

TOURISM LEARNING AND TEACHING SUPPORT MATERIALS

MAP READING

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Introduction

This teaching guide has been sponsored by the National Business Initiative (NBI). It will provide you, the educator, with information and tools to support and enhance your teaching methods. This Learning and Teaching resource will assist you to teach your learners about different map reading skills and how to locate physical features, borders, landmarks and so on for specific use in a tourism context.

Learner activities and case studies are included in this resource to help learners better understand map skills and their application in the tourism industry. Learners can do these activities individually or in groups or pairs.



Contents

1. What Are Maps?	Page 1
2. Maps in Tourism	Page 2
3. Terms and definitions	Page 2
3.1. Orientation of maps	
3.2. Scale	
3.3. Map Accuracy	
3.4. Labelling	
3.5. Map Symbols	
3.6. Grid Lines	
4. Types of Maps	Page 7
4.1. Electronic maps	
4.2. Global Positioning Systems (GPS)	
4.2.1. Geographic Information Systems (GIS)	
5. Measuring Distance	Page 9
5.1. Calculating Distance using linear scales and string	
5.2. Distance Charts	
6. Ideas Box	Page 10
7. Assessing Your Learners	Page 11
8. References and Resources	Page 12

would be seen from above, looking directly down. It could be anything from a sketch map for a visitor to find your school to a detailed map of a town centre or mountain range. Maps will often show other features such as roads, rivers, buildings, trees and lakes. A map can allow you to accurately plan a journey, giving a good idea of landmarks and features you will pass along the route, as well as how far you will be travelling.

Using a map you can visualise in your mind what the place looks like that you are going to, and you can see what landmarks and features you will pass on the way to your destination. Maps mean you know what to expect, and they help you to know you are going in the right direction to arrive at your destination safely and quickly.

Road maps are perhaps the most widely used maps today, and form part of a sub group of maps called navigational maps.

Maps usually have five basic elements to help you understand them:

1. The title of the map
2. Orientation (north, south, east, or west)
3. Scale to determine distance
4. A legend or key that explains the shapes, colours, and symbols used
5. A grid of coordinates that help show where the map fits into a larger global area

1 What Are Maps?

Maps have been in existence for thousands of years, and even feature in stories and legends across the globe.

But what is a map?

A map is simply a drawing or picture (in 2-D) of a landscape or area of a country (in 3-D). Maps usually show the landscape as it



Features of a map



Learner Activity 1: Sketch a map to your school

Draw your own map to show a friend the route from your house to your school, showing buildings and landmarks you pass on the way. Have a look at a 1:25 000 scale map to give you some ideas of what you could draw if you are slightly unsure.

2

Maps in Tourism

Maps are important to the tourism industry because:

- they help with route planning
- they can be used to calculate travel time when destinations are selected for itineraries
- they can be useful tools when planning stopovers for meals
- they help with identifying future attractions and tourism developments

Maps support the following sources of tourism information:

- Brochures
- Travel magazines
- Travel guides



Teacher Tip: have a selection of these available to show the learners how maps support the tourism industry. Have some brochures, travel magazines and travel guides with maps included in them on hand as examples.

The minimum map reading skills that are needed in the travel and tourism industry are:

1. Reading and interpreting the scale of a map
2. Interpreting the map legend (map keys and symbols)
3. Orientate a map

Maps come in various forms and sizes and provide different kinds of information. Different maps have different purposes and are designed to fulfil their purpose. In this learning resource, we will focus on maps that are produced for people who are travelling within or between places, and maps used in the tourism industry.

3

Terms and Definitions

There are a number of terms and definitions that are used with relation to maps that are important to understand when reading and working with maps. This section will explain these specific terms and definitions.



Refer to the LTSM on Time Zones for further information on these map-related topics:

- Time zones
- Latitude and longitude
- Greenwich meridian (Greenwich Mean Time – GMT)
- Universal Time Co-ordinate (UTC)

3.1 Orientation of maps

The orientation of a map is the relationship between the directions on the map and the corresponding compass directions in reality. Today it is common practice to have north at the top of a map.

There is usually a symbol printed somewhere on the map to indicate map orientation. The symbol will look something like these below:



Map Orientation Symbols

Points of the Compass

Just as it is important to know which is your left and your right hand, in map reading it is important to understand where north, east, south and west are. You can remember where the points of the compass are by using one of these rhymes and going anti-clockwise from North at the top: Naughty Elephants Squirt Water or Nobody Ever Swallows Whales.

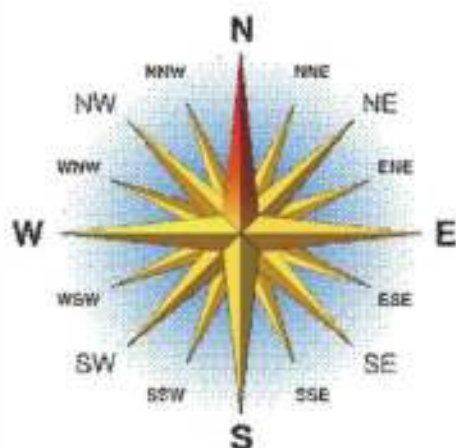
The 8 point compass:

You can make your compass more accurate by adding more points to it. By drawing a line in between each of the main four compass points (north, east, south, west), you can create an eight-point compass that shows the directions for north-east, south-east, south-west and north-west.

If you are heading in a direction half way between two of the points of a compass, you can say you are heading north-east, south-east, south-west or north-west, depending on the direction.

The 16 point-compass:

For even more accurate readings, some compasses add eight more points to make a total of sixteen. Each of these points also has a direction. West-south-west points to a direction west of south-west. Similarly, north-north-east (NNE) points north of north-east.



3.2 Scale

To create an accurate picture of a landscape on paper everything has to be made much, much smaller. This is done by 'scaling down' the actual size of the land. It wouldn't be possible for maps to show things the size they are in real life, so maps make things smaller using scale. Drawing something to scale means showing it at a different size to what it is in real life.

The map below shows South Africa. The size of the country has been 'scaled down' so it will fit on this page. The map is too small to contain a lot of detail and doesn't have many names on it, as there isn't much room.



Political map of South Africa

The scale of a map shows how much you would have to enlarge your map to get the actual size of the piece of land you are looking at. For example, if a map has a scale of 1:25 000, this means that every 1 cm on the map represents 25 000 of those same units of measurement on the ground (for example, 25 000 cm = 250 metres).

Maps are made at different scales for different purposes. The 1:25 000 scale map is very useful for walking, but if you use it in a car you will quickly drive off the edge! On the other hand, maps at 1:250 000 scale (note the extra zero) show lots more land but in far less detail.

Many, but not all, maps are drawn to a scale, expressed as a ratio such as 1:10,000, meaning that 1 of any unit of measurement on the map corresponds exactly, or approximately, to 10,000 of that same unit on the ground.

Large scale maps, say 1:10,000, cover relatively small regions in great detail and small scale maps, say 1:10,000,000, cover large regions such as countries, continents and the whole globe.

The large/small terminology arose from the practice of writing scales as numerical fractions: 1/10000 is larger than 1/10000000. There is no exact dividing line between large and small but 1/100000 can be considered as a medium scale. Examples of large scale maps are the 1:25000 maps produced for hikers; on the other hand maps intended for motorists at 1:250,000 or 1:1,000,000 are small scale.

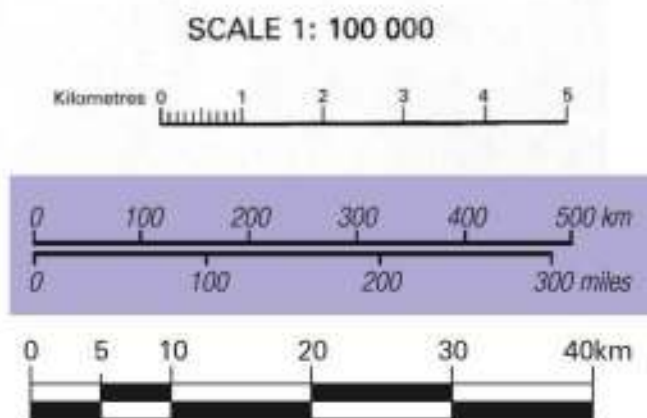
Remember:

Size	Scale	Example
Large Scale	1: 10 000	Street map of a town
	1: 25 000	Hiking map
Medium Scale	1: 100 000	Road map of a country or province
Small Scale	1: 250 000	Country maps
	1: 1 000 000	Countries, continents or the earth

Indicating scale on a map:

A word scale is a scale that verbally states what the scale is. For example: 10 mm represents 2 km

Linear scale: Is a line marked off in the lengths representing the ground distance. For example:



Linear scale indicators used on maps

Converting a fraction scale to a word scale:

For example: 1: 200 000
Means 1 cm on the map represents 200 000 cm on the ground
In other words, 1 cm represents 2 km.

Converting a word scale to a fraction scale:

For example: 1 mm represents 5 km
1 mm = 5 km
1 mm = 5 000 000mm
1: 5 000 000

Remember the following Metric system conversion table for 1 kilometre:

1	kilometre	km
1 000	meters	M
100 000	centimetres	cm
1 000 000	millimetres	mm

3.3 Map Accuracy

It is important to recognise that even the most accurate maps sacrifice a certain amount of accuracy in scale to ensure that they are useful to the user. For example, the width of roads and small streams are exaggerated when they are too narrow to be shown on the map at true scale. On a printed map they would be so narrow that we would not be able to see them if they were printed to scale. The map makers make them larger than scale in order for us to be able to see them.

Some inaccuracies on maps may be there on purpose. For example, cartographers may simply omit or remove features in order to make the map more clear and less cluttered. For example, a road map may or may not show railroads, smaller roads or other prominent non-road objects, and even if it does, it may show them less clearly (e.g. dashed or dotted lines/outlines) than the highways. This practice is called 'decluttering', and makes the subject matter that the user is interested in easier to read, usually without sacrificing overall accuracy.

If a map is electronic, the user can usually choose decluttering between ON, OFF and AUTO as needed. In AUTO the degree of decluttering is adjusted as the user changes the scale being displayed.

3.4 Labelling

To communicate spatial information effectively, features such as rivers, lakes, and cities need to be labelled. Over centuries cartographers have developed the art of placing names on even the densest of maps. Text placement or name placement can get very very complex as the number of labels and map density increases.

Maps communicate spatial information to the reader, therefore they are a medium of communication.

The typical features depicted on a geographic map are:

- line features (e.g. roads),
- area features (countries, forests, lakes, etc.),
- point features (villages, cities, etc.).

In addition to depicting the map's features in a geographically accurate manner, it is important to place the names that identify

these features in a way that the reader knows instantly which name describes which feature.

Did you know: Map Making

The science and art of mapmaking is called cartography. From cave paintings and ancient European maps to new maps of the 21st century, people have created and used maps to help define, explain, and navigate their way across the planet and beyond.

Where maps were once hand-drawn on paper, most modern cartographers now use a variety of computer graphics programs to generate new maps. For example, we have technologies like Global Positioning Systems (GPS) for navigation and Geographic Information Systems (GIS) to analyse and display information.

3.5 Map Symbols

When drawing a map, you will find that you have to label lots of things you draw, such as a shop or a church, so other people can tell what they are. If we had to do this on all maps there would be too much writing and it would be very confusing. The way we get around this problem is by using different shapes, colours and symbols to show all the roads, buildings and rivers and other interesting things in our landscape.

Maps therefore use symbols instead of words to label real life features and make maps clearer and easier to understand.

Symbols may be small pictures, letters, lines or coloured areas to show features like churches, museums, parks and so on. If you look closely at a map, you will see it is covered in symbols!

The various features shown on a map are represented by conventional signs or symbols. For example, colours can be used

to indicate a classification of roads. These signs are usually explained in the margin of the map, or on a separately published key or legend. If you find a symbol on the map that you don't know, simply look it up in the key.

These symbols are designed to be simple, often looking like the features they represent. This means things can be quickly and easily recognized as you look at a map. The following symbols are commonly used on maps in South Africa.

The basics: there are some basic features that most maps will include:

- **Roads** tend to be marked in different colours depending on the type of road depicted. Roads on a map range from thick blue lines, showing motorways, to dashed lines, indicating an untarred minor road.
- **Buildings** are marked by small black squares. However, some particular buildings have their own special symbols, such as churches and museums or monuments.
- **Rivers and streams** are shown as blue lines. The thickness of the line represents the size or width of the river - a thin line is a stream, and a thicker line is a bigger river. If the width of a river is more than eight metres it is shown as two blue lines with a light blue area between.
- **Scale** tells you how much the land has been scaled down to fit on the paper. If the scale of a map is 1:50 000 then everything on the map will be 50 000 times smaller than it is in reality.



Common tourism signs used in South Africa



Learner Activity 2: Draw Map Symbols

Draw your own map symbols for the following features:

- Art gallery
- Aquarium
- Botanical garden
- Casino
- Church
- Golf Course
- Museum
- National Park
- National Road
- Police station
- Railway line
- Secondary road
- Toll road
- Hiking trail



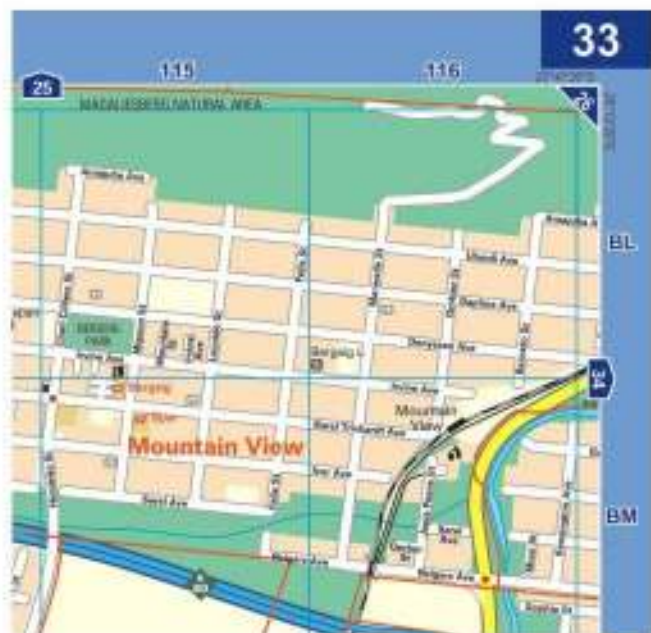
Learner Activity 2: Teacher Guidelines

Allow the learners to develop their own symbols for each of the map features listed. Give them an opportunity to draw them on the board or display them in the class and see if the other learners recognise what they are for. The key to good symbols is that they are easily recognised for what they represent. Keep this in mind when providing feedback to the learners on the symbols they have designed.

3.6 Grid Lines

Many maps are covered in a series of faint blue lines that make up a grid. The lines have numbers accompanying them that allow you to accurately pinpoint your location on a map. Once you have located where you are, the grid system makes it simple to tell other people exactly where you are. This description, which will be a series of numbers, is known as a **grid reference**.

The way to read grid lines is to identify in which grid block a particular attraction, place, building or feature is located. For example, an airport could be located in 2B. It is easy to read across from the number 2, and up from the letter B to find where the two meet. This is the grid reference for the location of the airport, and you can then use the rest of the map to plan the route on how to get there.



Example of map with grid lines

	Freeway / National Road		Provincial Boundary		Capital or City
	Main Road		Water Feature		Major Town
	Secondary Road		Pan		Secondary Town
	Route Numbers		Marsh		Other Town
	Toll Route and Toll Plaza		National Park and Nature Reserve		Settlement
	Major Junction (Selected)		Historical Site		Satellite Town
	Mountain Pass		Border Control		Accommodation
	Distance in Kilometres		Major Airport		Place of Interest
	Railway with Station		Airfield		Waterfall
	International Boundary				

Common Map Symbols used in South Africa

4 Types of Maps

There are many different types of maps. The type of map you would choose depends on what you need it for. If you were trying to find a certain street or building in your home town you would need a map that showed you all the smaller streets, maybe even footpaths in and around town. If you were hiking across a mountain range you might need a map that shows a bigger area of land and tells you the heights and steepness of the mountains. If you were a pilot flying from Durban to Johannesburg you might need a map that has the whole of the country on a single page, with only the locations of towns and cities on it.

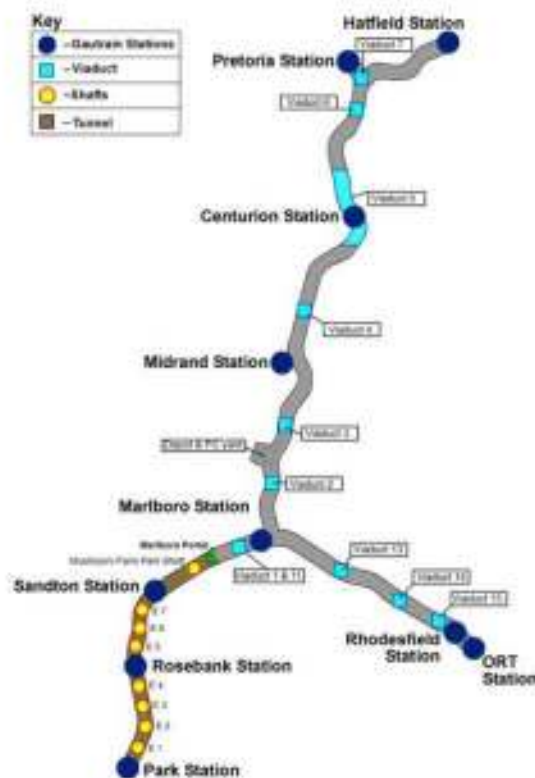
There are many explanations of the different types and classification of maps. However, there are generally two main classifications of maps:

1. **Reference maps** help us navigate. They show things like roads, cities, bus stops, or rooms in a museum.
2. **Thematic maps** help us interpret specific kinds of information. For example, maps may show the population of cities, languages, religion, race, climate, vegetation, the weather in another country, or the types of animals living in a national park.

These classifications include the following kinds of maps which each present different types of information that are used for different reasons:

- **Thematic** or physical maps: show features, population, and rainfall. These include relief maps.
- **Specialist** maps reflect for example climate, airports, railways and ferries, etc.)
- **Climate** maps give information about climatic and precipitation conditions in a region. Precipitation - rain and/or snow.
- **Inventory maps**: concentrate on a specific feature and show precise locations of that feature such as all the schools in a province or city.
- **Economic** or resource maps feature the type of natural resources or economic activities in an area.
- **Political** maps show the boundaries of countries, provinces, and states and each is usually in a different colour to make them easy to identify.
- **Navigational** maps: road and street maps help people find their way on land, water, and air

- **Road** maps show the major highways, railway tracks, airports and places of interest within a country, province or city.
- **Transit** maps show routes of buses, trains, subways and public transportation.



Gautrain Transit Map

- **Charts**: help ships and planes find their way across the sea or air space.
- **Topographic** maps use contour lines to highlight the shape and elevation of an area. Closer contour lines mean a steeper terrain, and if the lines are far apart from each other it indicates a flatter terrain.
- **Tourist information** maps show things that interest tourists such as national parks, tourism information centres, bureaux de change, world heritage sites, tourist attractions in specific areas, hiking trails, rambles, etc.
- **Physical** maps show the physical features of an area, such as mountains and rivers. They usually use colours such as blue, green and orange. Green is usually used for low-lying areas and orange to brown is used for higher altitudes.
- **Geological** maps show not only the physical surface, but characteristics of the underlying rock, fault lines, and subsurface structures.

Maps can show us all kinds of useful information:



Natural features,
such as mountains, lakes
and rivers



Political areas,
such as province and
country borders



Scientific information,
such as rainfall amounts
or population numbers



Navigation features,
such as roads, subway
stops and ocean depths

Maps of the world or large areas are often either 'political' or 'physical'. The most important purpose of the political map is to show the borders of different countries; the purpose of the physical map is to show features of geography such as mountains, soil type or land use.

4.1 Electronic maps

From the last quarter of the 20th century, the indispensable tool of the cartographer has been the computer. Much of cartography, especially at the data-gathering survey level, has been subsumed by Geographic Information Systems (GIS). Having local information such as rainfall levels, distribution of wildlife, or demographic data integrated within the map allows more efficient analysis and better decision making. Today, it is used by government and non-government agencies, as diverse as wildlife conservationists and militaries around the world.

Interactive computerised maps are commercially available, allowing users to zoom in or zoom out (meaning to increase or decrease the scale), sometimes by replacing one map with another of different scale, centered where possible on the same point. In-car global navigation satellite systems are computerised maps with route-planning and advice facilities which monitor the user's position with the help of satellites.

4.2 Global Positioning Systems (GPS)

GPS is a global positioning system that uses satellites to pinpoint your location anywhere on the planet.

How does it do that? Your GPS-enabled device—such as a cell phone, car navigation system, or handheld GPS unit—determines your location by measuring the time delay between when a satellite sends a signal and when your unit receives it.

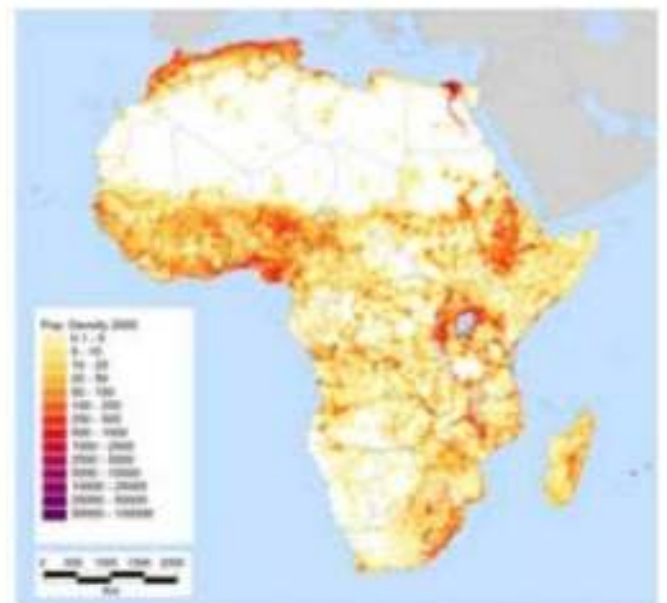
With more than 24 GPS satellites in orbit around the Earth, GPS has become very popular for navigation on land, sea, and air, as well as an important tool for mapmaking and land surveying.



4.2.1 Geographic Information Systems (GIS)

GIS is a computer-based technology that enables people to quickly combine different types of information (such as population, rainfall and transportation) on a single map.

GIS represents real-world objects (roads, a house, rainfall amount, land elevation) with digital information, and GIS technology can be used for all kinds of things such as scientific investigations, managing natural resources, cartography, and route planning, to mention just a few.



Example of a GIS generated map

5 Measuring Distance

5.1 Using linear scales and string

It is always important to know how far you have to travel and how long it is going to take you. By measuring a distance on your map, you can work out how far that is in reality. You can measure this distance either in a straight line (as the crow flies) or following a winding route such as along a road. To get this information from a map is very easy.

Here is a way of doing it:

Measuring distance using string: You can measure between two points by using a piece of thin string. If you are measuring the distance in a straight line, then simply stretch the string between the two points. If you are following a road or track that is not straight, bend the string to follow the exact shape until you reach the second point. Now that you have a distance in centimetres marked on your string you can find out the real distance. You can do this in a couple of ways:

- **By eye:** Place string against the scale bar on the map. This is usually at the foot of the map sheet. Based on this, you can add up how far it is
- **By measuring:** Measure your distance on your string with a ruler. If your string is 10 cms long and $4 \text{ cm} = 1 \text{ km}$, the distance is 2.5 km.

Calculating Distance

Some road maps help with this by placing small indicators along the roads to indicate the distance between towns. These are usually in red, and to calculate the distance you need to travel, just add up all the figures along the route you will take, and that will give you an indication of the distance on that route.



Learner Activity 3: Measuring distance on a map

Using a map that your teacher will give you, use a piece of string to measure the distance between two points on the map and calculate the exact distance using the map scale.

1. How far is it in a straight line on the ground from Point 1 to Point 2?
2. How far is it to drive along the road from Point 1 to Point 2?

5.1 Using distance charts

A distance chart is a section printed on a map or in a map book that provides information about the distances between the cities and towns of South Africa. A distance chart lists the cities and towns alphabetically and provides distance from that city to all the major places in the country.

Distance charts are very useful for people who travel within the country and also for many tourists. This tool will give them an exact idea of the distance between two places.

The distances given are those over the shortest practical routes, and are not necessarily the best or the fastest. Distances shown are in Km. Lines are shaded so that you can follow them easily without losing your place from left to right.



Learner Activity 4: Distance Tables

Using the distance table that your teacher will give you, work out the distance between:

- Cape Town and Port Elizabeth
- Port Elizabeth and Kimberly
- Kimberly and Durban
- Johannesburg and Nelspruit
- Bloemfontein and Polokwane

You will find a distance chart for the main cities in South Africa on Page 13.



Learner Activity 5: Design a Travel & Tourism Trail

The time needed for the activity: 2 hours outside the classroom; 1-2 hours in class after completing the walking tour.

Materials needed: A few copies of a good local map for students to take on their walk; paper and pencils.

Preparation needed: Before going on the walk, be sure students know the starting point and the end point.

Steps in the Activity

1. Divide the class into teams of 4 - 5 students. Assign groups to each develop a map for a different target group, for example a walking tour for either
 - a family visiting your area,
 - a business woman with some free time after her meeting, or
 - two teenagers visiting with their father who is on a business trip.
2. The students all start at the same point and using their map and their imagination, walk around the area and locate the following kinds of things that they believe their assigned group would want to see on a first visit to the

area:

- Attractions such as historic buildings
- Parks
- An interesting place to eat
- Some places to shop
- Toilet facilities (public rest rooms)
- Other places or things of interest

The students should mark the places they select on their map, and provide directions as well. For example:

- Start at the corner of X street and walk 2 blocks north to Z street
- Look for a statue or big tree
- Just behind the tree, find the restaurant selling special chocolates, etc.

Follow Up Activity

The idea is to map out an interesting walking tour that a visitor could take in order to learn something about your town. The maps can be carefully completed and some students may be interested in producing more polished versions that can be printed by the school or local tourism information office and given to tourists.

6

Ideas Box



1. Go to the local tourism information office and collect a range of maps from them. Remember that maps are often included on the leaflets of attractions and accommodation establishments to guide visitors and guests to them. Develop a collection of maps and keep them in a file or box. Remember that some magazines such as the Getaway and Sawubona magazines also have maps in them, and tear these out and add them to the collection. Use these for group or individual activities such as asking the learners to identify:

- map title
- type of map
- scale of map
- map orientation
- symbols used
- work out a route on the map

2. Show students a mobile GPS which could be on a cell phone or could be a version used in a vehicle. If you are not familiar with using a GPS, ask one of the students or a teacher or parent who is familiar with the technology, to demonstrate how it works. Use the GPS to find a place on a map, or follow it to take a short walk outside of the school grounds.

3. Google Earth is a tool that uses satellites to view the earth from above. By using this tool, you can zoom in to anywhere on the globe and have a closer look at it - including your school or even your house. If you have access to the internet, go onto Google and click on the 'Maps/Earth' icon. Try working with the tool and when you are familiar with it, show the learners in your computer lab, or with a computer which has connection to the internet. Find your school by zooming in on Africa/South Africa and your town or city. Find other places that students may have visited, or look up the location of international capitals such as London, New York, Tokyo, Sydney and so on, and international tourism icons like the Eiffel Tower, the Pyramids etc.

4. Find an old Road Atlas map book of South Africa – maybe there is an old one in the library, in your map collection or a parent has one. Carefully tear out the pages except for the front and back ones. (Alternatively, photocopy some pages, but it is best to have these in colour, or original map pages for easier interpretation.) Give each learner a page and ask them a number of questions. Each learner will have a different answer, but this exercise will develop their map reading skills. Ask them questions such as:

- Identify 2 towns on the map, and using the road distance markers, calculate the distance between the towns.
- Using the grid lines, give the grid co-ordinates of two different features on the map – such as an airport, hospital, museum, etc.
- Identify three different map symbols on the map - for example a church or place of worship, an airport, hospital etc, and tell the class what the symbol looks like.
- Identify the map numbers for the maps that lie north and south of the page you have (these are indicated as small numbers in arrows at the top and bottom of the pages).

Collect all the pages again for use with other classes. Show the students the map at the front of the book that breaks the whole country into the different pages that they have been studying, and ensure that they understand how these all fit together into a big jigsaw puzzle.

7

Assessing Your Learners

1. **True and False Questions:** One mark per question

- a) The science and art of making maps is called cartography (True) (1)
- b) Maps are usually orientated to the south (False) (1)
- c) Grid lines on a map indicate where you can have a braai (False) (1)
- d) A distance table tells the distance between towns and cities (True) (1)
- e) A 1 : 10 000 scale map is a large scale map (True) (1)
- f) GPS stands for Global Positioning System (False) (1)

2. Name and explain at least four different types of maps. (Any 4 with explanations from page 7) (8)

3. Draw and describe at least 5 symbols that can be found on a tourist map. (Any 5 from the chart provided on page 5) (10)

4. Explain the use and value of maps in the tourism industry. (8)

Maps are important to the tourism industry because:

- they help with route planning
- they can be used to calculate travel time when destinations are selected for itineraries

- they can be useful tools when planning stopovers for meals
- they help with identifying future attractions and tourism developments

Maps support the following sources of tourism information:

- Brochures
- Travel magazines
- Travel Guides

5. Is a 1:250 000 scale map useful for walking or driving? Explain your answer. (5)

(It is a small scale map which shows a great area in a small space. It is therefore more suitable for driving than for walking. 1 cm on the map represents 2,5 km in reality, which is a fair distance to walk, but not far to drive.)

6. Identify the direction that you would travel if you travelled the following routes: (6)

- Johannesburg to Durban (South east)
- Durban to Johannesburg (North west)
- Johannesburg to Nelspruit (East)
- Johannesburg to Polokwane (North north east)
- Cape Town to Johannesburg (North east)
- Port Elizabeth to Cape Town (West)

8

References and Resources

Types of maps	Where to source the map
Road Atlases	Leading bookstores such as CNA, filling stations, tourism information centres, some curio stores such as the Park Shops in the national parks
Topographical maps	Topographical map series can be obtained from the Government Printer, Private Bag X 85, Pretoria
City street maps	Leading bookstores such as CNA, filling stations, tourism information centres, some curio stores such as the Park Shops in the national parks
Maps of tourism routes & rambles	Tourism information centres, tourism attractions and establishments, local or Provincial Tourism Authorities such as Gauteng Tourism Authority, Garden Route Tourism, etc.

Useful websites and electronic references:

www.mapzone.ordnancesurvey.co.uk

Google Maps, Google Earth, OpenStreetMap or Yahoo! Maps.

www.mapstudio.co.za

<http://www.mywonderfulworld.org/toolsforadventure/usingmaps/index.html>



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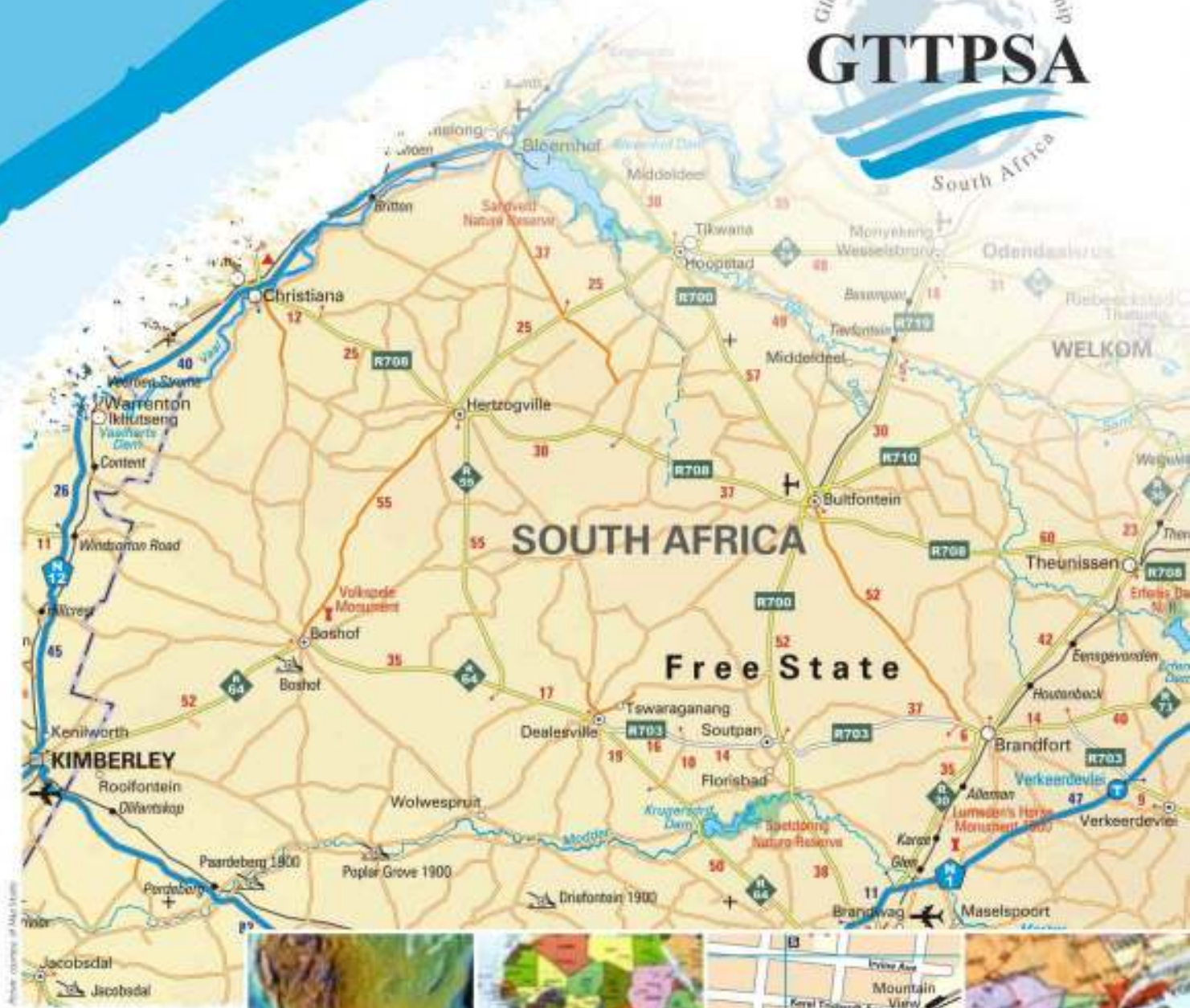
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Distance table for main South African Cities

	BLOEMFONTEIN	CAPE TOWN	DURBAN	EAST LONDON	GABORONE	JOHANNESBURG	KIMBERLEY	MAFIKENG	MAPUTO	MASERU	MBABANE	MTHATHA	PORT ELIZABETH	PRETORIA
BLOEMFONTEIN	● 1004	634	584	622	398	177	464	862	157	677	570	681	455	
CAPE TOWN	1004	● 1004	1753	1079	1501	1402	968	1343	1865	1680	1314	769	1460	
COLESBERG	226	778	860	488	848	624	292	672	1085	383	903	517	451	682
DURBAN	634	1753	● 1004	674	979	557	811	821	620	590	562	439	984	636
EAST LONDON	584	1079	674	● 1004	1206	982	780	1048	1301	630	1238	235	310	1040
GABORONE	622	1501	979	1206	● 1004	400	538	158	919	702	719	1192	1299	350
GEORGE	773	438	1319	645	1361	1171	762	1203	1670	913	1450	880	335	1229
GRAAFF-REINET	424	787	942	395	1012	822	490	854	1283	599	1101	503	291	880
GRAHAMSTOWN	601	899	854	180	1223	999	667	1065	1478	692	1418	415	130	1057
JOHANNESBURG	398	1402	557	982	400	● 1004	476	287	555	438	361	869	1075	58
KEETMANSHOOP	1074	995	1708	1468	1230	1296	897	1072	1851	1283	1657	1547	1429	1354
KIMBERLEY	177	968	811	780	538	476	● 1004	380	1033	334	833	747	743	530
LADYSMITH	410	1413	248	752	755	356	587	597	529	366	386	517	1062	414
MAFIKENG	464	1343	821	1048	158	287	380	● 1004	848	544	648	1034	1141	294
MAPUTO	862	1865	620	1301	919	555	1033	848	● 1004	815	223	1064	1609	545
MASERU	157	1160	590	630	702	438	334	544	815	● 1004	633	616	822	488
MBABANE	677	1680	562	1238	719	361	833	648	223	633	● 1004	1003	1548	372
MTHATHA	570	1314	439	235	1192	869	747	1034	1064	616	1003	● 1004	545	928
MUSINA (MESSINA)	928	1921	1107	1501	696	505	991	680	687	949	797	1392	1594	447
NELSPRUIT	757	1762	707	1226	672	355	827	635	206	713	173	976	1434	322
PIETERMARITZBURG	555	1674	79	595	900	499	732	742	706	511	640	360	905	557
POLOKWANE	706	1710	886	1290	485	297	780	569	567	738	504	1181	1383	250
PORT ELIZABETH	681	769	984	310	1299	1075	743	1141	1609	822	1548	545	● 1133	
PRETORIA	455	1460	636	1040	350	58	530	294	545	488	372	928	1133	● 1133
UPINGTON	574	894	1208	968	730	796	397	572	1357	731	1157	1047	933	854
WELKOM	153	1156	564	737	479	258	294	321	775	249	451	718	830	316



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