

Centre Number	Candidate Number

Candidate Name \_\_\_\_\_

**EXAMINATIONS COUNCIL OF ZAMBIA**

Examination for General Certificate of Education Ordinary Level

**Mathematics (Syllabus D) 4024/1**

**Paper 1**

**Thursday**

**7 JULY 2016**

Candidates answer on the question paper.  
Additional materials:  
Geometrical instruments

**Time: 2 hours**

**Instructions to Candidates**

Write your name, centre number and candidate number in the spaces provided at the top of this page.

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

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

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

No paper for rough work is to be provided.

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

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

**Information for Candidates**

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

The total number of marks for this paper is 80.

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

<b>FOR EXAMINER'S USE</b>

1 (a) Find the value of  $3 - 3 \times 3 + 3$ .

(b) Evaluate  $42 \div 0.07$ .

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

(b).....[1]

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2 (a) Simplify  $2m - 4n - 3(3n - m)$ .

(b) Evaluate  $3^2 + 2^3 \times 2^0$ .

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

(b).....[1]

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3 (a) It is given that  $10^x = 3$  and  $10^y = 9$ . What is the value of  $10^{y-x}$ ?

(b) A set has three elements. How many subsets does it have?

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

(b).....[1]

- 4 A plane flew from town A( $67^{\circ}\text{S}$ ,  $40^{\circ}\text{E}$ ) to a town B( $23^{\circ}\text{N}$ ,  $40^{\circ}\text{E}$ ). Calculate the distance AB in kilometres. ( $R = 6370\text{km}$  and  $\pi = \frac{22}{7}$ )

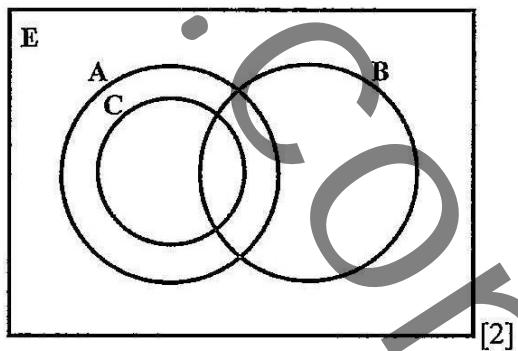
Answer: ..... [2]

- 5 An ultra modern stadium has a capacity of 43 492. Express this number in standard form correct to 2 significant figures.

Answer: ..... [2]

- 6 Using the Venn diagram in the answer space, shade the region represented by  $B' \cap (A \cap C)$ .

Answer:



7 Solve the simultaneous equations

$$x + 4y = 16,$$

$$x + y = 1.$$

**Answer:**  $x =$  .....

$y =$  ..... [3]

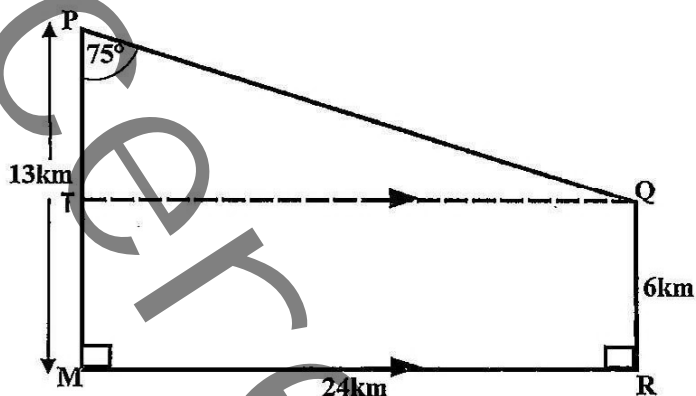
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8 Bronze is made up of zinc, tin and copper in the ratio 1: 4: 25 respectively. A bronze statue contains 120g of tin. Find the required quantities of the other metals.

**Answer:** zinc = .....g

copper = .....g [3]

- 9 In the diagram below,  $MP = 13\text{km}$ ,  $QR = 6\text{km}$  and  $MR = 24\text{km}$ .  $MR$  is parallel and equal to  $TQ$ ,  $\widehat{PMR} = \widehat{QRM} = 90^\circ$  and  $\widehat{TPQ} = 75^\circ$ .



Find

- (a)  $\widehat{PQT}$ ,  
 (b) the length  $PQ$ .

Answer: (a)  $\widehat{PQT} = \dots\dots\dots$  [1]

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

- 10 (a) The median of  $2x + 3$ ,  $x$  and  $2x + 12$  is 9, where  $x$  is a positive integer. Find the value of  $x$ .  
 (b) What is the position of 999 in the sequence represented by the  $n^{\text{th}}$  term  $n^3 - 1$ ?

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

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

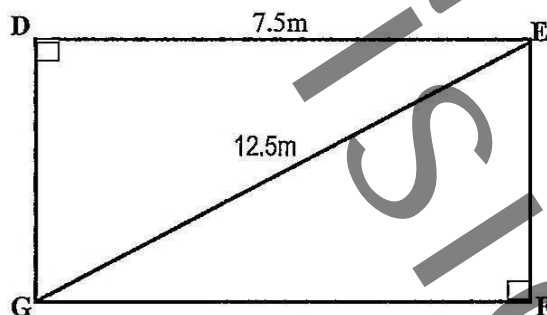
11 (a) Given that  $\vec{AB} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ , find  $|\vec{AB}|$ .

(b) If  $A = \begin{pmatrix} 1 & -2 \\ -1 & 4 \end{pmatrix}$  and  $C = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$ , calculate  $AC$ .

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

(b) ..... [2]

12 (a)  $DEFG$  is a rectangular piece of land in which  $GE = 12.5\text{m}$  and  $DE = 7.5\text{m}$ . Find the value of  $\cos \hat{E}GF$ .

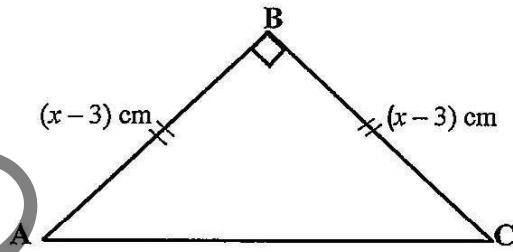


(b) The cost of advertising in a local newspaper for one week is K15.40 per word plus a fixed charge of K41.25. What is the cost of advertising 15 words for one week?

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

(b) ..... [2]

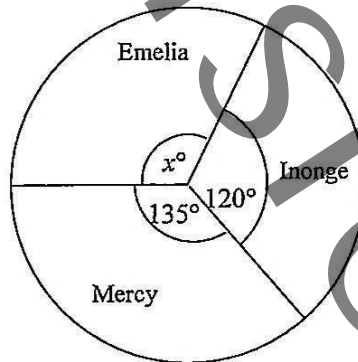
- 13 The diagram below shows an isosceles triangle  $ABC$  where  $AB = BC = (x - 3)$  cm and  $\hat{ABC} = 90^\circ$ .



Find the value of  $x$  for which the area of triangle  $ABC$  is  $18\text{cm}^2$ .

Answer: ..... [3]

- 14 The Pie chart below shows how members of a club voted for the position of chairperson.



- (a) What fraction of the members voted for Emelia?  
 (b) If 20 members voted for Inonge, how many did not vote for her?

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

(b) ..... [2]

15 A function  $h$  is defined as  $h(x) = \frac{3x+2}{4}$ .

Find

- (a)  $h(-2)$ ,
- (b) the value of  $x$  for which  $h(x) = 5$ ,
- (c)  $h^{-1}(x)$ .

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

(b) ..... [1]

(c) ..... [2]

16 It is given that  $\frac{v}{t-a} = d$ .

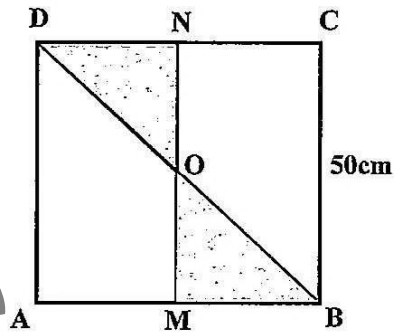
- (a) Find the value of  $d$  when  $v = 10$ ,  $t = -2$  and  $a = -4$ .
- (b) Express  $a$  in terms of  $v$ ,  $t$  and  $d$ .

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

(b) ..... [2]



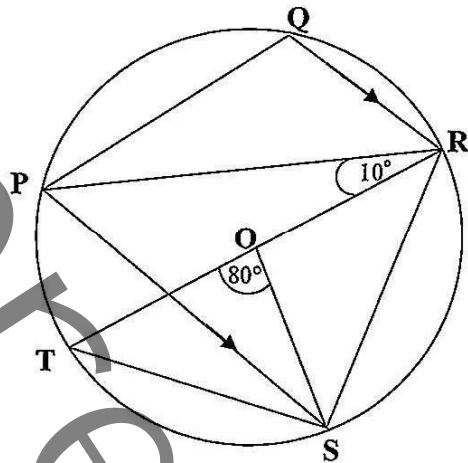
- 17** The diagram below shows a target made of a square piece of wood,  $ABCD$ , of side 50cm.  $M$  and  $N$  are midpoints of  $AB$  and  $CD$  respectively and  $O$  is the centre of the square.



A bullet is fired from some distance towards the target. Expressing your answer in its simplest form, find the probability that it will land in the shaded region.

Answer : ..... [4]

18 In the diagram below, **TR** is diameter of the circle with centre **O**, and **QR** and **PS** are parallel. Angle **TOS** =  $80^\circ$  and angle **TRP** =  $10^\circ$ .



Find

- (a)  $\hat{RPS}$ ,
- (b)  $\hat{PST}$ ,
- (c)  $\hat{PSO}$ .

- Answer: (a)  $\hat{RPS} = \dots\dots\dots [1]$   
 (b)  $\hat{PST} = \dots\dots\dots [1]$   
 (c)  $\hat{PSO} = \dots\dots\dots [2]$

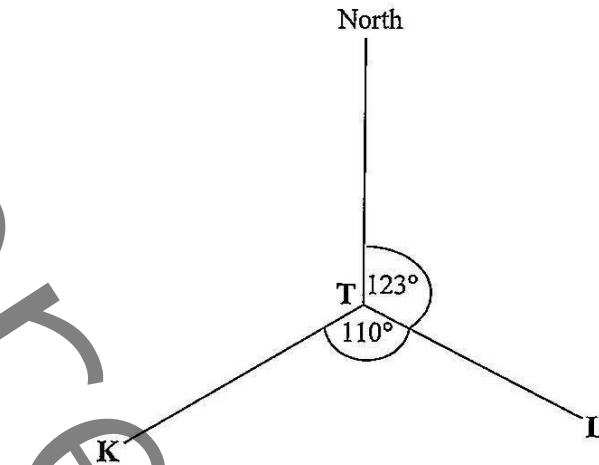
- 19 (a) A map is drawn to a scale of 1 to 50 000. Calculate
- (i) the length of a road, in **kilometres**, which is 5cm long on the map,
  - (ii) the actual area of a small town, in **square kilometres**, represented by an area of  $10\text{cm}^2$  on the map.
- (b) Find an integer value of  $q$  such that  $2q - 7 \leq 8 \leq 3q - 11$ .

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

(ii) .....  $\text{km}^2$  [2]

(b) ..... [2]

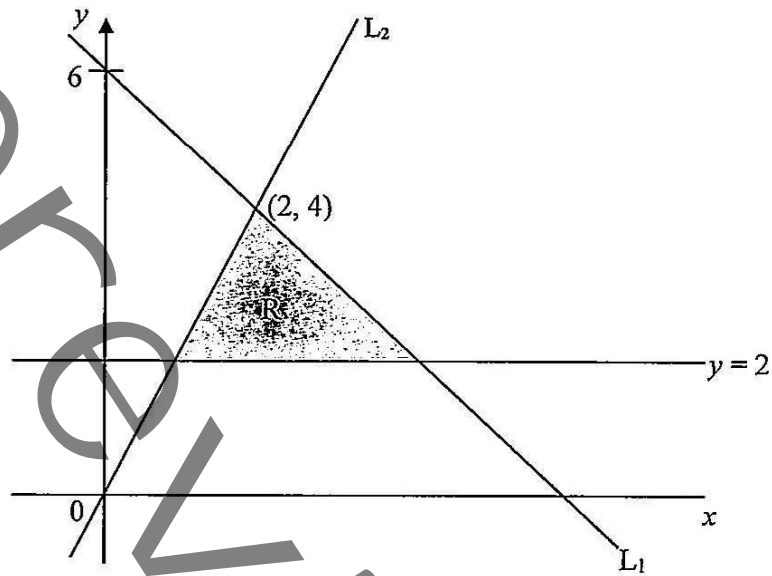
20 The diagram below shows the positions of three towns Kime (K), Teswa (T) and Luwaya (L). Angle  $KTL = 110^\circ$  and the bearing of L from T is  $123^\circ$ .



- (a) Find the bearing of
- (i) T from L,
  - (ii) T from K.
- (b) At 07 30 hours, an old Mini Bus starts off from Luwaya to Teswa at an average speed of 25km/h. Given that the distance between Luwaya and Teswa is 40km, find the time at which the bus reaches Teswa.

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

- 21 The boundary for the shaded region R is formed by the lines  $y = 2$ ,  $L_1$  and  $L_2$  as shown in the diagram below.  
Write three inequalities which define the region R.



Answer: .....  
 .....  
 ..... [5]

22 (a) A is a point (3, -4). Find the coordinates of the image of point A under

(i) a reflection in the line  $y = x$ ,

(ii) a translation with vector  $T = \begin{pmatrix} -4 \\ -2 \end{pmatrix}$ .

(b) Two similar solids have surface areas in the ratio 4:25. If the volume of the bigger solid is  $62.5\text{cm}^3$ , calculate the volume of the smaller solid.

(c) Solve the equation  $3x^2 = 5x$ .

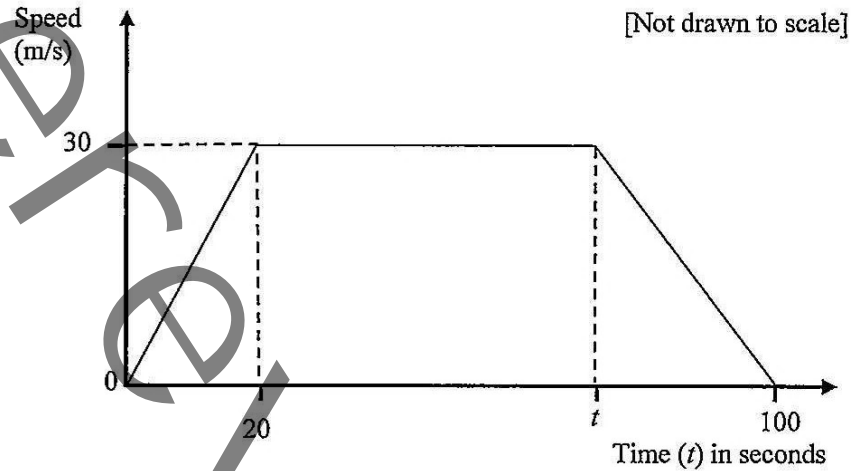
Answer: (a) (i) ..... [1]

(ii) ..... [1]

(b) ..... [2]

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

- 23 The diagram below is a speed-time graph of a car which starts from rest and accelerates uniformly for 20 seconds till it reaches a speed of 30m/s. It then moves at a constant speed for some time before it starts decelerating. It comes to rest after 100 seconds.



Given that the total distance travelled is 2 400 metres, calculate

- the value of  $t$ ,
- the retardation in the last part of the journey,
- the speed of the car at the ninety fifth second.

Answer: (a) ..... [3]  
 (b) ..... [1]  
 (c) ..... [2]