

# EXAMINATIONS COUNCIL OF ZAMBIA

## Examination for General Certificate of Education Ordinary Level



4024/1

# Mathematics

## Paper 1

Wednesday

10 AUGUST 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. Where appropriate, show all the steps 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

Centre Number				Examination Number										

For  
Examiner's  
use

1 Evaluate  $5^3 \times \frac{1}{5^2}$ .

Answer: ..... [2]

2 Expand and simplify  $(2a + 3)(3a - 4)$ .

Answer: ..... [2]

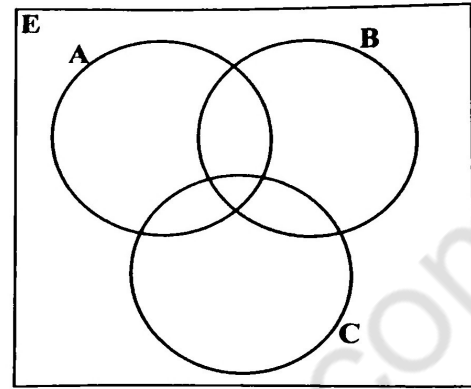
3 Solve the equation  $4x^2 = 9x$ .

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

Centre Number	Examination Number										

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

Answer:



[2]

5 Factorise completely  $2ab + xy - 2ay - bx$ .

Answer: .....

[2]

6 A company declares an annual dividend of 6%. The value of each share is K25.00. Mr Mapesa has 500 shares. Find his annual dividend.

(d) Answer: .....

[2]

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For  
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use

7 For the sequence 5, 12, 19, ..., find the

- (a) sixth term,
- (b)  $n$ th term.

Answer: (a) ..... [1]  
(b) ..... [2]

- 8 (a) The distance between town F and town G is 8 100 nautical miles. If a plane takes 18 hours to fly from F to G, find its average speed in knots.
- (b) Town B is east of town A. When it is 11 00 hours at B, it is 07 00 hours at A. Find the difference in longitudes between the towns A and B.

Answer: (a) ..... [1]  
(b) ..... [2]

Centre Number	Examination Number										

9 (a) Given that the matrix  $C = \begin{pmatrix} 7 & 3 \\ 1 & 4 \\ 2 & 5 \end{pmatrix}$ , find  $C^T$ .

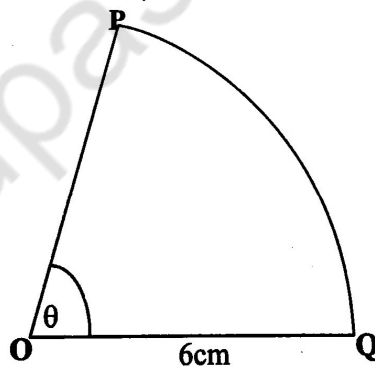
(b) Express as a single matrix  $(1 \ 8) \begin{pmatrix} 0 & -1 \\ 2 & 5 \end{pmatrix}$ .

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

(b) ..... [2]

10 (a) The probability of Kasukulu waking up late is 0.3. What is the probability that she will wake up early?

(b) The following diagram shows a sector POQ of radius 6cm. Angle POQ =  $\theta$  and the area of the sector is  $24.2\text{cm}^2$ . [ $\pi = \frac{22}{7}$ ]

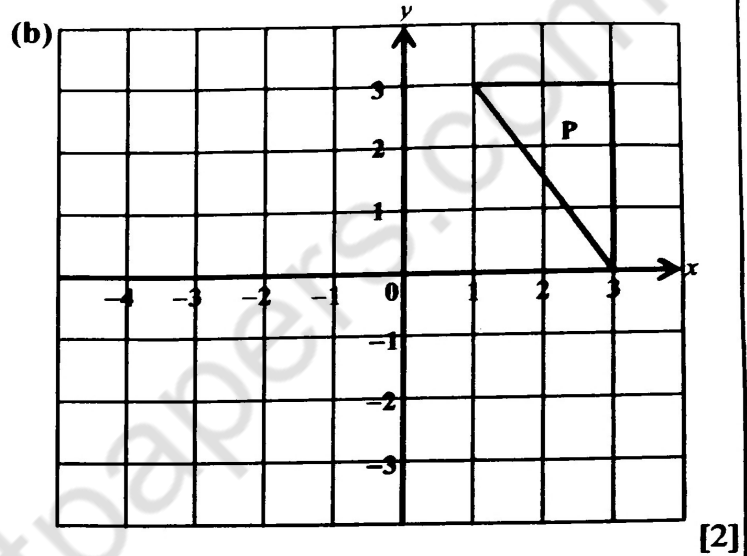


Find the value of  $\theta$ .

Centre Number					Examination Number																		

- 11 (a) Given that  $E = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ,  $A = \{\text{Prime numbers}\}$ ,  
 $B = \{\text{Multiples of 3}\}$ , list  $(A \cup B)'$ .
- (b) On the diagram in the answer space, draw triangle Q, the image of triangle P under a reflection in the line  $y = -x$ .

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



- 12 A piece of wood measures 25cm long. Find the
- (a) upper and lower limits,
- (b) percentage error.

Answer: (a) Upper limit ..... [2]  
 Lower limit ..... [2]

(b) ..... [2]

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13 Given that  $f(x) = x - 4$  and  $h(x) = 2x + 3$ ,

find

- (a)  $h^{-1}(x)$ ,
- (b)  $h^{-1}(5)$ ,
- (c)  $hf(x)$ .

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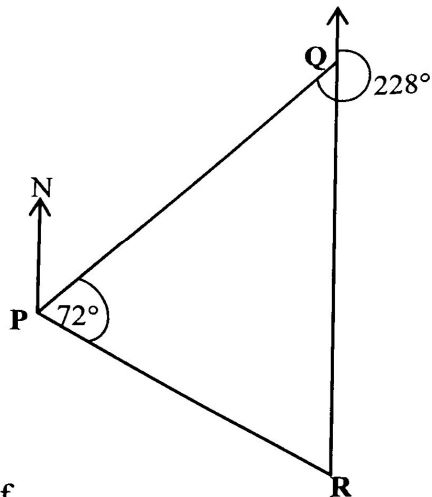
Answer: (a) .....

(b) .....

(c) .....

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- 14 In the following diagram, P, Q and R are three points on level ground. The bearing of P from Q is  $228^\circ$ , angle  $QPR = 72^\circ$  and R is due south of Q.



Find the bearing of

- (a) Q from P,
- (b) P from R.

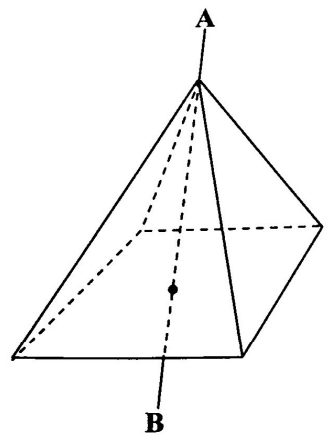
Answer: (a) .....

(b) .....



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- 16 (a) Two cylinders A and B are geometrically similar and the ratio of their heights is  $m : 4$  respectively. Given that the areas of A and B are  $144\text{cm}^2$  and  $256\text{cm}^2$  respectively, find the value of  $m$ .
- (b) The diagram below shows a square based right pyramid with an axis AB. Describe fully the symmetry of the pyramid.

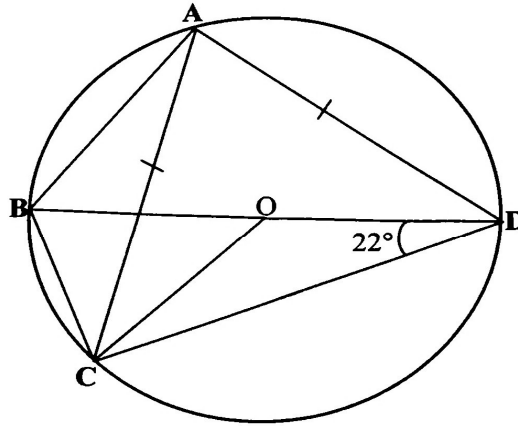


**Answer:** (a) ..... [2]

(b) ..... [2]

Centre Number	Examination Number										

- 17 In the following diagram, A, B, C and D are points on the circumference of the circle, centre O. BD is the diameter,  $AD = AC$  and  $\angle BDC = 22^\circ$ .



Find

- (a)  $\hat{BAC}$ ,
- (b)  $\hat{CBD}$ ,
- (c)  $\hat{ACO}$ .

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

(b) .....

(c) .....

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For  
Examiner's  
use

18  $y$  varies directly as  $x$  and inversely as the square of  $z$  and  $y = 8$  when  $x = 4$  and  $z = 1$ .  
Find the

- (a) value of  $k$ , the constant of variation,
- (b) value of  $y$  when  $x = 9$  and  $z = 3$ ,
- (c) values of  $z$  when  $y = 3$  and  $x = 54$ .

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(a) ..... [1]

(b) ..... [1]

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



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20 (a) Points A and B have coordinates (2, -3) and (7, 9) respectively. Find the length AB.

(b) Given that  $y = 4x^3 - 3x^2 + 5x$ , find  $\frac{dy}{dx}$ .

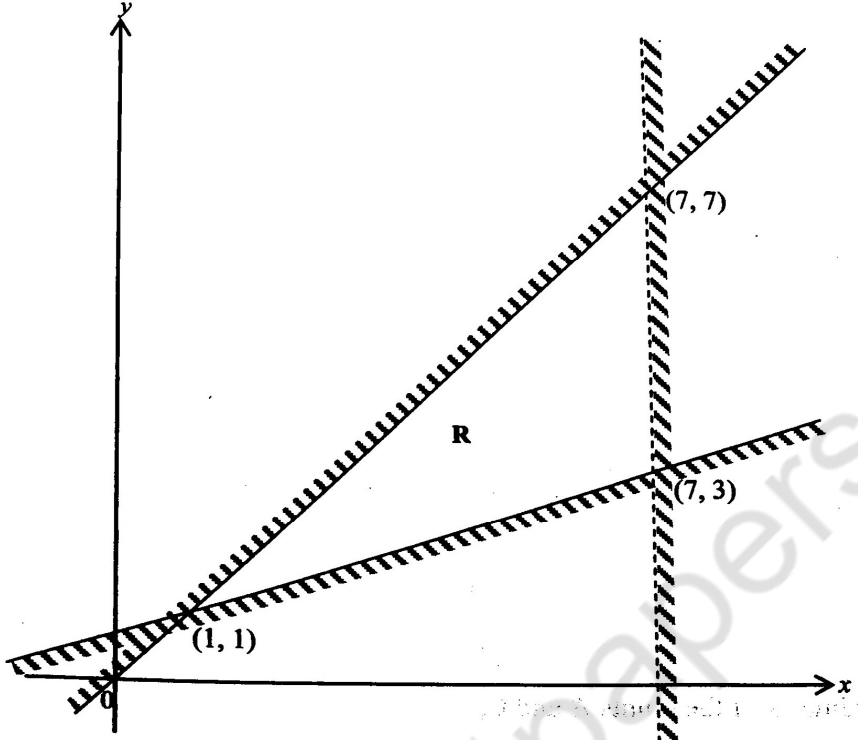
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Answer: (a) .....

(b) .....

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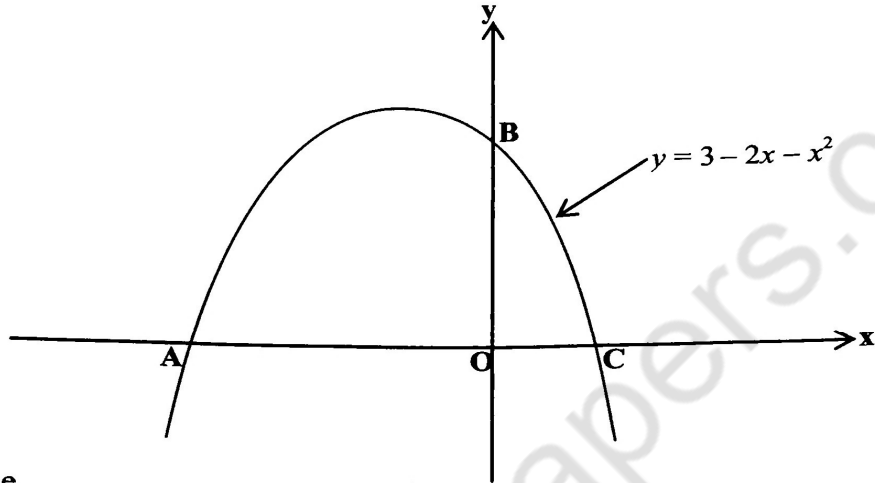
21 Write down the three inequalities that define the unshaded region R on the diagram below.



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- 22 (a) The components of the vectors  $\vec{OA}$  and  $\vec{OB}$  are  $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$  and  $\begin{pmatrix} 4 \\ 2 \end{pmatrix}$  respectively. Write down  $\vec{BA}$  as a column vector.
- (b) The diagram shows the sketch of the graph of  $y = 3 - 2x - x^2$  passing through A, B and C.



Find the

- (i) coordinates of the points A and C,
- (ii) turning point of the graph.

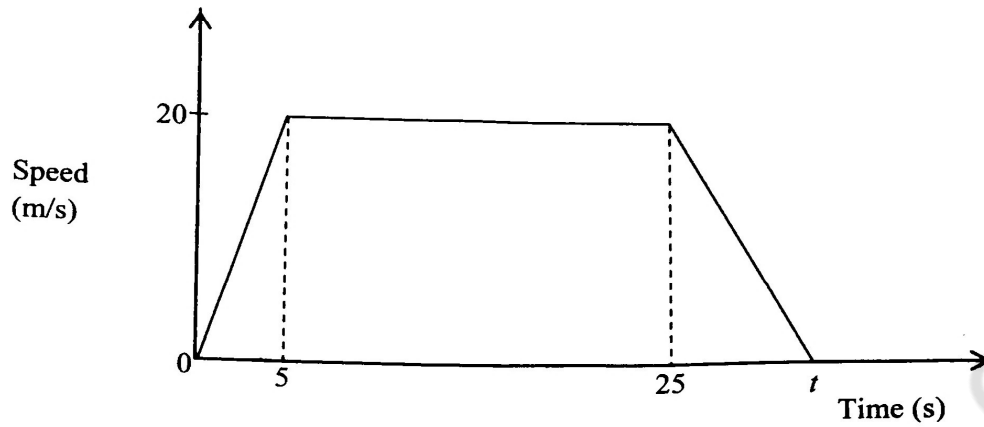
**Answer:** (a) ..... [2]

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

(ii) ..... [2]

Centre Number	Examination Number

23 The following diagram is the speed time graph of a car.



- (a) Calculate the acceleration of the car during the first 5 seconds.
- (b) Find the value of  $t$ , given that the total distance travelled was 550m.
- (c) Calculate the average speed for the whole journey.

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