

CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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Paper 4 (Extended)

October/November 2024

2 hours 30 minutes

Marks: 130

Candidates answer on the Question Paper.

Additional Materials: Electronic Calculator
Geometrical Instruments
Tracing Paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your name, centre number and candidate number in the relevant spaces provided at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.

Electronic calculators should be used.

If the degree of accuracy is not specified in a question, you should assume that the data in the table and any calculation are given correct to 3 significant figures. If you round an answer for a question and your answer is wrong, you should have sufficient accuracy to be given credit if it is within 1% of the exact answer.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place. For π , use either your calculator value or 3.142.

For π , use either your calculator value or 3.142.

The number of marks is given in brackets [] at the end of each question or part question.

This document consists of **19** printed pages and **1** blank page.



- 1 (a) Evaluate $\frac{-6 - \sqrt{24}}{3}$.

..... [2]

- (b) A rectangular land measures 420 m by 360 m correct to the nearest 10 m.

- (i) Calculate the largest possible perimeter of the land.

.....m [2]

- (ii) The 420 m by 360 m land is subdivided into equal square sites for housing.

Find the number of the largest square sites that could be made.

..... [2]

- (c) A container has 212 cm³ of water.

The water leaks out at the rate of 6 cm³ per minute.

Calculate the time, in **seconds**, needed for the container to be empty.

.....sec [3]

2 (a) Simplify.

(i) $\frac{2^x \times 2^{x+2}}{\sqrt{16}}$

.....[2]

(ii) $(-xy^{-1})^3 \div \frac{1}{3}x^3y^{-4}$

.....[2]

(b) Factorise fully.

(i) $3r^2t - 27ty^2$

.....[2]

(ii) $ab - 2ac + bd - 2cd$

.....[2]

3 Pule and Thabelo work in a company.

- (a)** In 2020, Thabelo's salary was M16 500.
He paid tax of 30% on his salary.

Calculate the amount he paid for tax.

M..... [2]

- (b)** Pule's salary was M20 088 in 2022.
This was an increase of 8% on his salary in 2021.

Calculate his salary in 2021.

M..... [3]

- (c)** Thabelo and Pule contributed some money in the ratio 7 : 11.
Pule's contribution was M300 more than Thabelo's contribution.

Calculate the total amount they contributed.

M..... [3]

- (d) Pule invested the same amount of money P , in option **A** and option **B** at the same time as follows:

In option **A**, for 4 years at 4% simple interest per annum.

In option **B**, for 3 years at 5% compound interest per annum.

At the end, simple interest exceeded the compound interest by M57.

Calculate the amount of money P , Pule invested in each option.

M..... [4]

- 4 (a) Two sections, A and B, of a company record the number of pens and markers produced in a week.

Section A recorded 40 pens and 25 markers.

Section B recorded 44 pens and 28 markers.

The matrix **R** shows weekly records of pens and markers produced.

$$\mathbf{R} = \begin{pmatrix} 40 & 25 \\ 44 & 28 \end{pmatrix}$$

- (i) The pens and markers are sold for M6.50 and M9.50 respectively.

Write a column matrix **C** to represent the cost of the pens and markers.

..... [1]

- (ii) Evaluate **RC**.

..... [2]

- (iii) Explain the meaning of **RC**.

.....
 [1]

5 A number sequence is given by 7, 13, 23, 37, 55, ...

(a) Find

(i) the next two terms of the sequence,

..... [2]

(ii) the n th term of the sequence.

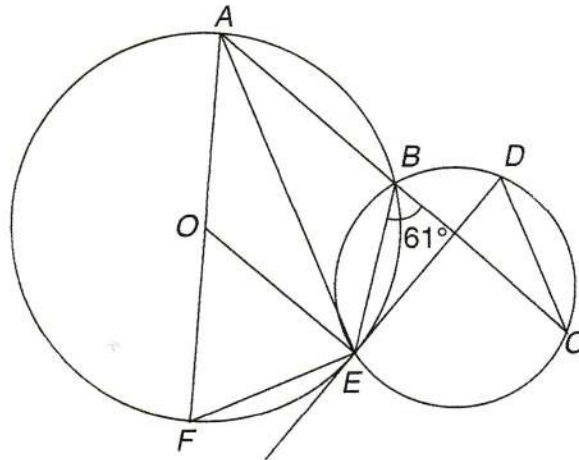
..... [3]

(b) The n th term of another sequence is $2n^2 - 7n + 54$.

Find the value of n for which this sequence and the one in (a) (ii) have the same term.

$n =$ [2]

- 6 In the diagram, ABC is a straight line and AOF is a diameter of the circle with the centre O . DE is a tangent to the bigger circle at E and angle $CBE = 61^\circ$.



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(a) Find

(i) the size of angle AFE ,

..... $^\circ$ [2]

(ii) the size of angle AOE ,

..... $^\circ$ [2]

(iii) the size of angle AEO ,

..... $^\circ$ [1]

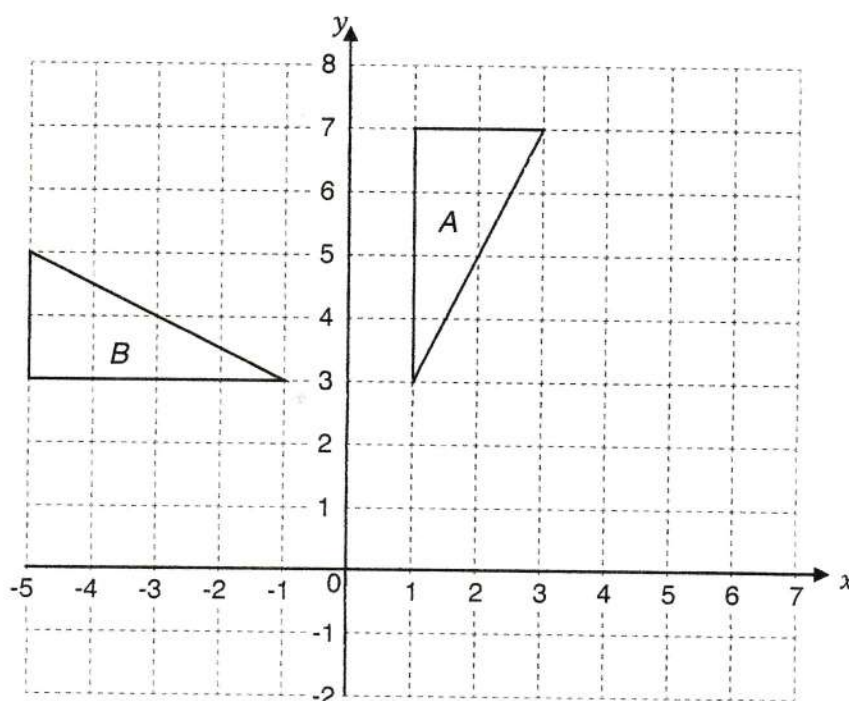
(iv) the size of angle AED .

..... $^\circ$ [1]

(b) Are the lines AE and DC parallel? Justify.

.....
.....
.....[2]

- 7 The grid shows triangles *A* and *B*.



- (a) Describe fully the transformation that maps triangle *A* onto triangle *B*.

.....

 [3]

- (b) Draw the image of triangle *B* after reflection along $y = 2$.

[2]

- (c) Triangle *A* is mapped onto triangle *C* after transformation matrix $\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix}$.

Draw triangle *C* on the grid.

[2]

- (d) Describe the transformation that maps triangle *A* onto triangle *C*.

.....

 [3]

8 $h(t) = 2t - 4$ and $g(t) = 3t^2 + 5t$.

Find

(a) $g(-2)$,

.....[1]

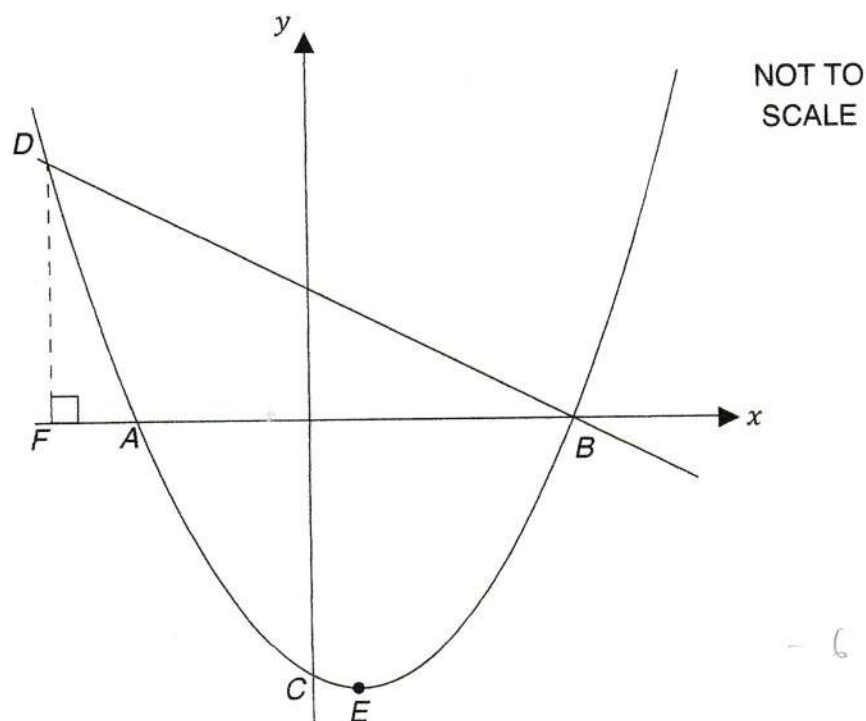
(b) $h^2(t)$, giving your answer in simplest form,

.....[2]

(c) the value of t for which $hg(t) = t - 4$.

$t = \dots\dots\dots$ or $t = \dots\dots\dots$ [3]

- 9 The diagram shows the graphs of curve $y = (x - 3)(x + 2)$ and line $y = -x + 3$



- (a) Find the coordinates of A , B and C .

A (.....) [1]

B (.....) [1]

C (.....) [1]

- (b) Find the coordinates of the turning point E .

..... [2]

- (c) Draw a tangent at C parallel to the line BD . [1]

- (d) The x coordinate of F is -3 .

Find the area of triangle BFD .

.....units² [3]

- 10** In a cycling race, Atang and Bokang used different routes to reach the same destination. Atang used a 115 km route and cycled at x km/h. Bokang used a 110 km route and cycled at 3 km/h slower than Atang. The time taken by Atang is $\frac{115}{x}$.

(a) Write an expression, in terms of x , for the time taken by Bokang.

..... [1]

(b) Atang waited 40 minutes for Bokang to arrive at the destination.

Form an equation and show that it simplifies to $2x^2 + 9x - 1035 = 0$.

[3]

(c) Solve the equation $2x^2 + 9x - 1035 = 0$.

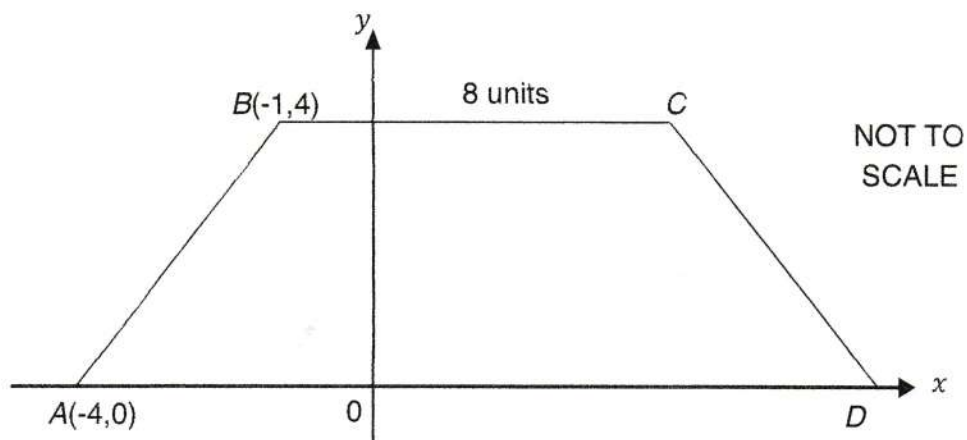
$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

(d) The race started at 08 05.

Find the time Bokang arrived at the destination.

.....[3]

- 11 The diagram shows a trapezium $ABCD$.
 $A(-4,0)$ and $B(-1,4)$ and the length of BC is 8 units.
 The area of the trapezium is 50 square units.



- (a) State the height of the trapezium.

.....units [1]

- (b) Find

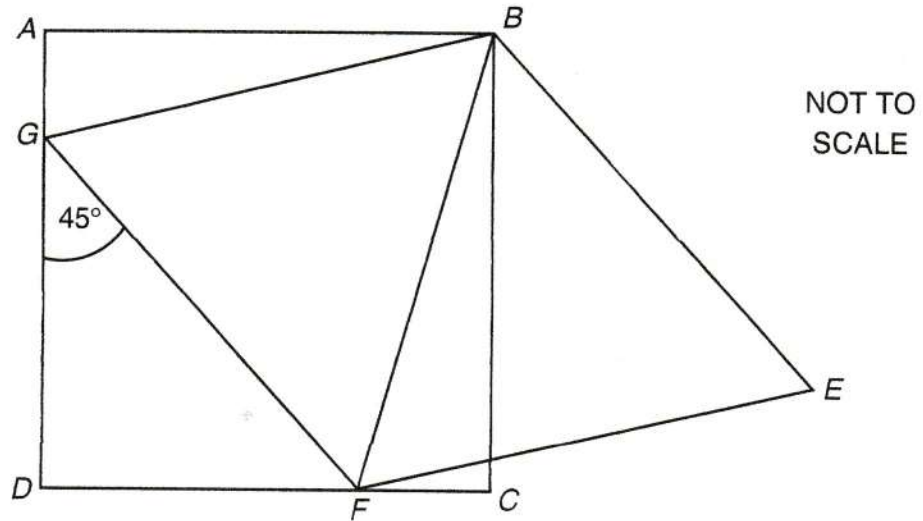
- (i) the gradient of the line AB ,

.....[2]

- (ii) the coordinates of D .

D (.....) [3]

- 12 In the diagram, $ABCD$ is a square and angle $DGF = 45^\circ$.



- (a) Give the special name of triangle DFG .

..... [1]

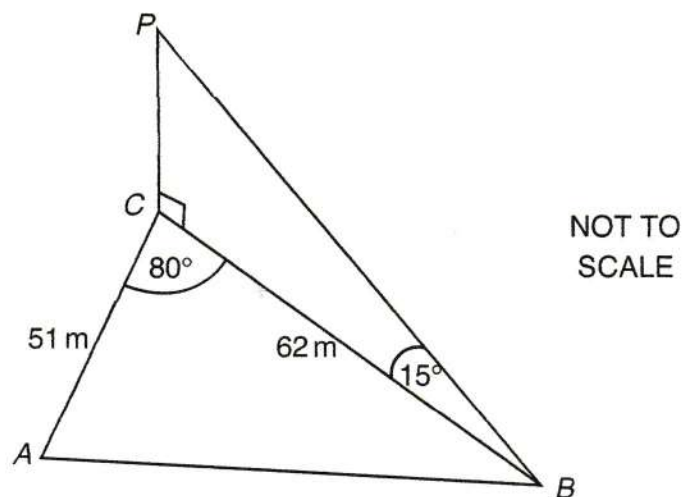
- (b) Show that triangle BGA is congruent to triangle BFC .

[3]

- (c) Given that $EFGB$ is a rhombus, find the size of angle AGB .

.....° [2]

- 13 The diagram shows triangular field ABC on horizontal land.
 CP is the vertical pole at C .
 $\widehat{ACB} = 80^\circ$, $\widehat{CBP} = 15^\circ$, $AC = 51$ m and $BC = 62$ m.



- (a) Calculate the height of the pole.

..... m [2]

- (b) Show that the length of AB is approximately 73.1 m.

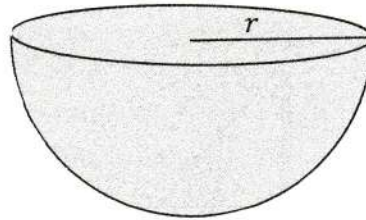
[3]

- (c) The area of the field is 1557 m^2 .

Calculate the shortest distance of C from AB .

..... m [2]

- 14 The diagram shows a hemisphere full of water.
The volume of water in the hemisphere is $486\pi \text{ cm}^3$.



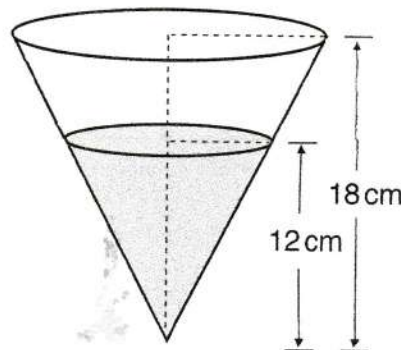
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Volume of sphere of radius r is given by $V = \frac{4}{3}\pi r^3$.

- (a) Calculate the radius of the hemisphere.

.....cm [2]

- (b) The water in the hemisphere is poured into a cone.
The height of the cone is 18 cm and the depth of water is 12 cm.



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The volume of a cone of radius r and height h is given by $V = \frac{1}{3}\pi r^2 h$.

Calculate the volume of water needed to fill up the cone.

..... cm^3 [4]

- 15 The table shows Mathematics grades of 120 first year students admitted at the College.

Mathematics grade	A*	A	B	C
Frequency	18	24	33	45

(a) Find

(i) the modal grade,

(ii) the size of the sector angle for grade A* to be used to draw a pie chart.[1]

.....° [2]

(b) The student with at least grade B is allowed to do Engineering.

The probability of a student choosing engineering is $\frac{3}{5}$.

(i) Calculate the number of students expected to choose engineering.

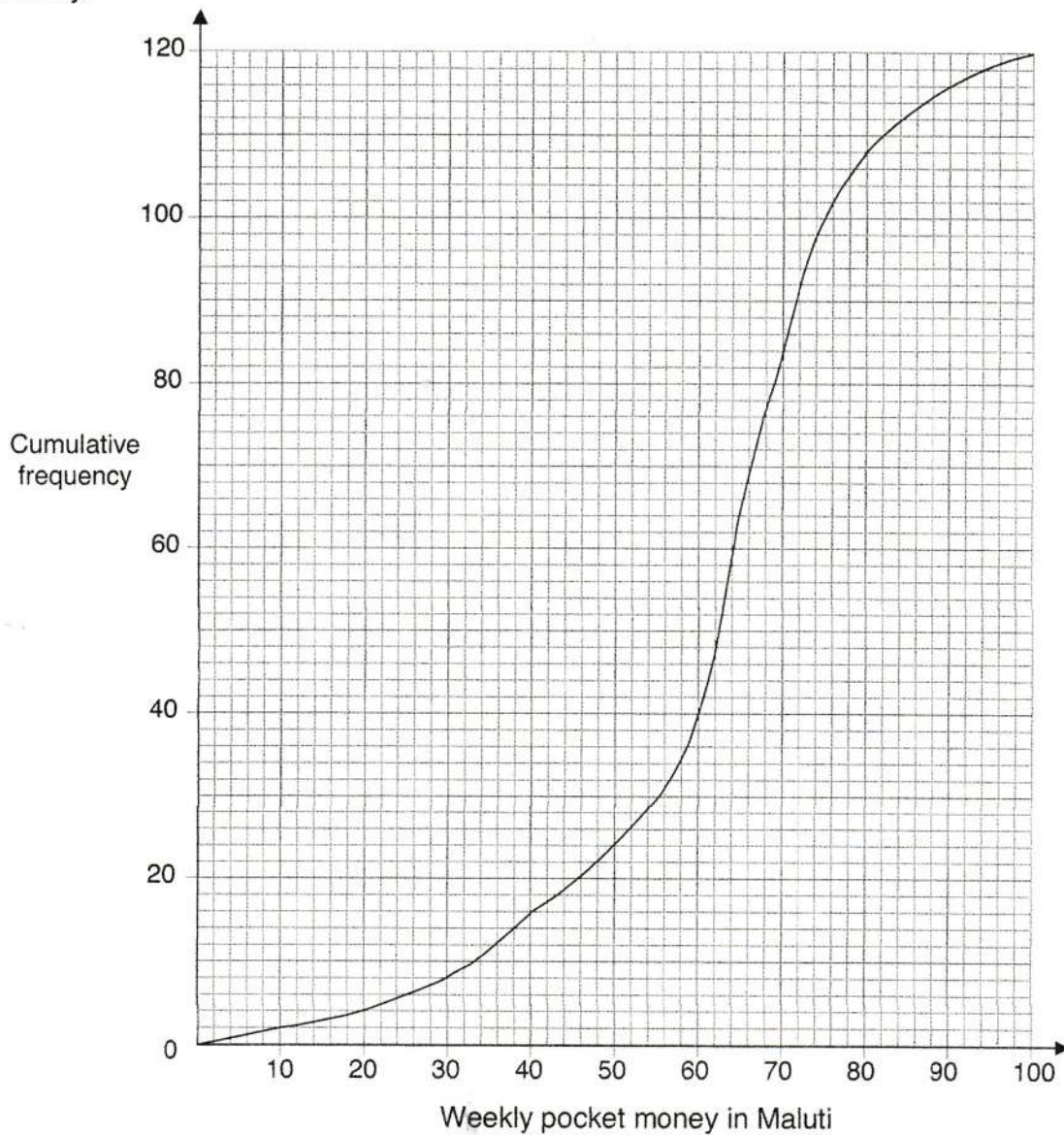
.....[2]

(ii) The probability of passing first year engineering is $\frac{1}{3}$.

Find the probability of choosing engineering and not passing.

.....[2]

- 16 The cumulative frequency curve shows the results of 120 learners about their weekly pocket money.



- (a) State, in this context, the meaning of the coordinate $(0,0)$.

.....
 [1]

- (b) Use the cumulative frequency curve to find
 (i) the median pocket money,

M..... [1]

(ii) the inter-quartile range,

M..... [2]

(iii) the 65th percentile,

M..... [2]

(iv) the number of learners whose pocket money is more than M60 but less than M80.

..... [2]

(c) A learner is randomly chosen.

Find the probability that the learner gets pocket money of at most M40.

.....[1]

(d) Two learners are chosen at random.

Find the probability that they get more than M70 pocket money.

.....[2]

(e) The information from the cumulative frequency curve can be represented using a frequency table.

Weekly pocket money (M)	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Frequency	4	12			

Complete the table.

[3]

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