



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

2012

MATRIC

Q&A

YOUR ESSENTIAL
EXEMPLARS & MEMORANDA

English FAL
Mathematics
Mathematical Literacy
Accounting
Physical Sciences
Life Sciences
Geography



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What can I do after I finish Matric?

There are different options for you, depending on your future plans and the quality of your Matric results.

1. If you have the required marks and a way of paying for it, you can become a full-time student. If you have the marks, but are battling to find the money, you may need to study part time and get a job to help pay for your studies.
2. Some young people do not get the marks they need to qualify for tertiary education. If this happens to you, do not be downhearted; this does not have to be the end of the road. You can apply to have your papers remarked or rechecked or you can apply to write a supplementary exam and improve your grades.
3. Some young people find that taking a gap year helps them to decide what they want to do with their lives. For example, you might be able to find a job in an industry that you are interested in, which will give you an opportunity to find out more about this type of work. Some people use a gap year to volunteer. Remember, whatever work experience you get will look good on your CV when you are looking for work later.



Study Tips

Show me the money

Tertiary education is expensive, but don't let that prevent you from following your dreams. Bursaries, scholarships and loans can all help make education more accessible.

What is a bursary?

A bursary is financial assistance that is given to a student to study further after school. They are usually for specific fields of study – such as information technology or engineering. Some bursaries will cover all your expenses, others will cover only certain elements. Many require the recipient to “pay back” the bursary by working for the company after they have qualified. Most bursaries require students to pass each year of study – if you do not qualify for the next year of study, you will lose the bursary and have to repay it.

What is a scholarship?

Scholarships are awarded to students with outstanding academic results. The usual minimum academic requirement is five or six As in matric. Recipients usually do not have to repay scholarships nor do they have employment conditions attached.

What is a loan?

The National Student Financial Aid Scheme (NSFAS) is a government loan scheme, which can be partly converted to a bursary if your academic performance warrants it. Most of the banks also offer student loans. All loans will have to be repaid once you are no longer a full-time student.

www.nsfas.org.za



Manage your time

1. Before you start trying to manage your time better, you need to realise that it is not time you need to manage but yourself. There are only 24 hours in every day, so you need to find ways to plan when and how you complete your various tasks.
2. We often become overwhelmed with everything we have to do because we are wasting time. Go through everything you do each day and find places where you are not using your time productively. But remember that taking a break from studying is not wasting time. You need to take a break every half hour or so.
3. Prioritise ruthlessly. Begin each day with a time-management session where you list everything you need to do in order of importance. Spending two hours colour-coordinating your summer wardrobe and then finding out at the end of the day that you still have a whole chapter of Maths to review does not make any sense.
4. Try to get into a routine and stick to it as much as you can. You will find crises much easier to manage if you have a routine to follow.
5. Set a time limit on each of the things you have to do. If you have set aside two hours for Maths revision, stick to it! The same goes for your 15-minute breaks!



Study for exams

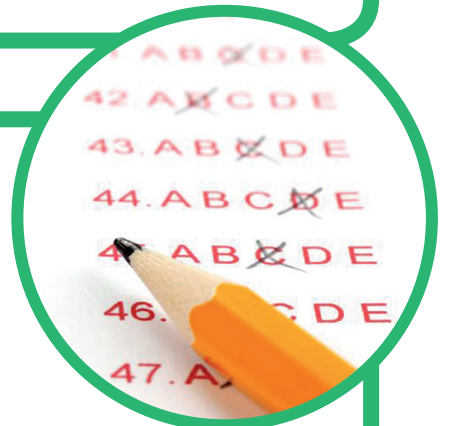
1. **Read.** That does not mean a quick glance over the page – you need to read with care and understanding. While you read, make notes, using bullet lists, mind maps and other techniques.
2. **Review.** Take your notes and review them, you can use your textbook too to make sure you understand all the concepts.
3. **Revise.** Find someone you can study with and revise your work together. You can teach each other different sections – teaching something is often the best way to learn it.
4. **Relax.** On the night before an exam, take a break and spend only about an hour reviewing the key concepts.



Plan for success

Before you even pick up your pen to begin writing, you need to prepare yourself.

1. Use the first 10 minutes of the exam to read through the whole paper and then divide your time into answering every section of the exam. Establish your own cut-off time for each section.
2. Be very strict about the time you have for each question and move onto the next one if you run out of time.
3. When you get to the end of the exam, go back to the beginning and complete the sections you left unfinished.





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E-mail: patti.mcdonald@avusa.co.za or nozi.canca@avusa.co.za

Message of support to the Class of 2012 from Education Minister Angie Motshekga

With just a few weeks left before the start of the 2012 National Senior Certificate (NSC) examinations, I would like to take this opportunity to wish our Class of 2012 well as they prepare to sit for the most important examinations of their whole schooling lives. The NSC is the culmination of 12 full years of learning, which, if successfully completed, will open up many great career opportunities.

The Department has partnered with UNICEF, Avusa Media and other stakeholders to supply Grade 12 learners, particularly in the under-performing provinces, with highly user-friendly learning materials through radio and television programmes and newspaper supplements. We do this to assist with revision, and as top-up for the curriculum covered in the classroom throughout the year. I am confident that these supplements will be highly useful and that, coupled with hard work, the Class of 2012 will be ready and fully prepared to achieve outstanding results. Good Luck.

Message of support to the Class of 2012 from the Director-General: Basic Education, Mr PB Soobrayan

I extend my best wishes to all Grade 12 learners and their teachers as they prepare for their final National Senior Certificate (NSC) examinations over the next two months.

I would like to remind all Grade 12 learners and their teachers that there are only a few weeks left before the start of the examinations in October. This is a crucial and challenging time for you. The results you achieve in your examinations will determine your choice of career and your future.

The Department is preparing extensive support materials that will assist learners and their teachers in revising for the examinations. Through our partnership with Avusa Media, Mindset, UNICEF and other stakeholders, we will be supporting learners as they prepare to write their final examinations. We will distribute learning materials through local newspapers and broadcast support programmes on specific topics on radio stations and television channels on a weekly basis. We believe the learning materials will help you with revision and assist you with the final preparations for your examinations. We want to ensure that all Grade 12s are sufficiently prepared and have covered all areas of the curriculum in the main subjects.

Grade 12s and their teachers are requested to look out for these important support materials in local newspapers and on radio and television. They will also be able to access radio and television programme schedules and copies of the support materials on the national department's website www.education.gov.za and provincial education departments' websites. If there are any problems accessing any materials, call the department's call centre on 0800 202 933.

To all Matriculants, I want to wish you well with your examinations. I hope that you will work hard and do your best. You are always in my thoughts as you and your teachers prepare for your examinations over the next few weeks.

ENGLISH PAPER 1 QUESTIONS

Section A: Comprehension

Question 1

Read the passage below and answer the set questions.

Brain for business

Lezerine Mashaba might be young but she's got a business mind that far exceeds her age. Now she's being recognised for her smart ideas and savvy workstyle.

1. In Sepedi it's said that if a mother loses one of her twins, she cannot cry as it might result in the loss of her other child. Lezerine Mashaba believes that she's become the person she is today because her mother stayed so strong when <u>Lezerine's twin sister passed away</u> . It's no surprise then that the first person Lezerine called when she was awarded the Black Business Quarterly (BBQ) Award last month was her mom. But how did the 22-year-old come to win this <u>coveted</u> award at such a young age?	5
2. After Grade 12 Lezerine couldn't afford to carry on with her studies. She decided to join loveLife, first as an <u>mpintshi</u> and later becoming a groundbreaker (gB). When her time as a gB came to an end, the young lady – <u>with more energy than even the Energizer Bunny</u> – started looking for something new to occupy her time. That's when she discovered the Manyeleti Youth Academy – an institution sponsored by the Department of Safety, Security and Liaison in Limpopo, which recruited young people eager to learn about Fire Fighting, Hospitality and Catering, and Business Management.	10
3. "One day <u>I'm</u> going to have my own business. I'm going to be my own boss and create employment." That's what Lezerine kept thinking to herself during her time at the institution and now, well, she's doing just that.	15
4. As part of the Business Management course, students were given two weeks to research and complete a <u>viable</u> business proposal. With R15 000 prize money to start up your own business, Lezerine was <u>supercharged</u> to go all the way. "This was my chance to help my community at Jane Furse in Polokwane. In my area there are young people in need of Internet services ... When you search the job market, look for bursaries <u>etc</u> you need Internet access for that sort of thing," she explains.	20
5. So Lezerine presented her proposal to the panel, and won! She could now turn her <u>vision</u> into something tangible by putting the money towards her first business, Napshadi Real Trading – a small business offering printing, designing, photocopying, laminating, and faxing services.	25
6. But this always-on-the-go young lady <u>doesn't</u> just run her own business. Since July 2008, she has been interning as the South African Institute for Entrepreneurship (SAIE), where she has been designing material and assisting with tourism training.	
7. Lezerine's achievements haven't gone unnoticed. In 2008, she was named one of the Mail&Guardian's Top 200 Achievers. In March this year, she scooped the BBQ award in the Government category. "With the recognition I was getting, I came to realise how huge this was. I need to work hard and not disappoint all the people who've had faith in me," says a still shell-shocked Lezerine about her recent win.	30

[Adapted from: Uncut April 2008]

Questions

- Describe the background from which Lezerine Mashaba comes. Make TWO points. Use your own words. (2)
 - 2.1 What two things did Lezerine do after she matriculated? (1)
 - 2.2 Why did Lezerine not continue her studies after matric? (1)
 - 3.1 Whom did Lezerine phone first when she heard that she had won the Black Business Quarterly Award? (1)
 - 3.2 Why do you think she phoned this person? Use the information from the passage, but use your own words. (1)
 4. What was Lezerine's dream while she was at the Youth Academy? (2)
 5. State whether the following statement is TRUE or FALSE, and give a reason for your answer. Lezerine believed that young people needed Internet access because they needed to search for jobs. (2)
 6. How many awards has Lezerine won so far? (2)
 7. Refer to paragraph 4, where Lezerine says, "This was my chance to help my community at Jane Furse in Polokwane." What do Lezerine's words reveal about her character? (2)
 8. Refer to the subheadline. Give THREE reasons why Lezerine is referred to as "smart" and "savvy". (3)
 9. Comment on the effectiveness of the title of the article (Brain for business). (2)
 10. This article first appeared in *Uncut*, a youth magazine published by *Sunday Times*. Is this an appropriate article for such a publication? Give two reasons for your answer. (2)
 11. Has this article taught you any important lessons about life? Explain. (3)
- [24]**

Question 2

Read the passage below and answer the set questions.

"Because I'm worth it"

Zoliwe Cutalele (20) used to worry about being accepted by the cool crew, but then she made her move to accept herself for who she really is.

1. Sometimes your voice seems to fade away because you don't really know your worth. I began to learn my worth when I went on a journey of self-discovery. I'm not talking about going on a retreat to the bush. Self-discovery can be as simple as spending time alone and finding out what you love about yourself.	5
2. At thirteen years old, I started becoming withdrawn because I wasn't part of the outgoing, hot group of girls. This left me feeling insignificant. The majority of my thoughts and opinions weren't heard or regarded; not unless I was part of 'their' picture. Not being recognised as part of the 'cool crew' took its toll – I became rebellious by back-chatting teachers and bunking classes.	10
3. If I could give advice based on my experience, I'd say, "Look in the mirror and see a person worthy of your respect and admiration. The capable person looking back at you should be someone you enjoy spending time with and would like to get to know better. Why? Because you're worth it!"	

[Adapted from: Uncut June/July 2009]

Questions

- Choose the BEST answer from the list below, considering the context of the passage. Write ONLY the number of the question and the letter of the answer.
A retreat to the bush is ...
A. an escape from the pressure and stress of work
B. an experience at a voice clinic so that you learn how to stop your voice from fading away
C. time spent by oneself in a peaceful setting
D. a holiday in a game reserve (1)
- Choose the BEST answer from the list below, considering the context of the passage. Write ONLY the number of the question and the letter of the answer.
In paragraph 2, "hot" means ...
A. sizzling
B. overheated
C. passionate
D. popular (1)
- Refer to paragraph 2. Pick out ONE WORD that tells you that the writer stopped trying to socialise with the other girls. (1)
- In your own words, sum up the writer's advice in paragraph 3. (3)

[6]
Total Section A: 30

Section B: Summary

Question 3

Your teacher has asked you to deliver a short talk to your classmates during the English oral period on how to manage your money.

Read the article below and summarise the MAIN POINTS for inclusion in your article.

Instructions

- List SEVEN points in full sentences using approximately 60 words.
 - Number your sentences from 1 to 7.
 - Write only ONE point per line.
 - Use your OWN words as far as possible.
 - Indicate the total number of words you have used in brackets at the end of your summary.
- NOTE: Marks will be deducted if you ignore these instructions.

How to manage your money

We all know it's important to save for a rainy day. And with the current economic crisis – characterised by job losses, interest rate inflation and rising food prices – saving for the future has become more important than ever before.

But saving isn't just about putting money aside for tough times and emergencies. It's also about peace of mind and becoming more self-reliant. According to South African Savings Institute CEO, Elizabeth Lwanga-Nanzir, a person who saves is less likely to rely on credit or government grants. We've all been tempted to spend money we don't have, but have you ever had that feeling of achievement when you've scraped together enough cash to buy your dream car or latest CD?

So how exactly does one go about saving? Start by identifying your "needs" and "wants", explains Lwanga-Nanzir. Write down your "needs" – the things you need to survive, like food, shelter and certain items of clothing. Then distinguish these from your "wants" – things like that hot pair of jeans or a night on the town. Once you've made a list of what you need to live versus those less important purchases, you'll be better prepared to stick to a budget and prioritise your spending. Put aside a fixed percentage of your earnings every month – whatever you think you can afford but it must be the same amount every month. You can't change your mind because you've suddenly seen a new iPod! Put this fixed amount into a savings account and leave it there. Don't touch!

Finally, don't borrow from your friends. Don't make them feel guilty and put pressure on them to help you out. All you'll end up with is loads of debt – and no friends!

[Adapted from Uncut June/July 2009]

Total Section B: 10

Section C: Language

Question 4: Visual Literacy

4.1 Analysing a cartoon

Read the cartoon below published in *The Star Moring* Thursday February 22 2007, and answer the set questions.



Questions

- 4.1.1 Refer to FRAME 1 of the cartoon.
What is the mechanic doing? (2)
- 4.1.2 What does the driver's face tell you about his mood? (1)
- 4.1.3 Refer to FRAME 2 of the cartoon.
Complete the sentence below by choosing the correct answer from the list provided.
Write down only the question number and the letter corresponding to the correct answer.
The tone of the driver's remark in FRAME 2 is ...
A. doubtful
B. uncertain
C. critical
D. angry (1)
- 4.1.4 State whether the statement below is TRUE or FALSE, and give a reason for your answer.
The driver is implying that the garage charges reasonable prices. (2)

4.2 Analysing an advertisement

Study the advertisement below published in *The Star*, Wednesday June 24 2009, and answer the set questions.

SALE! RARE OPPORTUNITY
A MASSIVE 50% DISCOUNT OFFER AVAILABLE

Subscribe to our papers and pay half price:

The Star	From just R162,50
The Saturday Star	From just R42,25
The Sunday Independent	From just R81,25

Above offers are for a 3-month home delivery PLUS you get to choose a FREE magazine of your choice for the duration of your initial subscription.

CALL TODAY ON 0860 32 62 62 or e-mail: subscribe@inl.co.za

Questions

- 4.2
- 4.2.1 Name the products being advertised. (2)
- 4.2.2 How has the advertiser drawn the reader's attention to the advert? (2)
- 4.2.3 State any THREE offers that the advertiser makes to persuade the reader to subscribe to the newspapers. (3)
- 4.2.4 Why does the advertiser include a picture of the three magazines? (2)
- [15]**

Question 5: Language and editing skills

Read the article below carefully and answer the questions that follow.

Too much homework		
1. At an education conference recently, children all complained, "We are given too much homework!" The parents stated, the previous week, their children had been asked to complete five pieces of homework a day.		1
2. Education experts agree. In a recent study published in the United Kingdom, academic Alfie Kohn said, "Too much study after school turns children off education and sparks family rows." In his book, <i>The Homework Myth</i> , Kohn claimed, "Homework does not help children score good marks in tests."		5
3. According to the National Department of Education's curriculum committee, schools should have a policy of homework drawn up in consultation with parents – but this varies from one school to another.		10
4. Kohn praises those schools that limit the amount of homework given to children. Parents must challenge school policy if they think the school is allowing the children to be pressurised by having too much homework.		
5. Kohn disagreed with those teachers who argue that homework teaches good world habits and develops positive qualities in a child's character. "The idea that homework develops self-discipline and independence is a myth," Kohn argues.		15

[Adapted from Saturday Star March 3 2007]

Questions

- 5.1 Refer to lines 1-2.
Rewrite the sentence below in indirect (reported) speech:
The children all complained, "We are given too much homework!"
Begin your sentence with: The children all complained that ... (2)
- 5.2 Refer to lines 2-3.
Rewrite the sentence below in direct speech:
The parents stated that, the previous week, their children had been asked to complete five pieces of homework a day. (2)
- 5.3 Refer to paragraph 2.
Why are the words *The Homework Myth* written in italics? (1)
- 5.4 Combine the following sentences into a single sentence, beginning with the given words:
Too much study after school turns children off education.
Too much study sparks family rows.
Begin with: Not only ... (2)

ENGLISH

**PAPER 1
QUESTIONS**

- 5.5 Replace the underlined word in the following sentence with a suitable synonym (word similar in meaning). Write only the question number and the answer.
Too much study sparks family rows. (1)
- 5.6 Refer to paragraph 2.
Complete the sentences below by choosing the correct answer from the list provided.
Write down only the question number and the letter corresponding to the correct answer.
The inverted commas in "Homework does not help children score good marks in tests." are used to indicate that the words are ...
A. being emphasised
B. in direct speech
C. in indirect speech
D. none of the above-mentioned (1)
- 5.7 Refer to paragraph 3.
The apostrophe in Department of Education's curriculum committee' is used to show ...
A. possession
B. the plural form
C. contraction
D. None of the above-mentioned (1)
- 5.8 Complete the sentences below by choosing the correct prepositions from the list below.
Write only the question numbers and the answers.
for on of in
- 5.8.1 Kohn congratulated schools ... limiting the amount of homework. (1)
- 5.8.2 Kohn was full ... praise for those parents who challenge school policy. (1)
- 5.9 Rewrite the sentence below in the past tense:
Homework teaches good world habits and develops positive qualities in a child's character. (2)
- 5.10 Find a word in paragraph 5 which means the same as 'story'. (1)
- [15]**

Question 6: Vocabulary and language skills

Read the passage below and answer the set questions.

Actors breed fashion brands		
The man in the ad for the latest Hugo Boss fragrance is not your usual model. There is something familiar about him. He is neither a world-famous star nor an anonymous hunk. Then the penny drops: it's the up-and-coming actor Jonathan Rhys Meyers. He doesn't voice his approval of the product and he can't even be seen to be wearing it. But he is there, with a two-year contract to be a "face".		1
"Just ten years ago, there were virtually no adverts for male creams, perfumes, deodorants and soaps." But now, there is so much interest in the male market that advertisers are facing the same challenge that women's brands have faced for years.		5

[Adapted from Saturday Star March 3 2007]

Questions

- 6.1 Write out the word 'doesn't' (line 4) in full. (1)
- 6.2 Give the correct form of the word in brackets. Write down only the question number and the answer.
Jonathan Rhys Meyers is not yet (fame). (1)
- 6.3 Replace the underlined words with a SINGLE WORD. Write down only the question number and the answer.
6.3.1 This model is not the usual. (1)
- 6.3.2 "Just ten years ago, there were virtually no adverts for creams, perfumes, deodorants and soaps for men." (1)
- 6.4 Give the correct form of the word in brackets. Write down only the question number and the answer.
The male market is now (challenging) than the female market. (1)
- [5]**

Question 7: Dictionary and language skills

The word product has been used in the passage above.

Study the dictionary entries linked to this word and then answer the questions that follow.

product (n) something that a company makes
production (n) the process of manufacturing or growing something in large quantities
productive (adj) good or useful
productively (adv) well or usefully
productivity (n) the rate at which goods are produced
produce (v) cause to happen; make or create; show or explain
producer (n) the person whose job is organising plays, films, programmes or records.

[Adapted from Collins COBUILD Essential English Dictionary]

Choose the most suitable word from the dictionary entries above to complete each of the following sentences. Write down only the question number and the word you have chosen.

- 7.1 Our teacher has organised for us to go to a ... of the play we are studying. (1)
- 7.2 The learner said he had done his homework, but he could not ... it when he was asked for it! (1)
- 7.3 The ... of the record has agreed to sign a contract with the artist. (1)
- 7.4 We have had a good lesson which has been most ... because we have completed our Maths assignment. (1)
- 7.5 The workers' ... is down because they are angry at their low wages. (1)

**Total Section C: 40
Grand Total: 80**

ENGLISH PAPER 1 MEMORANDUM

Section A: Comprehension

Question 1

1. Lezerine comes from a poor ✓, rural background ✓, but she has a loving and supportive mother ✓. (Any 2 points) (2)
2. (1)
- 2.1 Lezerine joined loveLife and then enrolled at a Youth Academy. (2)
- 2.2 She did not have the money to pay for further study. (1)
3. (1)
- 3.1 Lezerine phoned her mother. (1)
- 3.2 She admires and loves her mother and wanted to share the news with her first – or similar answer. (1)
4. Lezerine wanted to own her own business and create employment for other people. (2)
5. True ✓. The passage says "search the job market" ✓ and this means to look for a job. (2)
6. In 2008, Lezerine was named one of the Mail&Guardian's Top 200 Achievers. ✓
In March this year, she won the Black Business Quarterly (BBQ) Award (½ m) in the Government category (½ m). (2)
7. The learner must make TWO intelligent points. Example: She is not selfish and wants to empower other young people. (2)
8. The learner's answer must show that he/she understands smart and savvy and explain why she is called this.
smart = clever
savvy = knowledgeable
THREE REASONS, 1 mark each, e.g., she has achieved well at a youth academy, she has her own business, she takes on new projects, she has entrepreneurial insight. (3)
9. The title emphasises both Lezerine's intellect/intelligence ✓ (Brain) and her business acumen ✓ (business). The title also uses alliteration. ✓ (Any 2 points) (2)
10. Marks for the reasons given. The learner must make TWO intelligent points, e.g., The article is intended to inspire young people so will reach the target audience because Uncut is directed at the youth. The article fits into the government's propaganda about 'role models' and so fulfils the requirements of the DoE. (2)
11. Marks for the reasons given. The learners can say they have, indeed, been inspired by her, or they can say 'so what?' – just because she has been successful does not mean everyone will be. (3)

[24]

Question 2

1. C
2. D
3. Withdrawn
4. The learner must explain the following in his/her OWN words:
"Look in the mirror and see a person worthy of your respect and admiration. The capable person looking back at you should be someone you enjoy spending time with and would like to get to know better. Why? Because you're worth it!"
Suggestion:
The writer advises the readers to look carefully at themselves and believe that they are people whom other people can think a lot of. They must love themselves and be comfortable with themselves. They must believe that they are valuable.
The learners should see the three main points. (3)

Section B: Summary

Question 3

The following points form the answer to the question.

Quotation	Look for these core ideas – own words
We all know it's important to save for a rainy day. And with the current economic crisis – characterised by job losses, interest rate inflation and rising food prices – saving for the future has become more important than ever before. But saving isn't just about putting money aside for tough times and emergencies.	Put aside money for emergencies and difficult times so that you save money for the future.
It's also about peace of mind and becoming more self-reliant.	Do not rely on credit or government grants.
Start by identifying your "needs" and "wants", explains Lwanga-Nanzir.	Identify needs and wants.
Once you've made a list of what you need to live versus those less important purchases, you'll be better prepared to stick to a budget	Establish and stick to a budget.
and prioritise your spending.	Decide on what to buy according to their importance or urgency.
Put aside a fixed percentage of your earnings every month – whatever you think you can afford but it must be the same amount every month.	Save a fixed percentage of your income every month.
Finally, don't borrow from your friends.	Do not borrow from your friends.

[60 words]

Section C: Language

Question 4: Visual literacy

4.1 Analysing a cartoon

- 4.1.1 The mechanic is looking into the engine ✓ to see what might be making the noise ✓ the driver has complained about. (2)
- 4.1.2 The driver is upset and depressed (the mouth is turned down). (1)
- 4.1.3 The tone of the driver's remark in FRAME 2 is ...
D Angry (1)
- 4.1.4 False ✓ He says that the noise is not 'funny' i.e. amusing because – he implies – the prices are not 'funny'. It is not 'funny' (amusing) to find out what is causing the 'funny' (odd, peculiar) noise because of the high price to do so. Any point reasonably made that shows the learner understands the pun on funny or that the price is high. ✓ (2)

4.2 Analysing an advertisement

- 4.2.1 The products are The Star, The Saturday Star and The Sunday Independent. (2)
- 4.2.2 The word SALE ✓ which is large ✓ and has an exclamation mark ✓. (Any 2 points) (2)
- 4.2.3 The newspaper will be delivered to the person's home.
The reader will pay half the usual price.
The reader is allowed to choose a free magazine for the time of the subscription (3 months) (3)
- 4.2.4 The advertiser hopes to make the offer of a free magazine more inviting by showing the reader which magazines are meant. (2)

[15]

Question 5: Language and editing skills

- 5.1 The children all complained that they were given too much homework. (2)
- 5.2 The parents stated, "Last week (½), our (½) children were (½) asked to complete five pieces of homework a day." ½ (opening and closing inverted commas, capital letter and full stop) (2)
- 5.3 *The Homework Myth* is the title of a book. (1)
- 5.4 Not only does too much study after school turn children off education, but it also sparks family rows. (2)
- 5.5 rows = arguments, fights, quarrels. (1)
- 5.6 B In direct speech. (1)
- 5.7 A Possession. (1)
- 5.8 (1)
- 5.8.1 Kohn congratulated schools on limiting the amount of homework. (1)
- 5.8.2 Kohn was full of praise for those parents who challenge school policy. (1)
- 5.9 Homework taught good world habits and developed positive qualities in a child's character. (2)
- 5.10 Myth (1)

[15]

Question 6: Vocabulary and language skills

Questions

- 6.1 Does not (1)
- 6.2 Jonathan Rhys Meyers is not yet famous. (1)
- 6.3 (1)
- 6.3.1 Unusual (1)
- 6.3.2 Toiletries (1)
- 6.4 The male market is now more challenging than the female market. (1)

[5]

Question 7: Dictionary and language skills

- 7.1 production (1)
- 7.2 produce (1)
- 7.3 producer (1)
- 7.4 productive (1)
- 7.5 productivity (1)

[5]

Total Section C: 40
Grand Total: 80

MATHEMATICS PAPER 1 QUESTIONS

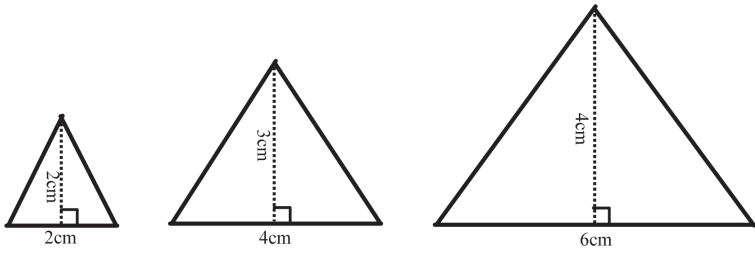
QUESTION 1

- 1.1 Solve for x rounded off to two decimal places where necessary:
 - 1.1.1 $\frac{x^2-1}{x+1} = 2$ (4)
 - 1.1.2 $8 - (x-2)(x-3) = 0$ (4)
- 1.2 Consider the inequality: $4x^2 < 9$
Determine the solution to this inequality if:
 - 1.2.1 $x \in \{\text{real numbers}\}$ (3)
 - 1.2.2 $x \in \{\text{integers}\}$ (1)
- 1.3 Solve for x and y:
 $3x - y = 2$ and $3y + 9x^2 = 4$ (7)

[19]

QUESTION 2

A sequence of isosceles triangles is drawn. The first triangle has a base of 2cm and height of 2cm. The second triangle has a base that is 2cm longer than the base of the first triangle. The height of the second triangle is 1cm longer than the height of the first triangle. This pattern of enlargement will continue with each triangle that follows.



- 2.1 Determine the area of the 100th triangle. (4)
 2.2 Which triangle will have an area of 240cm²? (3)
 [7]

QUESTION 3

- 3.1 Given: $\frac{1}{181} + \frac{2}{181} + \frac{3}{181} + \frac{4}{181} + \dots + \frac{180}{181}$ (4)
 3.1.1 Calculate the sum of the given series. (4)
 3.1.2 Hence calculate the sum of the following series: (4)
 $(\frac{1}{2}) + (\frac{1}{3} + \frac{2}{3}) + (\frac{1}{4} + \frac{2}{4} + \frac{3}{4}) + \dots + (\frac{1}{181} + \frac{2}{181} + \dots + \frac{180}{181})$
 3.2 In a geometric sequence in which all terms are positive, the sixth term is $\sqrt{3}$ and the eighth term is $\sqrt{27}$. Determine the first term and constant ratio. (5)
 3.3 Consider the series: $\sum_{n=1}^{\infty} 2(\frac{1}{2})^n$ (3)
 3.3.1 For which values of x will the series converge? (3)
 3.3.2 If $x = \frac{1}{2}$, calculate the sum to infinity of this series. (3)
 3.4 Malibongwe bought a franchise business on the 28th February 2009. He took out a loan to pay for the franchise which cost R2 000 000. On the 1st March 2009, he made a profit of R4. On the 2nd March, the profit made was R6. On the 3rd March, he made a profit of R9 and on the 4th March, a profit of R13,50. The profits made per day were deposited into a bank account. After how many days will he be able to pay off the R2 000 000 loan, using the amount saved in the bank account? (5)
 [24]

QUESTION 4

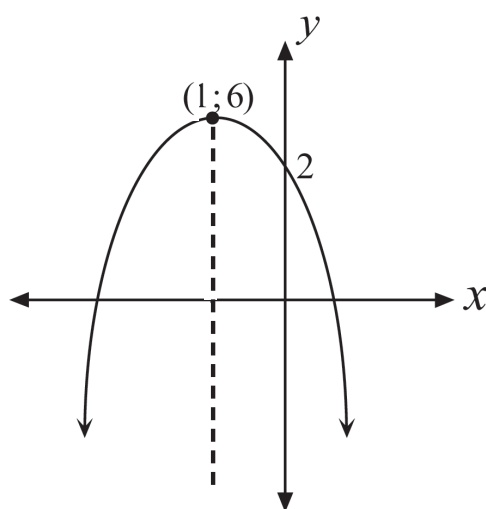
- 4.1 Given: $f(x) = \frac{2}{x+1}$ (2)
 4.1.1 Write down the equations of the asymptotes. (2)
 4.1.2 Sketch the graph of f indicating the coordinates of the y -intercept as well as the asymptotes. (6)
 4.1.3 Write down the equation of the graph formed if the graph of f is shifted 3 units right and 2 units upwards. (2)
 4.1.4 Determine graphically the values of x for which $\frac{2}{x+1} \geq 1$ (2)
 4.2 Consider the functions: $f(x) = 2x^2$ and $g(x) = (\frac{1}{2})^x$ (1)
 4.2.1 Restrict the domain of f in one specific way so that the inverse of f will also be a function. (1)
 4.2.2 Hence draw the graph of your new function f and its inverse function f^{-1} on the same set of axes. (2)
 4.2.3 Write the inverse of g in the form $g^{-1}(x) = \dots$ (2)
 4.2.4 Sketch the graph of g^{-1} (2)
 4.2.5 Determine graphically the values of x for which $\log_2 x < 0$ (1)
 [20]

QUESTION 5

- Consider: $f(x) = 2\cos x$
 5.1 Draw a sketch graph of $y = -2f(x)$ for $x \in [90^\circ; 360^\circ]$ (2)
 5.2 Write down the amplitude of $y = -2f(x)$. (1)
 5.3 Write down the period of $y = f(\frac{x}{2})$. (1)
 5.4 Write down the maximum value of the graph of $g(x) = f(x) - 2$ (1)
 [5]

QUESTION 6

Sketched below is the graph of $f(x) = a(x + p)^2 + q$.



- 6.1 Determine the equation of f in the form $f(x) = a(x + p)^2 + q$. (4)
 6.2 Write down the range of f . (1)
 6.3 If the graph of f is reflected about the x -axis to form the graph of g , write the equation of g in the form $g(x) = a(x + p)^2 + q$. (1)
 [6]

QUESTION 7

- 7.1 Patricia deposited a certain amount of money into a bank account paying 8% per annum compounded half-yearly. After four years, the money has a value of R100 000.
 7.1.1 Convert the nominal interest rate into the equivalent annual effective rate. (2)

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QUESTIONS

- 7.1.2 Hence, or otherwise, calculate the amount of money originally deposited into the bank account by Patricia. (2)
 7.2 A motor car which cost R200 000 depreciates at a rate of 8% per annum on the reducing balance method. Calculate how long it will take for the car to depreciate to a value of R90 000 under these conditions. (3)
 [7]

QUESTION 8

- Mpho takes out a retirement annuity that will supplement his pension when he retires in 30 years' time. He estimates that he will need R2 500 000 in this retirement fund at that stage. The interest rate he earns is 9% per annum compounded monthly.
 8.1 Calculate his monthly payment into this fund if he starts paying immediately and makes his final payment in 30 years' time. (5)
 8.2 The retirement fund does not pay out the R2 500 000 when Mpho retires. Instead he will be paid monthly amounts, for a period of 20 years, starting one month after his retirement. If the interest that he earns over this period is calculated at 7% per annum compounded monthly, determine the monthly payments he will receive. (5)
 [10]

QUESTION 9

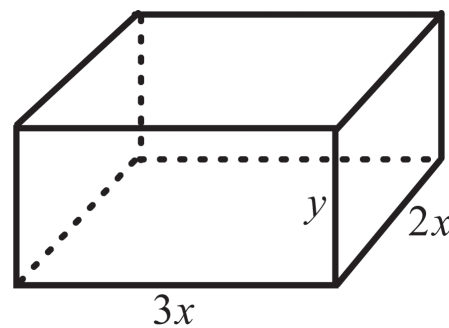
- 9.1 If $f(x) = -2x^2 + 1$, determine $f(x)$ from first principles. (5)
 9.2 Determine the following and leave your answer with positive exponents:
 $\frac{dy}{dx}$ if $y = (2\sqrt{x} - \frac{1}{3x})^2$ (4)
 [9]

QUESTION 10

- 10.1 The equation of the tangent to the curve of $f(x) = ax^3 + bx$ at $x = -1$ is $y - x - 4 = 0$. Calculate the value of a and b . (6)
 10.2 Given: $f(x) = 2x^3 - 6x - 4$ (5)
 10.2.1 Determine the coordinates of the points of intersection of f with the axes. (5)
 10.2.2 Determine the coordinates of the turning points of f . (4)
 10.2.3 Sketch the graph of f showing the intercepts with the axes and the turning points. (3)
 10.2.4 Determine the coordinates of the point of inflection on the graph of f . (3)
 10.2.5 Determine graphically the values of p for which the following equation will have one real solution: $2x^3 - 6x - 4 = p$ (2)
 [23]

QUESTION 11

The sides of the base of a rectangular cardboard box are $3x$ and $2x$ cm respectively. The height is y cm. The box is open on the top (without a lid).



- 11.1 If the total exterior surface area of the box is 200cm², prove that: (3)
 $y = \frac{20}{x} - \frac{3x}{5}$
 11.2 Express the volume of the box in terms of x . (2)
 11.3 Determine the value of x if its volume is to be a maximum. (3)
 [8]

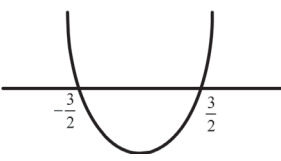
QUESTION 12

- In order to paint the walls of his home, Joseph will require at least 10 litres of purple paint. Purple paint is obtained by mixing quantities of red and blue paint. To obtain a suitable shade of purple paint, the volume of blue paint used must be at least half the volume of red paint used. The hardware store where Joseph intends buying the paint has only 8 litres of blue paint in stock. Let the number of litres of red paint be x and the number of litres of blue paint be y .
 12.1 Write down the inequalities in terms of x and y which represent the constraints of this situation. (3)
 12.2 On the attached diagram provided, represent the constraints graphically and clearly indicate the feasible region. (4)
 12.3 The cost of both red and blue paint is R40 per litre, but the paint is only sold in 2-litre tins. Determine the number of litres of red and blue paint which can be bought maintaining a minimum cost. Show all possible combinations. (5)
 [12]

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MEMORANDUM

QUESTION 1

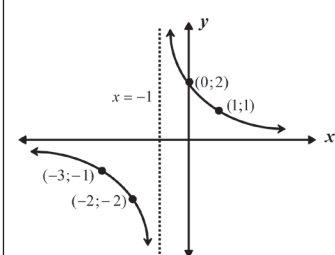
1.1.1	$\frac{x^2-1}{x+1} = 2$ $\therefore x^2 - 1 = 2(x + 1)$ $\therefore x^2 - 1 = 2x + 2$ $\therefore x^2 - 2x - 3 = 0$ $\therefore (x - 3)(x + 1) = 0$ $\therefore x = 3 \text{ or } x = -1$ <p>But $x \neq -1$</p> $\therefore x = 3 \text{ is the solution}$ <p>OR</p> $\frac{x^2-1}{x+1} = 2$ $\therefore \frac{(x+1)(x-1)}{(x+1)} = 2$ $\therefore x - 1 = 2 \text{ provided } x \neq -1$ $\therefore x = 3$	standard form = 0 factorisation both answers excluding $x = -1$ factorisation simplification correct answer excluding $x = -1$	(4)
1.1.2	$8 - (x - 2)(x - 3) = 0$ $\therefore 8 - (x^2 - 5x + 6) = 0$ $\therefore 8 - x^2 + 5x - 6 = 0$ $\therefore -x^2 + 5x + 2 = 0$ $\therefore x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-2)}}{2(1)}$ $\therefore x = 5 \pm \sqrt{\frac{33}{2}}$ $\therefore x = 5,37 \text{ or } x = -0,37$ <p>- 1 for inaccurate rounding off for both answers.</p>	simplification standard form substitution into formula correct answers	(4)
1.2.1	$4x^2 < 9$ $\therefore 4x^2 - 9 < 0$ $\therefore (2x + 3)(2x - 3) < 0$ $\therefore -\frac{3}{2} < x < \frac{3}{2}$ 	factorisation endpoints inequality notation	(3)
1.2.2	$x \in \{-1; 0; 1\}$	correct answer	(1)
1.3	$3x - y = 2$ $\therefore 3x - 2 = y$ $\therefore 3(3x - 2) + 9x^2 = 4$ $\therefore 9x - 6 + 9x^2 = 4$ $\therefore 9x^2 + 9x - 10 = 0$ $\therefore (3x + 5)(3x - 2) = 0$ $\therefore x = -\frac{5}{3} \text{ or } x = \frac{2}{3}$ $\therefore y = -7 \text{ or } y = 0$	$3x - 2 = y$ substitution standard form factorisation both x -values $y = -7$ $y = 0$	(7)

QUESTION 2

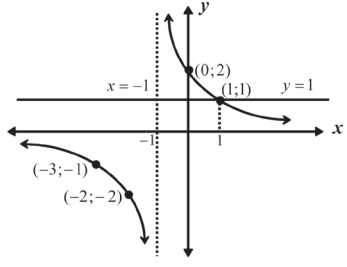
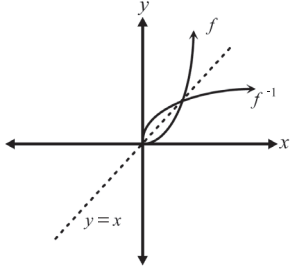
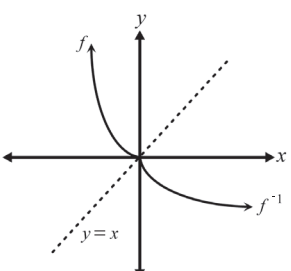
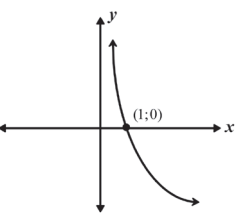
2.1	Area of triangle 1: $\frac{1}{2}(2 \text{ cm})(2 \text{ cm}) = (1)(2) \text{ cm}^2$ Area of triangle 2: $\frac{1}{2}(4 \text{ cm})(3 \text{ cm}) = (2)(3) \text{ cm}^2$ Area of triangle 3: $\frac{1}{2}(6 \text{ cm})(4 \text{ cm}) = (3)(4) \text{ cm}^2$ Area of triangle 4: $\frac{1}{2}(8 \text{ cm})(5 \text{ cm}) = (4)(5) \text{ cm}^2$ The areas form the following pattern: (1)(2); (2)(3); (3)(4); (4)(5); ... Area of triangle n : $(n)(n + 1) \text{ cm}^2$ Area of triangle 100: $(100)(100 + 1) \text{ cm}^2 = 10\,100 \text{ cm}^2$	determining areas establishing pattern obtaining general term area of 100 th triangle	(4)
	OR Area of triangle 1: $\frac{1}{2}(2 \text{ cm})(2 \text{ cm}) = 2 \text{ cm}^2$ Area of triangle 2: $\frac{1}{2}(4 \text{ cm})(3 \text{ cm}) = 6 \text{ cm}^2$ Area of triangle 3: $\frac{1}{2}(6 \text{ cm})(4 \text{ cm}) = 12 \text{ cm}^2$ Area of triangle 4: $\frac{1}{2}(8 \text{ cm})(5 \text{ cm}) = 20 \text{ cm}^2$ The bases are in arithmetic sequence: 2; 4; 6; 8; 10; ... General term is $2 + (n - 1)2 = 2n$ The heights are in arithmetic sequence: 2; 3; 4; 5; ... General term is $2 + (n - 1)(1) = n + 1$ Therefore, the general term for areas is: Area of triangle n : $\frac{1}{2}(2n)(n + 1) \text{ cm}^2$ $= n(n + 1) \text{ cm}^2$ Area of triangle 100: $(100)(100 + 1) \text{ cm}^2 = 10\,100 \text{ cm}^2$	determining areas general terms of arithmetic sequences obtaining area of n^{th} triangle area of 100 th triangle determining areas quadratic pattern obtaining general term area of 100 th triangle	

	The areas form a quadratic number pattern: 2; 6; 12; 20; ... $a + b + c$ 2 6 12 20 $3a + b$ 4 6 8 $2a$ 2 2	
	$2a = 2$ $a = 1$	$3a + b = 4$ $\therefore 3(1) + b = 4$ $\therefore b = 1$
	$a + b + c = 2$ $\therefore 1 + 1 + c = 2$ $\therefore c = 0$	
	Area of triangle n : $(n^2 + n) \text{ cm}^2$ Area of triangle 100: $[(100)^2 + 100] \text{ cm}^2 = 10\,100 \text{ cm}^2$	
2.2	$n(n + 1) = 240$ $\therefore n^2 + n - 240 = 0$ $\therefore (n + 16)(n - 15) = 0$ $\therefore n = -16 \text{ or } n = 15$ But $n \neq -16$ $\therefore n = 15$ The 15 th triangle will have an area of 240 cm^2	equating general term to 240 factorising obtaining 15 triangles (3)

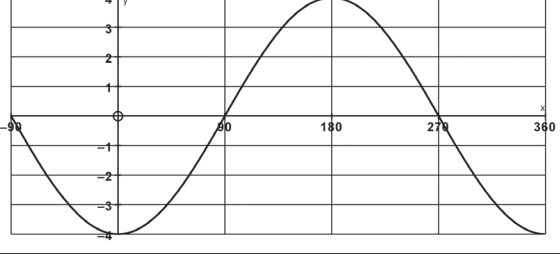
QUESTION 3

3.1.1	$\frac{1}{181} + \frac{2}{181} + \frac{3}{181} + \frac{4}{181} + \dots + \frac{180}{181}$ $a = \frac{1}{181} \quad d = \frac{1}{181} \quad n = 180$ $\therefore S_{180} = \frac{180}{2} \left(\frac{1}{181} + \frac{180}{181} \right) = 90[1] = 90$ <p>OR</p> $S_{180} = \frac{180}{2} \left[2 \left(\frac{1}{181} \right) + (179) \left(\frac{1}{181} \right) \right] = 90[1] = 90$	correct a and d correct n S_n formula correct answer	(4)
3.1.2	$\left(\frac{1}{2} \right) + \left(\frac{1}{3} + \frac{2}{3} \right) + \left(\frac{1}{4} + \frac{2}{4} + \frac{3}{4} \right) + \dots + \left(\frac{1}{181} + \frac{2}{181} + \dots + \frac{180}{181} \right)$ $= \frac{1}{2} + 1 + 1\frac{1}{2} + 2 + \dots + 90$ $a = \frac{1}{2} \quad d = \frac{1}{2} \quad T_n = 90$ $\therefore \frac{1}{2} + (n - 1)\frac{1}{2} = 90$ $\therefore 1 + n - 1 = 180$ $\therefore n = 180$ $\therefore S_{180} = \frac{180}{2} \left[\frac{1}{2} + 90 \right] = 90[90\frac{1}{2}] = 8\,145$ <p>OR</p> $S_{180} = \frac{180}{2} \left[2 \left(\frac{1}{2} \right) + (179) \left(\frac{1}{2} \right) \right] = 90[90\frac{1}{2}] = 8\,145$	simplifying fractions to get series $\frac{1}{2} + (n - 1)\frac{1}{2} = 90$ $n = 180$ substitution into S_n formula to get 8 145	(4)
3.2	$ar^5 = \sqrt{3}$ $ar^7 = \sqrt{27}$ $\therefore \frac{ar^7}{ar^5} = \frac{\sqrt{27}}{\sqrt{3}}$ $\therefore r^2 = \sqrt{\frac{27}{3}}$ $\therefore r^2 = \sqrt{9}$ $\therefore r^2 = 3$ $\therefore r = \sqrt{3} \text{ (terms are positive)}$ $\therefore a(\sqrt{3})^5 = \sqrt{3}$ $\therefore a = \frac{\sqrt{3}}{(\sqrt{3})^5}$ $\therefore a = \frac{1}{(\sqrt{3})^4}$ $\therefore a = \frac{1}{(3)^2}$ $\therefore a = \frac{1}{9}$	$ar^5 = \sqrt{3}; ar^7 = \sqrt{27}$ dividing $r = \sqrt{3}$ correct working with surds $a = \frac{1}{9}$	(5)
3.3.1	$\sum_{n=1}^{\infty} 2 \left(\frac{1}{2} x \right)^n$ $= 2 \left(\frac{1}{2} x \right)^1 + 2 \left(\frac{1}{2} x \right)^2 + 2 \left(\frac{1}{2} x \right)^3 + 2 \left(\frac{1}{2} x \right)^4 + \dots$ $= x + \frac{1}{2} x^2 + \frac{1}{4} x^3 + \frac{1}{8} x^4 + \dots$ <p>The series converges for:</p> $-1 < \frac{1}{2} x < 1$ $\therefore -2 < x < 2$	$r = \frac{1}{2} x$ $-1 < \frac{1}{2} x < 1$ $-2 < x < 2$	(3)
3.3.2	$a = \frac{1}{2} \quad r = \frac{1}{2} \left(\frac{1}{2} \right) = \frac{1}{4}$ $\therefore S_{\infty} = \frac{\frac{1}{2}}{1 - \frac{1}{4}} = \frac{2}{3}$	a and r S_{∞} formula $\frac{2}{3}$	(3)
3.4	$4 + 6 + 9 + 13,5 + \dots$ $a = 4 \quad r = \frac{3}{2} \quad S_n = 2\,000\,000$ $\therefore 2\,000\,000 = \frac{4 \left[\left(\frac{3}{2} \right)^n - 1 \right]}{\frac{3}{2} - 1}$ $\therefore 2\,000\,000 = 8 \left[\left(\frac{3}{2} \right)^n - 1 \right]$ $\therefore 250\,000 = \left(\frac{3}{2} \right)^n - 1$ $\therefore 250\,001 = \left(\frac{3}{2} \right)^n$ $\therefore \log_{\frac{3}{2}}(250\,001) = n$ $\therefore n = 30,654\,228,81$ Malibongwe will be able to pay off the R2 000 000 on the last day of March (31 days)	constant ratio correct substitution into the S_n formula use of logs $n = 30,654\,228,81$ 31 days	(5)
4.1.1	vertical: $x = -1$ horizontal: $y = 0$	vertical asymptote horizontal asymptote	(2)
4.1.2		$x = -1$ $y = 0$ left branch coordinates on left branch right branch coordinates on right branch	(6)
4.1.3	$y = \frac{2}{x+1} - 3 + 2$ $\therefore y = \frac{2}{x-2} + 2$	denominator: $x - 2$ $+2$	(2)

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4.1.4		$-1 < x$ $x \leq 1$	(2)
	Therefore $\frac{2}{x+1} \geq 1$ for $-1 < x \leq 1$		
4.2.1	$f(x) = 2x^2$ where $x \geq 0$ OR $f(x) = 2x^2$ where $x \leq 0$	$x \geq 0$ OR $x \leq 0$	(1)
4.2.2	 	f f^{-1}	(2)
4.2.3	$y = \left(\frac{1}{2}\right)^x$ $x = \left(\frac{1}{2}\right)^y$ $\therefore \log_{\frac{1}{2}} x = y$ $\therefore g^{-1}(x) = \log_{\frac{1}{2}} x$	$x = \left(\frac{1}{2}\right)^y$ $g^{-1}(x) = \log_{\frac{1}{2}} x$	(2)
4.2.4		shape (1; 0)	(2)
4.2.5	$\log_{\frac{1}{2}} x < 0$ for $x > 1$	$x > 1$	(1)

QUESTION 5

5.1	$y = -2f(x)$ $\therefore y = -2(2\cos x)$ $\therefore y = -4\cos x$		amplitude domain	(2)
5.2	Amplitude is 4		amplitude	(1)
5.3	$y = f\left(\frac{x}{2}\right)$ $\therefore y = 2\cos\left(\frac{x}{2}\right)$ period is $\frac{360^\circ}{\frac{1}{2}} = 720^\circ$		720°	(1)
5.4	$g(x) = f(x) - 2$ $g(x) = 2\cos x - 2$ maximum is 0		max	(1)

QUESTION 6

6.1	$y = a(x+p)^2 + q$ $\therefore y = a(x+1)^2 + 6$ Substitute (0; 2): $\therefore 2 = a(0+1)^2 + 6$ $\therefore 2 = a + 6$ $\therefore 2 - 6 = a$ $\therefore a = -4$ $\therefore f(x) = -4(x+1)^2 + 6$	$y = a(x+1)^2 + 6$ Substitute (0; 2) $a = -4$ $f(x) = -4(x+1)^2 + 6$	(4)	
6.2	Range: $y \in (-\infty; 6]$		$y \in (-\infty; 6]$	(1)
6.3	$y = -4(x+1)^2 + 6$ (f) $\therefore -y = -4(x+1)^2 + 6$ (g) $\therefore g(x) = 4(x+1)^2 - 6$		$g(x) = 4(x+1)^2 - 6$	(1)

QUESTION 7

7.1.1	$i_{eff} = \left(1 + \frac{0,08}{2}\right)^2 - 1$ $\therefore i_{eff} = 0,0816$	formula 0,0816	(2)
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7.1.2	$P = 100\,000(1,0816)^{-4}$ $\therefore P = R73\,069,02$ OR $P = 100\,000\left(1 + \frac{0,08}{2}\right)^{-8}$ $\therefore P = R73\,069,02$	formula answer	(2)
7.2	$90\,000 = 200\,000(1 - 0,08)^n$ $\therefore \frac{9}{20} = 0,92^n$ $\therefore \log_{0,92}\left(\frac{9}{20}\right) = n$ $\therefore n = 9,576\,544\,593$ 9 years and 7 months	correct substitution into formula use of logs answer	(3)

QUESTION 8

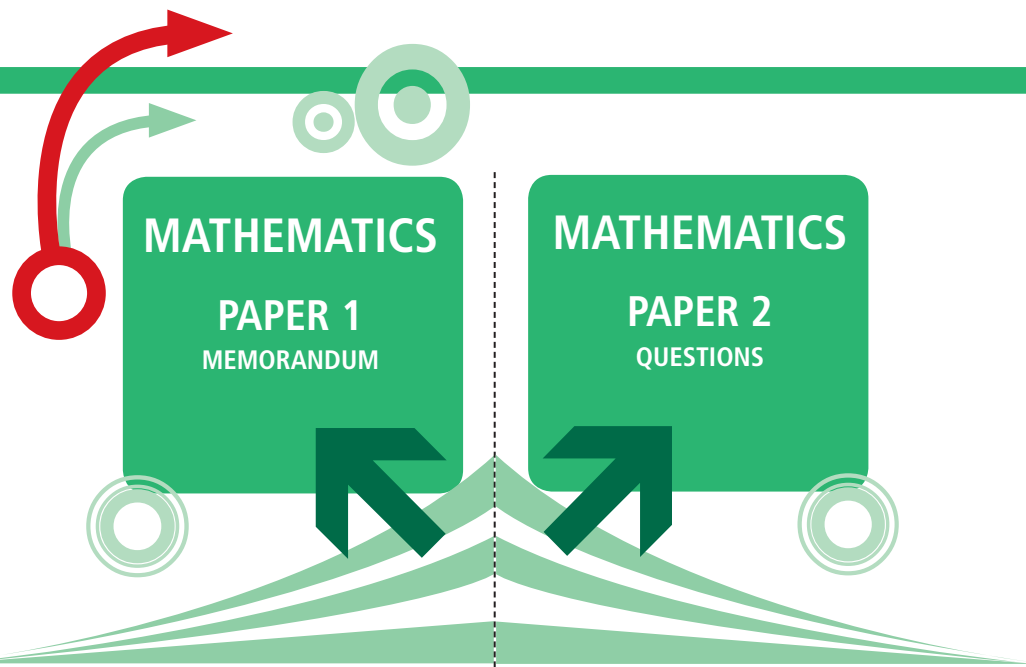
8.1	$2\,500\,000 = \frac{x(1,0075)^{361} - 1}{0,0075}$ $\therefore 2\,500\,000 \times \frac{0,0075}{[(1,0075)^{361} - 1]} = x$ $\therefore x = R1\,354,67$	correct formula $n = 361$ $\frac{0,09}{12} = 0,0075$ $F = 2\,500\,000$ answer	(5)
8.2	$2\,500\,000 = x\left[1 - \left(1 + \frac{0,07}{12}\right)^{-240}\right]$ $\therefore \frac{2\,500\,000 \times \left(\frac{0,07}{12}\right)}{\left[1 - \left(1 + \frac{0,07}{12}\right)^{-240}\right]} = x$ $\therefore x = R19\,382,47$	correct formula $n = 240$ $\frac{0,07}{12}$ $P = 2\,500\,000$ answer	(5)

QUESTION 9

9.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $\therefore f'(x) = \lim_{h \rightarrow 0} \frac{-2(x+h)^2 + 1 - (-2x^2 + 1)}{h}$ $\therefore f'(x) = \lim_{h \rightarrow 0} \frac{-2x^2 - 4xh - 2h^2 + 1 + 2x^2 - 1}{h}$ $\therefore f'(x) = \lim_{h \rightarrow 0} \frac{-2x^2 - 4xh - 2h^2 + 1 + 2x^2 - 1}{h}$ $\therefore f'(x) = \lim_{h \rightarrow 0} \frac{h(-4x - 2h)}{h}$ $\therefore f'(x) = \lim_{h \rightarrow 0} (-4x - 2h)$ $\therefore f'(x) = -4x - 2(0)$ $\therefore f'(x) = -4x$ - 1 for inaccurate notation	$-2(x+h)^2 + 1$ $-(-2x^2 + 1)$ $-2x^2 - 4xh - 2h^2$ $\frac{h(-4x - 2h)}{h}$ $-4x$	(5)
9.2	$y = \left(2\sqrt{x} - \frac{1}{3x}\right)^2$ $\therefore y = 4x - \frac{4\sqrt{x}}{3x} + \frac{1}{9x^2}$ $\therefore y = 4x - \frac{4x^{-\frac{1}{2}}}{3} + \frac{1}{9}x^{-2}$ $\therefore \frac{dy}{dx} = 4 - \frac{4}{3} \times -\frac{1}{2}x^{-\frac{3}{2}} + \frac{1}{9} \times -2x^{-3}$ - 1 for inaccurate notation $\therefore \frac{dy}{dx} = 4 + \frac{2}{3}x^{-\frac{3}{2}} - \frac{2}{9}x^{-3}$ $\therefore \frac{dy}{dx} = 4 + \frac{2}{3x^{\frac{3}{2}}} - \frac{2}{9x^3}$	$4x - \frac{4}{3}x^{-\frac{1}{2}} + \frac{1}{9}x^{-2}$ $4 + \frac{2}{3x^{\frac{3}{2}}} - \frac{2}{9x^3}$	(4)

QUESTION 10

10.1	$f(x) = ax^3 + bx$ $\therefore f'(x) = 3ax^2 + b$ $\therefore f'(-1) = 3a(-1)^2 + b$ $\therefore f'(-1) = 3a + b$ Now $y = x + 4$ $m_1 = 1$ $1 = 3a + b$ Now at $x = -1$ $y = -1 + 4 = 3$ \therefore Substitute (-1; 3) into the equation of f : $f(-1) = a(-1)^3 + b(-1)$ $\therefore 3 = -a - b$ $\therefore a + b = -3$ Solving simultaneously: $a = 2$ and $b = 5$	$f(x) = 3ax^2 + b$ $m_1 = 1$ $1 = 3a + b$ $a + b = -3$ $a = 2$ $b = -5$	(6)
10.2.1	y-intercept: (0; -4) x-intercepts: $0 = 2x^3 - 6x - 4$ $\therefore 0 = x^3 - 3x - 2$ $\therefore 0 = (x+1)(x^2 - x - 2)$ $\therefore 0 = (x+1)(x-2)(x+1)$ $\therefore x = -1$ or $x = 2$ (-1; 0) (2; 0)	\checkmark y-intercept $\checkmark 0 = 2x^3 - 6x - 4$ $\checkmark (x+1)(x^2 - x - 2) = 0$ $\checkmark (x+1)(x-2)(x+1)$ \checkmark x-intercepts	(5)
10.2.2	$f(x) = 2x^3 - 6x - 4$ $\therefore f'(x) = 6x^2 - 6$ $\therefore 0 = 6x^2 - 6$ $\therefore 0 = x^2 - 1$ $\therefore x = \pm 1$ $f(1) = -8$ $f(-1) = 0$ Turning points are (1; -8) and (-1; 0)	$\checkmark f'(x) = 6x^2 - 6$ $\checkmark 0 = 6x^2 - 6$ $\checkmark x = \pm 1$ $\checkmark (1; -8)$ and $(-1; 0)$	(4)



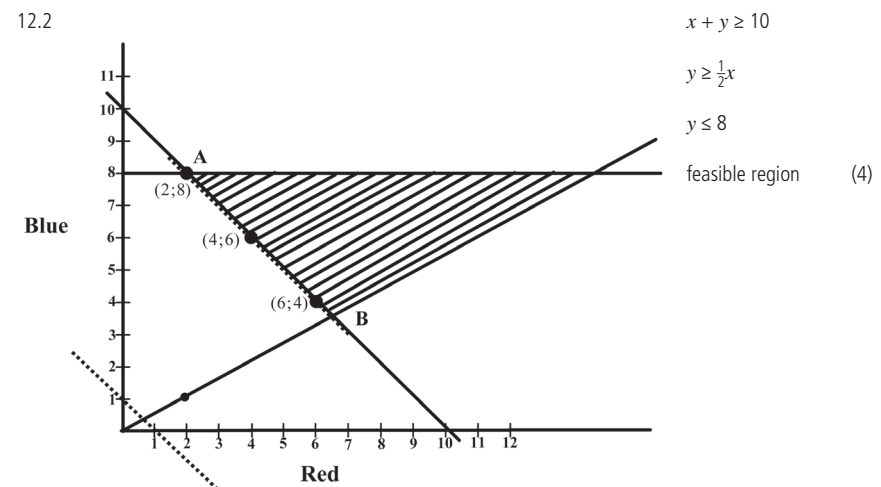
10.2.3		intercepts with the axes turning points shape (3)
10.2.4	$f(x) = 6x^2 - 6$ $\therefore f'(x) = 12x$ $\therefore 0 = 12x$ $\therefore x = 0$ $f(0) = -4$ Point of inflection at (0; -4)	$f''(x) = 12x$ $x = 0$ (0; -4) (3)
10.2.4	$p > 0$ or $p < -8$	$p > 0$ $p < -8$ (2)

QUESTION 11

11.1	$A = (2x)(3x) + 2(y)(3x) + 2(y)(2x)$ $\therefore 200 = 6x^2 + 6xy + 4xy$ $\therefore 200 = 6x^2 + 10xy$ $\therefore 100 = 3x^2 + 5xy$ $\therefore 100 - 3x^2 = 5xy$ $\therefore \frac{100 - 3x^2}{5x} = y$ $\therefore y = \frac{20 - 3x}{5}$	$6x^2 + 6xy + 4xy$ $200 =$ arriving at answer (3)
11.2	$V = (2x)(3x)(y)$ $\therefore V = (2x)(3x)(\frac{20 - 3x}{5})$ $\therefore V = (6x^2)(\frac{20 - 3x}{5})$ $\therefore V = 120x - \frac{18x^3}{5}$	$V = (2x)(3x)(y)$ $V = 120x - \frac{18x^3}{5}$ (2)
11.3	$V(x) = 120x - \frac{18x^3}{5}$ $\therefore V'(x) = 120 - \frac{18}{5} \times 3x^2$ $\therefore 0 = 120 - \frac{54}{5}x^2$ $\therefore 0 = 600 - 54x^2$ $\therefore 54x^2 = 600$ $\therefore x^2 = \frac{600}{54}$ $\therefore x^2 = \frac{100}{9}$ $\therefore x = \frac{10}{3}$	$V'(x)$ $V'(x) = 0$ $x = \frac{10}{3}$ (3)

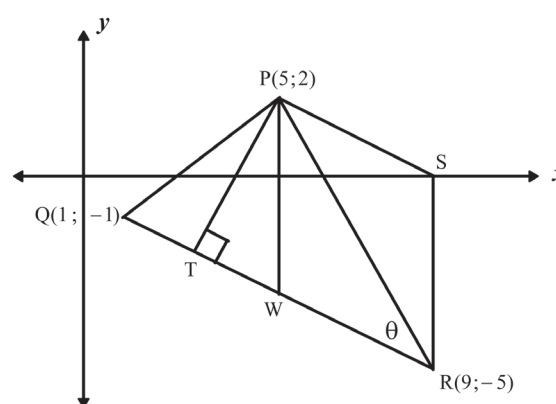
QUESTION 12

12.1	$x + y \geq 10$ $y \geq \frac{1}{2}x$ $y \leq 8$	$x + y \geq 10$ $y \geq \frac{1}{2}x$ $y \leq 8$ (3)
12.2	see diagram below	
12.3	$C = 40x + 40y$ $\therefore 40x + 40y = C$ $\therefore 40y = -40x + C$ $\therefore y = -x + \frac{C}{40}$	$C = 40x + 40y$ search line on diagram (2; 8) (4; 6) (6; 4) (5)



QUESTION 1

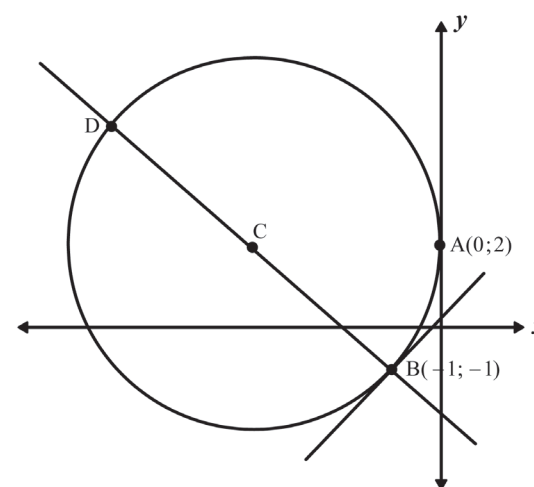
In the diagram, PQRS is a trapezium with vertices P(5;2), Q(1;-1), R(9;-5) and S. PT is the perpendicular height of PQRS and W is the midpoint of QR. Point S lies on the x-axis and $\angle PRQ = \theta$.



- 1.1 Determine the equation of PW if W is the midpoint of QR. (2)
- 1.2 Determine the equation of PS. (4)
- 1.3 Determine the equation of PT. (3)
- 1.4 Determine the coordinates of T. (5)
- 1.5 Show that $QT = \frac{1}{3}TR$. (5)
- 1.6 Calculate the size of θ rounded off to two decimal places. (5) [24]

QUESTION 2

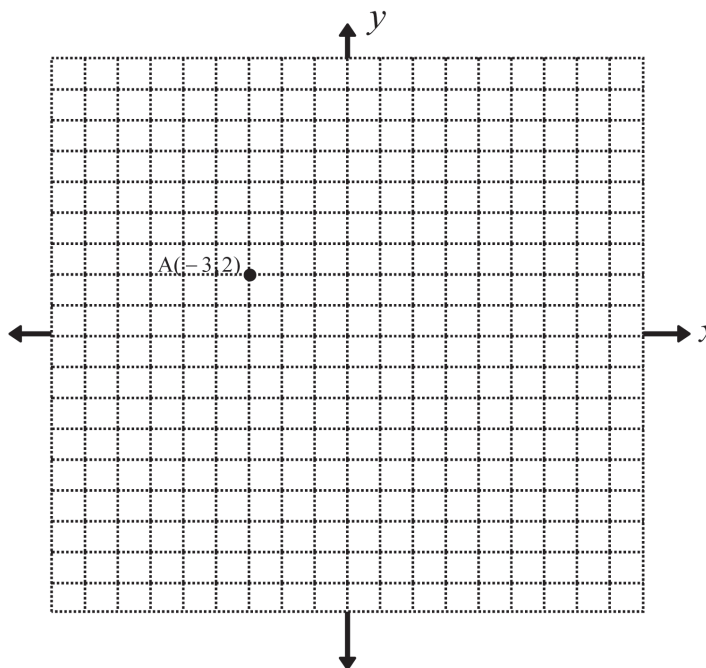
- 2.1 Calculate the value of k if the points A(6;5), B(3;2) and C(2k; k + 4) are collinear. (3)
- 2.2 A circle with equation $x^2 + y^2 - 4x + 6y + 4 = 0$ is rotated clockwise about the origin and then enlarged through the origin by a scale factor of 2 units. Determine the equation of the new circle formed under this transformation. (6)
- 2.3 In the diagram below, a circle centre C touches the y-axis at A(0;2). A straight line with equation $3x + 4y = 7$ cuts the circle at B(-1;-1) and D.



- 2.3.1 Determine the equation of the tangent to the circle at B. (4)
- 2.3.2 Determine the equation of the circle in the form $(x - a)^2 + (y - b)^2 = r^2$. (5)
- 2.3.3 Determine the coordinates of D. (4) [22]

QUESTION 3

In the diagram below, the point A(-3;2) is represented.



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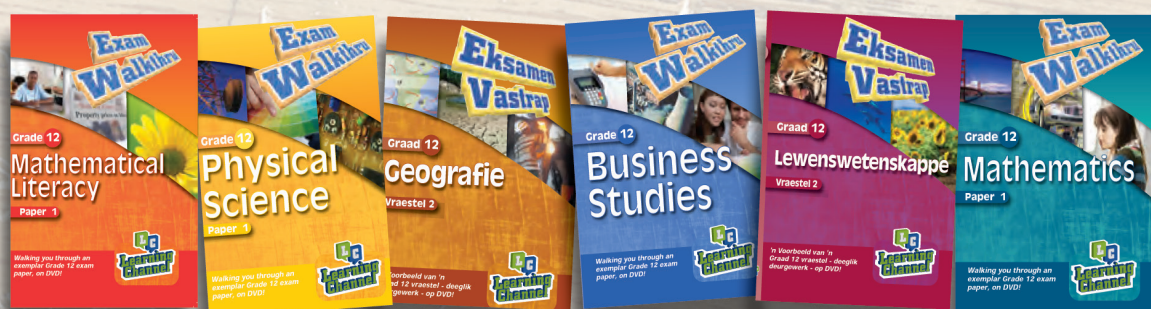
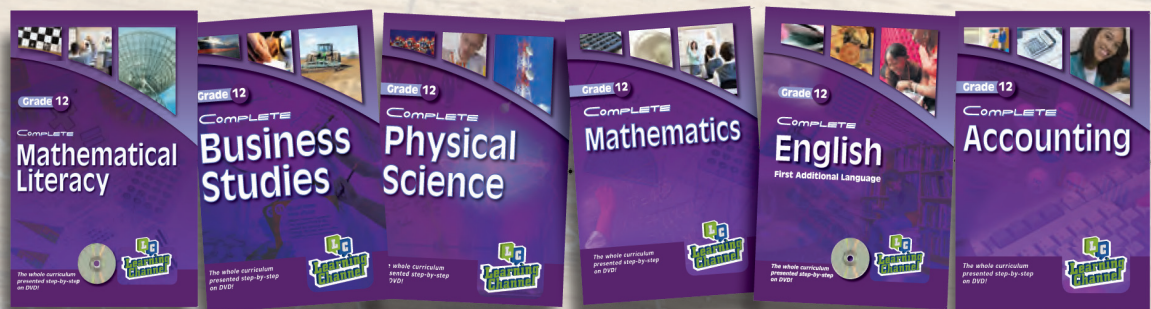
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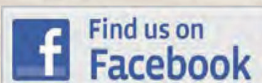
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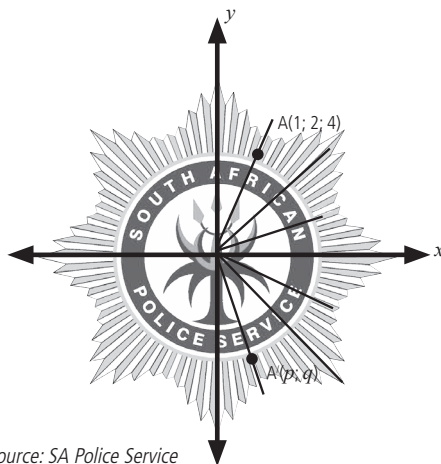


MATHEMATICS
PAPER 2
QUESTIONS

- 3.1 Represent the following points on the diagram provided on the attached diagram sheet:
- Point B, the rotation of point A, 90° anticlockwise about the origin.
 - Point C, the rotation of point A, 180° about the origin.
 - Point D, the rotation of point A, 90° clockwise about the origin. (3)
- 3.2 What type of quadrilateral is figure ABCD? Explain by referring to the properties of quadrilaterals. (3)
- 3.3 Figure ABCD is enlarged by a scale factor of 2 units through the origin to form its image A'B'C'D'. On the diagram provided on the diagram sheet, sketch the image A'B'C'D' and indicate the coordinates of the vertices. (2)
- 3.4 Determine the ratio: $\frac{\text{Area ABCD}}{\text{Area A'B'C'D'}}$ (1)
- 3.5 ABCD is reflected about the y-axis to form its image EFGH.
- 3.5.1 Write down the coordinates of E. (1)
- 3.5.2 Determine the ratio: $\frac{\text{Perimeter ABCD}}{\text{Perimeter EFGH}}$ (1)
- 3.6 Describe, using words and algebraic notation, the single transformations involved if figure ABCD is transformed by the rule: $(x; y) \rightarrow (\frac{1}{2}x; -\frac{1}{2}y - 1)$ (3)

QUESTION 4

The diagram below represents a police emblem with its centre at the origin. Point A(1;2;4) on the emblem is rotated clockwise about the origin.



The image of A is the point A'(p;q). The coordinates of this image point can be obtained by either reflecting point A about the x-axis, or by rotating the point A in a clockwise direction about the origin.

- 4.1 Calculate the size of the angle of rotation if point A is rotated clockwise about the origin to form its image point A'(p;q) (2)
- 4.2 Hence determine the coordinates of A', rounded off to one decimal place, by using the appropriate transformation rule. (4)

[6]

Source: SA Police Service

QUESTION 5

- 5.1 Simplify the following without using a calculator: $\frac{\tan(-60^\circ) \cos(-156^\circ) \cos 294^\circ}{\sin 492^\circ}$ (7)
- 5.2 Simplify without using a calculator: $\cos^2(180^\circ + x)[\tan(360^\circ - x) \cdot \cos(90^\circ + x) + \sin(x - 90^\circ) \cdot \cos 180^\circ]$ (9)
- 5.3 If $\sin 61^\circ = \sqrt{a}$, determine the value of the following in terms of a: $\cos 73^\circ \cos 15^\circ + \sin 73^\circ \sin 15^\circ$ (6)

[22]

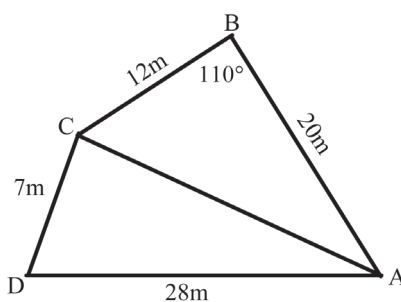
QUESTION 6

- 6.1 6.1.1 Prove that $\sin(45^\circ + \theta) \cdot \sin(45^\circ - \theta) = \frac{1}{2} \cos 2\theta$ (5)
- 6.1.2 Hence determine the value of $\sin 75^\circ \cdot \sin 15^\circ$ (3)
- 6.2 Determine the general solution of the following equation: $2x + 2\sin x + \cos^2 x + \cos x = 0$ (7)
- Round off your answers to one decimal place where appropriate. (7)

[15]

QUESTION 7

A piece of land has the form of a quadrilateral ABCD with AB = 20m, BC = 12m, CD = 7m and AD = 28m. B = 110° . The owner decides to divide the land into two plots by erecting a fence from A to C.



- 7.1 Calculate the length of the fence AC correct to one decimal place. (2)
- 7.2 Calculate the size of $\angle BAC$ correct to the nearest degree. (2)
- 7.3 Calculate the size of $\angle D$, correct to the nearest degree. (3)
- 7.4 Calculate the area of the entire piece of land ABCD, correct to one decimal place. (3)

[10]

QUESTION 8

- 8.1 Solve for x if $\cos(x - 45^\circ) = \sin 3x$ where $x \in [-60^\circ; 120^\circ]$. (8)
- 8.2 Sketch the graphs of the following functions on the same set of axes for the interval $x \in [-60^\circ; 120^\circ]$. Use the diagram provided on the diagram sheet. $f(x) = \cos(x - 30^\circ)$ $g(x) = \sin 3x$ (6)
- 8.3 Explain graphically what the solutions to the equation $\cos(x - 30^\circ) = \sin 3x$ represent. (1)
- 8.4 Determine graphically the values of x for which $\cos(x - 30^\circ) > \sin 3x$ (2)

[17]

QUESTION 9

Fifty motorists were asked to record the number of kilometres travelled in one week. The following table shows the results:

Number of kilometres	Number of motorists	Cumulative frequency
$10 < x \leq 20$	2	2
$20 < x \leq 30$		9
$30 < x \leq 40$		13
$40 < x \leq 50$		26
$50 < x \leq 60$		42
$60 < x \leq 70$		50

- 9.1 Complete the second column of the table (use table provided on the diagram sheet) (1)
- 9.2 On the grid provided on the diagram sheet, draw the cumulative frequency polygon (ogive curve). (3)
- 9.3 Use your graph to estimate the median number of kilometres per week. (1)

[5]

QUESTION 10

A medical researcher recorded the growth in the number of bacteria over a period of 10 hours. The results are recorded in the following table:

Time in hours	0	1	2	3	4	5	6	7	8	9	10
Number of bacteria	5	10	7	13	10	20	30	35	45	65	80

- 10.1 On the diagram provided on the diagram sheet, draw a scatter plot to represent this data. (2)
- 10.2 State the type of relationship (linear, quadratic or exponential) that exists between the number of hours and the growth in the number of bacteria. (1)

[3]

QUESTION 11

The maximum daily temperatures in $^\circ\text{C}$ for Johannesburg for the first 10 days in July were recorded in the following table.

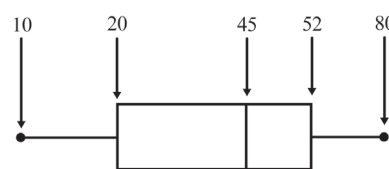
23	25	22	28	27
20	18	17	24	25

- 11.1 Calculate the mean for this data (one decimal place). (2)
- 11.2 Use a calculator to calculate the standard deviation for this data (one decimal place). (2)
- 11.3 How many temperatures lie outside one standard deviation of the mean? (2)

[6]

QUESTION 12

Consider the following box and whisker plot:

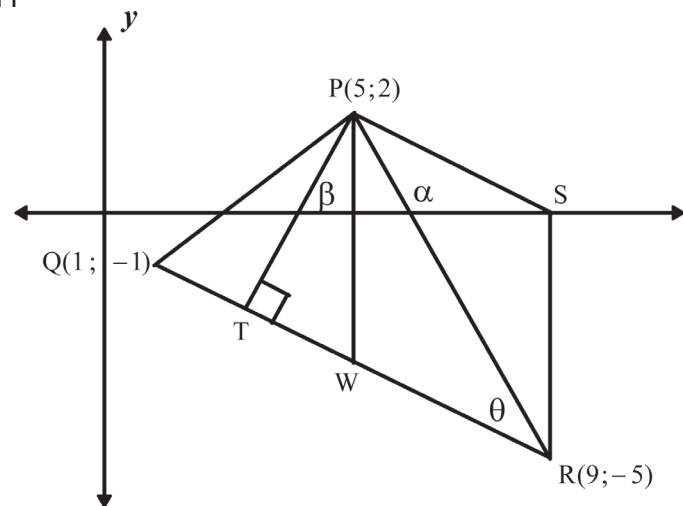


The data set contains a total of nine numbers. The second and third number of the data set are the same. The seventh and eighth numbers are different. The mean for the data set is 40. Write down a possible list of nine numbers which will result in the above box and whisker plot. (6)

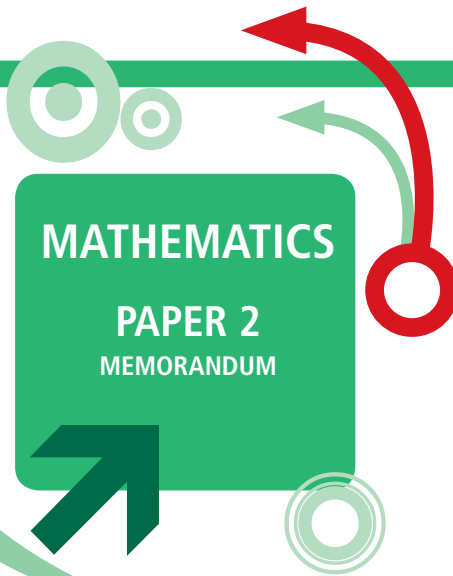
TOTAL MARKS: 150

MEMORANDUM

QUESTION 1

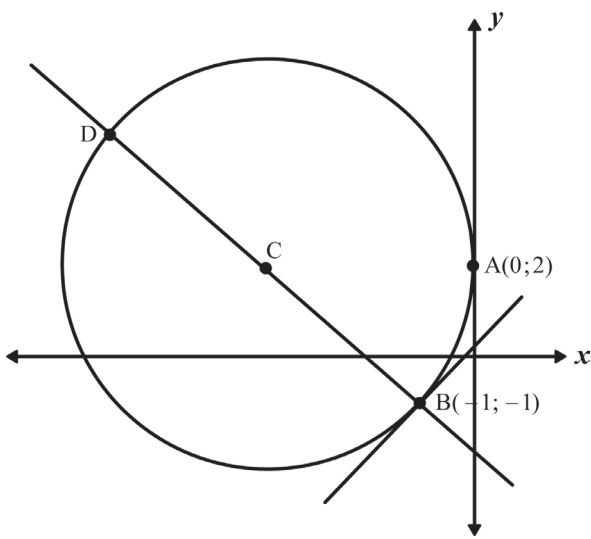


1.1	$W(\frac{1+(9), -1+(-5)}{2})$ $= W(5; -3)$ The equation of PW is $x = 5$	midpoint $x = 5$ (2)
1.2	$m_{QR} = \frac{-5 - (-1)}{9 - 1}$ $= \frac{-4}{8}$ $= -\frac{1}{2}$ $\therefore m_{PS} = -\frac{1}{2}$ (PS || QR) $y - 2 = -\frac{1}{2}(x - 5)$ $\therefore y - 2 = -\frac{1}{2}x + \frac{5}{2}$ $\therefore y = -\frac{1}{2}x + \frac{9}{2}$	m_{QR} m_{PS} correct substitution into formula for equation $y = -\frac{1}{2}x + \frac{9}{2}$ (4)
1.3	$m_{PT} = 2$ (PT \perp QR) $y - 2 = 2(x - 5)$ $\therefore y - 2 = 2x - 10$ $\therefore y = 2x - 8$	m_{PT} correct substitution into formula for equation $y = 2x - 8$ (3)



1.4	$m_{QR} = -\frac{1}{2}$ $y - (-1) = -\frac{1}{2}(x - 1)$ $\therefore y + 1 = -\frac{1}{2}x + \frac{1}{2}$ $\therefore y = -\frac{1}{2}x - \frac{1}{2}$ $\therefore -\frac{1}{2}x - \frac{1}{2} = 2x - 8$ $\therefore -x - 1 = 4x - 16$ $\therefore -5x = -15$ $\therefore x = 3$ $\therefore y = 2(3) - 8 = 2$ $\therefore T(3; -2)$	correct substitution into formula for equation $y = -\frac{1}{2}x - \frac{1}{2}$ $-\frac{1}{2}x - \frac{1}{2} = 2x - 8$ $x = 3$ $T(3; -2)$ (5)
1.5	$QT^2 = (1 - 3)^2 + (-1 - (-2))^2$ $\therefore QT^2 = 4 + 1$ $\therefore QT^2 = 5$ $\therefore QT = \sqrt{5}$ $TR^2 = (3 - 9)^2 + (-2 - (-5))^2$ $\therefore TR^2 = 36 + 9$ $\therefore TR^2 = 45$ $\therefore TR = \sqrt{45} = \sqrt{9 \times 5} = 3\sqrt{5}$ $\therefore \frac{1}{3}TR = \sqrt{5} = QT$ $\therefore QT = \frac{1}{3}TR$	correct substitution to get QT answer for QT correct substitution to get TR answer for TR establishing that $QT = \frac{1}{3}TR$ (5)
1.6	$\tan \alpha = m_{PR} = \frac{-5 - (-2)}{2 - (-5)}$ $\therefore \tan \alpha = \frac{-3}{7}$ $\therefore \tan \alpha = -\frac{3}{7}$ $\therefore \alpha = 180^\circ - 45^\circ$ $\therefore \alpha = 135^\circ$ $\tan \beta = m_{PT} = 2$ $\therefore \tan \beta = 2$ $\therefore \beta = 63,43494882^\circ$ Now $\widehat{TPR} + \beta = \alpha$ $\therefore \widehat{TPR} = \alpha - \beta$ $\therefore \widehat{TPR} = 135^\circ - 63,43494882^\circ$ $\therefore \widehat{TPR} = 71,56505118^\circ$ $\theta + 90^\circ + 71,56505118^\circ = 180^\circ$ $\therefore \theta = 18,43^\circ$	$\tan \alpha = -1$ $\alpha = 135^\circ$ $\beta = 63,43494882^\circ$ $\widehat{TPR} = 71,56505118^\circ$ $\theta = 18,43^\circ$ (5)

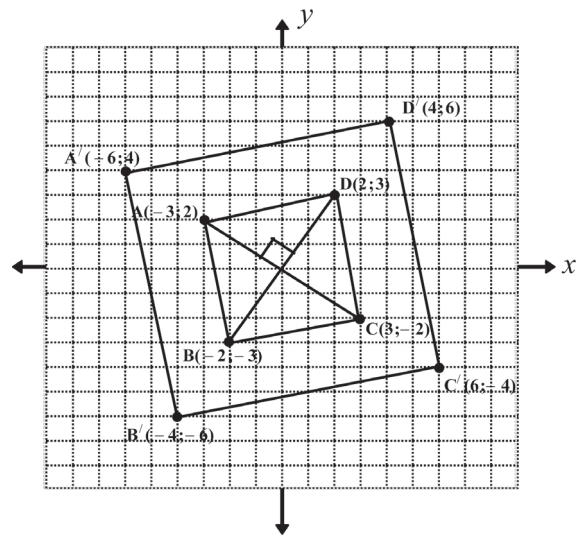
QUESTION 2



2.1	$m_{AB} = m_{BC}$ $\therefore \frac{2 - 5}{3 - 6} = \frac{k + 4 - 2}{2k - 3}$ $\therefore 1 = \frac{k + 2}{2k - 3}$ $\therefore 2k - 3 = k + 2$ $\therefore k = 5$	$m_{AB} = m_{BC}$ working out gradients $k = 5$ (3)
2.2	$x^2 + y^2 - 4x + 6y + 4 = 0$ $\therefore x^2 - 4x + y^2 + 6y = -4$ $\therefore x^2 - 4x + \left(\frac{-4}{2}\right)^2 + y^2 + 6y + \left(\frac{6}{2}\right)^2 = -4 + \left(\frac{-4}{2}\right)^2 + \left(\frac{6}{2}\right)^2$ $\therefore (x - 2)^2 + (y + 3)^2 = -4 + 4 + 9$ $\therefore (x - 2)^2 + (y + 3)^2 = 9$ centre = $(2; -3)$ new centre after rotation of 90° clockwise: $(-3; -2)$ new centre after enlargement through origin: $(-6; -4)$ original radius: $r = 3$ new radius after enlargement through origin: $r = 3 \times 2 = 6$ new circle: $(x + 6)^2 + (y + 4)^2 = 36$ (6)	$(x - 2)^2 + (y + 3)^2 = 9$ new centre = $(-6; -4)$ new radius: $r = 6$ new circle: $(x + 6)^2 + (y + 4)^2 = 36$ (6)
2.3.1	$3x + 4y = -7$ $\therefore 4y = -3x - 7$ $\therefore y = -\frac{3}{4}x - \frac{7}{4}$ $\therefore m_{CB} = -\frac{3}{4}$ $\therefore m_{\text{tangent}} = \frac{4}{3}$ $y - (-1) = \frac{4}{3}(x - (-1))$ $\therefore y + 1 = \frac{4}{3}(x + 1)$ $\therefore y + 1 = \frac{4}{3}x + \frac{4}{3}$ $\therefore y = \frac{4}{3}x + \frac{1}{3}$	$m_{CB} = -\frac{3}{4}$ $m_{\text{tangent}} = \frac{4}{3}$ substitution into equation of line $y = \frac{4}{3}x + \frac{1}{3}$ (4)
2.3.2	$C(x; 2)$ substitute $y = 2$ into $3x + 4y = -7$ $3x + 4(2) = -7$ $\therefore 3x = -15$ $\therefore x = -5$ $\therefore C(-5; 2)$ $\therefore (x + 5)^2 + (y - 2)^2 = r^2$ Now $r = 5$ $\therefore (x + 5)^2 + (y - 2)^2 = 25$ (5)	$y_c = 2$ $x = -5$ $C(-5; 2)$ $r = 5$ $(x + 5)^2 + (y - 2)^2 = 25$ (5)

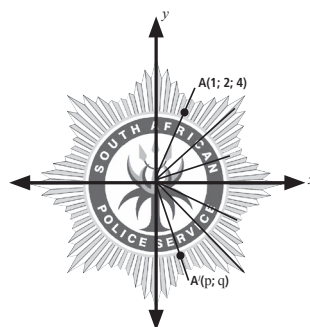
2.3.3	$C(-5; 2) = \left(\frac{x_0 + x_1}{2}; \frac{y_0 + y_1}{2}\right)$ $\therefore C(-5; 2) = \left(\frac{x_0 - 1}{2}; \frac{y_0 - 1}{2}\right)$ $\therefore -5 = \frac{x_0 - 1}{2}$ and $2 = \frac{y_0 - 1}{2}$ $\therefore -10 = x_0 - 1$ and $4 = y_0 - 1$ $\therefore x_0 = -9$ and $y_0 = 5$ $\therefore D(-9; 5)$ (4)	correct substitution into midpoint formula $x_0 = -9$ $y_0 = 5$ $D(-9; 5)$ (4)
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QUESTION 3



3.1	$B(-2; -3)$ $C(3; -2)$ $D(2; 3)$	$B(-2; -3)$ $C(3; -2)$ $D(2; 3)$ (3)
3.2	ABCD is a square since: Diagonals are equal in length Diagonals bisect each other at right angles	square properties (2)
3.3	$A'(-6; 4)$ $B'(-4; -6)$ $C'(6; -4)$ $D'(4; 6)$	correct coordinates indicated joining points to form enlarged square (2)
3.4	$\frac{\text{Area } ABCD}{\text{Area } A'B'C'D'} = \frac{1}{2^2} = \frac{1}{4}$	$\frac{1}{4}$ (1)
3.5.1	$E(3; 2)$	answer (1)
3.5.2	$\frac{\text{Perimeter } ABCD}{\text{Perimeter } EFGH} = \frac{4 \times \text{side } AB}{4 \times \text{side } EF} = 1$	answer (1)
3.6	$(x; y) \rightarrow \left(\frac{1}{2}x; \frac{1}{2}y\right)$ reduction by a factor of $\frac{1}{2}$ $\left(\frac{1}{2}x; \frac{1}{2}y\right) \rightarrow \left(\frac{1}{2}x; -\frac{1}{2}y\right)$ reflection about x-axis $\left(\frac{1}{2}x; -\frac{1}{2}y\right) \rightarrow \left(\frac{1}{2}x; -\frac{1}{2}y - 1\right)$ translation of 1 unit downwards $\therefore (x; y) \rightarrow \left(\frac{1}{2}x; -\frac{1}{2}y - 1\right)$	reduction reflection translation (3)

QUESTION 4



4.1	$22,5^\circ \times 6 = 135^\circ$	$22,5^\circ$ 135° (2)
4.2	$x' = (1) \cos(-135^\circ) - (2,4) \sin(-135^\circ)$ $\therefore x' = 1$ $y' = (2,4) \cos(-135^\circ) + (1) \sin(-135^\circ)$ $y' = -2,4$ $\therefore A'(1; -2,4)$	correct substitution into formula for x' $x' = 1$ correct substitution into formula for y' $y' = -2,4$ (4)

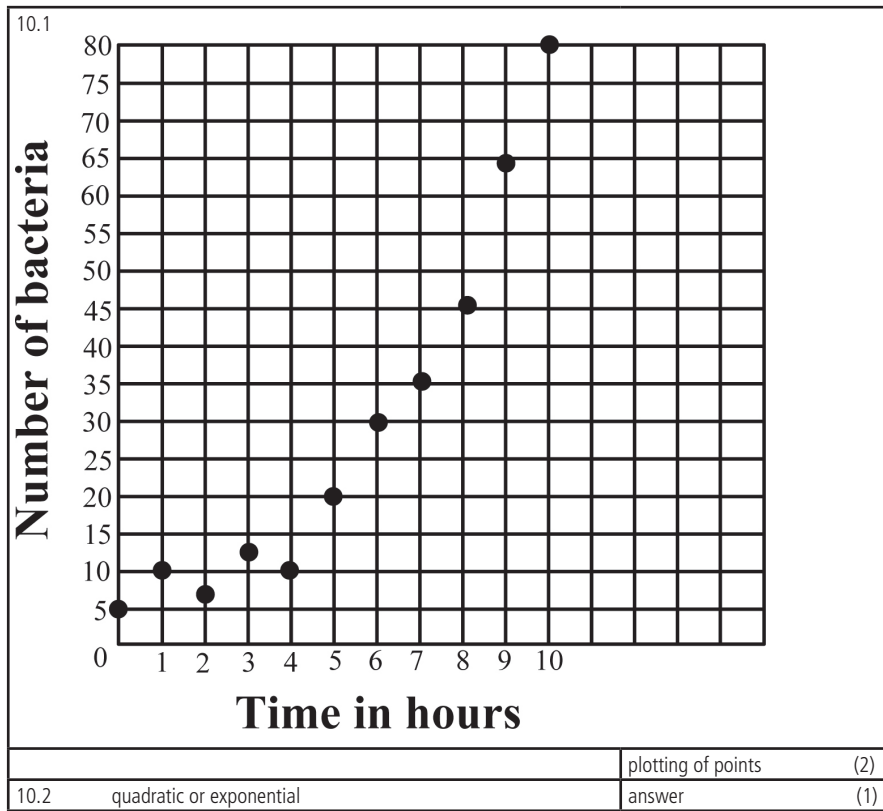
QUESTION 5

5.1	$\frac{\tan(-60^\circ) \cos(-156^\circ) \cos 294^\circ}{\sin 492^\circ}$ $= \frac{(-\tan 60^\circ)(\cos 156^\circ)(-\cos 66^\circ)}{(\sin 132^\circ)}$ $= \frac{(-\sqrt{3})(-\cos 24^\circ)(-\sin 24^\circ)}{(\sin 48^\circ)}$ $= \frac{(-\sqrt{3})(-\cos 24^\circ)(-\sin 24^\circ)}{2 \sin 24^\circ \cos 24^\circ}$ $= \frac{\sqrt{3}}{2}$	$(-\tan 60^\circ)(\cos 156^\circ)$ $-\cos 66^\circ$ $\sin 48^\circ$ $-\sqrt{3}$ $-\sin 24^\circ$ $2 \sin 24^\circ \cos 24^\circ$ $\frac{\sqrt{3}}{2}$ (7)
-----	---	---

MATHEMATICAL LITERACY
PAPER 1
QUESTIONS

9.3	median lies in the interval $48 \leq x \leq 49$	median in the allowable interval (1)
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QUESTION 10

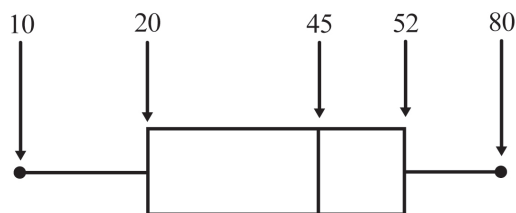


QUESTION 11

23	25	22	28	27
20	18	17	24	25

11.1	$\bar{x} = 22,9$	answer (2)
11.2	standard deviation = 3,5	answer (2)
11.3	$(\bar{x} - s; \bar{x} + s)$ = (22,9 - 3,5; 22,9 + 3,5) = (19,4; 26,4) 4 temperatures lie outside the first standard deviation interval	(19,4; 26,4) 4 temperatures (2)

QUESTION 12



10	20	20	x	45	y	51	53	80
----	----	----	---	----	---	----	----	----

minimum:	10	min, median and max $T_2 = T_3 = 20$ $T_7 = 51$ $T_8 = 53$ working with the mean value for x and y nine set of numbers Accept variations for T_7, T_8, x and y BUT make sure that the mean of all nine numbers is 40. (6)
maximum:	80	
median:	45	
Lower quartile:	$20 = \frac{20 + 20}{2}$	
Upper quartile:	$52 = \frac{51 + 53}{2}$	
Mean:	$\frac{10 + 20 + 20 + x + 45 + y + 51 + 53 + 80}{9} = 40$ $\therefore \frac{x + y + 279}{9} = 40$ $\therefore x + y + 279 = 360$ $\therefore x + y = 81$	
Now $20 < x < 45$ and $45 < y < 51$ Therefore let $x = 34$ and $y = 47$ Therefore the set of nine numbers are: 10; 20; 20; 34; 45; 47; 51; 53; 80		

QUESTION 1

- On a given day, the bank advertises the rand : Euro exchange rate as 1 : 0,0868. How many Euros can you buy with R5 000,00 on this day? (3)
- A house plan is drawn using a 1 : 75 scale
 - The front door is 2,4 cm tall on the plan. How tall is the door in reality? (3)
 - The plot of land on which the house is being built is 14m wide. What is the corresponding length on the plan? (3)
- The conversion table below is used to convert between the shoe sizes of different systems. Refer to this table to answer the questions that follow.

System	Sizes													
Europe	35	35½	36	37	37½	38	38½	39	40	41	42	43	44	
Japan	M	21,5	22	22,5	23	23,5	24	24,5	25	25,5	26	26,5	27,5	28,5
	W	21	21,5	22	22,5	23	23,5	24	24,5	25	25,5	26	27	28
UK	M	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	10
	W	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	9½
Inches	9	9¼	9½	9¾	10	10¼	10½	10¾	11	11¼	11½	11¾	12	12¼
Centimetres	22,8	23,1	23,5	23,8	24,1	24,5	24,8	25,1	25,4	25,7	26	26,3	26,7	27,3

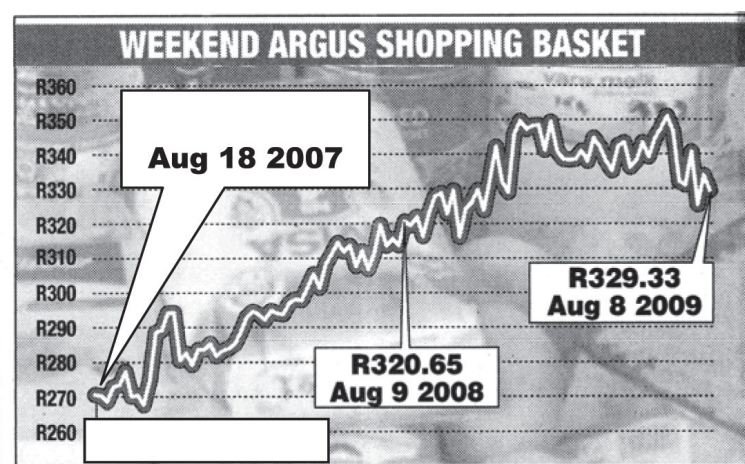
- What is the European equivalent of a UK (W) size 5 shoe? (2)
- What shoe size would a Japanese man with a size 24 foot ask for in the UK? (2)
- The standard inch : cm conversion rate is 1 : 2,54cm. According to the table, 9¼ inches = 23,8cm. Is this correct? Show your working (3)



- The box and whisker plot above represents the batting averages of the 160 cricketers who have batted in T20 matches since 1 January 2009. Answer the questions that are based on the plot.
 - What is the name given to the two data points with value 57 and 57,33? (2)
 - How many players have a batting average that is less than 6,25? (2)
 - What must a batsman's batting average be for him to be in the top quartile? (2)
 - Jacques Kallis is the South African with the highest batting average. If his average is 48,4, how does he compare with the other batsmen? (2)

QUESTION 2

The graph below appeared in a weekend newspaper and describes the price of that newspaper's "shopping basket" over a period of two years. Study the graph and answer the questions that follow, on the next page.



Source: Weekend Argus

- Use the graph to estimate the following (to the nearest R5,00):
 - What is the highest price paid for the shopping basket over the period? (2)
 - What is the lowest price paid for the shopping basket over the period? (2)
- Calculate the percentage change in the cost of the basket from 9 August 2008 to 8 August 2009. (4)
- If the percentage change in the cost of the basket from 18 August 2007 to 9 August 2008 was 18,50, calculate to the nearest rand what the actual cost of the basket was on 18 August 2007. Show your working. (4)

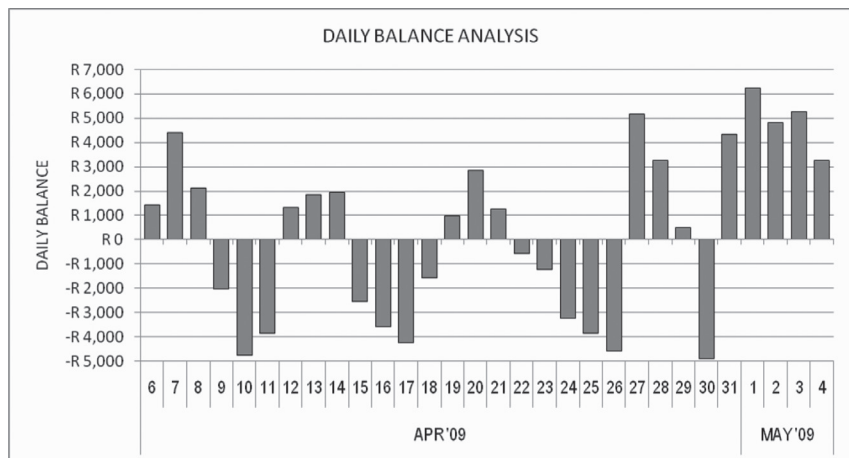
QUESTION 3

Athene runs a small catering business. Her bank provides a monthly bank statement that includes a graph depicting the daily balance in her account. One of these graphs is reproduced below. Athene has negotiated an overdraft facility of R5 000,00. Use the graph to answer the questions that follow.

MATHEMATICAL LITERACY PAPER 1 QUESTIONS

WEEKLY DEDUCTION TABLES (2010 TAX YEAR)

Remuneration	Annual Equivalent	Tax	
		Under 65	Over 65
R 0 - R 1,042	R 54,132	R 0	R 0
R 1,043 - R 1,044	R 54,262	R 0	R 0
R 1,045 - R 1,046	R 54,366	R 1	R 0
R 1,149 - R 1,150	R 59,774	R 19	R 0
R 1,151 - R 1,152	R 59,878	R 20	R 0
R 1,153 - R 1,154	R 59,982	R 20	R 0
R 1,155 - R 1,156	R 60,086	R 20	R 0
R 1,157 - R 1,158	R 60,190	R 21	R 0
R 1,601 - R 1,604	R 83,330	R 101	R 0
R 1,605 - R 1,608	R 83,538	R 102	R 0
R 1,609 - R 1,612	R 83,746	R 102	R 0
R 1,613 - R 1,616	R 83,954	R 103	R 0
R 1,617 - R 1,620	R 84,162	R 104	R 0
R 1,621 - R 1,624	R 84,370	R 104	R 1
R 1,625 - R 1,628	R 84,578	R 105	R 1



- 3.1 Determine the following from the graph (all values can be estimated to the nearest R500)
- 3.1.1 For what period is the graph? (2)
 - 3.1.2 What was the balance in the account on 14 April? (2)
 - 3.1.3 What was the balance in the account on 30 April? (2)
 - 3.1.4 On how many days in the period was the account in overdraft? (2)
- 3.2 Use the graph to calculate the following as accurately as possible. You should:
- Estimate all the values that you read from the graph to the nearest R500
 - Clearly show all your working.
- 3.2.1 How much money could Athene still withdraw from her account on 18 April? (4)
 - 3.2.2 Describe in overall terms what happened between the following pairs of dates to account for the change in the bank balance: (6)
 - (a) 8 April to 9 April
 - (b) 26 April to 27 April
- [18]

QUESTION 4

The table below is an extract from a fuller table published in the newspaper by the National Bargaining Council for the Road and Freight Industry (NBCRFI) to advertise the weekly wages of a wide range of employees in the industry.

Parts of the text have been enlarged to make it easier to read.

Extracts from the SARS weekly (PAYE) tax deduction tables for the same period are reproduced below.

Refer to both of these documents to answer the questions that follow.

For the purpose of this question we will assume all workers to be "Under 65" years old.

Wage Schedule for year 1: 01 June 2009 to 28 February 2010

Weekly Wages

Category Code	Class	New Minimum Wage
1	General worker	R642.87
42	General worker, repair shop	
3	Packer/loader, grade I	
27	Security guard	
5	Motorcycle/motor tricycle driver	R711.48
6	Light motor vehicle driver	
2	Checker, grade I	
22	Loader operator, grade II	
24	Mobile hoist operator, grade II	
46	Packer/loader, grade II	
7	Medium motor vehicle driver (articulated)	R876.91
8	Medium motor vehicle driver (rigid)	
44	Artisan assistant	
19	Gantry crane operator, grade I	
23	Mobile hoist operator, grade I	
47	Checker, grade II	
21	Loader operator, grade I	
20	Gantry crane operator, grade II	
26	Storeman (workshop)	
15	Team leader	
50	Vehicle Guard	R1153.94
10	Heavy motor vehicle driver (articulated)	R985.53
11	Heavy motor vehicle driver (rigid)	
12	Extra-heavy motor vehicle driver (articulated)	
13	Extra-heavy motor vehicle driver (rigid)	
18	Dispatch clerk	
14	Ultra-heavy motor vehicle driver	R1131.85
45	Semi-skilled artisan	R1131.85
49	Storeman (warehouse)	
51	Custodian	R1615.51
41	Security officer, III	R1384.72
40	Security officer, II	R1384.72
39	Security officer, I	R1384.72

Provident Fund

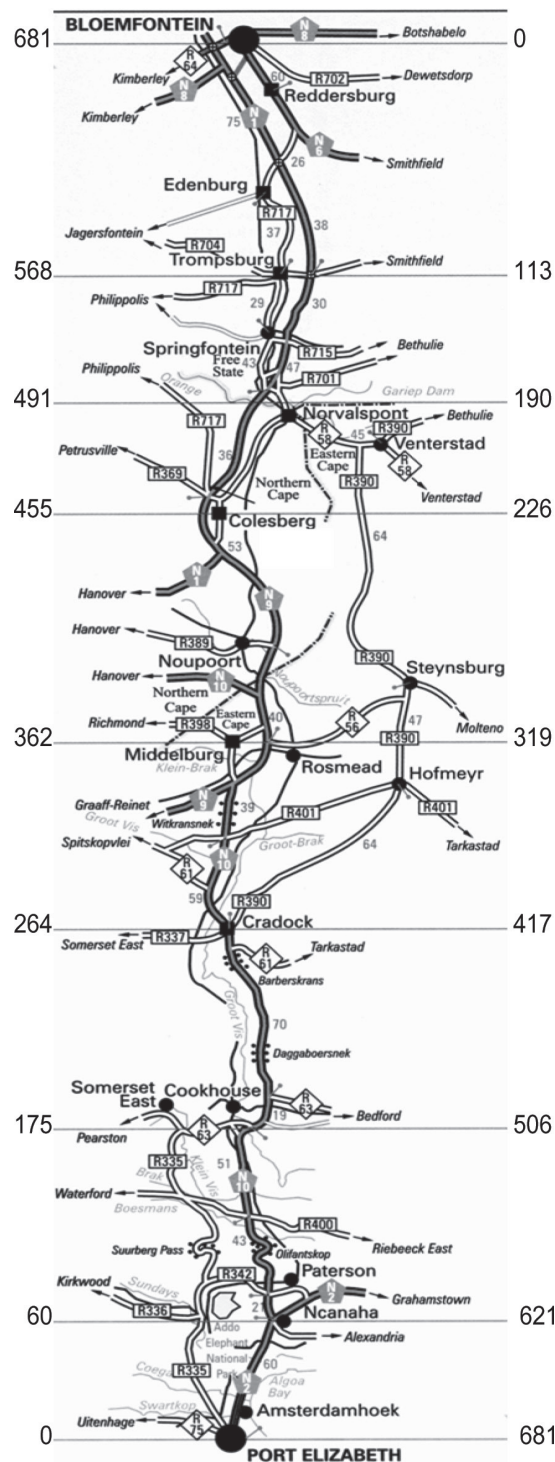
Employee's Deductions Contribution 10% of ordinary weekly wages

- 4.1 Determine the following from the information provided:
 - 4.1.1 For what period are the wages in the table valid? (2)
 - 4.1.2 What, according to SARS, is the annual equivalent remuneration of somebody who earns R 1 155 per week? (2)
 - 4.1.3 How much is the weekly deduction from the ordinary wages of employees for the Provident Fund? (2)
- 4.2 Use the weekly wage and tax tables to determine the following:
 - 4.2.1 What is the weekly PAYE deduction for a general worker? (2)
 - 4.2.2 What is the weekly PAYE deduction for a custodian? (2)
 - 4.2.3 What is the weekly Provident Fund deduction for a custodian? (2)
 - 4.2.4 Hence, or otherwise show that a custodian "takes home" R1 350,96 after deductions. (4)
- 4.3 The "New Minimum Wage" value in the table is the wage after an 11% increase. Hence determine:
 - 4.3.1 What did a custodian "take home" before the increase if:
 - The weekly PAYE deduction for the original wage (in the previous tax year) was R27,87
 - The provident fund deduction was the same: 10% of weekly wages. (5)
 - 4.3.2 What is the percentage increase in "take home" pay between the original wage and the new wage? (4)
 - 4.3.3 Is the percentage increase in "take home" wages:
 - the same as,
 - greater than, or
 - less than the increase of 11% in wages? Give a reason for the observation(s) you have made. (4)

QUESTION 5

A strip map of the road joining Bloemfontein to Port Elizabeth is reproduced below.

Use the map to answer the questions that follow.



MATHEMATICAL LITERACY
PAPER 1
QUESTIONS

- 5.1 Use the strip map to determine the following distances: (2)
 5.1.1 Port Elizabeth to Bloemfontein (3)
 5.1.2 Cradock to Colesburg
 5.2 A family living in Trompsburg travels to Port Elizabeth (a distance of 568km). If:
 • they travel at an average speed of 80km/h; and
 • their car has an average petrol consumption of 12 litres per 100km,
 calculate the following. (5)
 5.2.1 The time that it will take them to complete the journey, correct to the nearest 15 minutes. (5)
 5.2.2 The amount that they will spend on petrol if petrol costs R7,25 per litre.
 5.3 If the family wants to stop twice along the journey to stretch and buy cold drinks,
 determine the following: (4)
 5.3.1 Two towns shown on the map that would break the journey in three roughly equal parts. (4)
 5.3.2 The approximate times that they would arrive at each town if they depart at 07:00. (6)
 [25]

QUESTION 6

Part of one page from a Metrorail timetable is reproduced below.
 Use this timetable to answer the questions that follow.

TRAIN NO.	9516	9438	9218	9440	9442	9522	9444	9446	9526
KHAYELITSHA		06:48		07:00	07:10		07:22	07:35	
NONKQUBELA		06:51		07:03	07:13		07:25	07:38	
NOLUNGILE		06:54		07:06	07:16		07:28	07:41	
MANDALAY		06:58		07:10	07:20		07:32	07:45	
		06:59		07:11	07:21		07:33	07:46	
STOCK ROAD		07:01		07:13	07:23		07:35	07:48	
KAPTEINSKLIP	06:47	..	07:00	..	..	07:18	..	..	07:40
MITCHELLS PL.	06:50	..	07:03	..	..	07:21	..	..	07:43
LENTEGEUR	06:53	..	07:06	..	..	07:24	..	..	07:46
	06:54	..	07:07	..	..	07:25	..	..	07:47
PHILIPPI	06:58	07:04	07:11	07:16	07:26	07:29	07:38	07:51	07:51
NYANGA	07:03	07:09	..	..	07:31	07:34	07:43	07:56	07:56
HEIDEVELD	07:07	07:13	07:17	07:24	07:35	07:38	07:47	08:00	08:00
NETREG	07:11	07:17	07:20	..	07:39	07:42	07:51	08:04	08:04
BONTHEUWEL	07:14	07:20	07:23	07:29	07:42	07:45	07:54	08:07	08:07
	07:15	07:21	07:24	07:30	07:43	07:46	07:55	08:08	08:08
LANGA	07:18	07:24	07:27	07:33	07:46	07:49	07:58	08:11	08:11
YSTERPLAAT	..	07:34	07:37	07:43	07:56	..	08:08	08:21	..
ESPLANADE	..	07:39	07:42	07:48	08:01	..	08:13	08:26	..
PINELANDS	07:23	..	..	..	..	07:54	..	..	08:16
NDABENI	07:25	..	..	..	..	07:56	..	..	08:18
MAITLAND	07:28	..	..	..	..	07:59	..	..	08:21
SALT RIVER	07:33	..	..	..	..	08:04	..	..	08:26
CAPE TOWN	07:40	07:44	07:47	07:53	08:06	08:11	08:18	08:31	08:33

- 6.1 Use the time table to answer the following questions: (2)
 6.1.1 At what time does train number 9516 pass through Nyanga? (2)
 6.1.2 Does train number 9218 stop in Nyanga? (2)
 6.1.3 At how many stations does train number 9440 stop when travelling between Kapteinsklip and Cape Town? (2)
 6.1.4 How long does the train number 9438 take to travel from Nolungile to Ysterplaat? Show your working. (4)
 6.2 Themba takes the train from Lentegeur to Cape Town. He needs to arrive at Cape Town station before 07:50 in order to be at work on time. (4)
 6.2.1 List the numbers of all the trains that he can use. (4)
 6.2.2 One morning Themba is running very late and misses train number 9522. If he catches the next possible train from Lentegeur, at what time will he arrive at Cape Town station? (4)
 [18]

QUESTION 7

The Metropolitan Premier Cup is a soccer tournament hosted by Bay United FC. In the first round groups of four teams play a round robin tournament with the top two teams in each group going through to the second round. The fixtures and results of the first three games for the teams in Group A are shown in the following box.

Group A			
WP United	4	0	Junction Rovers
Bay United	1	1	WP United
Ajax Cape Town	5	0	Junction Rovers
Ajax Cape Town	Still to be played		Bay United
Ajax Cape Town	Still to be played		WP United
Bay United	Still to be played		Junction Rovers

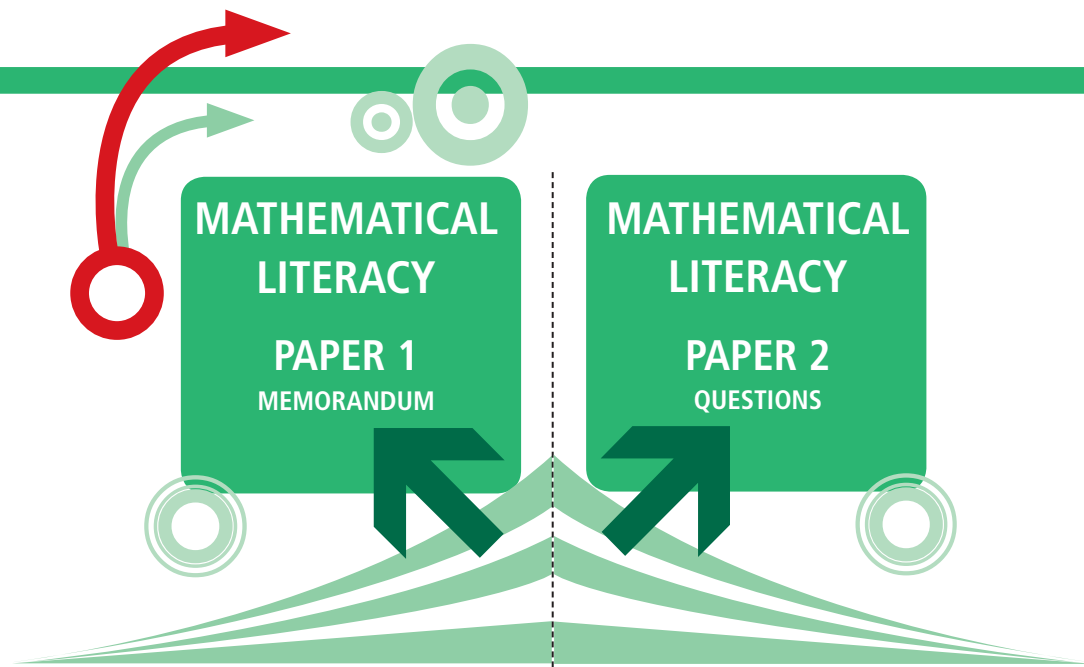
- 7.1 Teams are awarded:
 • 3 points for a win;
 • 2 points for a draw; and
 • 0 points for a loss
 Complete the missing information after the first three games in the log table below (you need only write down the values of (a) to (f) in your script):

Team name	Games played	Games won	Games drawn	Games lost	Goals for	Goals against	Points
WP United	2	1	1	0	5	1	(a)
Ajax Cape Town	1	1	0	0	(b)	0	3
Bay United	(c)	(d)	(e)	(f)	1	1	2
Junction Rovers	2	0	0	2	0	9	0

- 7.2 By considering the remaining games in the Group answer the following questions: (7)
 7.2.1 How many games must Ajax Cape Town still play? (2)
 7.2.2 What is the maximum number of points that Junction Rovers can end the group competition with? Explain your answer. (3)
 7.3 Consider the game between Ajax Cape Town and Bay United
 7.3.1 What are the three possible outcomes of the game? Answer this question by completing the statements below (write down the statements in your script): (4)
 (a) Ajax Cape Town wins and Bay United ____
 (b) Ajax Cape Town draws and Bay United ____
 (c) Ajax Cape Town ____ and Bay United ____
 7.3.2 For each of the three outcomes above state how many points each team will have on the log after the game. (6)
 7.4 In light of your answers in 7.3.1 and 7.3.2 discuss the likelihood (probability) of Junction Rovers ending the group tournament in positions 1 or 2. Give reasons for your answer. (4)
 [26]

MEMORANDUM

- 1.1 $R5\ 000,00 \times 0,0868 = \text{€}434$ 3
 1.2.1 $2,4\text{ cm} \times 75 = 180\text{ cm} = 1,8\text{ m}$ 3
 1.2.2 $14\text{ m} \div 75 = 0,186\text{ m} = 18,6\text{ cm}$ 3
 1.3.1 38 2
 1.3.2 $5\frac{1}{2}$ 2
 1.3.3 $9\frac{3}{8}\text{ inches} \times 2,54\text{ cm} = 23,81\text{ cm}$
 This is correct. 3
 1.4.1 Outliers 2
 1.4.2 About 40 players 2
 1.4.3 $> 25,5$ 2
 1.4.4 He is definitely in the top quartile. He is closer to the highest batting averages so he compares favourably with the best batsmen in the world. 2
 2.1.1 Accept between R350 and R355 2
 2.1.2 Accept between R265 and R270 2
 2.2 % change = $\frac{329,33 - R320,65}{R320,65} = 27\%$ 4
 2.3 $0,185 = \frac{R320,65 - x}{x}$
 $0,185x = R320,65 - x$
 $1,185x = R320,65$
 $x = R320,65 \div 1,185$
 $x = R270,59$ 4
 3.1.1 6th April, 2009 to 4 May, 2009 2
 3.1.2 R2 000 2
 3.1.3 -R5 000 2
 3.1.4 13 2
 3.2.1 $R5\ 000 - R1\ 500 = R3\ 500$ 4



- 3.2.2 (a) Athene withdrew R4 000. This caused her bank balance to go from R2 000 to –R2 000
 (b) Athene deposited R9 500. This caused her bank balance to go from –R4 500 to R5 000.
- 4.1.1 2010 Tax year
 4.1.2 R60 086
 4.1.3 10%
 4.2.1 R0,00
 4.2.2 R103
 4.2.3 Weekly deduction = 10% of R1 615,51
 Weekly deduction = R161,55
 4.2.4 Take home = R1 615,51 – (R103 + R161,55)
 = R1 350,96
 4.3.1 R1 615,51 = 111% of original wage
 Original wage = R1 615,51 ÷ 1,11
 = R1 455,41
 10% of R1 455,41 = R145,54
 Take home = R1 455,41 – (R27,87 + R145,54)
 = R1 282,00
 4.3.2 % change = $\frac{R1\,350,96 - R1\,282,00}{R1\,282,00} = 5,4\%$
 4.3.3 The take-home percentage increase is less than half of the wage increase of 11%.
 The reason for this is the increase in the PAYE that the custodian has to pay. Originally he/she paid R27,87 per week, which is 1,91% of his/her salary. After the increase he/she pays R103 PAYE per week which is 6,38% of his/her salary. Hence the discrepancy in the take-home increase and the wage increase.
- 5.1.1 681km
 5.1.2 455km – 264km = 191km
 5.2.1 Time = Distance ÷ speed
 Time = 568km ÷ 80km/hr
 = 7,1 hr
 ≈ 7 hr
 5.2.2 Average petrol consumption = 12 l / 100km
 568km ÷ 100km = 5,68km
 Petrol used = 12 l / 100km × 5,68km
 = 68,16 l
 Cost = 68,16 l × R7,25 = R494,16
 5.3.1 Middleburg and Cookhouse
 OR any other reasonable suggestion
 5.3.2 Distance to Middleburg = 568km – 362km
 = 206km
 Time taken = 206km ÷ 80km/hr
 = 2,6 hr = 2 h 36 min.
 They will arrive in Middleburg at approximately 09:36
 Distance to Cookhouse = 362km – 175 km
 = 187km
 Time taken = 187km ÷ 80km/hr
 = 2,3 hr = 2 h 18 min.
 They will arrive in Cookhouse at approximately 12:00 or later, depending on how long they spent in Middelburg
- 6.1.1 07:03
 6.1.2 No
 6.1.3 10 stations
 6.1.4 Train leaves Nolongile at 06:54
 Arrives in Ysterplaat at 07:34
 It takes 40 minutes
 6.2.1 9516
 9218
 6.2.2 The next possible train leaves at 07:46 and will arrive in Cape Town at 08:33
- 7.1 (a) 5
 (b) 5
 (c) 1
 (d) 0
 (e) 1
 (f) 0
 7.2.1 2 games
 7.2.2 Junction Rovers have only 1 game left to play. If they win then they will get the maximum number of points, which will be 3.
 Hence the maximum number of points that they can end the competition with is 3.
 7.3.1 (a) Ajax Cape Town wins and Bay United loses
 (b) Ajax Cape Town draws and Bay United draws
 (c) Ajax Cape Town loses and Bay United wins
 7.3.2 (a) Ajax Cape Town 6 and Bay United 2
 (b) Ajax Cape Town 5 and Bay United 4
 (c) Ajax Cape Town 3 and Bay United 5
 7.4 The maximum points that Junction Rovers can end the tournament with are 3.
 WP United already has 5 points which means that Junction Rovers cannot be placed in position 1.
 In each of the three scenarios in the Ajax Cape Town vs Bay United game one of the teams ends with more than 3 points which means that Junction Rovers cannot be placed in position 2.
 Hence the likelihood of Junction Rovers ending in position 1 or 2 is nil (impossible).

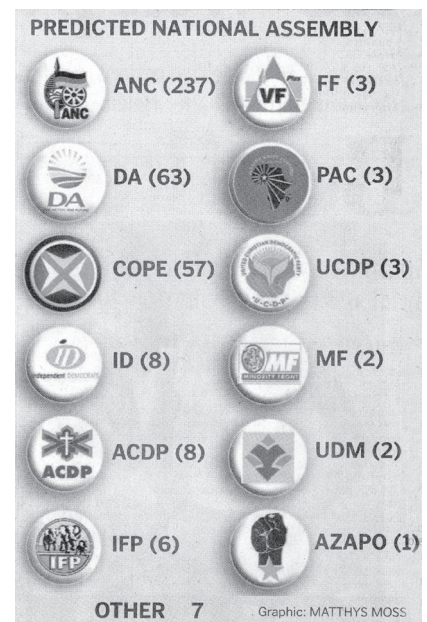
QUESTION 1

On the 22nd April 2009 South Africa held national elections.
 On the 19th April, the Sunday Times newspaper published two graphics below to illustrate the anticipated outcome of the elections in terms of seats in the national and provincial legislatures. Extracts from the accompanying article are reproduced below.
 The actual results of the elections in terms of seats in the national and provincial legislatures are reproduced at the bottom of the page.
 There were 23 181 997 registered voters for the 2009 elections.
 Use the information provided to answer the questions that follow.

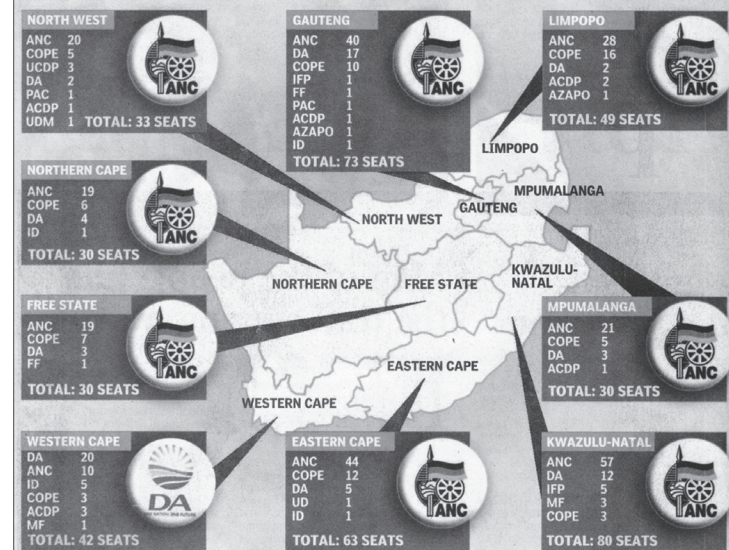
Another Landslide for the ANC

DA and COPE are neck and neck, survey finds.
 The ANC is on course to scoop 60% of the vote on Wednesday ...
 These are among the results of the final election poll conducted by Plus 94 Research between April 3 and 9 ... A total of 7 000 voters in urban and rural areas were questioned ...
 The poll forecasts that the DA will win the Western Cape – though not outright – while COPE will become the official opposition in six provinces: Mpumalanga, North West, Free State, Northern Cape, Limpopo and Eastern Cape.

(Sunday Times, 19 April 2009)



LATEST PREDICTIONS BY PROVINCE
 Provincial legislatures



	National		Seats in the provincial legislature								
	Votes	Seats	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape
ACDP	142 658	3			1	1					1
ANC	11 650 748	264	44	22	47	51	43	27	25	19	14
AZAPO	38 245	1									
COPE	1 311 027	30	9	4	6	1	4	1	3	5	3
DA	2 945 829	67	6	3	16	7	2	2	3	4	22
FF	146 796	4		1	1						
ID	162 915	4			1					2	2
IFP	804 260	18			1	18					
MF	43 474	1				2					
PAC	48 530	1									
UCDP	66 068	2							2		
UDM	149 680	4	3								
Other	170 491	1	1								
Total	17 680 729	400	63	30	73	80	49	30	33	30	42

MATHEMATICAL LITERACY
PAPER 2
QUESTIONS

- 1.1 Answer the following questions regarding the research on which the newspaper article is based. (2)
- 1.1.1 What is the name of the organization that conducted the research on which the article is based? (2)
- 1.1.2 Why does the Sunday Times name the organization? (2)
- 1.1.3 Express the sample size as a percentage of the voting population. (4)
- 1.2 A number of predictions are made in the survey. (4)
- 1.2.1 What is the prediction in terms of the percentage vote that the ANC will get? (4)
- What was the actual percentage of votes that the ANC got? (4)
- 1.2.2 The article states that "The poll forecasts that the DA will win the Western Cape – though not outright". What is meant by this statement and how accurate was the prediction. (4)
- 1.2.3 The survey predicts that: "COPE will become the official opposition in six provinces". What is meant by this statement and how accurate was the prediction. Provide a detailed substantiation for your answer. (5)
- 1.3 COPE was a new party in the 2009 elections. (5)
- 1.3.1 Use the grid provided in Appendix A to complete a double bar graph to compare the number of seats predicted for COPE in each province and the actual number of seats the party won. (5)
- 1.3.2 Based on the bar graph and the data available discuss whether or not COPE performed as well as the survey predicted it would? Provide a detailed substantiation for your answer. (4)
- 1.4 In light of the actual results as well as the analysis we have done in this question, discuss whether or not you think the survey was effective. Provide a detailed substantiation and possible explanations for your answer. (5)

QUESTION 2

The advertisement below for a VW Tenacity appeared in a local newspaper. Some of the details have been enlarged to make it easier to read them.

In this question we will explore three different ways of paying for the car.

NO DEPOSIT DEAL

Put us to the test on price and service - *9ms M/VW to 3000 And we'll call you! *R2,00 per sms

The time is right to talk to us about a finance plan to suit your needs.

Model	Vehicle Price	Monthly Installment	Number of Installments	Principal Debt	Interest Rate	Deposit	Final Balloon Value	Total Cost
1.4 Tenacity	R83 900	R1399	60 months	R88 040	9.5%	No Deposit	41% (R34 399)	121 753.81

"Take delivery by Friday"

Model	Vehicle Price	Monthly Installment	Number of Installments	Principal Debt	Interest Rate	Deposit	Final Balloon Value	Total Cost
1.4 Tenacity	R83 900	R1399	60 months	R88 040	9.5%	No Deposit	41% (R34 399)	121 753.81

Finance available to finance

Fixed interest rate for the full term. Installment most offer. Value of W An A. Proof charge without home.

monthly service fees of R57. All offers subject to credit approval.

- 2.1 Option 1: One way of buying the car is to pay cash. (2)
- 2.1.1 What is cash price of the car? (2)
- 2.2 Option 2: Another option is to pay for the car by means of the terms offered in the advertisement. Answer the following questions that relate to the finance option described in the advertisement. (2)
- 2.2.1 What deposit do you have to pay? (2)
- 2.2.2 What is the total monthly payment that you would be making (installment plus the loan service fee)? (3)
- 2.2.3 What is the total value of all the monthly payments that you have to make for the car? (3)
- 2.2.4 The "Final Balloon Value" is the amount that you will still owe on the car after making all of your monthly payments. What is the "Final Balloon Value"? (1)
- 2.2.5 Calculate the total value of all the monthly payments and the "Final Balloon Value" and try to explain why this is slightly different to the "Total Cost" shown in the advertisement. (4)
- 2.3 Option 3: A third option is to make a greater monthly payment every month and to pay the total debt over the repayment period. (5)
- 2.3.1 Refer to the repayment factor table below and calculate the monthly repayment that you will make for a loan with a Principal Debt, Interest Rate and the Number of Installments shown in the advertisement. (5)
- 2.3.2 What will the total cost of paying for the car be using this option – you must assume that the monthly loan service fee will be the same. (4)

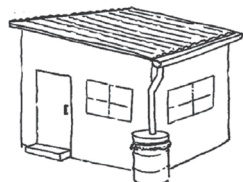
Monthly repayment per R1 000 borrowed										
	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
8,0%	86,99	45,23	31,34	24,41	20,28	17,53	15,59	14,14	13,02	12,13
8,5%	87,22	45,46	31,57	24,65	20,52	17,78	15,84	14,39	13,28	12,40
9,0%	87,45	45,68	31,80	24,89	20,76	18,03	16,09	14,65	13,54	12,67
9,5%	87,68	45,91	32,03	25,12	21,00	18,27	16,34	14,91	13,81	12,94
10,0%	87,92	46,14	32,27	25,36	21,25	18,53	16,60	15,17	14,08	13,22
10,5%	88,15	46,38	32,50	25,60	21,49	18,78	16,86	15,44	14,35	13,49

- 2.4 Redraw the table below and describe at least one advantage and one disadvantage of each of the three purchase options analysed in this question. (6)

Option	Total paid for the car	Advantage of option	Disadvantage of option
Option 1			
Option 2			
Option 3			

QUESTION 3

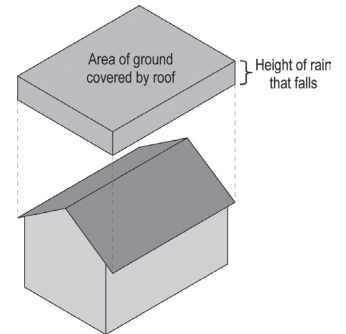
Water is a scarce resource and we need to work hard to preserve it. One way of reducing water consumption is to collect the rainwater that falls on the roof of a house.



To calculate the volume of water that can be captured during a rain storm we imagine the rectangular prism shown in the diagram on the left.

The volume of water collected is given by the formula:

$$\text{volume of water collected} = \text{surface area of the ground covered by the roof} \times \text{height of rain that falls}$$



NOTE: Be careful to express all of the values in terms of the same units when using the formula.

- 3.1 Consider the following situation: (3)
- A house with a roof that covers 80m² of ground
 - A monthly rainfall of 58mm
- 3.1.1 Show that the height of rain that fell in the month is 0,058m (3)
- 3.1.2 Hence show that the volume of water collected is 4,64m³ (3)
- 3.1.3 If there are 1 000 litres in 1m³, show that 4 640 litres could have been collected in the month. (3)
- 3.2 Assume: (2)
- That four people live in the house
 - Average daily water consumption is 25litres/person/day
 - That there are 30 days in a month
- 3.2.1 Show that the average monthly water consumption for the household is 3 000 litres. (3)
- 3.2.2 Show that if the water can be stored then the household will end the month with a surplus of 1 640 litres. (2)
- 3.3 The average monthly rainfall for Musing (Limpopo) is reflected in the water collection balance sheet supplied as Appendix B. Complete the questions below on Appendix B and hand this sheet in with your answer book. (11)
- 3.3.1 Show that the surplus water collected in February would be 1 560 litres (3)
- 3.3.2 Show that the amount of water stored in the storage tank would be 3 200 litres at the end of February. (2)
- 3.3.3 By completing the table, show that the household will run out of rainwater during June. (11)
- 3.4 The rainwater model that we have developed in this question assumes that the excess water each month is captured in a tank. The formula for the volume of a cylindrical tank is given by: $\text{volume} = \pi \times r^2 \times h$ where $\pi \approx 3,141$
- In light of the water collection balance sheet developed in Appendix B the household has decided to build a cylindrical tank to hold at least 3 500 litres of water.
- 3.4.1 Show that 3 500 litres of water is equivalent to 3,5m³ of water. (2)
- 3.4.2 Hence, calculate the radius of the tank if the tank is to be built 1,8m tall. (5)

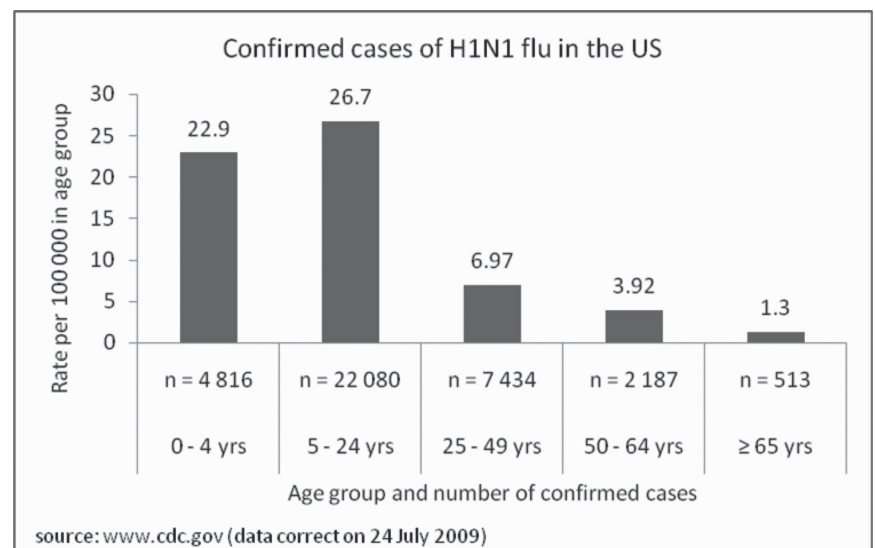
QUESTION 4

Swine (H1N1) flu was first detected in April 2009. By the 31st July 2009 162 380 cases of swine flu had been reported worldwide and 1 154 people had died from the virus (www.who.int).

Questions being asked by many people include:

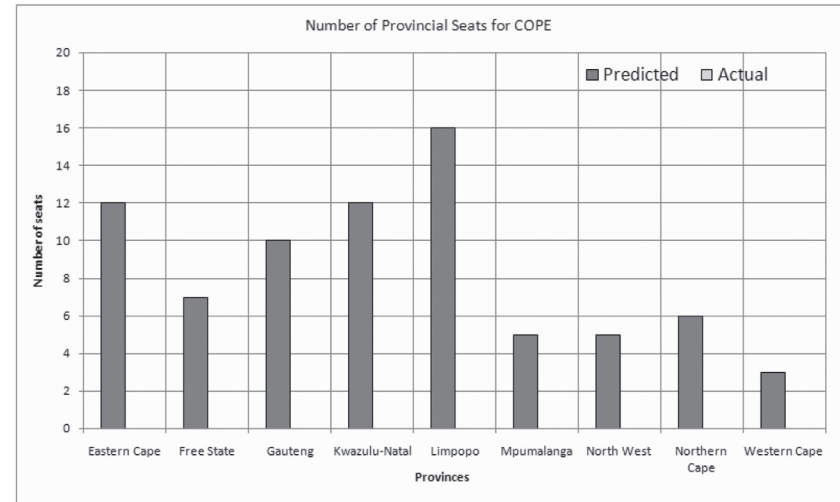
- How likely am I to catch the flu?
- How likely am I to die from the flu?

The graphs below have been produced by the Center for Disease Control describing the situation in the United States. Study these and answer the questions that follow.



MATHEMATICAL LITERACY PAPER 2 QUESTIONS + MEMORANDUM

APPENDIX A

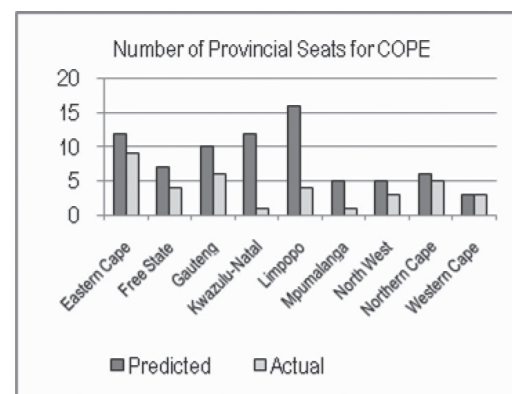


APPENDIX B

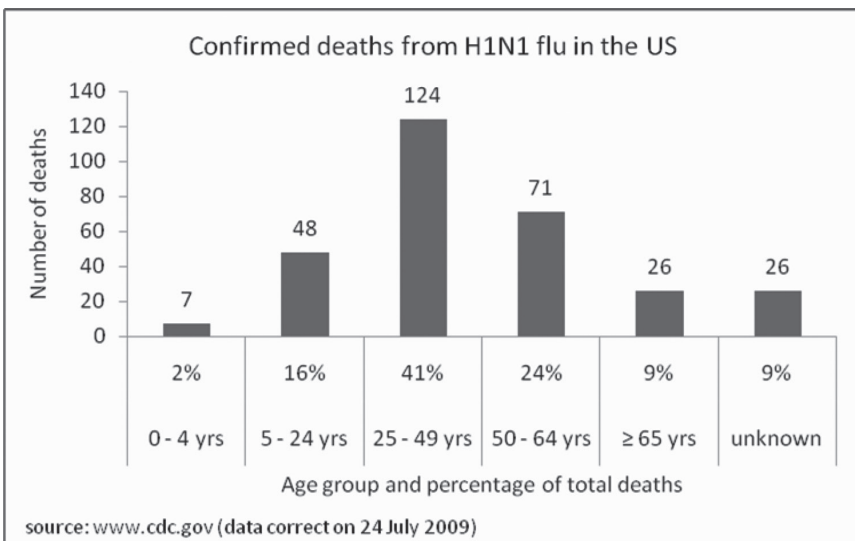
Month	Rainfall (mm)	Anticipated volume collected (l)	Anticipated consumption (l)	Surplus / deficit (l)	Month-end Balance (l)
Jan	58	4640	3000	1640	1640
Feb	57		3000		
Mar	39		3000		
Apr	27	2160	3000		
May	10	800	3000		
Jun	4	320	3000		

MEMORANDUM

- 1.1.1 Plus 94 Research 2
- 1.1.2 The newspaper is referencing its source of information 2
- 1.1.3 % of population = $\frac{7\,000}{23\,181\,997}$ as a % = 0,03% 4
- 1.2.1 Predicted % = 60%
Actual % = $\frac{11\,650\,748}{17\,680\,729}$ as a % = 65,9% 4
- 1.2.2 It means that the DA will get the most votes but will not get more than 50% of the votes. This means that they will not be completely in charge.
Actual % = $\frac{22}{42}$ as a % = 52,4% 4
- 1.2.3 It means that they predict that COPE will get the second-highest number of votes in those particular provinces and hence the second-highest number of seats. COPE became the official opposition in only 4 of the predicted provinces namely the Eastern Cape, Free State, Limpopo and Northern Cape. In the North West Province they share this position with the DA and in the Northern Cape Province the DA is the official opposition. 5
- 1.3.1 5



- 1.3.2 COPE did not do as well as had been predicted. The graph shows that except for the Western Cape where the predicted number of seats and the actual number of seats is the same, in all the other provinces the predicted result is more than the actual number of seats. In three of the provinces namely KwaZulu-Natal, Limpopo and Mpumalanga the predicted result was significantly more than the actual number of seats. 4
- 1.4 The predicted results anticipated that COPE would do much better than it did. They predicted that this would result in the ANC getting fewer votes than they actually did get. In the Western Cape they predicted that the ID would do much better than it did, which meant that the ANC and the DA did better than was predicted. The result was that the DA did get above 50% of the votes in the Western Cape. This survey gave the impression that the rise of COPE would make a big difference to the number of votes that the ANC would get. The sample that they used to obtain their data was only 0,03% of the voting population, which is a very small sample and hence could have given a skewed opinion. The newspaper does not say which province(s) the sample was taken from. 5
- 2.1.1 R83 900 2
- 2.2.1 There is no deposit needed 2
- 2.2.2 $R1\,399 + R57 = R1\,456$ 3
- 2.2.3 $60 \times R1\,456 = R87\,360$ 3
- 2.2.4 R34 399 1
- 2.2.5 Total cost = $R87\,360 + R34\,399 = R121\,759$
Total cost in advert = R121 753,81
This tiny difference is almost certainly the result of rounding 4
- 2.3.1 Principal debt = R88 040
Number of years = 5
Interest rate = 9,5%
Repayment factor = 21,00
Monthly installment = $\frac{88\,040}{1,000} \times 21,00 = R1\,848,84$ 5



- 4.1 Determine the following information from the graphs. (2)
- 4.1.1 How many confirmed cases of H1N1 flu were there by 24 July 2009? (2)
- 4.1.2 How many confirmed deaths from H1N1 flu were there by 24 July 2009? (2)
- 4.2 Use the information in the graphs to: (5)
- 4.2.1 Show that there are approximately 107 million people in the age group 25 – 49 years. Clearly show all working. (5)
- 4.2.2 Assume that the number of people in the age group 50 to 64 years is approximately 56 million. Calculate the approximate death rate per million people in each of the age groups: (4)
- a. 25 to 49 years (4)
- b. 50 to 64 years (4)
- 4.3 Based on your answers discuss, with explanation, which of the age groups in 4.2 appear to be at greater risk of dying from the H1N1 flu? (4)
- 4.4 Does the impression created by the “confirmed deaths” graph support your answer in 4.3? If yes, explain how. If no, explain why not. (4)

QUESTION 5

Eskom has been battling an electricity shortage since early in 2008. Not only do we need to conserve electricity but by saving electricity we also reduce the demand on the earth's fossil fuels (coal) and the production of carbon dioxide emissions which contribute to global warming. For the consumer the question is how to conserve electricity and save money at the same time. It is claimed that compact fluorescent light (CFL) bulbs use one-quarter the amount of electricity and last eight times as long as a regular incandescent light bulb. However, the CFL costs significantly more to buy!



- 5.1 To calculate the hourly running cost of each light bulb you need to know that: (2)
- Eskom charges 65,35c/kWh (prices vary)
- 5.1.1 The CFL bulb uses 15W of electricity per hour that it burns. How many kilowatts does it burn in one hour? (Recall 1kW = 1 000W) (2)
- 5.1.2 Hence calculate the hourly running cost of using a CFL in rand (correct to 4 decimal places). (3)

- 5.2 Use your answer to question 5.1 to complete the table below. You need only write down the values of a to d. (27)

	Fixed cost	Running cost/hour	Total cost (fixed + running costs)			
			0 hours	50 hours	100 hours	150 hours
CFL	R16,95		(a)	(b)	(c)	(d)
Incandescent	R3,99	R0,0392	R3,99	R5,95	R7,91	R9,87

- 5.3 Use the information from the table in 5.2 and graph paper to draw a graph comparing the running costs of the two bulbs for the time 0 to 750 hours. (8)
- 5.4 Use your graph to answer the following questions (4)
- 5.4.1 After approximately how many hours do the two options break-even? (4)
- 5.4.2 Approximately how much will you have saved after 600 hours by using the CFL bulb? (4)

2.3.2 Monthly cost = R1 848,84 + R57
 = R1 905,84
 = 60 × R1 905,84 = R114 350,04

2.4

	Total	Advantage	Disadvantage
1	R83 900	Most economical option. You do not have monthly finance service fees.	You will have to wait till you have saved up enough cash to purchase the car.
2	R121 753,81	You do not need a deposit. You can get the car even if you do not have the cash available. Monthly payments are low.	After 5 years you still owe R34 399 and may need another loan. You pay much more for the car if you do not pay cash.
3	R114 350,04	You do not need a deposit. You finish paying the car off after 5 years.	You have a higher monthly installment. You pay much more for the car if you do not pay cash.

3.1.1 1 000 mm = 1 m
 Height of rain = 58 mm ÷ 1 000 mm/m
 = 0,058 m

3.1.2 Vol of water = 80 m² × 0,058 m
 = 4,64 m³

3.1.3 4,64 m³ × 1 000 = 4 640 ℓ

3.2.1 Ave monthly water consumption = 4 × 25 ℓ / per × 30 days = 3 000 ℓ

3.2.2 Surplus = 4 640 ℓ – 3 000 ℓ = 1 640 ℓ

3.3.1 57 mm = 0,057 m

Vol of water = 80 m² × 0,057 m × 1 000 ℓ
 = 4 560 ℓ

Surplus = 4 560 ℓ – 3 000 ℓ = 1 560 ℓ

3.3.2 Water stored in tank = 1 640 ℓ + 1 560 ℓ
 = 3 200 ℓ

3.3.3

Mon	Anti	Sur/De	Bal
Mar	3 120	120	3 320
Apr		-840	2 480
May		-2 200	280
Jun		-2 680	-2 400

The negative balance indicates that the family will run out of water

March Anticipated calculation
 For all other values

3.4.1 1 000 ℓ = 1 m³

3 500 ℓ ÷ 1 000 = 3,5 m³

3.4.2 3,5 m³ = 3,141 × r² × 1,8 m

r² = 0,619

r = √0,619

r = 0,79 m

4.1.1 37 030 swine flu cases

4.1.2 302 deaths

4.2.1 Rate per 100 000 = 6,97

No. of cases = 7 434

No. of people = 7 434 ÷ 6,97 × 100 000

≈ 107 000 000

4.2.2 (a) Death rate per million people

= 124 ÷ 107 = 1,16 per mil.

(b) Death rate per million people

= 71 ÷ 56 = 1,27 per mil.

4.3 The 50 to 64 age group. The death rate per million of this group is greater than the death rate of the 25 to 49 age group. This means that there is a greater chance of someone who has swine flu in the 50 to 64 age group dying from it.

4.4 The confirmed deaths graph gives the impression that the 25 to 49 age group is more at risk than the 50 to 64 age group because the bars show that there have been many more deaths in the 25 to 49 age group. However, the rate of deaths per 100 000 as calculated in 4.3 shows that the relative risk is greater in the 50 to 64 age group. The confirmed deaths graph gives this impression because it represents the actual number of deaths which is not related to the population size of the group.

5.1.1 15W/h ÷ 1 000 W = 0,015 kW/h

5.1.2 Hourly running cost = 0,015 kW/h × 65,35c/kWh

= 0,98025c

= R0,0098

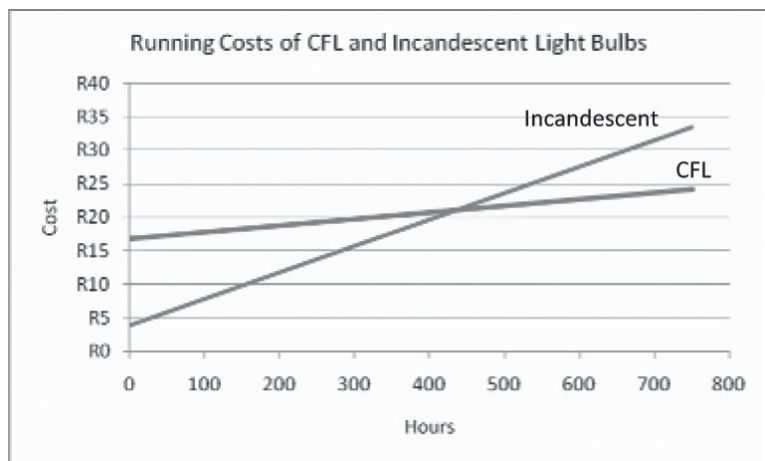
5.2 (a) R16,95

(b) R17,44

(c) R17,93

(d) R18,42

5.3



Correctly labelled

Suitable scale

Points plotted

Graphs drawn

5.4.1 Between 450 and 500 hours

5.4.2 Within a range of R3,00 to R7,00

TOTAL FOR PAPER 2: [150]

ACCOUNTING

QUESTIONS

QUESTION 1

BANK RECONCILIATION

(35 marks; 15 minutes)

You are provided with information from the accounting records of BELL Stores. Their financial year ends on 30 June 2008.

REQUIRED

- Use the information provided to show the reconciliation by completing the table below. Start with the provisional balances and end with the reconciled balance as per bank account. No details are required. (16)
- Calculate the amount that you would reflect in the financial statements in respect of Bank and Creditors Control. (4)
- Explain the procedure that the clerk was supposed to follow in respect of a post-dated cheque received at point 3.12. (4)

Information:

- Bank Reconciliation Statement on 31 May 2008

	R
Balance as per bank statement	3 000 (debit)
Outstanding deposit	1 000
Outstanding cheques:	

No.	Amount (R)
No. 101	250
No. 110	300
No. 113	320
No. 130	130
Balance according to bank account	?

2. Additional Information

- The bank statement showed a favourable balance on 30 June 2008 of R4 170.
- Provisional totals in the cash journals on 30 June 2008:
 - Cash Receipts Journal R25 580
 - Cash Payments Journal R18 580
- Creditors Control balance on 30 June 2008, R12 400.
- A comparison of the bank statement for June 2008 with the bank reconciliation statement on 31 May 2008 and the Cash Journals for June 2008, the following differences were discovered:
 - A deposit of R1 000 appeared in the bank statement on 1 June 2008 and not in the June cash journals.
 - Cheque 101 was lost in the mail and must be cancelled. It was replaced by cheque 175 in favour of Penny Suppliers for merchandise.
 - Cheque 110 was paid to Marketing World on 28 December 2007, but the campaign never took place.
 - Cheque 113 to Midas for repairs was corrected on the bank statement of June 2008 as R230.
 - Cheque 130 together with the following cheques do not appear on the bank statement of June 2008:
 - 168 in favour of Vooma Garage R110 (dated 27 June 2008)
 - 174 in favour of Ramos Suppliers (creditor) R890 (dated 15 July 2008)
 - The bank debited the bank statement of June 2008 with cash handling fees of R30 and interest on bank overdraft R170.
 - A debit order for the insurance premium appears on the bank statement in favour of Prima Insurers for R800.
 - The bank statement has a deposit of R1 000 on 1 June 2008 for rent received from Berg Furnitures, which does not appear in the cash journals of June 2008.
 - A deposit of R1 300 appears in the Cash receipts journal but not on the bank statement.
 - An amount of R700 was deposited directly into the bank account of BELL Store by J Crous, a debtor, in settlement of his account of R720.
 - The bank statement shows a debit of R440 which is a cheque of a debtor, J Johnson, rejected by the bank as "Refer to drawer" for insufficient funds. This was in settlement of an account of R450.
 - A cheque of G Gardner (a debtor) for R560 was returned by the bank as "Post dated". The cheque was held for redepositing on 3 July 2008.
 - The owner of BELL Stores applied to increase the bank overdraft from R5 000 to R10 000. The bank manager approved the request.

1.4. Scenario

BELL stores invested R30 000 on a Fixed Deposit at FIFI Bank on the 1 July 2007. The agreement stipulated that an interest rate of 15% per annum would be payable every six months. FIFI Bank is registered as an authorised financial services provider in terms of the FAIS Act. On 30th December 2007 BELL Stores received R2 250 from FIFI Bank for the first six months' interest. The Reserve Bank decreased the interest rate on 1st January 2008 by 2%. BELL Stores received a cheque to the amount of R20 000 on 30th June 2008 from FIFI Bank with a letter saying that the remaining R10 000 plus R1 950 (interest for the last six months) will be paid on 31st July 2008. The reason for this is that FIFI Bank has a cash flow problem. The owner of BELL Stores telephoned FIFI Bank and queried that this was not stipulated in the agreement and questioned the interest amount. FIFI Bank said that this was due to the decrease in the interest rate on 1st January 2008.

- What do you understand by the term "Financial Services Provider"? (2)
- What does the abbreviation FAIS stands for? (1)
- The owner of BELL Stores does not know how to solve the problem.
 - Where can the owner of BELL Stores go for advice? (2)
 - Is FIFI Bank complying with the FAIS Act? Explain briefly. (3)

ACCOUNTING QUESTIONS

- 1.4.3.3. If you were the adviser (answer in question 1.4.3.1), what should FIFO Bank do to solve the problem? (3)
[35]

QUESTION 2 INVENTORY VALUATION (30 marks; 15 minutes) REQUIRED

- Calculate the value of closing stock on the perpetual inventory system, using the FIFO and Weighted average methods. (16)
- Draw up a Trading stock account in the General ledger using the FIFO and Weighted average methods. All purchases are on credit and goods are sold for cash. (14)

INFORMATION:

Hemmingways Traders has the following transactions for inventory during the month of July 2008.

- 1 July** Balance of inventory, 400 units @ R4 each
10 July Purchases of inventory, 700 units @ R4,10 each
17 July 800 units sold, with a selling price of R12 each
22 July Purchases of inventory, 500 units @ R4,15 each
24 July 40 units returned to supplier, purchased on 22 July
30 July 600 units sold, with selling price of R12 each [30]

QUESTION 3 PROJECTED INCOME STATEMENT (45 marks; 30 minutes)

You are provided with a projected income statement for FOURIE Traders for January and February 2009. The actual figures are also provided. The business is owned by DANIELLE FOURIE. She uses a fixed mark-up percentage at all times and credit sales comprise 60% of all sales.

FOURIE TRADERS PROJECTED INCOME STATEMENT FOR JANUARY AND FEBRUARY 2009				
	JANUARY BUDGET	JANUARY ACTUAL	FEBRUARY BUDGET	FEBRUARY ACTUAL
Sales	540 000	396 000	594 000	360 000
Cost of sales	300 000	220 000	330 000	200 000
Gross profit	240 000	176 000	264 000	160 000
Other income	47 000	34 000	53 000	44 000
Commission received	11 000	16 000	11 000	23 000
Rent income	36 000	18 000	42 000	21 000
Gross operating income	287 000	210 000	317 000	204 000
Operating expenses	(154 480)	(147 580)	(136 128)	(143 300)
Salary of the store manager	40 000	40 000	50 000	50 000
Wages of shop assistants	24 000	24 000	24 000	16 800
Sundry operating expenses	13 000	9 000	14 000	9 000
Motor vehicle expenses	12 000	13 200	12 000	13 200
Telephone	1 000	3 000	1 000	5 000
Security expenses	7 000	3 500	7 000	3 500
Trading stock deficit	0	18 000	0	12 000
Training of employees	30 000	10 000	0	0
Advertising	5 000	1 000	5 000	1 000
Discount allowed	2 000	0	2 000	0
Bad debts	6 480	11 880	7 128	10 800
Stationery	4 000	4 000	4 000	7 000
Depreciation	10 000	10 000	10 000	15 000
Operating profit	132 520	62 420	180 872	60 700
Interest income (6% p.a.)	12 000	12 000	12 000	9 000
Profit before interest expense	144 520	74 420	192 872	69 700
Interest expense (15% p.a.)	(37 500)	(37 500)	(37 500)	(37 500)
Net profit for the year	107 020	36 920	155 372	32 200

REQUIRED:

- Calculate the mark-up % that DANIELLE uses for her business. (4)
- Refer to the actual figures for February for Interest income and Depreciation. In each case, provide a probable reason why the actual figure is different from the budget for February. (4)
- DANIELLE is always worried about the internal control over three expenses in particular: Stationery, Telephone and Motor Vehicle expenses (especially as the petrol price increased unexpectedly by 25% at the beginning of January). Comment on whether or not these expenses have been well controlled. Quote figures to support your answer. (7)
- DANIELLE is concerned that she has to keep contributing more capital each month so that the business can settle its debts. Explain why the Projected Income Statement will not help her in identifying the reasons for this problem. (3)
- DANIELLE has also borrowed money to set up this business. She is not sure if she can afford the loan repayments, which start in March.
 - Calculate the amount of the loan. (4)
 - What advice would you give her regarding accessing funds in order to repay the loan? Provide two points. (4)
- DANIELLE is concerned about the support she is getting from her customers. She is concerned about losing "goodwill".
 - Quote figures from the question that indicate that she appears to be losing customers. (2)
 - Identify three points, with appropriate figures from the projected Income Statement, that indicate that she has made mistakes in dealing with her customers. (6)
- The shop assistants earn equal wages. Two of the six shop assistants resigned at the beginning of February. They have not been replaced.
 - Calculate the monthly salary earned by each shop assistant in January. (3)
 - Calculate the % salary increase that DANIELLE granted the shop assistants in February. (4)
 - Provide two reasons why they would not be happy with this increase. Quote evidence from the question to support your answer. (4)

QUESTION 4 MANUFACTURING (50 marks; 30 minutes)

DUBE Tables Manufacturers produces wooden dining-room tables. The business is owned by THEBE DUBE.

REQUIRED:

- Calculate the Direct Labour Cost for the month. (7)
- Prepare the Production Cost Statement for the month ended 31 July 2008, with a separate note for Factory Overhead Cost. Show all other workings in brackets. (26)
- Calculate the unit cost of the production of finished goods for July 2008. (3)
- THEBE feels that the power cuts have had a significantly negative effect on his business. Provide two points from the question that indicate that he is correct. Quote figures/calculations from the question to support your answer. (6)
- THEBE is concerned about the control over certain costs. Direct materials account for more than 40% of the cost of one table, while direct labour accounts for more than 30%. THEBE wants your advice.
 - Provide two suggestions on how to improve efficiency in the use of direct materials. (8)
 - Provide two suggestions on how to improve the efficiency of the direct labourers. (8)

INFORMATION FOR JULY 2008:

- Stocks on hand at the beginning and end of the month:

	1 July 2008	31 July 2008
Raw materials	R40 000	R 65 000
Work-in-progress	R55 000	R40 000
Finished goods	Nil	Nil
Indirect material	R6 000	Nil

- Raw materials** purchased on credit, R180 000
- Depreciation** is as follows:
 - Factory plant, R7 400
 - Office equipment, R2 400.
- Factory maintenance** paid in July, R8 000. A further amount of R3 500 is owed for repairs to a machine.
- Electricity and water** paid amounts of R4 600 for July. The administration office uses 10% of this and the factory uses the rest.
- Rent and Insurance** are allocated between the factory and the administration office on the basis of floor area. The factory comprises 630 square metres, while the office comprises 270 square metres. The **monthly** rent for the entire premises is R30 000. The annual insurance premium is R43 200.
- Indirect materials** bought for cash, R20 000. There was no stock of indirect materials on hand at the end of the month. The factory uses 75% of these materials, while the office uses the rest.
- Direct labour and production:** The 15 factory workers who make the tables each work 9 hours per day. The normal rate is R36 per hour per person. There were normally 20 working days in a month. However, due to power cuts, the factory could operate for only 14 week days in July 2008. In order to make up for lost time, the 15 factory workers each worked 45 hours overtime on weekends. The overtime rate is double the normal rate. However, they were unable to meet their target production of 450 tables per month. They managed to complete 410 tables. The break-even point is 320 tables.
- Other salaries and wages comprise:**
 - The factory cleaner earns R2 600 per month
 - The factory foreman earns R15 000 per month. The bookkeeper had forgotten to process the foreman's pension. The employee's pension deduction is 7% and the employer's contribution is 10%. The contributions are added to the salaries account.
 - The administration staff earns R13 000 per month in total.
- The **selling price of each table** is set at cost of production plus R500 gross profit per table.
- The two **salespersons** work from home on a commission basis. The business incurs no fixed costs in this regard. [50]

QUESTION 5 Companies (50 marks; 35 minutes)

You are provided with information relating to LUIGIA Books Limited.

REQUIRED:

Refer to the information provided in order to answer the following questions.

- Calculate the missing amounts in the Cash Flow statement indicated by the letters (a) to (e). (12)
- Calculate the following for 2008:
 - Acid test ratio (3)
 - Stock turnover rate (4)
 - Debt/equity ratio (3)
 - Net asset value per share (3)
 - Earnings per share (3)

- 5.3 Does the company have a liquidity problem? Briefly explain, quoting THREE relevant liquidity ratios (financial indicators) to support your answer. (3)
- 5.4 As a shareholder in this company, would you be satisfied with the earnings per share, dividend per share and return on shareholders' equity? Briefly explain, quoting relevant financial indicators (ratios or percentages). (3)
- 5.5 The directors require another R600 000 to finance further expansions of the company. Credbank will not grant them additional loans. There are two options remaining:

OPTION A: Obtain a loan from Shifty at an interest rate of 24% p.a.
OR

OPTION B: Issue new shares at a premium of 50 cents per share.

- 5.5.1 In your opinion, which option should they choose? (2)
- 5.5.2 Briefly explain why you would choose this option and why you would reject the other option. Quote TWO financial indicators from your answer to QUESTION 5.4 to support your opinion. (4)
- 5.6 The managing director has approached you for advice. He currently owns 306 000 shares (that is 51% of the issued capital). He is worried that he will lose control of the company if all the unissued shares are issued to the public.
- 5.6.1 Calculate the minimum number of new shares he will have to buy to retain control of the company. (2)
- 5.7 If the shares are issued at a premium of 50c, what would he have to pay for the new shares? (2)
- 5.7.1 In your opinion, would this represent a fair value for these shares? Quote a financial indicator to support your answer. (2)
- 5.8 What is meant by "corporate social investment" and why is it important for a company to report on this? (2)
- 5.9 What is the difference between liquidity and solvency? (4)

INFORMATION:

LUIGIA BOOKS LIMITED CASH FLOW STATEMENT FOR THE YEAR ENDED 30 JUNE 2008	
Cash flow from operating activities	
Cash generated from operations	1 493 600
Interest paid	(a)
Dividends paid	(222 000)
Taxation paid	(b)
Cash flow from investing activities	
Purchase of fixed assets	(2 599 000)
Proceeds of sale of fixed assets	(c)
Cash flow from financing activities	
Proceeds of shares issued	(d)
Loans raised	720 000
Net change in cash and cash equivalents	(e)
Cash and cash equivalents at beginning of year	39 600
Cash and cash equivalents at the end of the year	52 800

The following financial indicators were calculated for the past two years:	2008	2007
Current ratio	0,9 : 1	1,7 : 1
Acid-test ratio	?	0,6 : 1
Stock turnover rate	?	6 times
Debt/equity ratio	?	0,8 : 1
Return on shareholders' equity (ROSHE)	12,3%	11%
Return on total capital employed (ROTCE) before tax	15%	13%
Interest rate on borrowed money	12%	12%
Net asset value per share (NAV)	?	534 cents
Earnings per share (EPS)	?	53,5 cents
Dividend per share (DPS)	43 cents	29 cents

LUIGIA BOOKS LIMITED INCOME STATEMENT FOR THE YEAR ENDED 30 JUNE	2008	2007
Sales	5 678 800	4 040 500
Cost of sales	(3 294 000)	(2 118 000)
Gross profit	2 384 800	1 922 500
Depreciation	(440 000)	(300 000)
Other operating expenses	(1 106 000)	(980 500)
Operating profit	838 800	642 000
Interest on long-term loan (capitalised)	(309 600)	(252 000)
Net profit before tax	529 200	390 000
Income tax	(158 700)	(117 000)
Net profit after tax	370 500	273 000

LUIGIA BOOKS LIMITED BALANCE SHEET AS AT 30 JUNE	2008	2007
Non-current/Fixed assets (see note 1)	6 278 200	4 699 200
Current assets	308 480	604 800
Inventories (all trading stock)	180 080	390 000
Trade and other receivables	75 600	163 200
SARS: Income tax	-	12 000
Cash and cash equivalents	52 800	39 600



TOTAL ASSETS	6 586 680	5 304 000
EQUITY AND LIABILITIES		
Ordinary shareholders' equity	3 318 000	2 724 000
Ordinary share capital (see note 2 below)	2 400 000	2 040 000
Share premium	409 500	288 000
Retained income	508 500	396 000
Non-current liability: Loan (see note 3 below)	2 940 000	2 220 000
Current liabilities	328 680	360 000
Trade and other creditors	175 280	258 000
SARS: Income tax	15 400	-
Shareholders for dividends	138 000	102 000
TOTAL EQUITY AND LIABILITIES	6 586 680	5 304 000

Notes to the Balance sheet:

- Fixed assets: Certain fixed assets were sold at book value during the year.
- Share capital: Authorised share capital comprises 700 000 ordinary shares of R4 par value. New shares were issued on the first day of the financial year.
- Loan from Credbank: All payments of loans and interest are up to date, but Credbank will not grant any further loans to this company. [50]

QUESTION 6

FIXED ASSETS AND CASH FLOW

(90 marks; 55 minutes)

You are provided with the Pre-adjustment trial balance of NICOLETTE Stores Ltd on 28 February 2009, at the end of their financial year, together with a list of adjustments at that date. NICOLETTE Stores Ltd has an authorised share capital of 1 000 000 shares at 50c each. NICOLETTE Stores Ltd uses the perpetual inventory system.

INSTRUCTION:

- Prepare the following ledger accounts in the General ledger of NICOLETTE Stores Ltd for the period 1 March 2008 to 28 February 2009. Balance/close off the accounts.
 - Depreciation (7)
 - Asset disposal (8)
- Prepare the Income statement of NICOLETTE Stores Ltd for the year ended 28 February 2009. (35)
- Prepare the following notes to the financial statements on 28 February 2009:
 - 6.3.1 Trade and other debtors (14)
 - 6.3.2 Accumulated profit (6)
 - 6.3.3 Trade and other creditors (14)
- Answer the following questions:
 - 6.4.1 Briefly explain the role performed in a company by the directors. (2)
 - 6.4.2 Briefly explain the role performed in a company by the auditors. (2)
 - 6.4.3 List three groups of people, apart from the existing shareholders, who would be interested in the financial statements of the company. (2)

INFORMATION:

- Pre-adjustment trial balance of NICOLETTE Stores Ltd on 28 February 2009.

BALANCE SHEET SECTION	DEBIT	CREDIT
Ordinary share capital		250 000
Share premium		15 000
Retained income		46 429
Land and buildings	211 000	
Vehicles	120 000	
Equipment	67 970	
Accumulated depreciation on vehicles		24 500
Accumulated depreciation on equipment		15 490
Trading stock	34 570	
Debtors' control	23 875	
Provision for bad debts		840
Bank		3 285
Petty cash	210	
Creditors' control		43 650
SARS: PAYE		1 349
SARS: Income tax	19 657	
Pension fund		425



- Pay the R2 250 interest and not only the R1 950 (did not stipulate in the contract)

3

TOTAL MARKS: [35]

QUESTION 2
Perpetual Inventory system - FIFO

Date	Received			Issued			Balance		
	Units quantity	Unit price	Total amount	Units quantity	Unit price	Total amount	Units quantity	Unit price	Total amount
1 July	700	R4,10	2 870				400	R4	1 600
							400	R4	1 600
							700	R4,10	2 820
10 July				400	R4	1 600	-	-	-
	500	R4,15	2 075	400	R4,10	1 640	300	R4,10	1 230
							300	R4,10	1 230
							500	R4,15	2 075
17 July	40	R4,15	166				300	R4,10	1 230
							460	R4,15	1 909
22 July				300	R4,10	1 230	-	-	-
				300	R4,15	1 245	160	R4,15	664
24 July									
30 July									
									8

Dr		Trading stock				Cr			
Jul	1	Balance	b/d	1 600	Jul	17	Cost of sales	CRJ	3 240
	10	Creditors control	CJ	2 870		24	Creditors control	CAJ	166
	22	Creditors control	CJ	2 075		30	Cost of sales	CRJ	2 475
							Balance	c/d	664
				6 545					6 545
Aug	1	Balance	b/d	664					
									7

Perpetual Inventory system – Weighted average

Date	Received			Issued			Balance		
	Units quantity	Unit price	Total amount	Units quantity	Unit price	Total amount	Units quantity	Unit price	Total amount
1 July							400	R4	1 600
	700	R4,10	2 870				1 100	R4,06	4 470
10 July				800	R4,06	3 248	300	R4,06	1 218
17 July	500	R4,15	2 075				800	R4,12	3 293
	40	R4,15	166				760	R4,12	3 127
22 July				600	R4,12	2 472	160	R4,12	659
24 July									
30 July									
									8

Dr		Trading stock				Cr			
Jul	1	Balance	b/d	1 600	Jul	17	Cost of sales	CRJ	3 248
	10	Creditors control	CJ	2 870		24	Creditors control	CAJ	166
	22	Creditors control	CJ	2 075		30	Cost of sales	CRJ	2 472
							Balance	c/d	659
				6 545					6 545
Aug	1	Balance	b/d	659					
									7

[30]

QUESTION 3

3.1	Calculate the mark-up % that Danielle uses for her business. 240 000 / 300 000 X 100 = 80% Or: use figures from any of the other columns	4
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3.2	Probable reason for interest income: The investment was decreased. Probable reason for depreciation: More fixed/tangible assets were bought.	4
3.3	Comment on Stationery: Well controlled in January, but R3 000 over-budget in February. This is possibly due to wastage/theft. Comment on Telephone: Abuse is apparent. R2 000 over budget in January and R4 000 over budget in February. Not well controlled. Comment on Motor vehicle expenses: Well controlled. The variance is only 10% (1 200/ 12 000) while the price of petrol increased by 25%.	7
3.4	Danielle is concerned that she has to keep contributing more capital each month so that the business can settle its debts. Explain why the Projected Income Statement will not help her in identifying the reasons for this problem. Cash problems will be identified in the Cash Budget. The projected Income Statement reflects profit. Certain income items might not have been collected, while payments for debts are not reflected in the projected Income Statement.	3
3.5	Calculate the amount of the loan. 37 500 / 0.15 X 12 = R3 m What advice would you give her regarding accessing funds in order to repay the loan? Provide two points Any two valid points, examples <ul style="list-style-type: none"> Liquidate the investment as the interest is only 6% Admit a partner/member Sell off unused property Any other valid point 	8
3.6	Quote figures from the question which indicates that she appears to be losing customers. Jan actual sales R396 000 Budgeted R540 000 OR Feb actual sales R360 000 Budgeted R594 000 OR Feb actual sales R360 000 are less than Jan R396 000 Identify three points, with appropriate figures from the projected Income Statement, which indicate that she has made mistakes in dealing with her customers. Any three valid points, for example <ul style="list-style-type: none"> Advertising only R1 000 per month compared with R5 000 budget Discount allowed is Nil, despite R2 000 monthly budget – not granting discount, or debtors are paying too slowly to gain the benefit The 80% mark-up at all times might be a problem in relation to prices of competitors – offer trade discounts Security spent is 50% of the budget of R7 000 – this is causing shop-lifting as evidenced by trading stock deficits which were not budgeted. Bad debts R11 880/R10 800 exceed the budget R6 480/R7 128 – indicates poor screening or poor collection. 	8
3.7	Calculate the monthly salary earned by each shop assistant in January. R24 000 / 6 = R4 000 Calculate the % salary increase that Danielle granted the shop assistants in February. R16 800 / 4 = R4 200 Increase = R4 200 – R4 000 = R200 % increase = 200 / 4 000 x 100 = 5% Provide two reasons why they would not be happy with this increase. Quote evidence from the question to support your answer. Any two valid points, examples <ul style="list-style-type: none"> The manager received a 25% increase while the assistants received 5% The 5% increase is significantly less than the inflation rate of approximately 11%. The assistants who resigned were not replaced. The remaining assistants probably have to work harder for a small increase. 	11

TOTAL MARKS: [45]

QUESTION 4

4.1	Calculate Direct Labour Cost: 15 employees x 14 days x 9 hours x R36 = R68 040 15 employees x 45 hours x R72 = R48 600 TOTAL = R116 640	7
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4.2 DUBE TABLES MANUFACTURERS
PRODUCTION COST STATEMENT FOR JULY 2008

Direct material cost 40 000 + 180 000 – 65 000	155 000
Direct labour cost	116 640

ACCOUNTING

PAPER 1

MEMORANDUM

Prime cost	271 640
Factory overhead cost	85 160
Total cost of production	356 800
Work-in-process on 1 July 2008	55 000
	411 800
Work-in-process on 31 July 2008	(40 000)
Cost of production of finished goods (410 tables)	371 800

Note 1: Factory overhead cost

Indirect materials 75% x (6 000 + 20 000)	19 500
Wages of factory cleaner	2 600
Salary of factory foreman 15 000 + 1 500	16 500
Depreciation	7 400
Factory maintenance 8 000 + 3 500	11 500
Electricity & water	4 140
Factory rent 630 / 900 x R30 000	21 000
Insurance 630 / 900 x R43 200 / 12	2 520
	85 160

4.3	Calculate the unit cost of production per table: R371 800 / 410 tables = R906,83	3
4.4	THEBE feels that the power cuts have had a significantly negative effect on his business. Provide two points from the question that indicate he is correct. Quote figures/calculations from the question to support your answer. <i>Any two valid points, quoting evidence, for example</i> <ul style="list-style-type: none"> Production is 40 units short. Loss of gross profit = 40 x R500 = R20 000. The overtime wages paid cause a difference in Direct Labour Cost of 1/2 x R48 600 = R24 300, that is R59,27 per table. They were exceeding their BEP by 130 tables. During July, the margin reduced to 90 tables. 	6
4.5	Provide two suggestions on how to improve efficiency in the use of direct materials. <i>Any two valid points, for example</i> <ul style="list-style-type: none"> Identify the exact amount of direct material required for each table Proper documentation for stocks drawn from the store-room Assess the degree of wastage (off-cuts) Provide two suggestions on how to improve the efficiency of the direct labourers. <i>Any two valid points, for example</i> <ul style="list-style-type: none"> Time and work study – inspect and calculate how long it takes for one table to be made Proper training of direct workers Assess procedure for clocking in and out Monitor tea breaks, lunch breaks, sick leave etc Reduce overtime – buy a generator to restrict work to normal time. 	8

TOTAL MARKS: [50]

QUESTION 5

5.1 Calculate the missing amounts on the face of the Cash flow statement indicated by the letters (a) to (e).	
(a) 309 600	
(b) 158 700 – 12 000 – 15 400 = 131 300	
(c) 4 699 200 + 2 599 000 – 6 278 200 – 440 000 = 580 000	
(d) (2 400 000 – 2 040 000) + (409 500 – 288 000) = 481 500	
(e) 52 800 – 39 600 = 13 200 (INFLOW)	
	12

5.2.1 Calculate the acid test ratio for 2008:	
308 480 – 180 080 : 328 680	
128 400 : 328 680	
0,39 : 1	
	3

5.2.2 Calculate the stock turnover rate for 2008:	
3 294 000	
(180 080 + 390 000)/2	
= 3 294 000	
285 040	
= 11,6 times	
	4

5.2.3 Calculate the debt/equity ratio for 2008:	
2 940 000 : 3 318 000	
0,89 : 1	
	3

5.2.4 Calculate the net asset value per share for 2008:	
3 318 000 X 100	
600 000 1	
= 553 cents	
	3

5.2.5 Calculate the earnings per share for 2008:	
370 500 X 100	
600 000 1	
= 61,75 cents	
	3

5.3 Does the company have a liquidity problem? Briefly explain, quoting THREE relevant liquidity ratios (financial indicators) to support your answer.	
<ul style="list-style-type: none"> The current ratio decreased from 1,7 : 1 in 2007 to 0,9 : 1 in 2008. The acid test ratio decreased from 0,6 : 1 in 2007 to 0,39 : 1 in 2008. The stock turnover rate improved from 6 times in 2007 to 11,6 times in 2008. There was too much stock on hand last year, but the company had better control over stock; the company will find it difficult to pay their short-term liabilities.	
	3

5.4 As a shareholder in the company, would you be satisfied with the earnings per share, dividends per share and return on shareholders' equity? Briefly explain, quoting relevant financial indicators (ratios or percentages).	
<ul style="list-style-type: none"> The earnings per share increased from 53,5 cents in 2007 to 61,75 cents per share in 2008. The dividends per share increased from 29 cents in 2007 to 43 cents per share in 2008. The return on shareholders' equity increased from 11% in 2007 to 12,3% in 2008. New shares were issued at the beginning of the year, but all the financial indicators increased. Thus, the shareholders can be satisfied with their investment in the company. 	
	3

5.5

5.5.1 In your opinion, which option should they choose?	
Option B	
5.5.2 Briefly explain why you would choose this option and why you would reject the other option. Quote TWO financial indicators from your answer to QUESTION 5.4 to support your opinion.	
<ul style="list-style-type: none"> The return on total capital employed before tax is 15% and the interest on loan from Shifty Lenders will be 24%. The debt/equity ratio is 0,89 : 1 for 2008. With the additional loan + interest the company could be at risk (high geared). 	4

5.6

5.6.1 Calculate the minimum of new shares he will have to buy to retain control of the company	
51% x 100 000 = 51 000 shares	2
5.7 If the shares are issued at a premium of 50 cents, what would he have to pay for the new shares?	
51 000 x R4,50 = R229 500	2
5.7.1 In your opinion, would this represent a fair value for these shares?	
Quote a financial indicator to support your answer.	
Yes. The net asset value per share is 553 cents, which is higher than 450 cents.	
	2

5.8 What is meant by "corporate social investment" and why is it important for a company to report on this?	
Relates to expenditure by the company in the community and the environment. It is essential that companies also put back into the economy, for the benefit of all, and don't just take in the form of profits. (KING REPORT)	
	2

5.9 What is the difference between liquidity and solvency?	
--	--

- Solvency
The ability to meet financial obligations on time, or to pay long-term debts.
- Liquidity
The ease and speed with which an investment can be converted into cash. Also referred to as the ability to pay short-term debts using short-term assets.

2

TOTAL MARKS: [50]

QUESTION 6
Question 6.1

General ledger of Nicolette Stores Ltd

Dr				Depreciation				Cr			
Feb	28	Accumulated depreciation on Equipment (Asset disposal)	GJ	1 989	Feb	28	Profit and loss	GJ	33 894		
		Accumulated depreciation on Equipment	GJ	1 905							
		Accumulated depreciation on Vehicles	GJ	30 000							
				33 894					33 894		
											7

Dr				Asset Disposal				Cr			
Feb	28	Equipment	GJ	48 000	Feb	28	Bank	GJ	35 000		
							Accumulated depreciation on equipment	GJ	10 209		
							Loss on sale of Equipment		2 791		
				48 000					48 000		
											8

Question 6.2

Income statement for the year ended 28 February 2009

Sales (525 780 – 21 560)		504 220	
Cost of sales		(254 680)	
Gross profit		249 540	
Other operating income		11 840	
Discount received	620		
Rent income (13 090 – 1 870)	11 220		
Gross income		261 380	
Operating expenses		(207 430)	
Depreciation (see calculation)	33 894		
Loss on sale of asset	791		
Trading stock deficit	2 780		
Provision for bad debts adjustment	74		
Salaries	149 920		
Packing material	2 548		
Discount allowed (350 – 25)	325		
Advertising (2 470 + 2760 – 1 840)	3 390		
Insurance (5 620 – 460)	5 160		
Stationery (4 258 – 435)	3 823		
Pension fund contributions (1 875 + 750)	2 625		
Medical aid contributions (965 + 320)	1 285		
Bad debts (350 + 465)	815		
Net income before tax		53 950	
Income tax		(18 680)	
Net income after tax		3 270	
			35

Calculations (adjustments)

1. Depreciation

$$\begin{aligned} \text{asset disposal} &= 15\% \times 48\,000 \times 2/12 = 1\,200 \\ &= 48\,000 - 1\,200 = 46\,800 \times 15\% = 7\,020 \\ &= 48\,000 - 1\,200 - 7\,020 \times 15\% \times 4/12 = 1\,989 \\ \text{Total} &= 1\,200 + 7\,020 + 1\,989 = 10\,209 \end{aligned}$$

3+4 Depreciation

$$\begin{aligned} \text{Equipment} &= 19\,970 - 7\,270 = 12\,700 \times 15\% = 1\,905 \\ \text{Vehicles} &= 120\,000 \times 25\% = 30\,000 \end{aligned}$$

5+6 Trading stock deficit

$$34\,570 + 750 - 32\,540 = 2\,780$$

9 Insurance

$$\begin{aligned} 6x + 7(x + 0,15x) &= 5\,620 \\ 6x + 7x + 1,05x &= 5\,620 \\ 14,05x &= 5\,620 \\ x &= 400 \\ 400 \times 0,15 &= 60 \end{aligned}$$

ACCOUNTING

MEMORANDUM

$$400 + 60 = 460$$

10 Salary (75 000/12)	6 250		
SARS: PAYE (36% x 6 250)			2 250
Pension fund (8% x 6 250)		500	
Medical aid fund		320	
Creditors for salaries			3 180
Pension fund contribution		750	
Pension fund			750
Medical aid contribution		320	
Medical aid		320	

Question 6.3

Notes to the financial statements

Trade and other receivables	R
Trade debtors (23 875 + 325 + 25 – 350 – 465)	23 410
Provision for bad debts (840 + 74)	(914)
Net trade debtors	22 496
Prepaid expenses (460 + 1 840)	2 300
SARS: income tax (19 657 – 18 680)	977
	25 773
	14

Accumulated profit	R
Balance at the beginning of the year	46 429
Net profit as per income statement	35 270
Ordinary dividends	(37 500)
Paid	25 000
Recommended	12 500
Balance at the end of the year	44 199
	6

Trade and other payables	R
Trade creditors (43 650 + 750)	44 400
SARS: PAYE (1 349 + 2 250)	3 599
Accrued expenses	2 760
Pension fund (425 + 500 + 750)	1 675
Medical aid fund (320 + 320)	640
Creditors for salaries	3 180
Shareholders for dividends	12 500
Income received in advance	1 870
	70 624
	14

Question 6.4

6.4.1 Briefly explain the role performed in a company by the directors.	
- To control and manage the activities of the company.	2
- They serve as the "ears, eyes, arms and legs" of the company.	

6.4.2 Briefly explain the role performed in a company by auditors.	
- To express an opinion on the presentation figures in the financial statements.	2
- Protect shareholders/check books/detect fraud	

6.4.3 List three groups of people, apart from the existing shareholders, who would be interested in the financial statements of the company.	
<ul style="list-style-type: none"> • SARS • Directors • Short-term credit providers • Long-term credit providers • Suppliers • General public • Unions 	2

TOTAL MARKS: [90]

PHYSICAL SCIENCES
PAPER 1
QUESTIONS

SECTION A

QUESTION 1: ONE-WORD/TERM ITEMS

Give ONE word/term for EACH of the following descriptions. Write only the word/term next to the question number (1.1 – 1.5).

1.1	The minimum amount of energy required to remove an electron from a metal surface	(1)
1.2	The energy of a body due to state of motion	(1)
1.3	The bending of light when it enters an optically more dense medium	(1)
1.4	The product of the magnetic field strength inside a single coil of conductor and the area enclosed by the coil	(1)
1.5	Increases the capacitance of a capacitor when placed between the parallel plates of the capacitor	(1)
		[5]

QUESTION 2: CORRECTING FALSE STATEMENTS

The statements in questions 2.1 – 2.5 are FALSE. Correct the statements.

2.1	When you hold a 1 kg mass in your hand with your palm facing upwards, the reaction to the weight of the 1 kg mass is the normal force of the hand on the 1 kg mass.	(2)
2.2	The refraction and diffraction of light both involve light "bending" when it passes into an optically denser medium.	(2)
2.3	If two resistors of $3\ \Omega$ and $5\ \Omega$ respectively are connected in parallel in a closed circuit (charge is flowing in it), the potential difference across the $3\ \Omega$ resistor will be higher than the potential difference across the $5\ \Omega$ resistor.	(2)
2.4	For the "lasing" process to be initiated in a laser, all electrons in the laser material must be in higher electron energy levels.	(2)
2.5	The wavelength of a "matter wave" – the waves associated with moving particles – is proportional to the momentum of the particle. (This section is not examinable.)	(2)
		[10]

QUESTION 3: MULTIPLE-CHOICE QUESTIONS

Four possible answers are provided for each of the following questions. Choose the correct answer and make a cross (X) in the block (A – D) next to the question number (3.1 – 3.5). Each question has ONE correct answer.

3.1	Two trolleys, A (2 kg) and B (4 kg), stand on a frictionless, horizontal table top. They are connected by a rubber band. The two trolleys are then moved apart and the rubber band stretches. When the trolleys are released they move towards each other, collide and stick together. After the collision the two trolleys, which are now joined, will A move in the direction of A, the 2 kg trolley. B move in the direction of B, the 4 kg trolley, with a decreased velocity. C move in the direction of B, the 4 kg trolley, with an increased velocity. D remain stationary.	(2)
-----	---	-----

3.2

A small cart is pulled along a rough road by a force, F. Consider these statements:
I F_A could be the component of force F in the direction of travel.
II F_C and F_D could be an action-reaction pair representing, respectively, the weight of the cart and the normal force of reaction that the ground exerts on the wheel.
III The resultant force that causes the cart to move could be given by the equation: $F_A - \mu F_D$ where μ is the appropriate coefficient of friction.

Which of the above statements is/are TRUE?
A Only I
B Only II
C I and III only
D II and III only

(2)

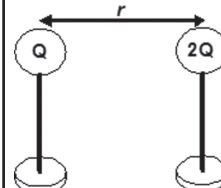
3.3 The diagrams below represent the diffraction bands formed by light falling on a single slit. Light of two different colours was directed, one colour at a time, on the single slit. The diffraction patterns A and B were obtained for the two, different colours.



- The colours of light used could have been:
A green light for A and blue light for B
B red light for A and yellow light for B
C yellow light for A and green light for B
D green light for A and red light for B

(2)

3.4 The centres of two identical spheres are a distance r apart. The spheres carry charges of Q and $2Q$ respectively, as shown in the diagram below. The magnitude of the electrostatic force each sphere exerts on the other is F .

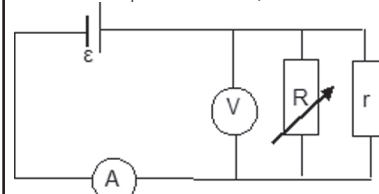


The two spheres are brought into contact and then separated to a distance $r/2$ apart, i.e. they are now one half of the original distance apart.

- The magnitude of the new force between the charges is ...
A $F/2$ if the original charges were oppositely charged
B F
C $4F$ if the original charges were both positive
D $8F$ if the original charges were both negative

(2)

3.5 In the circuit represented below, the resistance of the variable resistor is decreased.



How would this decrease affect the readings on the voltmeter and ammeter?

	Voltmeter reading	Ammeter reading
A	unchanged	decreases
B	decreases	increases
C	increases	unchanged
D	unchanged	increases

(2)

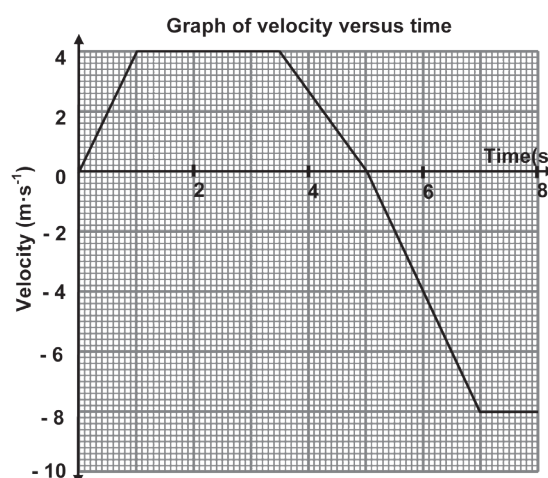
TOTAL SECTION A: [25]

SECTION B

QUESTION 4

An electrical toy racing car is placed on the start line on a long, rubber track. Aziz holds the control in his hands. Initially the toy is at rest. When Aziz pushes a lever forwards, the car moves forwards. When he pulls the lever backwards, the car reverses. The further backwards or forwards Aziz moves the control lever, the faster the car moves.

The toy car's motion is plotted on a computer as it travels. The following velocity-time graph was obtained for the car's movements over a period of 8 seconds.



	Use the information on the graph to answer the following questions:	
4.1	Calculate the acceleration of the car between times $t = 5\text{ s}$ and $t = 7\text{ s}$.	(2)
4.2	When does the car move at a speed of $2,6\text{ m}\cdot\text{s}^{-1}$?	(2)
4.3	Describe the motion of the car between 4 s and 6 s.	(3)
4.4	Where is the car in relation to the start line 8 s after it starts moving?	(4)
		[11]

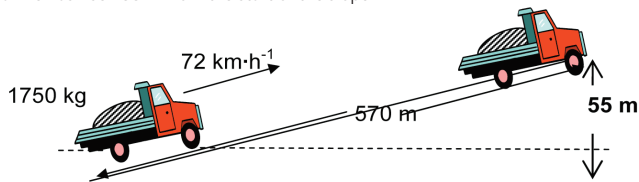
QUESTION 5

A 400 g ball is thrown vertically into the air with a velocity of $28,69 \text{ m}\cdot\text{s}^{-1}$. The ball takes 5,84 s to return to the ground.
On striking the ground, the ball bounces and reaches a height that is exactly half the maximum height attained in the throw.

5.1	Calculate the maximum height attained by the ball when thrown upwards.	(3)
5.2	Determine the velocity of the ball the instant before it strikes the ground.	(2)
5.3	Calculate the velocity of the ball the instant after bouncing off the ground.	(4)
5.4	If the average force exerted by the ground on the ball as it bounces is 103 N, for how long are the ball and ground in contact? You may ignore the effects of friction.	(6)
		[15]

QUESTION 6

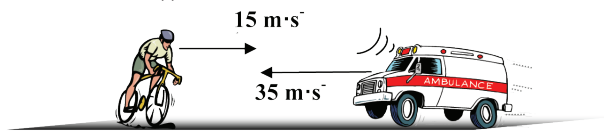
A loaded bakkie with a total mass of 1750 kg travels up a steadily sloping road. The bakkie maintains a constant speed of $72 \text{ km}\cdot\text{h}^{-1}$ during the 570 m climb. When it reaches the highest point on the road, the bakkie has risen 55 m from the start of the slope.



6.1	If the work done to overcome friction is $5,84 \times 10^6 \text{ J}$, calculate the average power developed by the bakkie's engine during the climb.	(3)
6.2	What is the resultant force on the bakkie at a point half way up the 570 m climb? Explain your answer.	(2)
6.3	When the bakkie is off-loaded its mass without the load is 1100 kg. On the same hill on its return journey, the bakkie accelerates from $72 \text{ km}\cdot\text{h}^{-1}$ at the top to $90 \text{ km}\cdot\text{h}^{-1}$ at the bottom of the slope. If the average frictional force on the bakkie during the journey down the slope is $6,44 \times 10^3 \text{ N}$, how much work does the engine do while the bakkie is accelerating?	(7)
		[12]

QUESTION 7

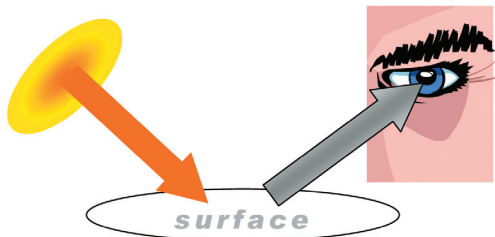
7.1 Describe the Doppler effect. (2)



A cyclist pedals along a road at a speed of $15 \text{ m}\cdot\text{s}^{-1}$ when an ambulance comes directly towards him at a steady speed of $35 \text{ m}\cdot\text{s}^{-1}$. The ambulance driver turns on his siren to warn the cyclist of his approach and the cyclist stops immediately he hears the siren. The ambulance maintains its steady speed. The speed of sound is $330 \text{ m}\cdot\text{s}^{-1}$.

- 7.2 What does the cyclist notice about the siren sound as he is coming to a stop? (1)
7.3 If the frequency of the continuous blast from the siren is 400 Hz, what change in frequency will the cyclist observe as the ambulance passes by him? (4)[7]

QUESTION 8

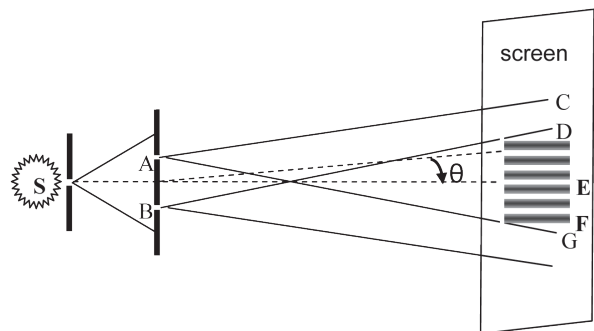


In the table below the columns represent the colour of the light falling on a surface. The rows represent the differently pigmented (coloured) surfaces that the incident light falls on.
Give the SURFACE COLOURS THAT WILL BE OBSERVED in each case i.e. 8.1 to 8.8.

	Light colour	GREEN	MAGENTA	YELLOW
Surfaces	CYAN	8.1	8.4	8.6
	BLUE	Black	Blue	8.7
	YELLOW	8.2	8.5	Yellow
	RED	8.3	Red	8.8
[8 x 1/2 = 4]				

QUESTION 9

In 1801, Thomas Young demonstrated the phenomenon of interference of light using a single source of monochromatic light (S in the diagram) which then illuminated two thin slits (A and B in the diagram below). The equation that describes the pattern formed in Young's experiment when two waves interfere is given as:



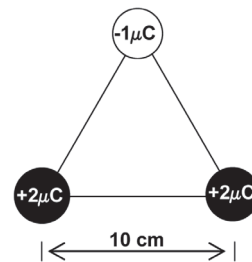
Refer to the diagram when answering the following questions.

**PHYSICAL SCIENCES
PAPER 1
QUESTIONS**

- 9.1 Which is/are regarded as the source(s) of light in Young's experiment? (1)
9.2 Why is there an interference pattern in the space between D and G but not between C and D? (2)
9.3 Explain why we find a bright band at E (known as the "central maximum") but a dark band at F. (2)
9.4 What is the value of m in the equation for the central maximum? Explain your answer using your knowledge of basic trigonometry. (2)
9.5 What is the value of m for the angle θ shown on the diagram? (1)
9.6 Write down the missing words in the following passage.
"When a wave (9.6.1) strikes a narrow gap, every point on the wavefront acts as a source of secondary wavelets. This "bending" of a wavefront by an edge is known as (9.6.2). Thus the pattern produced by a single slit is actually an (9.6.3) pattern with alternating bright and dark bands similar to those found in Young's experiment. Patterns formed in this kind of experiment with light are at their clearest when the width of the gap/slit used is of a similar length to that of the (9.6.4) of the monochromatic light being used." (4 x 1)[12]

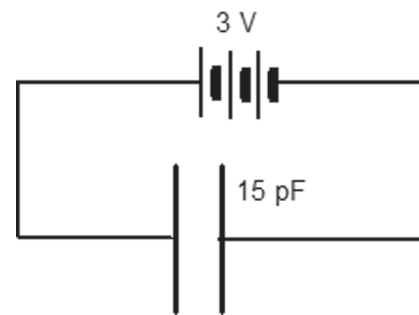
QUESTION 10

Three identical, charged metal spheres are positioned at the vertices of an equilateral triangle, as shown in the diagram. The charges on the three spheres are $+2 \mu\text{C}$, $+2 \mu\text{C}$ and $1 \mu\text{C}$, as shown. The centres of all the spheres are 10 cm apart.



- 10.1 What is the magnitude of the forces that the $-1 \mu\text{C}$ charge and one of the $+2 \mu\text{C}$ charges exert on each other? (3)
10.2 Draw a force diagram showing the direction and magnitude of the forces that act on the $-1 \mu\text{C}$ charge and the $+2 \mu\text{C}$ on the LEFT side of the triangle if the $+2 \mu\text{C}$ charge on the RIGHT side of the triangle is removed. (2)
10.3 The two spheres carrying the $+2 \mu\text{C}$ charges are held in position and the $-1 \mu\text{C}$ charge is replaced by a $+1 \mu\text{C}$ charge.
10.3.1 Draw a free-body diagram to show the direction and approximate size of the resultant force that acts on the $+1 \mu\text{C}$. (2)
10.3.2 State whether the magnitude of the force on the $+1 \mu\text{C}$ will be $< 1 \text{ N}$, $> 2 \text{ N}$ or $> 5 \text{ N}$. (1)[8]

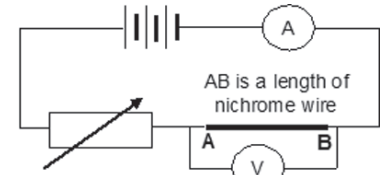
QUESTION 11



- 11.1 How much charge can a 15 pF capacitor hold when connected in series with a $3,0 \text{ V}$ battery? (2)
11.2 How many electrons make up this charge? (2)
11.3 How will a 30 pF capacitor differ from a 15 pF capacitor if they are both made from identical materials and if the gap between the capacitor plates is also identical? (1)[5]

QUESTION 12

Sipho connected this circuit to investigate whether a 500 mm length of nichrome wire with a diameter of 0,1 mm obeys Ohm's Law.



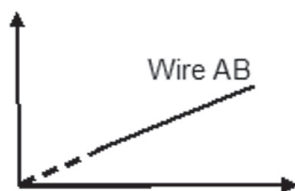
- 12.1 State Ohm's Law. (3)
12.2 What could Sipho's hypothesis be for this experiment? (1)
12.3 What is the purpose of the variable resistance in the experimental circuit? (1)
12.4 Sipho adjusts the current in the circuit and measures the potential difference across AB for every different value of current, I, i.e. the ammeter readings. Explain which variable Sipho should plot on the vertical axis of his graph. Sipho takes the following readings: (2)

PHYSICAL SCIENCES

PAPER 1 QUESTIONS + MEMORANDUM

Ammeter reading (A)	Voltmeter reading (V)
0,8	1,0
1,8	2,2
2,2	2,7
2,8	3,4

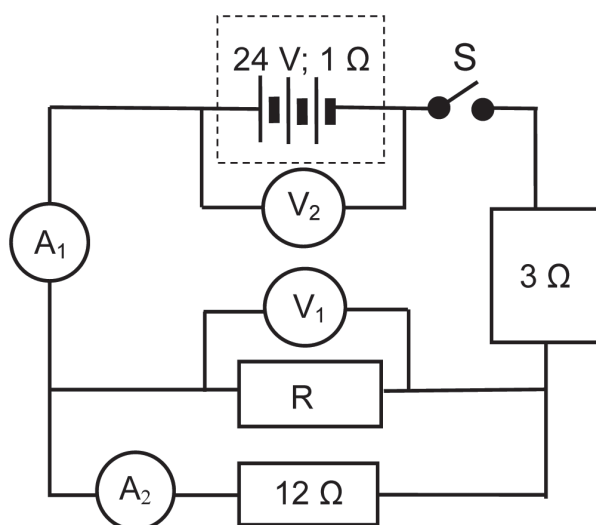
- 12.5 He plots his experimental data on a graph and finds that he gets a straight line which, when it is extrapolated to lower values of I , is found to pass through the origin.



- 12.5.1 What quantity does the slope of the graph represent? (1)
- 12.5.2 Use the raw data in the table to calculate the average value of slope of the graph to one decimal place. (1)
- 12.5.3 Was the nichrome wire used in Siphos's experiment ohmic? Explain your answer and mention one variable that must be controlled. (2)
- 12.6 What will the approximate resistance be of a 1 m length of 0,1 mm diameter nichrome wire? (1)
- 12.7 Estimate the resistance of a 500 mm length of nichrome wire with a diameter of 0,2 mm. (2)[14]

QUESTION 13

Arnold and Mary construct a circuit as shown in the circuit diagram below. The circuit contains a fresh, fully charged, 24 V battery with an internal resistance of 1 Ω .



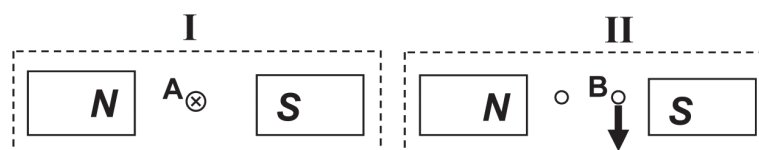
When the switch, S , is closed Mary reads the ammeter A_1 and records a current of 3 A.

- 13.1 Using this value of the reading on A_1 , i.e. 3A, calculate the (4)
- 13.1.1 Value of the unknown resistance, R (4)
- 13.1.2 The reading on the voltmeter V_1 (3)
- 13.1.3 The reading on the voltmeter V_2 (3)
- 13.1.4 The reading on the ammeter A_2 (3)
- 13.1.5 The energy dissipated per second in the battery when charge is flowing in the circuit. (3)
- 13.2 The switch, S , remains closed and charge is allowed to flow in the circuit for a long time. State whether the following readings will INCREASE, DECREASE or REMAIN UNCHANGED: (1)
- 13.2.1 A_1 (1)
- 13.2.2 A_2 (1)
- 13.2.3 V_1 (1)
- 13.2.4 V_2 (1)
- 13.3 Explain the underlying cause for any changes in the circuit as the battery gets older. (1)

[21]

QUESTION 14

14.1 Diagrams I and II each show two magnet poles and the end-view of a conducting coil situated between the poles. The diagrams illustrate the principle on which electric motors and generators work. The current in the coils is conventional current.

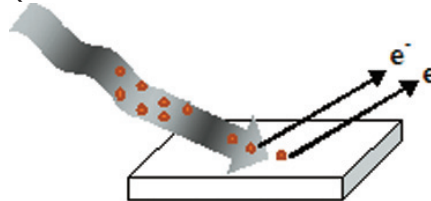


Use the appropriate rule to determine

- 14.1.1 The direction of the force ("up" or "down") on the conductor at A (1)
- 14.1.2 The direction of the current ("in" or "out") at B if the applied force on the conductor is downwards (1)
- 14.2 State which of the two diagrams illustrate the basis for an AC generator. (1)
- 14.3 An ammeter records a reading of 24 A for the current in an AC circuit. (1)
- 14.3.1 What is the term used to describe the value of this reading? (1)
- 14.3.2 What is the highest value the current actually attains in the positive half of the AC cycle in this circuit? (Calculation to 1 decimal place.) (2)
- 14.3.3 What is the maximum variation of the current for one AC cycle? (1)
- 14.3.4 What is the term used to describe the value calculated in 14.3.3? (1)
- 14.3.5 Can one calculate the rate at which the current in this circuit alternates using the information given? Explain. (1)

[9]

QUESTION 15



- 15.1 What is the name given to the phenomenon in which electrons are removed from a metal surface by the action of light? (1)
- 15.2 Yellow light has a wavelength of approximately 590 nm. The minimum energy required for a photon to remove an electron from zinc metal is $6,89 \times 10^{-19}$ J. Determine whether a beam of yellow light will liberate electrons from the surface of a clean piece of zinc metal? (5)
- 15.3 If the intensity of the yellow light on the zinc metal is increased, explain the effect this will have on the number of photoelectrons. (1)

[7]

TOTAL SECTION B: [125]

MEMORANDUM SECTION A

QUESTION 1: ONE-WORD/TERM ITEMS

- 1.1 Work function (1)
- 1.2 Kinetic (energy) (1)
- 1.3 Refraction (1)
- 1.4 Magnetic flux (1)
- 1.5 Dielectric (1)

[5 x 1 = 5]

QUESTION 2: CORRECTING FALSE STATEMENTS

- 2.1 ... the reaction to the weight of the 1 kg mass is the force of the 1 kg mass on the Earth. (2)
- 2.2 Only refraction and diffraction of light both involves light "bending" when it passes into an optically denser medium. Diffraction is due to the bending of a wave around an obstacle or through a narrow gap. (2)
- 2.3 If two resistors of 3 Ω and 5 Ω respectively are connected in parallel in a closed circuit (charge is flowing in it), the potential difference across the 3 Ω resistor will be higher than and the potential difference across the 5 Ω resistor will be the same. (2)
- 2.4 For the "lasing" process to be initiated in a laser, more all electrons from certain more electrons will be in the laser material must be in higher electron energy levels than in lower energy levels. (This is known as "population inversion"). (2)
- 2.5 The wavelength of a "matter wave" – the waves associated with moving particles – is inversely proportional to the momentum of the particle. (2)[5 x 2 = 10]

QUESTION 3: MULTIPLE-CHOICE QUESTIONS

- 3.1 D (1)
- 3.2 C (1)
- 3.3 D (1)
- 3.4 A (1)
- 3.5 D (1)

[5 x 2 = 10]

TOTAL SECTION A: [25]

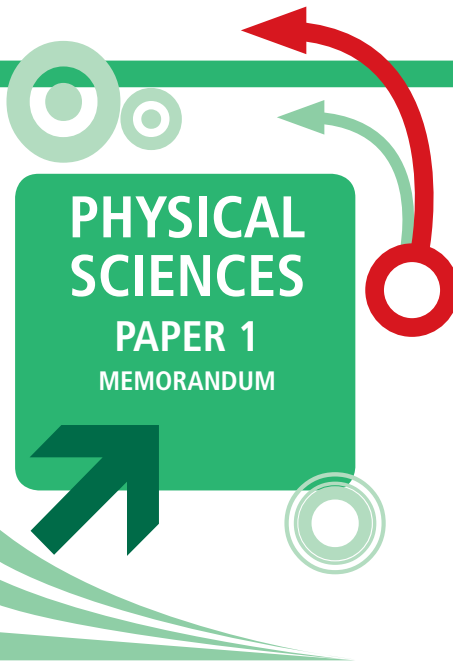
SECTION B

QUESTION 4

- 4.1 $a = \Delta v / \Delta t = (-8 - 0) / (7 - 5) = -8 / 4 = -2 \text{ m} \cdot \text{s}^{-2}$ (2)
- 4.2 0,65 s; 4,0 s; 5,65 s (2)
- 4.3 Slows down (accelerates negatively, NOT "decelerates" $[-2,6 \text{ m} \cdot \text{s}^{-2}]$). Stops instantaneously and accelerates (Note: speeds up) in the reverse/negative/backwards direction $[-4,0 \text{ m} \cdot \text{s}^{-2}]$. (3)
- 4.4 Area under v-t curve for 5 to 8 s is $[(\frac{1}{2} \times 1 \times 4) + (2,5 \times 4) + (\frac{1}{2} \times 1,5 \times 4)] = 15 \text{ m}$ in a positive direction. Area under v-t curve for 0 to 5 s is $[(\frac{1}{2} \times 2 \times -8) + (1 \times -8)] = -16 \text{ m}$ in a negative direction. So the car is 1 m back from/behind the start line. (4)

QUESTION 5

- 5.1 $y = vt + \frac{1}{2}gt^2 \therefore y = (28,69)(2,92) + \frac{1}{2}(-9,8)(2,92)^2 \therefore y = 42,00 \text{ m}$ Or $v_f^2 = v_i^2 + 2gy \therefore 0 = (28,69)^2 + 2(-9,8)(y) \therefore y = 42,00 \text{ m}$ (3)
- 5.2 By calculation: $v_f^2 = v_i^2 + 2gy \therefore v_f^2 = 0 + 2(9,8)(42) \therefore v_f = 28,69 \text{ m} \cdot \text{s}^{-1}$ (downwards) OR by symmetry we know that the speed at which the ball returns to the point of projection is the same as the speed at which the ball was thrown UP. (2)



- 5.3 After bouncing, the ball rises to a height of 21 m. Calculate the velocity with which it left the ground (v_i) using $v_f^2 = v_i^2 + 2gy$. $\therefore 0 = v_i^2 + 2(-9,8)(21) \therefore v_i = +20,29 \text{ m}\cdot\text{s}^{-1}$. (4)
- 5.4 The change in momentum of the ball ($m\Delta v$) is caused by the force of the ground on the ball (103 N). The ball's change in momentum is equal to the impulse ($F\Delta t$) on it. Therefore $\Delta t = m\Delta v/F = [0,4 \text{ kg} \times (-20,29 - 28,69)] / -103 = 0,19 \text{ s}$. (6)

QUESTION 6

- 6.1 $W_{\text{tot}} = W_f + \Delta PE = 5,84 \times 10^6 + 1750 \times 9,8 \times 55 = 6,78 \times 10^6 \text{ J}$
 $P = W/t$; $t = 570/(72 \times 10 / 36) = 28,5 \text{ s}$. $\therefore P = 6,78 \times 10^6 / 28,5 = 2,38 \times 10^6 \text{ W}$ (3)
- 6.2 Zero! (See Newton's First Law – constant velocity means $F_a = 0$) (2)
- 6.3 $90 \text{ km}\cdot\text{h}^{-1} \equiv (90/36) \times 10 = 25 \text{ m}\cdot\text{s}^{-1}$; $72 \text{ km}\cdot\text{h}^{-1} \equiv (72/36) \times 10 = 20 \text{ m}\cdot\text{s}^{-1}$
 $W_{\text{tot}} \text{ (by engine)} = W_f + \Delta KE - \Delta PE$ (in a sense we "get back" the PE i.e. this is work the engine doesn't have to do!)
 $= (6,44 \times 10^3 \times 570) + [\frac{1}{2} \times 1100 (25^2 - 20^2)] - 1100 \times 9,8 \times 55$
 $= (3,67 \times 10^6) + (1,24 \times 10^5) - (5,93 \times 10^5)$
 $= 3,20 \times 10^6 \text{ J}$ (7)

QUESTION 7

- 7.1 It is the change in pitch/frequency of a sound heard by a listener due to the relative motion of the source and the listener. (2)
- 7.2 As he slows down the relative speed of their approach decreases and he will notice a drop in the frequency of the siren. (1)
- 7.2 Frequency cyclist hears as ambulance recedes:
 $f_L = \frac{v \pm v_L}{v \pm v_s} \times f_s = \frac{330 - 0}{330 + 35} \times 400 = 361,6 \text{ Hz}$
 $\Delta f = 400 - 361,6 = 38,4 \text{ Hz}$ (decrease in frequency) (4)

QUESTION 8

(8 x 1/2 = 4) (drop odd halves!)

	GREEN	MAGENTA	YELLOW
CYAN	8.1 Green	8.4 Blue	8.6 Green
BLUE			8.7 Black
YELLOW	8.2 Green	8.5 Red	
RED	8.3 Black		8.8 Red

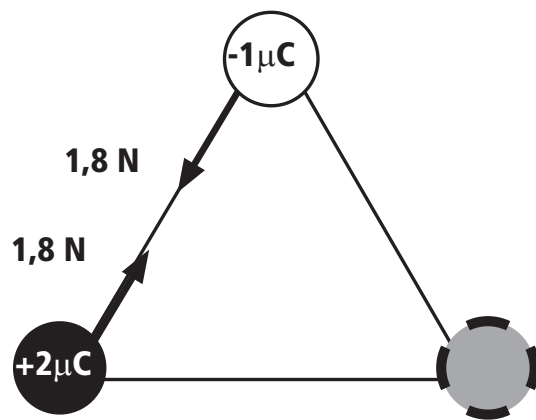
QUESTION 9

- 9.1 Slits A and B are the two sources (1)
- 9.2 Between D and G the light from the two sources "overlaps" i.e. interferes; between C and D the area is illuminated by light from slit A only (2)
- 9.3 At E light from A and B interfere CONSTRUCTIVELY. (2)
 At F light from A and B interfere DESTRUCTIVELY.
- 9.4 $m = 0$; in the equation this will mean that $\sin \theta = 0$ i.e. $\theta = 0^\circ$. (2)
- 9.5 $m = 2$ (the second bright band). (1)
- 9.6.1 Wavefronts
 9.6.2 Diffraction
 9.6.3 Interference
 9.6.4 Wavelength (4 x 1)

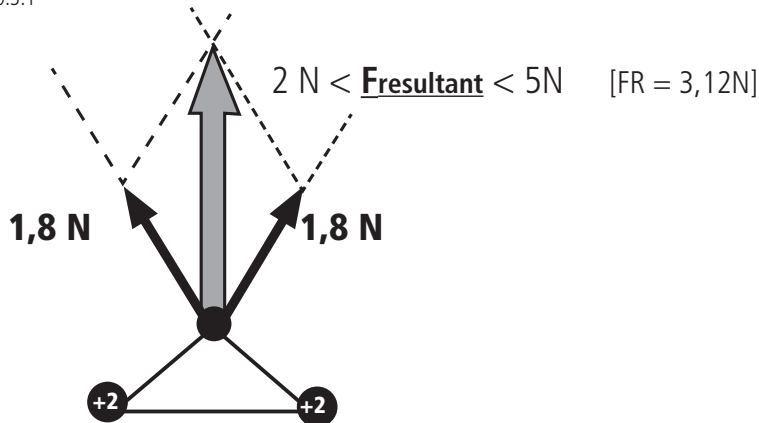
QUESTION 10

- 10.1 $F = \frac{kQ_1Q_2}{r^2} = \frac{-9 \times 10^9 \times (-1 \times 10^{-6})(+2 \times 10^{-6})}{(10^{-1})^2} \equiv 1,8 \text{ N}$ (3)

10.2



10.3.1



10.3.2 $F_R > 2 \text{ N}$ (1)

QUESTION 11

- 11.1 $C = Q/V$. $Q = CV$. $Q = 15 \times 10^{-12} \times 3 = 4,5 \times 10^{-11} \text{ C}$ (2)
- 11.2 $N_e = (4,5 \times 10^{-11} \text{ C}) / (1,6 \times 10^{-19} \text{ C/e}^-) = 2,81 \times 10^8$ electrons (2)
- 11.3 If the gap (d) is the same for both and the materials are the same (i.e. the same dielectric), then the only way to double the capacitance of the second capacitor is to double the area of the plates; A is twice as big for the 30 pF capacitor. (1)

QUESTION 12

- 12.1 The potential difference across a conductor is proportional to the current through it provided the temperature remains constant. (3)
- 12.2 Nichrome wire does not obey Ohm's Law. (1)
- 12.3 It enables the experimenter to vary the current in the circuit. (1)
- 12.4 Plot V (dependent variable) on the y-axis because V depends on I which the experimenter varies (independent variable). (2)
- 12.5.1 Resistance (1)
- 12.5.2 The four values of V/I are 1,25; 1,22; 1,23; 1,21. The average of these numbers will be very close to the average slope (i.e. the straight line graph which goes closest to most of the plotted points).
 Average = $(1,25 + 1,22 + 1,23 + 1,21)/4 = 1,23$. (1)
- 12.5.3 Yes, as indicated by the straight line on the V – I graph; must control for temperature. (2)
- 12.6 If a 500 mm length of 0,1 mm diameter wire has a resistance of 1,23 Ω, then a piece with the same diameter and twice the length will have a resistance of about 2,46 Ω. (1)
- 12.7 Same length but double the diameter i.e. about a quarter of the resistance or ± 0,3 Ω. (The greater the cross-sectional area the less resistance the conductor offers to charge moving through it.) (2)

QUESTION 13

- 13.1.1 $R_{\text{tot}} = 24/3 = 8 \Omega$; $(r_{\text{int}} + R_{\text{series}}) = 1 \Omega + 3 \Omega = 4 \Omega$. $R_{\text{parallel}} = 4 \Omega$
 $1/R_p = 1/12 + 1/R = 1/4$. $\therefore 1/R = 1/4 - 1/12$. $\therefore R = 6 \Omega$ (4)
- 13.1.2 $V_1 : 3 \text{ A} \times 4 \Omega = 12 \text{ V}$ (3)
- 13.1.3 $V_2 : 24 \text{ V} - (3 \text{ A} \times 1 \Omega) = 21 \text{ V}$ (3)
- 13.1.4 $A_1 : 12 \text{ V} / 12 \Omega = 1 \text{ A}$ (current divides in ratio 2 : 1 in 6 Ω and 12 Ω resistors.) (3)
- 13.1.5 $E/t = P = i^2 R = 3^2 \times 1 = 9 \text{ W}$. (Power dissipated in the battery.) (3)
- 13.2.1 Decrease (1)
 13.2.2 Decrease (1)
 13.2.3 Decrease (1)
 13.2.4 Decrease (1)
- 13.3 As the battery gets older (runs down) the internal resistance of the battery increases. Therefore the total resistance in the circuit increases and hence the current strength decreases. Thus all voltmeter readings also decrease. (1)

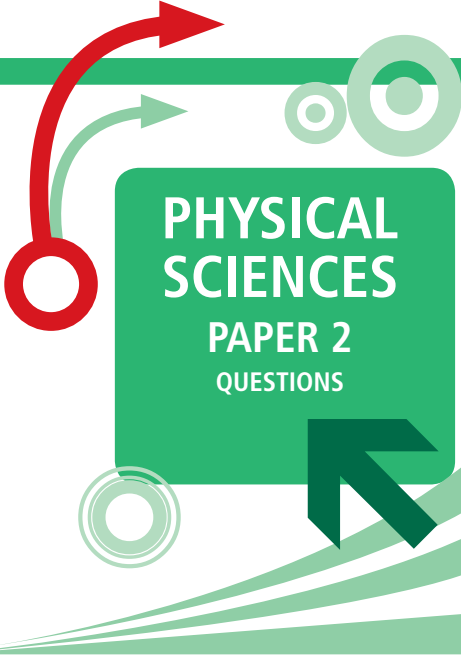
QUESTION 14

- 14.1.1 DOWN (1)
 14.1.2 OUT (1)
- 14.2 Diagram II (1)
- 14.3.1 "rms" or root mean square (current) (1)
- 14.3.2 $I_{\text{max}} = \sqrt{2} \times I_{\text{rms}} = 1,414 \times 24 = 33,9 \text{ A}$ (2)
- 14.3.3 $33,9 \times 2 = 67,8 \text{ A}$ (1)
- 14.3.4 Peak to peak current. (1)
- 14.2.3 No. There is no information given on the frequency of the AC when we measure AC current and AC potential difference. (1)

QUESTION 15

- 15.1 Photoelectric effect (1)
- 15.2 $E = hf$ and $c = f\lambda$; hence $E = hc/\lambda$
 The energy of a single photon of yellow light ($\lambda = 590 \times 10^{-9} \text{ m}$) can be calculated (see data sheet for values of h and c) from $E_{\text{yellow}} = hc/\lambda(\text{yellow}) = 3,37 \times 10^{-19} \text{ J}$.
 Since $3,37 \times 10^{-19} \text{ J} < \text{the work function for zinc } (W_0 = 6,89 \times 10^{-19} \text{ J})$ yellow light will NOT remove electrons from zinc. (5)
- 15.3 If the energy of yellow light photons is LESS than the work function of zinc, no matter how many of those photons there are (i.e. the number of photons per second determines the light intensity) it will NOT liberate photoelectrons. (1)

**TOTAL SECTION B: [125]
 GRAND TOTAL: [150]**



**PHYSICAL
SCIENCES
PAPER 2
QUESTIONS**

SECTION A**QUESTION 1: ONE-WORD ITEMS**

Give ONE word/term for each of the following descriptions in the questions numbered (1.1 – 1.5).

- 1.1 A group of atoms that forms the basis of a homologous series. (1)
- 1.2 The group of atoms: $\begin{array}{c} \text{O} \\ || \\ -\text{C}- \end{array}$ found in ketones, acids and amides. (1)
- 1.3 During a chemical reaction this energy is reduced by using a catalyst. (1)
- 1.4 The type of electrochemical cell in which electrical energy is converted to chemical energy. (1)
- 1.5 The electrode at which oxidation takes place. (1)

QUESTION 2: FALSE ITEMS

The statements in questions 2.1 – 2.5 are FALSE. Correct the statements.

- 2.1 The eutrophication of fresh water is caused by algal blooms brought on by a lowering of the water's oxygen concentration. (2)
- 2.2 An electrolytic cell is an electrochemical cell that converts chemical energy into electrical energy. (2)
- 2.3 The Ostwald, Contact and Haber processes are used in the chemical industry to produce important industrial acids. (2)
- 2.4 Strong reducing agents release electrons easily and improve the oxidising ability of chemical species that receive the electrons they release. (2)
- 2.5 A bag of fertiliser marked 2:3:2 (28) tells us that nitrogen, phosphorus and potassium are present in the ratio of 2% : 3% : 2% of the total mass of fertiliser in the bag. (2)

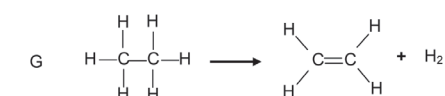
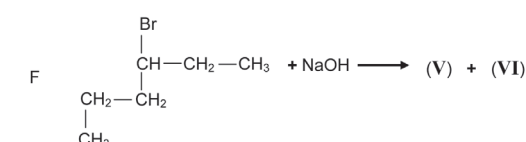
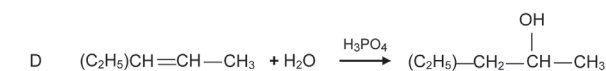
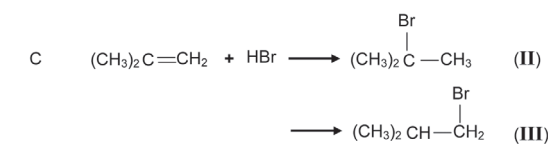
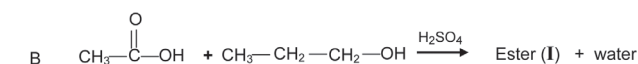
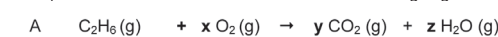
QUESTION 3: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write it next to the question number (3.1 – 3.5).

- 3.1 Factors that can influence chemical reaction rates are:
- A Temperature, presence of catalysts, vapour pressure, catalysts
B Surface area of solids, concentration of liquid solutions, purity of solid reactants, boiling point of liquid reactants
C Surface area of solids, concentration of gaseous solutions, catalysts, proportion of successful collisions of reactants
D Concentration of reactants, concentration of gaseous solutions, gas pressure, changes in equilibrium constant (2)
- 3.2 The forces that hold ice molecules in their crystalline structure in ice are:
- A Covalent bonds
B Hydrogen bonds
C Van der Waals forces
D Ion-dipole attractions (2)
- 3.3 Consider the following statements about the following chemical equilibrium:
 $4\text{A}(\text{s}) + \text{CD}_2(\text{g}) \rightleftharpoons 2\text{A}_2\text{D}(\text{s}) + \text{C}(\text{s}) \quad (\Delta H < 0)$
- I The reverse reaction is endothermic
II The equilibrium constant depends on the concentration of CD_2
III The concentration of C increases when the temperature is decreased
IV When the pressure in the reaction vessel is decreased the equilibrium equation becomes $4\text{A} + \text{CD}_2 \rightleftharpoons \text{A}_2\text{D} + \text{C}$
- Which statements are correct?
- A I and II
B II and III
C II and IV
D III and IV (2)
- 3.4 Three different gases are bubbled through different ionic solutions. Use the Table of Standard Reduction Potentials to predict in which case a white precipitate will be formed?
- A SO_2 through a solution of $\text{K}_2\text{Cr}_2\text{O}_7$
B H_2S through a solution of $\text{Zn}(\text{NO}_3)_2$
C Cl_2 through a solution of AgNO_3
D H_2S through a solution of FeCl_3 (2)
- 3.5 Consider the following statements:
- I The anode of a galvanic cell is positive.
II Oxidation takes place at the negative electrode of an electrolytic cell.
III Electroplating of metals occurs at the cathode.
- Which statement(s) is/are correct?
- A I only
B II and III
C I, II and III
D III only (2)[10]s

TOTAL SECTION A: [25]**SECTION B****QUESTION 4**

The questions in Question 4 all refer to the following organic chemical reactions.



- 4.1 The seven reactions labelled A to G represent some basic reactions of organic compounds. Select one example for each of the following reaction types. Write down only the letter that refers to the following reactions:
- 4.1.1 Substitution (2)
4.1.2 Condensation (2)
4.1.3 Oxidation (2)
4.1.4 Hydration (2)
- 4.2 The process of "thermal cracking" is used in oil refineries. Long chain hydrocarbons are broken by heating crude oils in the absence of air and shorter hydrocarbon molecules are produced. Cracking also leads to the production of unsaturated hydrocarbons.
- 4.2.1 Which of reactions A to G could occur during the cracking of crude oil? (Write down only the letter labelling the reaction.) (2)
4.2.2 What method is used to separate molecules of different molecular mass and molecular properties formed during the cracking process? (1)
4.2.3 In which reaction might the method of "reflux" be used? (1)
- 4.3 During all chemical reactions the reactants and products react in fixed, whole number proportions.
- 4.3.1 Balance Reaction A and show clearly the values of **x**, **y** and **z**. (3)
4.3.2 What process does Reaction A represent? (1)
4.3.3 If the reaction takes place in an excess of oxygen in which exactly 24 g of methane reacts completely, what volume of carbon dioxide gas will be recovered as a product when the conditions are adjusted to S.T.P.? (4)
- 4.4 Many chemical reactions will not take place under "normal" conditions unless a catalyst is used to promote the reaction.
- 4.4.1 Define a catalyst. (2)
4.4.2 What chemical species is active in promoting the reaction in an acid catalysed reaction? (It could be a molecule, an atom or an ion.) (1)
4.4.3 Two of the above reactions are acid catalysed. Which are they? (Write down only the letters labelling the reactions.) (2)
4.4.4 One of the above reactions uses a surface catalyst. Which is it? (Write down only the letter labelling the reaction.) (1)
- 4.5 Hydrogenation of vegetable oils is used in the food industry to make the well-known butter substitute, margarine.
- 4.5.1 Use the words *saturated*, *unsaturated*, *addition*, *double bond* in a short description of what happens to an organic molecule that is hydrogenated. (2)
4.5.2 Explain why liquid plant oils become a low melting point solid when they are hydrogenated. (3)
4.5.3 Reaction E represents a hydrogenation. Write the IUPAC name of the product **(IV)** if the reactant is completely hydrogenated. (3)
4.5.4 Can 1,5 cyclohexadiene be an isomer of 1,3 cyclohexadiene? Explain. (1)
- 4.6 Esters, such as the product in Reaction B, are used in the food industry as flavourings. These are not entirely artificial since esters produced by certain plants are often responsible for the plant's characteristic flavour.
- 4.6.1 Water is produced in Reaction B when H^+ and OH^- bond. Does the OH^- come from reactant alcohol or the reactant carboxylic acid? (1)
4.6.2 Write the IUPAC name of the carboxylic acid used in Reaction B. (1)
4.6.3 Give the IUPAC name of a lowest molecular mass carboxylic acid that will have a lower vapour pressure than the acid used in Reaction B. Give a reason for your answer. (2)
4.6.4 Give the structural molecular formula of the ester **(I)** produced in Reaction B and give its IUPAC name. (5)
- 4.7 Reaction C represents an addition reaction known as "hydrohalogenation".
- 4.7.1 What is the basic requirement for addition reactions to occur in organic molecules? (2)
4.7.2 Theoretically the product in Reaction C could be either molecule **(II)** or molecule **(III)**. Explain why it is **(II)**. (3)
4.7.3 Give the IUPAC name for molecule **(II)**. (2)

- 4.8 The terms isotope and isomer are often confused.
 4.8.1 Distinguish between an *isotope* and a *structural isomer*. (3)
 4.8.2 In Reaction D one of the possible products is the one shown. However, a second product, which is a structural isomer of the first, will also be formed. Draw condensed structural formulae for the two isomers and write the correct IUPAC names next to each. (4)
 [7]
- 4.9 Name products (**V**) and (**VI**) in Reaction E and give correct IUPAC names for any organic molecules formed. (4)
 [4]
 [64]

QUESTION 5

The reaction of the industrial process for the production of ammonia gas is
 $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ ($\Delta H < 0$)

Reactants and product are in the gaseous phase during the reaction. The data for the yield of ammonia gas under various temperatures – pressure conditions are given in the table below.

% YIELD OF NH ₃ AT EQUILIBRIUM							
Pressure (atmospheres)							
Temp (°C)	10	30	50	100	300	600	1000
200						5.0	
300	14.7	30.3	39.4	52.0	71.0	84.2	92.6
400	3.9	10.2	15.3	25.1	47.0	65.2	79.8
500	1.2	3.5	5.6	10.6	26.4	42.2	57.5
600	0.5	1.4	2.3	4.5	13.8	23.1	31.4
700	0.2	0.7	1.1	2.2	7.3	12.6	12.9

- 5.1 Ammonia is produced in a reaction of nitrogen and hydrogen gases and is an exothermic process. The reaction equation for the process is as follows:
 $3\text{H}_2 + \text{N}_2 \rightarrow 2\text{NH}_3$
- 5.1.1 Explain the effect on the equilibrium of running the reaction at high temperature. (3)
 5.1.2 Will high pressure favour the forward or reverse reaction? Explain your answer. (3)
 5.1.3 In the industrial process to manufacture ammonia a yield of 42,2% is obtained when the reaction is run at 500°C and 600 atm (60,8 MPa) pressure. This is less than half the yield that can be obtained at the lower temperature of 300°C and 1000 atm (101,3 MPa) pressure. Give two reasons why the reaction is run under temperature-pressure conditions that do not give the highest possible yield. (2)
- 5.2 3 moles of nitrogen gas react with 6 moles of hydrogen gas in a reaction vessel with a volume of 2 dm³. An equilibrium is established at 300 K and an analysis shows that 3 moles of NH₃ are present at this equilibrium.
- 5.2.1 Calculate the equilibrium constant K_c at 300 K. (6)
 5.2.2 Explain how the value of K_c will change when the temperature is raised to 500 K. (3)
 [17]

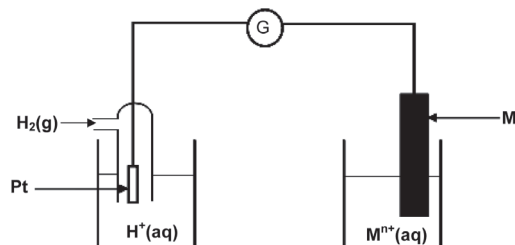
QUESTION 6

Marble is composed mainly of the mineral calcite, which is pure calcium carbonate. Many ancient buildings, particularly in Greece and Italy, were built entirely of marble. With rising levels of pollution in Europe, the phenomenon of acid rain is causing great damage to old buildings. Sulphur dioxide is produced when high sulphur content coal is burnt. When the gas dissolves in atmospheric water vapour, sulphurous acid (H₂SO₃) is formed and this attacks the marble.

- 6.1 What gas is produced when sulphurous acid and calcium carbonate react? (1)
 6.2 Write a balanced equation for the reaction. (2)
 6.3 Ronnie and Ronelle are curious about the rate at which the acid will dissolve marble. Their science teacher provides them with a solution of sulphurous acid with a concentration of 0,001 mol.dm⁻³ and a small piece of marble with a mass of 2,57 g.
- 6.2.1 State the question that the pair of learners would use to initiate their investigation. (1)
 6.2.2 State a hypothesis for this investigation. (1)
 6.2.3 Explain the procedure Ronnie and Ronelle would use in their investigation. The apparatus listed below is available to them. Draw a simple diagram to aid your explanation. (4)
 Thermometer
 Stopwatch
 Beaker
 Rubber stoppers ("corks")
 Rubber tubing
 Measuring cylinder
 Burette
 Distilled water
- 6.2.4 Name a variable besides temperature that should be controlled in the investigation. (1)
 6.2.5 Once the investigation is complete, what information will the investigators have? (1)
 6.2.6 What additional data will the investigators need to extrapolate their results to a real-life situation in Southern Europe? (1)
 [12]

QUESTION 7

The diagram below represents part of an electrochemical cell consisting of a standard hydrogen cell and a metal electrode in contact with a standard solution of its own ions.



- 7.1 What is the advantage of using a "centre-zeroing" galvanometer instead of a voltmeter in the circuit? (1)
 7.2 What addition must be made to the apparatus before the galvanometer will show a flow of charge? (1)
 7.3 If the galvanometer needle deflects to the left when the metal/metal ion half cell is Fe/Fe²⁺, in which direction will it deflect when the half cell is
 7.3.1 Mg/Mg²⁺ (1)
 7.3.2 Pb/Pb²⁺ (1)

PHYSICAL SCIENCES

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QUESTIONS + MEMORANDUM

- 7.4 If a new M/Mn⁺ half cell is connected and the emf is 0,80 V, what metal is now being used? (1)
 7.5 If the standard hydrogen electrode is now replaced by the Fe/Fe²⁺ electrode:
 7.5.1 Describe what will occur at the anode. (2)
 7.5.2 Write down the equation for the whole-cell reaction. (2)
 7.5.3 Calculate the initial emf of this electrochemical cell at standard conditions. (3)
 7.6. If the cell is left connected, a voltmeter will show that the emf of the electrochemical cell decreases with time. Explain this observation with reference to standard conditions. (2)
 [15]

QUESTION 8

The information on the table below compares three kinds of electrolytic cell used in the production of chlorine and caustic soda, both of which are very important reactants in a variety of industrial processes. Examine the table and answer the questions as numbered.

	Membrane	Diaphragm	Mercury
Reactant	Concentrated brine (NaCl) solution	Concentrated brine (NaCl) solution	Concentrated brine (NaCl) solution
Products	Cl ₂ gas H ₂ gas and [9.1]	Cl ₂ gas H ₂ gas and [9.1]	(1) Cl ₂ gas; Na metal (2) H ₂ gas and [9.1] [(2) is the decomposer reaction – 9.3]
[9.2.1]	$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$	$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$	$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$
[9.2.2]	$\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$	$\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$	$\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$
Decomposer reaction	-	-	[9.3]
Environmental hazards	None	[9.4.1]	[9.4.2]

- 9.1 What is the correct chemical name for the caustic soda which is produced in the three electrolytic cells? (1)
 9.2 Name the electrodes at which the reactions in 9.2.1 and 9.2.2 take place. (1)
 9.3 Write down a balanced equation for the reaction that takes place in the decomposer. (2)
 9.4 Name the environmental hazards associated with
 9.4.1 the diaphragm cell (1)
 9.4.2 the mercury cell (1)
 [7]

TOTAL SECTION B: [115]
GRAND TOTAL: [140]

MEMORANDUM

SECTION A

QUESTION 1

- 1.1 Functional (group) (1)
 1.2 Carbonyl (1)
 1.3 Activation (1)
 1.4 Electrolytic (1)
 1.5 Anode (1)
 [5 x 1 = 5]

QUESTION 2

- 2.1 The eutrophication of fresh water is caused by ~~algal blooms brought on by a lowering of~~ high concentrations of nitrate ions from highly soluble nitrate salts in fertilisers; the resulting algal blooms that thrive on the nitrates lower the water's oxygen concentration. (1)
 2.2 An electrolytic cell is an electrochemical cell that converts ~~chemical~~ electrical energy into chemical electrical energy. (1)
 2.3 The Ostwald, and Contact ~~and Haber~~ processes are used in the chemical industry to produce important industrial acids. (1)
 2.4 Strong reducing agents release electrons easily and improve the ~~oxidising~~ reducing ability of chemical species that receive the electrons they release. (1)
 2.5 A bag of fertiliser marked 2 : 3 : 2 (28) tells us that nitrogen, phosphorus and potassium are present in the ratio of 8% : 12% : 8% of the total mass of fertiliser in the bag. (1)
 [5 x 2 = 10]

QUESTION 3

- 3.1 C (1)
 3.2 B (1)
 3.3 A (1)
 3.4 C (1)
 3.5 D (1)
 [5 x 2 = 10]

TOTAL SECTION A: [25]

SECTION B**QUESTION 4**

- 4.1 4.1.1 F (1)
 4.1.2 B (1)
 4.1.3 A (1)

PHYSICAL SCIENCES PAPER 2 MEMORANDUM

- 4.1.4 D [4 X 2 = 8]
 4.2 4.2.1 G (2)
 4.2.2 fractional distillation (1)
 4.2.3 F (1)
 4.3 4.3.1 $C_2H_6 + 3\frac{1}{2} O_2 \rightarrow 2 CO_2 + 3 H_2O$
 or $2 C_2H_6 + 7 O_2 \rightarrow 4 CO_2 + 6 H_2O$ (4)
 4.3.2 Combustion of a hydrocarbon in oxygen/air (3)
 4.3.3 $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ (1)
 1 mole methane produces 1 mole carbon dioxide gas
 $24 g \equiv 24/(12 + 4) = 1,5 \text{ mol} \rightarrow 1,5 \text{ mol } CO_2$
 At S.T.P. 1,5 mol CO_2 occupies $(1,5)(22,4) \text{ dm}^3 = 33,6 \text{ dm}^3$ (4)
 4.4 4.4.1 A chemical substance that changes the rate of a chemical reaction (2)
 without undergoing any permanent change itself.
 4.4.2 H^+ ion (1)
 4.4.3 B, D (2)
 4.4.4 E (1)
 4.5 4.5.1 Organic molecules containing double bonds are termed unsaturated (2)
 because the carbons are not bonded to the maximum number of
 hydrogens i.e. they are not saturated. Addition reactions involve
 saturating the two, double-bonded carbon atoms.
 4.5.2 The Van der Waals forces between (crystalline) fat molecules increase. (3)
 4.5.3 Cyclohexane (3)
 4.5.4 No, they are equivalent, depending on which way around the ring molecule one (3)
 numbers the carbon atoms. [11]
 4.6 4.6.1 Carboxylic acid. (1)
 4.6.2 Ethanoic acid (1)
 4.6.3 Propionic acid: for a lower Vapour pressure we require an acid with a (1)
 higher molecular mass; the next more massive acid to ethanoic acid
 (the acid used in B) is propionic acid. (2)
 4.6.4 Propyl ethanoate (2)

$$\begin{array}{ccccccc} & H & H & H & & O & H \\ & | & | & | & & || & | \\ H & - & C & - & C & - & C & - & O & - & C & - & H \\ & | & | & | & & & | \\ & H & H & H & & & H \end{array}$$
 (5)
 4.7 4.7.1 Presence of MULTIPLE bonds (double and triple) (2)
 4.7.2 Because the hydrogen will always attach to the previously most (3)
 substituted carbon (i.e. the one that had the most hydrogens on it
 before the rxn). [This is known as Markownikoff's rule.] (3)
 4.7.3 2-bromo 2-methyl propane. (2)
 4.8 4.8.1 Isotopes are nuclei of the same element (i.e. same atomic number, Z) which (3)
 have different numbers of neutrons and hence different mass numbers (A).
 Structural isomers are molecules with the same molecular formulae but
 which are structurally different.
 4.8.2
$$\begin{array}{ccc} & OH & OH \\ & | & | \\ (C_2H_5) - CH_2 - CH - CH_3 & & (C_2H_5) - CH - CH_2 - CH_3 \end{array}$$
 (4)
 2-pentanol 3-pentanol
 4.9 3-hexanol and sodium bromide (4)
 (4)
 (4)
 (4)
 [64]

QUESTION 5

- 5.1 5.1.1 High temperatures favour the reverse reaction but also raise the rate of reaction. (3)
 5.1.2 There are 4 mols of reactants and only 2 mols of product; all are gases (3)
 therefore high pressure favours the forward reaction (by le Chatelier:
 equilibrium moves in the direction that removes stress on system)
 5.1.3 High temp to increase reaction rate; high pressure to shift equilibrium to the (2)
 right (600/500 is optimal because although high temp increases reaction
 rate it also favours the reverse reaction).
 5.2 5.2.1

V = 2 dm ³	N ₂	H ₂	NH ₃
Mole ratio (n)	1	3	2
n (mols at start)	3	6	0
n (mols used)	1,5	4,5	
N (mols at \equiv ium)	1,5	1,5	3
concentration at \equiv ium	0,75	0,75	1,5

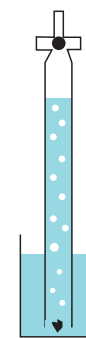
$$K_c = \frac{[NH_3]^2}{[N_2][H_2]^3} = \frac{[1,5]^2}{[0,75][0,75]^3} = \frac{[1,5]^2}{[0,75][0,75]^3} = 7,11$$

(6)

- 5.2.2 The forward reaction is exothermic. When the temp is raised (to 500 K) it (3)
 favours the reverse reaction i.e. product reforms reactants, hence
 concentration of ammonia drops hence K_c gets smaller. [17]

QUESTION 6

- 6.1 Carbon dioxide (1)
 6.2 $H_2SO_3 + CaCO_3 \rightarrow CaSO_3 + H_2O + CO_2$ (2)
 6.3 6.2.1 How fast does acid rain (consisting of weak sulphurous (1)
 acid) dissolve marble? (1)
 6.2.2 Weak sulphurous acid will not dissolve marble. (1)
 6.2.3 The best method will be to place the small marble chip in the (1)
 beaker, cover it with sulphurous acid and then to invert the burette
 which has been filled with the acid and place the open end of the
 burette over the marble chip. In this way, if it is done quickly,
 any and all gas produced, if there is any reaction, will be caught
 in the burette where the volume of gas and can be measured
 at regular intervals. From the time and gas volume data, a rate of
 reaction, if any, can be calculated. (4)
 6.2.4 Concentration of acid. (if the acid in the beaker is kept topped up, (1)
 the small amount of marble will not change the acid concentration appreciably.
 6.2.5 The rate at which a certain concentration of sulphurous acid will (1)
 decompose marble. The rate of decomposition, if any occurs, can
 be measured by the volume of carbon dioxide gas produced.
 6.2.6 Estimates of the SO_2 concentration in the air; the acidity of rain water (1)
 this will cause; the annual rainfall in the affected areas; and the results
 of the investigation that will enable an estimate of the rate of decay of
 exposed marble to be made. [12]



QUESTION 7

- 7.1 Needle deflects left and right so the direction will indicate direction of charge (1)
 flow (and hence which is the oxidizing – and which the reducing half cell).
 7.2 salt bridge (1)
 7.3 8.3.1 left (1)
 8.3.2 left (1)
 7.4 silver (Ag) (1)
 7.5 7.5.1 The iron electrode will decompose and Fe^{2+} ions will go into solution. (2)
 7.5.2 $Fe + Ag^+ \rightleftharpoons Fe^{2+} + Ag$ (2)
 7.5.3 $E^0 = E_{\text{reduced}}^0 - E_{\text{oxidized}}^0 = 0,80 - (-0,44) = +1,24 \text{ V}$ (3)
 7.6 The E^0 values on the Standard Reduction Table are measurements made for standard conditions (1)
 where solutions have a concentration of 1 mol.dm^{-3} . As the cell runs down the metal ion
 concentrations increase (for the reductant) and decrease (for the oxidant), the half cell equilibria shift
 and the half cell reduction potentials tend towards zero. (2)
 [15]

QUESTION 8

- 8.1 NaOH (sodium hydroxide) (1)
 8.2 8.2.1 Anode (1)
 8.2.2 Cathode (1)
 8.3 $2Na + 2H_2O \rightarrow (2Na^+ + 2H^+ + 2OH^-) \rightarrow 2NaOH + H_2$ (2)
 8.4 8.4.1 Asbestos (diaphragms made of fibrous asbestos, a mineral which causes (1)
 debilitating lung disease, asbestosis)
 8.4.2 Mercury (causes heavy metal poisoning and remains in ecosystems because (1)
 it is very difficult to remove) [7]

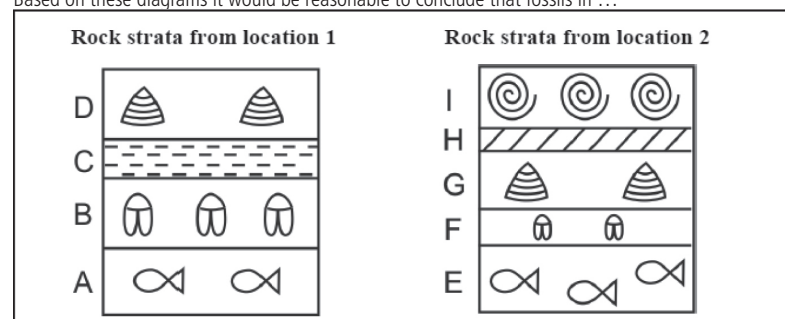
TOTAL SECTION B: [115]
GRAND TOTAL: [140]

LIFE SCIENCES PAPER 2 QUESTIONS

SECTION A

QUESTION 1

- 1.1 Various possible options are provided as answers to the following questions. Choose the correct answer (1)
 and write only the letter (A - D) next to the question number (1.1.1 - 1.1.7), for example 1.1.11 D.
 1.1.1 There is little fossil evidence of the earliest forms of life because the organisms ...
 A. decayed quickly in the oxygen-rich atmosphere.
 B. did not have hard parts which would fossilise easily.
 C. evolved so quickly that they left few remains.
 D. lived in water and were not preserved.
 1.1.2 The diagrams below represent sedimentary rock strata from two different paleontological sites. (1)
 Based on these diagrams it would be reasonable to conclude that fossils in ...

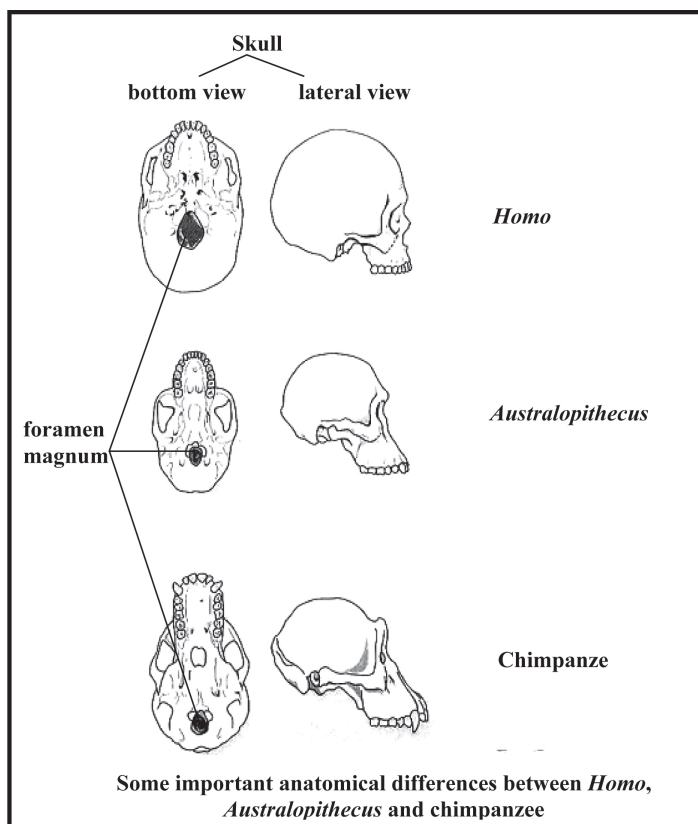


LIFE SCIENCES PAPER 2 QUESTIONS

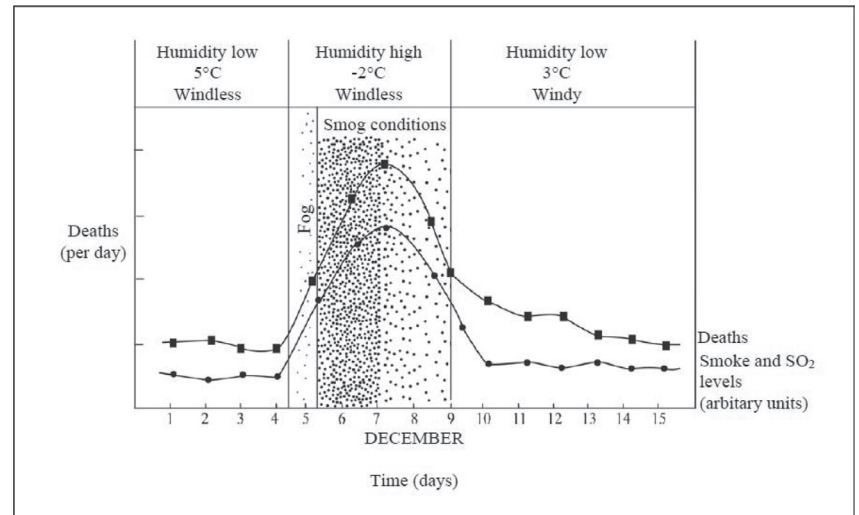
- A. strata B are the same age as fossils in strata E.
 B. strata A are younger than fossils in strata E.
 C. strata D are younger than fossils in strata F.
 D. strata I are older than fossils in strata G.
- 1.1.3 Possible measures for the reduction of air pollution would NOT include the following:
 A. Providing subsidies for solar panels
 B. Providing subsidies for truck drivers
 C. Rewards for cleaner production by industries
 D. Improving the public transport system
- 1.1.4 With which of the following scientists is the concept "survival of the fittest" associated?
 A. Jean Baptiste Lamarck
 B. Hans Krebs
 C. James Watson
 D. Charles Darwin
- Mesosaurus was a giant reptile that lived about 270 million years ago. The average Mesosaurus measured about one metre in length, had webbed feet, a long tail and many sharp teeth. Fossils of Mesosaurus have been found in only two places: the eastern side of South Africa and the western side of South Africa.
- 1.1.5 The distribution of the fossil remains is evidence of ...
 A. speciation.
 B. continental drift.
 C. natural selection.
 D. divergent evolution.
- 1.2 Give the correct biological term for each of the following descriptions. 5x2 (10)
 Write only the term next to the question number (1.2.1 – 1.2.8).
- 1.2.1 The simultaneous elimination of large numbers of species on a worldwide scale.
 1.2.2 A change in the structure or function of an organism to suit the conditions, thus increasing its chances of survival.
 1.2.3 Numerous interacting food chains that show the feeding relationships in an ecosystem.
 1.2.4 The whole variety of living things found in the defined environment.
 1.2.5 The arrangement of having five digits on front and hind limbs. (5)
- 1.3 Choose an item from COLUMN II that matches a statement in COLUMN I. Write only the letter (A – H) next to the question number (1.3.1 – 1.3.5), for example 1.3.6 J.

COLUMN I	COLUMN II
1.3.1 Slow changes in the characteristics of a species with time that are not enough to form a new species but keep it well suited to its environment	A homologous
1.3.2 Structures that are very similar to each other in two different species that arose due to convergent evolution	B micro-evolution
1.3.3 A change in the gene frequency not caused by the environment or sexual choice but due to accidental changes in a small population	C geographical isolation
1.3.4 The process that acts on an organism's genotype to bring about evolution	D analogous
1.3.5 The non-living factors of an ecosystem	E natural selection
1.3.6 Structures that appear different but have a similar evolutionary origin	F abiotic
	G genetic drift

- 1.4 A comparison of the anatomical features of organisms has helped scientists to propose evolutionary relationships. 6x1 (6)

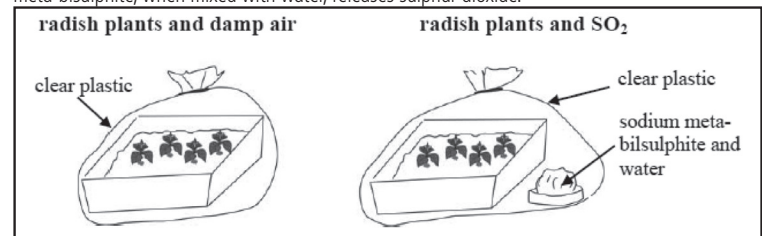


- 1.4.1 Tabulate THREE observable differences between the side view of the skulls of Homo and the chimpanzee. (7)
 1.4.2 Which ONE of the organisms (Australopithecus or chimpanzee) was/is not bipedal? (1)
 1.4.3 Give ONE observable reason for your answer to QUESTION 1.4.2. (2)
 1.4.4 Name TWO fossils of Australopithecus found in South Africa. (2)
 1.5 The following graph shows details of the great London smog of 1952. (2)



- 1.5.1 In the period shown, approximately how many extra deaths occurred during the period of the smog compared to deaths in periods of no smog? (1)
 1.5.2 From the information provided above, list FOUR environmental conditions that caused smog to form. (4)
 1.5.3 Suggest why the levels of smoke and sulphur dioxide (SO₂) started to rise before the smog formed. (2)

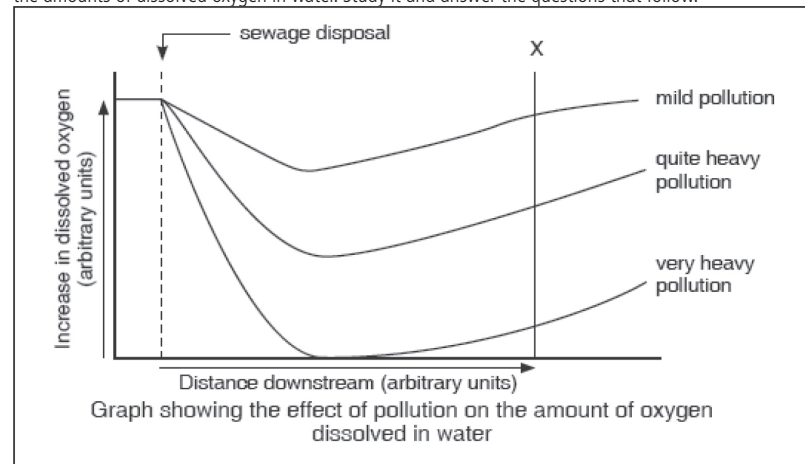
A pupil thinks that sulphur dioxide will have a toxic effect on plants. She set up an investigation, over a two-week period, as shown in the diagram below to test her hypothesis. Sodium meta-bisulphite, when mixed with water, releases sulphur dioxide.



- 1.5.4 In what THREE ways is the experiment a fair test of the hypothesis? Explain your answer. (6)
 1.5.5 Suggest TWO ways in which the experimental design could be more effective. (4)
[50]

SECTION B QUESTION 2

- 2.1 The graph below shows how different amounts of sewage that are discharged into a river have an effect on the amounts of dissolved oxygen in water. Study it and answer the questions that follow.



- 2.1.1 Why does the sewage discharge cause the oxygen level to decrease? (2)
 2.1.2 Why does the minimum amount of oxygen occur some distance below the point of sewage discharge? (2)
 2.1.3 Why does the level of dissolved oxygen in the river increase further downstream? (2)
 2.1.4 What TWO possible reasons could there be for sewage being disposed into river systems in a developing urban environment? (4)
 2.1.5 Name one positive and one negative effect that "quite heavy pollution" could have on a rural farming community that live at point X down the river. (2)
- 2.2 Birds called thrushes eat snails when their preferred food, insects, are in short supply. To get at the snail, the thrushes break open the shell by hitting the snail against a stone called an anvil. Researchers count the number of shells near an anvil to find out what the thrushes are eating. One particular snail species that the birds eat is *Cepaea nemoralis*. The colour of these shells can be pink, beige, brown, red or yellow or the shells can have dark stripes. Striped shells are described as banded and coloured shells as unbanded. The colour of the shells and the bands provide camouflage for the snails. For example, thrushes cannot see

LIFE SCIENCES PAPER 2 QUESTIONS

banded shells easily against a "striped" background such as grasses growing on sand dunes. Some students carried out an investigation of the number of shell remains of *Cepaea nemoralis* near anvils. The investigation was carried out in two areas.

Area A was in a forest where there were many dead leaves on the ground i.e. the background was fairly evenly coloured.

Area B was between grasses growing on a sand dune at a beach 50km away.

The students put forward the following hypothesis: "There will be more unbanded shells near anvils in area A (the forest) than banded and there will be more banded shells near anvils than unbanded in area B (grassy sand dunes)."

The results of their investigation in area A are shown in the table below.

Table showing number of *Cepaea nemoralis* shells collected in area A (forest area)

	Number of snail shells			
	Banded	Unbanded	Total	% Banded
Number of shell remains in forest area	486	377	863	56.0

- 2.2.1 How many more banded snail shells were collected than unbanded? (1)
- 2.2.2 Suggest why the thrushes ate more banded snails than unbanded. (3)
- 2.2.3 Do the results in the table above support the hypothesis the students made? Explain your answer. (3)
- 2.2.4 Describe how the students could have worked in the two areas (area A and area B) to ensure that their results were valid. (4)
- 2.2.5 The main points of the theory of evolution by natural selection are listed below: (4)
- The number of offspring produced by an organism is greater than the number that survive to adult stage.
 - Variation exists among the offspring.
 - Some variations are useful and help the organism to survive.
 - Competition occurs between the offspring for survival.
 - Only the survivors can reproduce.

Natural selection can affect the proportions of the different colours of the unbanded shells in a *Cepaea nemoralis* population on sand dunes. Use the five points listed in A – E to explain how this variation may come about. (7)

[30]

QUESTION 3

3.1 Read through the following text and then answer the questions that follow:

An ever-growing economy, expanding population, rapid increase in visitor numbers and unsustainable consumption patterns are all contributing to Cape Town's significant waste problem.

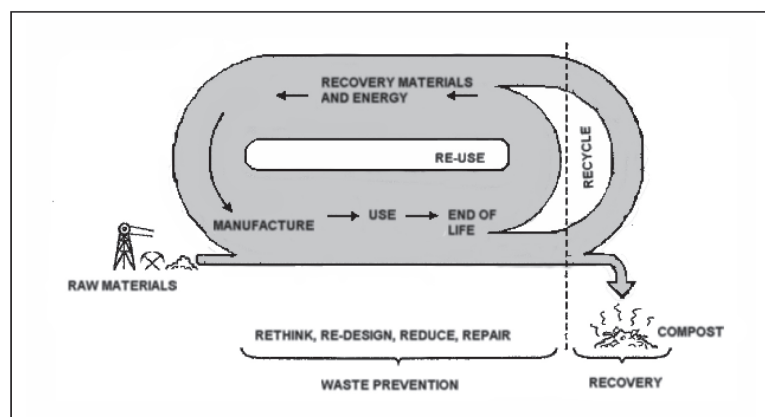
Approximately 6 000 tons of waste are currently generated daily within the City of Cape Town. This is equivalent to covering four soccer fields, one metre deep in waste every day. Fifty-five percent of waste ending up at the Council's six landfill sites is directly received from the industrial and commercial sectors whereas the domestic waste from households account for approximately 30% of the waste stream. The remaining portion constitutes sewage sludge coming from the city's wastewater treatment plants.

A total of 1.7 million tons of waste was received in landfill sites in Cape Town during 2002 compared to the 1.6 million tons in 2001 and the 1.5 million tons in 2000. This is roughly an annual increase of 7%.

Waste from lower-income households are shown to contain about 80% organic waste compared to that from affluent suburbs, which typically contains about 60-70% of packaging waste. Of the total amount of waste produced more than 90% is landfilled by the City of Cape Town.

There is an urgent need for a new regional landfill site as the city faces the closure of most of its current landfill sites. Clean-up costs of litter and dumping exceed R100 million a year. This is money that could be put to far greater use within the city, particularly given the housing crisis.

- 3.1.1. Much of the waste that is deposited on landfills has further uses and many people live on and around these landfill sites to collect these items. List THREE possible dangers to the health of the people who live in this environment. (3)
- 3.1.2. Landfills are known to cause pollution to the environment. Briefly describe two possible ways in which this could happen. (4)
- 3.1.3. Give one way in which lower-income households could reduce the amount of waste that they send to landfills. (1)
- 3.1.4. The flow diagram below illustrates a broad strategy that could be employed to help reduce waste. Discuss how the Cape Town municipality could implement these ideas to help reduce the amount of waste being sent to the landfills. (7)



3.2 Read the following information about dinosaur extinction.

What caused the mass extinction of the dinosaurs?

Theory A

One theory scientists put forward to explain this mass extinction is based on huge volcanic eruptions which occurred in an area in India (called the Deccan Traps) about 65 million years ago. Some eruptions produced flows of lava that released sulphur dioxide into the air, while other eruptions were so powerful that they brought the metal iridium from deep within the Earth to the surface. These volcanic eruptions spewed ash and other compounds into the atmosphere, causing widespread fires. The ash and dust spread throughout the Earth's atmosphere, blocking out the sun's rays for many years. Plants died, the Earth cooled and the dinosaurs became extinct.

Theory B

A second theory, the asteroid impact theory, suggests that a giant asteroid hit the Earth at the end of the Cretaceous era, 65 million years ago. The impact caused dust to rise throughout the atmosphere, blocking out the sun's rays for many years. Plants died, the Earth cooled and dinosaurs became extinct. The impact of the hot, burning asteroid would have started widespread fires.

Evidence for this theory is based on the presence of a layer of the metal, iridium, between two clay layers separating older Cretaceous rocks and younger Tertiary rocks throughout the world (meteors and asteroids contain iridium, which is rare in the Earth's crust). A very large impact crater has been found off the Mexican coast.

- 3.2.1 Write a flow chart to summarise the theory of volcanic eruptions being responsible for dinosaur extinction. A flow chart is a series of statements separated by arrows. Begin with the following statement: Volcanic eruptions released ash and other compounds into the air. (5)
- 3.2.2 Which theory, A or B, do you think, is better at explaining the extinction of the dinosaurs? Explain your answer. (5)
- 3.2.3 Compare and contrast the volcanic eruption theory (A) for mass extinction of the dinosaurs with the present-day sixth extinction. (5)[30]

SECTION C

QUESTION 4

4.1 Study the passage below and answer the questions that follow.

Particle pollution (also called particulate matter or PM) is the term for a mixture of solid particles and liquid droplets found in the air. These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Some particles, known as primary particles are emitted directly from a source such as construction sites, unpaved roads, fields, smokestacks or fires. Others form in complicated reactions in the atmosphere of chemicals such as sulphur dioxides and nitrogen oxides that are emitted from power plants, industries and automobiles; these particles are known as secondary particles.

Particles, such as dust, dirt, soot or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope. The size of particles is directly linked to their potential for causing health problems. Small particles less than 10 micrometres (0.01µm) in diameter pose the greatest problems, because they can get deep into your lungs, and some may even get into your bloodstream.

Exposure to such particles can affect both your lungs and your heart. Small particles of concern include those found near roadways and dusty industries, which are larger than 2.5 micrometres and smaller than 10 micrometres in diameter; and those found in smoke and haze, which are 2.5 micrometres in diameter and smaller.

- 4.1.1 What are the two main forms of particulate matter found in air? (2)
- 4.1.2 Suggest a reason why small particles are able to not only affect your lungs but also your heart. (2)

The following simple experiment to measure the presence of particulate matter (PM) in air was performed by a group of learners in their town.

- A permanent marking pen was used to draw three 1cm² areas on 5 glass microscope slides.
- The other side of each slide was then covered by a thin layer of petroleum jelly.
- The slides were then placed, with the side covered with petroleum jelly facing up, in 5 different outdoor locations throughout the town and left for 1 week.
- The slides were then collected and examined using a hand lens (magnification = X20) and the number of visible particles in each square were counted and recorded in a data table.
- The average number of visible particles per 1cm² at each of the locations was then calculated and presented in a graph.

- 4.1.3 What was the aim of the experiment? (2)
- 4.1.4 Was this a fair test? Explain your answer. (3)

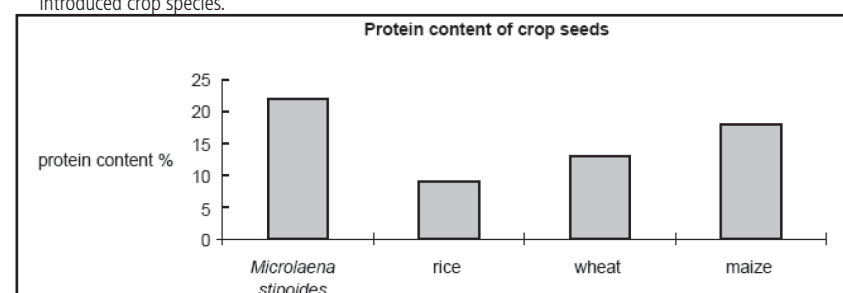
The 5 slides were placed in the following locations:

- Traffic lights in the CBD of town.
- Town sports fields.
- A shopping centre that was busy being built.
- The industrial area of the town.
- A fishing spot on the outskirts of the town.

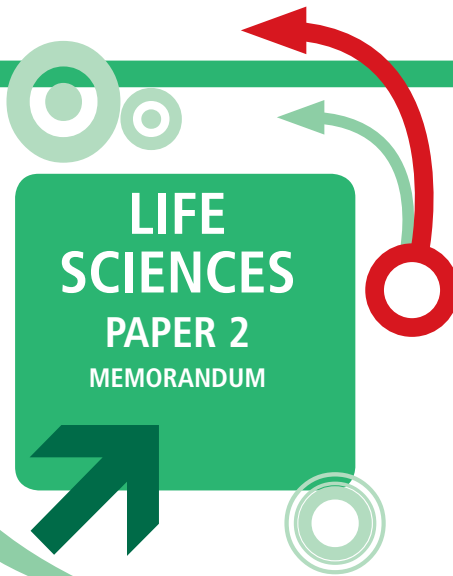
- 4.1.5 Which slide do you believe would have the highest average number of visible particles per 1cm²? Give a reason for your answer, based on the information given. (3)
- 4.1.6 Which slide do you believe would have the lowest average number of visible particles per 1cm²? Give a reason for your answer, based on the information given. (3)

4.2 Australia, like South Africa, has large areas of the country where rainfall is particularly low. Australian agricultural biologists are currently researching weeping rice grass (*Microlaena stipoides*), a deep-rooted native relative of rice. Their aim is to produce drought-tolerant grain crops, pasture grass for livestock and domestic lawns.

M. stipoides thrives in a variety of soil types from coastal to mountain habitats. It does not spread in an uncontrolled way as many introduced grasses do. It requires less fertiliser and liming of soil than introduced crop species.



At present *M. stipoides* seed is only half the size of domestic rice. A researcher stated that weeping rice grass has not undergone selection or breeding for larger seed size.



- 4.2.1 Why does low rainfall present a problem to farmers in South Africa and Australia? (1)
- 4.2.2 *M. stipoides* is indigenous to Australia. What possible advantages are there to Australian farmers ultimately being able to use this plant in agriculture over the regular "alien" crops that are currently used? (3)
- 4.2.3 Why now more than ever is it important that scientists globally are doing research into the uses of various alternative plant species for a food source? Give three reasons. (3)
- 4.2.4 What might be the advantage of breeding this species for larger seed size? (1)
- 4.2.5 There may be negative effects associated with selective breeding. Outline one risk associated with this type of breeding. (1)
- 4.3 Do you think that the titanium-rich dunes in the Xolobeni area of Pondoland, along the Eastern Cape coast should be mined? (1)
Read the source material (A – D) provided below to assist you in making a decision. Your written response should be 1 to 1½ pages in length and must be supported by evidence from the source material.

SOURCE A: The area in which dune mining is proposed

The proposed dune-mining site in the Xolobeni area of Pondoland on the Wild Coast, about half-way between East London and Durban, is an area under threat. The area earmarked for the mine is along the sea and includes several rivers and estuaries. Many homes are situated just a stone's throw away from the site and it is not clear at this stage whether or not people will be forced to move.

"They tell us that no-one will be forced to relocate, but we think that is a blatant lie," said one of the residents, Mthanjelwa Mpotomela. "Our forefathers lived in this area and we also like it because we farm here." He said even if people were not forced to relocate, they would be forced to leave because of tremors from the mine, adding that most of their houses were built from mud.

SOURCE B: Mining and rehabilitating dunes

In the process of dredge mining, which will be used in Pondoland, heavy minerals are extracted from the dunes after the complete removal of the existing vegetation. The dune remains are then reshaped to their original contours and covered with topsoil. Cereal seeds which germinate and grow rapidly are sown, together with indigenous seeds of long-lived (woody) species.

Recently rehabilitated (fixed) areas of 4 to 5 years are dominated by *Acacia karroo*, but species richness show a progressive increase with age of rehabilitated areas, with more woody species in the older areas and a slight decline in dominance of *A. karroo*.

Some soil nutrients of rehabilitated areas compared favourably with the pre-mined topsoil and subsoil, but percentage organic matter content was still higher in natural dune forests. Increases in soil nutrients suggest that nutrient retention and the establishment of substantial amounts of soil plants and animals are occurring, providing evidence for the sustainability of the soils.

SOURCE C: Predicted benefits for the community

The Australian mining company, which was awarded the rights to mine, has formed a partnership with a local community group to form what is called the Xolobeni Mineral Sands Project.

The Australian mining company puts forward economic advantages for a region of which it paints a dismal picture. Presently 71% of the community is unemployed, there is a high percentage of malnutrition, few people can read and write. The clinics are far away for many people whose houses lie over a large area. Children have to walk a large distance to get to school. Most people have no electricity or running water in their houses, and water has to be collected from rivers as there are no taps available.

Profits of billions of rands are anticipated and the mining company intends to bring about economic upliftment of local communities. One example is that of creating basic infrastructure which is currently lacking; it is proposed that a highway be built in the area.

Minister of Environmental Affairs Marthinus van Schalkwyk had turned down the road application on procedural grounds, but the National Road Agency has now reapplied, this time following the correct procedure. Again, the argument in favour of the road is that it will bring development to the area.

SOURCE D: The conservationist point of view

Conservationists reject the building of a road in the Pondoland area, saying that it will bypass bigger communities already served by good roads, and it will pass through a sparsely populated area which will receive no gain, and instead see their ecotourism prospects harmed.

Conservationists and tourism authorities promote their case for preserving the area's spectacular landscape with arguments about the more widespread and lasting benefits its use as an ecotourism destination would bring. "It has inestimable cultural and environmental value." Besides these issues is the fact that the area is a centre of botanical endemism: many plants that grow naturally in this area are found nowhere else in the world.

John Clarke, a leading anti-mining campaigner in the area, has submitted a complaint to the Human Rights Commission on behalf of the local communities on the basis that at least two of their rights are being violated – their right to information relevant to the exercise or protection of their rights, and the right to have the environment protected for the benefit of present and future generations.

NOTE: NO marks will be awarded for answers in the form of diagrams.

(15)[40]

GRAND TOTAL: 150

MEMORANDUM

SECTION A

QUESTION 1

- 1.1.1 B
- 1.1.2 C
- 1.1.3 B
- 1.1.4 D
- 1.1.5 B

5x2 = (10)

- 1.2.1 Mass extinction
- 1.2.2 Adaptation
- 1.2.3 Food web
- 1.2.4 Biodiversity
- 1.2.5 Pentadactyl

(5)

- 1.3.1 B
- 1.3.2 C

- 1.3.3 G
- 1.3.4 E
- 1.3.5 F
- 1.3.6 A

(6)

1.4.1

(7)

Homo	Chimpanzee
Canines not well developed	Canines well developed to form fangs
No ridge at base of skull	Ridge at base of skull
Less protruding jawline	Protruding jawline
Brow-ridge less pronounced	Brow-ridge pronounced
Foramen magnum positioned towards middle of skull	Foramen magnum position at back of skull
Cranium is proportionally large	Cranium is proportionally small

- 1.4.2 The chimpanzee (1)
- 1.4.3 The foramen magnum is positioned at the back of the skull. (2)
- 1.4.4 Mrs Ples and the Taung child and Little foot. (2)

1.5

- 1.5.1 Almost 4 times as many (1)
- 1.5.2 Drop in temperature (to below freezing) (2)
High humidity
No wind
Accumulation of smoke and sulphur dioxide (4)
- 1.5.3 The wind dropped resulting in the accumulation of smoke and SO₂ levels. (2)
- 1.5.4 The same number of plants (4) had been used. (6)
• The same type of plant i.e. radish, had been used.
• The investigation was left for a two-week period before results were compared.
• The same sized plant tray was used in both cases.
• Both plant trays were enclosed in clear plastic.
- 1.5.5 Repeat the experiment several times to check accuracy of results. (4)
Repeat the experiment with different types of plants.
Increase the number of plants.
Measure the time taken for plants to die.
Repeat the experiment with a range of sulphur dioxide concentrations.

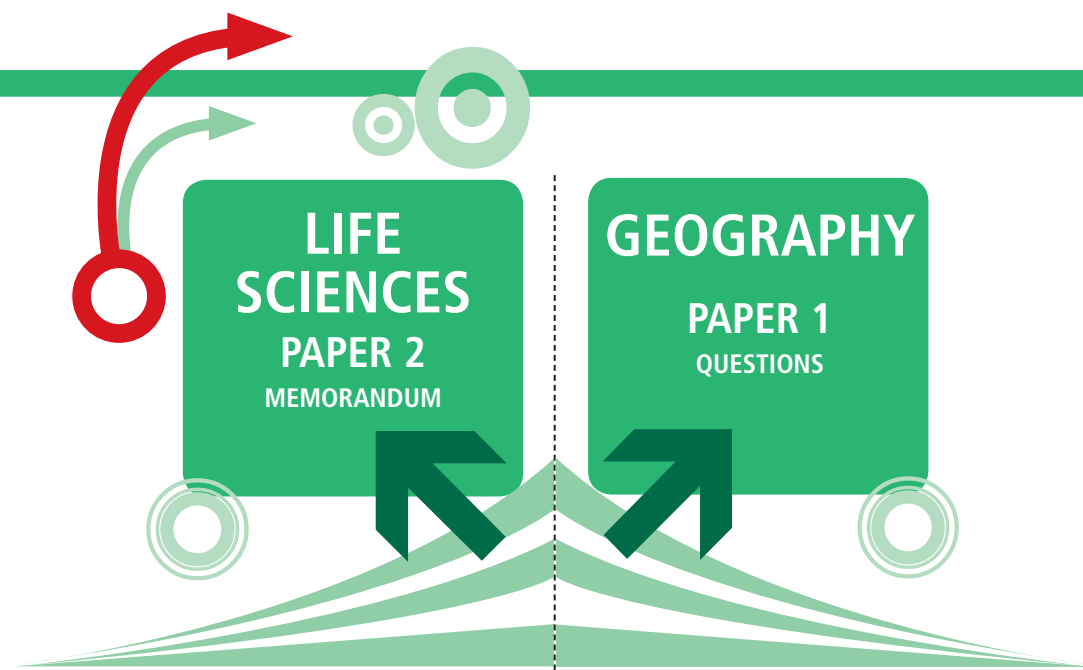
QUESTION 2

- 2.1.1 The sewage contains nutrients that bacteria use and as they use these nutrients they use up the oxygen in the water. (2)
- 2.1.2 This is when the bacteria have used up all the oxygen available as they use the nutrients in the sewage. (2)
- 2.1.3 The bacteria are no longer active and the water is naturally aerated as it travels downstream. (2)
- 2.1.4 There is overflow from overuse of existing systems. (4)
No new systems have been put in place.
Sewage is deposited straight into the river.
- 2.1.5 Negative = diseases; positive – nutrients for crops. (2)(12)
- 2.2.1 109 more banded snail shells were collected. (1)
- 2.2.2 Unbanded shells are better camouflaged and therefore less likely to be seen and snails don't get eaten as much. The banded shells are easy for the birds to see, so they get preyed on more easily. (3)
- 2.2.3 No, but only for this habitat; results for the grassed area are not given. (3)
- 2.2.4 Large numbers of shells to be counted; investigation to be repeated several times in each defined area; variables such as time of year counting occurs; natural distribution of snails and birds taken into account, etc to be considered, i.e. controlled; no live snail shells to be counted. (4)
- 2.2.5 When snails reproduce, they produce offspring which have a variety of colours and banding patterns. If the environment changes e.g. woodland trees are cut down, snails with particular patterns will have favourable variations will be selected for e.g. banded snails will be camouflaged against a background of shadows caused by cut-down trees. Banded snails will not be preyed on as much as thrushes will pick out and eat more snails with shells that are poorly camouflaged. Although the banded snails will mostly survive, they will compete for resources such as food, breeding space, etc. Only those that get the resources will survive and breed. (7)(18)

Total Question 2= 30 marks

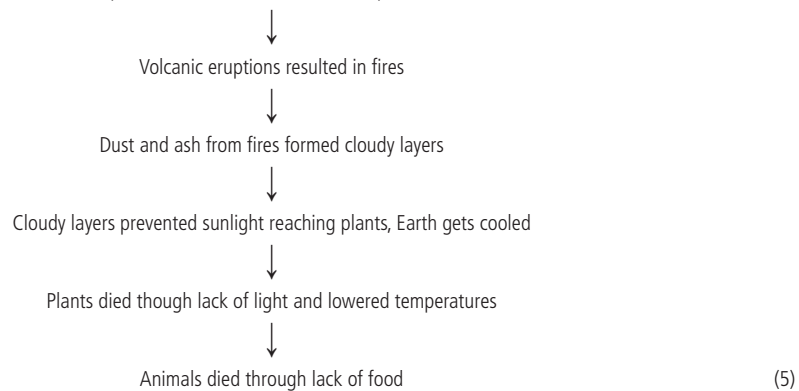
QUESTION 3

- 3.1.1 Exposure to poisonous chemical in the waste (lead, mercury, etc); increased possibility to exposure to disease-carrying organisms in the waste (tetanus, typhoid, dysentery, etc.); increased risk of lung diseases when being present on landfills when burning is taking place (any other acceptable answer). (3)
- 3.1.2 There could be littering when wind blows plastic bags off a landfill into surrounding areas; the ground water could be polluted when chemicals drain through to the bottom of the landfills when it rains; there is air pollution that occurs when the waste is burned on the landfills (any other acceptable answer). (4)
- 3.1.3 They could have compost heaps and not throw away organic waste (any other acceptable answer). (1)



- 3.1.4 The Cape Town municipality is faced with a huge problem of having to deal with approximately 6 000 tons of waste which is generated daily as a result of Cape Town's expanding population, rapid increase in visitors and its ever-growing economy. A broad strategy that can be adopted depends on the effective re-use and recycling of the waste. This strategy needs to involve all stakeholders from the manufacturers to consumers, working together to reduce the amount of waste that is dumped daily. Manufacturers must ensure that items that are manufactured must either be re-useable and/or re-recycleable. This will entail setting up an effective waste-prevention programme involving the rethinking and redesigning of items. Education of the consumers is important so that the sorting of items can take place. Households can recycle organic waste and will be encouraged to develop compost heaps which can be used in gardens. Packaging waste, glass and paper can be sorted so that the municipality can ensure that pick-ups are more effective. In this way millions will be saved which can be used to improve the lives of the people of Cape Town by providing decent housing. (7)(15)

- 3.2.1 Volcanic eruptions released ash and other compounds into the air



- 3.2.2 Both theories are possible
Choice of theory (+ reasons)
Asteroid theory: Evidence is present in the form of soot and iridium in clay layer; craters off Mexico, and others such as in Siberia.
Volcanic theory: comparisons can be made from present-day eruptions where data is collected. Data collected from different types of eruptions and their effects.
For either theory: rate of photosynthesis is negatively affected by lower light intensity and lower temperatures and lack of food would have resulted in dinosaurs dying. Max = 5 marks

- 3.2.3 **Volcanic theory:**
Extinction happened millions of years ago.
6th Extinction:
Present day.
Caused by human impact on planet.
Both resulted in habitat loss, food loss and therefore disappearance of species. (5)(15)
Total Question 3 = 30 marks

SECTION C

QUESTION 4

- 4.1.1 Primary and secondary particles. (2)
- 4.1.2 The particles are so small that they can move through the cells that line the lung and into the blood stream if they are breathed into the lungs. These foreign particles could then affect the heart. (2)
- 4.1.3 To determine which of the five areas tested in the town had the highest amount of PM present. (2)
- 4.1.4 Yes, the area of the collected dust on the slide was the same size; all the slides were covered with a thin layer of petroleum jelly; the time the slides were left at the sites was the same; all locations were outdoors; they tried to control the variables. (4)
- 4.1.5 The slide in Location 3 – lots of primary particles would be in the air and they are large enough to see with the hand lens. (3)
- 4.1.6 The slide in location 5 – an area that is not close to many possible pollutants and would therefore not have many PM in the air. (3)(15)
- 4.2.1 It limits the production of food crops; it affects the consistency of the production; it limits the types of crops that can be farmed and the areas that can be farmed in. (1)
- 4.2.2 It is more suited to the SA climate as it grows in a variety of soil types from coastal to mountain habitats; it does not have the potential to spread in an uncontrolled way as many introduced grasses do; it requires less fertiliser and liming of soil than introduced crop species. (3)
- 4.2.3 Low genetic diversity of crops could mean that with current climate change we could lose certain species and we would require alternatives. To stop the introduction of alien plants into countries we should try and use indigenous plants. Increasing population numbers means a need for a greater amount of food and the need to use more land that may not be suited to current crop species. (3)
- 4.2.4 Easier to harvest bigger seeds; better chance of seeds surviving when harvested. (1)
- 4.2.5 It reduces the genetic diversity and thereby raises the chances of defective mutations being expressed in the individuals. These organisms may also become more susceptible to disease as there is little genetic variation. (1)(10)

Total for Section C = 40
Grand Total = 150

SECTION A: CLIMATE AND WEATHER, FLUVIAL PROCESSES AND STRUCTURAL LANDFORMS

Answer at least ONE question from this section.

QUESTION 1

- 1.1 Look at Figure 1.1. Choose the correct word/phrase from the word/phrase given in brackets, which would make the sentence correct. Write down only the question number and the correct word/phrase.
- 1.1.1 (Katabatic/anabatic) winds will blow pollution from the factories to the townhouses at night. This wind is a (cold/warm) wind.
- 1.1.2 The suburb at B will be (warmer/colder) than the townhouses as it lies on the (north-facing south-facing) slope.
- 1.1.3 Temperatures in the CBD will be (warmer/colder) than temperatures at the townhouses. (5 x 2)(10)
- 1.2 Refer again to Figure 1.1. State whether the following statements are TRUE or FALSE.
- 1.2.1 Infiltration of rain water will be less in the CBD because many of the surfaces are impermeable.
- 1.2.2 There will be less runoff of rainwater at the suburb due to the steep gradient.
- 1.2.3 Infiltration of rain water will be greater at the golf course than it will be at the townhouses.
- 1.2.4 The channel pattern of this river is a meandering pattern.
- 1.2.5 The golf course lies on the inner bend of the river where there is more erosion. (5 x 2)(10)
- 1.3 Use Figure 1.3 to answer this question. The figure shows a cross section of the ITCZ.
- 1.3.1 What do the letters ITCZ stand for? (1)
- 1.3.2 Over which line of latitude does the ITCZ lie? (1)
- 1.3.3 Which season is it in the Southern Hemisphere? Give a reason for your answer (2 x 2)(4)
- 1.3.4 Name the planetary winds that are blowing towards the ITCZ. (1 x 2)(2)
- 1.3.5 Explain why heavy rain is shown at the ITCZ. (3 x 2)(6)
- 1.4 Refer to the sketch synoptic chart in Figure 1.4 to answer these questions.
- 1.4.1 Name the high pressure cells at A, B and C. (3 x 1)(3)
- 1.4.2 The mid-latitude cyclones at D and E are linked. What is this called? (1)
- 1.4.3 What season does this synoptic chart represent? Give ONE reason for your answer. (2 x 2)(4)
- 1.4.4 Explain why the high pressure cell at C causes dry conditions over the plateau in winter. [Hint: You must refer to the inversion layer.] You may use a diagram to illustrate your answer. (4 x 2)(8)
- 1.4.5 Describe and explain the weather that Cape Town could be experiencing. (3 x 2)(6)
- 1.4.6 It is possible that the area at F could experience berg winds. Why would this cause weather forecasters to warn the public about the possibility of fires? (2 x 2)(4)
- 1.5 Look at Figure 1.5 to help you to answer these questions.
- 1.5.1 Name the river pattern in Diagram A and the river pattern in Diagram B. (2 x 1)(2)
- 1.5.2 Describe the characteristics of the pattern in Diagram A. (1 x 2)(2)
- 1.5.3 Describe the rock structure that caused the pattern in Diagram B to develop. (2 x 2)(4)
- 1.5.4 Draw a longitudinal profile from point 1 to 2 on Diagram A. Fill in the following on your diagram:
- a) The source of the river
- b) The knickpoint waterfall
- c) Permanent/ultimate base level (3 x 2)(6)
- 1.5.5 Does the profile you have drawn indicate a graded river? Motivate your answer. (2 x 2)(4)
- 1.5.6 The knickpoint waterfall is a temporary base level.
- a) What is a temporary base level? (1 x 2)(2)
- b) Name the process which would cause this waterfall to move upstream. (1 x 2)(2)
- c) The waterfall indicates that the river has been rejuvenated because the sea level dropped. What are the characteristics of a rejuvenated river? (2 x 2)(4)
- 1.6 Refer to Figure 1.6.
- 1.6.1 Name the slope elements at A, B and C. (3 x 1)(3)
- 1.6.2 State TWO characteristics of the rock at D. (2 x 1)(2)
- 1.6.3 What is the shape of the slope between X and Z? (1)
- 1.6.4 Soil creep occurs between X and Z. Describe this process and explain ONE factor which would indicate that it is occurring. (2 x 2)(4)
- 1.6.5 How do people contribute to mass wasting processes? Discuss TWO factors. (2 x 2)(4)[100]

QUESTION 2

- 2.1 Choose the correct term/phrase from Column B to match the description in Column A. Write only the term/phrase next to the question number.

COLUMN A	COLUMN B
2.1.1 The winds that meet the Polar easterlies at the polar front.	Upslope
2.1.2 The winds that converge on the ITCZ.	From the interior to the coast
2.1.3 The direction in which tropical cyclones move.	Tropical easterlies
2.1.4 The direction of a berg wind.	From east to west
2.1.5 The direction of an anabatic wind.	Westerlies

(5 x 2)(10)

- 2.2 Choose the correct word/phrase from the word/phrase in brackets that would make the sentence correct. Write down only the question number and the correct word/phrase.
- 2.2.1 The steep slope of a homoclinal ridge is called the (dip/scarp) slope.
- 2.2.2 The dip slope of a cuesta has a (steeper/more gentle) gradient than the dip slope of a hog'sback.

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- 2.2.3 A cuesta is formed from strata which is (inclined/horizontal).
 2.2.4 A (trellis/radial) drainage pattern is usually found in an area where there are homoclinal ridges lying parallel to one another.
 2.2.5 The rock of which a tor is composed is (shale/granite). (5 x 2)(10)
 2.3 Refer to Figure 2.3, which is a satellite photograph showing cloud pattern over southern Africa on 22 February.
 2.3.1 Apart from the date, state TWO other factors to prove that this satellite image was taken in summer. (2 x 2)(4)
 2.3.2 A tropical cyclone is shown at A.
 a) Name the feature that can be clearly seen in the centre of A. (1 x 2)(2)
 b) Describe the pressure and the weather that is experienced in the centre of the tropical cyclone. (2 x 2)(4)
 c) In which direction will the winds rotate in this tropical cyclone? Give a reason for your answer. (2 x 2)(4)
 d) Predict the direction in which this tropical cyclone will move over the next few days. (1 x 2)(2)
 e) Discuss the impact that system A would have on local communities in the area near X. (3 x 2)(6)
 2.3.3 Figure 2.3.3 is a sketch to show the synoptic conditions associated with feature B on Figure 2.3.
 a) Name the high pressure cells at P and Q. (2)
 b) Name the winds at S and T and state the characteristics of each. (4)
 c) Explain why feature B is associated with heavy cloud cover. (2 x 2)(4)
 2.4 The climate of a city is slightly different to the climate of the rural area that surrounds it. Describe in what way the following weather elements in a city are different to the rural area and explain why they are different.
 2.4.1 Temperature (2 x 2)(4)
 2.4.2 Cloud cover (2 x 2)(4)
 2.5 Figure 2.5 is an illustration of river capture by the Graskop River in Mpumalanga. Refer to this diagram to answer the questions.
 2.5.1 Describe why and how the Graskop River captured the river at X. (2 x 2)(4)
 2.5.2 Supply labels for the features of capture marked W, X, Y and Z. (4)
 2.5.3 Discuss what changes took place in the Graskop River after the capture. (2 x 2)(4)
 2.6 Figure 2.6 shows the catchment area of a river system.
 2.6.1 Define:
 a) Catchment area (1 x 2)(2)
 b) River system (1 x 2)(2)
 2.6.2 Supply labels for:
 a) The high ground at D. (1)
 b) The point where the rivers join at C. (1)
 2.6.3 Draw sketches to show the likely shape of the cross profile of the river at A and at B. (2 x 2)(4)
 2.6.4 Deforestation is occurring near the dam. How will this affect the dam? Explain your answer. (2 x 2)(4)
 2.6.5 Hydrologists (people who monitor the flow of the river and the water in the river) are concerned about the impact that the grazing land, the factory and the agricultural land could have on the river. Discuss why they are worried about each of these factors. (3 x 2)(6)
 2.7 Look at Figure 2.7.
 2.7.1 Name the landforms at X and Y. (2)
 2.7.2 Give the characteristics of the rock structure that has led to the development of these landforms. (1)
 2.7.3 What landform is developing at Z? (1)
 2.7.4 Discuss the value of this landscape for people. (2 x 2)(4)[100]

SECTION B: PEOPLE AND PLACES: RURAL AND URBAN SETTLEMENTS, PEOPLE AND THEIR NEEDS

Answer at least ONE question from this section.

QUESTION 3

- 3.1 Choose the correct answer to the questions below. Only write down the letter next to the question number.
 3.1.1 The policy to return land to people who had their land taken away during Apartheid is called
 a) land redistribution
 b) land tenure
 c) land restitution
 d) Agenda 21
 3.1.2 The programme of action agreed on at the Earth Summit in Rio de Janeiro to improve the social, economic and environmental quality of human settlements is called:
 a) GEAR
 b) Agenda 21
 c) Land reform
 d) RDP
 3.1.3 The urban land use model that divides a city into 'slices' radiating out from the CBD is called the:
 a) Concentric Zone Model
 b) Bid Rent Model
 c) Multiple Nuclei Model
 d) Sector Model
 3.1.4 Forces which cause people and activities to move away from the CBD are:
 a) Centripetal forces
 b) Centrifugal forces
 c) Invasion forces
 d) Succession forces
 3.1.5 Which of the following are processes which assist with urban renewal?
 a) Gentrification and chelseafication
 b) Invasion and succession
 c) Functional magnetism
 d) Functional convenience (5 x 2)(10)
 3.2 The sentences below relate to South Africa's economic activities. Select the missing words from the list. Write down the question number and the correct word/words.
 List from which to choose answers:
 Mpumalanga, Southwestern Cape, Limpopo Province, Sishen, Saldanha Bay, Richards Bay, sugar, maize, fruit, platinum, gold
 3.2.1 The Southwestern Cape is the chief _____ producing region in the country.
 3.2.2 The North Western Province is important as _____ is mined there.
 3.2.3 The main harbour from which coal is exported is _____.
 3.2.4 The main agricultural product of South Africa is _____.

- 3.2.5 Most of the thermal power stations of South Africa are found in _____. (5 x 2)(10)
 3.3 Study Figure 3.3 which shows a settlement.
 3.3.1 What is a settlement? (1 x 2)(2)
 3.3.2 Is the settlement shown in the diagram a rural or urban settlement? Motivate your answer. (2)
 3.3.3 Is the settlement shown in the diagram a dry point or a wet point settlement? Motivate your answer. (2)
 3.3.4 Is the settlement pattern nucleated or dispersed? Give a reason for your answer. (2)
 3.3.5 Name and discuss TWO physical factors (other than water), which influenced the choice of the site of this settlement. (2 x 2)(4)
 3.3.6 The sustainability of this village is threatened by soil erosion. Describe TWO ways in which this community could prevent soil erosion. (2 x 2)(4)
 3.4 Refer to Figure 3.4 which shows the service area of four different functions provided by a town.
 3.4.1 The town is a central place. Define a 'central place urban settlement'. (2)
 3.4.2 What do the following terms mean?
 a) Sphere of influence
 b) Threshold population
 c) Range (3 x 2)(6)
 3.4.3 How would the size of the sphere of influence of the town compare with the size of the sphere of influence of the village? Explain your answer. (2 x 2)(4)
 3.4.4 Name ONE service/function that you would expect to find in the village. (1)
 3.4.5 Which service offered by the town has the largest threshold population and which service has the smallest threshold population? (2 x 2)(4)
 3.4.6 Many South African country towns such as the one shown in the figure are experiencing rural depopulation.
 a) Explain why country towns are experiencing rural depopulation. (2 x 2)(4)
 b) Discuss ONE strategy that could be implemented to revitalise a country town. (3)
 3.5 Study the map and diagrams in Figure 3.5, which shows a South African industrial complex and then answer these questions.
 3.5.1 Identify the industrial complex G (Insert A), shown on the map. (1)
 3.5.2 Suggest the main primary economic factor (evident on the map) which influenced the development of this industrial complex. (1)
 3.5.3 Give TWO other factors, also evident on the map, which attracted industries to this region. (2)
 3.5.4 Explain how the factors shown in Insert B have influenced the development of industries in this industrial region. (4 x 2)(8)
 3.5.5 Identify industrial areas B, C and D shown on Insert A. (3)
 3.5.6 Centralisation of industries in industrial complex G has created many problems in the area. State THREE of these problems. (3)
 3.5.7 To encourage economic development in other areas of South Africa the government has implemented SDIs.
 a) What are SDIs and how will they encourage development? (2 x 2)(4)
 b) What kind of incentives are used by government to encourage businessmen to move to these areas? (2)
 c) Give ONE example of an SDI. (1)
 3.6 Read the Fact File below:

Fact File:

According to the South Africa constitution it is every person's right to have access to clean water. However, by 2005, 16% of South Africans did not have an adequate water supply. Companies like Rand Water and Umgeni Water in Durban purify and distribute water to consumers. Approximately 59% is used by irrigated agriculture, 25% for domestic and municipal use in rural and urban areas, 6% for mining and large industries, 2% for power generation, and 4% for commercial forestry plantations. Total water use is expected to increase by at least 30% by 2025. By 2030 it is expected that our demand for water will exceed our supply.

- 3.6.1 Explain why 16% of South Africans do not have access to a reliable water supply. (2)
 3.6.2 Discuss TWO reasons for the increase in the demand for water. (2 x 2)(4)
 3.6.3 Which sector uses the most water? (1)
 3.6.4 Suggest THREE ways in which this sector could reduce their water consumption. (2 x 2)(4)
 3.6.5 Explain why the Drakensberg Pumping Scheme is called an "inter-basin" water transfer scheme. (2 x 2)(4)[100]

QUESTION 4

- 4.1 Choose the correct term/phrase from the word/phrase in brackets, which would make the sentence correct. Write down only the correct term/phrase next to the question number.
 4.1.1 Urban settlements are regarded as (unifunctional/multifunctional).
 4.1.2 A metropolis is (higher/lower) than a city in the urban hierarchy of settlements.
 4.1.3 The (site/situation) of a settlement refers to the actual piece of land on which the settlement is placed.
 4.1.4 An isolated rural settlement pattern has greater (social/economic) advantages than a nucleated rural settlement.
 4.1.5 Rural development projects that are set up by the community are called (co-operative/grassroot) development projects. (5 x 2)(10)
 4.2 State whether the following are TRUE or FALSE. Only write down the question number and true or false.
 4.2.1 A positive balance of trade is when the value of a country's imports is greater than the value of its exports.
 4.2.2 The balance of payments includes a country's invisible imports and exports.
 4.2.3 Tourists visiting South Africa is regarded as an invisible import.

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- 4.2.4 Globalisation is the movement of ideas, goods and people between countries.
- 4.2.5 GDP per annum refers to the value of the goods produced and services performed by the permanent inhabitants of a country in one year. (5 x 2)(10)
- 4.3 Refer to Figure 4.3 which shows the land use zones in Port Elizabeth and then answer the questions below:
- 4.3.1 What type of trade and transport town would this settlement be classified as? Motivate your answer. (2)
- 4.3.2 The CBD of a city is usually in the centre of the city. Suggest why this is not the case in Port Elizabeth. (1 x 2)(2)
- 4.3.3 List THREE functions that would be found in the CBD. (3)
- 4.3.4 Explain TWO reasons for the location of the industrial land use zone. (2 x 2)(4)
- 4.3.5 Give a reason for the location of Area B. (1)
- 4.3.6 Discuss how the RDP (Reconstruction and Development Programme) attempted to improve the quality of life for the people living in Area B. (4 x 2)(8)
- 4.3.7 The airport is located in the rural-urban fringe (Area C). Describe the characteristics of this land use zone. (3 x 2)(6)
- 4.3.8 Explain, giving ONE reason for each, the location of each of the residential areas 1, 2 and 3. (3 x 2)(6)
- 4.3.9 As a town planner, suggest where a regional shopping centre should be built. Give TWO reasons for your answer. (3 x 2)(6)
- 4.4 Read the extract below, which relates to the Coega Industrial Development Zone.

Coega: Gateway to the African renaissance
[An advertisement for Coega]

Anyone who knows anything about international trade will tell you that Hong Kong, Singapore and Dubai are amongst the world's busiest ports.

South Africa will soon be part of this powerful group thanks to the benefits available at the Coega IDZ near Port Elizabeth.

It's the ideal location for export-orientated industries.

For a start there are no import duties so manufacturers can bring raw materials in at lowest cost. And because there are no export duties, they can send beneficiated goods out at the keenest prices. Transport costs are minimised, too, because Coega is right next door to South Africa's new deepwater port where state-of-the-art container handling will speed up distribution.

The proven combination of a duty-free industrial zone, purpose-built modern port and ready access to the rest of the world will result in competitive advantages for exporters.

Not to mention economic benefits for the people of the Eastern Cape. Or international trading opportunities for the entire sub-continent.

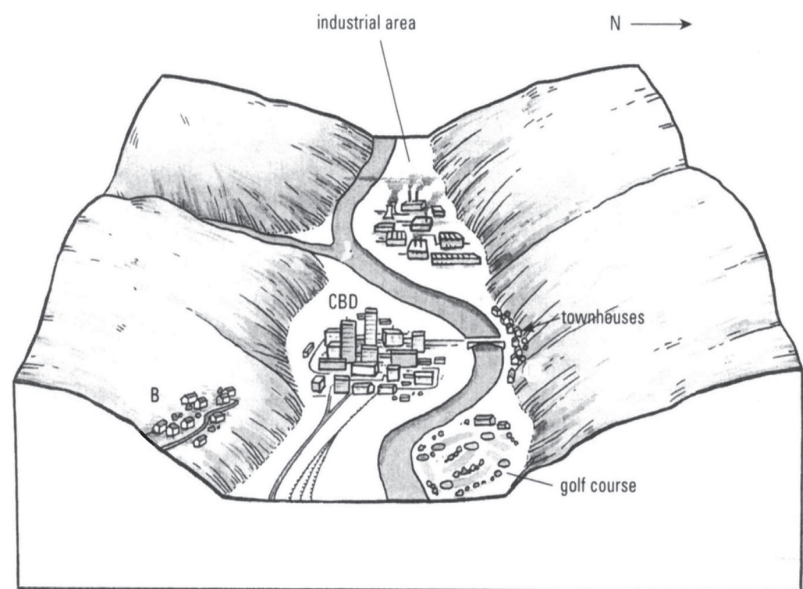
Welcome Coega.

Visit www.coega.com for further information.

- 4.4.1 What is meant by the following:
- export-orientated industries
 - beneficiated goods
 - container handling
- (3 x 2)(6)
- 4.4.2 In what ways is Coega an "ideal location for export-orientated industries"? (2 x 2)(4)
- 4.4.3 State TWO advantages of Coega for manufacturers, stated in the advertisement (other than its location). (2)
- 4.4.4 The main economic activities at Coega are industry and trade. Classify each of these activities as primary, secondary or tertiary economic activities. (2)
- 4.4.5 Write a short paragraph explaining how the people of the Eastern Cape will benefit from the development of this IDZ. (4 x 2)(8)
- 4.4.6 Suggest the meaning of the heading of the article. (1 x 2)(2)
- 4.4.7 In January 2008, it was announced that a multibillion-rand aluminium smelter for Rio-Tinto-Alcan, an anchor tenant, was approved and that 150 skilled Canadians have arrived to help with its construction.
- What do you understand by an anchor tenant? (2)
 - How will the arrival of 150 Canadians impact on the economy of the Eastern Cape? (2 x 2)(4)
- 4.5 The Department of Minerals and Energy is investigating a strategy to use mealies or sugar cane as the main ingredient to produce bioethanol. However, Citizens United for Renewable Energy and Sustainability (CURES) is worried that: "... a strategy based on industrial agriculture will bring more environmental problems as well as increased food prices ..." (Annie Sugrue).
- 4.5.1 How is most of the power, used in industry, presently generated in South Africa? (1 x 2)(2)
- 4.5.2 Why is it important to investigate alternative methods to produce power? Give TWO reasons for your answer. (2 x 2)(4)
- 4.5.3 How would the use of mealies or sugar cane to produce bioethanol impact on food security? Explain your answer. (2 x 2)(4)
- 4.5.4 Where is the main maize-growing area in South Africa and where is the main sugar-growing area in South Africa? (2)[100]

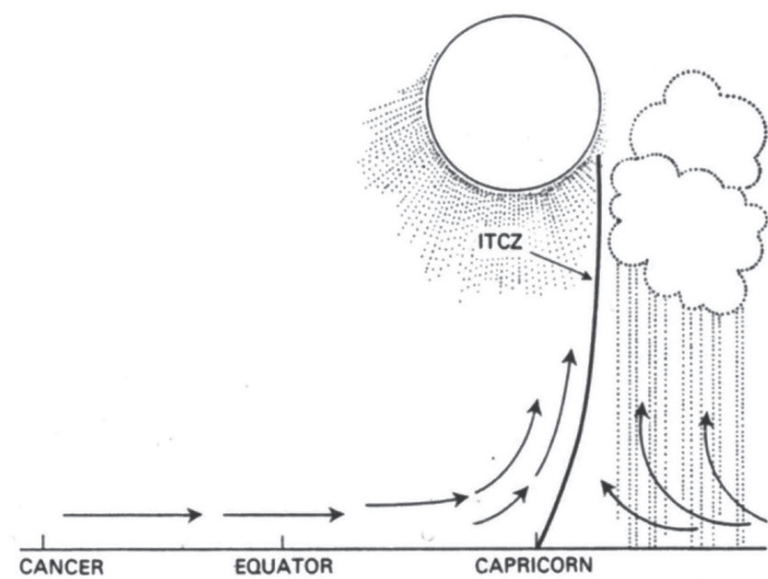
GEOGRAPHY SOURCES

FIGURE 1.1



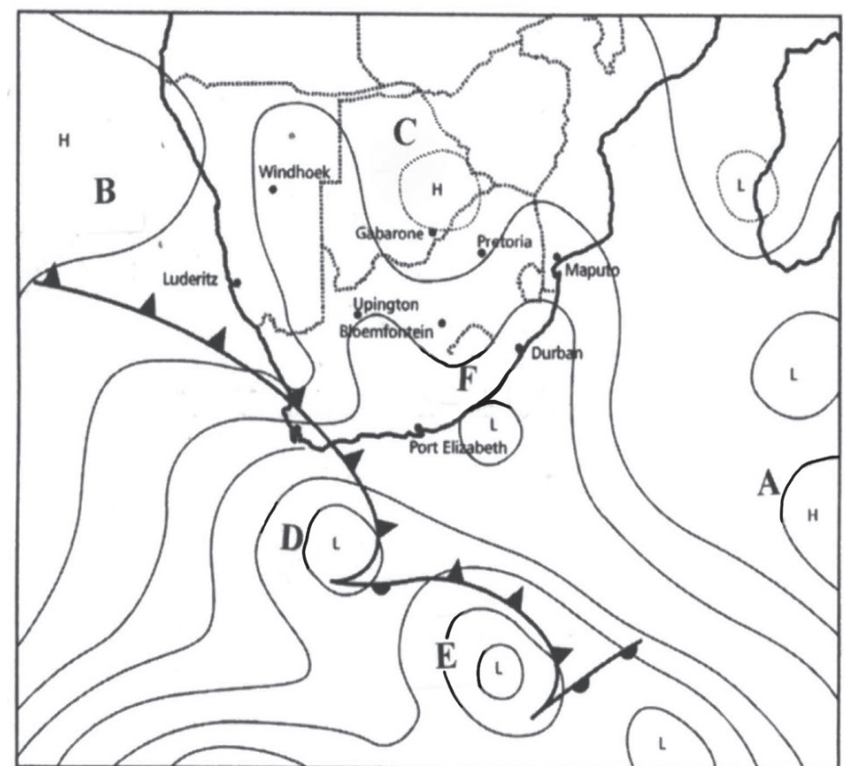
[Source: Understanding Geography – J. H. Reynhardt]

FIGURE 1.3



[Source: A Geography of Africa – W. J. Minns]

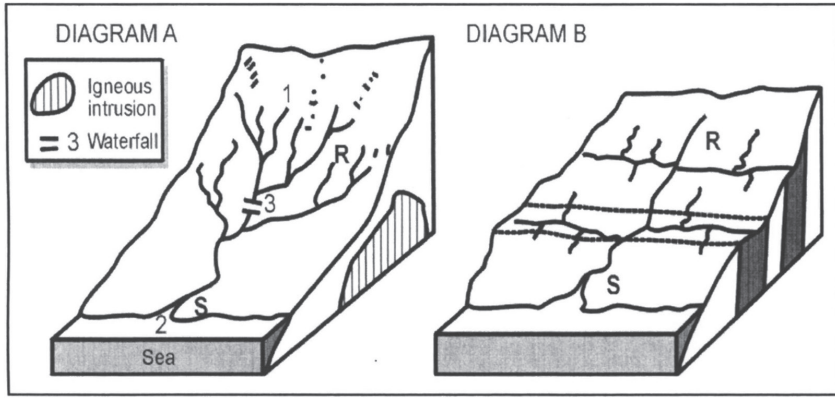
FIGURE 1.4



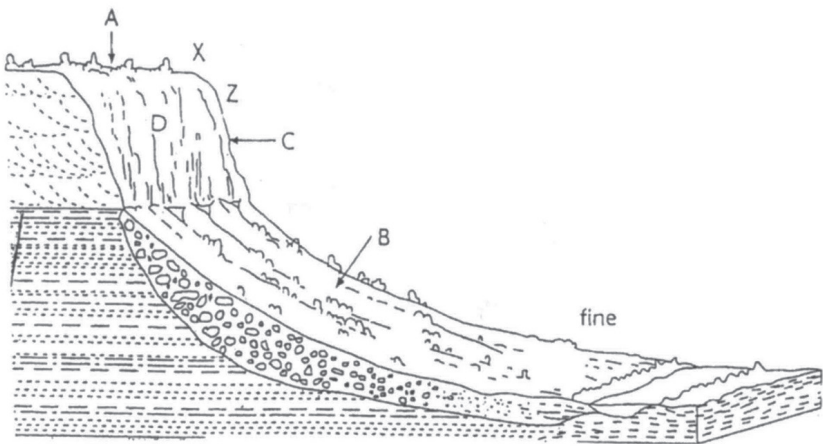
[Source: Spot On Geography – A. Blackbeard et al]

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FIGURE 1.5



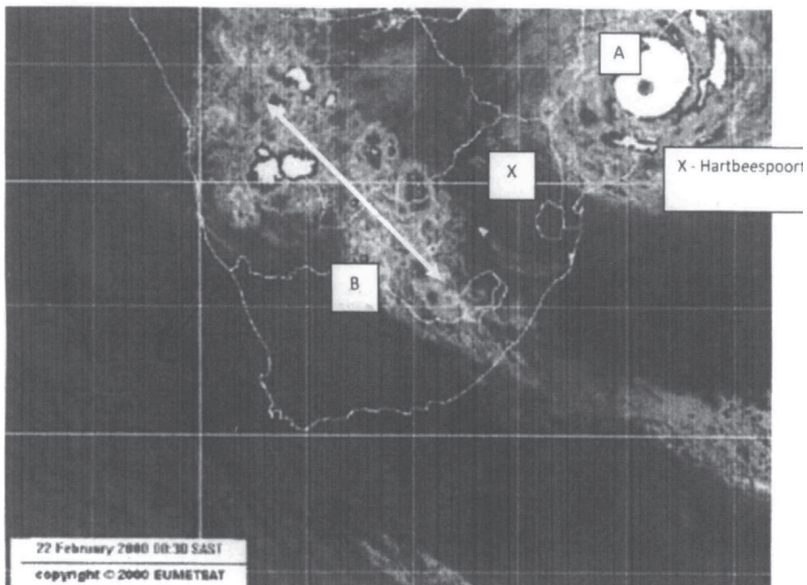
[Source: Unknown]
 FIGURE 1.6



[Source: Focus on Geography Exam Practice Book – G. Ravenscroft]

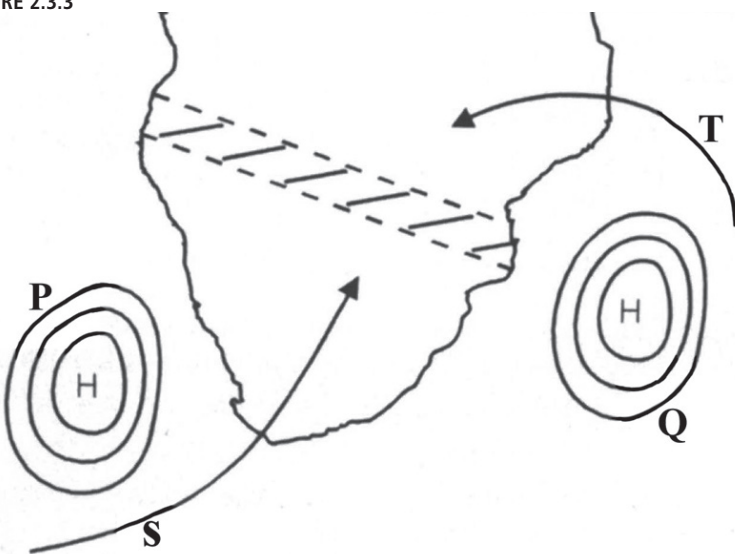
FIGURE 2.3

EUMETSAT of South Africa 22 February 2000



[Source: Eumetsat]

FIGURE 2.3.3



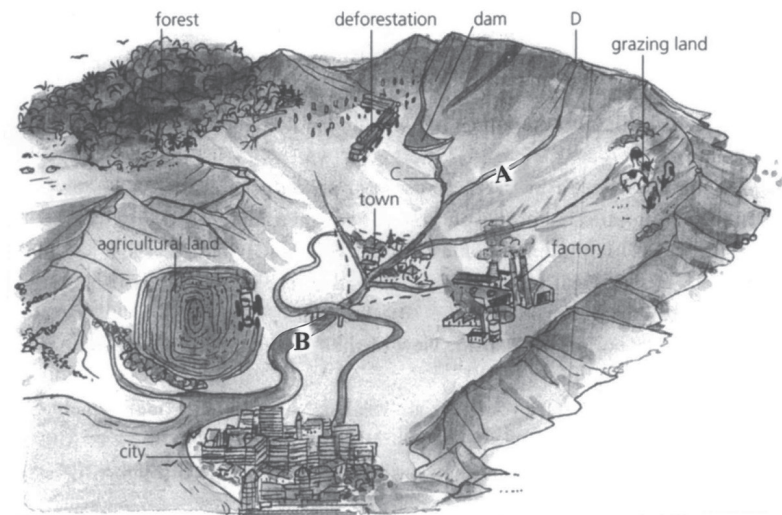
[Source: Multiple Choice Questions – Johan Snyman]

FIGURE 2.5



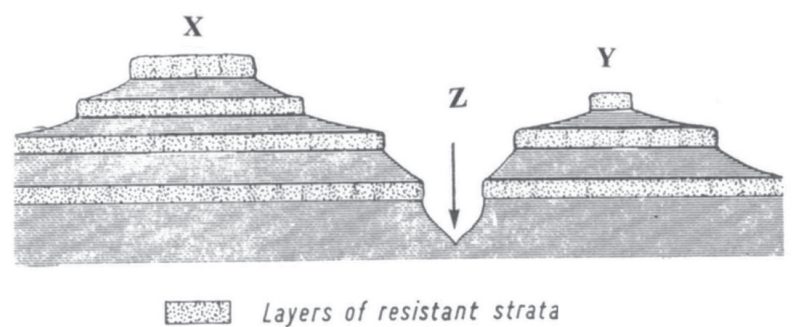
[Source: Visual Geography Grade 12 – D. Gear]

FIGURE 2.6



[Source: The Learning Generation Grade 12 – Loredana Borello et al]

FIGURE 2.7

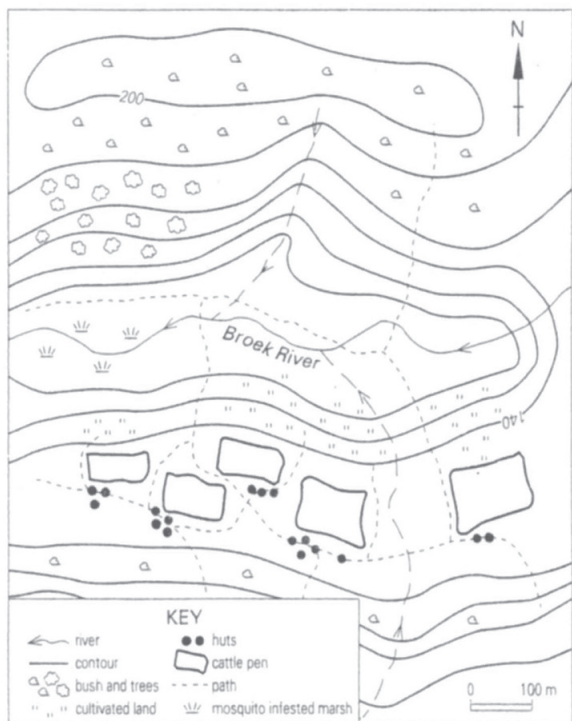


[Source: African Landscape Studies – L. A. Lister]

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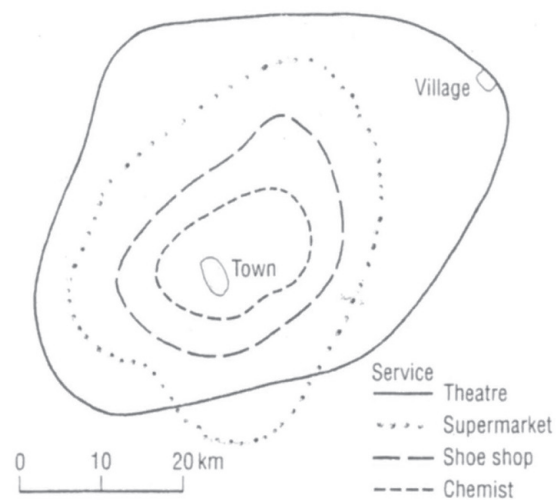
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MEMORANDUM

FIGURE 3.3



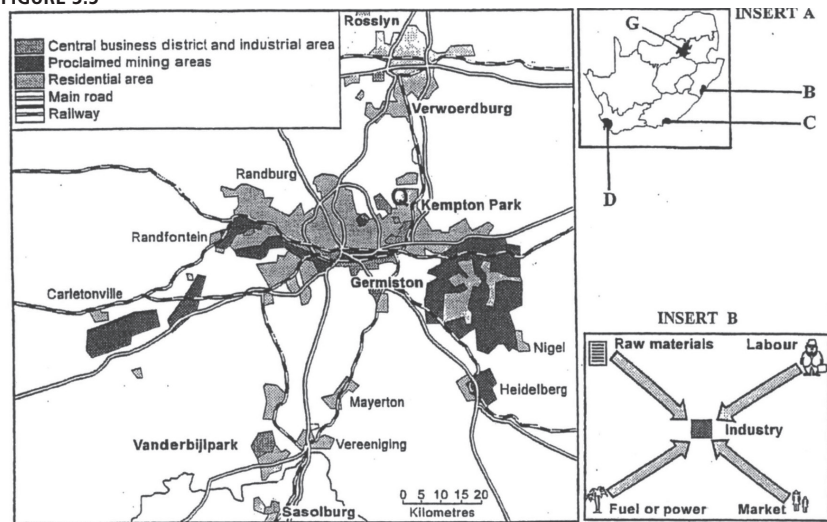
[Source: Focus on Geography Grade 12 – J. Earle et al]

FIGURE 3.4



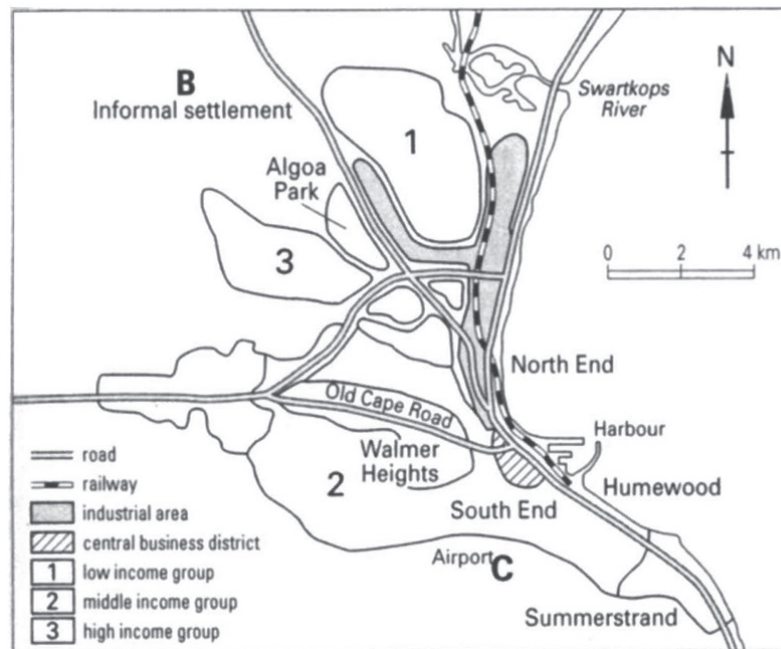
[Source: Unknown]

FIGURE 3.5



[Source: Unknown]

FIGURE 4.3



[Source: Focus on Geography Grade 12 – J. Earle et al]QUESTION 1

MEMORANDUM

- 1.1 1.1.1 Katabatic, cold
- 1.1.2 Warmer, north-facing
- 1.1.3 Warmer
- 1.2 1.2.1 True
- 1.2.2 False
- 1.2.3 True
- 1.2.4 True
- 1.2.5 False
- 1.3 1.3.1 Inter-tropical convergence zone
- 1.3.2 Tropic of Capricorn/23½°S
- 1.3.3 Summer – sun overhead Tropic of Capricorn/ITCZ in Southern Hemisphere.
- 1.3.4 Tropical easterlies.
- 1.3.5 Air is hot air therefore light and rises, convergence of winds leads to air rising, rising air cools and condenses.
- 1.4 1.4.1 A – South Indian HP B – South Atlantic HP C – Inland/Kalahari HP.
- 1.4.2 Family of depressions.
- 1.4.3 Winter – cold fronts further north and crossing land/high pressure over the land/South Atlantic high pressure more north.
- 1.4.4 Plateau cold, no rising air, strong high pressure over the land, descending air from high pressure warms, inversion lies below height of escarpment, moist air from Indian Ocean cannot reach plateau.

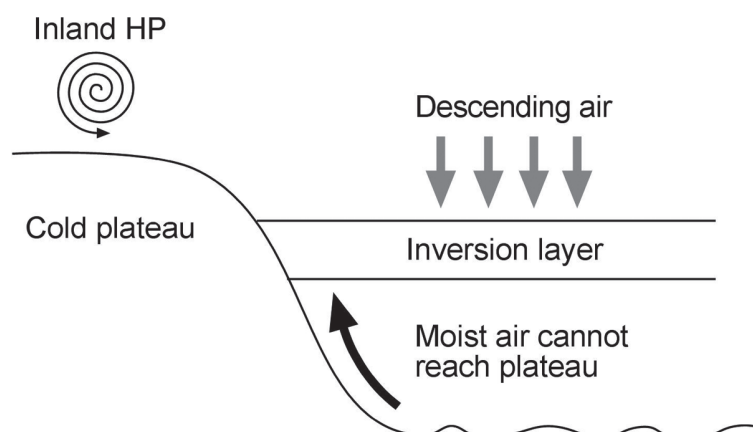


DIAGRAM of inversion layer

- 1.4.5 Cold temperatures as air behind cold front is cold, heavy cloud as cold air forces warm air to rise and cool and condense, rain due to air condensing etc.
- 1.4.6 Berg winds are hot and dry winds, could cause fires as it is winter and vegetation is dry.
- 1.5 1.5.1 A – dendritic B – trellis
- 1.5.2 Tributaries join main stream at acute angle/looks like branches of a tree.
- 1.5.3 Rock is inclined, rock strata has different resistance to erosion.
- 1.5.4

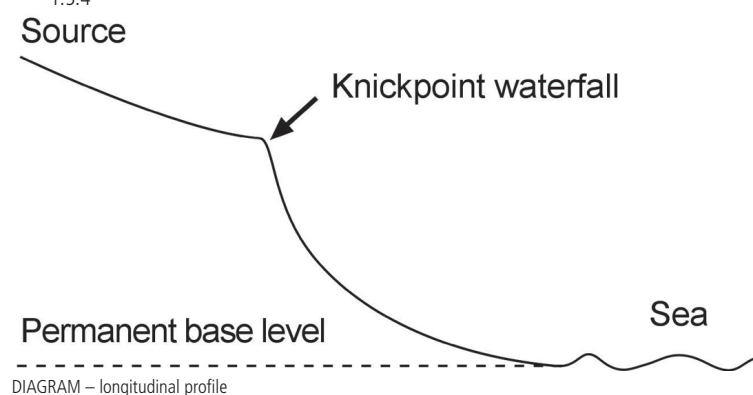
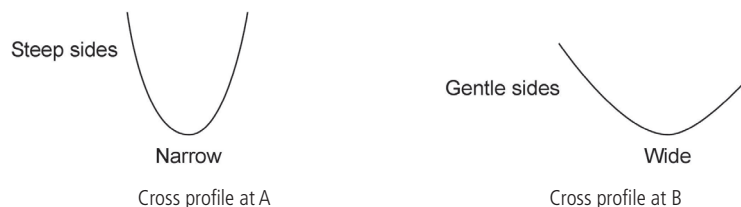


DIAGRAM – longitudinal profile

- 1.5.5 Not a graded river as there is a sharp change in gradient at the waterfall, profile is not a smooth concave shape.
- 1.5.6 a) Temporary base level is where downward erosion of the river is slowed.
b) Headward erosion.
c) River has excess energy, begins to erode vertically.
- 1.6 1.6.1 A – Crest B talus/scree/debris slope C – Cliff/scarp/free-face
1.6.2 Resistant, lies horizontally.
1.6.3 Convex.
1.6.4 Soil particles slowly move downslope under the influence of gravity, evidence – bent trees and poles/broken retaining walls etc.
1.6.5 Remove vegetation/ build on slopes etc – must discuss.

QUESTION 2

- 2.1 2.1.1 Westerlies
2.1.2 Tropical easterlies
2.1.3 From east to west
2.1.4 From the interior to the coast
2.1.5 Upslope
- 2.2 2.2.1 Scarp
2.2.2 More gentle
2.2.3 Inclined
2.2.4 Trellis
2.2.5 Granite
- 2.3 2.3.1 Cloud pattern over the land stretching from NW to SE; tropical cyclone evident; no cloud over SW Cape.
2.3.2 a) Eye
b) Lowest pressure; clear skies; no rain; calm.
c) Clockwise – it is in the Southern hemisphere.
d) Towards the SW
e) Will bring strong winds; will bring very heavy rain; damage to houses, power lines, could lead to flooding; crops damaged etc.
2.3.3 a) P – S Atlantic HP Q – S Indian HP
b) S – SW winds – cool and dry T – NE winds – warm and moist
c) SW winds and NE winds converge at the trough of low pressure; warm NE winds rise cool and condense.
- 2.4 2.4.1 Temperature – hotter in the city as industry, people, cars generate heat, concrete and tar absorb heat etc.
2.4.2 Cloud cover – more cloud in the city as the hotter air rises and condenses, there are many dust particles on which water vapour condenses (condensation nuclei).
- 2.5 2.5.1 Graskop River has more energy as it flows down the steep slopes of the escarpment; erodes through watershed by headward erosion and intercepts the other river.
2.5.2 W – misfit/beheaded stream X – elbow of capture Y – captive Z – captor.
2.5.3 Graskop River gets more water, then has more energy and erodes vertically.
- 2.6 2.6.1 a) Catchment area – area from which a river system gets its water
b) River system – main river and the tributaries that flow into it.
2.6.2 a) D – watershed C – confluence
2.6.3 DIAGRAM



- 2.6.4 More water and silt in the dam as there will be more runoff and water will pick up sand from the bare ground.
2.6.5 Grazing land – could be over grazing therefore less vegetation to bind the soil and more silt will reach the river; factory – could pollute the water as effluent from industries could reach the water; agricultural land – fertilisers could reach the water and cause a build-up of nutrients in the water (eutrophication).
- 2.7 2.7.1 X – mesa Y – butte
2.7.2 Horizontal rock with different resistance to erosion.
2.7.3 Canyon
2.7.4 Canyon – tourism – spectacular scenery, river rafting etc; little value for agriculture – dry and water from river difficult to access.

QUESTION 3

- 3.1 3.1.1 C
3.1.2 B
3.1.3 D
3.1.4 B
3.1.5 A
- 3.2 3.2.1 Fruit
3.2.2 Platinum
3.2.3 Richards Bay
3.2.4 Maize
3.2.5 Mpumalanga
- 3.3 3.3.1 It is a place where people live and contains buildings and an infrastructure.
3.3.2 Rural – primary activity – farming.
3.3.3 Dry point settlement – people have settled away from the river on higher ground.
3.3.4 Nucleated – a number of homes are grouped together.
3.3.5 On the terrace as this is flat ground; on the warmer north-facing slope; in the warm thermal belt half-way up the slope.
3.3.6 Prevent overgrazing by not keeping too many cattle; contour ploughing when they plant crops; avoid the development of footpaths.
- 3.4 3.4.1 An urban place which provides services to the surrounding rural population.
3.4.2 a) The area served by a central place.
b) The minimum amount of people required to support a central place/function/service.
c) The maximum distance a person will travel to the central place or to get a function/service.
3.4.3 Sphere of influence of the town would be larger as it will have more functions and higher order functions, needs a greater threshold population.
3.4.4 Shop selling bread etc.
3.4.5 Largest – theatre; smallest – chemist.
3.4.6 a) Farmers leave the farms therefore services or shops in the town don't meet their threshold population and have to close down and so people leave the town to go to the city.
b) Must discuss – can choose to discuss some kind of tourist activity, encouraging retired people to move there, government can introduce incentives to encourage business people to move there etc.

GEOGRAPHY

PAPER 1

MEMORANDUM

- 3.5 3.5.1 Gauteng
3.5.2 Mining – gold
3.5.3 Roads and railways
3.5.4 Raw materials – for industry i.e. coal, iron ore not too far away – lead to development of iron and steel industry and manufacture of machinery; labour – dense population therefore skilled and unskilled labour supply; markets – gold mines, people need manufactured goods; power – coal and electricity from Mpumalanga, not far away etc.
3.5.5 B – eThekweni Metropolitan region (Durban-Pinetown) C – Nelson Mandela Metropolitan region (Port Elizabeth-Uitenhage); Southwestern Cape.
3.5.6 Overcrowding, not enough houses, job shortages, strain on infrastructure and resources, excessive pollution etc.
3.5.7 a) Corridors of development along which tourism, transport links, industry, farming will be developed. This will lead to more jobs and economic development.
b) Tax rebates, low interest loans, a developed infrastructure, cheap land etc.
c) Maputo Development Corridor/Saldanha/Fish River/Wild Coast etc.
- 3.6 3.6.1 In the times of Apartheid there were many rural areas, especially in the old “homelands” which the government did not develop or supply with services.
3.6.2 The population is growing; growth of industry which needs water; people's standards of living are increasing etc.
3.6.3 Agriculture.
3.6.4 Use underground drip irrigation rather than overhead sprays, plant more drought-resistant crops, bushes between rows of crops to catch runoff etc.
3.6.5 Water is transferred from the drainage basin of the Tugela River into the drainage basin of the Vaal River.

QUESTION 4

- 4.1 4.1.1 Multifunctional
4.1.2 Higher
4.1.3 Site
4.1.4 Economic
4.1.5 Grassroot
- 4.2 4.2.1 False
4.2.2 True
4.2.3 False
4.2.4 True
4.2.5 True
- 4.3 4.3.1 Break-of-bulk settlement as it is a harbour so goods are loaded off a ship onto another form of transport.
4.3.2 CBD is closer to the harbour/ocean.
4.3.3 Commercial or retail/offices/theatres/professional services/financial/transport etc.
4.3.4 Near harbour; near railway line; close to low-income housing for labour; flat land close to sea.
4.3.5 Open land on edge of the city.
4.3.6 Built low-cost housing, supplied homes with electricity and water, developed clinics and schools.
4.3.7 Area of urban and rural functions i.e. urban – airport, rural – market gardens, land has lower value, open space, not many people.
4.3.8 1 – near industry; 2 – good view (Walmer Heights); 3 – at road intersection etc, must explain.
4.3.9 Can choose giving a good reason e.g. to the NW of Area 2 where the roads intersect and so it will be accessible etc.
- 4.4 4.4.1 a) Goods manufactured that will be exported to other countries.
b) Raw minerals are converted into manufactured goods.
c) Containers are large steel boxes into which goods are placed for export by ships etc.
4.4.2 Is on the sea at the new harbour, is on the sea route to the east as well as the west.
4.4.3 No import/export duties so raw materials/manufactured goods can be shipped in/out cheaply; minimal transport costs as it is so close to the new harbour.
4.4.4 Industry – secondary activity; trade – tertiary activity.
4.4.5 Better infrastructure e.g. power supply; better transport facilities; many more jobs; people will have more money; people will have a higher standard of living etc. Must expand on these points.
4.4.6 Gateway – Coega and new harbour will provide access to rest of Africa; African Renaissance – revival of Africa, greater economic activities etc.
4.4.7 a) Main tenant/industry that will attract other industry and economic activity.
b) Improve economy – these people will need homes, food etc – can be provided by the people of the E Cape – will bring more money into the area etc.
- 4.5 4.5.1 Coal-fired power stations.
4.5.2 Coal is a non-renewable resource and will run out; the burning of coal contributes to global warming.
4.5.3 It would make maize less available and more expensive. Maize is the staple food of many South Africans and poor people might not be able to afford it. This could lead to many people starving.
4.5.4 Maize – on the Highveld – parts of Gauteng and the Free State; sugar – coastal areas of KwaZulu-Natal.

DATA FOR PHYSICAL SCIENCES PAPERS 1 and 2

DATA FOR PHYSICAL SCIENCES PAPER 1

TABLE 1: PHYSICAL CONSTANTS

NAME/NAAM	SYMBOL/SIMBOOL	VALUE/WAARDE
Acceleration due to gravity	g	9,80 m·s ⁻²
Speed of light in a vacuum	c	3,00 x 10 ⁸ m·s ⁻¹
Planck's constant	h	6,63 x 10 ⁻³⁴ J·s
Gravitational constant	G	6,67 x 10 ⁻¹¹ N·m ² ·kg ⁻²
Coulomb's constant	k	9,00 x 10 ⁹ N·m ² ·C ⁻²
Charge on electron	e	-1,60 x 10 ⁻¹⁹ C
Electron mass	m _e	9,11 x 10 ⁻³¹ kg
Permittivity of free space	ε ₀	8,85 x 10 ⁻¹² F·m ⁻¹
Permeability of free space	μ ₀	4π x 10 ⁻⁷ T·m·A ⁻¹

TABLE 2: FORMULAE

MOTION

$V_f = V_i + a\Delta t$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ or $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$V_f^2 = V_i^2 + 2a\Delta x$ or $V_f^2 = V_i^2 + 2a\Delta y$	$\Delta x = \left(\frac{V_f + V_i}{2}\right)\Delta t$ or $\Delta y = \left(\frac{V_f + V_i}{2}\right)\Delta t$

FORCE/KRAG

$F_{net} = ma$	$p = mv$
$F\Delta t = \Delta p = mv_f - mv_i$	$F_g = mg$

WORK, ENERGY AND POWER

$W = F\Delta x \cos\theta$	$U = E_p = mgh$
$K = E_k = \frac{1}{2}mv^2$	$W = \Delta K = \Delta E_k = E_{kf} - E_{ki}$
$P = \frac{W}{\Delta t}$	$P = Fv$

WAVES, LIGHT AND SOUND

$v = f\lambda$ or $v = \nu\lambda$	$T = \frac{1}{f}$ or $T = \frac{1}{\nu}$
$f_L = \frac{v \pm v_L}{v \pm v_s} f_s$	$E = hf$ or $E = h\nu$ or $E = h\frac{c}{\lambda}$
$\lambda = \frac{h}{mv}$	$\sin\theta = \frac{m\lambda}{a}$
$hf = W_0 + \frac{1}{2}mv^2$	

MATTER AND MATERIALS

$F = k\Delta x$	stress = $\frac{F}{A}$
$\lambda = \frac{\Delta x}{\ell}$	

ELECTRICITY AND MAGNETISM

$I_{rms} = \frac{I_{max}}{\sqrt{2}}$	$\varepsilon = -N \frac{\Delta\Phi}{\Delta t}$
$V_{rms} = \frac{V_{max}}{\sqrt{2}}$	
$\phi = BA$	$P_{average} = V_{rms} I_{rms}$ $P_{average} = \frac{V_{rms}^2}{R}$ $P_{average} = I_{rms}^2 R$

ELECTROSTATICS

$F = \frac{kQ_1Q_2}{r^2}$	$E = \frac{kQ}{r^2}$
$E = \frac{V}{d}$	$U = \frac{kQ_1Q_2}{r}$
$E = \frac{F}{q}$	$Q = It$
$E = \frac{Q}{V}$	$F = \frac{\varepsilon_0 A}{d}$

ELECTRIC CIRCUITS

$R = \frac{V}{I}$	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$
$R_s = R_1 + R_2 + \dots$	emf (ε) = I(R + r)

DATA FOR PHYSICAL SCIENCES PAPER 2 (CHEMISTRY)

TABLE 4A: STANDARD REDUCTION POTENTIALS

Half-reactions	E ⁰ (V)
F ₂ (g) + 2e ⁻ ⇌ 2F ⁻	+ 2,87
Co ³⁺ + e ⁻ ⇌ Co ²⁺	+ 1,81
H ₂ O ₂ + 2H ⁺ + 2e ⁻ ⇌ 2H ₂ O	+ 1,77
MnO ₄ ²⁻ + 8H ⁺ + 5e ⁻ ⇌ Mn ²⁺ + 4H ₂ O	+ 1,51
Cl ₂ (g) + 2e ⁻ ⇌ 2Cl ⁻	+ 1,36
Cr ₂ O ₇ ²⁻ + 14H ⁺ + 6e ⁻ ⇌ 2Cr ³⁺ + 7H ₂ O	+ 1,33
O ₂ (g) + 4H ⁺ + 4e ⁻ ⇌ 2H ₂ O	+ 1,23
MnO ₂ + 4H ⁺ + 2e ⁻ ⇌ Mn ²⁺ + 2H ₂ O	+ 1,23
Pt ²⁺ + 2e ⁻ ⇌ Pt	+ 1,20
Br ₂ (l) + 2e ⁻ ⇌ 2Br ⁻	+ 1,07
NO ₃ ⁻ + 4H ⁺ + 3e ⁻ ⇌ NO(g) + 2H ₂ O	+ 0,96
Hg ²⁺ + 2e ⁻ ⇌ Hg(l)	+ 0,85
Ag ⁺ + e ⁻ ⇌ Ag	+ 0,80
NO ₃ ⁻ + 2H ⁺ + e ⁻ ⇌ NO ₂ (g) + H ₂ O	+ 0,80
Fe ³⁺ + e ⁻ ⇌ Fe ²⁺	+ 0,77
O ₂ (g) + 2H ⁺ + 2e ⁻ ⇌ H ₂ O ₂	+ 0,68
I ₂ + 2e ⁻ ⇌ 2I ⁻	+ 0,54
Cu ⁺ + e ⁻ ⇌ Cu	+ 0,52
SO ₂ + 4H ⁺ + 4e ⁻ ⇌ S + 2H ₂ O	+ 0,45
2H ₂ O + O ₂ + 4e ⁻ ⇌ 4OH ⁻	+ 0,40
Cu ²⁺ + 2e ⁻ ⇌ Cu	+ 0,34
SO ₄ ²⁻ + 4H ⁺ + 2e ⁻ ⇌ SO ₂ (g) + 2H ₂ O	+ 0,17
Cu ²⁺ + e ⁻ ⇌ Cu ⁺	+ 0,16
Sn ⁴⁺ + 2e ⁻ ⇌ Sn ²⁺	+ 0,15
S + 2H ⁺ + 2e ⁻ ⇌ H ₂ S(g)	+ 0,14
2H ⁺ + 2e ⁻ ⇌ H ₂ (g)	0,00
Fe ³⁺ + 3e ⁻ ⇌ Fe	- 0,06
Pb ²⁺ + 2e ⁻ ⇌ Pb	- 0,13
Sn ²⁺ + 2e ⁻ ⇌ Sn	- 0,14
Ni ²⁺ + 2e ⁻ ⇌ Ni	- 0,27
Co ²⁺ + 2e ⁻ ⇌ Co	- 0,28
Cd ²⁺ + 2e ⁻ ⇌ Cd	- 0,40
Cr ³⁺ + e ⁻ ⇌ Cr ²⁺	- 0,41
Fe ²⁺ + 2e ⁻ ⇌ Fe	- 0,44
Cr ³⁺ + 3e ⁻ ⇌ Cr	- 0,74
Zn ²⁺ + 2e ⁻ ⇌ Zn	- 0,76
2H ₂ O + 2e ⁻ ⇌ H ₂ (g) + 2OH ⁻	- 0,83
Cr ²⁺ + 2e ⁻ ⇌ Cr	- 0,91
Mn ²⁺ + 2e ⁻ ⇌ Mn	- 1,18
Mg ²⁺ + 2e ⁻ ⇌ Mg	- 2,36
Na ⁺ + e ⁻ ⇌ Na	- 2,71
Ca ²⁺ + 2e ⁻ ⇌ Ca	- 2,87
Sr ²⁺ + 2e ⁻ ⇌ Sr	- 2,89
Ba ²⁺ + 2e ⁻ ⇌ Ba	- 2,90
Cs ⁺ + e ⁻ ⇌ Cs	- 2,92
K ⁺ + e ⁻ ⇌ K	- 2,93
Li ⁺ + e ⁻ ⇌ Li	- 3,05

Increasing oxidising ability

Increasing reducing ability

DATA FOR PHYSICAL SCIENCES PAPER 2 (CHEMISTRY)

TABLE 1: PHYSICAL CONSTANTS

NAME	SYMBOL	VALUE
Standard pressure	p^0	$1,013 \times 10^5$ Pa
Molar gas volume at STP	V_m	$22,4 \text{ dm}^3 \cdot \text{mol}^{-1}$
Standard temperature	T^0	273 K

TABLE 2: FORMULAE

$n = \frac{m}{M}$	$c = \frac{\rho}{V}$
$C = \frac{m}{MV}$	$E^0_{\text{cell}} = E^0_{\text{cathode}} - E^0_{\text{anode}}$
	$E^0_{\text{cell}} = E^0_{\text{reduction}} - E^0_{\text{oxidation}}$
	$E^0_{\text{cell}} = E^0_{\text{oxidising agent}} - E^0_{\text{reducing agent}}$



TABLE 3: THE PERIODIC TABLE OF ELEMENTS

1 (I)	2 (II)	3	4	5	6	7	8 Atomic number	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
1 H 1 1,0	2 He 4 4,0	3 Li 7 7,0	4 Be 9 9,0	5 B 11 11,0	6 C 12 12,0	7 N 14 14,0	8 O 16 16,0	9 F 19 19,0	10 Ne 20 20,0	11 Na 23 23,0	12 Mg 24 24,0	13 Al 27 27,0	14 Si 28 28,0	15 P 31 31,0	16 S 32 32,0	17 Cl 35,5 35,5	18 Ar 40 40,0
19 K 39 0,8	20 Ca 40 1,0	21 Sc 45 1,3	22 Ti 48 1,5	23 V 51 1,6	24 Cr 52 1,6	25 Mn 55 1,5	26 Fe 56 1,8	27 Co 59 1,8	28 Ni 59 1,8	29 Cu 63,5 1,9	30 Zn 65 1,6	31 Ga 70 1,6	32 Ge 73 1,8	33 As 75 2,0	34 Se 79 2,4	35 Br 80 2,8	36 Kr 84 3,6
37 Rb 86 0,8	38 Sr 88 1,0	39 Y 89 1,2	40 Zr 91 1,4	41 Nb 92 1,8	42 Mo 96 1,9	43 Tc 98 2,2	44 Ru 101 2,2	45 Rh 103 2,2	46 Pd 106 2,2	47 Ag 108 1,9	48 Cd 112 1,7	49 In 115 1,7	50 Sn 119 1,8	51 Sb 122 1,9	52 Te 128 2,1	53 I 127 2,5	54 Xe 131 3,8
55 Cs 133 0,7	56 Ba 137 0,9	57 La 139 1,6	58 Ce 140 1,4	59 Pr 141 1,4	60 Nd 144 1,4	61 Pm 147 1,4	62 Sm 150 1,4	63 Eu 152 1,4	64 Gd 157 1,4	65 Tb 159 1,4	66 Dy 163 1,4	67 Ho 165 1,4	68 Er 167 1,4	69 Tm 169 1,4	70 Yb 173 1,4	71 Lu 175 1,4	72 Hf 179 1,6
73 Ta 181 0,7	74 W 184 0,7	75 Re 186 0,7	76 Os 190 0,7	77 Ir 192 0,7	78 Pt 195 0,7	79 Au 197 0,7	80 Hg 201 0,7	81 Tl 204 0,7	82 Pb 207 0,7	83 Bi 209 0,7	84 Po 209 0,7	85 At 210 0,7	86 Rn 222 0,7	87 Fr 223 0,7	88 Ra 226 0,7	89 Ac 227 0,7	90 Th 232 0,7
91 Pa 231 0,7	92 U 238 0,7	93 Np 237 0,7	94 Pu 244 0,7	95 Am 243 0,7	96 Cm 247 0,7	97 Bk 247 0,7	98 Cf 251 0,7	99 Es 252 0,7	100 Fm 257 0,7	101 Md 258 0,7	102 No 259 0,7	103 Lr 262 0,7	104 Rf 261 0,7	105 Db 262 0,7	106 Sg 266 0,7	107 Bh 264 0,7	108 Hs 277 0,7
109 Mt 268 0,7	110 Ds 271 0,7	111 Rg 272 0,7	112 Cn 285 0,7	113 Nh 286 0,7	114 Fl 289 0,7	115 Mc 290 0,7	116 Lv 293 0,7	117 Ts 294 0,7	118 Og 294 0,7	119 Tennessine 289 0,7	120 Oganesson 289 0,7	121 Uue 288 0,7	122 Uub 287 0,7	123 Uut 286 0,7	124 Uuq 285 0,7	125 Uuq 284 0,7	126 Uuq 283 0,7

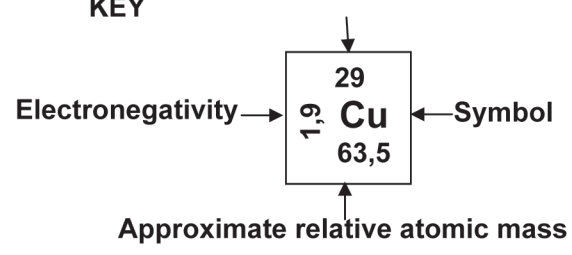


TABLE 4B: STANDARD REDUCTION POTENTIALS

Half-reactions	E^0 (V)
$\text{Li}^+ + e^- \rightleftharpoons \text{Li}$	-3,05
$\text{K}^+ + e^- \rightleftharpoons \text{K}$	-2,93
$\text{Cs}^+ + e^- \rightleftharpoons \text{Cs}$	-2,92
$\text{Ba}^{2+} + 2e^- \rightleftharpoons \text{Ba}$	-2,90
$\text{Sr}^{2+} + 2e^- \rightleftharpoons \text{Sr}$	-2,89
$\text{Ca}^{2+} + 2e^- \rightleftharpoons \text{Ca}$	-2,87
$\text{Na}^+ + e^- \rightleftharpoons \text{Na}$	-2,71
$\text{Mg}^{2+} + 2e^- \rightleftharpoons \text{Mg}$	-2,36
$\text{Al}^{3+} + 3e^- \rightleftharpoons \text{Al}$	-1,66
$\text{Mn}^{2+} + 2e^- \rightleftharpoons \text{Mn}$	-1,18
$\text{Cr}^{3+} + 3e^- \rightleftharpoons \text{Cr}$	-0,91
$2\text{H}_2\text{O} + 2e^- \rightleftharpoons \text{H}_2(\text{g}) + 2\text{OH}^-$	-0,83
$\text{Zn}^{2+} + 2e^- \rightleftharpoons \text{Zn}$	-0,76
$\text{Cr}^{3+} + 3e^- \rightleftharpoons \text{Cr}$	-0,74
$\text{Fe}^{2+} + 2e^- \rightleftharpoons \text{Fe}$	-0,44
$\text{Cr}^{3+} + e^- \rightleftharpoons \text{Cr}^{2+}$	-0,41
$\text{Cd}^{2+} + 2e^- \rightleftharpoons \text{Cd}$	-0,40
$\text{Co}^{2+} + 2e^- \rightleftharpoons \text{Co}$	-0,28
$\text{Ni}^{2+} + 2e^- \rightleftharpoons \text{Ni}$	-0,27
$\text{Sn}^{2+} + 2e^- \rightleftharpoons \text{Sn}$	-0,14
$\text{Pb}^{2+} + 2e^- \rightleftharpoons \text{Pb}$	-0,13
$\text{Fe}^{3+} + 3e^- \rightleftharpoons \text{Fe}$	-0,06
$2\text{H}^+ + 2e^- \rightleftharpoons \text{H}_2(\text{g})$	0,00
$\text{S} + 2\text{H}^+ + 2e^- \rightleftharpoons \text{H}_2\text{S}(\text{g})$	+0,14
$\text{Sn}^{4+} + 2e^- \rightleftharpoons \text{Sn}^{2+}$	+0,15
$\text{Cu}^{2+} + e^- \rightleftharpoons \text{Cu}^+$	+0,16
$\text{SO}_4^{2-} + 4\text{H}^+ + 2e^- \rightleftharpoons \text{SO}_2(\text{g}) + 2\text{H}_2\text{O}$	+0,17
$\text{Cu}^{2+} + 2e^- \rightleftharpoons \text{Cu}$	+0,34
$2\text{H}_2\text{O} + \text{O}_2 + 4e^- \rightleftharpoons 4\text{OH}^-$	+0,40
$\text{SO}_2 + 4\text{H}^+ + 4e^- \rightleftharpoons \text{S} + 2\text{H}_2\text{O}$	+0,45
$\text{Cu}^+ + e^- \rightleftharpoons \text{Cu}$	+0,52
$\text{I}_2 + 2e^- \rightleftharpoons 2\text{I}^-$	+0,54
$\text{O}_2(\text{g}) + 2\text{H}^+ + 2e^- \rightleftharpoons \text{H}_2\text{O}_2$	+0,68
$\text{Fe}^{3+} + e^- \rightleftharpoons \text{Fe}^{2+}$	+0,77
$\text{NO}_3^- + 2\text{H}^+ + e^- \rightleftharpoons \text{NO}_2(\text{g}) + \text{H}_2\text{O}$	+0,80
$\text{Ag}^+ + e^- \rightleftharpoons \text{Ag}$	+0,80
$\text{Hg}^{2+} + 2e^- \rightleftharpoons \text{Hg}(\text{l})$	+0,85
$\text{NO}_3^- + 4\text{H}^+ + 3e^- \rightleftharpoons \text{NO}(\text{g}) + 2\text{H}_2\text{O}$	+0,96
$\text{Br}_2(\text{l}) + 2e^- \rightleftharpoons 2\text{Br}^-$	+1,07
$\text{Pt}^{2+} + 2e^- \rightleftharpoons \text{Pt}$	+1,20
$\text{MnO}_2 + 4\text{H}^+ + 2e^- \rightleftharpoons \text{Mn}^{2+} + 2\text{H}_2\text{O}$	+1,23
$\text{O}_2(\text{g}) + 4\text{H}^+ + 4e^- \rightleftharpoons 2\text{H}_2\text{O}$	+1,23
$\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6e^- \rightleftharpoons 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$	+1,33
$\text{Cl}_2(\text{g}) + 2e^- \rightleftharpoons 2\text{Cl}^-$	+1,36
$\text{MnO}_4^- + 8\text{H}^+ + 5e^- \rightleftharpoons \text{Mn}^{2+} + 4\text{H}_2\text{O}$	+1,51
$\text{H}_2\text{O}_2 + 2\text{H}^+ + 2e^- \rightleftharpoons 2\text{H}_2\text{O}$	+1,77
$\text{Co}^{3+} + e^- \rightleftharpoons \text{Co}^{2+}$	+1,81
$\text{F}_2(\text{g}) + 2e^- \rightleftharpoons 2\text{F}^-$	+2,87

Increasing oxidising ability

Increasing reducing ability



GRADE 12'S WATCH Mindset Learn Xtra

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SPRING SCHOOL BROADCAST SCHEDULE 1-7 OCTOBER 2012



channel 319

	MON: 1 OCT	TUE: 2 OCT	WED: 3 OCT	THUR: 4 OCT	FRI: 5 OCT		SAT: 6 OCT	SUN: 7 OCT
	MATHS P1	ENGLISH	PHYSICAL SCIENCES P1	MATHS P2	PHYSICAL SCIENCES P2		REPEAT OF LIVE	REPEAT OF LIVE
09:00	Calculus	Poetry	Electrostatics & Electric Circuits	Trigonometry: Expressions, Equations & Graphs	Rates of Reaction	09:00	Spring School: Calculus	Spring School: Trigonometry
10:00	Calculus Applications	Drama	Electrodynamics	Trigonometry: Identities	Chemical Equilibrium	10:30	Spring School: Electricity	Spring School: Chemical Change
11:00	LIVE: Calculus	LIVE: Literature	LIVE: Electricity	LIVE: Trigonometry	LIVE: Chemical Change	12:00	Spring School: Evolution	Spring School: Reproduction
12:30	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break	13:30	Spring School: Finance	Spring School: Literature
	MATHS LIT	ACCOUNTING	LIFE SCIENCES P1	GEOGRAPHY	LIFE SCIENCES P2	15:00	Spring School: Manufacturing & Inventories	Spring School: Manufacturing & Inventories
13:00	Finance Calculations	Manufacturing	Theories of Evolution	People & Places	Reproduction	16:30	Spring School: People, places & their needs	Spring School: People, places & their needs
14:00	Working with Graphs	Inventory Valuation	Human Evolution	People & their needs	Human Reproduction	18:00	People & Places	People & their needs
15:00	LIVE: Finance	LIVE: Manufacturing & Inventories	LIVE: Evolution	LIVE: People, Places & their Needs	LIVE: Reproduction	EACH DAY PROGRAMMES ARE REPEATED FROM 10:30pm-6:00am		
	MATHS P1	ENGLISH	PHYSICAL SCIENCES P1	MATHS P2	PHYSICAL SCIENCES P2	22:30	Spring School: Calculus	Spring School: Trigonometry
16:30	LIVE: Calculus	LIVE: Literature	LIVE: Electricity	LIVE: Trigonometry	LIVE: Chemical Change	24:00	Spring School: Electricity	Spring School: Chemical Change
18:00	Calculus Applications	Short Stories	Electrostatics & Electric Circuits	Trigonometry: Expressions, Equations & Graphs	Chemical Equilibrium	01:30	Spring School: Evolution	Spring School: Reproduction
EACH DAY PROGRAMMES ARE REPEATED FROM 10:30pm-6:00am						03:00	Spring School: Finance	Spring School: Literature
	MATHS LIT	ACCOUNTING	LIFE SCIENCES P1	GEOGRAPHY	LIFE SCIENCES P2	06:00	Coming up Cabanga	Coming up Cabanga
22:30	LIVE: Finance	LIVE: Manufacturing & Inventories	LIVE: Evolution	LIVE: People, Places & their Needs	LIVE: Reproduction	Mindset Learn Xtra Spring School is proudly brought to you by Liberty		
24:00	Finance Calculations	Manufacturing	Theories of Evolution	People & Places	Reproduction			
01:00	Working with Graphs	Inventory Valuation	Human Evolution	People & their needs	Human Reproduction			
	MATHS P1	ENGLISH	PHYSICAL SCIENCES P1	MATHS P2	PHYSICAL SCIENCES P2			
02:00	Calculus	Poetry	Electrostatics & Electric Circuits	Trigonometry: Expressions, Equations & Graphs	Rates of Reaction			
03:00	Calculus Applications	Drama	Electrodynamics	Trigonometry: Identities	Chemical Equilibrium			
04:00	LIVE: Calculus	LIVE: Literature	LIVE: Electricity	LIVE: Trigonometry	LIVE: Chemical Change			
05:30	Break: Coming up	Break: Coming up	Break: Coming up	Break: Coming up	Break: Coming up			

Join us on DStv and Toptv channels 319 for special Grade 11 & 12 exam revision programming. Remember you can catch all the Exam School action from **15 October – 20 November 2012**

For more information be sure to visit www.learnxtra.co.za

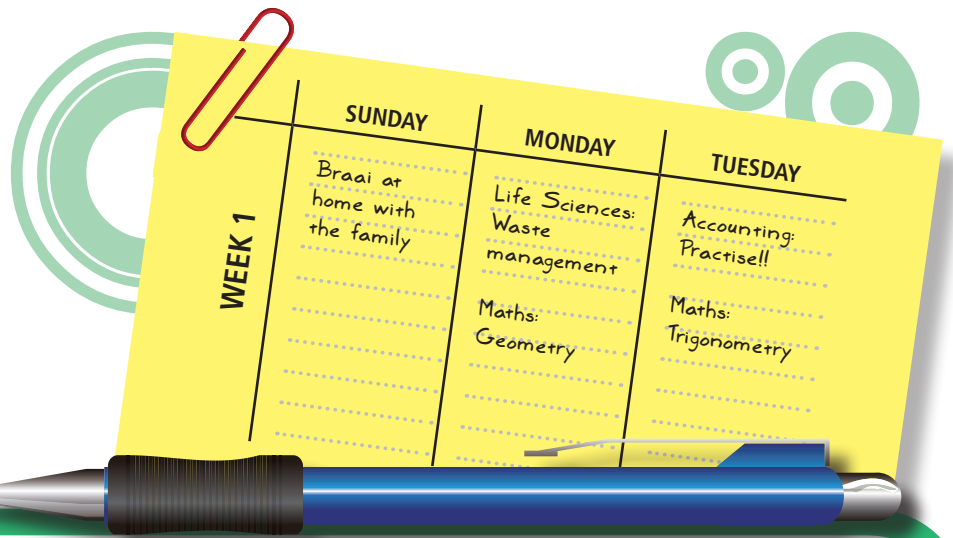


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Your study timetable

Here is a blank study timetable for you to use to plan your studying. Remember to add in the things you have to do apart from studying. For example, you may have a family commitment coming up and you will need to make sure you have given yourself enough time to study beforehand so you can enjoy yourself without worrying about getting behind in your exam preparation.



	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
WEEK 5							
WEEK 4							
WEEK 3							
WEEK 2							
WEEK 1							

The exam timetable 2012

OCTOBER/NOVEMBER 2012



basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

WEEK 1	09:00	14:00
Monday 22/10	English HL and FAL P1 (2hrs) SAL P1 (2½hrs)	Dramatic Art (3hrs)
Tuesday 23/10	Accounting (3hrs)	Portuguese HL, FAL, SAL P1 (2hrs) German HL, SAL P1 (2hrs) Hebrew P1 (2hrs)
Wednesday 24/10	Computer Application Tech P1 (3hrs) Practical	Hindi, Gujarati, Urdu, Tamil, Telegu HL, FAL, SAL P1 (2hrs) Arabic, French, Italian, Spanish, Modern Greek SAL P1 (2hrs) Latin SAL P1 (2½hrs)
Thursday 25/10	Physical Sciences (Physics) P1 (3hrs)	Computer Application Speed Test (Optional)
Friday 26/10	RELIGIOUS HOLIDAY	
WEEK 2	09:00	14:00
Monday 29/10	Physical Sciences (Chemistry) P2 (3hrs)	Hindi, Gujarati, Urdu, Tamil, Telegu HL P2 (2½hrs) FAL and SAL P2 (2hrs) Arabic, French, Italian, Spanish, Modern Greek SAL P2 (2hrs) Latin SAL P2 (1½hrs)
Tuesday 30/10	Information Technology P1 (3hrs) Practical	Music P1 Theory (3hrs)
Wednesday 31/10	Agricultural Sciences P1 (2½hrs) Nautical Science P1 (3hrs)	Computer Application Tech P2 Theory (3hrs) Information Technology P2 Theory (3hrs)
Thursday 1/11	Afrikaans HL and FAL P1 (2hrs) SAL P1 (2½hrs)	Music P2 Comprehension (1½hrs)
Friday 2/11	Mathematics P1 (3hrs) Mathematical Literacy P1 (3hrs)	Portuguese HL P2 (2½hrs), Portuguese FAL, SAL P2 (2hrs) German HL P2 (2½hrs), German SAL P2 (2hrs) Hebrew P2 (2hrs)
WEEK 3	09:00	14:00
Monday 5/11	Mathematics P2 (3hrs) Mathematical Literacy P2 (3hrs)	Portuguese HL and FAL P3 (2½hrs) German HL P3 (2½hrs), Hindi, Gujarati, Urdu, Tamil, Telegu HL and FAL P3 (2½hrs)
Tuesday 6/11	Agricultural Sciences P2 (2½hrs)	Sepedi, Sesotho, Setswana, Xitsonga, Tshivenda HL and FAL P1 (2hrs) SAL P1 (2½hrs)
Wednesday 7/11	History P1 (3hrs) Maritime Economics (3hrs) Equine Studies (3hrs)	isiZulu, isiXhosa, Siswati, isiNdebele HL and FAL P1 (2hrs) SAL P1 (2½hrs)
Thursday 8/11	English HL P2 (2½hrs) FAL and SAL P2 (2hrs)	Mathematics P3 (2hrs)
Friday 9/11	Life Sciences P1 (2½hrs)	Agricultural Management Practices (2½hrs)
WEEK 4	09:00	14:00
Monday 12/11	Life Sciences P2 (2½hrs)	Engineering Graphics and Design P1 (3hrs)
Tuesday 13/11	RELIGIOUS HOLIDAY	
Wednesday 14/11	Business Studies (3hrs)	isiZulu, isiXhosa, Siswati, isiNdebele HL P2 (2½hrs) FAL and SAL P2 (2hrs)
Thursday 15/11	Afrikaans HL P2 (2½hrs) FAL and SAL (2hrs)	Design and Technology (3hrs)
Friday 16/11	History P2 (3hrs)	Mechanical Technology (3hrs)
WEEK 5	09:00	14:00
Monday 19/11	Geography (Theory) P1 (3hrs)	Geography (Map work) P2 (1½hrs)
Tuesday 20/11	Tourism (3hrs) Sport and Exercise Science P1 (2hrs)	Engineering Graphics and Design P2 (3hrs)
Wednesday 21/11	Economics (3hrs)	Religion Studies P1 (2hrs)
Thursday 22/11	Sepedi, Sesotho, Setswana, Xitsonga, Tshivenda HL P2 (2½hrs) FAL and SAL P2 (2hrs)	isiZulu, isiXhosa, Siswati, isiNdebele HL and FAL P3 (2½hrs)
Friday 23/11	Agricultural Technology (3hrs) Visual Arts (3hrs)	Afrikaans HL and FAL P3 (2½hrs)
WEEK 6	09:00	14:00
Monday 26/11	Civil Technology (3hrs) Sport and Exercise Science P2 (2hrs)	English HL and FAL P3 (2½hrs)
Tuesday 27/11	Sepedi, Sesotho, Setswana, Xitsonga, Tshivenda HL and FAL P3 (2½hrs)	Consumer Studies (3hrs) Hospitality Studies (3hrs) Nautical Science P2 (3hrs)
Wednesday 28/11	Dance Studies (3hrs) Electrical Technology (3hrs)	Religion Studies P2 (2hrs)