education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 12

MARKS: 150

TIME: 3 hours

This question paper consists of 14 pages and 2 annexures.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of SIX questions. Answer ALL the questions.

2.   Part of QUESTION 4 must be answered on the attached ANNEXURE. Write your centre number and examination number in the spaces on the annexures and hand in the annexures with your ANSWER BOOK.

3.   Number the answers correctly according to the numbering system used in this question paper.

4.   An approved calculator (non-programmable and non-graphical) may be used, unless stated otherwise.

5.   ALL the calculations must be clearly shown.

6.   ALL the final answers must be rounded off to TWO decimal places, unless stated otherwise.

7.   Units of measurement must be indicated, where applicable.

8.   Start each question on a NEW page.

9.   Write neatly and legibly.

QUESTION 1

1.1   Do the following calculations. Show ALL the steps.

     1.1.1   Simplify: $5 \times (17 - 3) + \sqrt{121}$ (3)

     1.1.2   Write $\dfrac{33}{125}$ as a decimal fraction.   (1)

     1.1.3   Calculate $7\frac{1}{2}\%$ of R650 000.   (2)

     1.1.4   A season ticket for 15 bus trips costs R110,10. What is the cost per trip?   (2)

     1.1.5   Write the ratio of 2 km to 1 500 m in simplfied form.   (2)

     1.1.6   Convert R10 500 into euros (€). Use the exchange rate R1,00 = €0,11   (2)

1.2   On 24 November 2008, the South African Police Service announced a massive recruitment drive. They stated that they wanted to increase the number of police officers by 55 000 in order to have 190 000 police officers available for the 2010 Soccer World Cup.

     1.2.1   Calculate the number of police officers before the increase.   (2)

     1.2.2   Determine the proposed percentage increase in the number of police officers, rounded off to ONE decimal place.

              Use the formula:

$$\textbf{Percentage increase} = \frac{\textbf{actual increase}}{\textbf{190 000} - \textbf{actual increase}} \times \textbf{100\%}$$

              (4)

1.3   Determine the number of 2,5 m lengths of material that can be cut from a roll of material that is 120 m long.   (2)

1.4   Determine the profit margin if a product that costs R350 is sold for R650.

     Use the formula:

$$\textbf{Profit margin} = \frac{\textbf{selling price} - \textbf{cost price}}{\textbf{selling price}} \times \textbf{100\%}$$

              (4)

1.5   Calculate the total outer surface area of a box with dimensions:
     length = 40 cm, breadth = 30 cm and height = 50 cm.

     Use the formula:

     Total outer surface area = 2 $\times$ (L $\times$ B + L $\times$ H + B $\times$ H)

              (3)

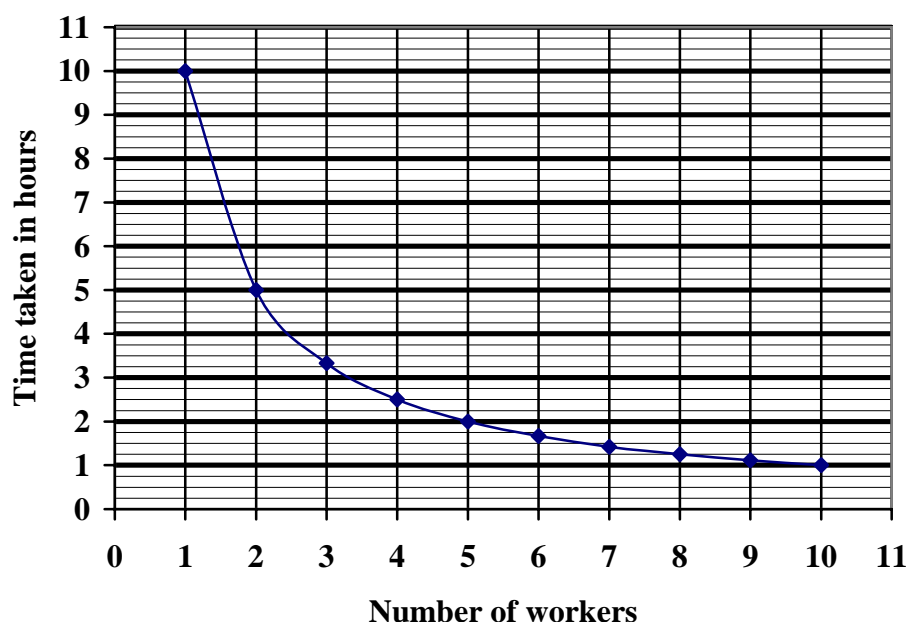   where **L** = length, **B** = breadth and **H** = height

1.6   Mr Petersen's company is awarded the contract to cut the grass at a school sports field. The management of the school warns Mr Petersen that there will be days when the grass will have to be cut within 1 hour due to unexpected sports fixtures.

Mr Petersen draws a graph to help him decide how many workers he needs to send to the school to cut the grass, as well as the lengths of time they would need.

**NUMBER OF WORKERS NEEDED
AGAINST TIME TAKEN**

1.6.1   Exactly how many workers must Mr Petersen send for the grass to be cut within:

(a)   1 hour?   (2)

(b)   2,5 hours?   (2)

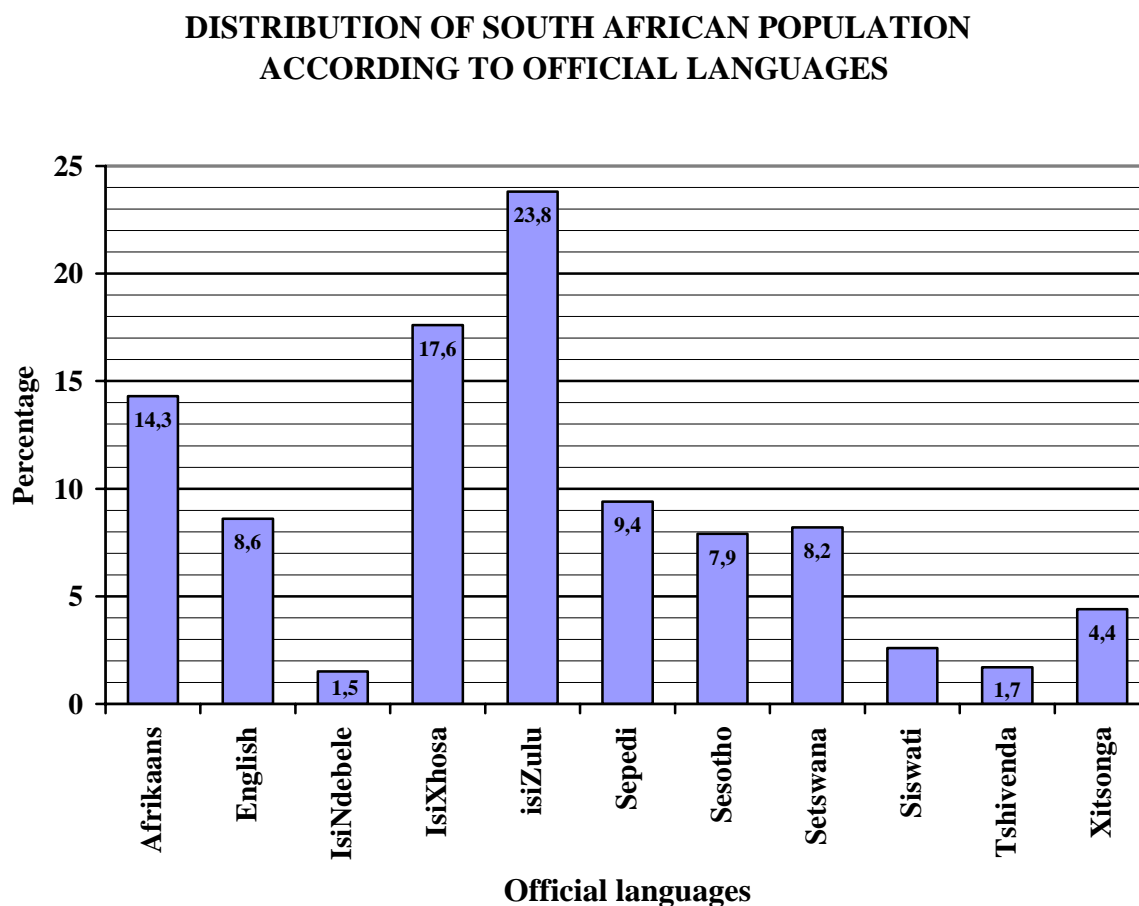1.6.2   How long should it take exactly 8 workers to cut the grass?   (2)

1.6.3   On a particular day it took 5 hours to cut the grass. Suppose the workers started at 08:00 and took two 15-minute tea breaks and a half-hour lunch break. At what time would the workers finish cutting the grass?   (2)

[35]

QUESTION 2

2.1 Mr Le Roux publishes children's books. Initially he published the children's books only in English. He now intends to translate the books into other official South African languages.

The bar graph below shows the percentage distribution of the South African population according to official language groups. The population of South Africa was approximately 47 900 000 in 2009.
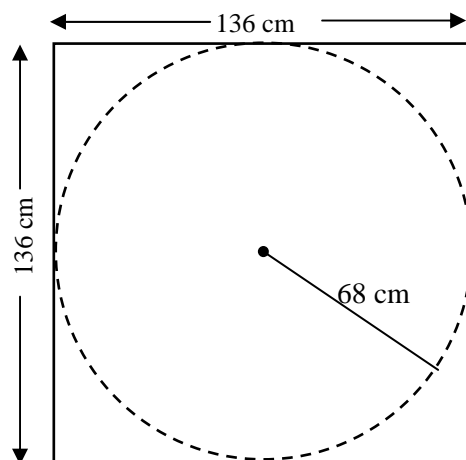
DISTRIBUTION OF SOUTH AFRICAN POPULATION ACCORDING TO OFFICIAL LANGUAGES

2.1.1   Which official language is spoken by the largest percentage of South Africa's population?   (1)

2.1.2   Use the graph to list the official languages that are used by less than 5% of the population.   (2)

2.1.3   What percentage of the population uses Siswati as an official language?   (2)

2.1.4   Calculate the number of South Africans that uses English as an official language.   (3)

2.1.5   Suppose Mr Le Roux decides to print 100 000 copies of a particular book. Use the graph above to calculate how many of these books should be printed in IsiXhosa.   (3)

2.2   A circular glass tabletop is cut from a square piece of glass that is 136 cm by 136 cm, as shown in the picture below.

The length of the radius of the circle is 68 cm.

A flexible aluminium strip is attached to the circular edge of the tabletop to form an edging.

NOTE: Units of measurement must be indicated in this question.

2.2.1   What is the length of the diameter of the table?   (1)

2.2.2   Calculate the perimeter of the square piece of glass.

Use the formula:

Perimeter of square = 4 × length of side   (2)

2.2.3   Calculate the area (in cm²) of the glass tabletop.

Use the formula:

Area of circle = $\pi \times$ (radius)^2 using $\pi = 3{,}14$.   (3)

2.2.4   Calculate the circumference (in cm) of the glass tabletop.

Use the formula:

Circumference of circle = 2 × π × radius using $\pi = 3{,}14$.   (2)

2.2.5   The aluminium strip costs 54c per cm. Calculate the cost in rands for 425 cm of edging.   (3)

2.2.6   If the volume of the glass top is 7 259,68 cm³ and the density of glass is 2,5 g/cm³, calculate the mass in grams of the glass top.

Use the formula:

Mass = volume × density   (3)

[25]

QUESTION 3

3.1 Cholera is a bacterial infection caused by drinking contaminated water containing the *Vibrio cholerae* bacteria. In 2005 there was a serious cholera outbreak in West Africa.

The table below shows the number of cases of cholera reported in 8 countries in West Africa, as well as the number of cholera-related deaths.

TABLE 1: Cholera outbreak in West Africa in 2005

Country	Number of cholera cases recorded	Number of cholera-related deaths
Guinea-Bissau	14 303	252
Senegal	23 325	303
Burkina Faso	615	9
Guinea	1 956	9
Benin	210	4
Mali	158	20
Mauritania	2 640	55
Niger	72	9
TOTAL	**43 279**	**661**

3.1.1 Which country recorded the following:

(a) The highest number of cholera cases (1)

(b) The fifth lowest number of cholera-related deaths (2)

3.1.2 How many of the West African countries had less than 10 cholera-related deaths? (1)

3.1.3 Write down the ratio (in simplified form) of the number of cholera cases to the number of cholera-related deaths in Niger. (2)

3.1.4 What percentage of the total number of cholera cases in West Africa resulted in death? Give the answer rounded off to TWO decimal places. (3)
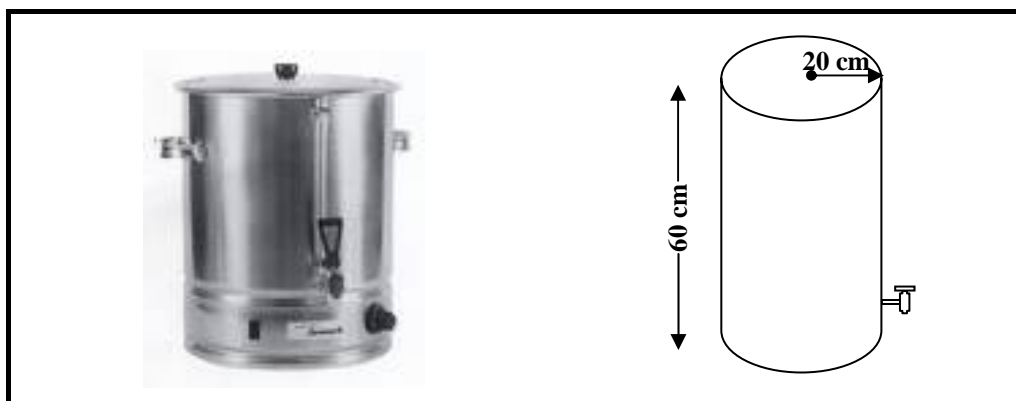
3.2 | Contaminated water can be made safe by adding Jik or some other bleach to the water and leaving the mixture to stand for at least two hours before use. One teaspoon of Jik can be added to 25 litres of water, or 5 drops of Jik can be added to 1 litre of water. The drinking water can then be stored in sealed water containers with taps.

3.2.1   Convert 5 litres to cm³ if 1 litre = 1 000 cm³. (1)

3.2.2   How many drops of Jik need to be added to 16 ℓ of water? (2)

3.2.3   Some countries measure capacity in gallons.
Convert 5 litres to gallons if 1 gallon = 3,8 litres.
Give the answer rounded off to ONE decimal place. (3)

3.2.4   Lebo purchased a cylindrical water container to store her treated drinking water.
The height of the container is 60 cm and the radius is 20 cm, as shown below.

Calculate the volume of the water container.

Use the formula:

Volume of cylinder = $\pi \times$ (radius)$^2 \times$ height using π = **3,14**. (3)

3.3 | A person suffering from cholera may become dehydrated through loss of water from the body. A special rehydration mixture can be made at home to prevent someone from becoming dehydrated.

Rehydration Mixture:
Take 1 litre of clean water, 8 level teaspoons of sugar and half a level teaspoon of salt. Mix all together.

3.3.1   Write down the ratio (in simplified form) of the sugar to the salt in the rehydration mixture. (2)

3.3.2   How much salt will you need when preparing 6 litres of the rehydration mixture? (2)

[22]

QUESTION 4

4.1 | Two small companies, Lithe Fitters, a cupboard-making company, and Mango Computech, a computer company, compared the number of days sick leave taken by the employees of their respective companies in 2008.

Lithe Fitters employed 12 workers who took the following number of days sick leave:

| 1 | 2 | 3 | 3 | 8 | 8 |
| 8 | 8 | 9 | 9 | 10 | 10 |

Mango Computech employed 12 workers who took the following number of days sick leave:

| 0 | 0 | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 8 | 10 |

4.1.1   Determine the modal number of days sick leave taken by the employees of Lithe Fitters. (1)

4.1.2   Determine the range of the number of days sick leave taken by the employees of Mango Computech. (2)

4.1.3   Determine the median number of days sick leave taken by the employees of Mango Computech. (2)

4.1.4   Calculate the mean (average) number of days sick leave for the employees of Mango Computech. Round the answer off to the nearest whole number. (3)

4.1.5   What is the ratio (in simplified form) of the employees of Lithe Fitters who took less than 4 days sick leave to the employees who took more than 4 days sick leave? (3)

4.2 | Each of the two companies employs a general assistant.
|
| Mango Computech's general assistant earns R300 per day. If, however, she is at work for less than 1 hour on a particular day, then she earns no salary for that day.
|
| The general assistant of Lithe Fitters earns a basic daily wage of R100 plus an additional R30 for each hour worked.

4.2.1   The formula used to calculate the daily wage of the general assistant of Lithe Fitters is:

Daily wage = R100   +   R30 × number of hours worked

TABLE 2: Wages earned by the two general assistants

Number of hours worked	0	1	4	**C**	7	8
Wages earned at Mango Computech (in rand)	0	310	310	310	310	310
Wages earned at Lithe Fitters (in rand)	**A**	130	**B**	280	310	340

Calculate the following missing values from the table:

(a)   **A**   (1)

(b)   **B**   (2)

(c)   **C**   (2)

4.2.2   A graph showing the daily wages earned by Mango Computech's general assistant is shown on ANNEXURE A.

On the same set of axes, draw a labelled graph to illustrate the daily wages earned by the Lithe Fitters' general assistant.   (4)

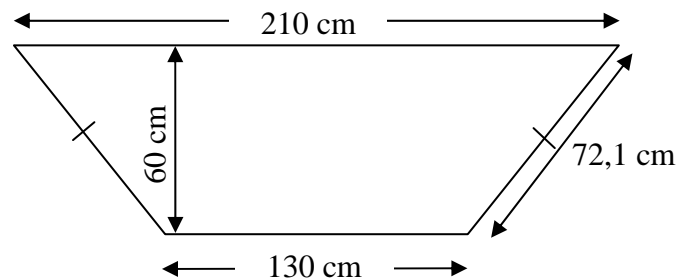4.2.3   Use the graphs drawn on ANNEXURE A or the information in TABLE 2 to answer the following questions:

(a)   How many hours should both assistants work to earn an equal amount on a particular day?   (1)

(b)   Which company's general assistant earned more if both worked for 8 hours on a particular day?   (1)

(c)   Calculate the difference in daily wages if the two general assistants worked for 1 hour on a particular day.   (2)

4.3 | Lithe Fitters were requested by a customer to manufacture a table with the top in the shape of a trapezium, as shown below.

The lengths of the parallel sides of the top of the table are 210 cm and 130 cm. The perpendicular distance between the parallel sides of the top of the table is 60 cm. The slant edges of the top of the table are each 72,1 cm long.

4.3.1 Calculate the area of the top surface of the table.

Use the formula:

Area of trapezium (4)
$= \frac{1}{2} \times$ **(perpendicular distance)** $\times$ **(sum of the lengths of the parallel sides)**

4.3.2 A decorative edging is to be glued around the edge of the table.

Calculate the length of the decorative edging needed. (2)

[30]

QUESTION 5

5.1   Mrs Mazibuko is the deputy principal of Injoloba High School in KwaMevana which is in the Howick area in KwaZulu-Natal. She lives at 4 Memory Place. Her husband is a medical doctor at the Howick Medi-Clinic. Use the map of the area on ANNEXURE B to answer the following questions:

       5.1.1   Write down the grid reference for Injoloba High School.   (1)

       5.1.2   Describe the relative position of Howick High School from Injoloba High School.   (2)

       5.1.3   The athletics coaches of Injoloba High School and Howick High School are organising a fun run for their learners, parents and the community which will start at Injoloba High School and will finish at Howick High School.

              Describe a possible route for the fun run if traffic officials declare that Main Rd must not be used.   (4)

       5.1.4   Use a ruler to determine the length (in mm) of the shortest distance on the map from Howick High School to Injoloba High School.   (2)

       5.1.5   Every morning, Mrs Mazibuko drops her husband at the Medi-Clinic and then drives to school. Driving at an average speed of 45 km/h, she completes the single trip in one tenth of an hour.

              Calculate the distance Mrs Mazibuko covers on this single daily trip.

              Use the formula:

              Distance = average speed $\times$ time   (3)

5.2 Every year, Injoloba High School runs a soccer tournament for the learners. The teams in the tournament are named after cats.

TABLE 3 shows the number of points obtained by the six soccer teams after playing **some** games in the school tournament. Each team plays against the five other teams only once. Teams are awarded 3 points for a win (W), 1 point for a draw (D) and 0 points for a loss (L).

The formula used to work out the final points scored is:

Total points scored = 3 × W + D

TABLE 3: Log for the school soccer tournament after some games played

Teams	Number of games played	W	D	L	Total points
Tigers	5	3	2	0	11
Leopards	4	2	1	1	7
Cheetahs	**A**	1	1	3	4
Lions	5	1	2	2	5
Pumas	5	0	2	3	**B**
Panthers	4	2	2	0	8

5.2.1 Calculate the following missing values:

(a) **A**   (1)

(b) **B**   (2)

5.2.2 The Leopards and the Panthers played against each other and the match ended in a draw.

Calculate the total points of:

(a) The Leopards   (2)

(b) The Panthers   (2)

5.3 Mrs Schultz sells sweets at the tournament. After one of the soccer games she had one packet of sweets left over and she decided to give these sweets away for free. The packet contains 144 sweets, made up of 44 strawberry-flavoured sweets, 38 orange-flavoured sweets, 30 apple-flavoured sweets and 32 grape-flavoured sweets. Learners were invited to randomly select a sweet from the packet.

Determine the probability (in simplified form) that the first learner will choose the following:

5.3.1 A strawberry-flavoured sweet   (3)

5.3.2 A pear-flavoured sweet   (1)

[23]

QUESTION 6

In February 2007, a large-scale community survey was conducted in all nine provinces in South Africa. The table below shows the results of the survey, showing the number of people using electricity for lighting and having access to tap water in each province and in South Africa.

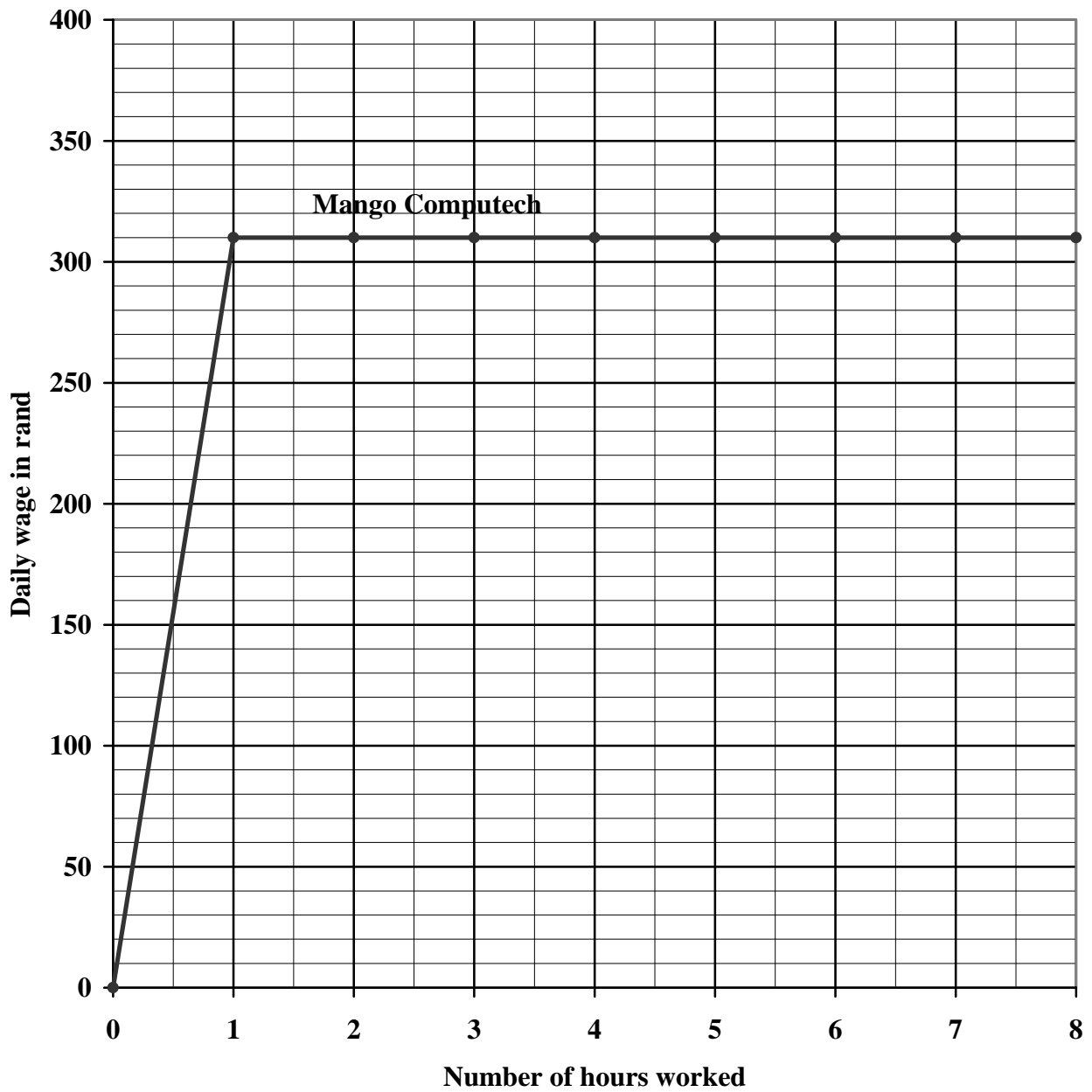**TABLE 4: Access to electricity and tap water in South Africa**

PROVINCE	Total population	Number of people using electricity for lighting	% using electricity for lighting	Number of people having access to piped water	% having access to piped water
Free State	2 773 059	2 401 469	86,6	2 703 733	97,5
Gauteng	10 451 713	C	83,5	10 232 227	97,9
Northern Cape	1 058 060	923 686	87,3	1 003 041	94,8
Eastern Cape	6 527 747	4 275 674	65,5	4 595 534	70,4
North West	3 271 948	2 692 813	82,3	2 941 481	89,9
KwaZulu-Natal	10 259 230	7 335 349	71,5	8 145 829	D
Limpopo	5 238 286	4 243 012	81,0	4 379 207	83,6
Mpumalanga	3 643 435	2 976 686	81,7	3 345 526	91,3
Western Cape	5 278 585	4 993 541	94,6	5 215 242	98,8
SOUTH AFRICA	48 502 063	38 569 410	B	A	87,8

6.1   What does the missing value **C** in the table above represent?   (2)

6.2   Calculate the following missing values: (Give each answer rounded off to the nearest unit.)

      6.2.1   **A**   (2)

      6.2.2   **B**   (3)

      6.2.3   **C**   (3)

      6.2.4   **D**   (3)

6.3   In which province is both the percentage use of electricity for lighting, as well as the percentage access to tap water the smallest?   (2)

[15]

TOTAL: 150

CENTRE NUMBER								

EXAMINATION NUMBER												

ANNEXURE A

QUESTIONS 4.2.2 AND 4.2.3

DAILY WAGES EARNED BY THE TWO GENERAL ASSISTANTS

ANNEXURE B

QUESTION 5.1

MAP OF THE HOWICK AREA IN KWAZULU-NATAL

Entrance of Howick High School

Howick Medi-Clinic

Mrs Mazibuko's house

Entrance of Injoloba High School