

Surname

Forename(s)

Centre Number

Candidate Number



*Zimbabwe School Examinations Council*

# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

**MATHEMATICS**

**4028/1**

PAPER 1

JUNE 2015 SESSION

2 hours 30 minutes

Candidates answer on the question paper.

Additional materials:

Geometrical instruments

Allow candidates 5 minutes to count pages before the examination.

**This booklet should not be punched or stapled and pages should not be removed.**

**TIME** 2 hours 30 minutes

## INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page and your Centre number and Candidate number on the top right corner of every page of this paper.

Answer all questions.

Check that all the pages are in the booklet and ask the invigilator for a replacement if there are duplicate or missing pages.

Write your answers in the spaces provided on the question paper using black or blue pens.

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

Omission of essential working will result in loss of marks.

Decimal answers which are not exact should be given correct to three significant figures unless stated otherwise.

Mathematical tables, slide rules and calculators should not be brought into the examination room.

## INFORMATION FOR CANDIDATES

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

**FOR EXAMINER'S USE**

**This question paper consists of 28 printed pages.**

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Centre Number

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2

**NEITHER MATHEMATICAL TABLES NOR SLIDE RULES NOR CALCULATORS MAY BE USED IN THIS PAPER**

1 Express 0,0978

- (a) correct to two decimal places,
- (b) correct to 2 significant figures,
- (c) in standard form.

*Answer*

(a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [1]

(c) \_\_\_\_\_ [1]

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3

2 (a) Evaluate  $39,6 + 0,09$ .

(b) Simplify  $\left(\frac{2}{3} - \frac{1}{2}\right) \times \frac{3}{4}$ , giving the answer in its lowest terms.

Answer (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

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4

3 A jet plane leaves Harare for Praia at 2323. The journey takes 5 hours 33 minutes and Praia's time is 2 hours behind Harare's time.

- (a) Express 2323 in 12-hour notation.
- (b) Find the time in Praia when the jet arrives.

*Answer* (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

Centre Number	Candidate Number

5

- 4 (a) Write down  $1 \times 2^4 + 1 \times 2^3 + 1 \times 2^1$  as a number in base 2.
- (b) Given that  $a = -3$ ,  $b = 3$  and  $c = -1$ ,  
evaluate  $\left(\frac{c-a}{b-a}\right)^2$ , giving the answer as a common fraction in its  
lowest terms.

Answer (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

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**6**

**5**

(a) Find  $\sqrt[3]{0,027}$ .

(b) The size of each interior angle of a regular polygon is  $168^\circ$ .

Find the number of sides of the polygon.

*Answer* (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

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7

6 Given that  $\mathbf{a} = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$  and  $\mathbf{b} = \begin{pmatrix} -3 \\ -4 \end{pmatrix}$ ,

(a) express  $\mathbf{a} - \mathbf{b}$  as a column vector,

(b) find  $|\mathbf{b}|$ .

*Answer* (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

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8

- 7 A is a set of perfect square numbers less than 50 and B is a set of even numbers not greater than 20.

Given that the elements of sets A and B are whole numbers,

- (a) list the elements of set A,  
(b) find  $n(A \cap B)$ .

*Answer* (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [1]



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**9**

**8** Solve the equation  $\frac{3}{x} = x - 2$ .

*Answer*  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [3]

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**10**

- 9 (a) If B is East of A, state the three figure bearing of A from B.
- (b) Express  $33,55^\circ$  in degrees and minutes.

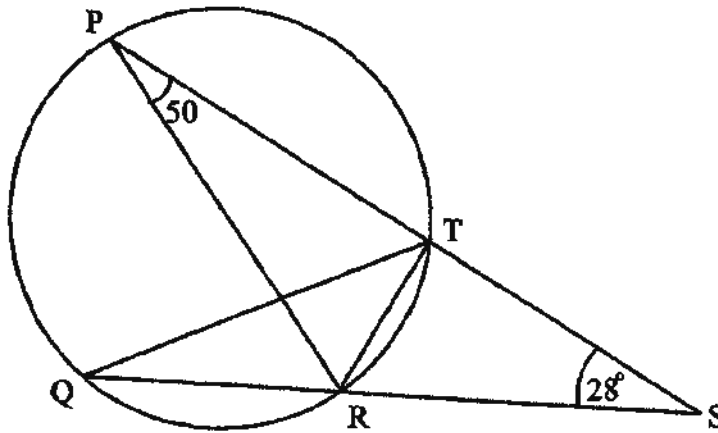
*Answer* (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

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11

10



In the diagram P, Q, R and T are points on the circumference of a circle.  
 PTS and QRS are straight lines. PR is a diameter,  $\widehat{QSP} = 28^\circ$  and  $\widehat{RPS} = 50^\circ$ .

- Calculate
- $\widehat{PRT}$ ,
  - $\widehat{QTS}$ ,
  - $\widehat{QTR}$ .

Answer (a)  $\widehat{PRT} = \underline{\hspace{2cm}}$  [1]

(b)  $\widehat{QTS} = \underline{\hspace{2cm}}$  [1]

(c)  $\widehat{QTR} = \underline{\hspace{2cm}}$  [1]

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12

11 Solve the simultaneous equations:

$$3x - y = 7$$

$$y = 5 - x$$

Answer  $x =$  \_\_\_\_\_

$y =$  \_\_\_\_\_ [3]

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13

12 It is given that  $y$  varies directly as the square root of  $z$ .

- (a) Write down the equation connecting  $y$ ,  $z$  and a constant  $k$ .
- (b) Find  $k$  when  $y = 3$  and  $z = 4$ .
- (c) Find  $y$  when  $z = 16$ .

*Answer*

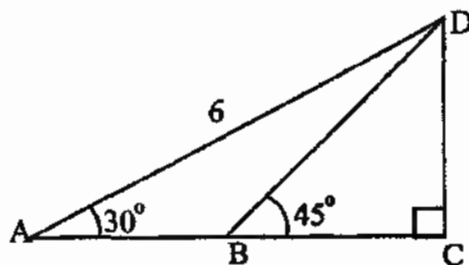
(a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [1]

(c) \_\_\_\_\_ [1]

14

13



Triangle ACD is right angled at C.

$AD = 6$  cm,  $\widehat{DBC} = 45^\circ$  and  $\widehat{DAC} = 30^\circ$ . ABC is a straight line.

Using the information below, calculate

- (a) CD,  
 (b) AB, giving the answer correct to 1 decimal place.

$$\left[ \begin{array}{l} \sin 30^\circ = 0,50; \quad \cos 30^\circ = 0,87; \quad \tan 30^\circ = 0,58; \\ \sin 45^\circ = 0,71; \quad \cos 45^\circ = 0,71; \quad \tan 45^\circ = 1,00; \end{array} \right]$$

Answer (a) \_\_\_\_\_ cm [1]  
 (b) \_\_\_\_\_ cm [2]

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15

14 Simplify

(a)  $(2a)^{-2} \times 3a^2$ ,

(b)  $\log 8 + \log 4$ .

*Answer* (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [2]

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**16**

15 Given that  $A = \begin{pmatrix} x-1 & 2 \\ x+1 & -1 \end{pmatrix}$  and  $B = \begin{pmatrix} 3 & 4 \end{pmatrix}$ ,

Find in terms of  $x$

- (a) the determinant of  $A$  in its simplest form,  
(b)  $BA$  in its simplest form.



*Answer* (a) \_\_\_\_\_ [2]  
(b) \_\_\_\_\_ [2]



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**17**

- 16 (a) On a day when the exchange rate was R9,03 to 1 USD, a trader exchanged 600 USD for rands.

Find the amount, in rands, the trader received.

- (b) Given that  $f = \frac{mv - mu}{t}$ , express  $m$  in terms of  $f$ ,  $v$ ,  $u$  and  $t$ .

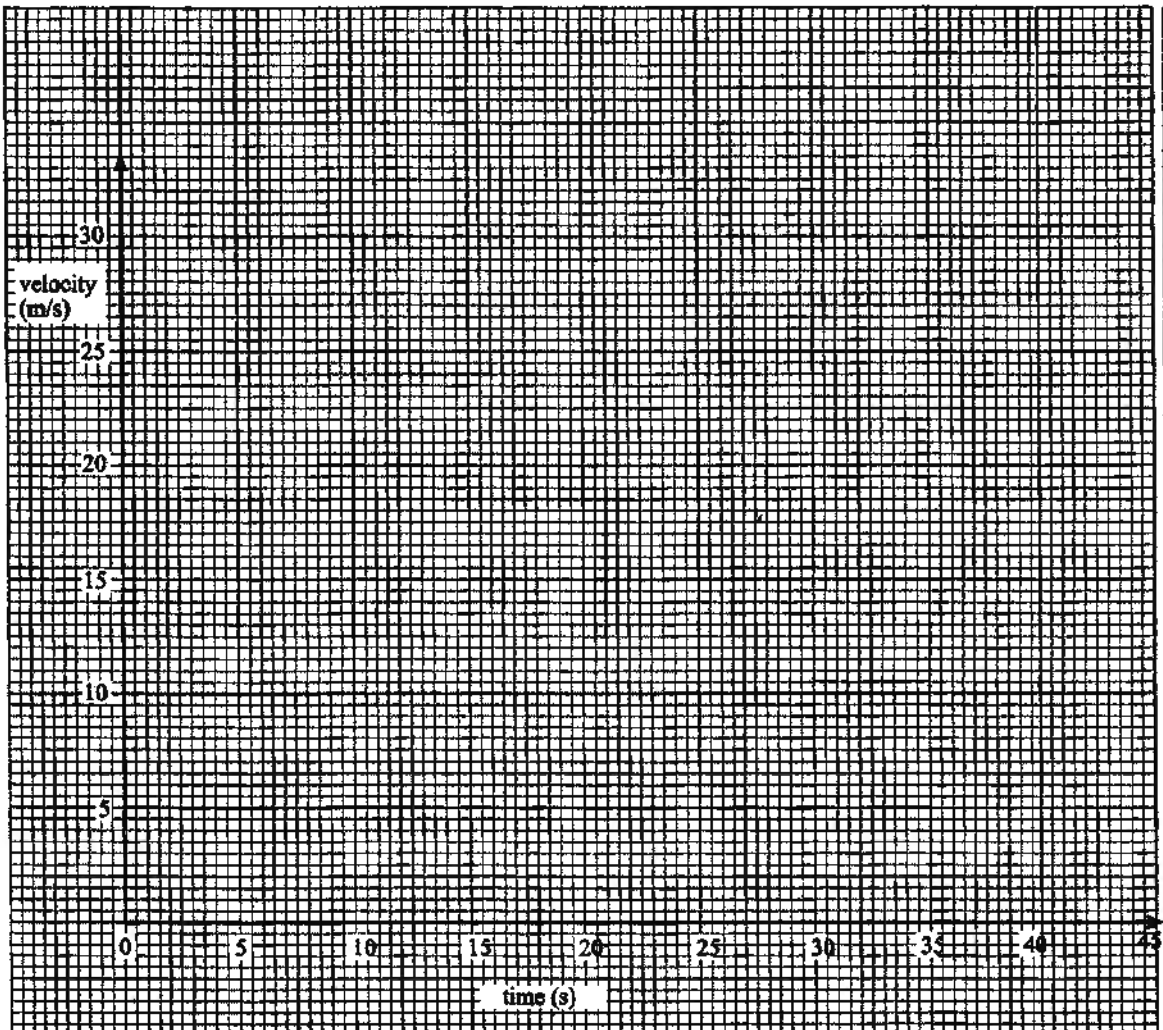
*Answer* (a) R \_\_\_\_\_ [2]

(b)  $m =$  \_\_\_\_\_ [2]

18

- 17 An object starts from rest and accelerates at  $4 \text{ m/s}^2$  for 5 seconds until it reaches a speed of  $20 \text{ m/s}$ . It then travels at this speed for 30 seconds, after which it decelerates uniformly and comes to rest in a further 10 seconds.

- (a) Draw a velocity-time graph on the grid.
- (b) Calculate the total distance travelled.



Answer (a) on the diagram [2]

(b) \_\_\_\_\_ m [2]

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19

- 18 9 white and 6 yellow identical tennis balls are placed in a box. Kuda picks balls at random one at a time.

Find the probability that the first and second balls picked are

- (a) both white,  
(b) of different colours.

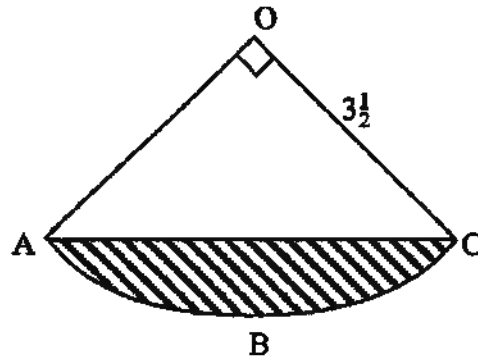
*Answer* (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [2]

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20

19



Take  $\pi$  to be  $\frac{22}{7}$

In the diagram OABC is a sector of a circle centre O and radius  $3\frac{1}{2}$  cm.

- (a) State the name given to the shaded region.
- (b) Calculate the area of the shaded region.

Answer (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_  $\text{cm}^2$  [3]

Centre Number	Candidate Number

**21**

- 20** A rural district council increases the value of land by 5 % every year.  
If the value of a piece of land is \$ 4 600,  
calculate its value in 2 years' time.

*Answer* \$ \_\_\_\_\_ <sup>2</sup> [4]

Centre Number

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22

21 Simplify  $\frac{x^2 - y^2}{x^2 + xy} + \frac{2y - 2x}{xy}$ .

*Answer* \_\_\_\_\_ [4]

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23

22 (a) Solve the equation  $3 - (2n - 5) = 32$ .

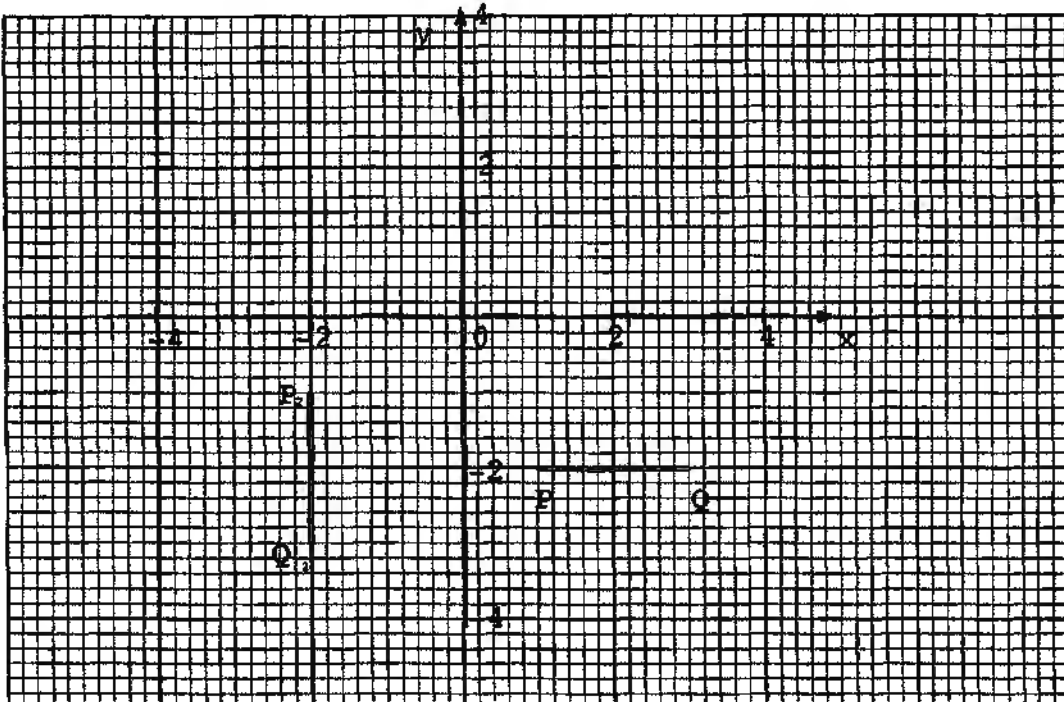
(b) Express  $\frac{7x+2}{5} - \frac{5x+3}{6}$  as a single fraction in its simplest form.

Answer (a)  $n =$  \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [2]

24

23



Use the diagram to answer the following questions.

- (a) Write down the coordinates of the image of P, if P is translated by vector  $\begin{pmatrix} -1 \\ 4 \end{pmatrix}$ .
- (b) Describe fully a single transformation which maps PQ onto  $P_2Q_2$ .

Answer (a) (   ;   ) [1]

(b) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [3]



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25

- 24 Ten students walk to Chitsa High School every day. The distances they walk, to the nearest kilometre, are given in the frequency table below.

<b>distance in kilometres</b>	1	2	3	4	5
<b>frequency</b>	4	2	2	1	1

- (a) State the least possible distance walked by a student.
- (b) Find (i) the modal distance walked,  
(ii) the median distance walked.
- (c) Calculate the mean distance walked.

*Answer*

(a) \_\_\_\_\_ km [1]

(b) (i) \_\_\_\_\_ km [1]

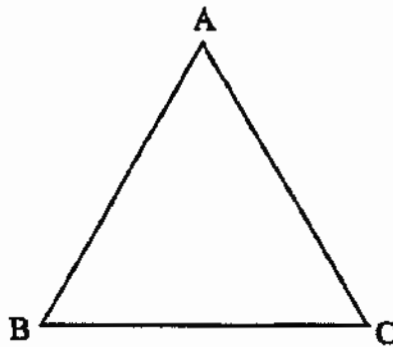
(ii) \_\_\_\_\_ km [1]

(c) \_\_\_\_\_ km [2]

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26

25



- (a) On the diagram construct using ruler and compasses only, the locus of points which are
- (i) 2 cm from BC and on the same side of BC as A,
  - (ii) 3 cm from A.
- (b) Mark and label two points P and Q which are 2 cm from BC and 3 cm from A.

<i>Answer</i>	(i)	on the diagram	[2]
	(ii)	on diagram	[1]
	(b)	on diagram	[2]

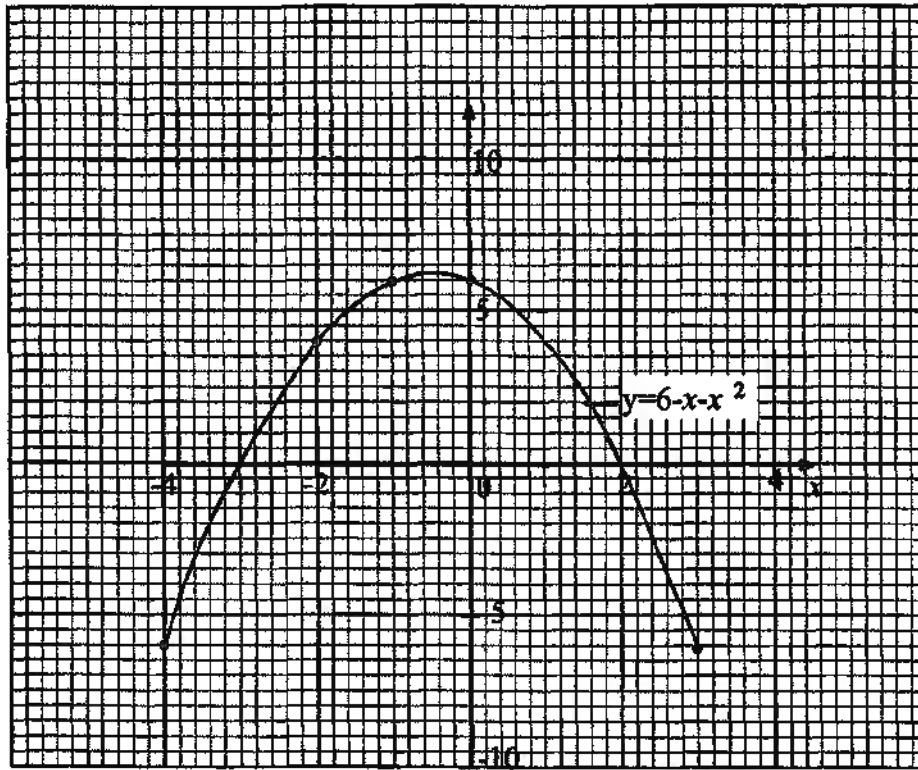
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27

- 26 The scale of the plan of a house is 1:500.
- (a) Find the length of a room on the plan which measures 8 m.
- (b) Calculate the actual height of a wall which is represented by 3,6 cm on the plan.
- (c) Find the actual area of a room which has an area of 1,6 cm<sup>2</sup> on the plan.

*Answer* (a) \_\_\_\_\_ cm [1]  
(b) \_\_\_\_\_ m [1]  
(c) \_\_\_\_\_ m<sup>2</sup> [3]

27



The diagram shows the graph of  $y = 6 - x - x^2$ .

Use the graph to

- solve the equation  $6 - x - x^2 = 0$ ,
- state the equation of the line of symmetry of the curve,
- estimate the maximum value of the function,
- estimate the area bounded by the curve, the  $x$ -axis, the lines  $x = -1$  and  $x = 1$ .

*Answer* (a)  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [1]

(c) \_\_\_\_\_ [1]

(d) \_\_\_\_\_ [2]



**ZIMBABWE SCHOOL EXAMINATIONS COUNCIL**  
General Certificate of Education Ordinary Level

**MATHEMATICS**  
PAPER 2

**4028/2**

**JUNE 2015 SESSION**     2 hours 30 minutes

Additional materials:

- Answer paper
- Geometrical instruments
- Graph paper (3 sheets)
- Mathematical tables
- Plain paper (1 sheet)
- Electronic calculator

**TIME** 2 hours 30 minutes

**INSTRUCTIONS TO CANDIDATES**

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

Answer **all** questions in Section **A** and any **three** questions from Section **B**.

Write your answers on the separate answer paper provided.  
If you use more than one sheet of paper, fasten the sheets together.

All working must be clearly shown. It should be done on the same sheet as the rest of the answer.

Omission of essential working will result in loss of marks.

If the degree of accuracy is not specified in the question and if the answer is not exact, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets [ ] at the end of each question or part question. Mathematical tables or electronic calculators may be used to evaluate explicit numerical expressions.

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**This question paper consists of 11 printed pages and 1 blank page.**

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## Section A [64 marks]

*Answer all the questions in this section.*1 (a) Express  $\frac{5}{16}$  as a

- (i) decimal fraction,  
 (ii) percentage.

[3]

(b) Simplify

(i)  $27^{\frac{2}{3}} - \left(\frac{1}{8}\right)^{\frac{1}{3}}$ ,

(ii)  $3\frac{4}{5} - \left(1\frac{2}{3} + \frac{7}{15}\right)$ , giving the answer in its lowest terms.

[5]

(c) Given that  $p = 0,045$  and  $r = 2,513 \times 10^{-4}$ ,

- (i) express  $p$  in standard form,  
 (ii) evaluate  $pr$  giving the answer in standard form.

[2]

2 (a) It is given that  $\xi = \{x : 1 \leq x \leq 10, \text{ where } x \text{ is an integer}\}$  $A = \{x : x \text{ is a prime number}\}$  and $B = \{x : x \text{ is a factor of } 20\}$ .

- (i) List all the elements of  $A$ .  
 (ii) List all the elements of  $(A \cup B)'$ .  
 (iii) Find  $n(A \cap B)$ .  
 (iv) Draw a clearly labelled Venn diagram to show the sets and their elements.

[7]

(b) Solve the equation  $\frac{3x+1}{3} - \frac{x-4}{5} = \frac{1}{2}$ . [3]

- 3 (a) It is given that 300 cattle are to be shared in the ratio 12 : 10 : 8.
- (i) Express the ratio in its simplest form.
- (ii) Calculate the difference between the largest and smallest shares. [5]

- (b) An advert in a shop read,

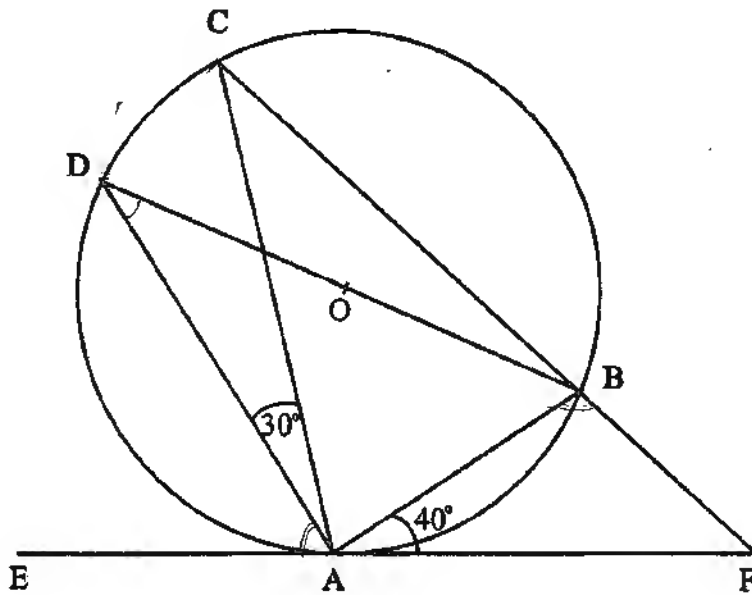
**“VALENTINE SPECIAL 25 % OFF ALL RED SHIRTS”.**

The red shirts were originally marked at \$25, 00 each.

- (i) Joko bought a red shirt.  
Calculate the amount that Joko paid for the shirt.
- (ii) Tindo bought 10 such shirts and sold them at \$23, 00 each.  
Calculate the total profit Tindo made.

[6]

4 (a)



The diagram shows points A, B, C and D on the circumference of a circle centre O. EAF is a tangent to the circle at A.

Given that  $\hat{BAF} = 40^\circ$  and  $\hat{CAD} = 30^\circ$ , calculate

- (i)  $\hat{ADB}$ ,
- (ii)  $\hat{DAE}$ ,
- (iii)  $\hat{ABF}$ ,
- (iv)  $\hat{CDB}$ .

[7]

- (b) (i) Convert  $65_{10}$  to a number in base 3.
- (ii) Simply  $3102_4 + 11101_2$ , giving the answer in base 4.

[4]

5 (a) Given that  $f(x) = 3x^2 - 7x + 1$ ,

- (i) evaluate  $f(-1)$ ,
- (ii) find the values of  $x$  when  $f(x) = -1$ .

[6]



(b) Given that  $P = \frac{n}{2}\{2a + (n-1)d\}$ ,

(i) express  $a$  in terms of  $d$ ,  $n$ , and  $P$ ,

(ii) find the value of  $a$  when  $n = 10$ ,  $d = 4$  and  $P = 20$ .

[5]

6 Answer the whole of this question on a sheet of plain paper.

Use ruler and compasses only and show clearly all construction lines and arcs.

All constructions should be done on a **single diagram**.

From a point, M, on level ground, the angle of elevation of a bird on top of a vertical pole is  $30^\circ$ . From another point, N, 10 metres closer to the pole such that M and N are on the same side of the pole, the angle of elevation of the same bird is  $45^\circ$ .

(a) Using a scale of 1 cm to represent 2 metres, construct a diagram to show the positions of M, N and the vertical pole. [6]

(b) Use the diagram to find the

(i) height of the pole,

(ii) distance of M from the bottom of the pole.

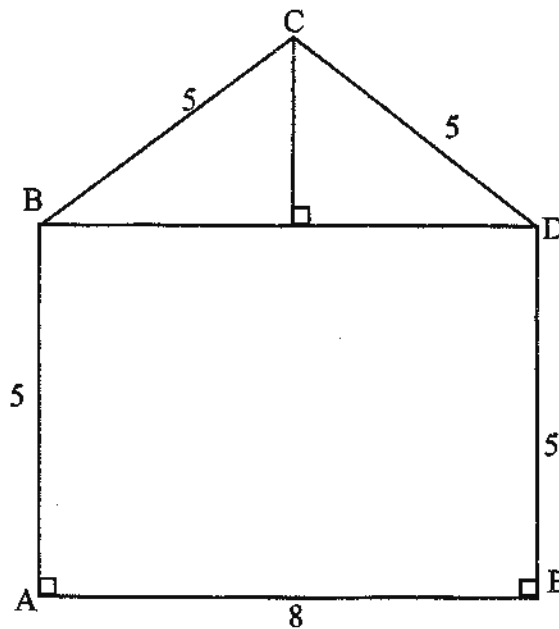
[5]

## Section B [36 marks]

Answer any three questions in this section

- 7 (a)  $M$  is directly proportional to  $(d-1)^2$ . Given that  $M = 12$  when  $d = 4$ , calculate  $M$  when  $d = 7$ . [3]

(b)



The diagram ABCDE is a cross-section of a tobacco shed that is 20 m long.  $AB = BC = CD = DE = 5$  m and  $AE = 8$  m.

Calculate the

- (i) perpendicular height of C above the side BD,
- (ii) area of the cross-section ABCDE,
- (iii) volume of the shed,
- (iv) number of bales of tobacco that can be stored in the shed up to BD, given that each bale has a volume of  $4 \text{ m}^3$ .

[9]

**8 Answer the whole of this question on a sheet of graph paper.**

A girl is given \$ 6,00 to buy fireworks for her birthday party. She buys  $x$  rockets at 60 c each and  $y$  crackers at 30 c each.

- (a) Write down an inequality in  $x$  and  $y$  and show that it reduces to  $2x + y \leq 20$ . [2]

- (b) She wants to buy at least 4 rockets and the number of crackers should be more than or equal to twice the number of rockets.

Write down **two** inequalities that satisfy these conditions. [2]

- (c) Using a scale of 2 cm to 2 units on both axes, show by shading the **UNWANTED** regions, the region in which  $(x; y)$  must lie. [5]

- (d) Use your graph to find

- (i) the combination that uses the maximum amount of money available,

- (ii) 1. the combination that uses the minimum amount of money,

2. the change she would get in (ii) 1. [3]

**9 Answer the whole of this question on a sheet of graph paper.**

Quadrilateral ABCD has vertices at A(1; 0), B(2; 0) C(2; 2) and D(1; 2)

Using a scale of 2 cm to represent 1 unit on each axes, draw the  $x$  and  $y$  axes for  $-4 \leq x \leq 6$  and  $-5 \leq y \leq 5$ .

- (a) (i) Draw and label ABCD.  
(ii) State the special name given to quadrilateral ABCD. [2]

- (b) Quadrilateral  $ABC_1D_1$  has coordinates at A(1;0), B(2;0),  $C_1(6;2)$  and  $D_1(5;2)$ .

- (i) Draw and label quadrilateral  $ABC_1D_1$ .

- (ii) Describe **fully the single** transformation that maps ABCD onto  $ABC_1D_1$ . [4]

- (c) Quadrilateral ABCD is mapped onto quadrilateral  $A_2B_2C_2D_2$  by a reflection in the line  $y = x + 2$ .

(i) Draw and label line  $y = x + 2$ .

(ii) Draw and label quadrilateral  $A_2B_2C_2D_2$ .

[3]

- (d)  $A_3B_3C_3D_3$  is the image of ABCD under an enlargement of scale factor  $-1$  with  $(-1; -1)$  as centre.

Draw and label quadrilateral  $A_3B_3C_3D_3$ .

[3]

- 10 (a) The point, M, has coordinates  $(7; -3)$  and  $\overline{RM} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$ .

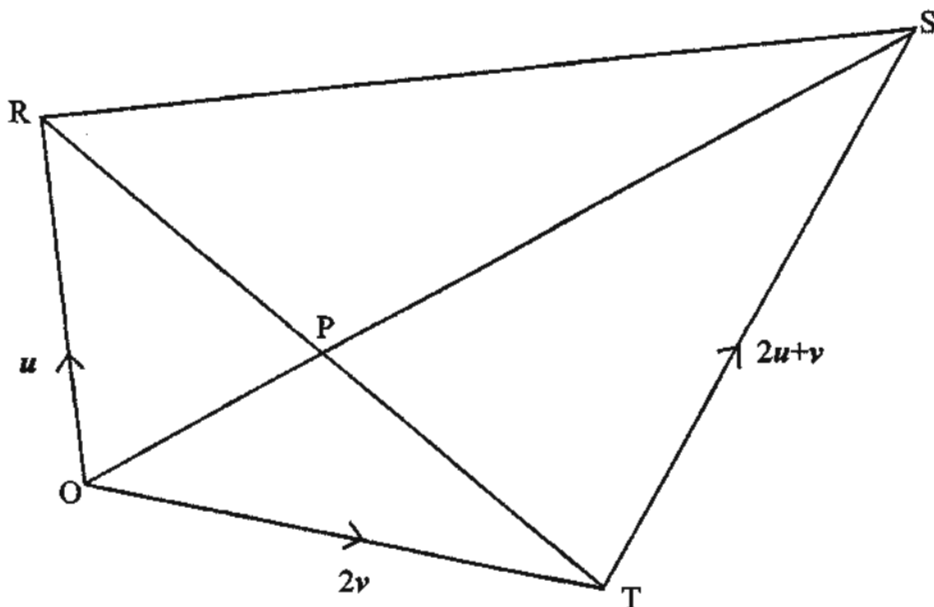
Calculate

(i) the coordinates of R,

(ii)  $\overline{MR}$ .

[3]

- (b)



The diagram is a quadrilateral ORST in which  $\overline{OR} = u$ ,

$\overline{OT} = 2v$  and  $\overline{TS} = 2u + v$ .

Diagonals OS and RT intersect at P.

- (i) Express in terms of  $u$  and/or  $v$ .
1.  $\overline{RT}$ ,
  2.  $\overline{OS}$ .
- (ii) Given that  $\overline{OP} = k\overline{OS}$ , express in terms of  $k$ ,  $u$  and/or  $v$
1.  $\overline{OP}$ ,
  2.  $\overline{RP}$  and show that it reduces to  $(2k-1)u + 3kv$ .
- (iii) Given also that  $\overline{RP} = h\overline{RT}$ , express  $\overline{RP}$  in terms of  $h$ ,  $u$  and/or  $v$ .
- (iv) Using the results in (ii) 2 and (iii), calculate the value of  $h$  and the value of  $k$ .

[9]

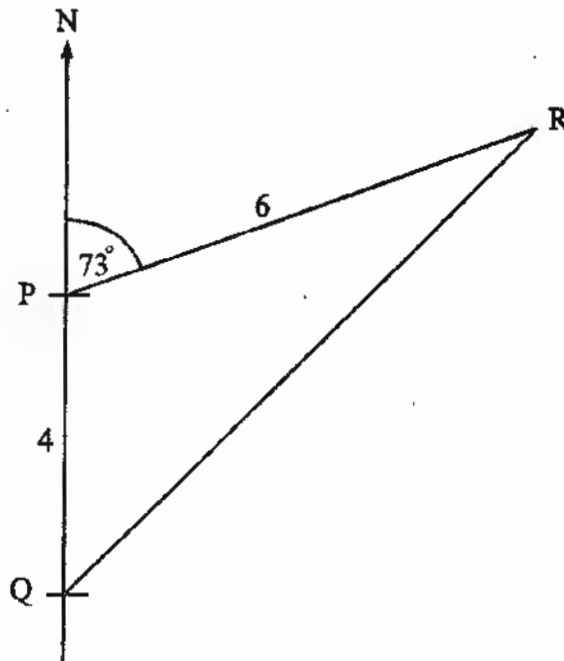
- 11 (a) Solve the simultaneous equations:

$$3x - 2y = 8$$

$$5x - 4y = 12$$

[3]

(b)



The diagram shows three points, P, Q and R such that P is 4 km North of Q and R is 6 km from P on a bearing of  $073^\circ$ .

Calculate

- (i) QR,
- (ii)  $\hat{PQR}$ ,
- (iii) the bearing of R from Q to the nearest degree.

[9]

12 Answer the whole of this question on a sheet of graph paper.

The table below shows the distribution of Mathematics marks for 500 students in an examination.

mark ( $x$ )	$x \leq 10$	$x \leq 20$	$x \leq 30$	$x \leq 40$	$x \leq 50$	$x \leq 60$	$x \leq 70$	$x \leq 80$	$x \leq 90$	$x \leq 100$
cumulative frequency( $f$ )	10	50	150	245	325	400	465	490	495	500

- (a) Using a scale of 2 cm to represent 10 marks on the horizontal axis and 2 cm to represent 50 students on the vertical axis, draw a cumulative frequency curve for this distribution. [4]
- (b) Use your graph to find the
- (i) median mark,
  - (ii) inter-quartile range. [5]
- (c) Two students are chosen at random.
- Find the probability that both students got marks less than or equal to 50. [3]

Surname

Forename(s)

Centre Number

Candidate Number



# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

**MATHEMATICS**

**4028/1**

**PAPER 1**

**NOVEMBER 2015 SESSION**

**2 hours 30 minutes**

Candidates answer on the question paper.

Additional materials:

Geometrical instruments

**Allow candidates 5 minutes to count pages before the examination.**

**This booklet should not be punched or stapled and pages should not be removed.**

**TIME** 2 hours 30 minutes

## **INSTRUCTIONS TO CANDIDATES**

Write your name, Centre number and candidate number in the spaces at the top of this page and your Centre number and Candidate number on the top right corner of every page of this paper.

Answer **all** questions.

Check that all the pages are in the booklet and ask the invigilator for a replacement if there are duplicate or missing pages.

Write your answers in the spaces provided on the question paper using **black** or **blue** pens.

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

Omission of essential working will result in loss of marks.

Decimal answers which are not exact should be given correct to three significant figures unless stated otherwise.

**Mathematical tables, slide rules and calculators should not be brought into the examination room.**

## **INFORMATION FOR CANDIDATES**

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

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**This question paper consists of 28 printed pages.**

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NEITHER MATHEMATICAL TABLES NOR SLIDE RULES NOR CALCULATORS MAY BE USED IN THIS PAPER.

1 (a) Find the value of  $\frac{8}{0,04}$ .

(b) Simplify  $1\frac{1}{2} - \frac{4}{7} + \frac{2}{3}$  giving the answer as a fraction in its simplest form.

Answer (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

2 Given that  $p = -4$ ,  $q = 3$  and  $r = -1$ , evaluate

(a)  $\frac{p+q}{r}$ ,

(b)  $\sqrt{p^2q-r}$ .

*Answer (a)* \_\_\_\_\_ [1]

*(b)* \_\_\_\_\_ [2]

- 3 In an athletics competition, under 20 boys compete in a 5 000 m race, while under 16 boys compete in a 3 000 m race.
- (a) Calculate the difference in the distances they run giving the answer in standard form.
- (b) A lap is 400 m long.  
Find the number of laps in the 5 000 m race.

*Answer (a)* \_\_\_\_\_ [2]

*(b)* \_\_\_\_\_ [1]

4 It is given that  $\overline{OP} = \begin{pmatrix} -2 \\ 7 \end{pmatrix}$  and  $\overline{OQ} = \begin{pmatrix} 12 \\ -5 \end{pmatrix}$  where O is the origin.

(a) Express  $\overline{PQ}$  as a column vector.

(b) Find

(i)  $|\overline{OQ}|$ ,

(ii) the co-ordinates of M, the midpoint of PQ.

Answer (a)  $\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$  [1]

(b) (i) \_\_\_\_\_ [1]

(ii) ( ; ) [1]

**6**

- 5 (a) Express  $1 \times 3^5 + 2 \times 3^3 + 3$  as a number in base 3.
- (b) Convert  $101_{10}$  to a number in base 9.
- (c) Evaluate  $203_7 - 154_7$  giving the answer in base 7.

*Answer (a)* \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [1]

(c) \_\_\_\_\_ [1]

6 Solve the simultaneous equations:

$$2x + 3y = 28$$

$$x + 5y = 35$$

*Answer*  $x =$  \_\_\_\_\_

$y =$  \_\_\_\_\_ [3]

7 Solve the equation:

$$\frac{2y+5}{3y-2} = \frac{9}{4}$$

*Answer*  $y =$  \_\_\_\_\_ [3]

- 8 Make  $a$  the subject of the formula  $\frac{1}{a} + \frac{1}{b} = 3$ .

*Answer* \_\_\_\_\_ [3]



- 9 When baking scones, a baker mixes **six** cups of flour, **one** cup of sugar, **two** cups of water and **half** a cup of milk, together with other ingredients.
- (a) Express the quantities of flour, sugar, water and milk as a ratio in its simplest form.
- (b) Calculate the number of cups of water needed if the baker uses four cups of flour.

*Answer* (a) \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

- 10 The probability that Sihle will bring a calculator is  $\frac{5}{6}$  while the probability that Yemurai will bring a calculator is  $\frac{3}{5}$ .

Giving the answer as a fraction in its simplest form, find the probability that,

- (a) Sihle will **not** bring a calculator for the lesson,  
(b) only one of them will bring a calculator for the lesson.

*Answer* (a) \_\_\_\_\_ [1]  
(b) \_\_\_\_\_ [2]

- 11 (a) Write down the **special** name given to a polygon with five sides.
- (b) State, for a regular five sided polygon,
- (i) the number of lines of symmetry,
  - (ii) the order of rotational symmetry.

*Answer*

(a) \_\_\_\_\_ [1]

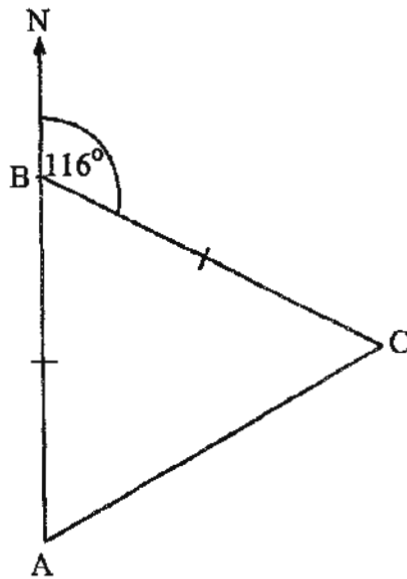
(b) (i) \_\_\_\_\_ [1]

(ii) \_\_\_\_\_ [1]

- 12 Solve the inequality  $2 - x \leq 2x - 1 < 11$ , giving your answer in the form  $a \leq x < b$ , where  $a$  and  $b$  are integers.

Answer \_\_\_\_\_  $\leq x <$  \_\_\_\_\_ [3]

13



In the diagram, A, B and C are positions of 3 boreholes where  $BA = BC$ . The borehole at C has a bearing of  $116^\circ$  from the borehole at B.

Calculate

- (a)  $\hat{ACB}$ ,
- (b) the bearing of the borehole at A from the borehole at C.

Answer (a)  $\hat{ACB} =$  \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

14 (a) If  $\log_{10} 7 = 0,8451$ , evaluate

(i)  $\log_{10} 0,07$ ,

(ii)  $\log_{10} 49$ .

(b) Evaluate  $\log_2 \left( \frac{1}{64} \right)$ .

*Answer (a)* (i) \_\_\_\_\_ [1]

(ii) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

15

The table shows part of Ms Dube's payslip for a particular month.

Earnings	\$	Deductions	\$
transport allowance	100,00	pension contribution	6,00
housing allowance	129,00	union subscription	10,00
		medical aid	8,00
		Insurance	17,50
basic salary	275,00	total deductions	_____
net salary	_____		

- (a) Calculate
- (i) the total deductions,
- (ii) the net salary.
- (b) Express the pension contribution as a percentage of her basic salary.

Answer (a) (i) \$ \_\_\_\_\_ [1]

(ii) \$ \_\_\_\_\_ [1]

(b) \_\_\_\_\_ % [2]

- 16 (a) Evaluate  $81^{\frac{3}{4}}$ .
- (b) Find  $x$  if  $9^{x-1} \times 3^{3x-2} = 3$ .

*Answer* (a) \_\_\_\_\_ [2]

(b)  $x =$  \_\_\_\_\_ [2]



- 17 Given that  $y$  is inversely proportional to  $(x-1)^2$  and that  $y = 2$  when  $x = 7$ ,
- (a) express  $y$  in terms of  $x$ ,
  - (b) calculate the values of  $x$  when  $y = 8$ .

*Answer* (a)  $y =$  \_\_\_\_\_ [2]

(b)  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [2]

- 18 A luxury coach leaves Bulawayo for Harare every morning at 7.30 am and arrives in Harare at 1.00 pm.
- (a) Express the departure time as a time in the 24 hour notation.
  - (b) Calculate the total time taken to travel from Bulawayo to Harare.
  - (c) Calculate the average speed of the bus to the nearest whole number if the distance from Bulawayo to Harare is 439 km.

*Answer*

(a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [1]

(c) \_\_\_\_\_ km/h [2]

19 Factorise completely

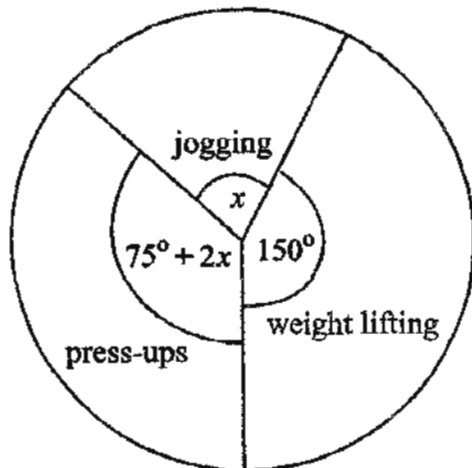
(a)  $cg - dg - ch + dh$ ,

(b)  $5d^2 - d - 4$ .

*Answer*

(a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [2]



The pie chart shows the distribution of an athlete's daily exercise programme.

- (a) Calculate the value of  $x$ .
- (b) If the athlete spent 18 minutes jogging, calculate
- the time the athlete spent on weight lifting,
  - the total time spent exercising.

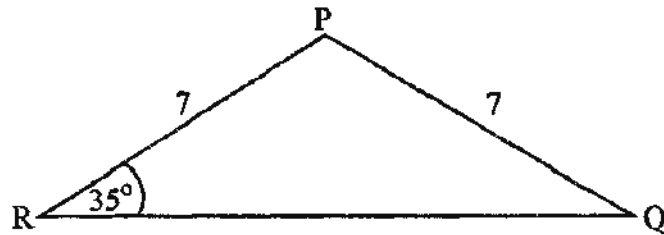
*Answer*

(a)  $x =$  \_\_\_\_\_ [1]

(b) (i) \_\_\_\_\_ [1]

(ii) \_\_\_\_\_ [2]

21



In the diagram, PQR is an isosceles triangle such that  $PQ = PR = 7$  cm and  $\hat{P}RQ = 35^\circ$ .

Using as much of the information given below as is necessary, calculate

- (a) QR,  
 (b) the area of triangle PQR.

$$\left[ \begin{array}{lll} \sin 35^\circ = 0,57 & \cos 35^\circ = 0,82 & \tan 35^\circ = 0,70 \\ \sin 70^\circ = 0,94 & \cos 70^\circ = 0,34 & \tan 70^\circ = 2,75 \end{array} \right]$$

Answer (a) \_\_\_\_\_ cm [2]

(b) \_\_\_\_\_ cm<sup>2</sup> [2]

22 It is given that,

$\xi = \{x : 31 \leq x < 37 \text{ and } x \text{ is an integer}\}$  has subsets P, Q and R such that

$P = \{x : x \text{ is a multiple of } 3\}$ ,

$Q = \{x : x \text{ is a factor of } 99\}$  and

$R = \{x : x \text{ is a prime number}\}$ .

- (a) List all the elements of R.
- (b) Write down  $n(P \cup R)$ .
- (c) List all elements of  $(P \cup Q \cup R)$ .

*Answer*

(a) \_\_\_\_\_ { } [1]

(b) \_\_\_\_\_ [1]

(c) \_\_\_\_\_ { } [2]

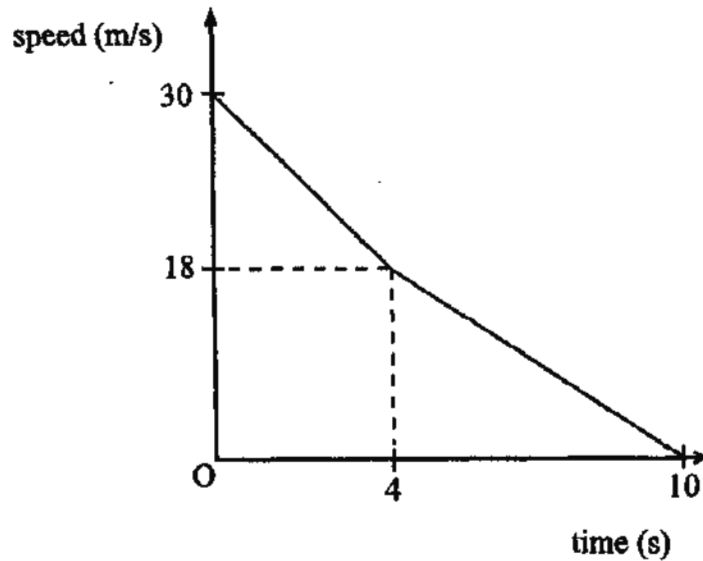
23 A map is drawn to a scale of 1: 75 000.

- (a) Calculate in km the actual distance between two towns which are 40 cm apart on the map.
- (b) An airport has an actual area of 22,5 km<sup>2</sup>.

Calculate in cm<sup>2</sup> the area of the airport on the map.

*Answer* (a) \_\_\_\_\_ km [2]  
(b) \_\_\_\_\_ cm<sup>2</sup> [2]

24



In the diagram, a moving object decelerates from a speed of 30 m/s to a speed of 18 m/s in 4 seconds and further decelerates from a speed of 18 m/s to rest in 6 seconds.

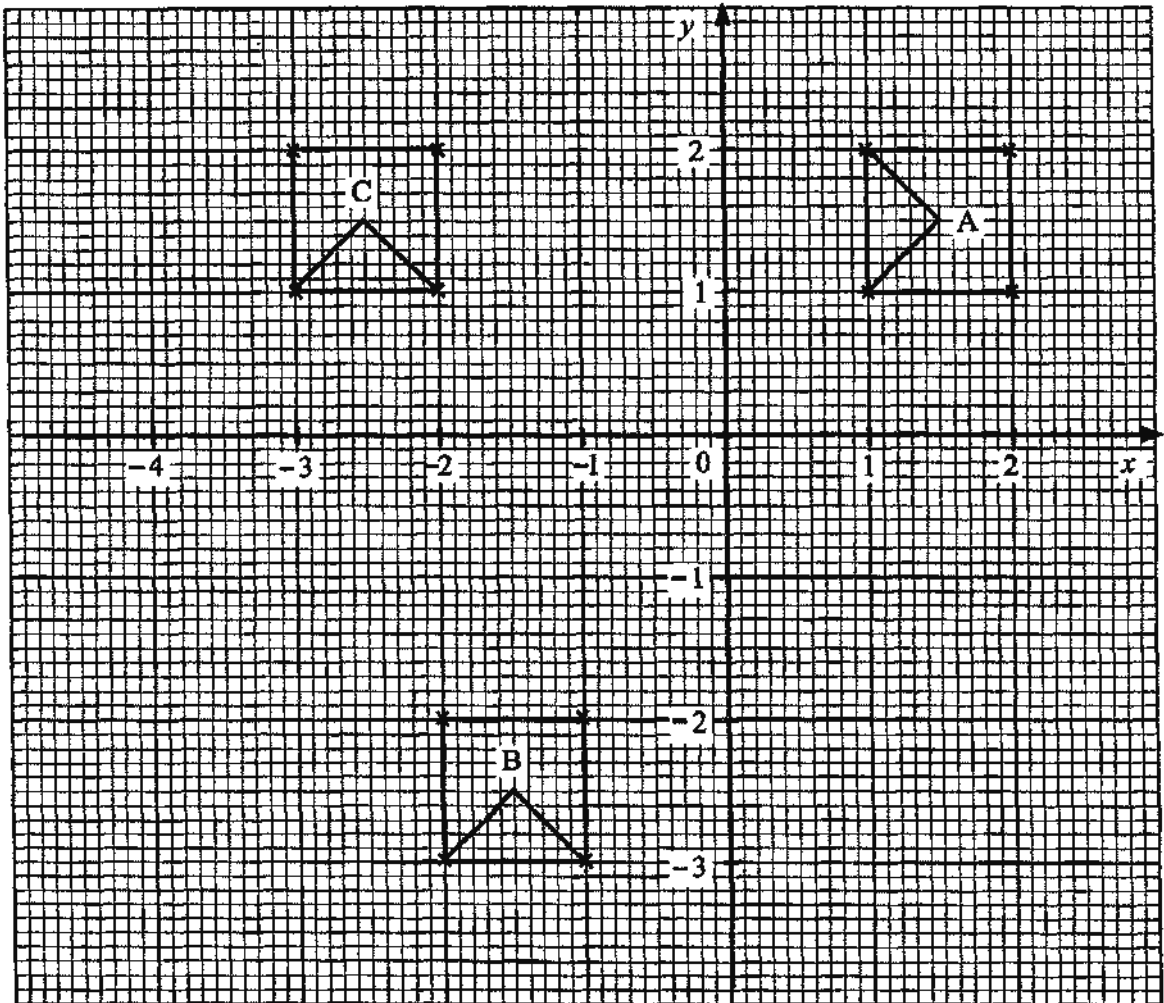
Calculate

- (a) the speed of the object after the first 2 seconds,  
 (b) the total distance covered by the object in the 10 seconds.

Answer (a) \_\_\_\_\_ m/s [2]

(b) \_\_\_\_\_ m [2]





The diagram shows three shapes A, B and C on a Cartesian plane.

- (a) Describe completely the single transformation which maps shape A onto shape B.
- (b) Shape B is mapped onto shape C by a transformation P. Describe fully the transformation P.

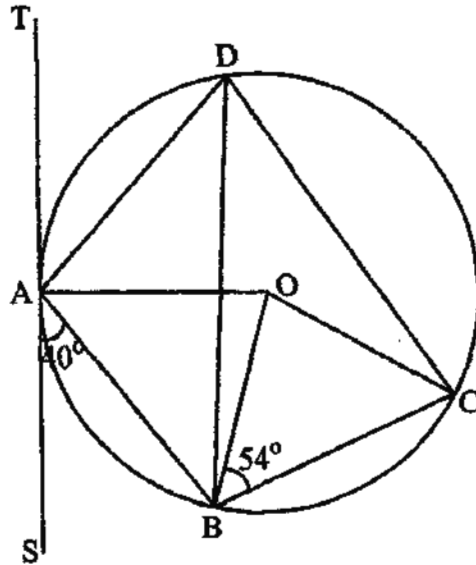
Answer (a) \_\_\_\_\_

[3]

(b) \_\_\_\_\_

[2]

26



In the diagram, O is the centre of the circle. TAS is a tangent to the circle at A.  $\hat{BAS} = 40^\circ$  and  $\hat{OBC} = 54^\circ$ .

Calculate,

- (a)  $\hat{OAB}$ ,
- (b)  $\hat{AOB}$
- (c)  $\hat{ADC}$ ,
- (d) reflex  $\hat{AOC}$

Answer (a)  $\hat{OAB} =$  \_\_\_\_\_ [1]

(b)  $\hat{AOB} =$  \_\_\_\_\_ [1]

(c)  $\hat{ADC} =$  \_\_\_\_\_ [2]

(d) reflex  $\hat{AOC} =$  \_\_\_\_\_ [2]

27 If  $F = \begin{pmatrix} 3 & x \\ -4 & -6 \end{pmatrix}$ ,  $G = \begin{pmatrix} 3 & -2 \\ 2 & -1 \end{pmatrix}$  and  $H = \begin{pmatrix} 7 \\ 1 \end{pmatrix}$ ,

find

- (a)  $F + 3G$  in terms of  $x$ ,  
 (b) the value of  $x$  if the determinant of  $F$  is  $-14$ ,  
 (c)  $GH$ .

*Answer* (a)            $\begin{pmatrix} \quad \quad \end{pmatrix}$            [2]

(b)            $x =$            [2]

(c)            $\begin{pmatrix} \quad \quad \end{pmatrix}$            [2]

Surname

Forename(s)

Centre Number

Candidate Number



# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

## MATHEMATICS

## 4008/2

### PAPER 2

NOVEMBER 2015 SESSION

2 hours 30 minutes

Candidates answer on the question paper.

Additional materials: Geometrical instruments

Mathematical tables

Allow candidates 5 minutes to count pages before the examination.

**This booklet should not be punched or stapled and pages should not be removed.**

TIME 2 hours 30 minutes

### INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page and your Centre number and Candidate number on the top right corner of every page of this paper.

Answer all questions in Section A and any three from Section B.

Check that all the pages are in the booklet and ask the invigilator for a replacement if there are duplicate or missing pages.

Write your answers in the spaces provided on the question paper using black or blue pens.

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

Omission of essential working will result in loss of marks.

Decimal answers which are not exact should be given correct to three significant figures unless stated otherwise. Answers in degrees should be given to one decimal place.

### INFORMATION FOR CANDIDATES

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

Mathematical tables may be used to evaluate explicit numerical expressions.

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**This question paper consists of 30 printed pages and 2 blank pages.**

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2

## Section A [64 marks]

*Answer all the questions in this section.*

1 (a) Find the value of  $\left(1\frac{3}{4} + 2\frac{1}{3}\right) + \frac{5}{6}$ .

*Answer* (a) \_\_\_\_\_ [3]

(b) (i) Factorise completely  $y^2 + 10y - 24$ .

*Answer* (b) (i) \_\_\_\_\_ [2]

(b) (ii) Factorise completely  $27 - 3x^2$ .

*Answer* (b) (ii) \_\_\_\_\_ [2]

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3

1 (c) It is given that  $f(x) = 10 + 3x - x^2$ .

(i) Find,  $f(2)$ .

*Answer (i)* \_\_\_\_\_ [1]

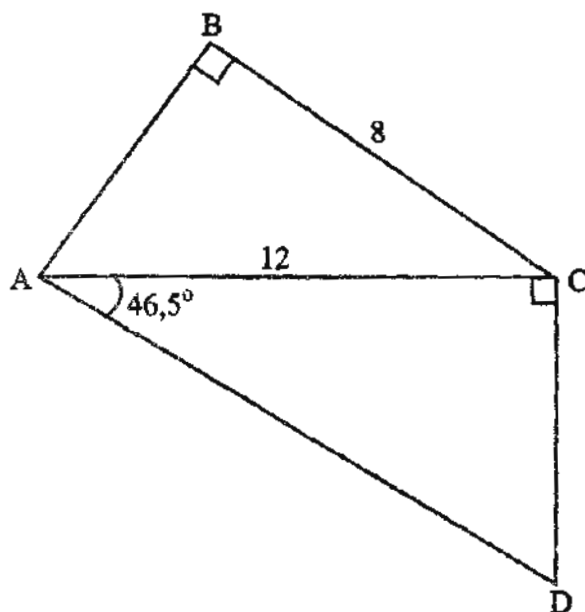
(ii) Find the values of  $x$  when  $f(x) = 0$ .

*Answer (ii)*  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [3]

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4

2 (a)



The diagram shows a quadrilateral ABCD with  $BC = 8$  cm,  $AC = 12$  cm  
 $\hat{C}AD = 46,5^\circ$  and  $\hat{A}BC = \hat{A}CD = 90^\circ$ .

(i) Calculate AB,

Answer (i)  $AB =$  \_\_\_\_\_ cm [2]

--	--

5

2 (a) (ii) Calculate CD.

*Answer* (ii) CD = \_\_\_\_\_ cm [2]

2 (a) (iii) Calculate the area of quadrilateral ABCD.

*Answer* 2 (a) (iii) \_\_\_\_\_ cm<sup>2</sup> [3]



Centre Number	Candidate Number

6

- 2 (b) Four interior angles of a nonagon have a sum of  $460^\circ$ . The remaining interior angles are equal. Find the size of each of the equal angles.

*Answer* (b) \_\_\_\_\_ [2]

- (c) A shop sells a refrigerator at \$ 540. In the previous year the same type of a refrigerator cost 8 % less.

Calculate the cost price of the same type of refrigerator in the previous year.

*Answer* 2 (c) \$ \_\_\_\_\_ [2]

Centre Number	Candidate Number

7

3 (a) It is given that  $M = \begin{pmatrix} 8 & -4 \\ -5 & 3 \end{pmatrix}$  and  $N = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$ .

(i) Find  $MN$ .

*Answer* (a) (i) \_\_\_\_\_ [2]

(ii) Find the inverse of  $M$ .

*Answer* (a) (ii) \_\_\_\_\_ [2]

(iii) Find  $M^2$ .

*Answer* (a) (iii) \_\_\_\_\_ [2]

Centre Number	Candidate Number

8

- 3 (b) Express  $\frac{2x-1}{4} - \frac{3x-5}{12}$  as a single fraction in its simplest form.

*Answer* (b) \_\_\_\_\_ [3]

- (c) The area of a trapezium is  $63 \text{ cm}^2$  and the sum of the lengths of its two parallel sides is  $22,5 \text{ cm}$ .

Calculate the perpendicular distance between the two parallel sides.

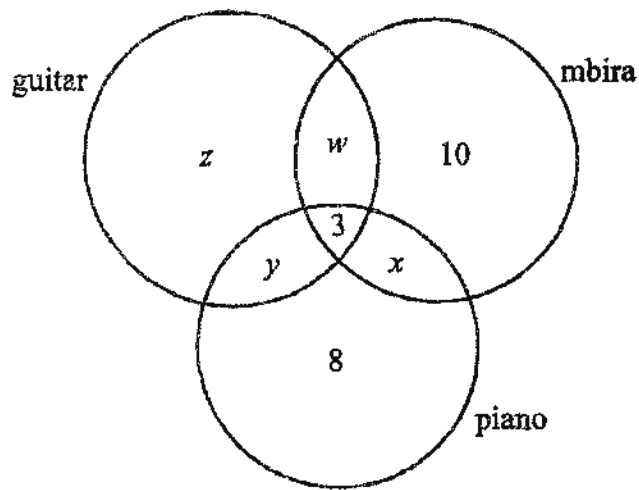
*Answer* (c) \_\_\_\_\_ cm [2]

- (a) In a survey, a class of 40 music students were taught to play mbira, piano and guitar. At the end of their course they were asked to state at least one of the three instruments they found enjoyable to play.

The table shows the students' choices.

type of instrument indicated as enjoyable	number of students
mbira	18
piano	14
guitar	20
mbira only	10
piano only	8
mbira and guitar	6
piano and mbira	5
guitar and piano	4
all the three	3

The Venn diagram shows some of the number of students in each subset.



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10

- 4 (a) (i) Find the values of  $w$ ,  $x$ ,  $y$  and  $z$ .

*Answer* (a) (i)  $w =$  \_\_\_\_\_  
 $x =$  \_\_\_\_\_  
 $y =$  \_\_\_\_\_  
 $z =$  \_\_\_\_\_ [4]

- (i) If two students were selected at random from the class, find the probability that both enjoyed playing the guitar.

*Answer* (ii) \_\_\_\_\_ [2]

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**11**

- 4 (b) Solve the equation  $9^{m-1} = 27$ . [3]

*Answer* (b)  $m =$  \_\_\_\_\_ [3]

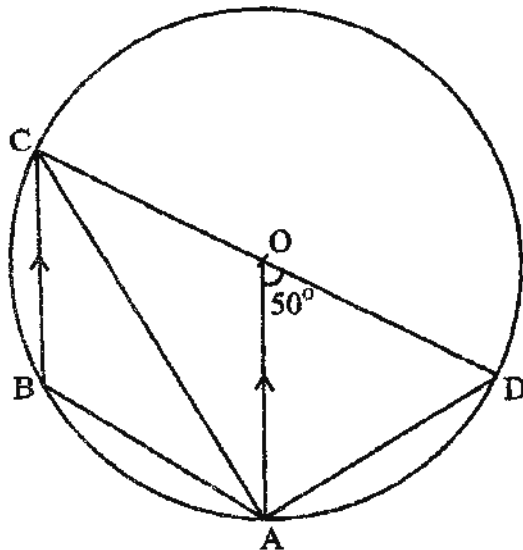
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12

- 5 (a) Make  $x$  the subject of the formula  $y = \frac{p-2x}{x}$ .

Answer (a)  $x =$  \_\_\_\_\_ [3]

- 6 (b)



In the diagram, ABCD is a circle with centre O. CD is a diameter of the circle,  $\hat{AOD} = 50^\circ$  and OA is parallel to CB.

- (i) Find  $\hat{OCA}$ .

Answer (b) (i)  $\hat{OCA} =$  \_\_\_\_\_ [1]

5 (b) (ii) Find  $\widehat{O\hat{A}D}$ .

*Answer (ii)*  $\widehat{O\hat{A}D} =$  \_\_\_\_\_ [2]

(iii) Find  $\widehat{A\hat{B}C}$ .

*Answer (iii)*  $\widehat{A\hat{B}C} =$  \_\_\_\_\_ [2]

(iv) Find  $\widehat{C\hat{A}B}$ .

[7]

*Answer (iv)*  $\widehat{C\hat{A}B} =$  \_\_\_\_\_ [2]



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14

6 Answer the whole of this question on page 15.

Use ruler and compasses only for all constructions and show clearly all construction lines and arcs.

All constructions should be done on a single diagram.

- (a) Construct on a **single diagram**
- (i) parallelogram ABCD with  $AB = 8$  cm,  $BC = 10$  cm, and  $\hat{A}BC = 120^\circ$ , line AB has been drawn on page 15.
  - (ii) the locus of points equidistant from B and C,
  - (iii) the bisector of  $\hat{A}BC$ .
- [9]
- (b) Mark and label the point X that lies on the bisector of  $\hat{A}BC$  and is equidistant from B and C. [1]
- (c) Describe the locus that the bisector of angle ABC represents. [2]

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DO NOT WRITE ON THIS SPACE

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15



- Answer*
- (a) (i) on diagram [5]
- (ii) on diagram [2]
- (iii) on diagram [2]
- (b) on diagram [1]
- (c) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

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16

## Section B [36 marks]

Answer any *three* questions in this section

Each question carries 12 marks.

7

The table shows values for the function  $y = \frac{1}{2}x(5-x)$ .

$x$	-1	0	1	2	3	4	5	6
$y$	-3	0	2	3	$p$	2	0	-3

- (a) Calculate the value of  $p$ . [1]

Answer (a)  $p =$  \_\_\_\_\_ [1]

Answer this part of the question on the grid on page 17.

- (b) Draw the graph of  $y = \frac{1}{2}x(5-x)$ . [4]

- (c) Use the graph to estimate

- (i) the maximum value of  $y$ ,
- (ii) the range of values of  $x$  for which  $y$  is positive. [2]

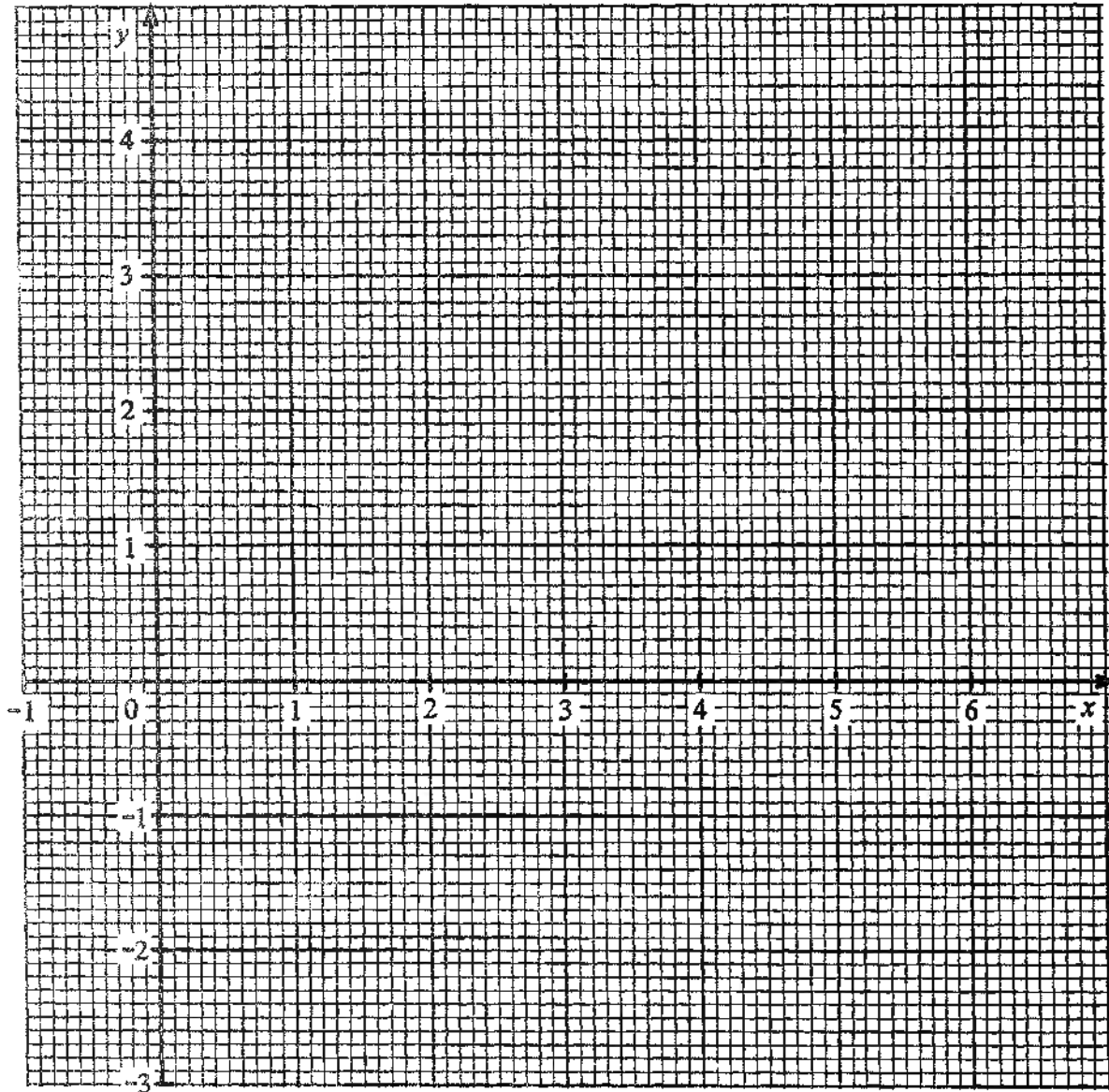
- (d) (i) Draw a suitable straight line, that can be used to solve the equation

$$\frac{1}{2}x(5-x) = x-1.$$

- (ii) Use the graph to solve the equation  $\frac{1}{2}x(5-x) = x-1$ . [3]

- (e) Find the area bounded by the curve, the  $x$ -axis and the lines  $x = 2$  and  $x = 4$ . [2]

7



(b) on diagram [4]

(c) (i)  $y =$  \_\_\_\_\_ [1]

(ii) \_\_\_\_\_ [2]

(d) (i) on diagram [1]

(ii)  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [2]

(e) \_\_\_\_\_ [2]

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18

- 8 (a) (i) Show that  $\frac{2}{1-x} - \frac{4}{x} = 3$  reduces to  $3x^2 + 3x - 4 = 0$ .

*Answer* (a) (i)

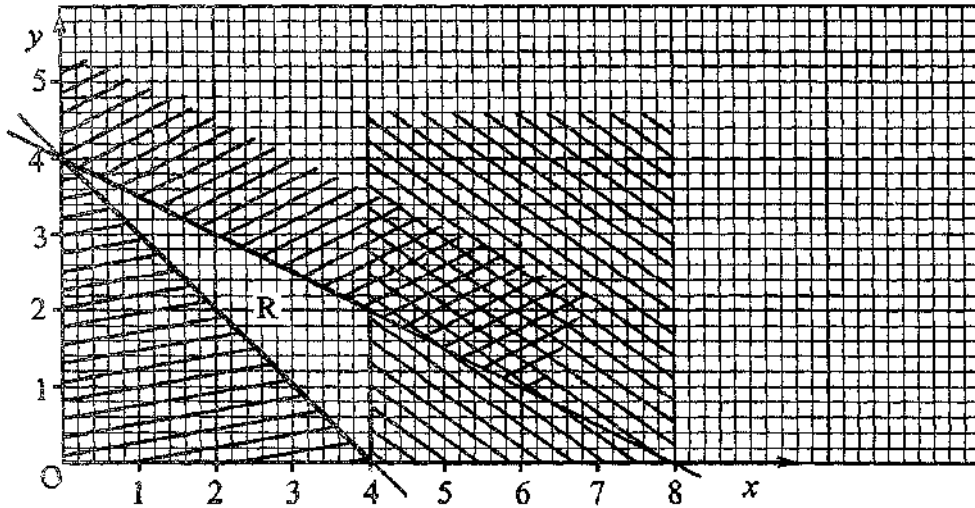
[3]

- (ii) Solve the equation  $3x^2 + 3x - 4 = 0$ , giving answers correct to 3 significant figures.

[5]

*Answer* (a) (ii)  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [5]

8 (b)



The diagram shows the unshaded region R defined by three inequalities, one of which is  $y \geq 4 - x$ .

(i) Write down the other two inequalities.

Answer (b) (i) \_\_\_\_\_  
 \_\_\_\_\_ [2]

(ii) Find the maximum value of  $3y + x$ , given that  $x$  and  $y$  satisfy these three inequalities.

Answer (b) (ii)  $3y + x =$  \_\_\_\_\_ [2]

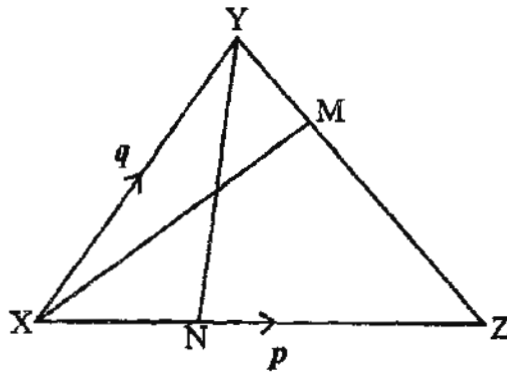
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20

- 9 (a) If  $v = \begin{pmatrix} 8 \\ u \end{pmatrix}$  and  $|v| = 17$ , find the two possible values of  $u$ . [2]

*Answer* (a)  $u = \underline{\hspace{2cm}}$  or  $\underline{\hspace{2cm}}$  [2]

- 9 (b)



In the diagram,  $\overrightarrow{XZ} = p$ ,  $\overrightarrow{XY} = q$  and  $M$  is a point on  $YZ$  such that  $3YM = YZ$ .

- (i) 1. Express  $\overrightarrow{YZ}$  as simply as possible in terms of  $p$  and /or  $q$ .

*Answer (b)* (i) 1.  $\overrightarrow{YZ} = \underline{\hspace{2cm}}$  [1]

--	--

21

- 9 (b) 2. Express  $\overline{YM}$  as simply as possible in terms of  $p$  and /or  $q$ .

*Answer (b) (i) 2.*  $\overline{YM} =$  \_\_\_\_\_ [1]

3. Express  $\overline{XM}$  as simply as possible in terms of  $p$  and /or  $q$ .

*Answer (b) (i) 3.*  $\overline{XM} =$  \_\_\_\_\_ [2]

- (ii) Given that N is the point such that  $\overline{XN} = h\overline{XZ}$ , express  $\overline{XN}$  in terms of  $h$  and  $p$ .

*Answer (b) (ii)*  $\overline{XN} =$  \_\_\_\_\_ [1]

- (iii) Given also that  $\overline{XM} = h p + k q$ , use the two expressions for  $\overline{XM}$  to find the value of  $h$  and the value of  $k$ .

(iii)  $h =$  \_\_\_\_\_

$k =$  \_\_\_\_\_ [2]



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- 9 (b) (iv) 1. Write down the numerical value of  $\frac{XN}{NZ}$ ,

*Answer (b) (iv) 1.*  $\frac{XN}{NZ} =$  \_\_\_\_\_ [1]

2. Write the ratio of the area of  $\triangle XYN$  : area of  $\triangle XYZ$   
in its simplest form.

*Answer (b) (iv) 2.* \_\_\_\_\_ [1]

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23

10 Answer the whole of this question on page 24.

The triangle LMN has vertices at L (3; 1), M (2; 2) and N (0; 1).

(a) Draw and label triangle LMN. [1]

(b) Triangle LMN is mapped onto triangle  $L_1M_1N_1$  by a reflection in the line  $y = 1$ .

Draw and label triangle  $L_1M_1N_1$ . [3]

(c) Triangle LMN is mapped onto triangle  $L_2M_2N_2$  by a rotation through  $180^\circ$  about the point  $(-1; 0)$ .

Draw and label triangle  $L_2M_2N_2$ . [3]

(d) Triangle  $L_3M_3N_3$  is the image of triangle LMN under a transformation

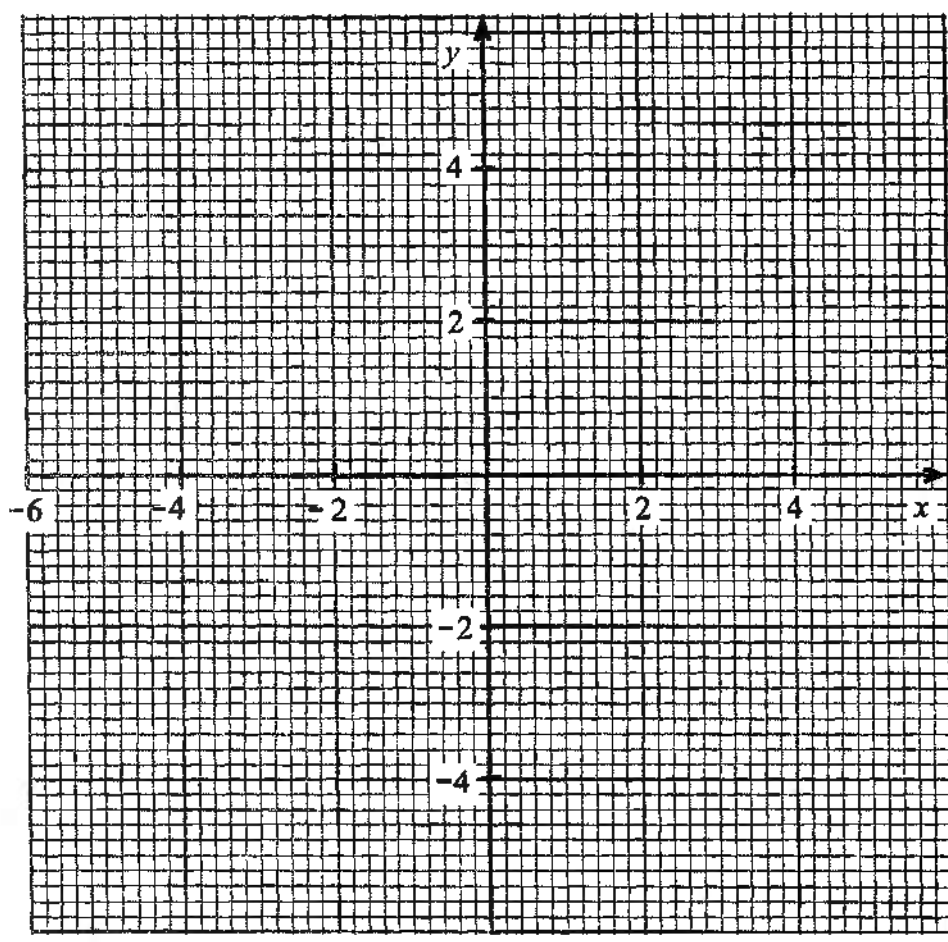
P, represented by the matrix  $\begin{pmatrix} -2 & 0 \\ 0 & 1 \end{pmatrix}$ .

(i) Draw and label triangle  $L_3M_3N_3$ .

(iii) Describe fully the single transformation P, which maps triangle LMN onto triangle  $L_3M_3N_3$ . [5]

**DO NOT WRITE ON THIS SPACE**

10



- Answer*
- (a) on diagram [1]
  - (b) on diagram [3]
  - (c) on diagram [3]
  - (d) (i) on diagram [2]
  - (ii) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

25

- 11 The marks obtained by 80 students in a Mathematics test are shown in the table.

mark $m$ (%)	frequency
$0 < m \leq 20$	0
$20 < m \leq 30$	5
$30 < m \leq 40$	19
$40 < m \leq 50$	18
$50 < m \leq 60$	16
$60 < m \leq 70$	14
$70 < m \leq 80$	4
$80 < m \leq 90$	2
$90 < m \leq 100$	2

- (a) Estimate the mean mark for the students' test. [3]

Answer (a) \_\_\_\_\_ [3]

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- 11 (b) The following is an incomplete cumulative frequency table for the distribution.

mark (%)	$m \leq 20$	$m \leq 30$	$m \leq 40$	$m \leq 50$	$m \leq 60$	$m \leq 70$	$m \leq 80$	$m \leq 90$	$m \leq 100$
Cumulative frequency	0	5	24	42	58	72	q	78	80

- (i) Find the value of  $q$ .

*Answer (b) (i)*  $q =$  \_\_\_\_\_ [1]

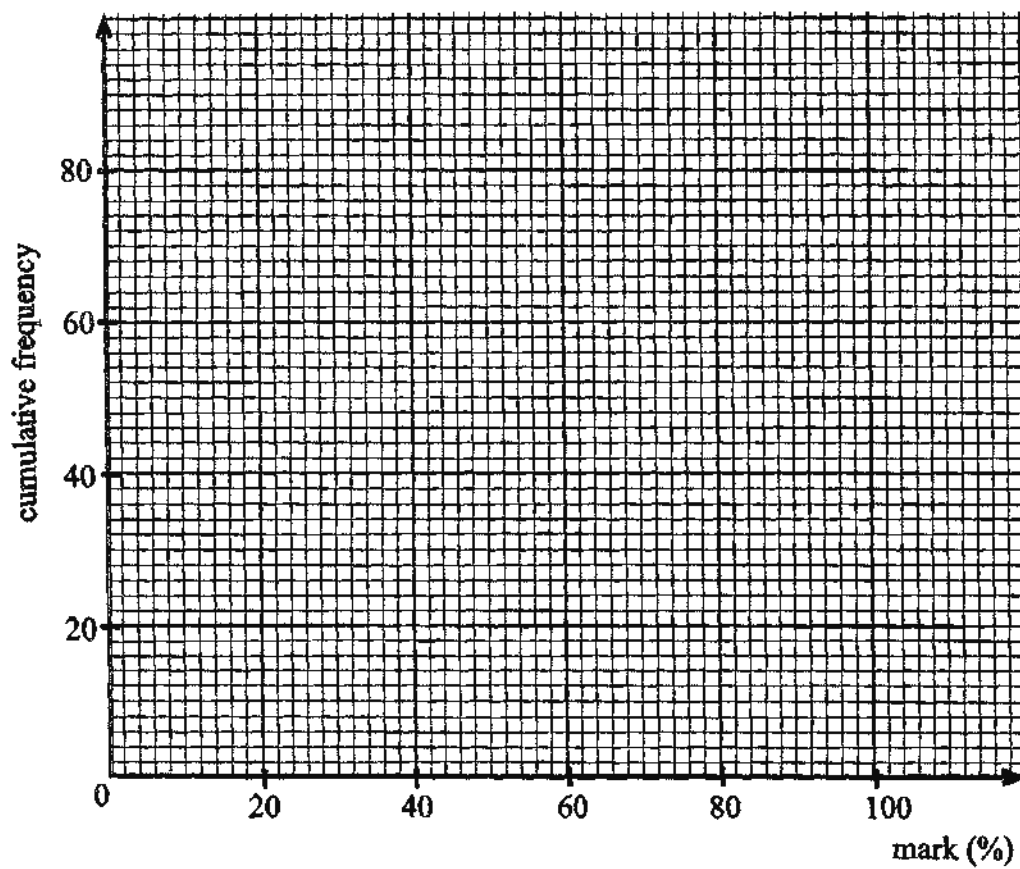
Answer the whole of this part of the question on the grid on page 27.

- (ii) Draw a cumulative frequency curve to illustrate this information. [4]
- (iii) Showing your method clearly on the graph, use your graph to estimate
1. the median mark,
  2. the number of students whose marks were more than 45 % but less than 75 %. [4]

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11 (b)



*Answer (b)* (ii) on diagram [4]

(iii) 1. \_\_\_\_\_ [2]

2. \_\_\_\_\_ [2]

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12 In this question take  $\pi$  to be  $\frac{22}{7}$ .

$$\left[ \begin{array}{l} \text{curved surface of cone} = \pi r l \\ \text{volume of cone} = \frac{1}{3} \pi r^2 h \end{array} \right]$$

(a) A right cone, made of paper, has a base radius of 8 cm and a slant height of 10 cm.

(i) Calculate for the cone, the perpendicular height,

*Answer (a) (i)* \_\_\_\_\_ cm [2]

(ii) Calculate for the cone, the curved surface area,

*Answer (a) (ii)* \_\_\_\_\_ cm<sup>2</sup> [2]

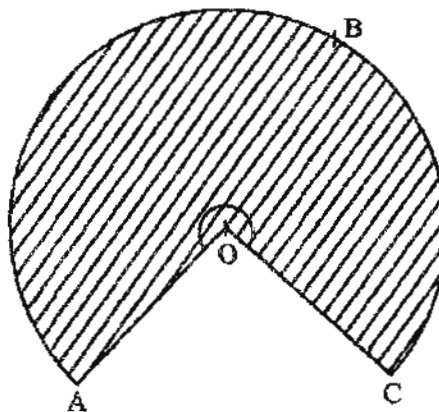
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**29**

(iii) Calculate for the cone, the volume.

Answer (a) (iii) \_\_\_\_\_ cm<sup>3</sup> [2]

- 12 (b) The cone is cut open to make a sector ABC of a circle centre O as shown in the diagram.





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30

12 (b) Calculate reflex  $\hat{AOC}$ .

*Answer* (b)  $\hat{AOC} =$  \_\_\_\_\_ [3]

(c) Another cone, PQR, which is similar to the right cone in (a) has a slant height of 18 cm.

Calculate the base area of the cone PQR.

(c) \_\_\_\_\_ [3]