Centre Number	Examination Number

07330059

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Mathematics

4024/1

Paper 1

Wednesday 9 NOVEMBER 2022

Additional materials: Geometrical Instruments

Time: 2 hours **Marks: 80**

Instructions to Candidates

1 Write the **centre number** and your **examination number** on **every page** of this question paper.

2 There are **twenty-three** questions in this paper.

3 Answer **all the** questions.

4 Write your answers in the **spaces provided** in this question paper.

5 If working is needed for any question, it must be shown in the space below that question.

6 **Electronic calculators and mathematical tables should not be used in this paper.**

Information for Candidates

1 No paper for rough work is to be provided.

2 **Omission of essential working** will result in loss of marks.

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

4 Cell phones are **not allowed** in the examination room.

For Examiner's Use Only

Question	Mark obtained	Examiner's Initials
1		
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Total		

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Centre Number	Examination Number

For Examiner's use

1 Evaluate $\left(\frac{3}{2}\right)^{-2}$.

Answer: ..... [2]

2 Factorise completely $2ax + 4ay - 3bx - 6by$.

Answer: ..... [2]

3 Simplify $3(4x - 5) + 2$.

Answer: ..... [2]

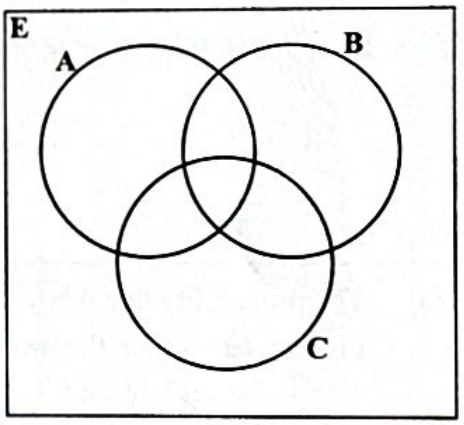
For Examiner's use

4 Solve the equation $4y^2 - 8y = 0$.

Answer: $y =$ ..... or ..... [2]

5 Shade $(A \cup B') \cap C$ on the diagram in the answer space below.

Answer:



[2]

6 A company declared a dividend of K2.75 per share. A businessman invested 560 shares in the company. How much dividend did he get?

Answer: ..... [2]

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For Examiner's use

7 Given that 2, –1, –4 … are consecutive terms of an Arithmetic progression, find the

(a) common difference, d,

(b) formula for the nth term.

Answer: **(a)** ..... [1]

(b) ..... [2]

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8 **(a)** The probability that a boy will be late for school on any particular day is x. Find, in terms of x, the probability that he will **not** be late for school.

(b) The vector $\overrightarrow{RS} = \begin{pmatrix} -4 \\ 5 \end{pmatrix}$. Given that the coordinates of the point S are (1, 2), find the coordinates of the point R.

Answer: **(a)** ..... [1]

(b) ..... [2]

For Examiner's use

9 The matrix $M = \begin{pmatrix} 1 & 5 \\ 2 & 7 \end{pmatrix}$ and the matrix $N = \begin{pmatrix} 0 & 1 \\ 2 & 0 \end{pmatrix}$. Find

(a) M^T,

(b) NM.

Answer: **(a)** ..... [1]

(b) ..... [2]

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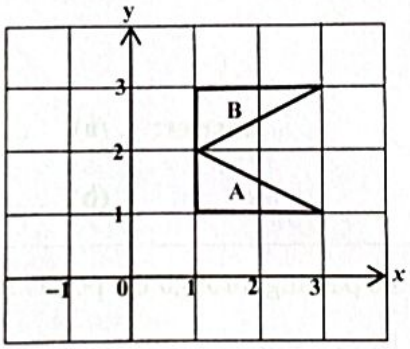
10 **(a)** Given that the universal set $E = \{1, 3, 5, 7, 9, 11\}$, $X = \{1, 5, 9\}$ and $Y = \{3, 9, 11\}$, list $X \cap Y'$.

(b) The diagram shows two triangles A and B.



Describe fully the single transformation which maps triangle A onto triangle B.

Answer: **(a)** ..... [1]

(b) .....

..... [2]

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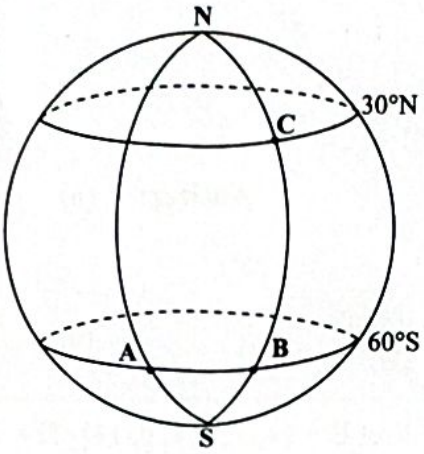
For Examiner's use

11 In the following diagram, points A and B lie on latitude 60°S while point C is on latitude 30°N.

(a) The local time at A is 10 00 hours when it is 13 00 hours at B. Find the difference in longitudes between A and B.

(b) A plane flew from B to C at a speed of 600 knots. How long did the plane take?



Answer: **(a)** ..... [1]

(b) ..... [2]

12 **(a)** Find the gradient of the line passing through the points A(4, −6) and B(2, 4).

(b) Solve the equation $2x^3 = 16$.

Answer: **(a)** ..... [2]

(b) ..... [2]

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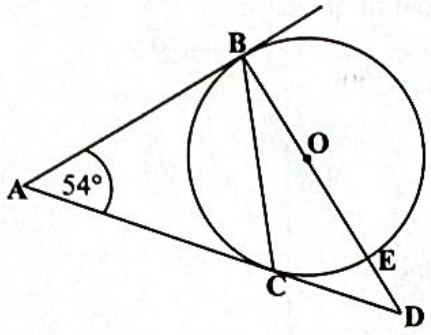
13 In the following diagram, AB and AC are tangents to the circle, centre O. AC and BE produced, meet at D and angle BAC = 54°.

For Examiner's use



Calculate angle

(a) ACB,

(b) CBD,

(c) CDB.

Answer: (a) ..... [1]

(b) ..... [1]

(c) ..... [2]

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For Examiner's use

14 The mass of a loaf of bread is 702.1g correct to 1 decimal place. Find the

(a) lower limit,

(b) relative error of the mass of the loaf of bread.

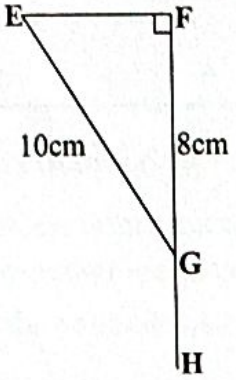
Answer: **(a)** ..... [2]

(b) ..... [2]

For Examiner's use

15 **(a)** Two similar solids P and Q have volumes $80cm^3$ and $270cm^3$ respectively. The height of the smaller solid is 8cm. Find the height of the larger solid.

(b) In the diagram, FGH is a straight line, FG = 8cm, EG = 10cm and angle EFG = 90°.



Find the value of $\sin E\hat{G}H$.

Answer: **(a)** ..... [2]

(b) ..... [2]

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For Examiner's use

16 y varies directly as the square of x and inversely as z and $y = 2$ when $x = 4$ and $z = 24$.
Find the

(a) value of k, the constant of variation,

(b) value of y when $x = 9$ and $z = 27$,

(c) values of x when $y = 8$ and $z = 6$.

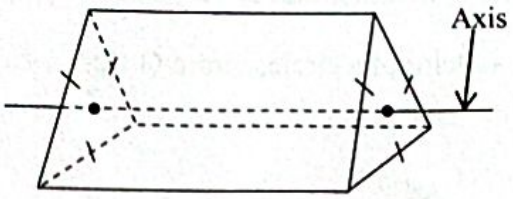
Answer: **(a)** ..... [1]

(b) ..... [1]

(c) $x =$ ..... or ..... [2]

For Examiner's use

17 **(a)** The diagram below shows a regular triangular prism.



Describe the symmetry of the prism.

(b) In the answer space below is an incomplete program written in pseudocode for calculating the curved surface area (A) of a cone with base radius (r) and slant height (s). Complete the program. ($A = \pi rs$)

Answer: **(a)** .....

.....

[2]

(b) Start

Enter .....

A = ...

Output A

Stop

[2]

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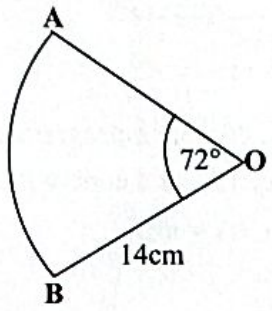
18 **(a)** ABC is a straight line. The coordinates of the points A and B are (2, 1) and (−6, 5) respectively. Given that B is the midpoint of AC, find the coordinates of C.

(b) In the diagram, AOB is a sector of a circle, centre O. Angle AOB = 72° and the radius is 14cm.



Calculate the area of the sector. $[\pi = \frac{22}{7}]$

Answer: **(a)** ..... [2]

(b) ..... [2]

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19 Given that $f(x) = 3x + 1$ and $g(x) = 4x - 1$, find

(a) $f^{-1}(x)$,

(b) $f^{-1}(-5)$,

(c) $fg(x)$.

Answer: **(a)** ..... [1]

(b) ..... [1]

(c) ..... [2]

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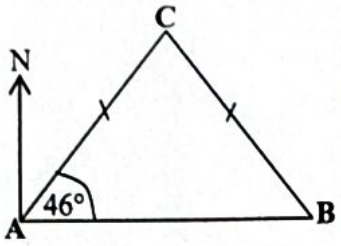
20 In the following diagram, angle BAC is 46° and AC = BC. B is due east of A.



Calculate the bearing of

(a) A from C,

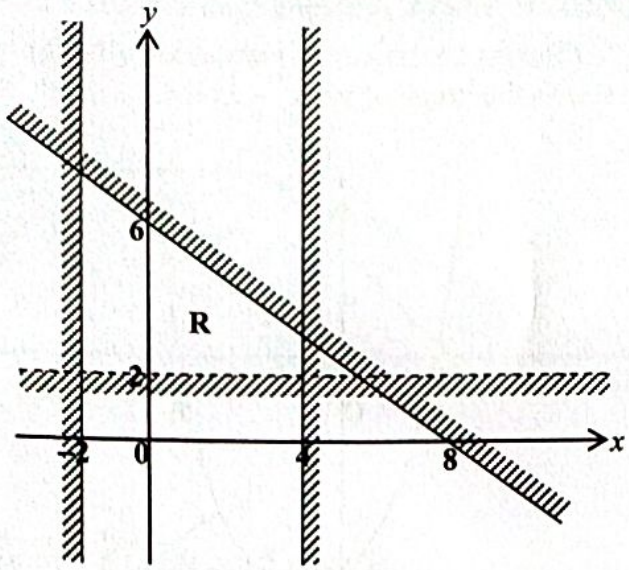
(b) C from B.

Answer: **(a)** ..... [2]

(b) ..... [2]

21 Write the four inequalities that define the unshaded region R in the diagram below.

For Examiner's use



Answer: .....

.....

.....

..... [5]

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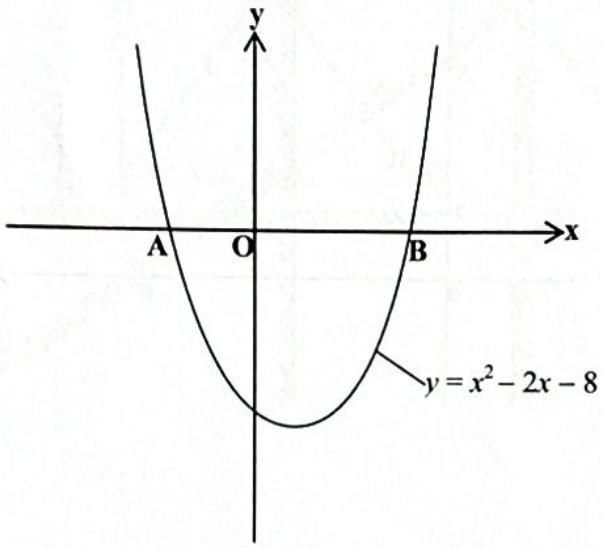
22 **(a)** Given that $y = 2x^2 - 4x + 3$, find $\frac{dy}{dx}$.

(b) The sketch shows the graph of $y = x^2 - 2x - 8$.



Find the coordinates of

(i) A and B,

(ii) the minimum point on the graph.

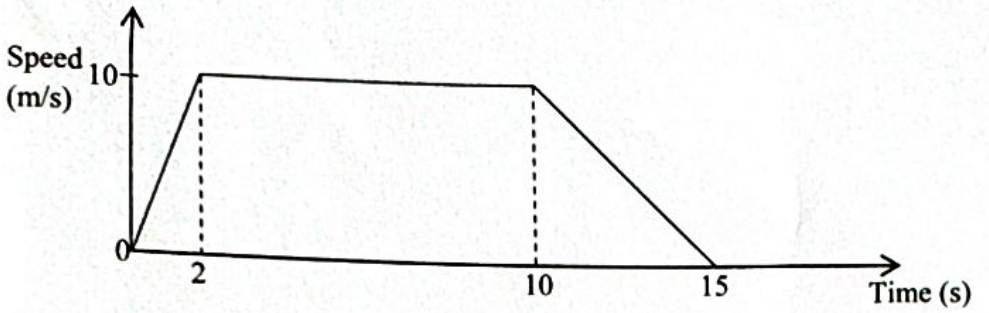
Answer: **(a)** ..... [2]

(b) **(i)** ..... [2]

(ii) ..... [2]

For Examiner's use

23 The diagram below is the speed-time graph of an object. The object starts from rest and accelerates uniformly for 2 seconds until it reaches a speed of 10m/s. It then travels at this speed for 8 seconds and finally decelerates to rest after 5 seconds.



Find the

(a) retardation of the object in the last 5 seconds,

(b) distance travelled in the first 10 seconds,

(c) average speed of the object for the whole journey.

Answer: **(a)** ..... [1]

(b) ..... [2]

(c) ..... [3]