basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE/

GRADE 10

TECHNICAL MATHEMATICS P1

EXEMPLAR 2016

MEMORANDUM

MARKS:100

This memorandum consists of 8 pages.

NOTE:

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the memorandum.
- Assuming values/answers in order to solve a problem is NOT acceptable.

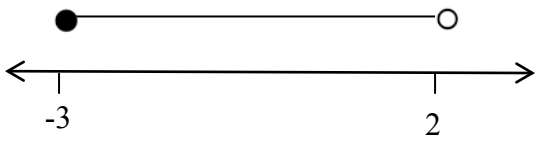
QUESTION 1

1.1	$\sqrt{81} < \sqrt{97} < \sqrt{100}$ $\therefore$ between 9 and 10	✓9 ✓10 (2)
1.2.1	$111_2 + 100_2 = 1011_2$	✓✓answer only (2)
1.2.2	$= (2^3 \times 1) + (2^2 \times 0) + (2^1 \times 1) + (2^0 \times 1)$ $= 8 + 0 + 2 + 1$ $= 11$	✓answer (1)
1.3.1	$a(x^2 + 3y) + ax + 4ay$ $= ax^2 + 3ay + ax + 4ay$ $= ax^2 + ax + 7ay$	✓product ✓$7ay$ (2)
1.3.2	$(p-2)(p^2 + 2p + 4)$ $= p^3 + 2p^2 + 4p - 2p^2 - 4p - 8$ $= p^3 - 8$	✓$p^3 + 2p^2 + 4p$ ✓$-2p^2 - 4p - 8$ ✓answer Answer only: full marks (3)
1.4	$\frac{10^{x+1}}{2^{-1+x}.25^x}$ $= \frac{(5.2)^{x+1}}{2^{-1+x}.5^{2x}}$ $= \frac{5^{x+1}.2^{x+1}}{2^{-1+x}.5^{2x}}$ $= 5^{x+1-2x}.2^{x+1+1-x}$ $= 5^{1-x}.2^2$ $= 4.5^{1-x}$	✓5.2 ✓5^{2x} ✓simplification ✓answer (4) **[14]**

QUESTION 2

2.1.1	$= 2(x^2 - 16)$ $= 2(x - 4)(x + 4)$	✓common factor ✓difference of two squares (2)
2.1.2	$= (5x + 10y) - (ax + 2ay)$ $= 5(x + 2y) - a(x + 2y)$ $= (x + 2y)(5 - a)$	✓$-(ax + 2ay)$ ✓common factors 5 and a ✓answer (3)
2.1.3	$6 - 17m - 3m^2$ $= (6 + m)(1 - 3m)$ **OR** $= -(3m^2 + 17m - 6)$ $= -(3m - 1)(m + 6)$	✓$(6 + m)$ ✓$(1 - 3m)$ **OR** ✓$-(3m - 1)$ ✓$(m + 6)$ (2)
2.1.4	$= a^3(a - 1) + (a - 1)$ $= (a - 1)(a^3 + 1)$ $= (a - 1)(a + 1)(a^2 - a + 1)$	✓$+(a - 1)$ ✓common factor ✓factorising sum of two cubes (3)
2.2	$= (2x - 3)(3x + 4)$ $= 6x^2 - x - 12$ $\therefore d = -1$	✓$(3x + 4)$ ✓$6x^2 - x - 12$ ✓value of d (3)
2.3.1	$= \left(\frac{y + x}{xy}\right) \div \left(\frac{y - x}{xy}\right)$ $= \frac{y + x}{xy} \times \frac{xy}{y - x}$ $= \frac{y + x}{y - x}$	✓$\left(\frac{y+x}{xy}\right)$ ✓$\left(\frac{y-x}{xy}\right)$ ✓$\frac{y+x}{xy} \times \frac{xy}{y-x}$ ✓answer (4)
2.3.2	$= \frac{100001 + 99999}{99999 - 100001}$ $= \frac{200\,000}{-2}$ $= -100\,000$	✓$\frac{100001+99999}{99999-100001}$ ✓answer (2) **[19]**

QUESTION 3

3.1.1	$(x-5)(x+3)=0$ $\therefore x=5 \text{ or } x=-3$	✓$x=5$ ✓$x=-3$ (2)
3.1.2	$\frac{x^2-3}{2}=x$ $x^2-3=2x$ $\therefore x^2-2x-3=0$ $(x-3)(x+1)=0$ $\therefore x=3 \text{ or } x=-1$	✓multiplying by 2 ✓standard form ✓factors ✓ $x=3$ ✓ $x=-1$ (5)
3.1.3	$2^{2x-1}=64$ $2^{2x-1}=2^6$ $\therefore 2x-1=6$ $\therefore x=\frac{7}{2}$	✓2^6 ✓$2x-1=6$ ✓answer (3)
3.1.4	$-5<1-3x\leq 10$ $-6<-3x\leq 9$ $\therefore -3\leq x<2$  	✓$-6<-3x\leq 9$ ✓endpoints ✓notation ✓closed and open points ✓connecting points (5) **[15]**

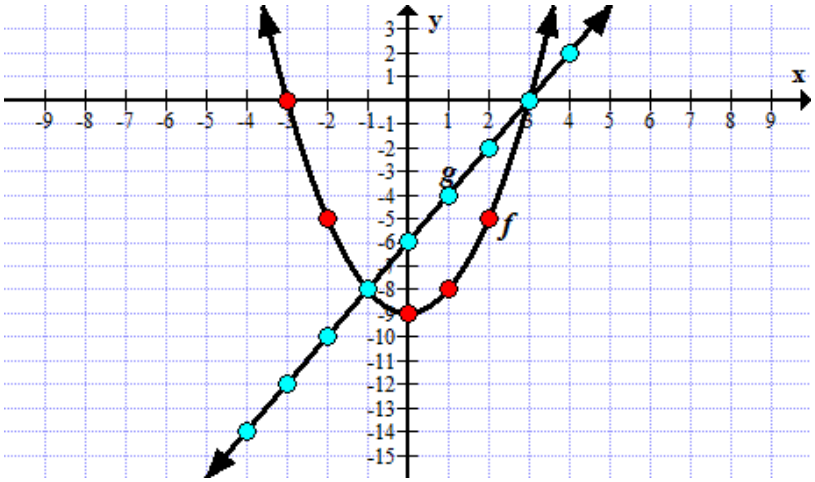
QUESTION4

4.1	$E = 3 \times (3 \times 10^8)^2$ $\therefore E = 2{,}7 \times 10^{17}$	✓substitution ✓answer (2)
4.2	$2x + y = 5$.....(1) $6x + 7y = 3$.....(2) Make y in (1) the subject $y = 5 - 2x$.....(3) Substitute y in (2) $6x + 7(5 - 2x) = 3$ $6x + 35 - 14x = 3$ $\therefore -8x = -32$ $\therefore x = 4$ Substitute x in (3) $y = 5 - 2(4)$ $\therefore y = -3$ **OR** $2x + y = 5$.....(1) $6x + 7y = 3$.....(2) Multiply equation (1) by 3: $\therefore 6x + 3y = 15$.....(3) Subtract (3) from (2): $6x + 7y = 3$ $6x + 3y = 15$ $4y = -12$ $\therefore y = -3$ Substitute y in (1): $2x - 3 = 5$ $2x = 8$ $\therefore x = 4$	✓ $y = 5 - 2x$ ✓substituting (3) into (2) ✓$-8x = -32$ ✓value of x ✓value of y **OR** ✓$6x + 3y = 15$ ✓$4y = -12$ ✓value of y ✓ Substitute y in (1) ✓value of x (5)
4.3	Suppose they will be 168 km apart after x hours. Distance covered by Thabo at 18 km/h is $18x$ km. Distance covered by Lesley at 6 km/h after x hours is $6x$ km. $\therefore 18x + 6x = 168$ $24x = 168$ $\therefore x = 7$ $\therefore$ they will be covering 168 km apart at 12:00	✓$18x$ km ✓$6x$ km ✓$18x + 6x = 168$ ✓ $x = 7$ ✓answer (5) **[12]**

QUESTION5

5.1.1	R3 500	✓ answer (1)
5.1.2	R4 480 + R490 + R490 ∴ she will receive R5 460	✓ method ✓answer (2)
5.1.3	Simple interest, because the interest (R490) is constant every year.	✓ Simple interest ✓Reason (2)
5.1.4	$A = P(1 + in)$ $5\,950 = 3\,500(1 + i(5))$ $1.7 = 1 + 5i$ $0.7 = 5i$ $0.14 = i$ ∴ interest rate is 14%	✓formula ✓substitution ✓$0.7 = 5i$ ✓answer (4)
5.2.1	15% deposit = 0,15 x R24 000 = R3 600 ∴ Loan amount = R24 000 – R3 600 = R20 400 $A = P(1 + in)$ = R20 400[1 + 0,18(3)] = R31 416	✓ R3600 ✓ R20 400 ✓substitution ✓answer (4)
5.2.2	Monthly payments $=\frac{R31\,416}{36}$ = R872, 67	✓method ✓answer (2)
5.2.3	Total amount paid = R31 416 + R3 600 = R35 016	✓ R31 416 ✓ R3 600 ✓answer (3) **[18]**

QUESTION 6

6.1	x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 $f(x)$ | 7 | 0 | -5 | -8 | -9 | -8 | -5 | 0 | 7 $g(x)$ | -14 | -12 | -10 | -8 | -6 | -4 | -2 | 0 | 2	✓✓all correct values of f ✓✓all correct values of g (4) ✓ if 5 values are correct for f ✓if 5 values are correct for g No mark for less than 5 values for f and g
6.2		*f:* ✓intercepts with axes ✓shape f *g:* ✓intercepts with axes ✓shape g (4)
6.3.1	$x = 3$ and $x = -1$	✓ $x = 3$ ✓ $x = -1$ (2)
6.3.2	$x = 0$ and $x = 2$	✓ $x = 0$ ✓ $x = 2$ (2)
6.4.1	-9	✓answer (1)
6.4.2	$h(x) = x^2 - 7$	✓✓ -7 (2) **[15]**

QUESTION 7

7.1	$h(x) = \frac{k}{x}$ $2 = \frac{k}{1}$ $k = 2$	✓substitution ✓value of k (2)
7.2	$y = 0$	✓$y = 0$ (1)
7.3	$\{y \in R ; y \neq 0\}$	✓ $y \in R$ ✓ $y \neq 0$ (2)
7.4	$y = -x$	✓ equation (1)
7.5	$x < 0$	✓ answer (1) **[7]**

TOTAL: 100