

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for General Certificate of Education Ordinary Level

Mathematics

Paper 1

2020

4024/1

Candidates answer on the question paper

Additional materials:

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.

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	Candidate Number

For
Examiner's
use

- 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]

Centre Number	Examination Number

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

Answer: [2]

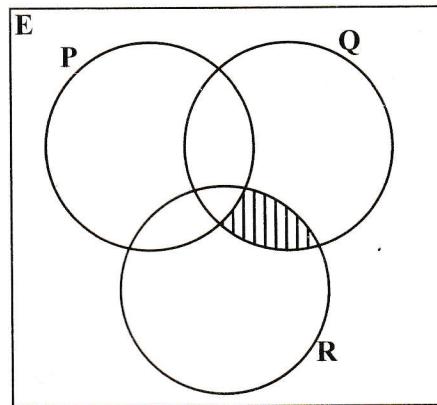
- 5 Given that A is the point $(-2, 1)$ and B is the point $(1, 5)$, find $|\vec{AB}|$.

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

Centre Number	Candidate Number

- 6 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]

Centre Number	Examination Number							

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

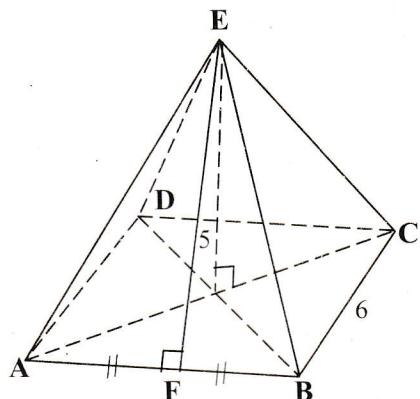
Centre Number	Candidate Number

- 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 $EF = 5\text{cm}$.



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

Answer: (a) [1]

(b) [2]

Centre Number	Examination Number

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 $ff(x) = x$.

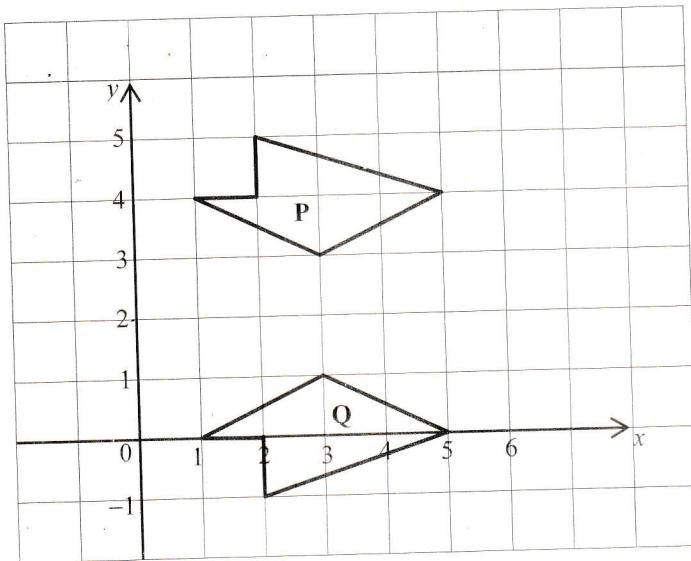
Answer: (a) [1]

(b) [1]

(c) [2]

Centre Number	Candidate Number

- 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 $y = 2x^3 - \frac{4}{x^2}$, find $\frac{dy}{dx}$.

Answer: (a)

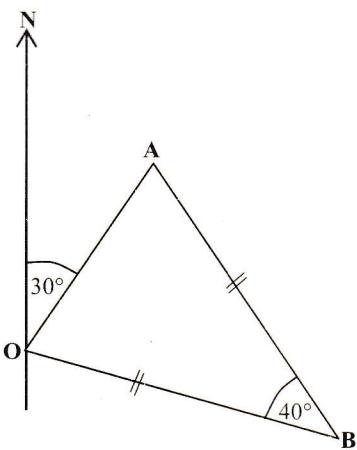
[2]

(b)

[2]

Centre Number	Examination Number

- 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° 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. $x + y = \dots$ [2]

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

Centre Number	Candidate Number

- 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 .

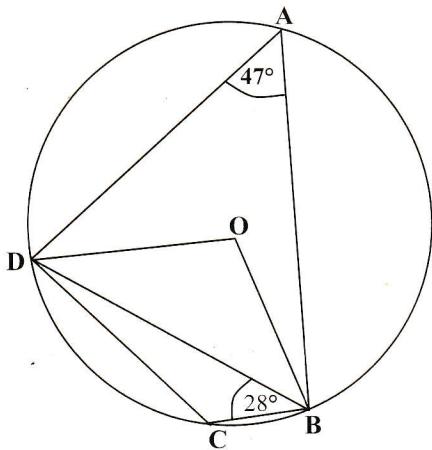
Answer: (a) $k = \dots\dots\dots\dots\dots$ [1]

(b) $a = \dots\dots\dots\dots\dots$ [1]

(c) $b = \dots\dots\dots$ or $\dots\dots\dots$ [2]

Centre Number	Examination Number

- 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 $\angle DBC = 28^\circ$,

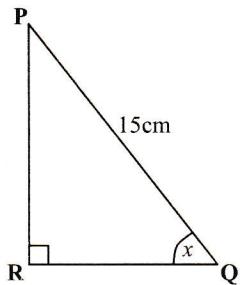
calculate

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

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

Centre Number	Candidate Number

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



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

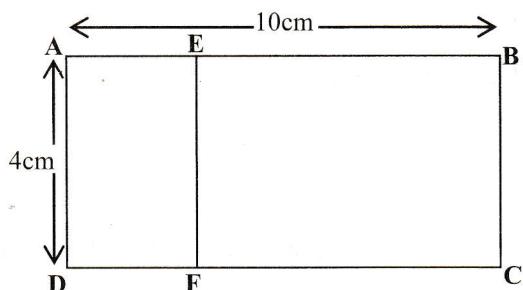
- (b) A straight line L has equation $3y = 5x - 6$. Find the y co-ordinate of the point where L cuts the y-axis.

Answer: (a) [2]

(b) [2]

Centre Number	Examination Number

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



Given that $AB = 10 \text{ cm}$ and $AD = 4 \text{ cm}$, 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.

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

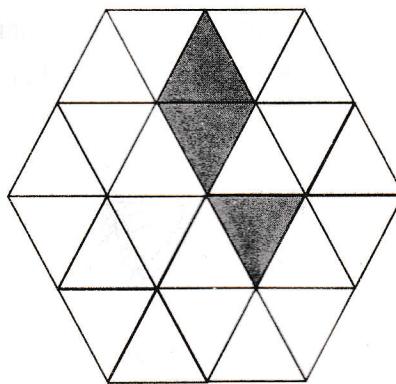
Centre Number	Candidate Number

- 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

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

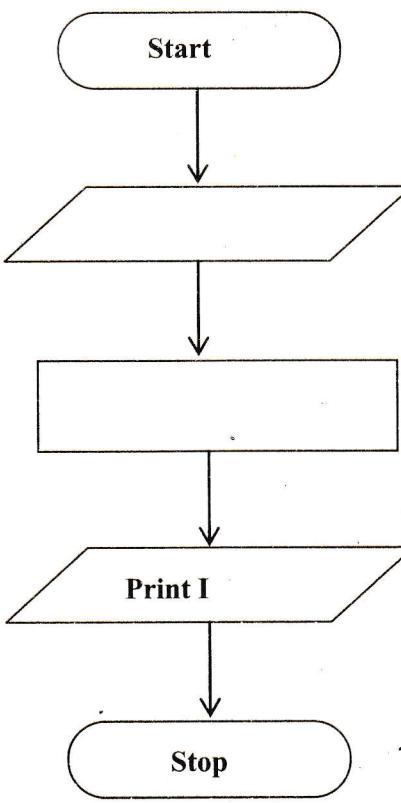
Complete the flow chart in the answer space below for calculating simple interest.

Answer: (a)



[2]

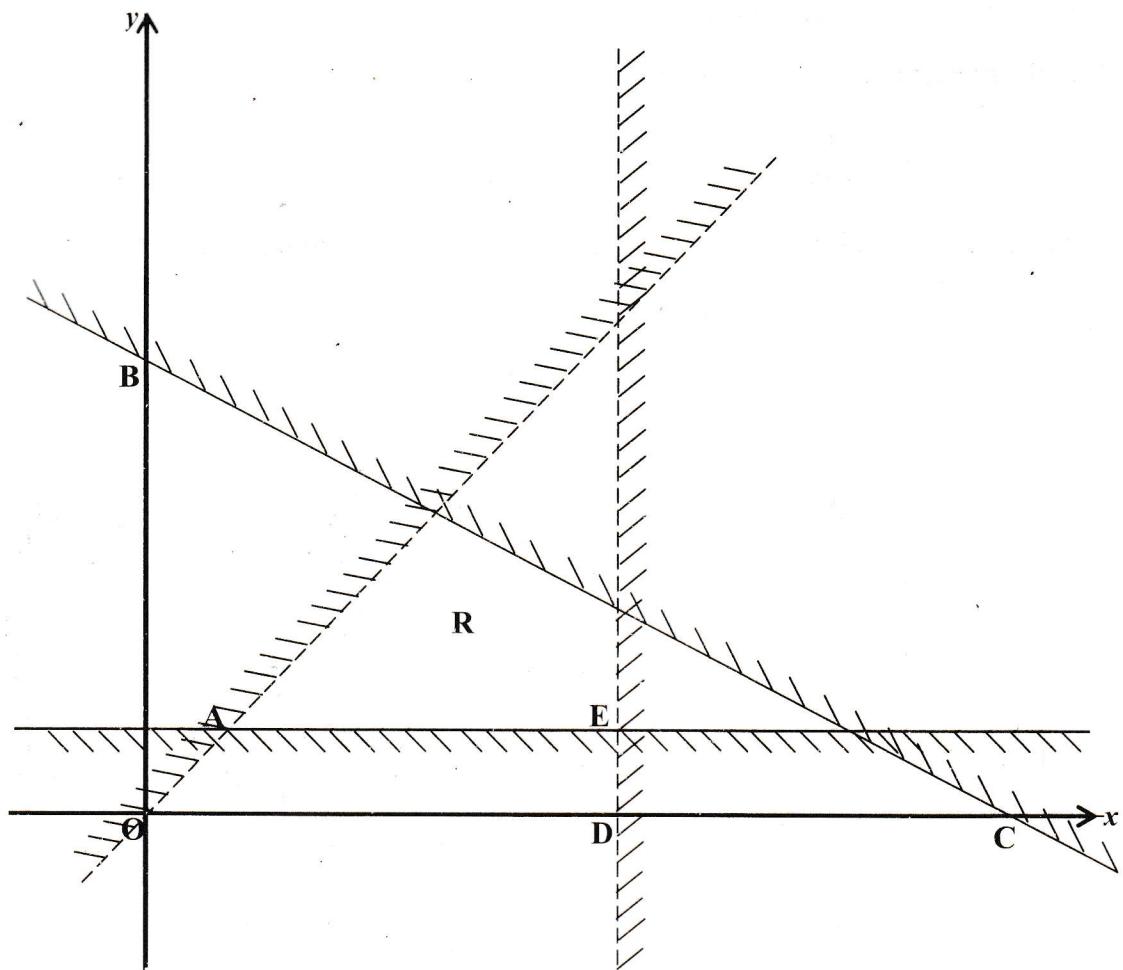
(b)



[2]

Centre Number	Examination Number

- 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:

.....

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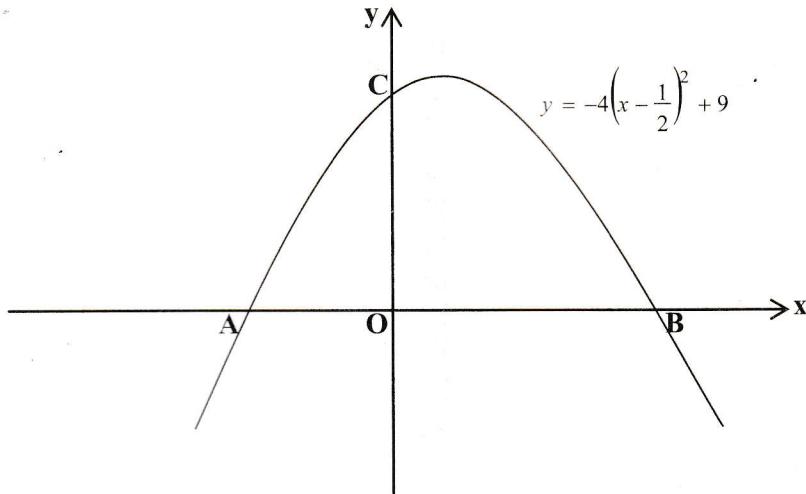
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[5]

Centre Number	Candidate Number

- 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.

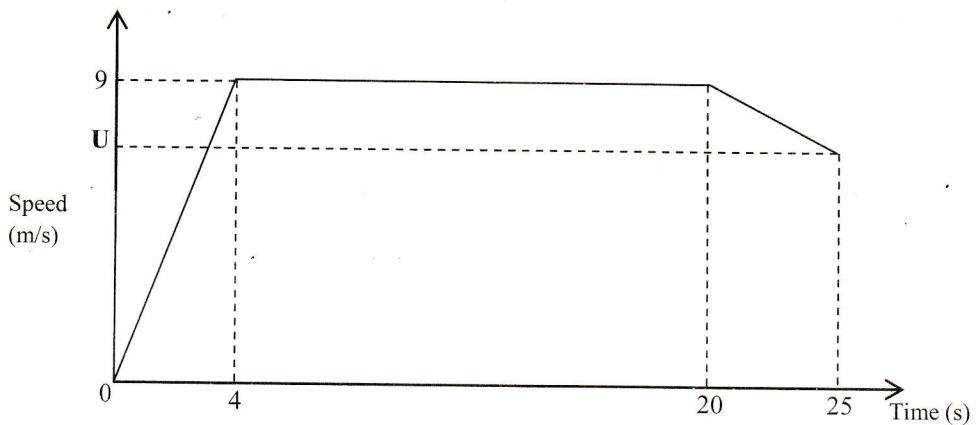
Answer: (a) or [2]

(b) (i) and [2]

(ii) [2]

Centre Number	Examination Number

- 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) $a = \dots$ [1]

(b) \dots [2]

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