EXAMINATIONS COUNCIL OF ZAMBIA

Examination for General Certificate of Education Ordinary Level

Mathematics
Paper 1

4024/1

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.

For Examiner's Use

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This question paper consists of 17 printed pages

For Examiner's use

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

Answer: .... [2]

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

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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use

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 $|\overrightarrow{AB}|$.

Answer: $|\overrightarrow{AB}| = $ .... [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]

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]

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]

13   (a)   The diagram below shows two figures P and Q on the XOY plane.
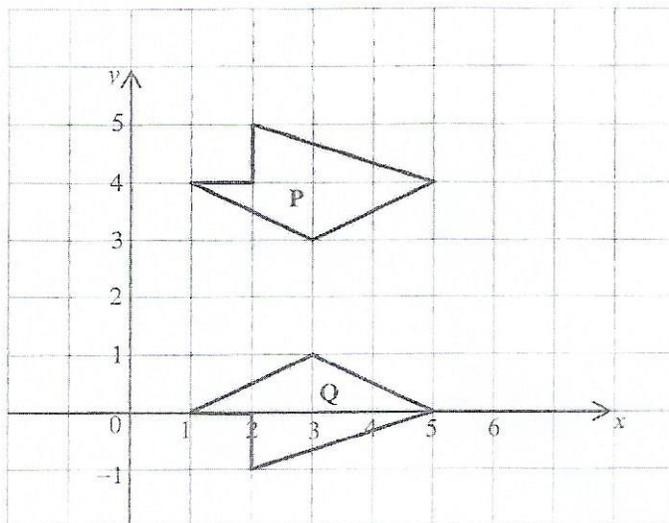
Describe fully the single transformation that maps P onto Q.

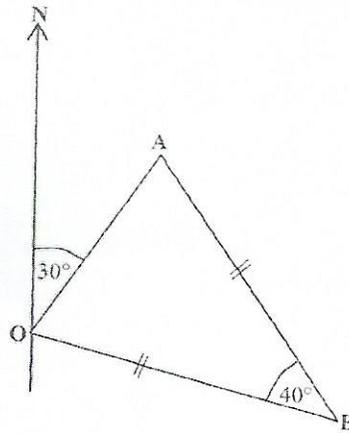(b)   Given that $y = 2x^3 - \dfrac{4}{x^2}$, find $\dfrac{dy}{dx}$.

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° and angle ABO = 40°, 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]

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) $k =$ .... [1]

          (b) $a =$ .... [1]

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

For Examiner's use

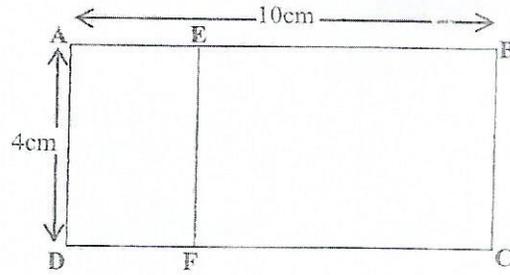17   In the diagram below, A, B, C, and D lie on the circumference of the circle, centre O.
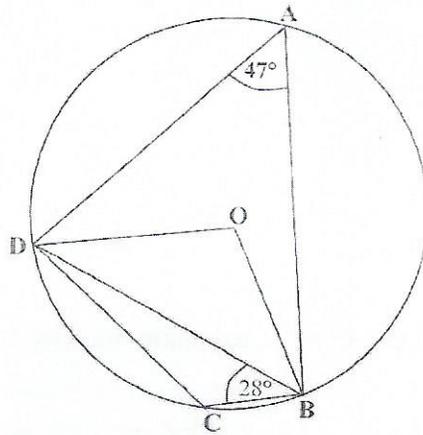
Given that $\angle BAD = 47°$ and $\angle DBC = 28°$,

calculate

(a) $\angle BOD$,

(b) $\angle OBD$,

(b) $\angle BDC$.

Answer: (a) $\angle BOD =$.. [1]

(b) $\angle OBD =$.. [1]

(c) $\angle BDC =$.. [2]

For Examiner's use

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

Given that PQ = 15 cm and $\cos x° = \dfrac{2}{3}$, 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 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.

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

              (b) .... [2]
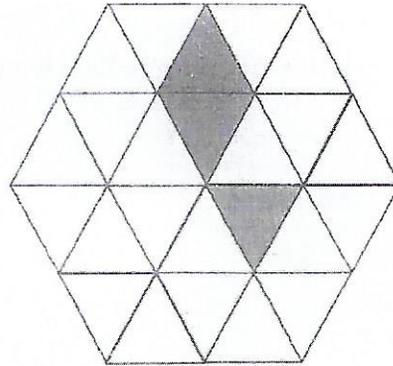
For Examiner's use

20 (a) On the diagram in the answer space, shade three more triangles to make a pattern with rotational symmetry of order 3.

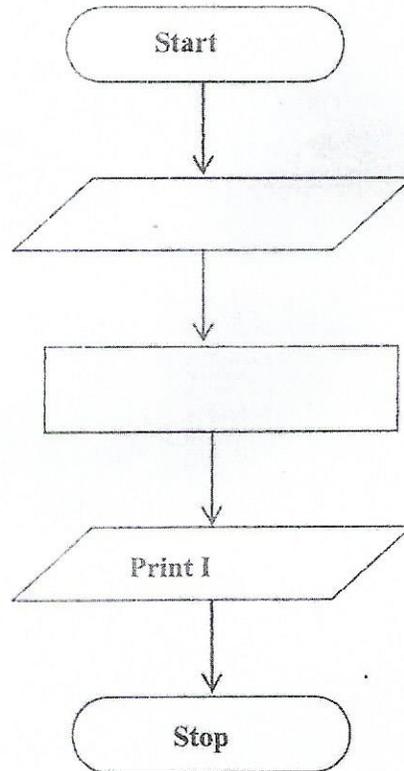(b) Simple interest is given by the formula

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

Complete the flow chart in the answer space below for calculating simple interest.
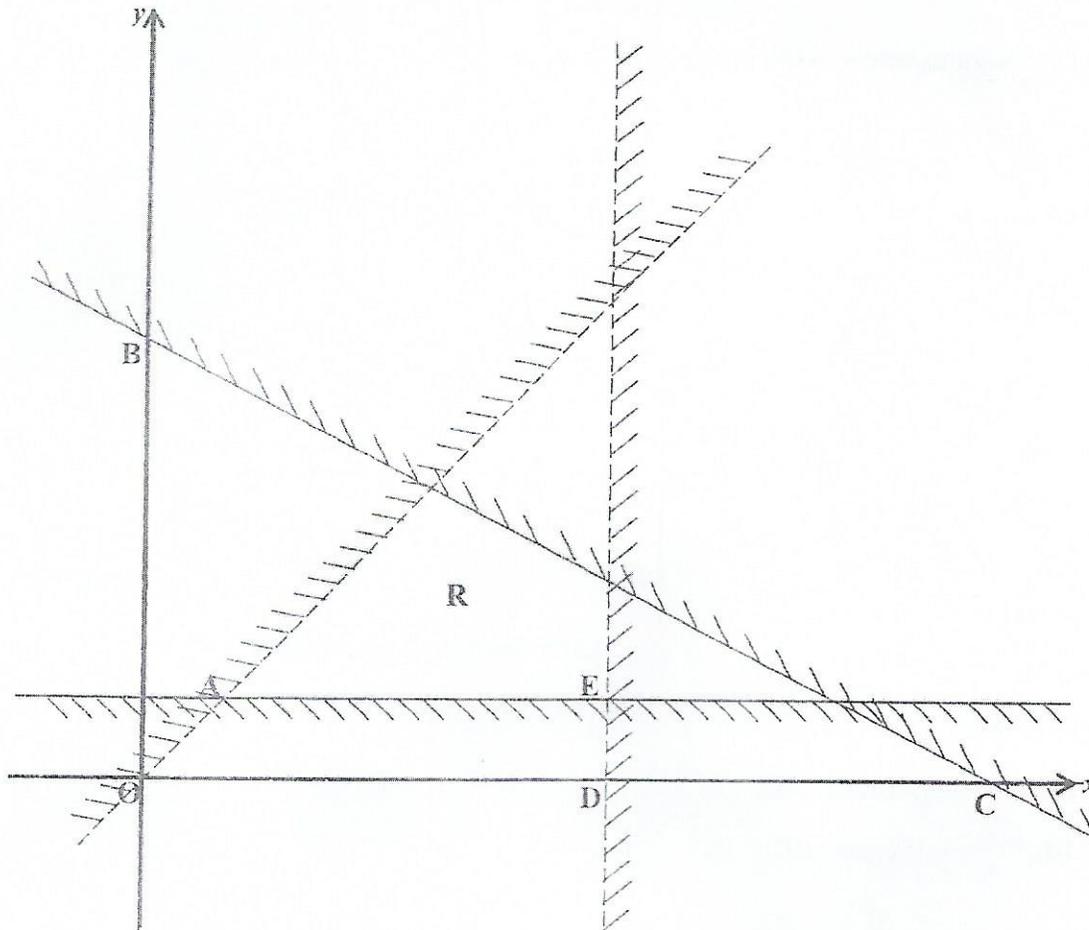
Answer: (a) [2]

(b)

[2]

[2]

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.
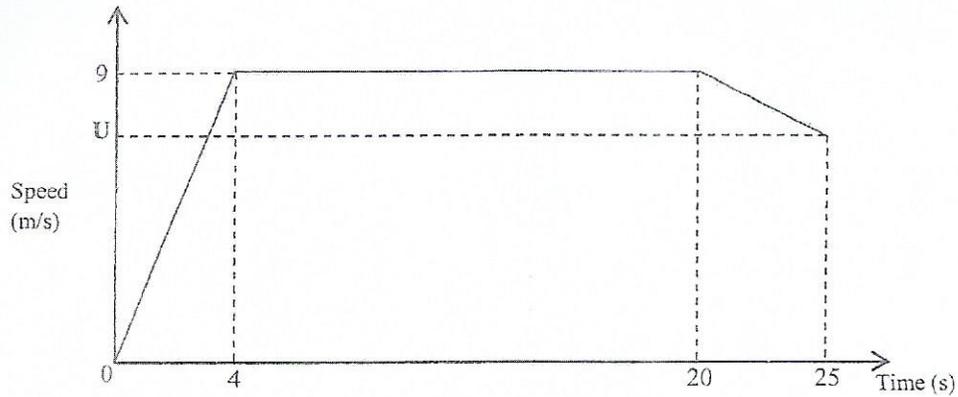
Answer: ....

....

....

.... [5]

For Examiner's use

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

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

Find the

(i) x coordinates of A and B,

(ii) coordinates of C.

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

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

            (ii) .... [2]

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) $a =$ .... [1]

(b) .... [2]

(c) $U =$ .... [3]