basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICAL LITERACY P2

NOVEMBER 2023

MARKS: 150

TIME: 3 hours

Stanmorephysics

This question paper consists of 12 pages and an addendum with 4 annexures.

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INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE questions. Answer ALL the questions.
2. Use the ANNEXURES in the ADDENDUM to answer the following questions:

   ANNEXURE A for QUESTION 2.3
   ANNEXURE B for QUESTION 4.1
   ANNEXURE C for QUESTION 4.2
   ANNEXURE D for QUESTION 5.3

3. Number the answers correctly according to the numbering system used in this question paper.
4. Start EACH question on a NEW page.
5. You may use an approved calculator (non-programmable and non-graphical), unless stated otherwise.
6. Show ALL calculations clearly.
7. Round off ALL final answers appropriately according to the given context, unless stated otherwise.
8. Indicate units of measurement, where applicable.
9. Maps and diagrams are NOT drawn to scale, unless stated otherwise.
10. Write neatly and legibly.

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QUESTION 1

1.1 TABLE 1 below contains a list of explanations and definitions of concepts used in Mathematical Literacy.

TABLE 1: EXPLANATIONS AND DEFINITIONS OF CONCEPTS

A	A drawing showing the streets for a person who drives a car
B	Visual indication of the real-life distance and its distance on the map
C	The boundary that surrounds a circular-shaped object
D	A position which roughly shows the location of an object
E	The sum of the areas of all the faces of a 3D object
F	The rate of covering a certain distance
G	The amount of space that is enclosed by the perimeter of an object

Use TABLE 1 above to write down the letter of the explanation or definition (A to G) of EACH of the following concepts:

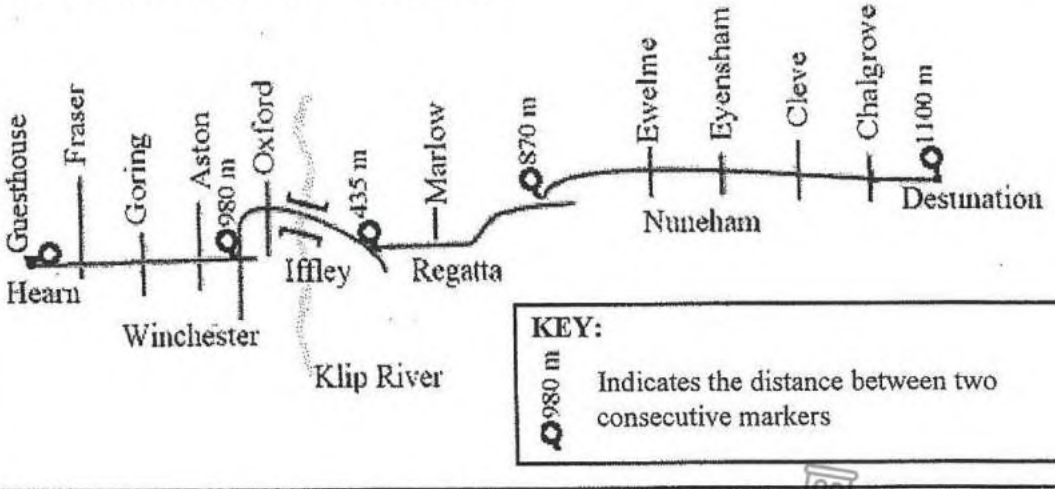
1.1.1 Bar scale (2)

1.1.2 Surface area (2)

1.1.3 Road map (2)

1.1.4 Speed (2)

1.2 Mr Masunte stays at a guesthouse in Hearn Street. Below is a strip chart showing the streets he will use to reach his destination.



[Adapted from https://scoutwiki.scouts.org.za/wiki/Strip maps]

Use the information above to answer the questions that follow.

1.2.1 Write down how many streets Mr Masunte must cross before turning into Winchester Street. (2)

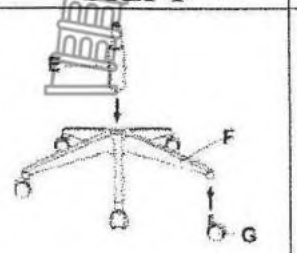
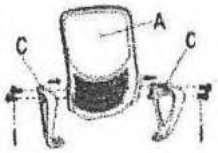
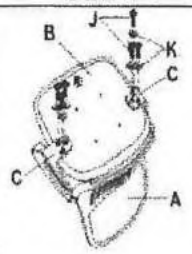
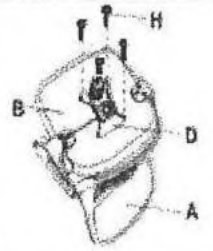
1.2.2 Name the street that goes over the Klip River. (2)

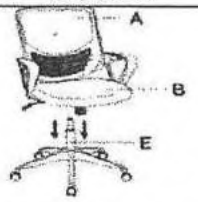
1.2.3 Calculate the total distance from the guesthouse to his destination. (3)

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1.3 Illustrated below are the steps and components needed to assemble a chair. The components to assemble the chair are labelled alphabetically (A–K).

STEPS TO ASSEMBLE A CHAIR

STEP 1	STEP 2	STEP 3	STEP 4
			

STEP 5	COMPLETED CHAIR
	

COMPONENTS NEEDED TO ASSEMBLE THE CHAIR

A Chair back	B Chair seat	C Seat mechanism	D Gas lift	E Chair base	F Chair arms
					

G Casters	H Screws	I Screws	J Screws	K Washer	L Assembly tool: Allen key
					

[Source: http//www.bing.com]

Use the information above to answer the questions that follow.

1.3.1 Determine how many different types of screws are needed to assemble the different parts of the chair. (2)

1.3.2 Use the steps to assemble a chair to identify the following:

(a) The letter that indicates the chair base (2)

(b) The number of screws used in step 4 (2)

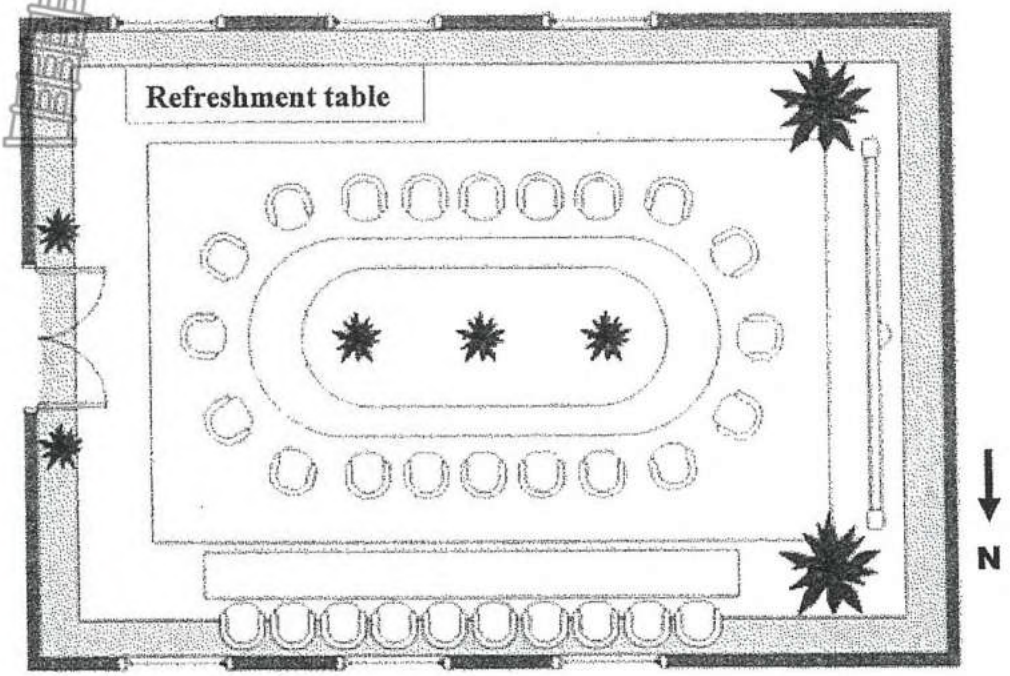
1.3.3 Name the tool needed to assemble the chair. (2)

1.3.4 Identify the component of the chair that comes as a pair. (2)

[25]

QUESTION 2

2.1 Shown below is the layout plan of a conference room in the Pretoria Hotel.



CONFERENCE ROOM LAYOUT PLAN

KEY		
Chair	Plant	Screen for presentations

Use the information above to answer the questions that follow.

2.1.1 Define the term *layout plan*. (2)

2.1.2 Write down the total number of chairs around the oval-shaped table. (2)

2.1.3 Which ONE of the following statements regarding the conference room layout is TRUE?

A The screen is on the eastern side of the room.
B The screen covers some windows.
C The screen is opposite the door leading into the room. (2)

2.1.4 Give ONE possible reason why plants are NOT placed on the table on the northern side of the room. (2)

2.1.5 The actual outside length of the conference room is 12 m.

(a) Measure the outside length of the conference room on the layout plan. (2)

(b) Hence, calculate the scale used in this layout plan. (3)

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2.2 A single layer of the bottled water will be packed on a rectangular base. The packed bottled water will occupy half of the length of the rectangular refreshment table and will not overlap the edges of the table.

Shown below are the pictures and the dimensions of the top of the rectangular refreshment table and the packed bottled water.

DIMENSIONS OF THE RECTANGULAR REFRESHMENT TABLE TOP	PACKED BOTTLED WATER (Rectangular base packaging)
Refreshment table Width = 49 cm Length = 290 cm	 Width = 24,2 cm Length = 36,4 cm

Calculate the maximum number of packed bottled water that can fit on this half of the table. (8)

2.3 On ANNEXURE A is a road map and area information directing the conference attendees to the Pretoria Hotel.

Use ANNEXURE A to answer the questions that follow.

2.3.1 State the general direction of the Atterbury Road off-ramp from the Fountains Circle. (2)

2.3.2 Explain the phrase, 'Map is not drawn to scale'. (2)

2.3.3 Complete: Pretoria Hotel is at the corner of … and … Streets. (2)

2.3.4 State the probability of having a traffic light at Brooklyn Circle. (2)

2.3.5 Give ONE reason why some streets are numbered from 1 to 7. (2)

2.3.6 A receptionist at the Pretoria Hotel has to report for work by 05:30.

She takes 10 minutes to walk from home to board a taxi.

- She leaves home at 04:55.
- She rides in a taxi for 20 minutes.
- She walks 5 minutes from the taxi stop to the hotel.

Verify whether or not the receptionist will get to work on time. (4)

[35]

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QUESTION 3

3.1 Andrew and Duncan went fishing for carp on a friend's farm.

NOTE: Carp is a large freshwater fish that can be eaten by humans.

3.1.1 A female carp can lay 2,7 million eggs.

Write 2,7 million in full, using numerals only. (2)

3.1.2 Andrew caught a carp with a mass of 2,375 kg. Duncan caught two carp, one weighing 1,2 kg and the other 750 g.

Determine, in kg, the total mass of the carp they caught. (3)

3.2 Andrew wants to erect a Vibracrete wall on the boundary of his property.

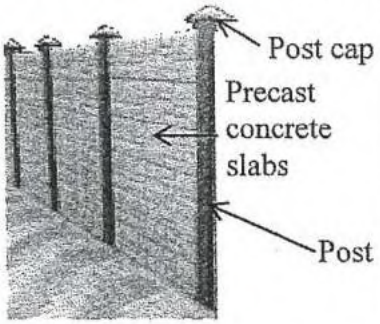
The wall will consist of concrete posts with precast concrete slabs between them.

The wall will have 12 posts planted into the ground using concrete.

On top of each post, he will place a post cap.

For each post, Andrew digs a square hole in the ground with a side length of 30 cm and a depth of 60 cm.

PICTURE OF A VIBRACRETE WALL



Use the information above to answer the questions that follow.

3.2.1 Calculate, in m^3, the total capacity of all the holes dug for the required posts.

You may use the formula:

Volume = length × width × depth (5)

3.2.2 Andrew mixed the same volume of concrete as the volume calculated in QUESTION 3.2.1.

Give an explanation why he had some concrete left over after planting all the posts in the holes with concrete. (2)

3.2.3 The concrete is made from a mixture of cement, river sand and stone in the ratio as illustrated below.

Cement	River Sand	Stone
 50 kg		
1 Bag	2 Wheelbarrows	2 Wheelbarrows

0,75 m^3 of concrete requires 5,5 bags of cement.
One level wheelbarrow full of river sand weighs 102 kg.

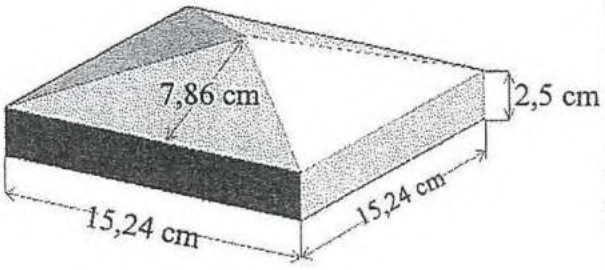
Calculate the mass of river sand needed to make 1 m^3 of concrete. (6)

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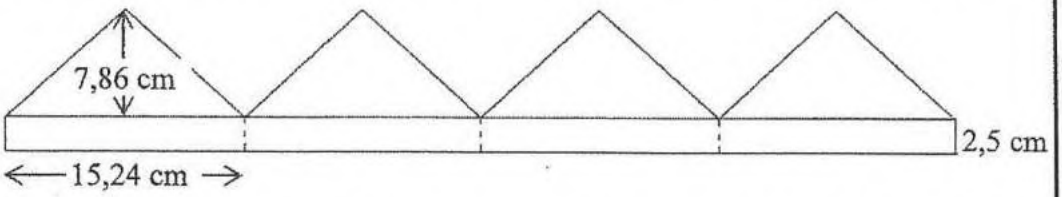
3.3 The square-based post cap has a side length of 15,24 cm and a constant height of 2,5 cm.

The perpendicular height of the triangular face is 7,86 cm, as shown in the diagram alongside.

DIMENSIONS OF THE POST CAP



NET OF THE FACES OF ONE OF THE POST CAPS TO BE PAINTED



Andrew will paint two sides of each of the concrete posts (each is 125 mm wide and 1,6 m long) and all the outside faces of the post caps.

The following formulae may be used:

Area of a rectangle = length × width

Area of a triangle $= \frac{1}{2} \times$ **base × perpendicular height**

Use the information above to answer the questions that follow.

3.3.1 Calculate, in cm^2, the total area of all the post sides that have to be painted. (4)

3.3.2 Duncan stated that the total area of all the posts and the post caps to be painted was 52 704 cm^2, rounded to the nearest whole number.

Verify, showing ALL calculations, whether his statement is VALID. (8)

3.3.3 The spread rate of the paint is 12,46 litre/m^2.

Calculate how many litres of paint is needed to paint 52 704 cm^2. (3)
[33]

QUESTION 4

4.1

A programme inspiring people of all ages and genders usually ends with a fashion show.

ANNEXURE B shows the layout of the runways and the seating arrangements at the fashion show.

Next to the floor runway are single seats arranged in rows. Each round table next to the raised runway can seat a maximum of 10 adults.

Each of the runways is 4 feet wide.

NOTE: 1 m = 3,28084 feet

Use the information above and ANNEXURE B to answer the questions that follow.

4.1.1 Write, in simplified form, the ratio of the width to the length of the raised runway. (3)

4.1.2 Convert the length of the floor runway to metres. (3)

4.1.3 Give a possible reason for EACH of the following:

(a) Why the second- and third-row seats are not arranged exactly behind the first-row seats that are closest to the floor runway (2)

(b) Why there is a gap between the two runways (2)

4.1.4 The diameter of the round table is 1,8288 m.

You may use the following formulae in the questions that follow:

Area of a circle = 3,142 × radius^2

Circumference of a circle = 3,142 × diameter

(a) Calculate the area of the top of ONE round table. (3)

(b) Each person occupies an equal length of the outer edge around the round table.

Determine the maximum length allocated to each person seated around the round table. (4)

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4.2 The girls participating in the fashion show need dresses that fit well. The fashion show uses an **equal number** of girls for each size.

ANNEXURE C shows a body type chart used to select the correct dress size.

Use ANNEXURE C and the information above to answer the questions that follow.

4.2.1 Write down the body size for a girl with a mass of 55 kg and a height of 1,6 m. (2)

4.2.2 State the mass of a girl with a height of 1,75 m wearing dress size 14–16. (2)

4.2.3 Calculate the body mass index (BMI) of a girl who weighs 70 kg and is 1,50 m tall.

You may use the formula: $\textbf{BMI} = \dfrac{\textbf{mass (kg)}}{\textbf{(height in metres)}^2}$ (3)

4.2.4 Write, as a percentage, the probability of randomly selecting a girl who weighs 50 kg and wears an XS dress. (2)

4.2.5 Bonolo stated that the probability of randomly selecting a girl wearing a dress with body size smaller than XXL is 0,833.

Verify, with calculations, whether her statement is VALID. (4)
[30]

QUESTION 5

5.1

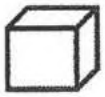
Ice is usually used in cool drinks to further cool them.

Ice can be made by freezing water in different shapes.

Cubes are the most common shape used to make ice.

PICTURE OF ICE CUBES AND DIAGRAM OF AN ICE CUBE





Side length of the cube = 4,5 cm

Use the information above to answer the question that follows.

Determine the surface area of a cube.

You may use the formula: **Surface area of a cube = 6 × side length^2** (3)

5.2

Countries surrounding the North Pole have started building ice hotels for travellers to stay overnight.

The hotel buildings, with furniture and decorations, are made of big blocks of ice, each weighing two tons.

Blocks of ice are stacked on top of each other to build a room.

Ice can also be carved to form different shapes.

ICE HOTEL



Ice carved to make a frame for taking photos



Use the information above to answer the questions that follow.

5.2.1 Calculate the total mass (in kg) of a wall built with 60 big blocks of ice.

NOTE: 1 kg = 0,001 ton (4)

5.2.2 A block of ice was carved out to make a circular opening. The carved-out ice was melted resulting in water with a volume of 38 500 cm^3.

Calculate the volume of the ice that was carved out.

You may use the formula: **Volume of water = volume of ice × 0,92** (3)

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5.3

Alaska is one of the states in the USA. Anchorage is the largest city in Alaska.

ANNEXURE D shows a part of the globe indicating the shortest distances, in nautical miles, between Anchorage and a few selected cities in the world.

NOTE: 1 nautical mile = 1,151 miles
1 km = 0,6215 miles

Use ANNEXURE D and the information above to answer the questions that follow.

5.3.1 Determine, in nautical miles, the difference in the distances from Tokyo to Honolulu and from Washington to Anchorage. (3)

5.3.2 Convert, to kilometres, the distance from Berlin to Anchorage. (4)

5.3.3 Cargo needs to be shipped from Los Angeles to Honolulu and then from Honolulu to Tokyo.

Phenyo searched the internet to determine how long it would take the cargo to reach its destination. Shown below are the search results. Some information has been omitted.

OCEAN ROUTE	TIME	DISTANCE
USLAX Los Angeles → USHNL Honolulu	10 days 4 hours	2 607 nautical miles
USHNL Honolulu → JPYOK Tokyo	...	3 350 nautical miles

NOTE: Ships sail 24 hours a day.

(a) Calculate the average speed of the ship, rounded to TWO decimal places, in nautical miles per hour.

You may use the formula: **Distance = speed × time** (4)

(b) Hence, determine the date and time of arrival in Tokyo if the ship leaves Honolulu on 24 September at 16:00 and sails at the same average speed. (6)

[27]

TOTAL: 150

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ADDENDUM

NOVEMBER 2023

This addendum consists of 5 pages with 4 annexures.

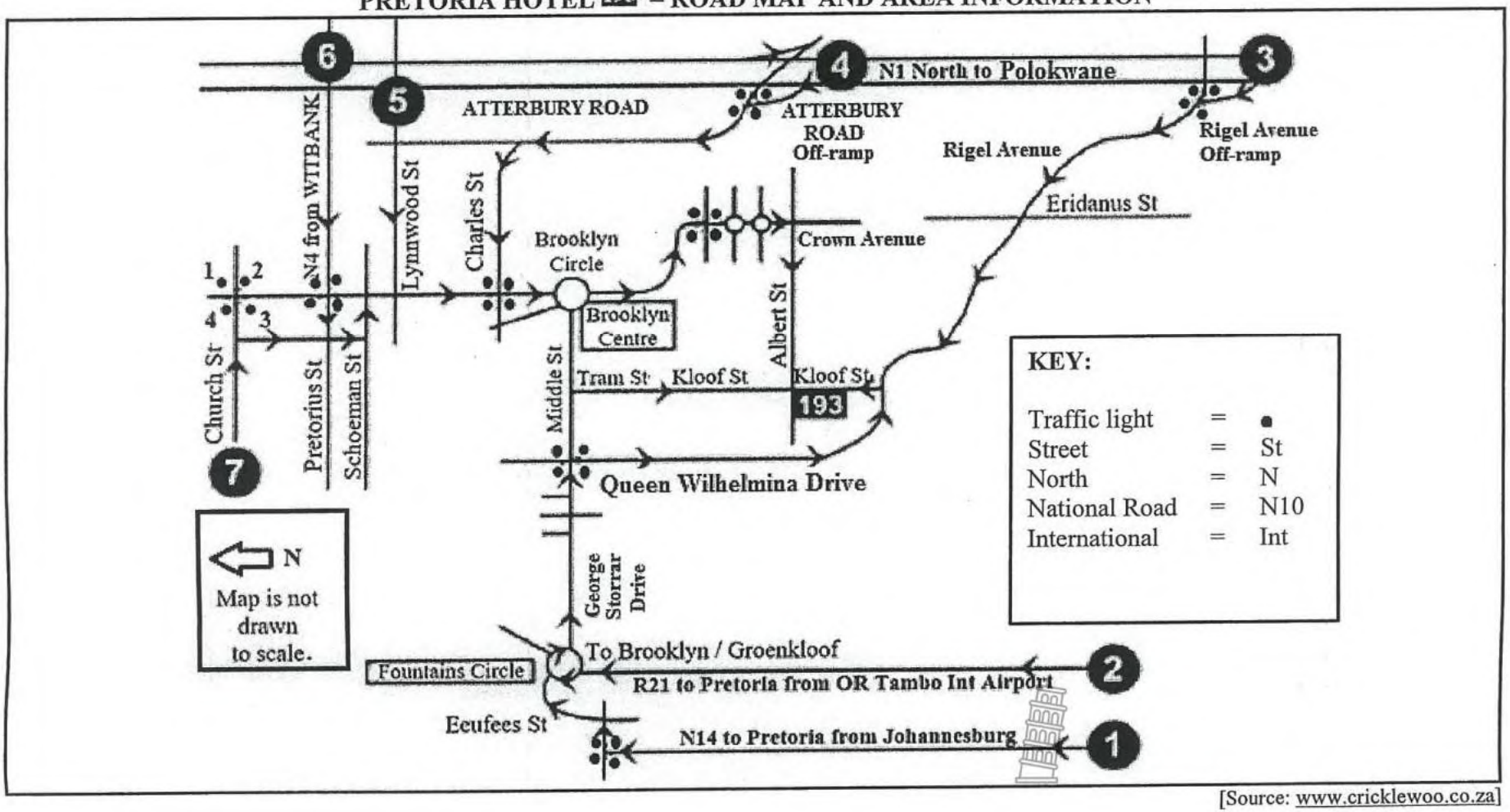
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ANNEXURE A

QUESTION 2.3

PRETORIA HOTEL 193 – ROAD MAP AND AREA INFORMATION

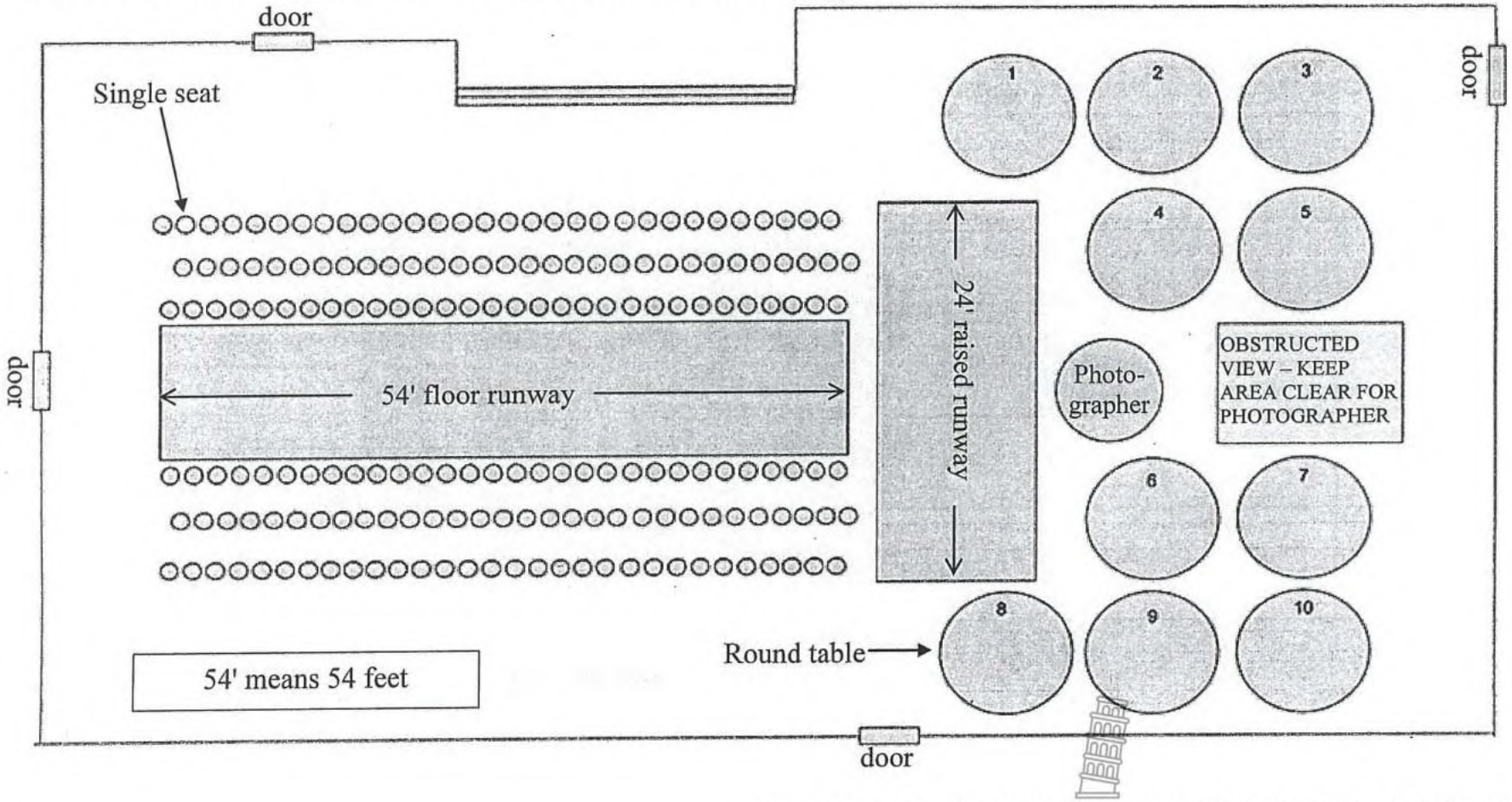


[Source: www.cricklewoo.co.za]

ANNEXURE B

QUESTION 4.1

LAYOUT OF THE RUNWAYS AND THE SEATING ARRANGEMENTS AT A FASHION SHOW



[Adapted from https://fearlessfocusprogram.com/celebration-fashion-show-tickets/]

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ANNEXURE C

QUESTION 4.2

TABLE 1: BODY TYPE CHART USED TO SELECT DRESS SIZE

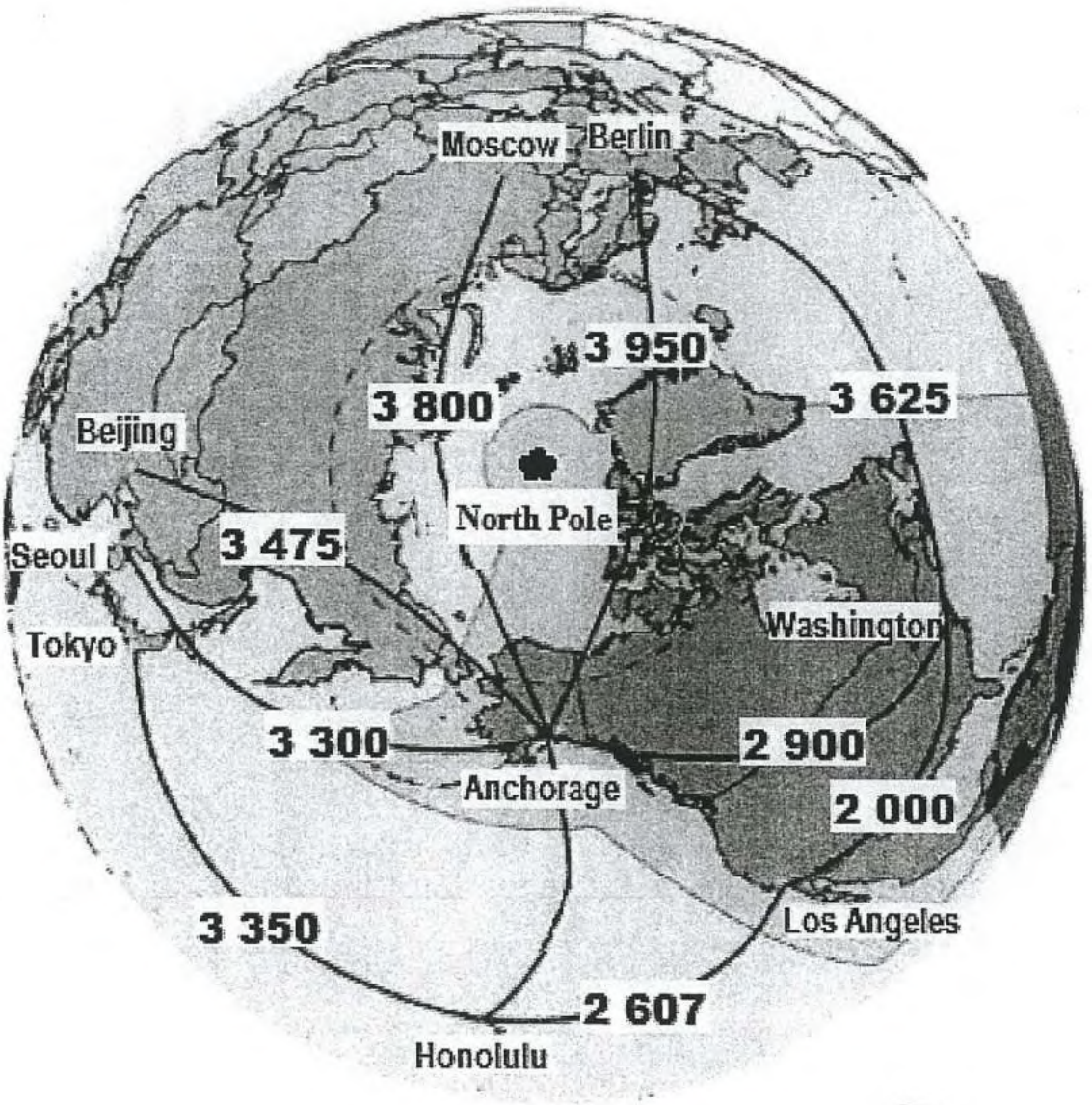
BODY TYPE CHART											
Mass → / Height ↓	50 kg	55 kg	60 kg	65 kg	67 kg	70 kg	75 kg	80 kg	85 kg	90 kg	100 kg
1,50 m	XS	S	S	M	L	L	XL	XL	XL	XL	XXL
1,55 m	XS	XS	S	M	M	L	L	XL	XL	XL	XXL
1,60 m	XS	XS	S	S	M	L	L	L	XL	XL	XXL
1,65 m	XS	XS	S	S	M	L	L	L	XL	XL	XXL
1,70 m	XS	XS	S	S	M	M	L	L	XL	XL	XXL
1,75 m	XS	XS	XS	S	S	M	M	L	XL	XL	XXL
Dress size	0–2	2–4	4–6	6–8	8–10	10–12	12–14	14–16	16–18	18–20	20–22
Body size	XS	XS	S	S	M	M	M	L	L	XL	XXL

[Adapted from https://cmmodels.com/model-measurements-for-catwalks-and-fashion-shows/]

ANNEXURE D

QUESTION 5.3

PART OF THE GLOBE INDICATING THE SHORTEST DISTANCES, IN NAUTICAL MILES, BETWEEN ANCHORAGE AND A FEW SELECTED CITIES IN THE WORLD



[Adapted from anchorage.net]

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