**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**MATHEMATICAL LITERACY P2**

SEPTEMBER 2021

MARKS: 150

TIME: 3 hours

This question paper consists of 16 pages and an addendum with 3 annexures.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of **FOUR** questions. Answer **ALL** the questions.

2.   Use the ANNEXURES in the ADDENDUM for the following questions:

   - ANNEXURE A for QUESTION 2.4
   - ANNEXURE B for QUESTION 4.2
   - ANNEXURE C for QUESTION 4.5

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, 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 may not be drawn to scale, unless stated otherwise.

10.   Write neatly and legibly.

QUESTION 1

1.1 | **DIAGRAM 1: FLOOR PLAN OF A THEATRE**
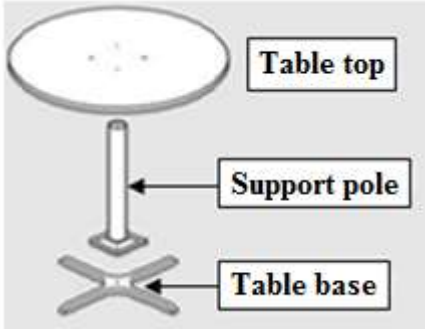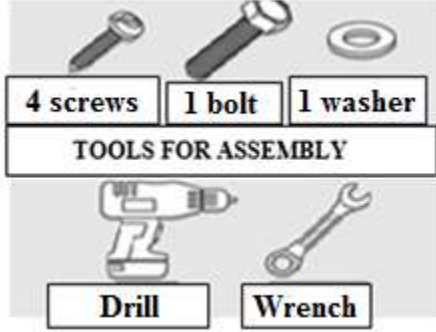

[Source: www.smartdraw.com]
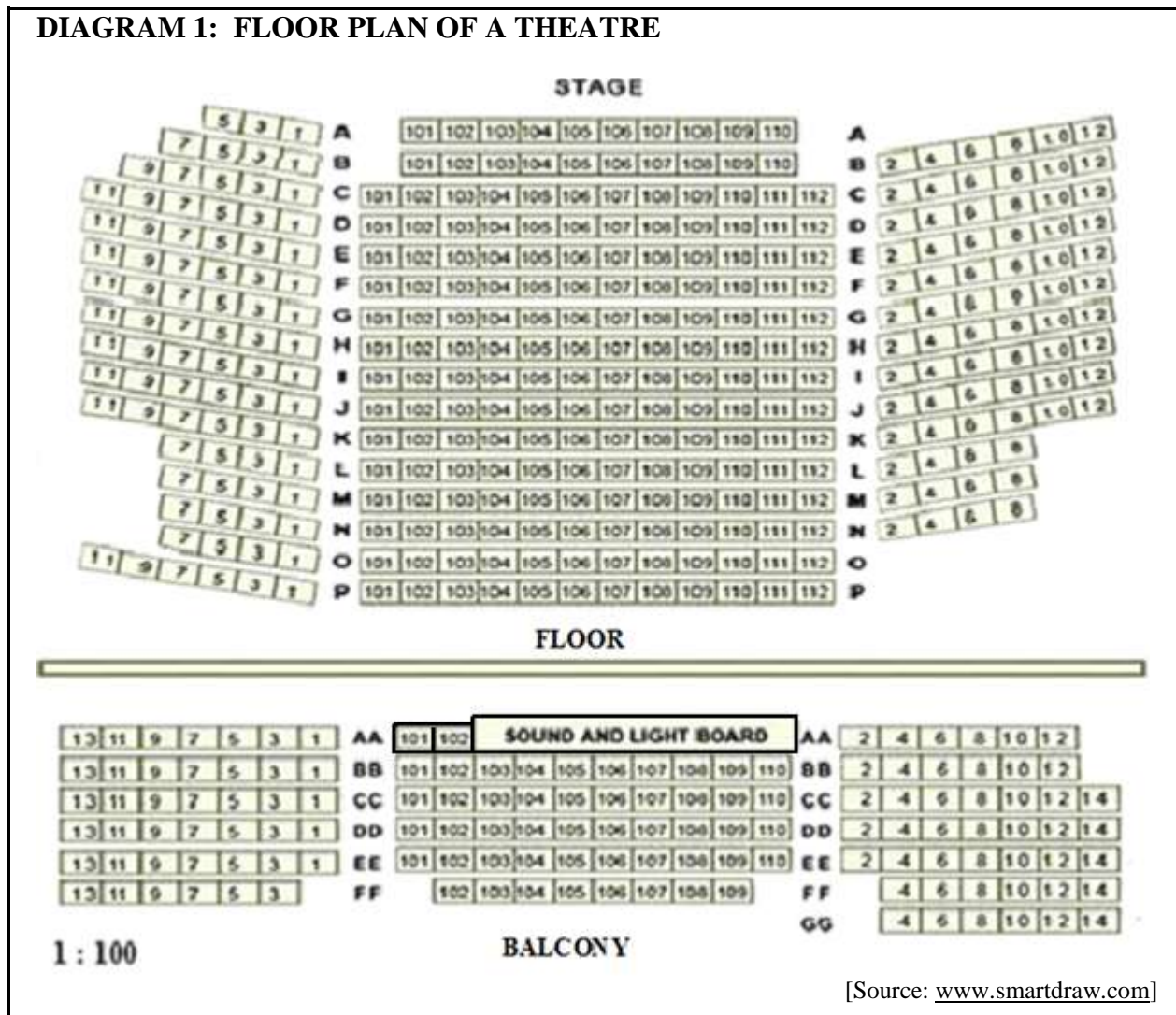
Use the floor plan of a theatre above to answer the questions that follow.
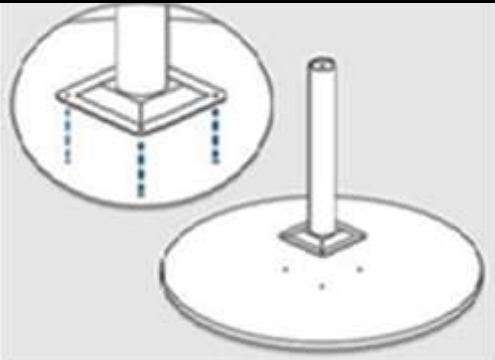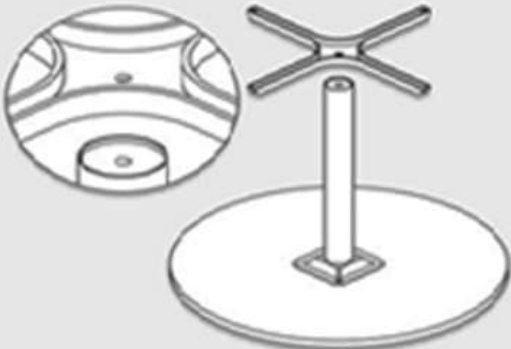
1.1.1 Write down the scale of the floorplan. (2)

1.1.2 Determine the number of seats in row AA in the middle block of the balcony. (2)

1.2 Miss Ndoe, the manager of the theatre bought a table for her home. The pieces needed to assemble the table comes in a box and the assembly instructions are as shown below.

DIAGRAM 2: TABLE- & JOINING PIECES AND TOOLS NEEDED

TABLE PIECES	JOINING PIECES AND TOOLS NEEDED

DIAGRAM 3: ASSEMBLY INSTRUCTIONS

STEP 1	STEP 2

[Source: www.globalindustrial.com]

Use DIAGRAM 2 AND DIAGRAM 3 above to answer the questions that follow.

1.2.1 Determine the number of screws that are provided to assemble this table. (2)

1.2.2 Name ONE tool that has to be used to assemble the table. (2)

1.2.3 Identify the STEP (give number only) in the ASSEMBLY INSTRUCTIONS that represents the following instruction:

"Use the bolt and the washer to install the table base to the table support pole." (2)

1.2.4 What kind of shape is the long part of the support pole? (2)

1.3 | DIAGRAM 4 shows dimensions of the round table Miss Ndoe purchased.

DIAGRAM 4: DIMENSIONS OF ROUND TABLE
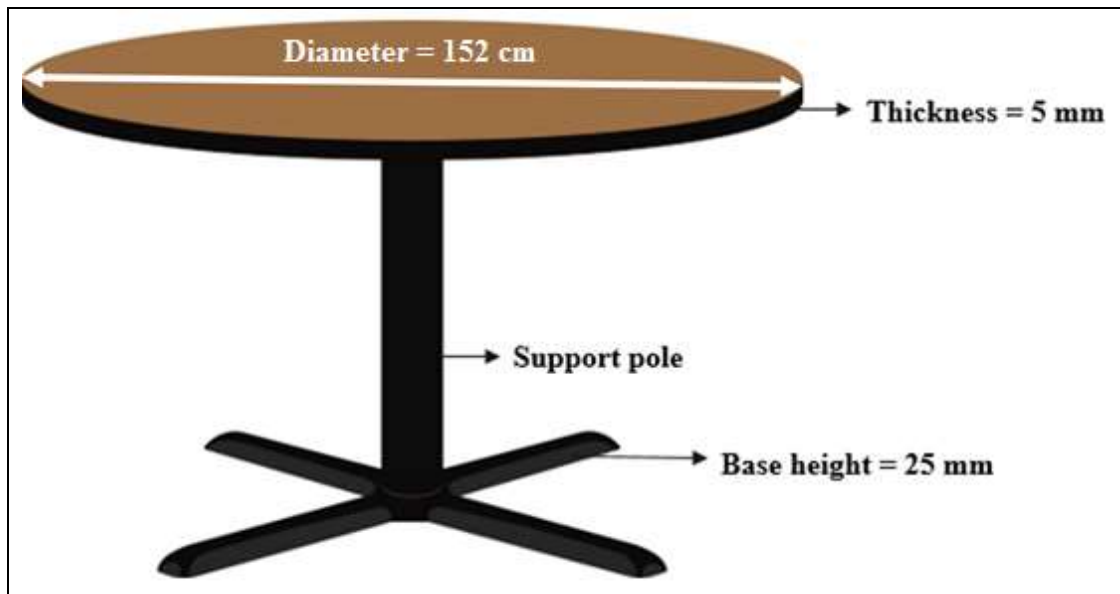
[Source: www.vectorstork.com]

Use information above to answer the questions that follow.

1.3.1   (a) Explain the meaning of the term "radius" (of a circle).   (2)

          (b) Calculate the radius of the tabletop.   (2)

1.3.2   Identify a suitable formula for calculating the area of the tabletop (circle).

        A.   πd

        B.   πr²

        C.   2 π r

        D.   2πr (r + h)   (2)

1.3.3   Calculate the total height (in millimetres) of the table if the height of the support pole and the base is 755 mm.   (2)

1.3.4   Convert your answer in question 1.3.3 to metres.   (2)

1.4 DIAGRAM 5 below shows Miss Ndoe's family home in Witbank, Mpumalanga. The house has one aluminium sliding door on the North elevation and one aluminium door on the West elevation. Each door is fitted with two panels of safety glass. The aluminium sliding door (DIAGRAM 6) is shown alongside the elevation plans.

DIAGRAM 5: ELEVATION PLANS   **DIAGRAM 6**

[Source: www.vectorstork.com]

Use the elevation plans and information above to answer the questions that follow.

1.4.1 Define the term "elevation plan".   (2)

1.4.2 Measure the height (in cm) of the safety glass of the aluminium sliding door in DIAGRAM 6.   (2)

1.4.3 Describe the term used for the space within the perimeter of a two-dimensional flat surface.   (2)

1.4.4 How many windows are shown on the plan's West elevation?   (2)

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QUESTION 2

2.1 | Mr Pretorius and his wife travelled for their holidays with their caravan to Dube Private Game Reserve, near Brits in North-West. They left home on 19 December 2020 at 05:57 and arrived at Dube Private Game Reserve at 10:47.

DUBE PRIVATE GAME RESERVE

[Source: https://www.dubegame.co.za]

TRIP INFORMATION

Vehicle	:	Toyota Legend 50
Fuel consumption	:	12,6 ℓ / 100 km
Fuel tank capacity	:	80 ℓ
Diesel price	:	R14,41 / ℓ
One-way distance to Dube	:	390 km
Distance travelled while at Dube	:	200 km

Use the diagram and the information above to answer the questions that follow.

2.1.1   Give the compass direction of B with reference to A.   (2)

2.1.2   Make use of the given scale to calculate the actual distance (in cm) between the two swimming pools (A and C) if the distance on the diagram is 9 cm.   (2)

2.1.3 How much did Mr Pretorius pay to fill up if the car's tank was empty when they left for the trip? (2)

2.1.4 Calculate the average speed (to the nearest 10 km/h) at which Mr Pretorius drove from home to Dube Private Game Reserve if they stopped for 35 minutes at The Rose to have breakfast.

You may use the formula: **Distance = Speed × Time** (8)

2.1.5 Mr Pretorius stated that he would only have to refill the Toyota once with 50 ℓ of diesel for the return trip and still have some diesel left in the tank on arrival back.

Prove by calculation whether his statement is VALID. (7)

2.2 The couple went through five toll gates. The toll fees at the various toll gates were as follows:

Machadodorp : R96
Middelburg : R64
Diamond Hill : R39
Doornpoort : R15,50
Brits : R15,50

Calculate the total amount they spent on toll fees on their return trip. (3)

2.3 Mr Pretorius' expenditure for the entire trip was 29,6905% less than R20 000 (that they budgeted for).

Calculate the amount they saved on their budgeted amount. (2)

2.4 | The map of North-West on ANNEXURE A shows the last part of the couple's trip to Dube Private Game Reserve.

Use the map on ANNEXURE A to answer the questions that follow.

| 2.4.1 | State the kind of scale that is used on the map. | (2) |

| 2.4.2 | What is the length (in mm) of 8 km on the scale? | (2) |

| 2.4.3 | Explain the meaning of this scale according to the given context. | (2) |

| 2.4.4 | Give ONE reason why this kind of scale does not change when the map is reduced or enlarged. | (2) |

| 2.4.5 | Name another province that is shown on the map. | (2) |

| 2.4.6 | Give the name of a river that flows through Brits. | (2) |

| 2.4.7 | Name the route number of ONE of the roads to Brits after turning off the N4. | (2) |

| 2.4.8 | If you travel on the N4 to Zeerust (from East to West), what is the only town you will drive through? | (2) |

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QUESTION 3

3.1

FACTS ABOUT RIO DE JANEIRO

- Rio de Janeiro has about 917 635 streetlamps, which each use 50 watts (W) of power per hour.
- Rio de Janeiro has 27 807 km of streets and paths.
- Public green spaces and parks make up 0,3% of Rio de Janeiro's total area of 4 945 square kilometres (km^2).
- Rio de Janeiro has 6 429 923 residents.

[Source: www.stanfords.co.uk/rio-de-janeiro]

You may use the following formula.

$$Time = \frac{Distance}{Speed}$$

NOTE: 1 megawatt = 1 000 000 watts

Use the information above to answer the questions that follow.

3.1.1 How many watts of power does all the streetlamps use in an hour? (2)

3.1.2 Convert your answer in question 3.1.1 to megawatts. (2)

3.1.3 Johnny reckoned it will not take more than 870 full days to walk all the streets and paths, assuming you walked at four kilometres an hour for eight hours a day.

Verify whether Johnny is CORRECT.

(5)

3.1.4 How many square kilometres consist of public green spaces and parks in Rio de Janeiro? (2)

3.1.5 Which of the following formulas do you have to use to calculate the approximate area of public green spaces and parks?

A. length × breadth

B. 2(length + breadth)

C. length × breadth × height (2)

3.1.6 Write the number of residents of Rio de Janeiro in words. (2)

3.2 | **STATUE OF CHRIST THE REDEEMER IN RIO DE JANEIRO**

Assuming body is a rectangular prism

- Construction of the statue of Christ the Redeemer started in 1922 and was completed in 1931.
- The height of the statue (without the pedestal) is 30 m.
- The statue sits on a square pedestal (base) with a height and a side length of about 8 m.
- The height of the head is 3,75 m.
- The length of the statue is about 6 m.
- The statue weighs 635 tons, of which the head weighs 30 tons and the arms 80 tons each.

[Adapted from www.britannica.com and www.wonders-of-the-world.net]

You may use the following formulas.

Perimeter of square = side × 4

Volume of rectangular prism = length × width × height

NOTE: 1 m = 3,28084 feet
1 ton = 0,42 m^3

Use the information above to answer the questions that follow.

3.2.1 How many years did it take to complete work on the statue? (2)

3.2.2 (a) Define perimeter. (2)

(b) Calculate the perimeter of the pedestal. (2)

3.2.3 What is the total height (in metre) of the statue (including the pedestal)? (2)

3.2.4 Convert your answer in 3.2.3 to feet. (2)

3.2.5 Calculate the weight (in tons) of the statue without the head and the arms. (3)

3.2.6 Calculate the width of the body of the statue (assuming it is a rectangular prism). Round off your answer to one decimal place. (5)

3.3 Rio de Janeiro hosted the 2014 Soccer World Cup. The final between Argentina and Germany was played at the Maracana Stadium.

The match ended in a draw after 90 minutes. Thereafter two periods extra time of 15 minutes each had to be played. Germany scored the winning goal in the 113th minute.

MARACANA STADIUM, RIO DE JANEIRO

[Source: www.footballtripper.com/brazil/maracana-stadium]

Use the information above to answer the questions that follow.

3.3.1 Calculate the inner circumference of the roof if the diameter is 122 m.

You may use the following formula:

Circumference of a circle = diameter × 3,142   (2)

3.3.2 Annie stated that the outer circumference of the roof is twice the inner circumference.

Verify whether her statement is VALID if the outer circumference is 502,72 m. Show ALL calculations.   (3)

3.3.3 Calculate the total duration of the final match.   (2)

3.3.4 What percentage of the total duration of the final match was extra time?   (2)

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QUESTION 4

Livestock farming is the largest agricultural sector in the Republic of South Africa.

The number of cattle in South Africa increased from 6 million in 1970 to 16 million in 2019.

One cow consumes 3 kg of feed per day for every 100 kg of body weight and needs a maximum of 15 gallons of water per day.

The average weight of a cow in South Africa is 460 kg.

NOTE: 1 pound = 0,453592 kg

[Adapted from www.elsenburg.com and southafrica.co.za]

Use the information above to answer the questions that follow.

4.1.1   Calculate the average weight (in pounds) of a cow.   (2)

4.1.2   Mr Leshole has 150 cows on his farm. He claimed that he needs 755 550 kg of feed per
        year.

        Verify by calculation if his claim is CORRECT.   (5)

4.2 Mr Leshole uses hay to feed his livestock. Hay bales are gathered, covered, and stored indoors.

CYLINDRICAL BALE OF HAY

Curved area

Circular shaped side

Diameter of bale = 0,9144 m

Height of bale = 1,8 m
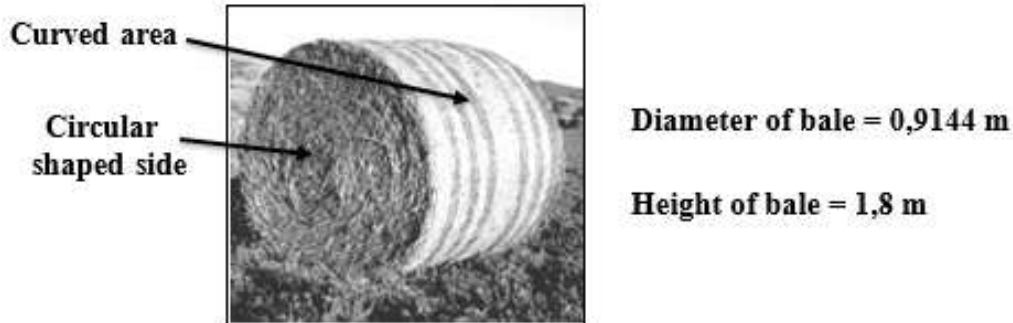
Hay is grass, legumes or other herbaceous plants that have been cut and dried and then stored for use as animal feed.

[Adapted from www.beefmasters.co.za]

You may use the following formulas:

Volume of a cylinder = $\pi r^2 h$

Total surface area of a cylinder = $2 \times \pi \times r\,(r + h)$

where: **r = radius and *h* = height of the cylinder**

Use $\pi = 3,142$

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

4.2.1 Calculate the total number of bales that can be transported on the trailer of the truck. (3)

4.2.2 Determine the total volume (in cubic metres) of the hay bales on the trailer. (4)

4.2.3 To conform to specifications, the percentage of the volume to the surface area of the bales should be less than 20%.

Determine by calculation whether the bales CONFORM to the specifications. (5)

4.3 | The table below gives temperature categories and guidelines for actions to take at different bale temperatures.

TABLE 1: CATEGORIES AND ACTIONS FOR BALE TEMPERATURES

Bale temperatures	Action to be taken
Below 125 °F	No action needed
125 °F to 145 °F	Separate from the rest of the bales to cool off
Above 145 °F	Separate from the rest of the bales and destroy

[Adapted from www.beefmasters.co.za]

The temperature of each bale should be controlled to prevent fermentation (decay due to moisture) and combustion (burning due to dryness).

Mr Leshole measured the temperature of a specific bale and found it to be as shown on the thermometer below. Thereafter he separated the affected bale from the rest and destroyed it.
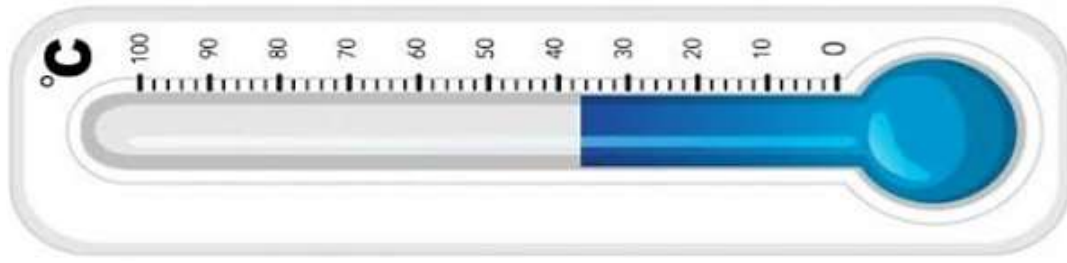
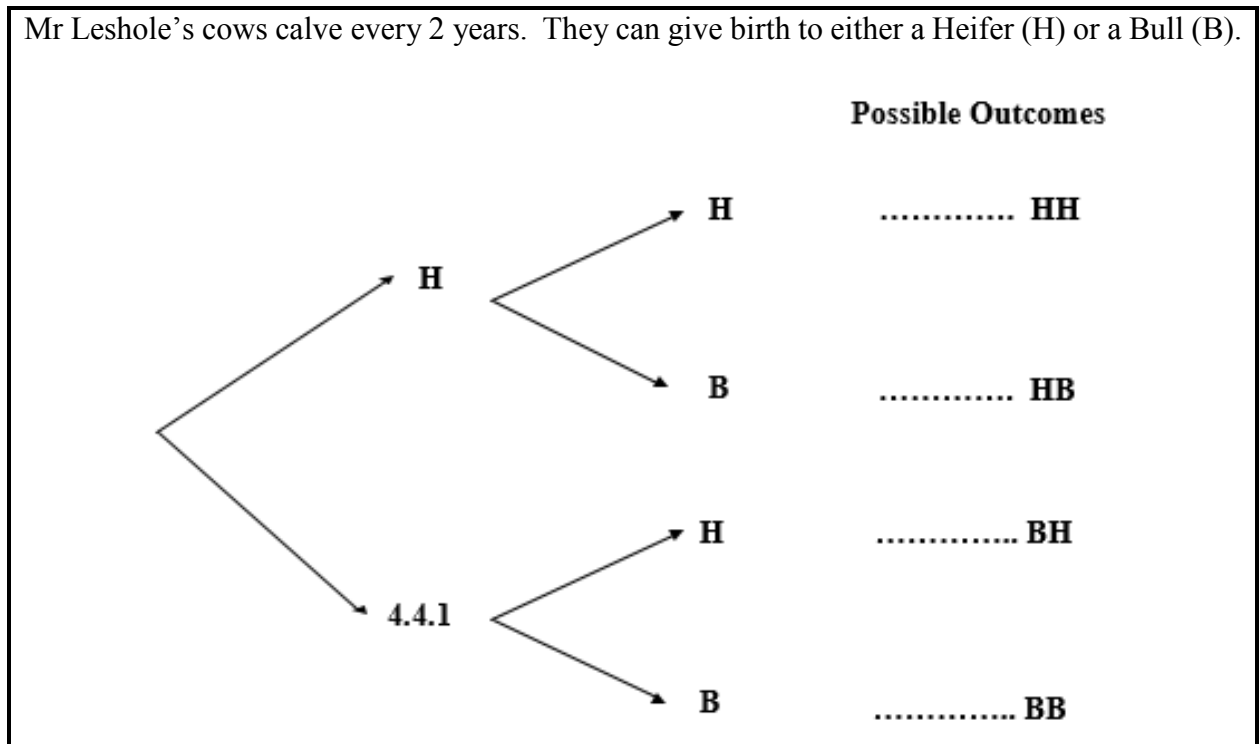Determine, showing ALL the necessary calculations, whether the action that Mr Leshole took, is CORRECT.

You may use the formula:

$$^{\circ}C = (^{\circ}F - 32) \div 1,8$$

(5)

4.4 | Mr Leshole's cows calve every 2 years. They can give birth to either a Heifer (H) or a Bull (B).

Possible Outcomes

Use the tree diagram above to answer the questions that follow.

4.4.1   Complete the tree diagram. Write down the correct letter only.   (2)

4.4.2   Determine the probability (as a simplified common fraction) of a cow giving birth to calves of the same gender.   (2)

4.4.3   Determine the probability (as a decimal fraction) of a cow having at least one heifer.   (2)

4.4.4   The probability of a cow giving birth to a heifer and a bull is 25%. Choose the most suitable letter to describe this probability.

      A. Certain   **B. Most likely**   **C. Less likely**   **D. Impossible**   (2)

4.5   Mr Leshole lives in Grahamstown. He has to deliver bales of hay in Port Elizabeth (now Gqeberha).

Use the scale and the map on ANNEXURE C to determine the distance (to the nearest kilometre) he has to travel.   (4)

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TOTAL   150