



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

**MATHEMATICAL LITERACY
(Second Paper)
NQF LEVEL 3**

(10401023)

**6 November 2019 (X-Paper)
09:00–12:00**

Nonprogrammable calculators may be used.

This question paper consists of 11 pages.

TIME: 3 HOURS
MARKS: 150


INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
 2. Read All the questions carefully.
 3. Number the answers according to the numbering system used in this question paper.
 4. Start each question on a NEW page.
 5. Clearly show ALL calculations.
 6. Round off your answers correctly according to the given context. In all other cases, where the context is not specific, round off your answers correctly to two decimal places.
 7. Indicate units of measurement where applicable.
 8. Diagrams are NOT necessarily drawn to scale.
 9. Write neatly and legibly.
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QUESTION 1

1.1 Anna runs a small business after work and during weekends. She makes and sells cone-shaped party hats and triangular-shaped place mats in her small business. The height of the triangle is 250 millimetres and $BD = DC$. The area of the triangle ABC is $37\,500\text{ mm}^2$. Use the formulae, information and the diagram below to answer the questions that follow:



Area = $\frac{1}{2} \times \text{base} \times \text{height}$ 

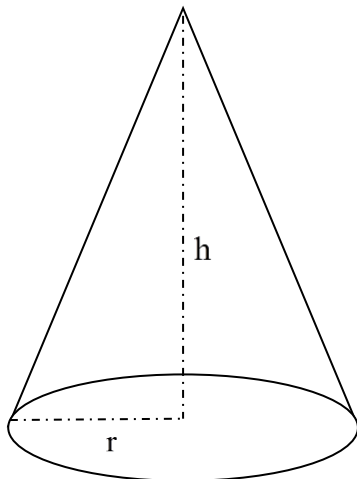
$AC^2 = AD^2 + DC^2$ (Pythagoras theorem)

Volume = $\frac{1}{3} \pi r^2 h$, where $\pi = 3,14$

Surface area = $\pi r \sqrt{r^2 + h^2}$, where $\pi = 3,14$

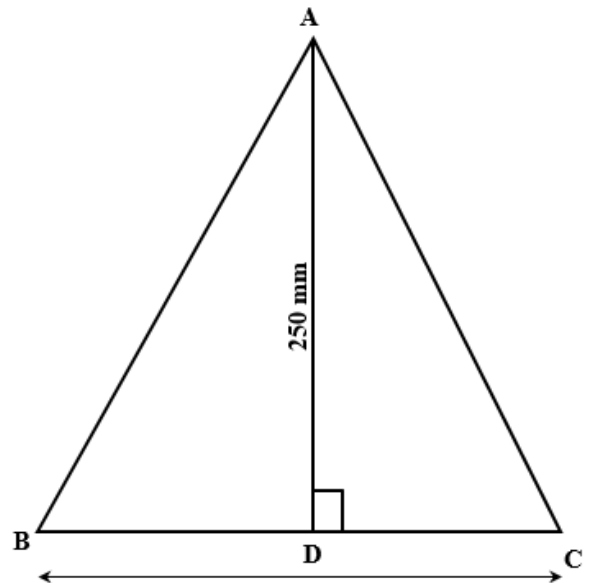
The cone-shaped hat has the following dimensions:

Diameter = 18 cm and,
Height = 24 cm




The place mat has the following dimensions:

Area Δ (triangle) ABC = $37\,500\text{ mm}^2$ 
AD = 250 mm
BD = DC




Study the above information and answer the following questions.

1.1.1 Calculate the volume of the party hat.  (6)

1.1.2 Calculate the surface area of the party hat. (5)

1.1.3 The area of the triangle ABC is $37\,500\text{ mm}^2$.

Show by calculations that $BC = 300\text{ mm}$.  (4)

1.1.4 If $BD = DC$

Calculate the length of DC in mm.



(1)

1.1.5 Use Pythagoras to calculate AC, the hypotenuse of triangle ADC. Round off the answer to the nearest millimetre.

(5)

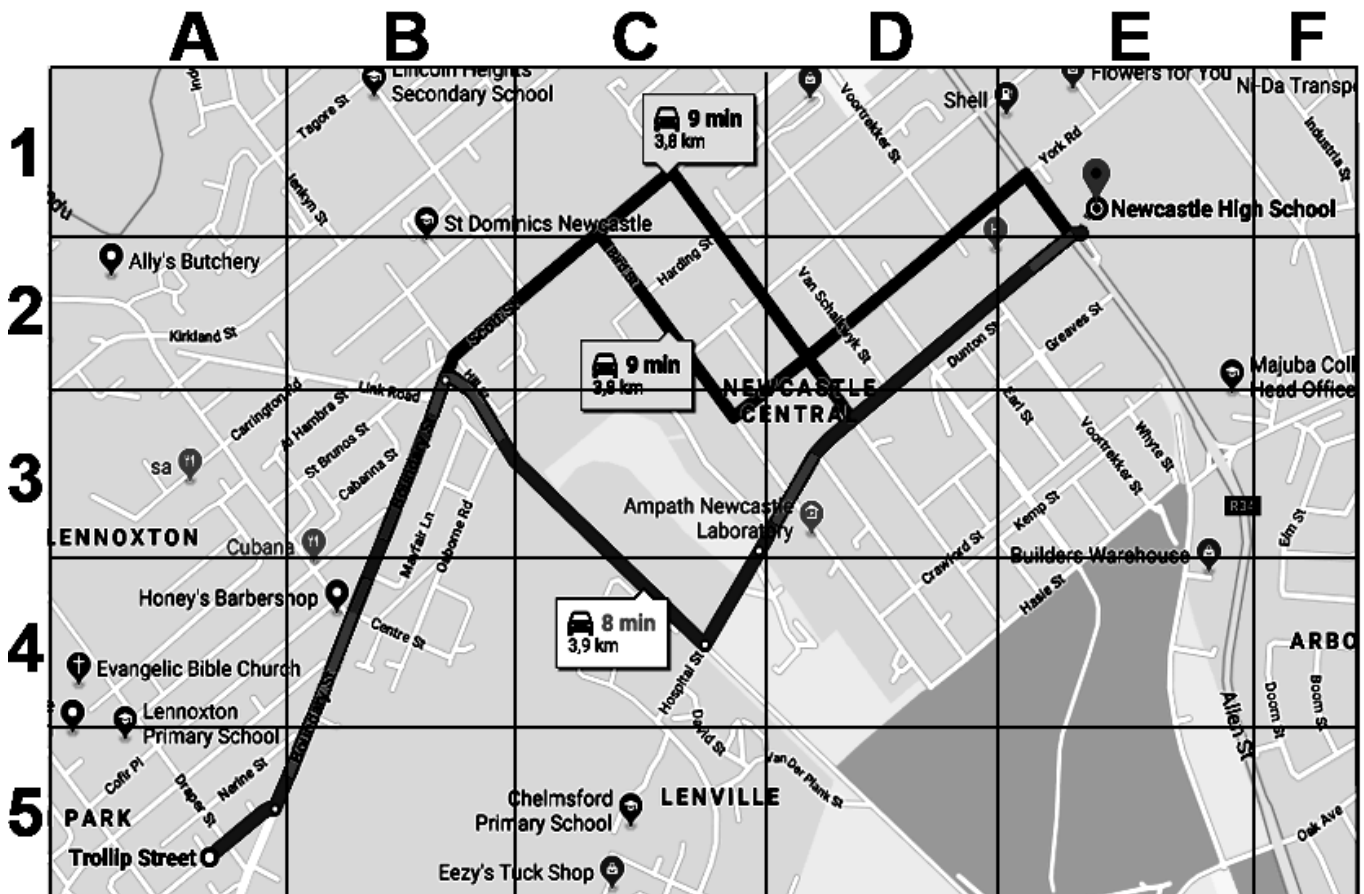
1.1.6 Anna stitches decorative edging on the placemats. Calculate the total length of the edging in metres.

1 000 mm = 1 m



(5)

1.2 Anna lives in Trollip Street and she must deliver an order of muffins to Newcastle High School. Consider the Google map below to answer the questions that follow:



[Source: Google maps: <https://www.google.co.za/maps>]

1.2.1 What are the grid references for Trollip Street and Newcastle High School?

(2)

1.2.2 Name TWO streets that Anna will drive on to get to Newcastle High School in the quickest time.



(2)

1.2.3 Use your ruler to measure the straight line distance between Trollip Street and Newcastle High School. Write down your answer in mm.

(2)

- 1.2.4 The scale on the map is 1:20 000 and the actual distance between Trollip Street and Newcastle High is 3,9 km via the fastest route.

Use the scale on the map to determine the map distance between Trollip Street and Newcastle High School. Write down your answer in mm. (4)

- 1.2.5 The distance from Trollip Street to Newcastle High School via the quickest route indicated on the map is 3,9 km and the estimated time that Anna will take to get to Newcastle High is 8 minutes. Calculate the speed Anna must travel.

$$\text{Formula: Speed (km/h)} = \frac{\text{Distance (km)}}{\text{Time (hours)}}$$



(4)
[40]

QUESTION 2

- 2.1 Anna works for ABC Electronics. She receives a job offer from Magic Electronics. The salary packages for both companies are presented below:

ABC ELECTRONICS	
Employee name: Anna de Beer	
Payment period: 1 June to 30 June 2019	
Monthly payment	
Gross salary	20 000
Overtime pay	2 500
Total payment	22 500
Benefits from company	
Medical aid allowance	2 130
Retirement fund allowance	5% of gross salary
Travel allowance	2 850
Total benefits	5 980
Deductions	
Medical aid contribution from employee	1 370
Retirement fund contribution from employee	1 250
Tax amount	3 699,25
Total deductions	6 319,25
Total amount payable to employee	16 180,75





MAGIC ELECTRONICS

Offer:

- Total package of R29 000 per month CTC.




Study the above salary packages to answer the questions.

- 2.1.1 The abbreviation CTC stands for 'cost to company'. What does cost to company mean?  (2)
- 2.1.2 Calculate the tax amount (PAYE) Anna would pay if she worked at Magic Electronics at a tax rate of 19% of the total package. (3)
- 2.1.3 Calculate the amount that ABC Electronics contributes to Anna's retirement fund each month. (3)
- 2.1.4 What is the total monthly cost of Anna's medical aid at ABC Electronics? (3)
- 2.1.5 What is the total monthly cost of Anna's retirement fund at ABC Electronics?  (2)
- 2.1.6 Explain why it is advisable for Anna to remain with ABC electronics. (2)

2.2 Anna also makes and sells muffins in her small business. Below, is the recipe Anna uses to bake 12 muffins. It includes the costs of making the muffins:

<ul style="list-style-type: none"> • 500 g muffin mix at R12,00 per kg • 1 large egg at R10,50 for ½ dozen • ½ cup oil (125 ml) at R12,50 per 750 ml • 1 ½ cups of milk (375 ml) at R11,50 per litre  <p>Preheat the oven to 180 °C and then bake for 25 minutes.</p>	
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Study the above recipe and costs to answer the questions.

- 2.2.1 Name TWO other expenses in addition to the cost of the ingredients that Anna will have when making these muffins. (2)
- 2.2.2 Calculate the total amount, in rands, she will spend on ingredients for making 24 muffins?  (10)
- 2.2.3 Anna sells the muffins at R30 per dozen. If Anna sells 1 200 muffins, determine whether she would make a profit of more than R1 000. (6)
- Consider only the costs of the ingredients.

2.2.4 Anna uses an oven that can bake 24 muffins at a time. The baking time for 24 muffins is 25 minutes.

Anna has an order for 240 muffins. The customer will pick up the muffins at 16:00. She starts baking at 9:00. Anna allows 10 minutes for cleaning and refilling the pans after each batch of muffins, including cleaning up after the last batch.

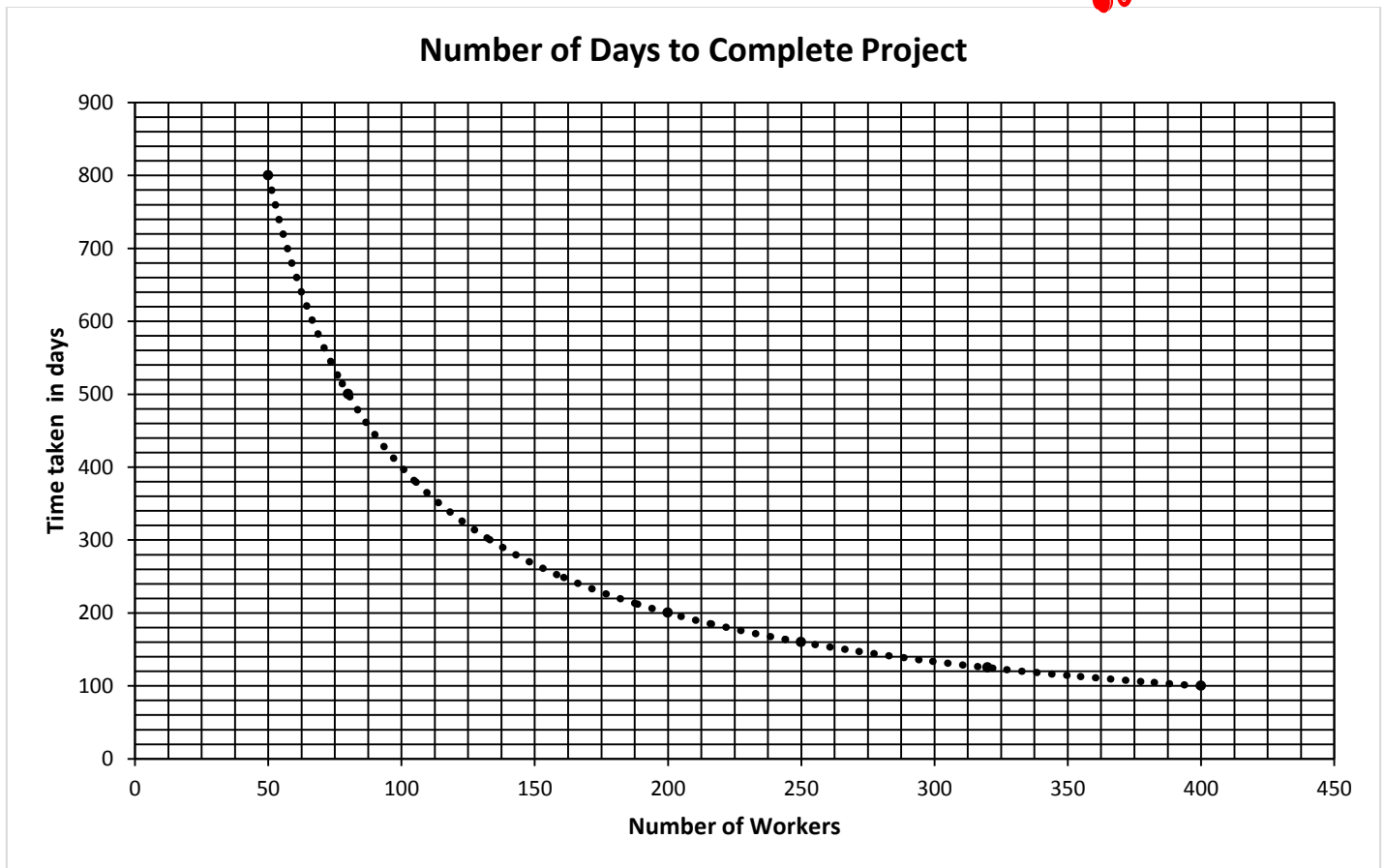


Determine whether the muffins will be ready on time.

(7)
[40]

QUESTION 3


3.1 The company Anna works for, ABC Electronics, are involved in a building project. The graph below shows the number of days it will take to complete the project based on the number of workers that are available:



Study the above graph to answer the questions.


- 3.1.1 Determine the constant value in the relationship between the number of workers and the time taken in days. (2)
- 3.1.2 Why is the above graph drawn as a dotted line (broken-line graph)? (2)
- 3.1.3 Name the dependent and independent variable in the above graph. (2)
- 3.1.4 How many workers are needed to complete the project in 100 days? (2)

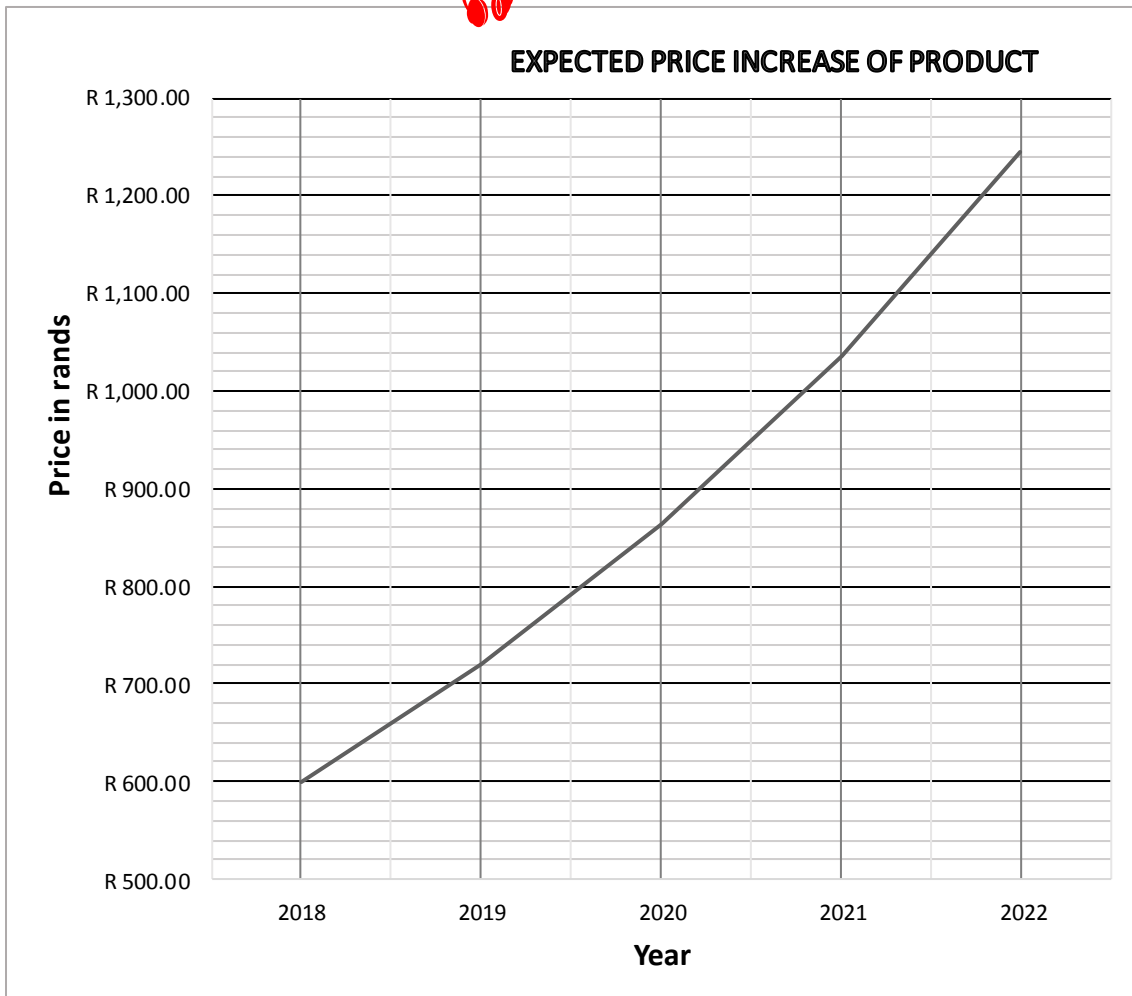
3.1.5 How many days will 125 workers take to complete the project? (3)

3.2 Three of Anna’s employees use a metered taxi to work. The metered taxi charges each passenger a flat rate of R25 plus R7 for every km travelled. 


3.2.1 Derive a formula that represents the taxi fare. (3)

3.2.2 If the 3 employees used the taxi to travel 12 kilometres, Calculate the total taxi fare. (4)

3.3 The graph below shows how the cost price of a product, Anna uses in her business is expected to increase in the next few years. 

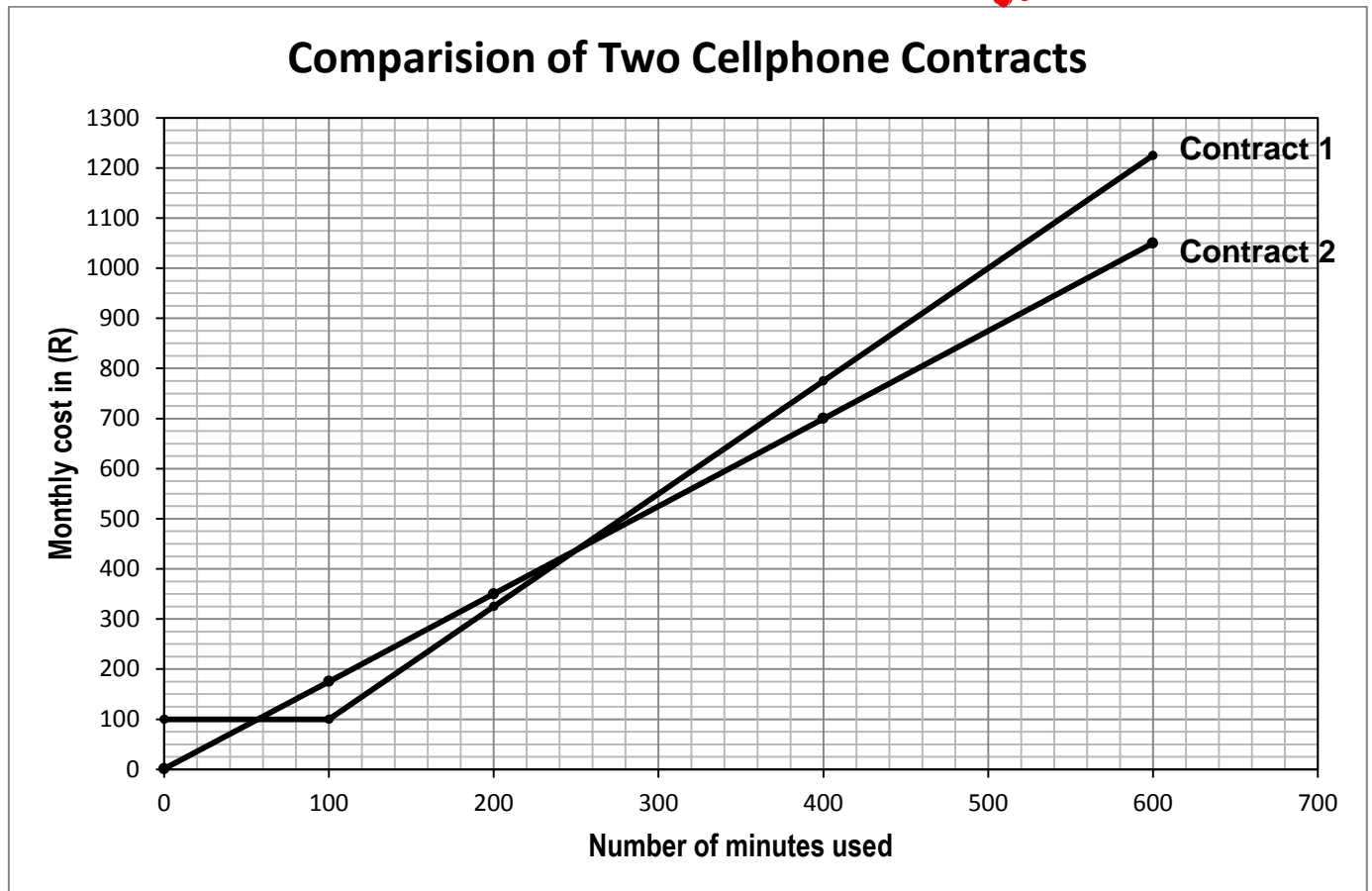


Use the above graph to answer the questions.

3.3.1 What is the current price of the product?  (1)

3.3.2 Calculate the percentage increase in the cost price of the product between 2019 and 2022. (4)

3.4 Anna wants to take a cellphone contract. The graphs below represent two cellphone contracts:



Use the above graphs to answer the questions.

3.4.1 Which contract is an example of direct proportion? Give a reason for your answer. (2)

3.4.2 How many free minutes does Contract 1 offer? (1)

3.4.3 After how many minutes of talk time will the monthly cost of Contract 1 and Contract 2 be the same? (2)

3.4.4 The formula below, represents the monthly cost of Contract 1:
 Total monthly cost = R _____ + (total minutes of call time - _____) × _____

Fill in the three missing values to complete the formula. (3)

3.4.5 Anna's average talk time per month is 400 minutes.

Which contract would be a cheaper option for Anna? Substantiate your answer by calculating the amount she will save per month. (4)

[35]

QUESTION 4

4.1 Anna’s sister caters for small private functions. She offers two basic menus for each function, a vegetarian menu and meat menu. The number of guests who chose each menu for the last eight functions is shown in the table below:

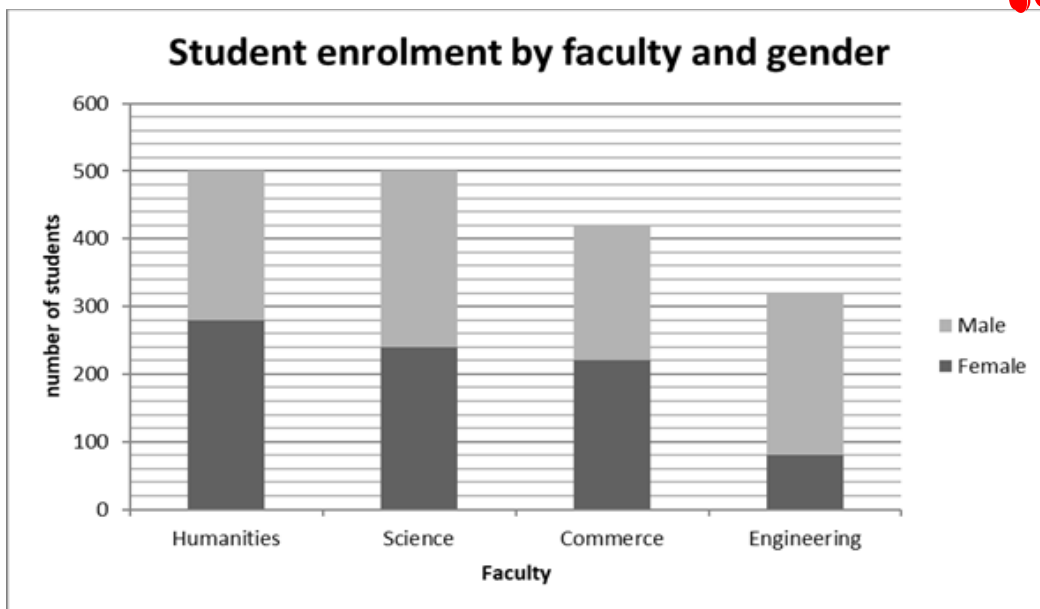
Vegetarian Menu	Meat Menu
2	20
6	19
4	21
12	13
6	21
9	11
12	10
5	21



4.1.1 Which value represents the mode of guests who chose the meat menu option? (1)

4.1.2 Determine the difference between the median of the number of times the meat dish was chosen and the median of the number of times the vegetarian dish was chosen. (6)

4.2 Anna wants to enrol her son at a university in 2020. The bar chart below shows the enrolment of students in different faculties at that university in 2019.





Use the above graph to answer the questions.

4.2.1 How many females were enrolled in 2019? (3)



4.2.2 Calculate the total number of students that were enrolled in 2019. (2)

4.2.3 Which faculty enrolled the most males? (1)

- 4.2.4 Calculate the number of males that enrolled in the Commerce faculty (3)
- 4.2.5 Determine the difference between the mean value of the number of male students enrolled and the mean value of the number of female students enrolled.  (6)
- 4.2.6 The university's enrolments in 2019, based on gender, are skewed. Give one example on how this university could improve on their recruitment process in 2020. (2)

- 4.3 A random selection of customers, who were buying bottled water at a supermarket near Anna's home, was asked if they preferred sparkling water or still water. The results are shown in the following table: 

	SPARKLING WATER	STILL WATER	TOTAL
Aged 10 to 20	60	10	70
Aged over 20	10	A	40
TOTAL	B	40	110

- 4.3.1 Calculate the missing values of **A** and **B**. (2)
- 4.3.2 What is the probability that a person chosen at random from this sample will prefer still water? Give the answer as a percentage.  (3)
- 4.3.3 If 1 200 customers were buying water, how many of them are expected to buy still water? (3)
- 4.3.4 What is the probability that a person chosen will be under 20 years old and prefer sparkling water? Give the answer as a fraction in its simplest form.  (3)

[35]

TOTAL: 150