

Centre Number	Candidate Number

# EXAMINATIONS COUNCIL OF ZAMBIA

Examination for General Certificate of Education Ordinary Level

## Mathematics

4024/1

Paper 1

2020

Candidates answer on the question paper  
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** questions.
- 4 Write your answers in the **spaces provided** on the 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.**
- 7 **Omission of essential working** will result in loss of marks.

### 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.

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1 Simplify  $2a + (b - a) - 2b$ .

Answer: ..... [2]

2 Evaluate  $\left(\frac{64}{125}\right)^{\frac{1}{3}}$ .

Answer: ..... [2]

3 Given that the lines  $3y = x + 6$  and  $y = kx + 12$  are perpendicular, find the value of  $k$ .

Answer: ..... [2]

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

Answer: ..... [2]

5 Given that A is the point  $(-2, 1)$  and B is the point  $(1, 5)$ , find  $|\vec{AB}|$ .

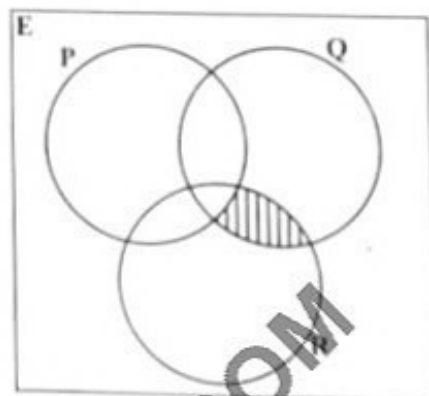
Answer:  $|\vec{AB}| = \dots\dots\dots$  [2]

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Use set notation to describe the shaded region in the diagram below.

Answer:



Answer: ..... [2]

7 Given that  $A = \begin{pmatrix} 2 & 3 \\ 1 & 0 \end{pmatrix}$ ,  $B = \begin{pmatrix} -1 & 0 \\ x & 2 \end{pmatrix}$  and  $C = \begin{pmatrix} 7 & 6 \\ -1 & 0 \end{pmatrix}$

find

(a)  $C^T$ ,

(b)  $x$  for which  $AB = C$ .

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

(b)  $x =$  ..... [2]

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- 8 Given that the 11<sup>th</sup> term of an arithmetic progression is 43 and that the first term is 3, find the
- (a) common difference,
  - (b) 4<sup>th</sup> term.

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

- 9 (a) A plane flying at a speed of 900 knots takes 5 hours to fly from town A to town B. Calculate the distance between the two towns.
- (b) Point Q on longitude 85°E lies on the equator and is due east of P. The time difference between P and Q is 5 hours. Calculate the longitude on which P lies.

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

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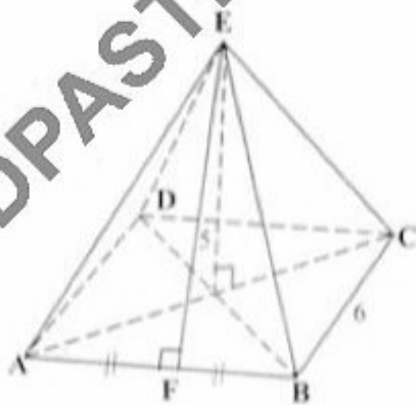
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- 10 (a) The probability of a girl not wearing a neck tie is 0.55. What is the probability that the same girl will wear a neck tie?
- (b) Given that  $8^{x-1} = 16$ , find the value of  $x$ .

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

(b)  $x =$  ..... [2]

- 11 (a) Given that  $S = \{x: 1 < x \leq 15, x \text{ is a prime number}\}$ , list the elements of set  $S$ .
- (b) The diagram below shows a right square pyramid  $ABCDE$  of base 6cm and  $EF = 5$ cm.



Calculate the total surface area of the triangular faces of the pyramid.

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

(b) ..... [2]

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12 A function  $f$  is defined by  $f(x) = 2x - 5$ .

Find

- (a)  $f^{-1}(x)$ ,
- (b)  $ff^{-1}(2)$ ,
- (c) the value of  $x$  if  $ff(x) = x$ .

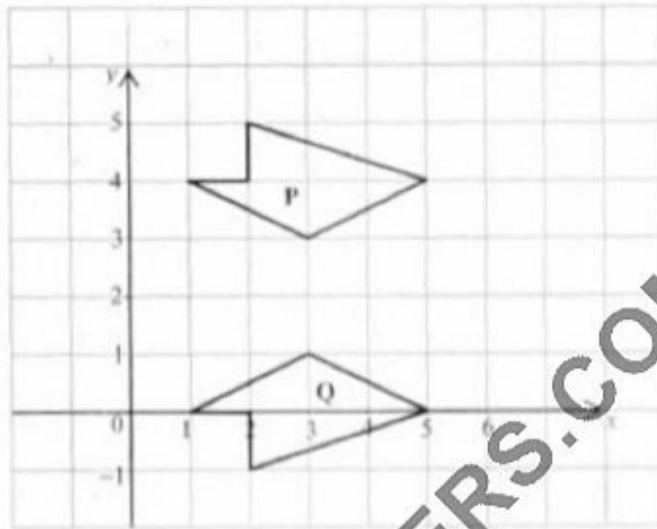
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- Answer: (a) ..... [1]  
 (b) ..... [1]  
 (c) ..... [2]

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- 13 (a) The diagram below shows two figures P and Q on the XOY plane.



Describe fully the single transformation that maps P onto Q.

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

Answer: (a) .....

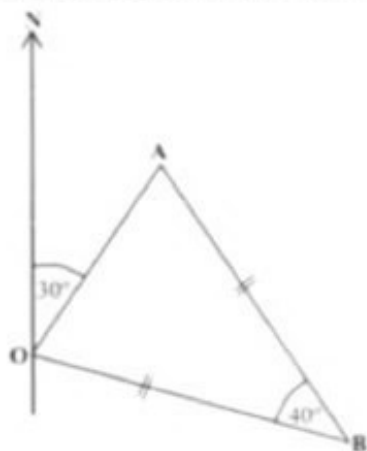
[2]

(b) .....

[2]



- 14 The diagram below shows three points O, A and B in which  $OB = AB$ .



Given that the bearing of A from O is  $030^\circ$  and angle  $ABO = 40^\circ$ , calculate the bearing of

- (a) B from A,  
(b) O from B.

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

(b) ..... [2]

- 15 The values of  $x$  and  $y$  are given to 1 decimal place as  $x = 4.2$  and  $y = 7.3$ . Find the

- (a) maximum value of  $x + y$ ,  
(b) minimum value of  $x - y$ .

Answer: (a) max.  $x + y =$  ..... [2]

(b) min.  $x - y =$  ..... [2]

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- 16 It is given that  $y$  varies inversely as the square of  $x$ . The table below shows some values of  $x$  and corresponding values of  $y$ .

$x$	2	$b$	6
$y$	9	4	$a$

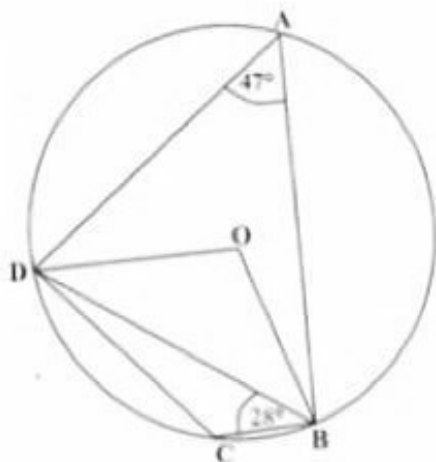
Find the

- (a) value of  $k$ , the constant of variation,  
 (b) value of  $a$ ,  
 (c) values of  $b$ .

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Answer: (a)  $k = \dots\dots\dots$  [1](b)  $a = \dots\dots\dots$  [1](c)  $b = \dots\dots\dots$  or  $\dots\dots\dots$  [2]

- 17 In the diagram below, A, B, C, and D lie on the circumference of the circle, centre O.



Given that  $\angle BAD = 47^\circ$  and  $\angle DBC = 28^\circ$ ,

calculate

- (a)  $\angle BOD$ ,  
 (b)  $\angle OBD$ ,  
 (b)  $\angle BDC$ .

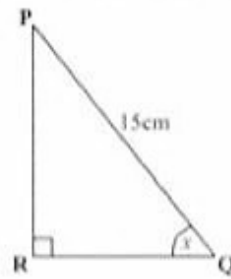
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- Answer: (a)  $\angle BOD = \dots\dots\dots$  [1]  
 (b)  $\angle OBD = \dots\dots\dots$  [1]  
 (c)  $\angle BDC = \dots\dots\dots$  [2]

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- (a) The diagram below shows a right angled triangle PQR.



Given that  $PQ = 15$  cm and  $\cos x^\circ = \frac{2}{3}$ , calculate the length of QR.

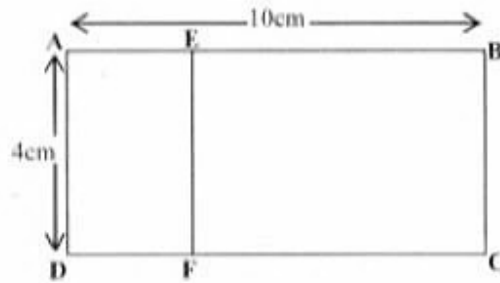
- (b) A straight line L has equation  $3y = 5x - 6$ . Find the y co-ordinate of the point where L cuts the y-axis.

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

(b) ..... [2]

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- 19 (a) Rectangle ABCD and DAEF are geometrically similar.



Given that  $AB = 10$  cm and  $AD = 4$  cm, calculate the area of rectangle DAEF.

- (b) Mrs Kalomba bought 120 shares at a nominal value of K40.00 each which she later sold at K42.50 each. Find her profit.

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

(b) ..... [2]

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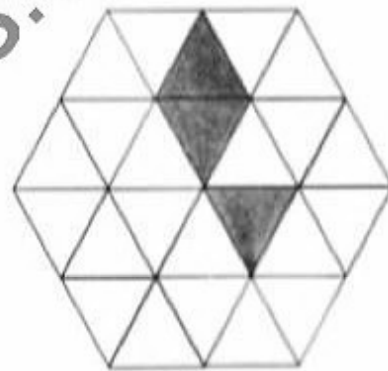
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- 20 (a) On the diagram in the answer space, shade three more triangles to make a pattern with rotational symmetry of order 3.
- (b) Simple interest is given by the formula

$$I = \frac{PTR}{100}$$

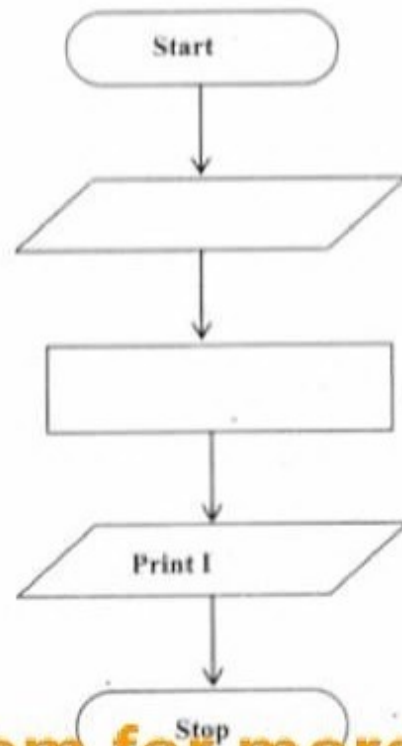
Complete the flow chart in the answer space below for calculating simple interest.

Answer: (a)



[2]

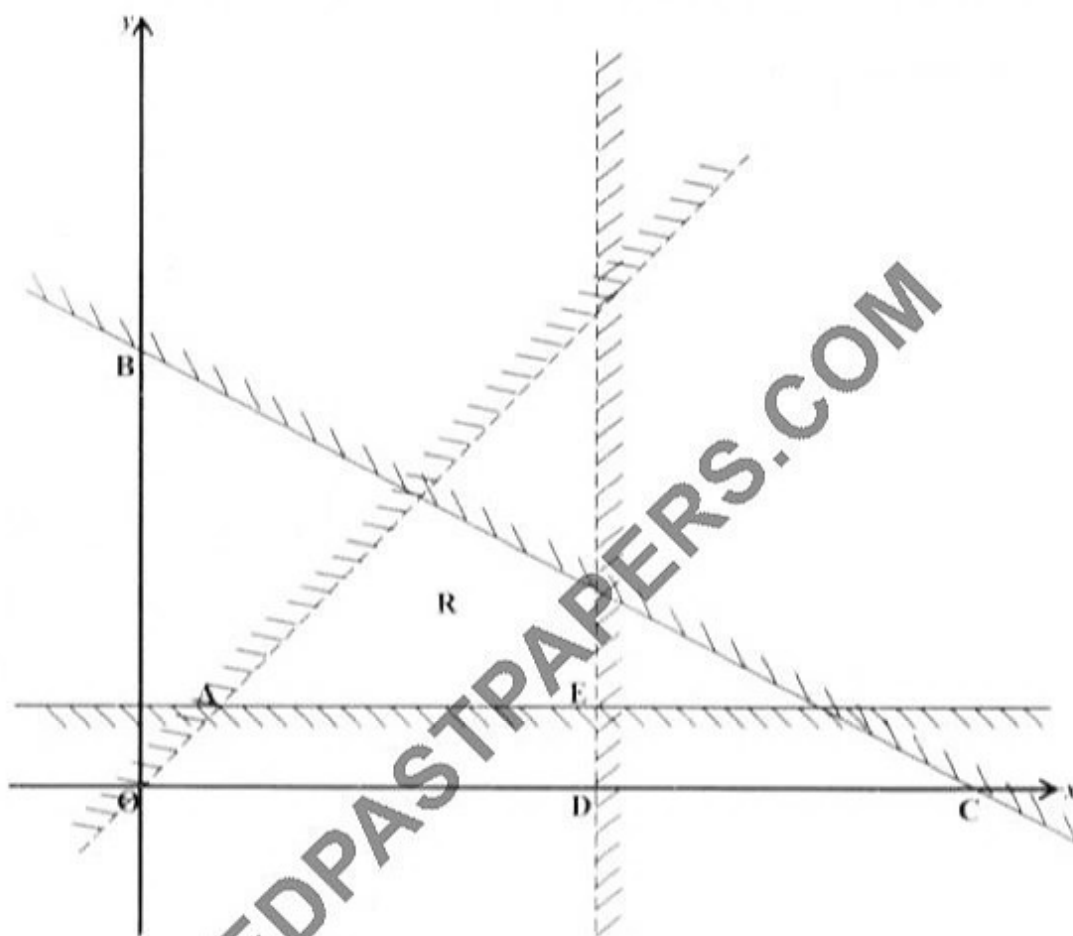
(b)



[2]

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21 In the diagram below, point A is (1, 1), B is (0, 7), C is (14, 0), D is (7, 0) and E is (7, 1).



Write down the four inequalities that define the unshaded region **R**.

Answer: .....

.....

.....

.....

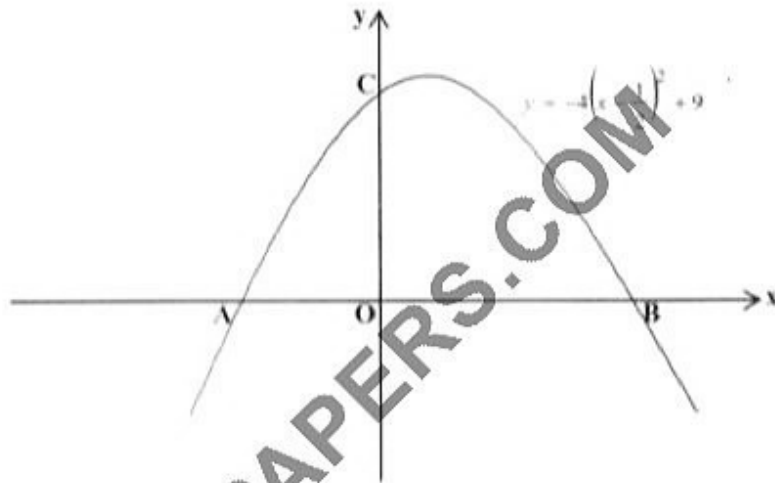
[5]

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22 (a) Solve the equation  $x^2 - 7x = 8$ .

(b) The diagram below is the graph of  $y = -4\left(x - \frac{1}{2}\right)^2 + 9$ .



Find the

- (i) x coordinates of A and B,
- (ii) coordinates of C.

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

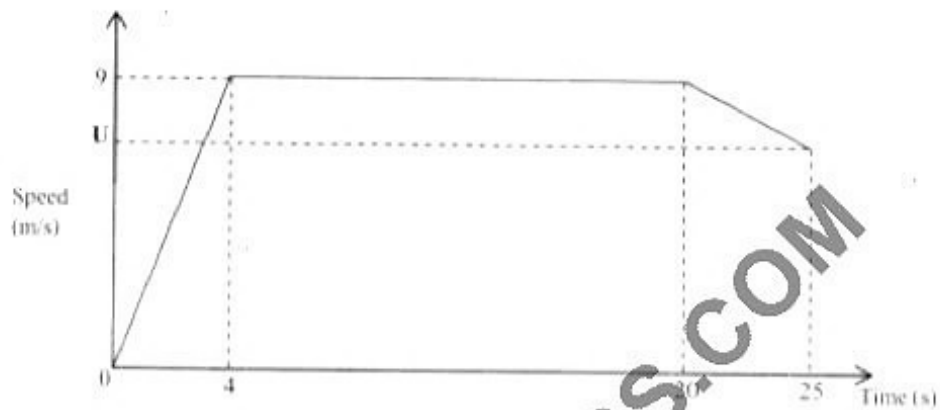
(b) (i) ..... and ..... [2]

(ii) ..... [2]



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- 23 A sprinter runs a race of 200m. Her total time for running the race is 25 seconds ending at  $U$  m/s. Below is a sketch of the motion of the sprinter.



Calculate the

- (a) acceleration in the first 4 seconds,
- (b) distance covered in the first 20 seconds,
- (c) value of  $U$ .

Answer: (a)  $a = \dots\dots\dots$  [1]

(b)  $\dots\dots\dots$  [2]

(c)  $U = \dots\dots\dots$  [3]