

*For Performance Measurement*

**Zimbabwe School Examinations Council**

**GENERAL CERTIFICATE OF EDUCATION  
ORDINARY LEVEL**

**MATHEMATICS 4008, 4028**

**Past Question Papers and Expected Answers**

**June 2008 - November 2010 Examinations**

*Zimbabwe School Examinations Council  
Upper East Road  
Mount Pleasant  
Harare*

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## FOREWORD

This is the second series of the Zimbabwe School Examinations Council Question and Answer Booklets at the Ordinary Level of the General Certificate of Education. The booklet is made up of question papers and suggested answers for past examinations. The Council hopes that the booklet will help both teachers and students in their preparation for examinations.

Candidate Name

Centre Number

Candidate Number



# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

## MATHEMATICS

## 4008/1, 4028/1

PAPER 1

JUNE 2008 SESSION

2 hours 30 minutes

Candidates answer on the question paper.

Additional materials:

Geometrical instruments

**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.

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.

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**

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**This question paper consists of 24 printed pages.**

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

- 1 (a) Express 0,000 0526 in standard form.
- (b) Estimate by first rounding off each number to one significant figure,  
the value of  $\frac{3,04 \times 1,98 - 9,48}{2,91}$ .

For  
Examiner's  
Use

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

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

2 Express

- (a)  $5,3 \text{ km}^2$  in hectares,  
(b) 20 litres in cubic centimetres,  
(c) 408 hours in weeks and days.

*Answer* (a) \_\_\_\_\_ ha [1]  
(b) \_\_\_\_\_  $\text{cm}^3$  [1]  
(c) \_\_\_\_\_ weeks \_\_\_\_\_ days [1]

- 3 (a) Find the value of the base  $y$  such that  $6703_y - 725_y = 5756_y$ .  
(b) Convert  $134_5$  to a number in base two.

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

4 In a shop one loaf of bread cost \$65 000.

(a) Find

(i) the cost of a dozen loaves of bread;

(ii) the number of loaves of bread that could be bought for \$4 550 000.

(b) Write down the type of variation which connects the cost of bread and the number of loaves of bread bought.

For  
Examiner's  
Use

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

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

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

- 5 (a) Write down **one** capital letter of the alphabet which has rotational symmetry of order 2 but no line of symmetry.
- (b) The mean of  $m, p, q$  and  $r$  is 8.25.  
The mean of  $m, n, p, q$  and  $r$  is 4.6.  
Find the value of  $n$ .

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

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

- 
- 6 The radius,  $r$  cm, of a circle is given as 9 cm, correct to the nearest whole number.

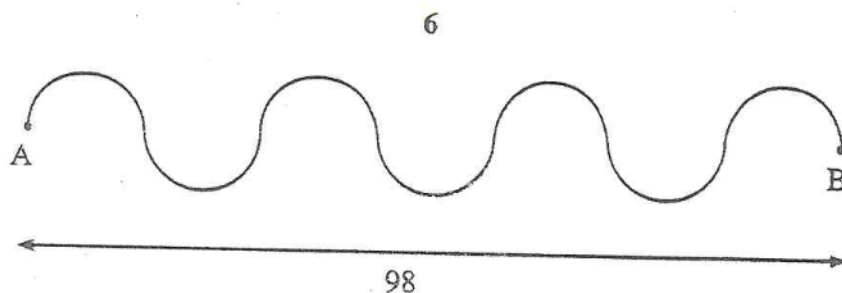
- (a) Write down the limits between which  $r$  must lie.
- (b) Calculate the least possible circumference of the circle, giving your answer in terms of  $\pi$ .

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

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



7



The diagram shows a pattern which is made up of identical semi-circular arcs. The shortest distance between the ends A and B is 98 cm.

Calculate

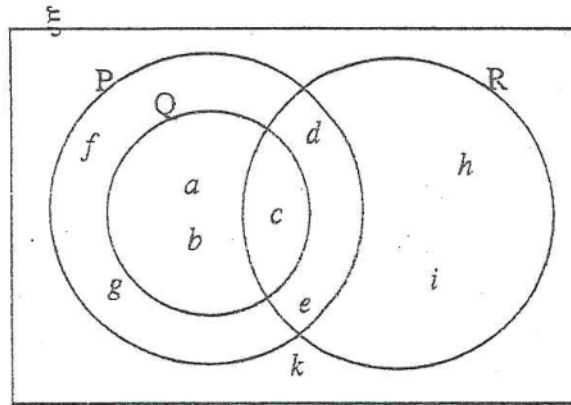
- (a) the diameter of each semi-circle,  
 (b) the distance from A to B along the curves.

$$\left( \text{Take } \pi = \frac{22}{7} \right)$$

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

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

For  
Examiner's  
Use



The Venn diagram shows the universal set,  $\xi$  and the sets P, Q and R with their members.

- (a) From the venn diagram, list the members of
- (i)  $P \cap Q$ ,
  - (ii)  $P' \cap Q'$ .
- (b) Find  $n(P)$ .

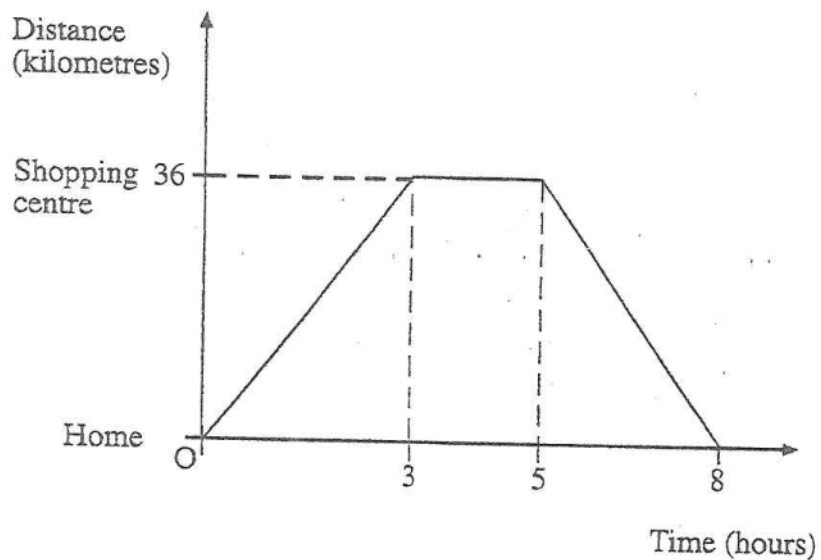
*Answer*

(a) (i)  $P \cap Q =$  \_\_\_\_\_ [1]

(ii)  $P' \cap Q' =$  \_\_\_\_\_ [1]

(b)  $n(P) =$  \_\_\_\_\_ [1]

9



The diagram is the distance-time graph of a cyclist who goes out shopping and returns home.

Calculate

- the time spent at the shopping centre,
- the average speed for the whole journey.

Answer (a) \_\_\_\_\_ hours [1]  
 (b) \_\_\_\_\_ km/h [2]

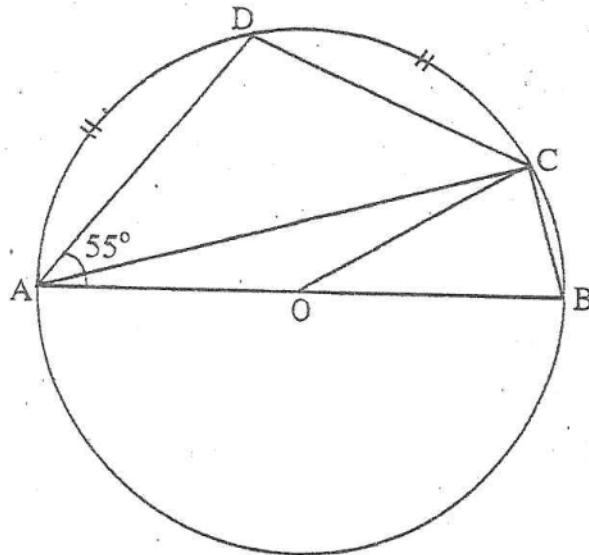
- 10 A bag contains 60 identical marbles, except for colour. 36 are green,  $x$  are red and the rest are blue.

For  
Examiner's  
Use

- (a) If the probability of selecting a red marble at random is  $\frac{1}{3}$ , find  $x$ .
- (b) Two marbles are drawn, one after the other, with replacement. Find the probability that neither marble is green, giving your answer as a common fraction in its lowest terms.

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

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



In the diagram ABCD is a circle centre O. Arc AD = arc DC,  $\hat{D}AO = 55^\circ$  and AOB is a straight line.

Calculate

- (a)  $\hat{BCD}$ ,
- (b)  $\hat{ACB}$ ,
- (c)  $\hat{DAC}$ .

- Answer*
- (a)  $\hat{BCD} =$  \_\_\_\_\_ [1]
  - (b)  $\hat{ACB} =$  \_\_\_\_\_ [1]
  - (c)  $\hat{DAC} =$  \_\_\_\_\_ [1]

12 Evaluate

(a)  $(-32)^{\frac{2}{3}}$ ,

(b)  $\frac{1}{5^{-3}}$ .

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

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

13 Factorise completely

(a)  $15m + 18 - 10mn - 12n$ ,

(b)  $27x^2 - 12y^2$ .

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

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

- 14 The following is an extract of Mr Dube's telephone bill for the month of January 2002.  $x$  is the number of units used and  $y$  is the Value Added Tax (VAT).

DATE	ACCOUNT DETAILS	AMOUNT
31 Jan 2002	Rental from 01/02/02 to 28/02/02	140,00
	Metered units 02781 01685 ( $x$ units)	2 192,00
	Sub Total	2 332,00
	VAT @ 15.0%	$y$
	Amount Due	

- (a) Find,
- the units used,  $x$
  - the cost per unit.
- (b) Calculate the Value Added Tax,  $y$ .

Answer (a) (i) \_\_\_\_\_ [1]  
(ii) \$ \_\_\_\_\_ [2]  
(b) \$ \_\_\_\_\_ [1]

- 15 (a) A triangle has sides of length 7 cm, 15 cm and  $x$  cm. If  $x$  is an integer, find
- (i) the minimum value of  $x$ ,
  - (ii) the maximum value of  $x$ .
- (b) The sum of the interior angles of an irregular polygon is  $5040^\circ$ . Find the number of sides of the polygon.

For  
Examiner's  
Use

*Answer* (a) (i) minimum  $x =$  \_\_\_\_\_ [1]

(ii) maximum  $x =$  \_\_\_\_\_ [1]

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



16 The selling price of school shoes at a departmental store in January 2005 was \$750 000 per pair.

- (a) Calculate the amount paid for one pair of school shoes if a 10% discount was allowed.
- (b) In February 2005 the price rose by 15%. Calculate the new selling price of one pair of school shoes.

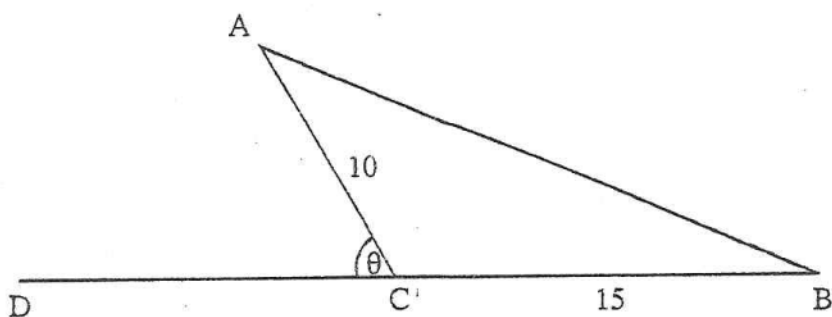
For  
Examiner's  
Use

*Answer*

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

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

17



In the diagram DCB is a straight line.  $BC = 15$  cm,  $AC = 10$  cm and  $\hat{ACD} = \theta$ .

Given that  $\sin\theta = \frac{3}{5}$ , find

- (a)  $\cos\theta$ ,
- (b) the area of  $\triangle ABC$ .

Answer (a)  $\cos\theta =$  \_\_\_\_\_ [2]

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

18 Bulawayo and Harare are 400 km apart by air.

A helicopter leaves Bulawayo at 2.30 p.m. and arrives in Harare at 4.10 p.m. on the same day. Calculate

- (a) the average speed of the helicopter,
- (b) the arrival time in Bulawayo in the 24-hour clock on the return journey if the helicopter leaves Harare at 10.36 p.m. and takes 1 hour 49 minutes.

*Answer* (a) \_\_\_\_\_ km/h [2]  
(b) \_\_\_\_\_ [2]

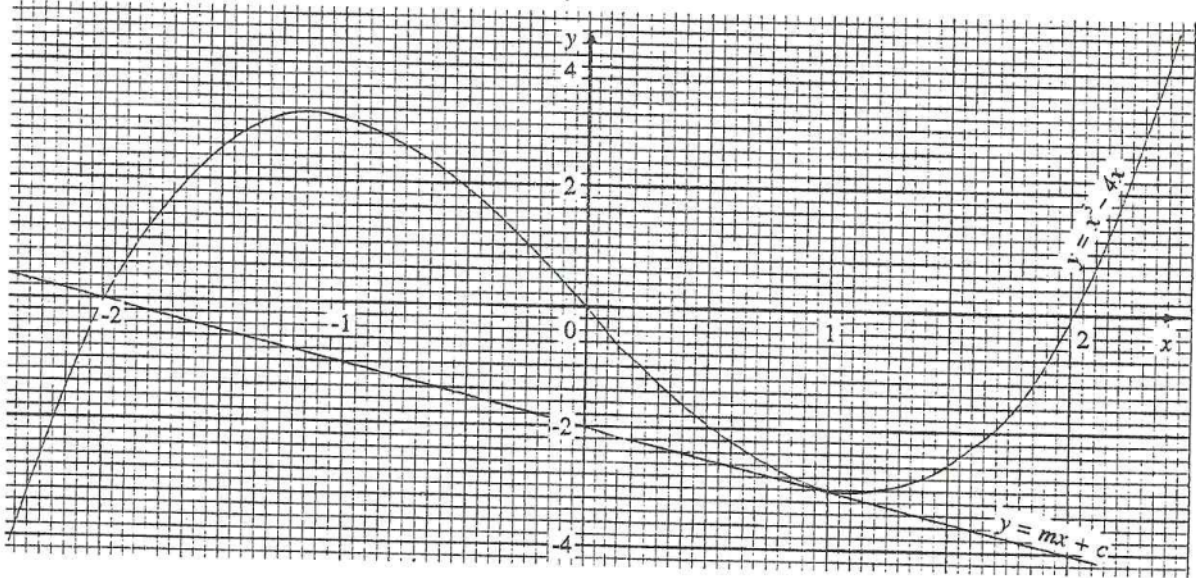
19 It is given that  $\mathbf{p} = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$  and  $\mathbf{q} = \begin{pmatrix} -15 \\ y \end{pmatrix}$ .

- (a) Calculate  $|\mathbf{p}|$ , leaving your answer in surd form.
- (b) If  $\mathbf{p}$  is parallel to  $\mathbf{q}$ , calculate the value of  $y$ .

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

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

20



In the diagram the line  $y = mx + c$  touches the curve  $y = x^3 - 4x$  at  $(1; -3)$ .

Write down

- the value of  $c$ ,
- the value of  $m$ ,
- the gradient of  $y = x^3 - 4x$  when  $x = 1$ ,
- the range of values of  $x$  for which  $mx + c > x^3 - 4x$ .

*Answer*

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

(b)  $m =$  \_\_\_\_\_ [1]

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

(d) \_\_\_\_\_ [1]

21 It is given that  $M = \begin{pmatrix} 2x & x \\ x & 2x \end{pmatrix}$ .

(a) Find  $M^2$  in terms of  $x$ .

(b) Find  $x$  given also that  $|M| = 48$ .

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

(b)  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [3]

22 It is given that  $y$  varies inversely as  $x + 4$ .

- (a) Express  $y$  in terms of  $x$  and a constant  $k$ .
- (b) Given also that  $x = 6$  when  $y = 2$ , find the value of  $k$ .
- (c) Find the value  $x$  when  $y = 8$ .

*Answer*

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

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

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

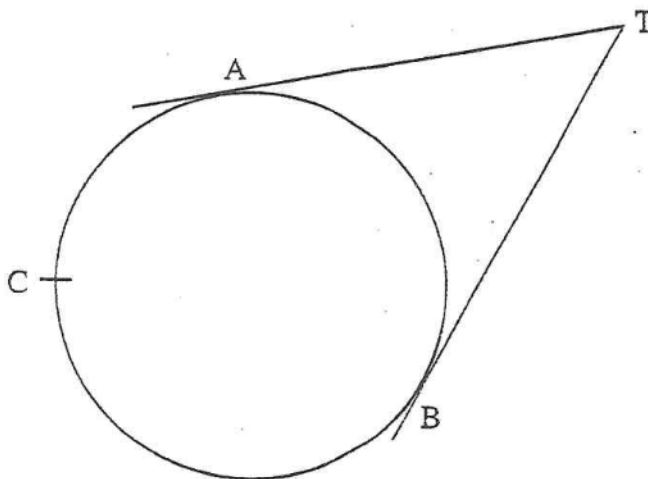
For  
Examiner's  
Use

- 23 (a) At a certain party the ratio *men: women: children* was 5: 6: 4. If there were 80 children at the party, calculate the total number of people at the party.
- (b) The area of a certain country is given as  $8,5 \times 10^6 \text{ km}^2$ . The area of the country's map is given as  $3,4 \times 10^5 \text{ cm}^2$ . Find, in the form 1: n, the scale used in drawing the map.

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

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



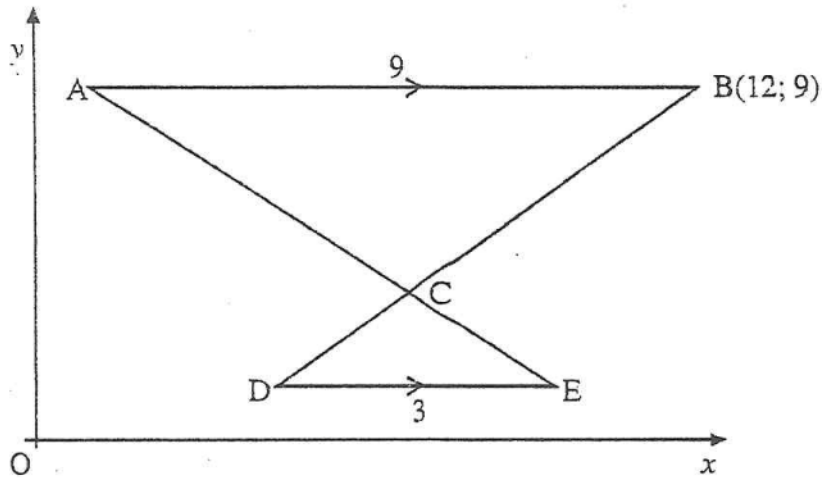


In the diagram TA and TB are tangents to the circle ABC.

- (a) Using a ruler and compasses only, construct
- (i) the locus of points equidistant from A and C,
  - (ii) the locus of points equidistant from AT and BT.
- (b) Write down the radius of the circle.

*Answer*

	(a)	(i)	on diagram.	[2]
		(ii)	on diagram.	[2]
	(b)	_____ cm		[1]



In the diagram ACE and BCD are straight lines. AB is parallel to DE,  $AB = 9$  cm,  $BC = 3$  cm and B is the point  $(12; 9)$ .

- (a) Describe **fully** the **single** transformation which maps  $\triangle ABC$  onto  $\triangle EDC$ .
- (b)  $\triangle ABC$  is mapped onto  $\triangle A'B'C'$  by a transformation represented by the matrix  $\begin{pmatrix} 2 & 0 \\ 0 & 3 \end{pmatrix}$ . Calculate the coordinates of  $B'$ .

Answer

(a)

\_\_\_\_\_

\_\_\_\_\_

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

(b)

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

26 Given that  $\log 2 = 0,3010$  and  $\log 3 = 0,4771$ , calculate

(a)  $\log 6$ ,

(b)  $\log 1,5$ ,

(c)  $\log \sqrt{2}$ .

*Answer* (a)  $\log 6 =$  \_\_\_\_\_ [2]

(b)  $\log 1,5 =$  \_\_\_\_\_ [2]

(c)  $\log \sqrt{2} =$  \_\_\_\_\_ [2]

For  
Examiner's  
Use

**ZIMBABWE SCHOOL EXAMINATIONS COUNCIL**  
**GENERAL CERTIFICATE OF EDUCATION ORDINARY LEVEL**

**POSSIBLE ANSWERS**

**JUNE 2008**

**MATHEMATICS**

4008	01
4028	

1	(a)	$5,26 \times 10^{-5}$	1
	(b)	-1	2
2	(a)	530	1
	(b)	20 000	1
	(c)	2 weeks 3 days	1
3	(a)	8	1
	(b)	101 100	2
4	(a)	(i) 780 000	1
		(ii) 70	1
	(b)	direct	1
5	(a)	N or Z or S	1
	(b)	-10	2
6	(a)	$8,5 \leq r < 9,5$	1
	(b)	$17\pi$	2
7	(a)	14	1
	(b)	154	2
8	(a)	(i) a; b; c	1
		(ii) k, h, i,	1
	(b)	7	1

---

9	(a)	2	1
	(b)	9	2

---

10	(a)	20	1
	(b)	$\frac{4}{25}$	2

---

11	(a)	$125^\circ$	1
	(b)	$90^\circ$	1
	(c)	$35^\circ$	1

---

12	(a)	-8	2
	(b)	125	2

---

13	(a)	$(5m+6)(3-2n)$ or	2
	(b)	$3(3x-2y)(3x+2y)$	2

---

14	(a)	(i) 1 096	1
		(ii) 2	2
	(b)	\$349,80	1

---

15	(a)	(i) 9	1
		(ii) 21	1
	(b)	30	2

---

16	(a)	675 000	2
	(b)	862 500	2

---

17	(a)	$\frac{4}{5}$	2
	(b)	45	2
18	(a)	240	2
	(b)	00 25	2
19	(a)	$\sqrt{52}$ or $2\sqrt{13}$	2
	(b)	10	2
20	(a)	-2	1
	(b)	-1	1
	(c)	-1	1√
	(d)	$x < -2$	2
21	(a)	$\begin{pmatrix} 5x^2 & 4x^2 \\ 4x^2 & 5x^2 \end{pmatrix}$	2
	(b)	-4 or 4	3
22	(a)	$\frac{k}{x+4}$ or $\frac{1}{k(x+4)}$	1
	(b)	20 or $\frac{1}{20}$	2
	(c)	$-1\frac{1}{2}$ or equiv.	2
23	(a)	300	2
	(b)	1:500 000	2

24	(a)	(i)	Perpendicular bisector	2
		(ii)	Bisector of $A\hat{T}B$	2
	(b)		$2,6 \pm 0,2$	1

---

25	(a)		Enlargement with centre	3
	(b)		$B^1$ 924; 27)	2

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26	(a)		0,7781	2
	(b)		0,1761	2
	(c)		0,1505	2

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

**MATHEMATICS**

**4008/2**

PAPER 2

JUNE 2008 SESSION

2 hours 30 minutes

Additional materials:

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

**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.

**Electronic calculators must not be used.**

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 may be used to evaluate explicit numerical expressions.

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**This question paper consists of 13 printed pages and 3 blank pages.**

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## Section A [64 marks]

Answer all the questions in this section.

- 1 (a) Solve the equation

$$\frac{2}{3}(x+4) = x-1. \quad [3]$$

- (b) Factorise completely

$$6y^2 - y - 12. \quad [2]$$

- (c) Express  $\frac{2}{2x-1} - \frac{3}{x}$  as a single fraction in its lowest terms. [2]

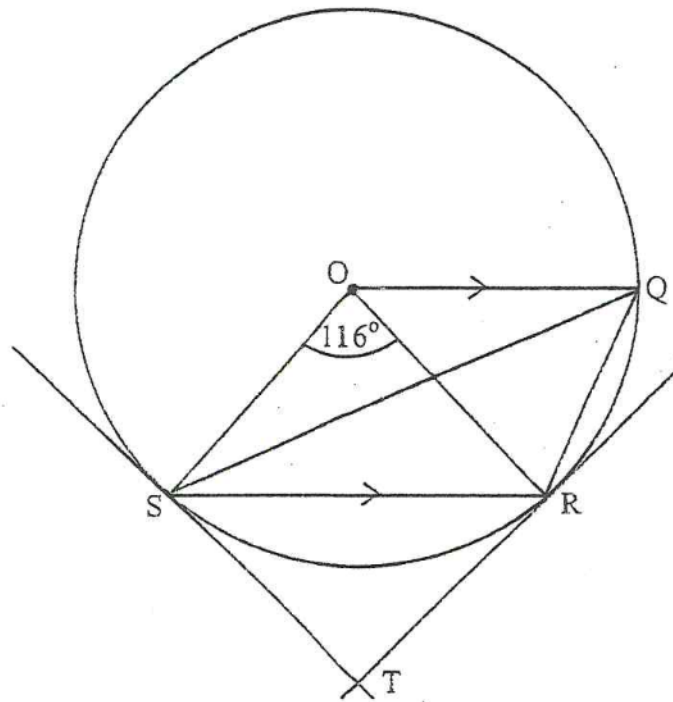
- (d) Given that  $z = r\sqrt{n-1}$ ,

(i) find  $z$  when  $r = 0,3$  and  $n = 50$ , [2]

(ii) express  $n$  in terms of  $z$  and  $r$ . [2]

---

2 (a)



In the diagram, TR and TS are tangents to the circle centre O.

SR is parallel to OQ and  $\hat{S}OR = 116^\circ$ .

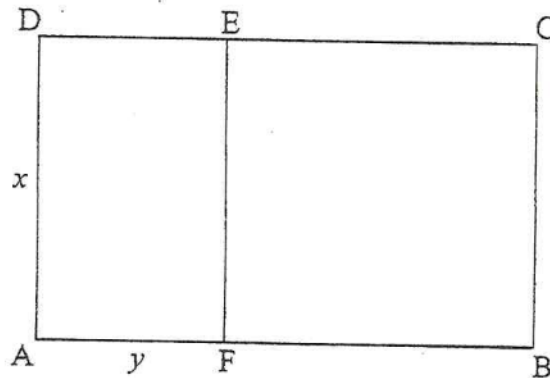
Calculate

(i)  $\hat{S}QR$ , [1]

(ii)  $\hat{R}SQ$ , [2]

(iii)  $\hat{R}TS$ . [2]

(b)



In the diagram, ABCD is a rectangle and BCEF is a square.

Given that  $DA = x$  cm,  $AF = y$  cm,  $x + y = 15$  and  $x - y = 7$ ,

Calculate

- (i) the value of  $x$ , [2]
- (ii) the area of ABCD. [1]
- (c) Six angles of an octagon are  $140^\circ$  each. The remaining angles are equal. Find the size of each of the remaining angles. [3]

3 (a) Given that  $(x \ 2) \begin{pmatrix} 3 & 1 \\ 0 & y \end{pmatrix} = (15 \ -7)$ ,

find the value of

- (i)  $x$ , [1]
- (ii)  $y$ . [2]
- (b) It is given that
- $\xi = \{\text{all triangles}\}$ ,
- $A = \{\text{all equilateral triangles}\}$ ,
- $B = \{\text{all isosceles triangles}\}$  and
- $C = \{\text{all right angled triangles}\}$ .

Draw a clearly labelled Venn diagram to illustrate the relationship between the sets.

[3]

- (c) Study the number patterns shown in the table.

Column 1	Column 2	Column 3
1	1	1
3	3	9
4	6	36
4	10	100
5		$p$
6	$q$	
.	.	.
.	.	.
.	.	.
	66	
$r$	78	
.	.	.
.	.	.
.	.	.
$n$	$w$	$v$

- (i) Write down the numerical value of

(a)  $p$ ,

(b)  $q$ ,

(c)  $r$ .

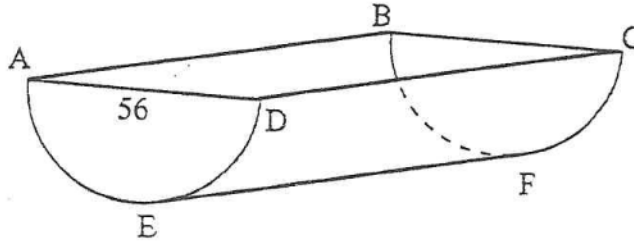
[3]

- (ii) Express  $v$  in terms of  $w$ .

[1]

4 (a)

6



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

The diagram ABCDEF represents a metal drinking trough made from a closed cylindrical drum that was bisected lengthwise.

The trough has a diameter of 56 cm and a capacity of 110 litres.

(i) Calculate

(a) the area of the cross-section ADE,

[2]

(b) AB.

[2]

(ii) The whole drum was bought for \$25 500 and this represents a 70% increase in price of such a drum in the previous year.

Calculate the price of such a drum in the previous year.

[2]

(b) Solve the equation

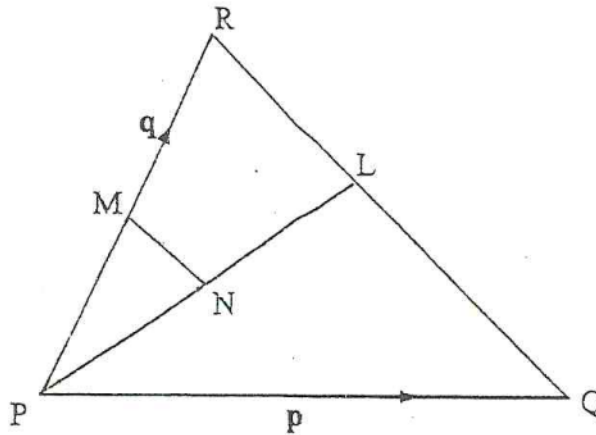
$$4x^2 - 2x - 3 = 0,$$

giving your answers correct to 2 significant figures.

[5]

5 (a)

7



In the diagram  $\overrightarrow{PQ} = \mathbf{p}$  and  $\overrightarrow{PR} = \mathbf{q}$ . M is a midpoint of PR, QL:LR = 2:1 and MN is parallel to RQ.

(i) Express in terms of  $\mathbf{p}$  and/or  $\mathbf{q}$

(a)  $\overrightarrow{QR}$ , [1]

(b)  $\overrightarrow{LR}$ , [1]

(c)  $\overrightarrow{MR}$ . [1]

(ii) Given that  $\overrightarrow{NM} = k\overrightarrow{QR}$ , find the scalar  $k$ . [2]

(b) In this question take  $\pi$  to be  $\frac{22}{7}$ .

A hemispherical bowl is made of wood 2 cm thick.

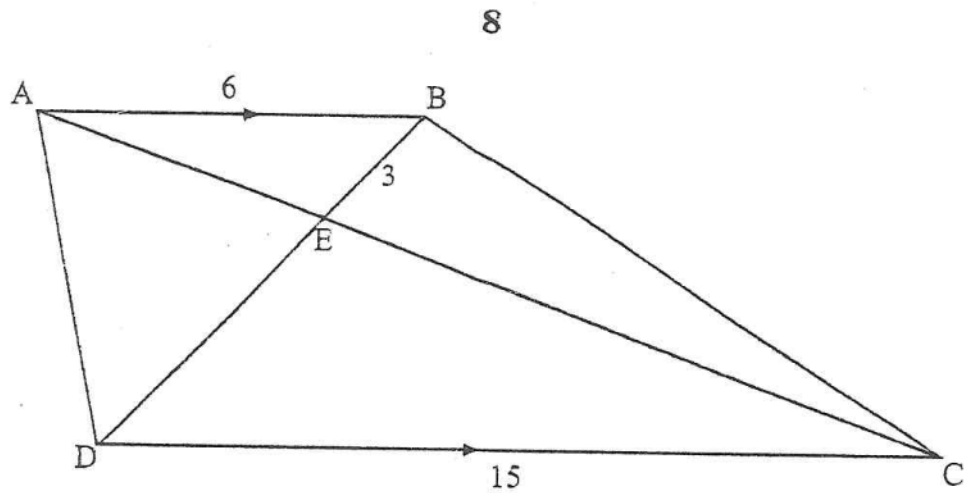
(i) Given that the bowl has an internal diameter of 14 cm, calculate the capacity of the bowl in litres. [3]

(ii) Calculate the mass of the bowl given that the density of the wood is  $0,8 \text{ g/cm}^3$ . [4]

$$\left[ \text{Volume of a sphere} = \frac{4}{3}\pi r^3 \right]$$



6



In the diagram, ABCD is a quadrilateral with AB parallel to DC. Diagonals AC and BD meet at E.  $AB = 6$  cm,  $BE = 3$  cm and  $DC = 15$  cm.

- (a) Name, in the correct order, the triangle that is similar to  $\triangle ABE$ . [1]
- (b) Calculate DE. [2]
- (c) If the area of  $\triangle BEC$  is  $22,5 \text{ cm}^2$ , calculate
- (i) the area of  $\triangle DEC$ , [2]
- (ii) the ratio  $\frac{\text{area of } \triangle ABE}{\text{area of } \triangle ADC}$  in its simplest form. [4]

## Section B [36 marks]

Answer any *three* questions in this section.

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

Triangle A has vertices (6; 4), (8; 6) and 4; 6).

Using a scale of 2 cm to represent 2 units on each axis, draw the  $x$  and  $y$  axes for

- (a) Draw and label triangle A. [1]
- (b) A reflection in the line  $y = x + 2$  maps triangle A onto triangle B.
- (i) Draw the line  $y = x + 2$ . [1]
- (ii) Draw and label triangle B. [2]
- (c) Triangle C has vertices at
- (i) Draw and label triangle C. [1]
- (ii) Describe fully the **single** transformation which maps triangle A into triangle C. [2]
- (d) A transformation P represented by the matrix  $\begin{pmatrix} 1 & 0 \\ -1\frac{1}{2} & 1 \end{pmatrix}$  maps triangle A onto triangle D.
- (i) Draw and label triangle D. [2]
- (ii) State the name of the transformation represented by P. [1]
- (e) A clockwise rotation of  $90^\circ$ , centre (0;10) maps triangle A onto triangle E.
- Draw and label triangle E. [2]

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

Use ruler and compasses only. All construction arcs and lines must be clearly shown.

Three schools, P, Q and R are such that the bearing of Q from P is  $045^\circ$  and that of R from P is  $300^\circ$ . The distance between P and R is 18 km and Q is due east of R.

- (a) (i) Using a scale of 1 cm to represent 2 km, construct a **single diagram** to show the relative positions of the 3 schools, P, Q and R. [5]
- (ii) Use the diagram to find the actual distance between P and Q. [2]
- (iii) Construct the perpendicular from R to QP produced. [2]
- (b) Calculate the area of the triangular region PQR, giving your answer in  $\text{km}^2$ . [3]

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

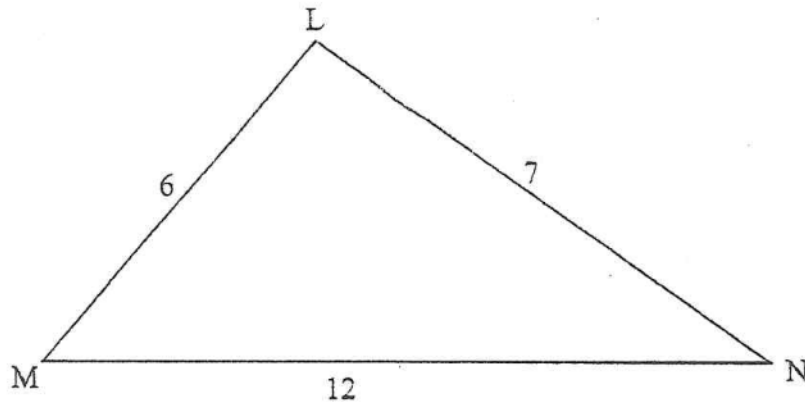
The following is an incomplete table of values for the graph of  $y = x^2 + \frac{1}{x}$ .

$x$	0.25	0.5	0.8	1	1.5	2	2.5	3
$y$	4.1	2.3	1.9	$p$	2.9	4.5	$q$	9.3

- (a) Calculate the value of  $p$  and the value of  $q$ . [2]
- (b) Taking 4 cm to represent 1 unit on the  $x$ -axis and 2 cm to represent 1 unit on the  $y$ -axis, draw the graph of
- $$y = x^2 + \frac{1}{x} \text{ for } 0.25 \leq x \leq 3. [4]$$
- (c) On the same axes draw the graph of  $2y = 5x + 2$ . [2]
- (d) (i) Write down the coordinates of their points of intersection of the graph of  $y = x^2 + \frac{1}{x}$  and graph of  $2y = 5x + 2$ . [2]
- (ii) Estimate the area bounded by  $y = x^2 + \frac{1}{x}$  and  $2y = 5x + 2$  and the lines  $x = 1$  and  $x = 2$ . [2]

- 10 (a) A vertical aerial mast is 20,5 m high. Calculate, to the nearest degree, the angle of elevation of the top of the mast from a point on horizontal ground which is 32,6 m from the foot of the mast. [2]

(b)



The diagram shows  $\triangle LMN$  in which  $LM = 6$  cm,  $LN = 7$  cm and  $MN = 12$  cm.

Calculate  $\hat{M}LN$ . [5]

- (c) A co-operative deposited \$60 million into a bank for  $1\frac{1}{2}$  years at the rate of 20% per annum simple interest.

After  $1\frac{1}{2}$  years the co-operative was charged 15% tax on the total interest they made and \$4,32 million as bank charges.

Calculate

- (i) the interest the co-operative made, [2]  
 (ii) the tax deducted, [1]  
 (iii) the net profit they made. [2]

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

A group of 70 students were involved in a 50 km sponsored walk.

The distances covered by the students are shown in the table.

Distance $x$ covered (km)	$10 < x \leq 20$	$20 < x \leq 25$	$25 < x \leq 40$	$40 < x \leq 50$
Number of students	30	12	$w$	13
Frequency density	3	$v$	1	1,3

- (a) Find the value of
- (i)  $v$ , [1]
- (ii)  $w$ . [1]
- (b) Using a scale of 2 cm to represent 10 km on the horizontal axis and 2 cm to represent 1 unit on the vertical axis, draw a **histogram** to represent the information in the table. [3]
- (c) State the modal class. [1]
- (d) A sponsor paid at the rate of \$10 000 per km. Calculate an estimate of the total amount paid to those who walked more than 25 km. [3]
- (e) Two students were chosen at random from the group. Calculate the probability that one walked at most 20 km and the other walked more than 20 km but less than or equal to 25 km. [3]

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

Mr Hove manufactures tables and chairs using softwood and hardwood.

A table requires 5 metres of softwood and 3 metres of hardwood.

A chair requires 3 metres of softwood and 4 metres of hardwood.

Mr Hove has 45 metres of softwood and 48 metres of hardwood.

Let  $x$  be the number of tables made and  $y$  be the number of chairs made.

(a) Using the above information, write down two inequalities other than  $x > 0$  and  $y > 0$  in  $x$  and  $y$ , which satisfy these conditions. [4]

(b) In order for Mr Hove to make a profit, he should manufacture more than 2 tables and at least 4 chairs. Write down two inequalities, one in  $x$  and the other one in  $y$ , which satisfy these conditions. [2]

(c) The point  $(x; y)$  represents  $x$  tables and  $y$  chairs manufactured. Using a scale of 2 cm to represent 2 tables on the horizontal axis and 2 cm to 2 chairs on the vertical axis, draw the axes for

$$0 \leq x \leq 16 \text{ and } 0 \leq y \leq 16.$$

Indicate clearly by shading the UNWANTED regions, the region in which  $(x; y)$  should lie. [4]

(d) Use your graph to write down all possible combinations which give the maximum number of tables and chairs manufactured. [2]



**ZIMBABWE SCHOOL EXAMINATIONS COUNCIL**

General Certificate of Education Ordinary Level

**POSSIBLE ANSWERS**

**JUNE 2008**

**MATHEMATICS**

**4008/2,  
4028/2**



1 (a)  $\frac{2}{3}x + \frac{8}{3} = x - 1$  or equiv.

$$3x - 2x = 8 + 3 \text{ or equiv.}$$

$$(x =) 11 \quad (3)$$

(b)  $2y(3y + 4) - 3(3y + 4)$  or equiv.

$$(3y + 4)(2y - 3) \quad (2)$$

(c)  $2x - 3(2x - 1)$  or equiv. soi

$$\frac{-4x + 3}{x(2x - 1)} \quad (2)$$

(d) (i)  $0,3\sqrt{49}$  or equiv soi

$$(z =) 2,1 \quad \text{accept } \pm 2,1 \quad (2)$$

(ii)  $n - 1 = \left(\frac{z}{r}\right)^2$  or equiv

$$n = 1 + \left(\frac{z}{r}\right)^2 \text{ or equiv.} \quad (2)$$

a.n.w. (a) 1, (b) 2, (c) 2, (d)(i) 1, (ii) 1 [11]

2 (a) (i)  $(\hat{S}\hat{Q}\hat{R} =)$   $58^{(0)}$

(ii)  $(\hat{R}\hat{S}\hat{Q} =)$   $16^{(0)}$

(iii)  $(\hat{R}\hat{T}\hat{S} =)$   $64^{(0)}$

(b) (i)  $2x = 22$  or equiv soi

$$(x =) 11$$

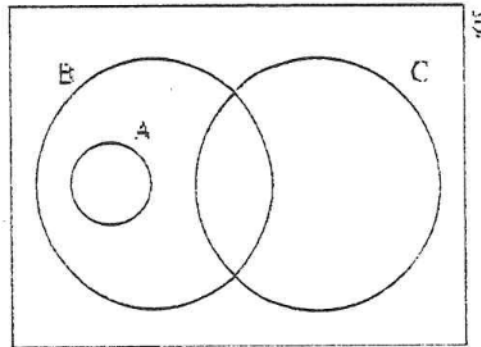
(ii)  $165 \text{ (cm}^2\text{)}$

(c)  $6 \times 180^{(0)} - 6 \times 140^{(0)}$  or equiv.  
 their  $\frac{6 \times 180^{(0)} - 6 \times 140^{(0)}}{2}$  soi  
 $120^{(0)}$

anw (a) No penalty (b) No penalty (c) 2 [11]

3 (a) (i)  $(x =) 5$   
 (ii) their  $(x) + 2y = -7$  or equiv.  
 $(y =) -6$

(b) Condone one missing label other than  $\xi$ .



(c) (i) (a)  $(p =) 225$   
 (b)  $(q =) 21$   
 (c)  $(r =) 12$   
 (ii)  $v = w^2$

anw (a) No penalty (b) 3 (c) No penalty [10]

4 (a) (i) (a) (Area =)  $\frac{\pi}{2} \times \left(\frac{56}{2}\right)^2$  or equiv.  
 $1232 \text{ (cm}^2\text{)}$

$$(b) \quad (AB =) \frac{\text{figs } 11}{\text{their(a)(i)(a)}} \text{ or equiv}$$

$$89\frac{2}{7} \text{ or } 89,29 \text{ (cm)}$$

$$(ii) \quad (\text{Old Price} =) \frac{1}{\text{figs } 17} \times \text{figs } 255 \text{ or equiv.}$$

\$15 000

(b) Formula provided purely numerical

$$\frac{p \pm (+\text{or})\sqrt{q}}{r} \text{ but Not } \pm \frac{p\sqrt{q}}{r} \text{ is seen or used.}$$

$$p = 2$$

$$q = 52 \text{ or } \sqrt{q} = 7,211$$

$$r = 8$$

$$[\text{Comp.sq} \left( x - \frac{1}{4} \right)^{(2)}$$

$$\frac{13}{16} \text{ or } \sqrt{\frac{13}{16}}$$

$$\frac{1}{4} \pm \sqrt{\frac{13}{16}}]$$

F.A. and nww but condone PA if answers reached.

1,2

-0,65

S.C: If wrongly or not corrected, give SC  
For both 1,115 and -0,651 seen

Anw (a)(i)(a) 1 (b) 1 (ii) 11 (b) 1 + 1

[11]

5 (a) (i) Only expression linear in p and /or q can score.

(a)  $(\overline{QR} =) p + q$

(b)  $(\overline{LR} =) \frac{1}{3}$  their  $\overline{QR}$

$$(\overline{MR} =) \frac{1}{2} q$$

(ii)  $\overline{NM} = \frac{1}{2} \overline{LR}$  or equiv. soi

$$(k =) \frac{1}{6}$$

(b) (i)  $\frac{1}{2} \times \frac{4}{3} \times 7^3 \times \pi$  or equiv.

$$\frac{1}{2} \times \frac{4}{3} \times \frac{7^3 \times \pi}{1000}$$
 or equiv. soi

$$0,718 \frac{7}{10}$$

(ii)  $\frac{1}{2} \times \frac{4}{3} \times 9^3 \times \pi$  or equiv.

$$\frac{1}{2} \times \frac{4}{3} \pi (9^3 - 7^3)$$
 or equiv. method

$$\frac{1}{2} \times \frac{4}{3} \pi (9^3 - 7^3) \times 0,8$$

$$647,0 \text{ (g)}$$

anw (a)(i) No penalty (ii) 1 (b)(i) 1 (ii) 1 [12]

6 (a)  $\Delta CDE$

(b)  $(DE =) \frac{15}{6} \times 3$  or equiv

$$7,5 \text{ (cm)}$$

(c) (i)  $(\Delta CDE =)$  their  $\frac{(7,5)}{3} \times \text{figs } 225$

$$56,25 \text{ (cm}^2\text{)}$$

$$(ii) \quad (\Delta ABE =) \quad \left(\frac{6}{15}\right)^2 \times \text{their} \left[\frac{7,5}{3} \times \text{figs } 225\right] \text{ or equiv.}$$

$$(\Delta ACD =) \quad 22,5 + \text{their} \left[\frac{7,5}{3} \times \text{figs } 225\right] \text{ or equiv.}$$

$$\left(\frac{\Delta ABE}{\Delta ACD} =\right) \frac{\left(\frac{6}{15}\right)^2 \times \text{their} \left[\frac{7,5}{3} \times \text{figs } 225\right]}{22,5 + \text{their} \left[\frac{7,5}{3} \times \text{figs } 225\right]}$$

$$\frac{4}{35} \text{ or } 0,1143$$

anw (a) No penalty (b) No penalty (c)(i) 2 (ii) 1 [9]

- 7 (a)  $\Delta A$  correctly
- (b) (i) Line  $y = x + 2$  at least 3 cm long drawn  
(ii)  $\Delta B$  correctly drawn with vertices at (4;6), (4;10) and (2;8).
- (c) (i)  $\Delta C$  correctly drawn  
(ii) Two-way stretch and n other transformation mentioned  
SF =  $-1\frac{1}{2}$  in X-axis direction and  
SF = -2 in y-axis direction
- (d) (i)  $\Delta D$  Correctly drawn with vertices at (4;0), (6;-5)  
and (8; -6) B2 -1 each error  
SC. After BO give SCB1 for all correct coordinates seen  
even in matrix form.
- (ii) Shear stated
- (e)  $\Delta E$  correctly drawn with vertices at (-4;2), (-4;6) and (-6;4)  
-1 each error

Anw. No penalty

- 8 (a) (i)  $< 45^\circ \pm 2^\circ$  with correct arcs  
 $< 60^\circ \pm 2^\circ$  with correct arcs

Q due east of R

Triangle with angles  $60^\circ \pm 2^\circ$  and  $45^\circ \pm 2^\circ$  adjacent to each other and side  $9 \pm 0,2$  cm

$\Delta 2$

(ii)  $6,2^6$  (cm) soi

(PQ =)  $\begin{matrix} 13, 2 \\ 12, 4 \end{matrix}$  (km)

(iii) line from point R to QP produced  
correct construction arcs

(b) (Area =)  $\frac{1}{2} \times 18 \times \text{their PQ} \sin 75^\circ$  or equiv.

$\begin{matrix} 114, 8 \\ 107, 8 \end{matrix}$  (km<sup>2</sup>)

anw. No diagram 0

[12]

9 (a) (p = ) 2

(q = ) 6,65 or 6,7

The answers in correct position in tables.

(b) The 6 given points + their 2 points correctly plotted.

Curve, not grossly thick, passing within 1 mm of the 8 correct points.

(c) Correct line cutting graph at 2 points

(d) (i)  $\left(\frac{1}{2}; 2\frac{1}{4}\right)$  or equiv.

$\left(2\frac{4}{5}; 8\right)$  or equiv.

Accept use of common (,) if no decimals in co-ordinates.

(ii) (Area =)  $1,72_0^4$  (square units)

After Bo, give Sc B1 for

$$\begin{array}{r} , 92 \\ 13, 76 \text{ cm}^2 \text{ seen} \\ , 6(0) \end{array}$$

anw (a) 2; (b), (c), (d) No graph 0

[12]

10 (a)  $(\tan \theta =) \frac{\text{figs } 20.5}{\text{figs } 32.6}$

$32^{(0)}$  c.a.o.

(b)  $\text{Cos } \theta = \frac{6^2 + 7^2 - 12^2}{2 \times 6 \times 7}$  or equiv.

$$= -\frac{59}{84} \text{ or } -0,7024 \text{ soi}$$

$$\text{or } 180 - 45, 38^{(0)}$$

$$180 - 45^\circ 23' \text{ soi}$$

$$134,6^{(0)} \text{ or}$$

$$134^\circ 37'$$

(c) Condone use m for million

(i)  $(\text{SI} =) \frac{20}{100} \times 60 \times \frac{3}{2}$

$$= \$18 \text{ million}$$

(ii)  $(\text{tax} =) \frac{15}{100} \times \text{their} \left( \frac{20}{100} \times 60 \times \frac{3}{2} \right)$

(iii) (Net profit =)

$$\text{figs} \left[ 18 - (432 + \text{their}) \left\{ \frac{15}{100} \times \text{their} \times \frac{20}{100} \times 60 \times \frac{3}{2} \right\} \right] \text{ or equiv}$$

$$(=) \$10,98 \text{ million}$$

anw (a) 1 (b) 3 (c)(i) 2 (ii) 1 (iii) 1

- 11 (a) (i) (v =) 2,4  
(ii) (w =) 15
- (b) Histogram drawn with centres at 15,  $22\frac{1}{2}$ ,  $32\frac{1}{2}$  and 45
- (c)  $10 < x \leq 20$  stated
- (d)  $(15 \times 32,5 + 13 \times 45) \times 10\ 000$  or equiv.  
(\$) 10 725 000
- (e)  $\frac{30}{70} \times \frac{12}{61} \times 2$  or equiv.  
 $\frac{24k}{161k}$

anw (i), (ii) (iii) No penalties (iv) 1 (v) 1

[12]

- 12 (a)  $5x + 3y \leq 45$  or equiv.  
 $3x + 4y \leq 48$  or equiv.
- (b)  $x > 2$   
 $y \geq 4$
- (c) Line  $5x + 3y = 45$  correctly drawn  
Line  $3x + 4y = 48$  correctly drawn  
Lines  $x = 2$  and  $y = 4$  correctly drawn  
Correct region bounded by three continuous lines and one broken line.
- (d) (4; 8) or equiv.  
(3; 9) or equiv.

Condone use of commas in both parts.  
Sc. After BOBO give SCB1 for 12 seen.

Anw. No penalty except (iv) No graph O.

[12]





Candidate Name

Centre Number

Candidate Number



# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

**MATHEMATICS**

**4008/1, 4028/1**

**PAPER 1**

**NOVEMBER 2008 SESSION**

**2 hours 30 minutes**

Candidates answer on the question paper.

Additional materials:

Geometrical instruments

**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.

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.

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

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This question paper consists of 26 printed pages and 2 blank pages.

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[Turn over

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

For  
Examiner's  
Use

13 (a) Simplify

(i)  $6,3 \times 1,1$ , giving your answer as a decimal,

(ii)  $\frac{2}{3} - \frac{3}{4}$ , giving your answer as a common fraction.

(b) Find 5% of 130 metres.

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

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

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

- 2 (a) Evaluate  $54_6 + 305_6$ , giving your answer in base 6.
- (b) Convert  $10011_2$  to a number in base 3.

For  
Examiner's  
Use

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

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

- 3 Given that  $94 \times 152 = 14\,288$ ,
- (a) find the value of N if  $95 \times 152 = 14\,288 + N$ .
- (b) Write down the exact value of
- (i)  $0,094 \times 1\,520$ .
- (ii)  $0,14\,288 \div 0,0094$ .

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

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

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

4 (a) Simplify  $(0.2)^3 \times (0.2)^2$ , giving your answer as a decimal.

(b) Solve the equation

$$5x - 2(x + 3) = 9.$$

For  
Examiner  
Use

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

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

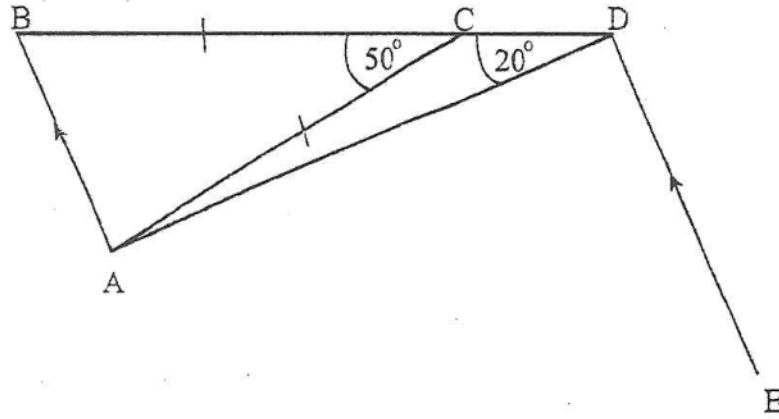
- 5 (a) Write 0019 in 12-hour notation.
- (b) Tapiwa and Netsai share some money in the ratio 2: 5. Given that Tapiwa's share is \$620 000, calculate Netsai's share.

For  
Examiner's  
Use

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

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

6

For  
Examiner's  
Use

In the diagram,  $BCD$  is a straight line and  $AB$  is parallel to  $ED$ . Given that  $BC = AC$ ,  $\hat{A}DB = 20^\circ$  and  $\hat{A}CB = 50^\circ$ , calculate

- (a)  $\hat{B}AC$ ,  
 (b)  $\hat{D}AC$ ,  
 (c)  $\hat{A}DE$ .

- Answer*
- (a)  $\hat{B}AC =$  \_\_\_\_\_ [1]  
 (b)  $\hat{D}AC =$  \_\_\_\_\_ [1]  
 (c)  $\hat{A}DE =$  \_\_\_\_\_ [1]

7 Given that  $m = 4 \times 10^6$  and  $n = 2,4 \times 10^{-3}$  giving each answer in standard form, calculate

(a)  $mn$ ,

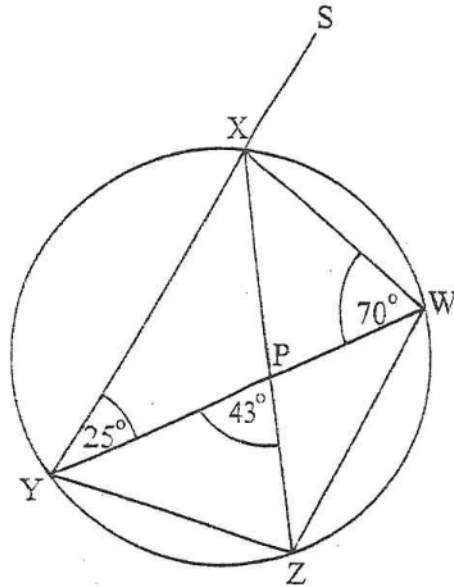
(b)  $\frac{n}{m}$ .

For  
Examiner's  
Use

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

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





$WXYZ$  is a cyclic quadrilateral. The diagonals  $XZ$  and  $YW$  intersect at  $P$  and  $YX$  is produced to  $S$ .  $\angle YWX = 70^\circ$ ,  $\angle XYP = 25^\circ$  and  $\angle YPZ = 43^\circ$ .

Calculate

- (a)  $\angle XZY$ ,  
 (b)  $\angle YXZ$ ,  
 (c)  $\angle SXW$ .

*Answer*

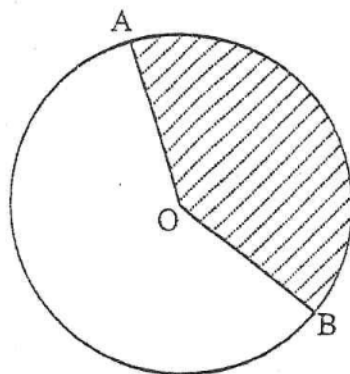
(a)  $\angle XZY =$  \_\_\_\_\_ [1]  
 (b)  $\angle YXZ =$  \_\_\_\_\_ [1]  
 (c)  $\angle SXW =$  \_\_\_\_\_ [1]

9. (a) The bearing of town B from town A is  $141^\circ$ . Find the bearing of town A from town B.
- (b) The interior angle of a regular polygon is  $162^\circ$ . Find the number of sides of the polygon.

For  
Examiner's  
Use

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

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



- (a) In the diagram, the shaded sector AOB is  $\frac{7}{15}$  of the circle centre O.  
Calculate  $\hat{AOB}$ .
- (b) Calculate the radius of a circle whose area is  $154 \text{ cm}^2$ .

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

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

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

- 11 Taurai is  $x$  years old. Zvikomborero, her brother is 9 years older than her. Their father is 3 times as old as Taurai. Their mother is twice as old as Zvikomborero.

- (a) Write down and simplify, in terms of  $x$ , an expression for the total age of the four members of the family.
- (b) Given that the sum of the ages of the four members is 139 years, find the value of  $x$ .

For  
Examiner's  
Use

Answer

(a) \_\_\_\_\_ [4] [ ]

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

12 The scale of a map is 1: 1 000 000.

Find

- (a) the length, in cm, of a line on the map, which represents a road 160 km long,
- (b) the actual area of a piece of land which is represented by  $2,64 \text{ cm}^2$  on the map, giving your answer in  $\text{km}^2$ .

*Answer*

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

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

For  
Examiner's  
Use

13 If  $f(x) = x^2 - 7x + 5$ , find

(a)  $f(-1)$ ,

(b) the values of  $x$  for which  $f(x) = -7$ .

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

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

- 14 A bag contains red, blue and green counters all of which are identical except for colour.

A counter is picked at random from the bag. Its colour is noted and then it is replaced. The probability that it is red is 0,2 and the probability that it is blue is 0,5.

- (a) Calculate the probability that the counter picked is either blue or green.
- (b) Two counters are picked at random one after the other, with replacement. Calculate the probability that one is red and the other is blue.

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

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

For  
Examine  
Use

- 15 (a) Factorise  $x^2 - y^2$ .
- (b) Given that  $x - y = 4$  and  $x^2 - y^2 = 20$ , find the value of  $x$  and the value of  $y$ .

For  
Examiner's  
Use

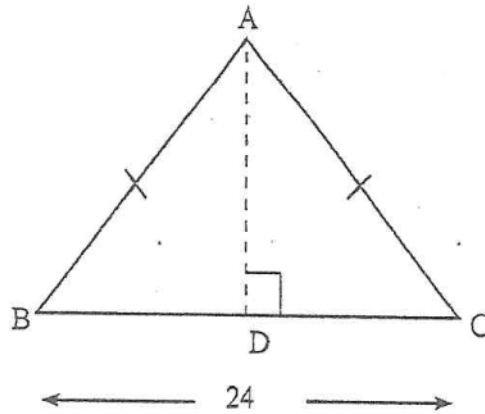
*Answer*

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

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

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





The diagram shows an isosceles triangle ABC with  $AB = AC$ ,  $BC = 24$  cm and AD is perpendicular to BC.

Given that the area of the triangle is  $108$  cm<sup>2</sup>, find

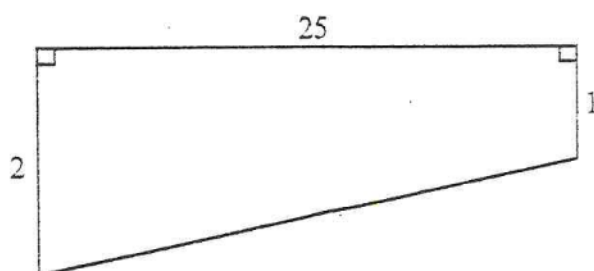
- (a) AD,
- (b) AC.

*Answer* (a) AD = \_\_\_\_\_ cm [2]

(b) AC = \_\_\_\_\_ cm [2]

17

17

For  
Examiner's  
Use

The diagram shows a cross-section of a swimming pool which is 25 m long, 1 m deep at the shallow end and 2 m deep at the deep end.

- (a) Calculate the area of the cross-section in  $\text{m}^2$ .
- (b) Given that the swimming pool is 10 m wide, calculate the volume of the pool in  $\text{m}^3$ .

Answer (a) \_\_\_\_\_  $\text{m}^2$  [2]  
(b) \_\_\_\_\_  $\text{m}^3$  [2]

18 Given that  $\log_5 2 = 0,431$  and  $\log_5 3 = 0,683$ , find the value of

(a)  $\log_5 \frac{1}{2}$ ,

(b)  $\log_5 \sqrt{3}$ .

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

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

For  
Examiner  
Use

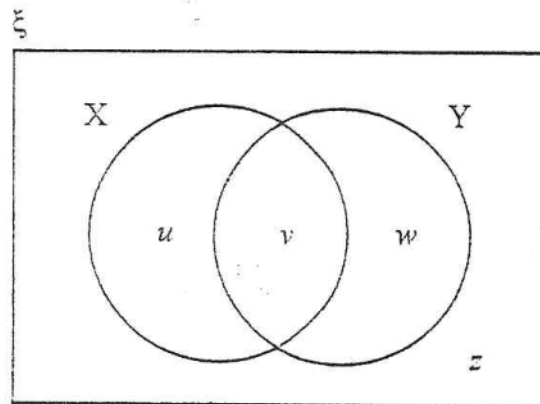
- 19 (a) It is given that  $\overline{AB} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$  and  $\overline{BC} = \begin{pmatrix} -8 \\ 6 \end{pmatrix}$ .

Find

- (i)  $\overline{AC}$ ,
- (ii)  $\overline{CX}$ , given that  $2\overline{CX} = \overline{BC}$ .
- (b) P is the point  $(-3; 2)$  and  $\overline{PQ} = \begin{pmatrix} 3 \\ -5 \end{pmatrix}$ .

Find the coordinates of point Q.

- Answer*
- (a) (i)  $\overline{AC} = \begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$  [1]
- (ii)  $\overline{CX} = \begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$  [1]
- (b)  $(\phantom{0}; \phantom{0})$  [2]



The Venn diagram shows the universal set  $\xi$ , set  $X$  and set  $Y$ . The letters  $u$ ,  $v$ ,  $w$  and  $z$  represent the numbers of elements in each subset.

It is given that  $n(\xi) = 150$ ;  $n(X) = 55$  and  $n(Y) = 32$ .

Find

- the smallest possible value of  $z$ ,
- the largest possible value of  $v$ ,
- the value of  $w$  if  $u = 45$ .

Answer

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

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

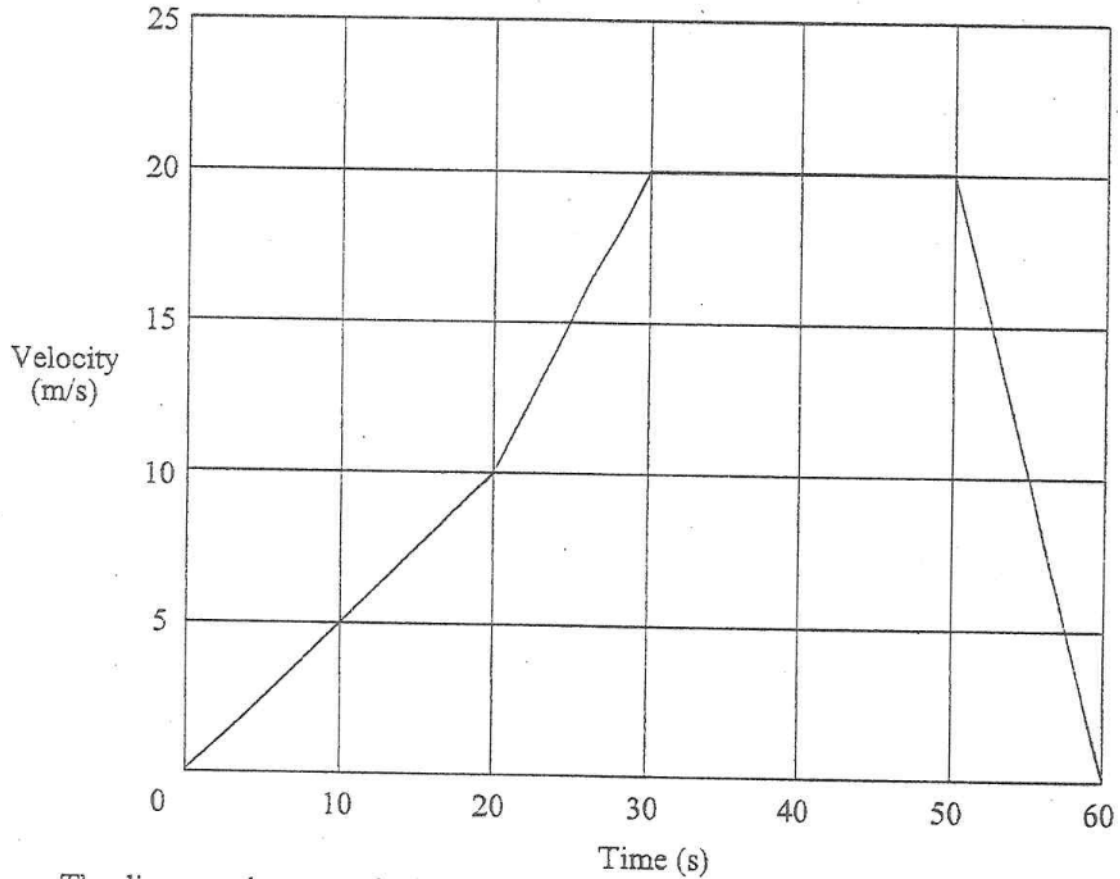
(c) \_\_\_\_\_ [1]

- 21 (a) During a sale, a shop reduced all its prices by 20%. Calculate the original price of an article which was sold during the sale for \$440 000.
- (b) On a particular day, a bank bought British pounds (£) at a rate of 1 British pound (£) to 35 000 Zimbabwean dollars (\$) and sold British pounds (£) at a rate of \$40 000 per £.

Calculate

- (i) the amount, in British pounds, bought for \$10 500 000,
- (ii) the amount, in Zimbabwean dollars, received for selling £112.

<i>Answer</i>	(a)	\$ _____	[2]
	(b)	(i) £ _____	[2]
		(ii) \$ _____	[1]



The diagram shows a velocity-time graph for a particular journey. Calculate

- the distance travelled in the first 30 seconds,
- the speed when the time is 40 seconds,
- the deceleration during the last 10 seconds.

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

23  $x$  is partly constant and partly varies as  $y$ .

- (a) Express  $x$  in terms of  $y$  and constants  $h$  and  $k$ .
- (b) Given that  $x = 1$  when  $y = 8$  and that  $x = 3$  when  $y = 12$ , calculate the value of
- (i)  $h$ ,
- (ii)  $k$ .
- (c) Find the value of  $x$  when  $y = 30$ .

For  
Examiner's  
Use

*Answer*

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

(b) (i)  $h =$  \_\_\_\_\_ [1]

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

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

---



Mark	0	1	2	3	4	5	6	7	8	9	10
No of pupils who scored this mark	0	1	3	7	9	5	2	2	1	2	0

The table shows the test results of a class of pupils. The test was marked out of 10.

- (a) Find
- (i) the number of pupil, in the class,
  - (ii) the modal mark,
  - (iii) the range of marks scored by the pupils.
- (b) Calculate the percentage of pupils who scored less than 5 marks.

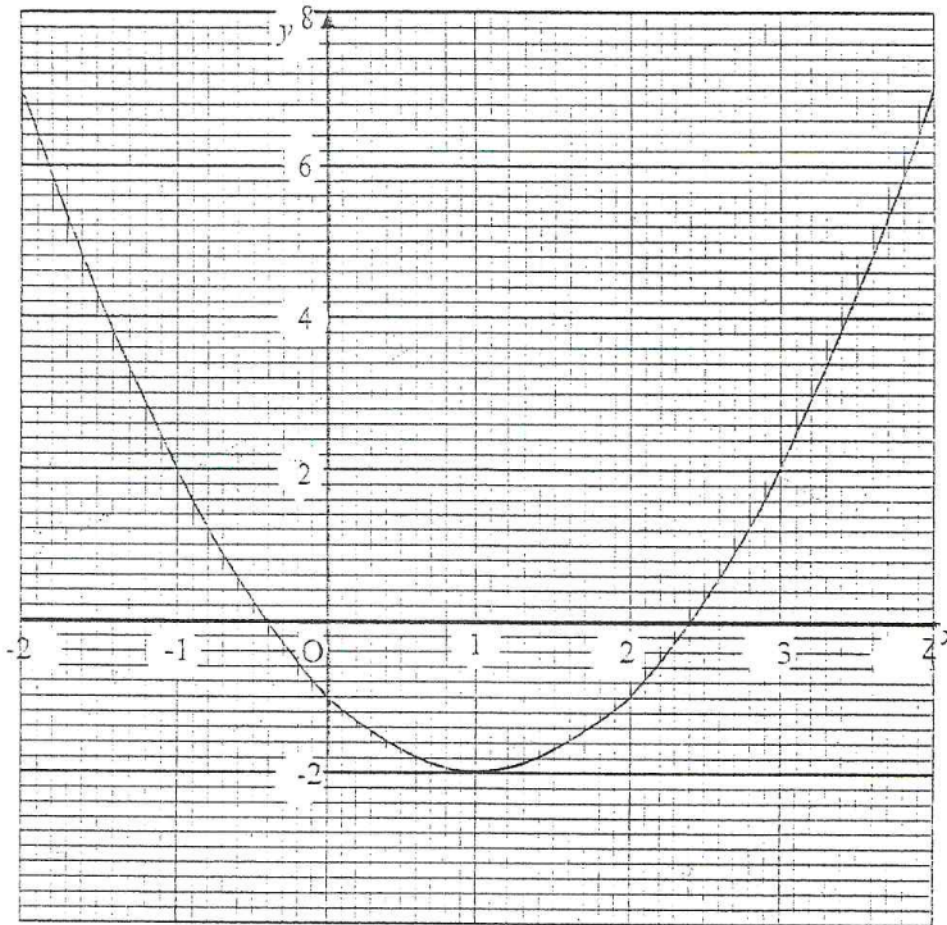
*Answer*

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

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

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

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



The diagram shows the graph of the function  $y = x^2 - 2x - 1$ . Use the graph to find

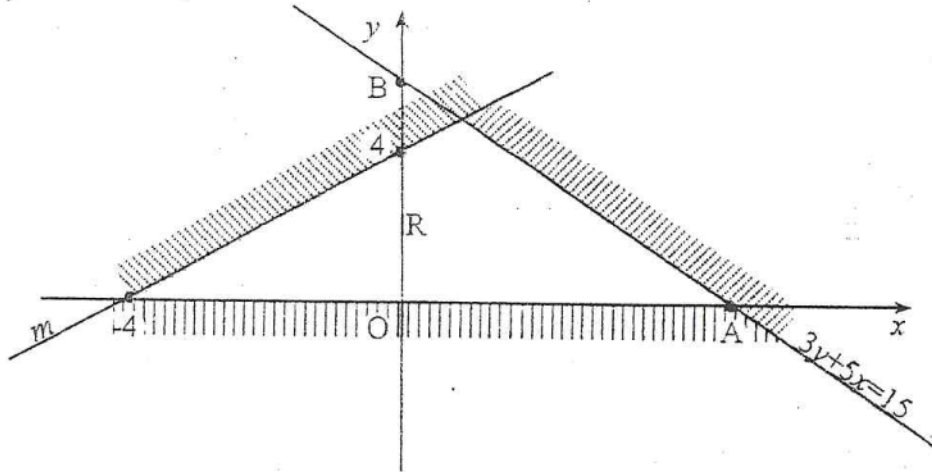
- the roots of the equation  $x^2 - 2x - 1 = 0$ ,
- the minimum value of  $x^2 - 2x - 1$ ,
- the equation of the line of symmetry,
- the area enclosed by the curve, the  $x$ -axis, the  $y$ -axis and the line  $x = 2$ .

Answer

	(a)	x = _____ or _____	[2]
	(b)	_____	[1]
	(c)	_____	[1]
	(d)	_____	[2]

26 (a) Solve the equation  $(2x - 3)^2 = 9$ .

(b)



In the diagram, line  $m$  passes through the points  $(-4; 0)$  and  $(0; 4)$ . The line  $3y + 5x = 15$  cuts the  $x$ -axis and the  $y$ -axis at  $A$  and  $B$  respectively.

- (i) Write down the coordinates of  $A$  and the coordinates of  $B$ .
- (ii) Find the equation of line  $m$ .
- (iii) Write down two inequalities, other than  $y \geq 0$ , which define the region  $R$ .

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

(b) (i)  $A(\underline{\hspace{1cm}}; \underline{\hspace{1cm}})$

$B(\underline{\hspace{1cm}}; \underline{\hspace{1cm}})$  [2]

(ii)  $\underline{\hspace{4cm}}$  [2]

(iii)  $\underline{\hspace{4cm}}$  [2]

# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

## POSSIBLE ANSWERS

NOVEMBER 2008 SESSION

MATHEMATICS

4008	
4028	01

1	(a)	(i)	6.93	1	
		(ii)	$-\frac{1}{12}$	1	
	(b)		6.5 or $6\frac{1}{2}$	1	
2	(a)		$403_{(6)}$	1	
	(b)*		$201_{(3)}$	2	
3	(a)		152	1	
	(b)	(i)	142.88	1	
		(ii)	15.2	1	
4	(a)		$(0).00032$	1	
	(b)*		5	2	
5	(a)		12.19 <u>am</u> or equiv.	1	
	(b)*		1 550 000	2	
6	(a)		$65^{(0)}$	1	
	(b)		$30^{(0)}$	1	
	(c)		$95^{(0)}$	1	

7	(a)	$9.6 \times 10^3$	1	
	(b)	$6 \times 10^{-10}$	2	
8	(a)	$70^{(0)}$	1	
	(b)	$18^{(0)}$	1	
	(c)	$95^{(0)}$	1	
9	(a)	$321^\circ$ or equiv.	1	
	(b)	20	2	
10	(a)	$168^{(0)}$	1	
	(b)*	7	2	
11	(a)	$7x + 27$	2	
	(b)	16	1	
12	(a)	16	1	
	(b)*	264	2	

13	(a) 13 (b)* 3 or 4	1 1 + 1	
14	(a) (0), 8 or equiv (b)* (0), 2 or equiv.	1 2	
15	(a) $(x-y)(x+y)$ (b)* $x = 4\frac{1}{2}$ $y = \frac{1}{2}$	1 3	
16*	(a) 9 (b) 15	2 2	
17*	(a) $37\frac{1}{2}$ (b) 375	2 2	

18*	(a) (0), 252	2	
	(b) (0), 3415	2	
19	(a) (i) $\begin{pmatrix} -6 \\ 10 \end{pmatrix}$	1	
	(ii) $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$	1	
	(b)* (0; -3)	2	
20	(a) 63	1	
	(b) 32	1	
	(c)* 22	2	
21	(a) 550 000	2	
	(b)* (i) 300	2	
	(ii) 4 480 000	1	



22	(a)* 250	2	
	(b) 20	1	
	(c)* $\frac{20}{10}$ or equiv.	2	
23	(a) $x = h + ky$ or $k + hy$	1	
	(b) (i) $-3$ or $\frac{1}{2}$	1	
	(ii) $\frac{1}{2}$ or $-3$	1	
	(c)* 12	2	
24	(a) (i) 32	1	
	(ii) 4	1	
	(iii) 8	1	
	(b)* $62\frac{1}{2}$ or equiv.	2	

25	(a) 2.4 or 0.4 (b) -2 (c) $x = 1$ (d)* 3.3 ( $\pm 0.1$ )	1 + 1 1 1 2	
26	(a)* 3 or 0  (b) (i) A (3; 0) B (0; 5)  (ii)* $y - x = 4$  (iii) $3y + 5x \leq 15$ $y - x \leq 4$ or equiv.	1 + 1  1 1  2  1 + 1	





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

**MATHEMATICS**

**4008/2**

PAPER 2

NOVEMBER 2008 SESSION

2 hours 30 minutes

Additional materials:

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

**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.

**Electronic calculators must not be used.**

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 may be used to evaluate explicit numerical expressions.

**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  $3\frac{2}{5} - 2\frac{13}{20}$  as a single fraction in its lowest terms. [2]

(b) Remove the brackets and simplify

$$3(a + 2c) - 4(2a - c). \quad [2]$$

(c) Solve the equation

$$\frac{4x - 5}{7} = 1\frac{3}{4}. \quad [3]$$

(d) Find the number of circular rings each of diameter 6,3 cm which can be made from a wire 19,8 m long.

(Use  $\pi = \frac{22}{7}$ ). [4]

2 (a) Factorise completely

(i)  $2x^2 + ax - 2bx - ab$ ,

(ii)  $3 - 12y^2$ . [4]

(b) It is given that P(4; 8) and R(-4; -2) are points on the Cartesian plane. Find

(i)  $\overline{PR}$  as a column vector,

(ii)  $|\overline{PR}|$ . [3]

- (c) Two cyclists, Alice and John, started a journey at the same time from two villages which are 27 km apart. Alice cycled at  $x$  km/h and John cycled at  $2x$  km/h. They travelled towards each other and met after  $\frac{3}{4}$  hour.

- (i) Write down, in terms of  $x$ , the distance that Alice travelled in  $\frac{3}{4}$  hour.
- (ii) Form an equation in  $x$  and solve it.
- (iii) Hence write down the numerical value of John's speed. [4]



In the diagram, the Sun, Earth and Mars are in a straight line. It is given that the Earth is  $1.496 \times 10^8$  km from the Sun and Mars is  $2.279 \times 10^8$  km from the Sun.

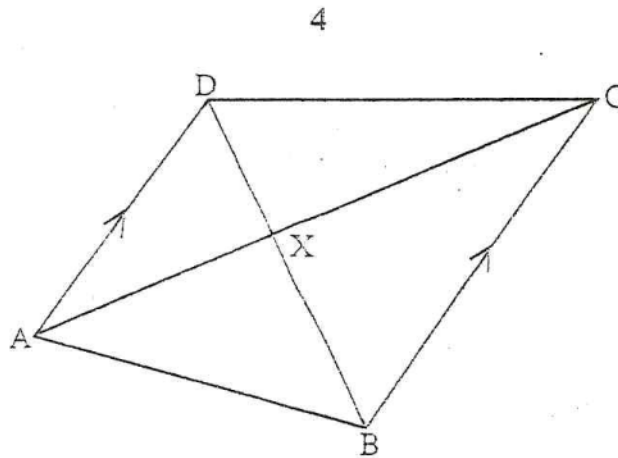
- (i) Write down  $1.496 \times 10^8$  in ordinary form.
- (ii) Find, in standard form, the distance of Mars from the Earth. [3]
- (b) In a certain year, a paint manufacturer mixed 27 litres of white paint with 9 litres of red paint to produce 36 litres of **pink** paint. If one litre of the white paint cost \$36 800 and the average cost of the **pink** paint was \$33 575 per litre, calculate the cost of one litre of the red paint then. [5]
- (c) (i) Solve the simultaneous inequalities

$$2x - 6 < 5x + 3 \leq 3x + 11$$

giving your answer in the form  $a < x \leq b$  where  $a$  and  $b$  are integers.

- (ii) Write down the least possible value of  $x$ . [4]

4 (a)

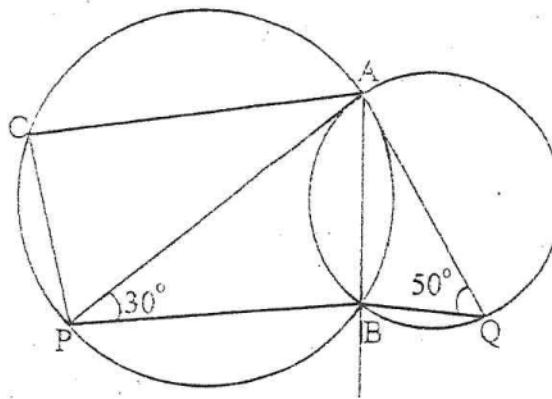


In the diagram, ABCD is a quadrilateral in which AD is parallel to BC and AC and BD intersect at X such that the ratio  $BX:XD = 3:2$ . Given that  $\Delta ABX = 9 \text{ cm}^2$  in area,

- (i) calculate the area of  $\Delta ADX$ ,
- (ii) name, in correct order, the triangle which is similar to  $\Delta BCX$ ,
- (iii) hence calculate the area of  $\Delta BCX$ .

[5]

(b)



In the diagram, AP and AQ are tangents to the circles ABQ and ABPC respectively. Given that  $\hat{APB} = 30^\circ$  and  $\hat{AQB} = 50^\circ$ ,

calculate

- (i)  $\hat{BAP}$ ,
- (ii)  $\hat{BAQ}$ ,
- (iii) reflex  $\hat{PBQ}$ ,
- (iv)  $\hat{ACP}$ .

[6]

- 5 (a) Express as a single fraction in its simplest form

$$n + \frac{2n}{6n+5} \quad [2]$$

- (b) Make  $m$  the subject of the formula

$$a = \frac{m-5}{3m-2} \quad [3]$$

- (c) Given that  $A = \begin{pmatrix} 3 & 5 \\ -2 & 7 \end{pmatrix}$  and  $B = \begin{pmatrix} 5 & y \\ y & 3 \end{pmatrix}$  find

(i)  $A^2$ ,

- (ii) the two possible values of  $y$  given that the determinant of the matrix  $B$  is  $5y + 1$ . [5]

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

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

- (a) On a single diagram, construct

(i) a line  $OP$ , 9 cm long,

(ii) a circle centre  $O$  and radius 3.5 cm,

(iii) the locus of points which are equidistant from  $O$  and  $P$ .

(iv) the circle whose diameter is  $OP$  to cut the circle centre  $O$  at  $R$  and  $Q$ ,

(v) the two tangents to the circle centre  $O$  from the point  $P$ . [7]

- (b)  $OP$  represents a certain locus. Describe this locus **fully**. [2]

- (c) A point  $T$  lies inside the quadrilateral  $PQOR$  and is such that it is nearer  $PQ$  than  $PR$  and nearer  $O$  than  $P$ . Given also that  $OT \geq 3.5$  cm, show by shading clearly the region in which  $T$  lies. [2]



## 6

## Section B [36 marks]

Answer any three questions in this section.

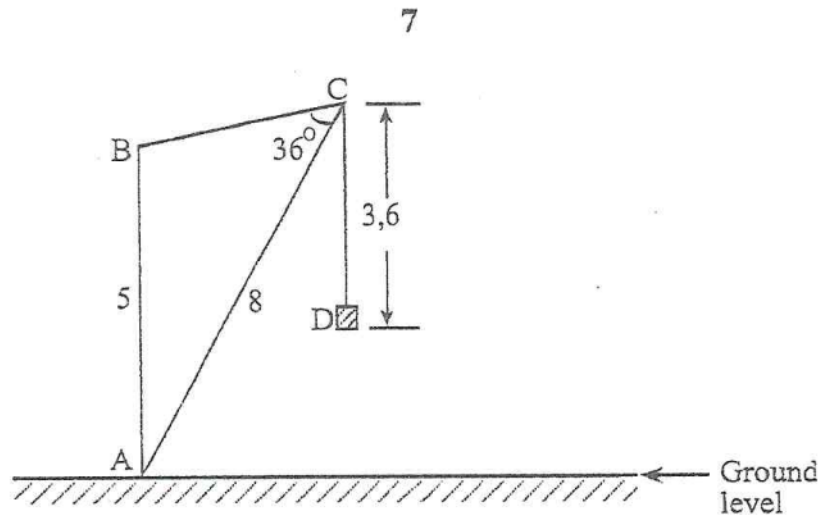
7 Answer the whole of this question on a sheet of graph paper.

Mass ( $m$ kg)	$35 < m \leq 45$	$45 < m \leq 50$	$50 < m \leq 55$	$55 < m \leq 60$	$60 < m \leq 70$
Frequency	$p$	11	13	8	3
Frequency density	0,5	2,2	2,6	$q$	0,3

The table gives the masses,  $m$  kg, of a group of students at a teachers' college.

- (a) Find the value of  $p$  and the value of  $q$ . [2]
- (b) Using a horizontal scale of 2 cm to represent 5 kg and a vertical scale of 4 cm to represent 1 unit of frequency density, draw a histogram of the data. [4]
- (c) Calculate an estimate of the mean mass of the students in the group whose masses are greater than 45 kg. [3]
- (d) Two students are chosen at random from the whole group. Find the probability that each of them has a mass which is greater than 50 kg. [3]

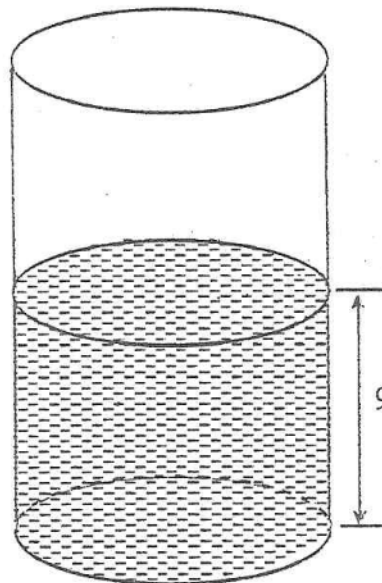
8 (a)



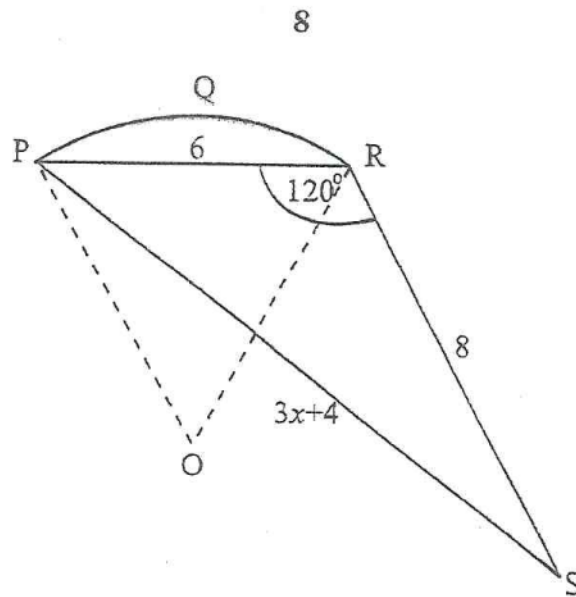
In the diagram, ABC is a crane lifting a load D. AB and BC are beams and ACD is a string. Given that the vertical beam  $AB = 5$  m,  $AC = 8$  m,  $CD = 3,6$  m and  $\widehat{BCA}$  calculate

- (i)  $\widehat{ABC}$ ,  
(ii) the height of D above the ground level. [6]

(b)



The diagram shows a vertical cylindrical container with water up to a height of 9 cm. The volume of the water in the container is  $512 \text{ cm}^3$ . A metal solid, of volume  $217 \text{ cm}^3$ , is lowered into the container until the solid is completely immersed in water. Calculate the height by which the water level rises in the container. Give your answer correct to the nearest millimetre. [6]



Take  $\pi$  to be = 3,142

In the diagram, PQR is a segment of a circle of radius 6 cm and centre O.  
 $PR = 6$  cm,  $RS = 8$  cm,  $PS = (3x + 4)$  cm and  $\hat{PRS} = 120^\circ$ .

- (a) Calculate the area of the segment PQR. [4]
- (b) (i) Form an equation in  $x$  and show that it reduces to  $3x^2 + 8x - 44 = 0$ .
- (ii) Solve the equation  $3x^2 + 8x - 44 = 0$  giving your answers correct to 2 decimal places. [8]

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

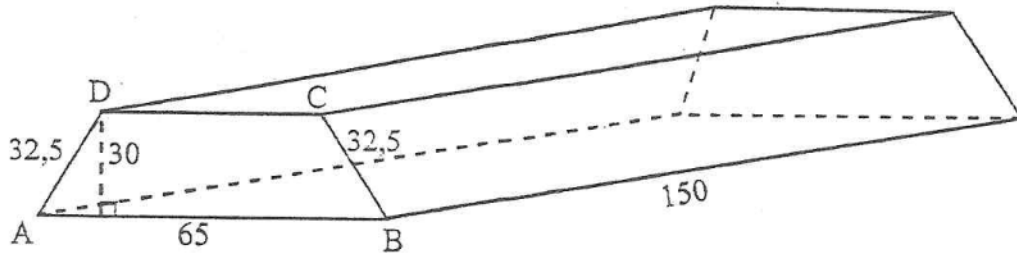
A stone is thrown into the air. Its height  $h$  metres after  $t$  seconds is given by the formula  $h = 60 + 30t - 5t^2$ .

Below is a table of values for  $h = 60 + 30t - 5t^2$ .

Time ( $t$ seconds)	0	1	2	3	4	5	6	7	8
Height $h$ (metres)	60	85	100	$p$	100	85	60	$q$	-20

- (a) Find the value of  $p$  and the value of  $q$ . [2]
- (b) Using a horizontal scale of 2 cm to represent 1 second and a vertical scale of 2 cm to represent 20 metres, draw the graph of  $h = 60 + 30t - 5t^2$  for  $0 \leq t \leq 8$ . [8]
- (c) Use your graph to find
- (i) the maximum height reached by the stone,
  - (ii) the velocity of the stone when  $t = 2$ ,
  - (iii) the times when the stone is at a height of 80 m. [6]

11



The diagram shows a wooden block of length 150 cm, whose cross-section, ABCD is a trapezium in which AB is parallel to DC.  $AB = 65$  cm,  $AD = BC = 32,5$  cm and the perpendicular height is 30 cm.

(a) Calculate

- (i) the length CD given that the area of the trapezium is  $1\,575$  cm<sup>2</sup>,
- (ii) the volume of the block,
- (iii) the mass of the block given that the density of the wood of which it is made, is  $0,72$  g/cm<sup>3</sup>,
- (iv) the total surface area of the block. [10]

(b) The block is to be varnished. One litre of varnish covers an area of  $2\,000$  cm<sup>2</sup> and is bought in 5-litre tins only. Calculate the number of tins of varnish that need to be bought to varnish the whole block. [2]

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

A quadrilateral E with vertices  $(-8; -4)$ ,  $(-4; -4)$ ,  $(-6; -12)$  and  $(-10; -8)$  is the image of quadrilateral A with vertices  $(4; 2)$ ,  $(2; 2)$ ,  $(3; 6)$  and  $(5; 4)$ .

Using a scale of 1 cm to represent 1 unit on both axes, draw the  $x$  and  $y$  axes for  $-10 \leq x \leq 6$  and  $-12 \leq y \leq 8$ .

- (a) (i) Draw and label clearly the quadrilateral E.
- (ii) Draw and label clearly the quadrilateral A.
- (iii) Write down the matrix which represents the transformation which maps E onto A. [5]
- (b) Quadrilateral T with vertices  $(0; 6)$ ,  $(0; 4)$ ,  $(-4; 5)$  and  $(-2; 7)$  is the image of quadrilateral A under a certain transformation.
- (i) Draw and label clearly the quadrilateral T.
- (ii) Describe completely, the single transformation which maps A onto T. [4]
- (c) A one-way stretch represented by  $\begin{pmatrix} 1 & 0 \\ 0 & -1\frac{1}{2} \end{pmatrix}$  maps quadrilateral A onto quadrilateral S.
- Draw and label clearly the quadrilateral S. [3]
-



# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

## MARKING SCHEME

NOVEMBER 2008

MATHEMATICS

4008/2,  
4028/2



1 (a)  $1\frac{8-13}{20}$  or equiv.

$$\frac{3}{4} \text{ F.A.}$$

(b)  $3a + 6c - 8a + 4c$

$$10c - 5a \text{ or equiv.}$$

(c)  $4(4x - 5) = 7 \times 7$  or equiv.

$$16x = 49 + 20$$

$$(x =) 4\frac{5}{16}$$

(d)  $(c =) \frac{22}{7} \times 6.3$  or equiv.

$$\frac{19800}{\text{their } \frac{22}{7} \times 6.3} \text{ or equiv.}$$

$$100$$

Anw: (a) 2    (b) 2    (c) 1    (d) 1 + 1

[11]

2 (a) (i)  $x(2x + a) - b(2x + a)$  or equiv.

$$(2x + a)(x - b) \text{ or equiv.}$$

(ii)  $3(1 - 4y^2)$

$$3(1 + 2y)(1 - 2y) \text{ or equiv.}$$

(b) (i)  $\begin{pmatrix} -8 \\ -10 \end{pmatrix}$

(ii)  $\sqrt{(-8)^2 + (-10)^2}$

$$12.81$$

- (c) (i)  $\frac{3}{4}x$  (km)  
 (ii)  $\frac{3}{4}x + 1\frac{1}{2}x = 27$  or equiv.

$$3x + 6x = 108$$

$$(x =) 12$$

- (iii) (speed =) 24 (km/h)

[12]

Anw: (a)(i) 1 (ii) 2 (b)(i) 1 (ii) 1 (iii) 1

- 3 (a) (i) 149 600 000 (km)  
 (ii)  $2.279 \times 10^8 - 1.496 \times 10^8$   
 $7.83 \times 10^7$ (km)  
 (b)  $\frac{36 \times 33\,575 - 27 \times 36\,800}{9}$   
 (\$)23 900  
 (c) (i)  $2x - 6 < 5x + 3$  OR  $5x + 3 \leq 3x + 11$   
 $x > -3$  and  $x \leq 4$   
 $-3 < x \leq 4$   
 (ii) -2

[10]

Anw: (a)(i) 1 (ii) 1 (b) 1 (c)(i) 2 (ii) 1

- 4 (a) (i)  $(\Delta ADX =) \frac{2}{3} \times \frac{9}{1}$   
 $6 \text{ (cm}^2\text{)}$   
 (ii)  $(\Delta) DAX$   
 (iii)  $(\Delta BCX =) \frac{3}{2} \times \frac{9}{1}$   
 $13\frac{1}{2} \text{ (cm}^2\text{)}$

- (b) (i)  $(\hat{B}\hat{A}P =) 50^{(0)}$   
 (ii)  $(\hat{B}\hat{A}Q =) 30^{(0)}$   
 (iii)  $360^\circ - (\text{their } 50^{(0)} + \text{their } 30^{(0)} + 30^{(0)} + 50^{(0)})$   
 $(\hat{P}\hat{B}Q =) 200^{(0)}$   
 (iv)  $(\hat{A}\hat{C}P =) 180^{(0)} - 100^{(0)}$  or equiv.  
 $80^{(0)}$

Anw: (a)(i) 2 (ii) 1 (iii) 1 (b) No penalty.

[11]

5 (a)  $\frac{6n^2 + 5n + 2n}{6n + 5}$

$$\frac{6n^2 + 7n}{6n + 5}$$

(b)  $3am - 2a = m - 5$

$$3am - m = 2a - 5 \text{ or equiv.}$$

$$(m =) \frac{2a - 5}{3a - 1}$$

(c) (i)  $\begin{pmatrix} -1 & 50 \\ -20 & 39 \end{pmatrix}$  -1 each error

(ii)  $5 \times 3 - y \times y = 5y + 1$

$$(y + 7)(y - 2) = 0$$

-7 or 2 both correct

[10]

Anw: (a) 1 (b) 1 (c)(i) 2 (ii) 1

- 6 (a) (i) Line OP = 9 cm ( $\pm 0.2$  cm) correctly drawn with arcs seen.  
 (ii) Circle centre O and radius 3.5 cm ( $\pm 0.2$  cm)  
 (iii) Perpendicular bisector of OP, ruled and at least 3 cm long and within 2 mm and ( $\pm 2^\circ$ ) at mid-point.

Correct construction arcs

- (iv) Circle centre the mid-point of OP and passing through O and P.
- (v) Tangent PQ passing through P and Q  
Tangent PR passing through P and R
- (b) Points equidistant from PQ and PR or equiv.
- (c) Correct region shaded

[11]

Anw: No diagram 0

With diagram (a) 0 (b) 2 (c) 0

For penalties and tolerances refer to question 10.

- 7 (a) (p =) 5  
(q =) 1.6
- (b) Histogram with rectangles of heights 2 cm; 8.8 cm; 10.4 cm;  
their  $q \times 4$  and 1.2 cm and class mid-points 40 kg; 47.5 kg;  
52.5 kg; 57.5 kg and 65 kg -1 each error
- (c) at least 3 correct class centres

$$\text{their } \frac{47.5 \times 11 + \text{their } 52.5 \times 13 + \text{their } 57.5 \times 8 + \text{their } 65 \times 3}{35}$$

$$53.14 \text{ (kg) accept } 53\frac{1}{7}$$

(d)  $\frac{24}{35 + \text{their } p} \times \frac{23}{35 + \text{their } p - 1}$

$$\frac{23k}{65k}$$

Anw: (a) 1 + 1 (b) No diagram 0 (c) 1 (d) 1 [12]

8 (a) (i)  $(\sin \hat{A}BC =) \frac{8 \sin 36^{(0)}}{5}$  or equiv.

$$(\hat{A}BC =) 109^{\circ}52' (109.9^{(0)})$$

(ii)  $8 \sin 55,9^{(0)}$  or equiv.

Their  $(8 \sin 55,9^{(0)} - 3.6$

$3,025 \text{ (m)})$

(b)  $\sqrt[3]{\frac{729}{512}}$

$\frac{9}{8}$

$\frac{9}{8} \times \frac{9}{1}$

10.125

10.125 - 9

1.1 (cm) accept 11 mm

[12]

Anw: (a)(i) 1 (ii) 1 (b) 3

9 (a)  $\frac{60}{360} \times 3.142 \times 6 \times 6 - \frac{1}{2} \times 6 \times 6 \sin 60^{(0)}$  or equiv.

3.264 (cm<sup>2</sup>)

(b) (i)  $(3x + 4)^2 = 6^2 + 8^2 - 2 \times 6 \times 8 \cos 120^{(0)}$

$9x^2 + 24x + 16 = 100 + 48$

Correct reduction to

$3x^2 + 8x - 44 = 0$  n.w.w

(ii) Formula provided purely numerical

$\frac{p \pm (or + or -) \sqrt{q}}{r}$  but not when  $\pm p$  is seen or used, give

for  $p = -8$ , for  $q = 592$  or  $\sqrt{q} = 24.33$  and for  $r = 6$ .

Comp. square  $\left(x + \frac{4}{3}\right)^2$

$\sqrt{\frac{148}{9}}$  or 4.055

$$\frac{-4 \pm \sqrt{148}}{3}$$

Final answers (NWW but condone P.A. if correct answers reached) 2.72 or -5.39 dep. On B3.  
 SC. If answers wrongly corrected or not corrected give SC for both 2.7216 and -5.3883 seen.

Anw: (a) 1            (b)(i) 0            (ii) 1 + 1

- 10 Penalties and tolerances: ws -1 once; or -1 once nus -2 after marking as generously as possible.

Allow 1 mm at the plots. If plots are not visible and if wrong plots are not Used, accept curve if it passes within 1 mm of correct point(s).

(a)  $(p =) 105$   
 $(q =) 25$

- (b) The 7 given points plus (3; his  $x$ ) and (7; his  $y$ ) correctly plotted.  
 -1 each error  
 Correct curve, not grossly thick but smooth

(c) (i) 105 (m)

- (ii) Tangent drawn at  $t = 2$

$$10 \pm 0,2 \text{ m/s}$$

- (iii) The line  $h = 80$  correctly drawn  
 $0.8 \pm 0,1$  secs and  $5.2 \pm 0,1$  secs.

[12]

Anw: (a) 1 + 1            (b) No graph 0            (c)(i) 1            (ii) 0 (iii) 0.

11 (a) (i)  $\frac{1}{2}(DC + 65) \times 30 = 1575$

$$(DC =) 105 - 65$$

$$40 \text{ (cm)}$$

- (ii)  $1\,575 \times 150$   
 $236\,250 \text{ (cm}^3\text{)}$
- (iii) their (b)(i)  $\times 0.72$   
 $170.1 \text{ kg accept } 170\,100 \text{ (g)}$
- (iv)  $150 \times 32.5 \times 2 + 1575 \times 2 + 40 \times 150 + 65 \times 50$   
 $28\,650 \text{ (cm}^2\text{)}$

(b)  $\frac{\text{their (a)(iv)}}{2000 \times 5}$

3 (tins)

Anw: (a) 1 (b)(i) 1 (ii) 1 (iii) 1 (c) 1

12 For penalties and tolerances, refer to question 10.

- (a) (i) Quad. E correctly drawn  
 (ii) Quad. A correctly drawn  
 (iii)  $\begin{pmatrix} -\frac{1}{2} & 0 \\ 0 & -\frac{1}{2} \end{pmatrix}$  -1 each error.
- (b) (i) Quad. T correctly drawn  
 (ii) Rotation and no other transformation stated  $90^\circ$  anticlockwise or equiv.  
 Centre (0; 2)
- (c) Quad. S correctly drawn -1 each error (4; -3); (2; -3)  
 (3; -9) (5; -6)  
 sc. After SO, give SC for all coordinates seen even in matrix form or plotted.

Anw: (a)(i) 2 (ii) No diagram 0. (iii) 2 (b)(i) No diagram 0  
 (ii) 0 (c) 1

Candidate Name

Centre Number

Candidate Number



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

**MATHEMATICS**  
PAPER 1

**4008/1, 4028/1**

**JUNE 2009 SESSION**

**2 hours 30 minutes**

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

**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.

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.

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 23 printed pages and 1 blank page.**

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

- 1 (a) Express 97,85 in standard form.
- (b) Giving your answer as a decimal, evaluate,
- (i)  $15,915 + 24,09,$
- (ii)  $85,34 \div 17.$

*Answer*

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

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

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

- 2 (a) Estimate  $4,63 \times 33,6$  correct to 1 significant figure.
- (b) The perimeter of a square is 36 cm. Find the area of the square.

For  
Examiner's  
Use

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

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

- 3 (a) Solve the inequality  $5y - 5 < 10$ .
- (b) Giving your answer in ascending powers of  $x$ , expand  $(x + 2)^2$ .

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

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

4 (a) Find the product of  $\frac{4}{13}$  and 3,25.

(b) Factorise completely  $18x^2 + 15x + 3$ .

For  
Examiner's  
Use

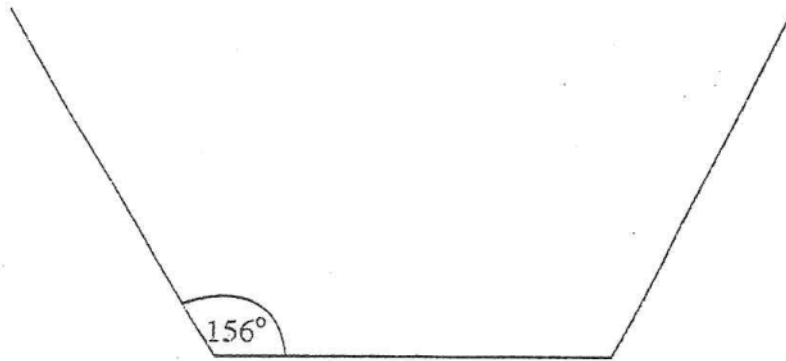
Answer (a) \_\_\_\_\_ [1]

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

5

(a)

5



For  
Examiner's  
Use

The diagram shows part of a regular polygon of interior angle  $156^\circ$ .  
Find the number of sides of the polygon.

(b) State the number of lines of symmetry of a regular decagon.

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

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

- 6 (a) Giving your answer in base 9, evaluate  $785_9 + 306_9$ .
- (b) Express
- (i) 20,45 hours in hours and minutes,
- (ii) 0,0256 to one significant figure.

*Answer*

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

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

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

- 7 (a) Express 22 35 as time on the 12-hour clock.
- (b) Chipso takes 35 minutes to walk to school which is  $3\frac{1}{2}$  km away from her home. Calculate her average speed in km/h.

*Answer*

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

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

- 8 A man was awarded a 15% salary increase. If his previous salary was \$5 240, calculate his new salary.

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

- 9 The mean age of a father and his 4 children is 18 years. The mean age of the four children is 12 years. Calculate the father's age.

Answer \_\_\_\_\_ years [3]

- 10 Two similar cones have their curved surface areas in the ratio 4: 9.
- (a) Write down the ratio of the height of the smaller cone to the height of the larger cone.
- (b) Given that the volume of the smaller cone is  $40 \text{ cm}^3$ , calculate the volume of the larger cone.

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

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

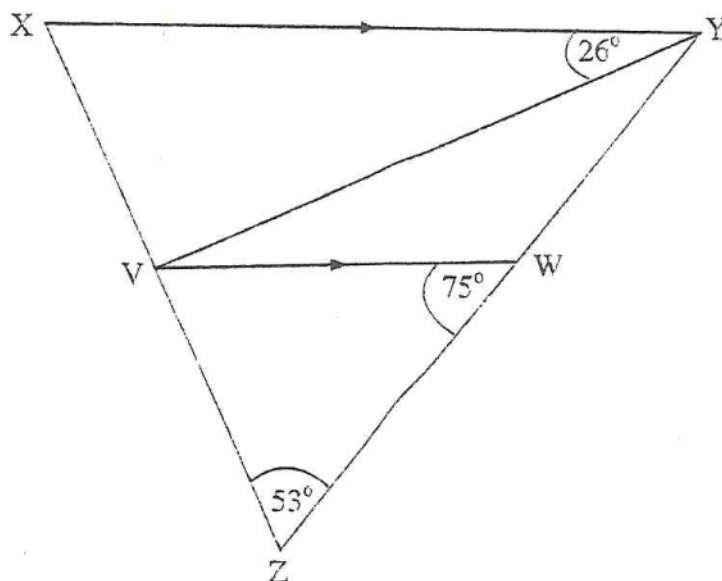
- 11 (a) Write down the next two numbers in the sequence

27; 9; 3; 1;  $\frac{1}{3}$  \_\_\_\_\_; \_\_\_\_\_; ...

- (b) Express  $2,6 \text{ m}^2$  in  $\text{cm}^2$

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

(b) \_\_\_\_\_  $\text{cm}^2$  [1]



In the triangle  $XYZ$  above,  $\hat{XZY} = 53^\circ$ ,  $\hat{VWZ} = 75^\circ$ ,  $\hat{XYV} = 26^\circ$  and  $XY$  is parallel to  $VW$ . Find

- (a)  $\hat{WVY}$ ,  
 (b)  $\hat{VYW}$ ,  
 (c)  $\hat{XVY}$ .

- Answer*
- (a)  $\hat{WVY} = \underline{\hspace{2cm}}$  [1]  
 (b)  $\hat{VYW} = \underline{\hspace{2cm}}$  [1]  
 (c)  $\hat{XVY} = \underline{\hspace{2cm}}$  [1]



13 (a) Write down the 2 by 2 identity matrix for multiplication.

(b) It is given that

$$3 \begin{pmatrix} p & 10 \\ 8 & 16 \end{pmatrix} - \begin{pmatrix} -4 & 14 \\ 0 & 4 \end{pmatrix} = 2 \begin{pmatrix} -10 & 8 \\ 12 & q \end{pmatrix}.$$

Find the value of  $p$  and the value of  $q$ .

For  
Examine  
Use

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

(b)  $p =$  \_\_\_\_\_  $q =$  \_\_\_\_\_ [2]

14 (a) Evaluate (i)  $9^2 \times 9^{\frac{11}{0}}$ ,

(ii)  $8^{\frac{3}{3}}$ .

(b) Solve the equation  $4^x = 32$ .

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

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

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

15

13	8	12	1
3	10	6	15
2	A	7	14
16	5	9	4

For  
Examiner's  
Use

The diagram above represents a magic square. The sum of the numbers horizontally, vertically or diagonally is the magic number.

- (a) Using the diagram, write down
- (i) the magic number,
  - (ii) the value of A.
- (b) A number is chosen at random from the magic square. Write down the probability that it is a perfect cube.

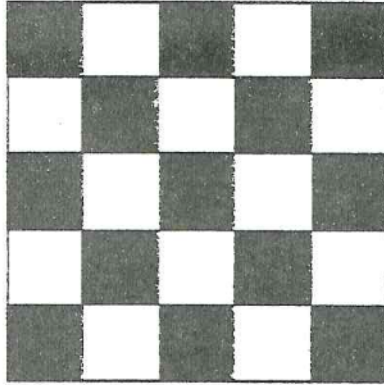
*Answer*

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

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

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

16 (a)

For  
Examiner's  
Use

The above figure is made up of squares of equal size. Find the percentage of the figure which is shaded.

(b) Given that  $\log M = -5$  and  $\log N = 2$ , find the value of

(i)  $\log MN$ .

(ii)  $\log M^{-\frac{1}{2}}$ .

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

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

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

- 17 A plot whose area is  $60\,000\text{ m}^2$  is divided into residential stands each of area  $950\text{ m}^2$ .

Find

- (a) the number of stands obtained,  
(b) the area of the plot left over.

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

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

For  
Examine  
Use

- 18 (a) Find the angle through which one turns from  $027^\circ$  to  $S82^\circ W$  in an anticlockwise direction.
- (b) A lorry is loaded with 608 boxes each of mass 42 kg. Calculate the mass of the load in tonnes correct to two decimal places.

For  
Examiner's  
Use

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

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

19  $\triangle KLM$  is such that  $KL = MK = 8\text{cm}$  and  $\hat{LKM} = 40^\circ$ .

- (a) In the answer space draw an accurate diagram of  $\triangle KLM$ .
- (b) On the diagram, draw the line of symmetry to intersect with one of the sides at T.
- (c) Write down two triangles which are congruent.

*Answer* (a)

[2]

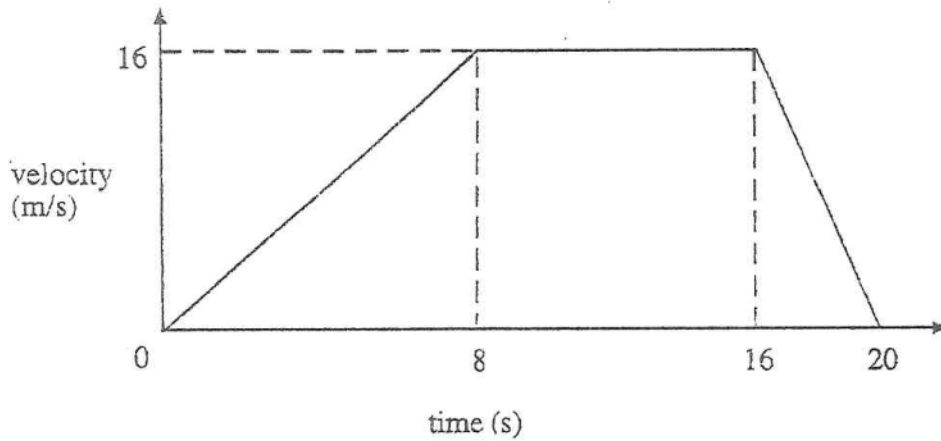
(b) *on the diagram*

[1]

(c) \_\_\_\_\_

[1]

**For  
Examiner's  
Use**



The diagram shows the velocity-time graph of a body which accelerates uniformly from rest to 16 m/s in 8 seconds, travels at constant velocity for a further 8 seconds and finally retards uniformly to rest in 4 seconds.

Calculate

- (a) the acceleration during the first 8 seconds,
- (b) the distance covered during the first 8 seconds,
- (c) the velocity of the object when the time is 18 seconds.

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



21 Given that

$$\xi = \{x: x \text{ is an integer and } 30 \leq x \leq 85\}$$

$$P = \{x: x \text{ is a multiple of } 9\}$$

$$Q = \{x: x \text{ is a perfect square}\} \text{ and}$$

$$R = \{35; 45; 55; 65; 75; 85\}$$

(a) List members of

(i) P,

(ii)  $P \cap Q$ .

(b) Find

(i)  $n(\xi)$ ,

(ii)  $n(Q \cap R)$ .

<i>Answer</i>		(a)	(i)		[2]
			(ii)		[1]
		(b)	(i)		[1]
			(ii)		[1]

For  
Examiner's  
Use

22 (a) Express  $\frac{3}{b+1} - \frac{2}{b-2}$  as a single fraction in its simplest form.

(b) Solve the equation  $\frac{2-x}{15} = \frac{2}{3} + \frac{x}{5}$ .

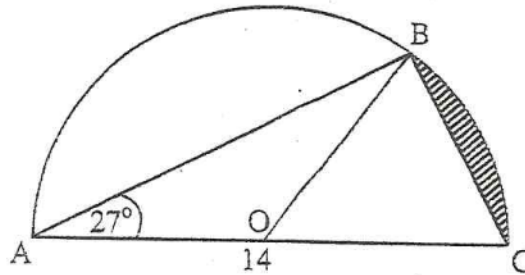
**For  
Examiner's  
Use**

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

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

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

23



In the diagram, ABC is a semi-circle. OA, OB and OC are radii, AC = 14 cm and  $\hat{BAO} = 27^\circ$ .

- (a) Find  $\hat{BOC}$ .
- (b) Using as much of the information given below as is necessary, calculate the shaded area.

$$\left[ \begin{array}{lll} \sin 27^\circ = 0,45 & \cos 27^\circ = 0,89 & \tan 27^\circ = 0,51 \\ \sin 54^\circ = 0,80 & \cos 54^\circ = 0,59 & \tan 54^\circ = 1,4 \end{array} \right]$$

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

(b) \_\_\_\_\_ [4]

4008/1 J2009

24 It is given that,  $y^2 \propto x$  and that  $y = 15$  when  $x = 25$ . Find

(a)  $x$  when  $y = 12$ ,

(b)  $y$  when  $x = 4$ .

For  
Examiner's  
Use

For  
Examiner's  
Use

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

(b)  $y =$  \_\_\_\_\_ or \_\_\_\_\_ [3]

25 The straight line  $y = 2x$  intersects with the curve  $y = x^2 - 3$  at two points.

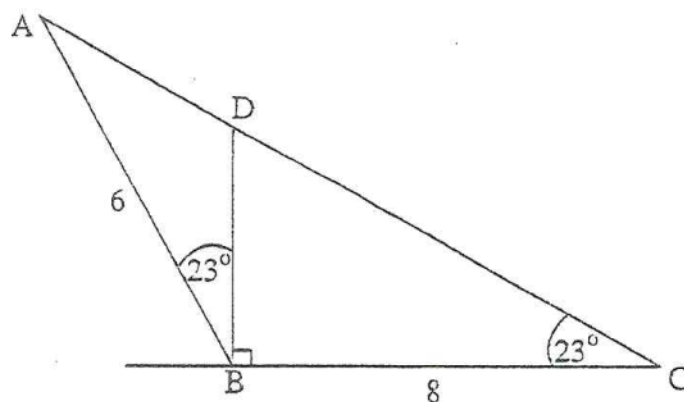
- (a) Form an equation in  $x$  and show that it reduces to  $x^2 - 2x - 3 = 0$ .
- (b) Solve the equation  $x^2 - 2x - 3 = 0$ .
- (c) Find the coordinates of the two points of intersection.

For  
Examiner  
Use

*Answer*

- (a) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]
- (b)  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [2]
- (c) { \_\_\_\_\_ ; \_\_\_\_\_ } and { \_\_\_\_\_ ; \_\_\_\_\_ } [2]

26



In the diagram,  $ADC$  is a straight line,  $AB = 6$  cm,  $BC = 8$  cm,  $\hat{D}BC = 90^\circ$  and  $\hat{A}CB = \hat{A}BD = 23^\circ$ .

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

- (a)  $BD$ ,
- (b) the area of  $\triangle ABC$ ,
- (c)  $AC^2$ .

$$\left[ \begin{array}{lll} \sin 23^\circ = 0,39 & \cos 23^\circ = 0,92 & \tan 23^\circ = 0,42 \\ \sin 67^\circ = 0,92 & \cos 67^\circ = 0,39 & \tan 67^\circ = 2,36 \end{array} \right]$$

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

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

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

---

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

**POSSIBLE ANSWERS**

**JUNE 2009**

**MATHEMATICS**

4008	
4028	01



1	(a)	$9,785 \times 10^1$	1
	(b)	(i) 40,005	1
		(ii) 5,02	1
2	(a)	200	1
	*(b)	81	2
3	(a)	$y < 3$ or equiv.	1
	*(b)	$4 + 4x + x^2$	2
4	(a)	1	1
	*(b)	$3(2x + 1)(3x + 1)$ or equiv	2
5	*(a)	15	2
	(b)	10	1
6	(a)	1202 <sub>(9)</sub>	1
	(b)	(i) 20h 27 min	1
		(ii) (0),03	1
7	(a)	10.35 pm	1
	*(b)	6	2
*8		\$6 026	3
*9		42	3

10	(a)	2:3	1	
	*(b)	135	2	
<hr/>				
11	(a)	$\frac{1}{9}; \frac{1}{27}$	1+1	
	*(b)	26 000	1	
<hr/>				
12	(a)	$26^{(9)}$	1	
	(b)	$49^{(9)}$	1	
	(c)	$102^{(9)}$	1	
<hr/>				
13	*(a)	$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	2	-1 for each error
	(b)	$p = -8$ $q = 22$	1+1	
<hr/>				
14	(a)	(i) 81	1	
		(ii) 4	1	
	*(b)	$2\frac{1}{2}$	2	
<hr/>				
15	(a)	(i) 34	1	
		(ii) 11	1	
	*(b)	$\frac{1}{8}$	2	
<hr/>				
16	*(a)	52	2	
	(b)	(i) -3	1	
		(ii) $2\frac{1}{2}$	1	
<hr/>				

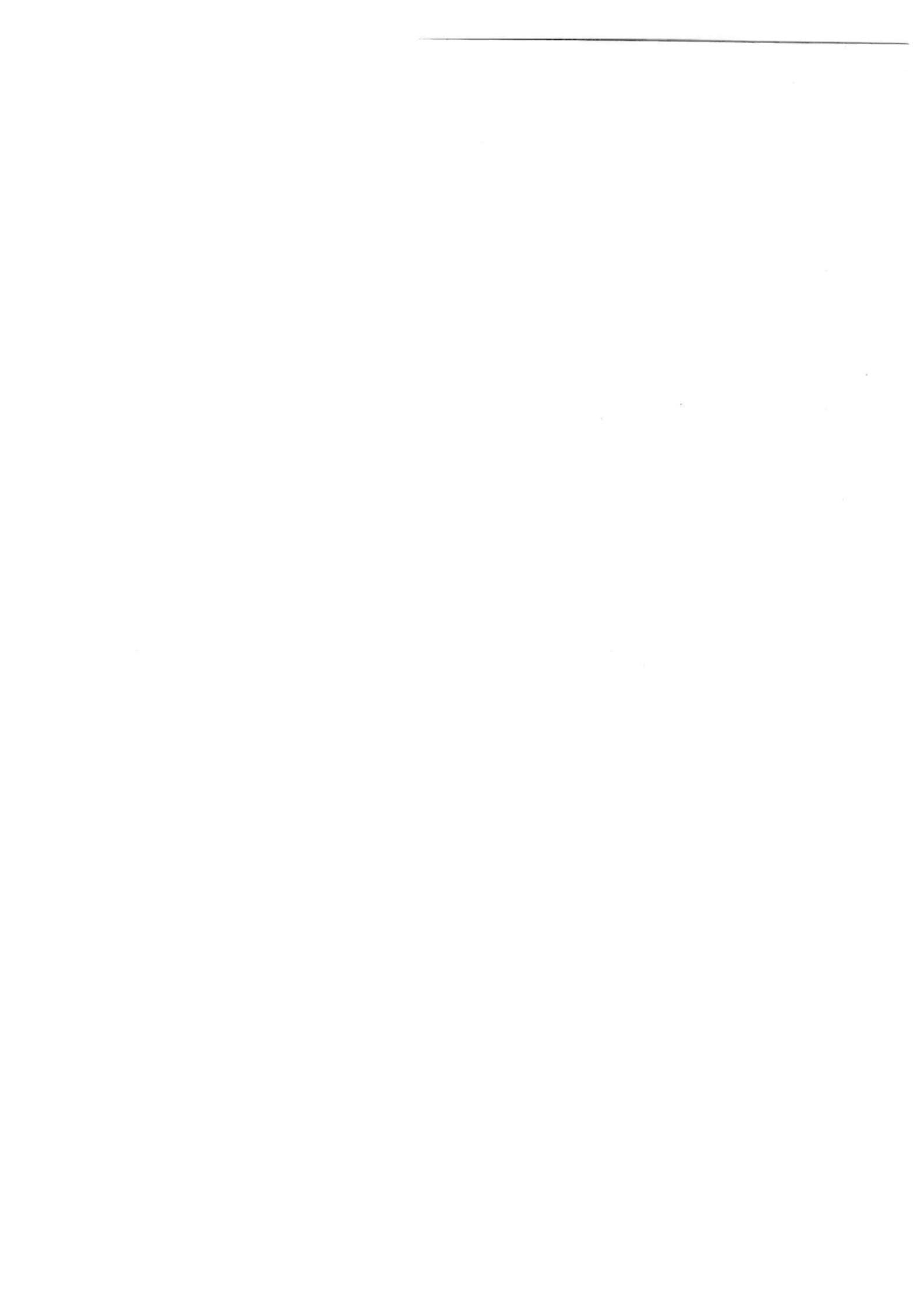
*17	(a)	63	2
	(b)	150	2
*18	(a)	$125^\circ$	2
	(b)	25,54	2
*19	(a)	Correct $\triangle$	2
	(b)	KT	1
	(c)	$\triangle KLT = \triangle KMT$	1
20	(a)	2	1
	(b)	64	1
	*(c)	8	2
*21	(a)	(i) $P = \{36; 45; 54; 63; 72, 81\}$	2
		(ii) $\{36; 81\}$	1
	(b)	(i) 56	1
		(ii) 0	1
22	(a)	$\frac{b-8}{(b+1)(b-2)}$	2
	(b)	-2	3
23	(a)	$54^\circ$	1
	(b)	3,5	4
*24	(a)	16	2
	(b)	6 or -6	3

*25	(a)	Correct reduction	2
	(b)	3 or -1	1 + 1
	(c)	(3; 6) (-1; -2)	1 + 1

---

*26	(a)	3,36	1
	(b)	22,08	2
	(c)	137,44	3

---





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

**MATHEMATICS**

**4008/2**

PAPER 2

**JUNE 2009 SESSION**

**2 hours 30 minutes**

Additional materials:

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

**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.

**Electronic calculators must not be used.**

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 may be used to evaluate explicit numerical expressions.

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**This question paper consists of 12 printed pages.**

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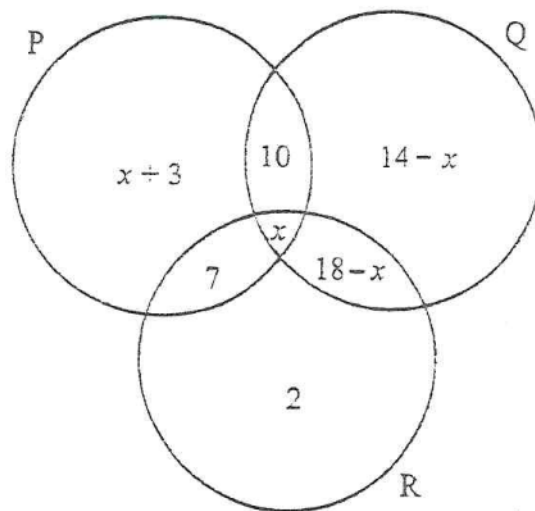
## Section A [64 marks]

Answer all the questions in this section.

- 1 (a) Given the formula  $A = 2\pi(r^2 + h)$ .
- (i) calculate the value of  $A$  when  $\pi = 3\frac{1}{7}$ ,  $r = 1\frac{3}{4}$  and  $h = 3\frac{1}{2}$ . [2]
- (ii) make  $r$  the subject of the formula. [2]
- (b) Express as a single matrix  $\begin{pmatrix} 8 & -4 \\ 5 & 3 \end{pmatrix} - 2\begin{pmatrix} 1 & 3 \\ 4 & 0 \end{pmatrix}$  [2]
- (c) If  $M = \begin{pmatrix} 3 & -1 \\ 1 & -2 \end{pmatrix}$ ,
- (i) find the inverse of  $M$ . [2]
- (ii) hence solve the following simultaneous equations
- $$\begin{aligned} 3x - y &= 2, \\ x - 2y &= -6. \end{aligned}$$
- [3]
- 

- 2 (a) (i) Solve the inequality  $8 - 2(2x - 3) \leq 3x$  [2]
- (ii) Illustrate your solution on a number line. [1]

(b)

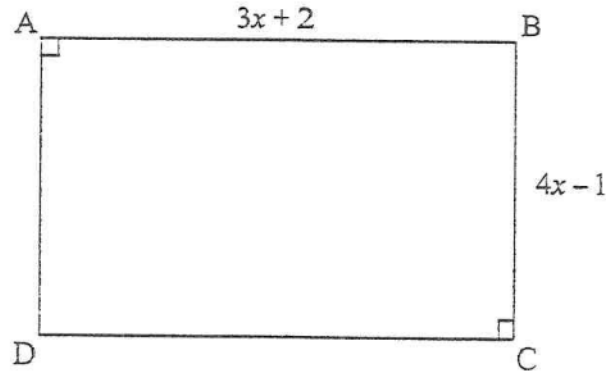


In the Venn diagram P, Q and R are sets such that  $\xi = P \cup Q \cup R$ . The number of elements is shown in each region.

- (i) Find  $n(R)$ . [1]
- (ii) Given that  $n(Q) = 40$ , find the numerical value of  $x$ . [2]
- (iii) Hence calculate the value of  $n(P \cup (R \cap Q'))$  [2]



3

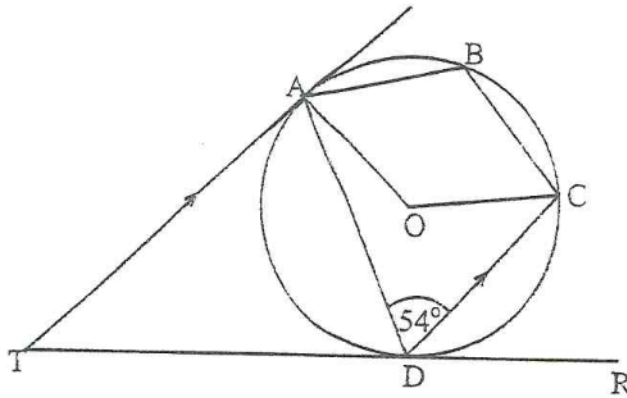


In the diagram  $AB = DC = (3x + 2)$  m,  $BC = AD = (4x - 1)$  m and  $\hat{A}BC = 90^\circ$ .

- (a) Find the numerical value of  $x$  that would make ABCD a square. [2]
- (b) If ABCD is a rectangle, write down, in terms of  $x$ ,
- (i) its perimeter. [2]
- (ii) Given that the area of the rectangle ABCD is  $10 \text{ m}^2$  form an equation and show that it reduces to  $12x^2 + 5x - 12 = 0$ , [2]
- (iii) solve the equation in (ii), giving your answer correct to two decimal places. [5]

- 4 (a) In a certain town with a population of 840 000, 15% of the people are left-handed.
- (i) Calculate the number of left-handed people in the town. [2]
- (ii) If among the left-handed people, the ratio of *men: women: children* is 5: 11: 14, calculate the number of children who are left-handed.
- (iii) The population of the town is 125% of what it was 20 years ago. Calculate the population of the town 20 years ago. [2]

(b)



In the diagram,  $ABCD$  is a cyclic quadrilateral. The tangents  $AT$  and  $DT$  to the circle centre  $O$  meet at  $T$ ,  $TDR$  is a straight line,  $AT$  is parallel to  $CD$  and  $\hat{ADC} = 54^\circ$ .

Calculate

- (i)  $\hat{ATD}$ ,
- (ii)  $\hat{CDR}$ ,
- (iii)  $\hat{ABC}$
- (iv) reflex  $\hat{AOC}$ ,
- (v)  $\hat{DAO}$ .

[5]

- 5 (a) A map is drawn to a scale of 1 : 50 000.
- Calculate
- (i) the actual distance, in kilometres, represented by 7 cm on the map, [2]
- (ii) the area on the map, in square centimetres, which represents an actual area of 3,2 hectares. [2]
- (b) The cost  $C$ , in US dollars (US\$), of hiring a car is partly constant and partly varies as the distance,  $x$  kilometres, covered by the car.
- (i) Write down an equation which connects  $C$ ,  $x$  and two constants  $h$  and  $k$ . [1]
- (ii) Given that  $C = 41,5$  when  $x = 50$  and  $C = 42,25$  when  $x = 75$ , find the value of  $h$  and the value of  $k$ . [4]
- (iii) A tourist hires a car and travels 670 kilometres. Calculate the amount he has to pay in Zimbabwean dollars (Z\$) if the exchange rate is US\$1 : Z\$100 000. [3]

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

- 6 Use a ruler and compasses only for all constructions and show clearly all the construction lines and arcs on a single diagram.
- (a) Construct a kite ABCD with  $AB = AD = 6$  cm,  $BC = DC = 9$  cm and  $\hat{B}AD = 60^\circ$ . Join BD. [6]
- (b) Construct
- (i) the locus of points equidistant from B and D,
- (ii) the locus of points equidistant from BD and DC. [3]

- (c) The loci in (b) intersect at P. Using P as centre
- (i) draw a circle with BD as tangent,
  - (ii) measure and write down the radius of the circle. [2]
- 

**Section B [36 marks]**

*Answer any three questions in this section.*

- 7 A bus travels from Zano Growth Point to Harare and back the same day. The distance covered on one way is such that 72 km are on dust road and 312 km are on tarred road.
- (a) The bus leaves Zano at 0400 hours and arrives in Harare at 1100 hours. Calculate the average speed of the bus for this journey. [2]
  - (b) The bus covers 10,8 km per litre of diesel on the dust road and 12,5 km per litre on tarred road.  
Calculate the amount of fuel needed to cover the
    - (i) 72 km on dust,
    - (ii) 312 km on tarred road,
    - (iii) the whole journey to and fro. [7]
  - (c) If diesel costs \$195 000 per litre, calculate the total cost of diesel needed for the whole journey, giving your answer to the nearest million dollars. [3]
-

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

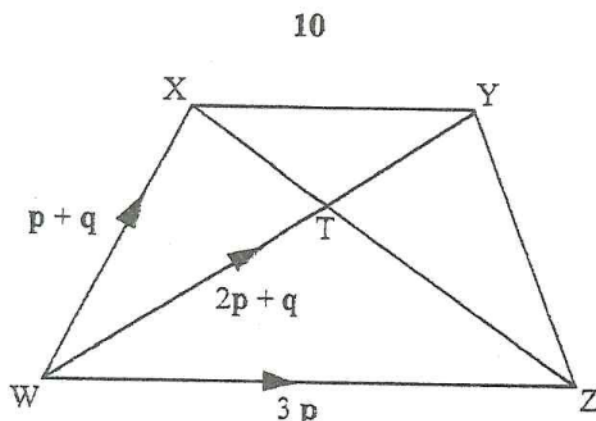
- 8 Quadrilateral ABCD has vertices A(3; 2), B(6; 0), C(6; -1), and D(3; -1). Using a scale of 2 cm to represent 2 units on each axis, draw axes for the values of  $x$  and  $y$  in the ranges  $-10 \leq x \leq 8$  and  $-6 \leq y \leq 8$ .
- (a) Draw and label quadrilateral ABCD. [1]
- (b) ABCD is mapped onto quadrilateral  $A_1B_1C_1D_1$  by an enlargement of scale factor  $-2$ , centre (1; 0). Draw and label  $A_1B_1C_1D_1$ . [2]
- (c) ABCD is mapped onto quadrilateral  $A_2B_2C_2D_2$  by a transformation represented by the matrix  $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ .
- (i) Calculate the coordinates of the points  $A_2$ ,  $B_2$ ,  $C_2$  and  $D_2$ . [2]
- (ii) Draw and label  $A_2B_2C_2D_2$ . [2]
- (iii) Describe fully the single transformation which maps ABCD onto  $A_2B_2C_2D_2$ . [2]
- (d) ABCD is mapped onto quadrilateral  $A_3B_3C_3D_3$  by a stretch of factor 3 with the  $x$ -axis invariant. Draw and label  $A_3B_3C_3D_3$ . [3]
-

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

- 9 The following is a table of values for the function  $y = x^2 + 4x - 22$ .

$x$	-8	-7	-6	-4	-2	0	2	3	4
$y$	10	-1	-10	-22	-26	-22	-10	-1	10

- (a) Using a scale of 2 cm to represent 2 units on the  $x$ -axis and 2 cm to represent 5 units on the  $y$ -axis, draw the graph of  $y = x^2 + 4x - 22$  for  $-8 \leq x \leq 4$  and  $-30 \leq y \leq 15$ . [4]
- (b) Use your graph to
- (i) write down the minimum value of  $y$ . [1]
- (ii) state the range of values of  $x$  for which the function is positive. [2]
- (iii) find the gradient of the curve at the point where  $x = 0$ . [2]
- (c) By drawing a suitable straight line, solve the equation  $x^2 + 4x - 22 = -x - 8$ . [3]



In the diagram  $\overline{WX} = p + q$ ,  $\overline{WY} = 2p + q$  and  $\overline{WZ} = 3p$ .  $WY$  and  $XZ$  intersect at  $T$  such that  $WT = hWY$  and  $XT = kXZ$  where  $h$  and  $k$  are constants.

(a) Express, in terms of  $p$  and / or  $q$

(i)  $\overline{XZ}$  [1]

(ii)  $\overline{XY}$  [1]

(iii)  $\overline{YZ}$  [1]

(b) Express  $\overline{WT}$  in terms of  $h$ ,  $p$  and/or  $q$ . [1]

(c) Express  $\overline{XT}$  in terms of  $k$ ,  $p$  and/or  $q$ . [1]

(d) Using your results from (b) and (c) find the numerical value of  $h$  and the numerical value of  $k$ . [4]

(e) Use your results in (d) to express  $\overline{TZ}$  in terms of  $p$  and  $q$  only. [1]

(f) Given that  $|\overline{WZ}| = n|\overline{XY}|$ , write down

(i) the value of the constant  $n$ . [1]

(ii) the geometrical relationship between  $\overline{XY}$  and  $\overline{WZ}$ . [1]

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

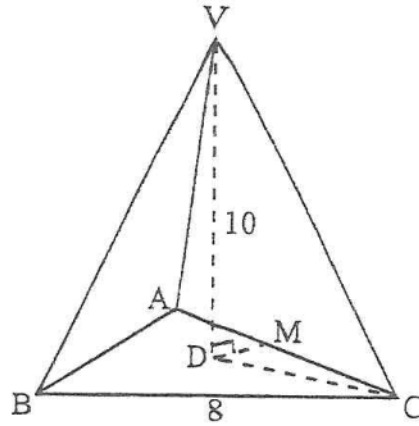
11

Weight Class (kg)	Frequency	Cummulative Frequency
26 – 30	4	4
31 – 35	6	10
36 – 40	12	22
41 – 45	10	32
46 – 50	7	$p$
51 – 55	1	40

The incomplete table shows the grouped frequency of the weights, to the nearest kilogram, of a group of 40 people.

- (a) Write down (i) the value of  $p$ ,  
(ii) the modal class. [2]
- (b) Using a horizontal scale of 2 cm to represent 5 kilogrammes and a vertical scale of 2 cm to represent 5 people, draw a cumulative frequency curve (ogive) to show this information. [5]
- (c) Use your ogive to find an estimate of the median weight. [2]
- (d) One person is picked at random. Find the probability that this person is in the 36 to 40 kg range. [1]
- (e) Given also that 30% of the people are female, find the probability that two people chosen at random, from the group, are both female. [2]





In the diagram,  $VABC$  is a right pyramid whose base  $ABC$  is an equilateral triangle of sides 8 cm. The height of the pyramid is 10 cm,  $D$  is the centre of the triangle  $ABC$  and  $M$  is the midpoint of  $AC$ .

- (a) show that  $DM = 2,309$  cm. [2]
- (b) Calculate
- (i)  $VM$ , [2]
- (ii)  $\hat{VMD}$ , [2]
- (iii) the volume of the pyramid, [3]
- (iv) the area of one sloping face. [3]

$$\left[ \text{Volume of pyramid} = \frac{1}{3} \text{ base area} \times \text{height} \right]$$

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

**MARKING SCHEME**

**JUNE 2009**

**MATHEMATICS**

**4008/2,  
4028/2**

1 (a) (i)  $(A =) \frac{44}{7} \times \frac{105}{16}$  or equiv

$$41\frac{1}{4}$$

(ii)  $r^2 = \frac{A}{2\pi} - h$

$$r = \sqrt{\frac{A}{2\pi} - h}$$

(b)  $\begin{pmatrix} 6 & -10 \\ -3 & 3 \end{pmatrix}$

-1 each error

After B0 give SCB1 for  $\pm \begin{pmatrix} 2 & 6 \\ 8 & 0 \end{pmatrix}$  seen

(c) (i)  $\frac{-1}{5} \begin{pmatrix} -2 & 1 \\ -1 & 3 \end{pmatrix}$

-1 each error

After B0 give SC B1 for  $\frac{1}{\text{their det}} \begin{pmatrix} -2 & 1 \\ -1 & 3 \end{pmatrix}$  or  $\frac{-1}{5} \begin{pmatrix} a & c \\ b & d \end{pmatrix}$  where a, b, c, d are elements of the matrix in any order or with all signs changed

(ii)  $\frac{-1}{5} \begin{pmatrix} -2 & 1 \\ -1 & 3 \end{pmatrix} \begin{pmatrix} 2 \\ -6 \end{pmatrix}$

$$x = 2$$

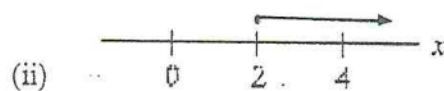
$$y = 4$$

Anw (a)(i) 1 (ii) 1 (b) 2 (c) (i) 2 (ii) 1+1

[11]

2 (a) (i)  $8 + 6 \leq 3x + 4x$

$$x \geq 2$$



(b) (i) 27

(ii)  $10 + x + 18 - x + 14 - x = 40$

2

(iii)  $2 \times \text{his } x + 22$

26

Anw: (a) 1 + 1 (b) No penalty

[8]

3 (a)  $3x + 2 = 4x - 1$

$(x =) 3$

(b) (i)  $2(3x + 2 + 4x - 1)$

$14x + 2$  (m)

(ii)  $(3x + 2)(4x - 1) = 0$

correct reduction to  $12x^2 + 5x - 12 = 0$  nww

(iii)  $12x + 5x - 12 = 0$

Formula provided purely numerical

$$\frac{p \pm (+ \text{ or } -) \sqrt{q}}{r}$$
 but not  $\pm p$  is

seen or used

$p = -5$

$q = 601$  or  $\sqrt{q} = 24.52$

$r = 24$

[competition of the square

$$\left(x - \frac{4}{24}\right)^2$$

$$\frac{551}{576}$$

$$\text{Their } \frac{5}{24} + \sqrt{\text{Their } \frac{551}{576}}$$

FA (nww but condone PA if correct answer(s) reached)

0,81 B1, -1,23

Anw (a) (b) No penalty

[11]

4 (a) (i) figs 15 × figs 84

126 000

(ii)  $\frac{14}{30} \times \text{figs (their 126 000)}$

58 800

(iii)  $\frac{100}{125} \times \text{figs 84}$

672 000

(b) (i) 54<sup>(°)</sup>

(ii) 72<sup>(°)</sup>

(ii) 126<sup>(°)</sup>

(iii) 252<sup>(°)</sup>

(iv) 36<sup>(°)</sup>

Anw. (a)(i) 1

(ii) 1

(b) no penalty

[11]

5 (a) (i) 7 × fig 5

3,5 (km)

(ii)  $\left(\frac{1}{\text{fig 5}}\right)^2 \times \text{figs 32 or equiv}$

0,128 (cm<sup>2</sup>)

- (b) (i)  $C = h - kx$
- (ii)  $41,5 = h + 50k$  or equiv OR  
 $42,25 = h + 75k$  or equiv  
 $0,75 = 25k$  or equiv  
 $k = 0,03$   
 $h = 40$
- (iii) (C =) their  $40 + 670 \times$  their  $0,03$   
 (US\$=)  $60,1$  (0)  
 (Z\$)  $6\ 010\ 000$  or (Z\$)  $6,01$  m

Anw a(i) 2 (ii) 1 (b)(i) 1 (ii) 1+1 (iii) 1

[12]

6. Scale drawing :  $\geq$  half size KO but  $\sqrt$  marks available  
 :  $<$  half size, zero

- (a) (i) Angle  $\hat{B}AD = 60^{\circ} \pm 2^{\circ}$   
 Correct construction areas  
 Kite with their  $\hat{B}AD = 60^{\circ} \pm 2^{\circ}$ .  
 $BA = AD = 6 \pm 0,2$  cm.  $BC = DC = 9 \pm 0,2$  cm  
 Correct construction arcs
- (ii) Ruled perpendicular bisector of BD at least 3 cm long and within  $\pm 2^{\circ}$  and  $\pm 1$  mm.
- (iii) Ruled bisector of their  $\hat{B}DC$  at least 3 cm long and within  $\pm 2^{\circ}$ . Correct construction arcs.
- (b) Circle centred at the intersection of their angle bisector and their perpendicular bisector, and touching BD.  
 (Radius) =  $2,1 \pm 0,2$  cm

Anw. No diagram: zero

[11]

7 (a) (Average speed =)  $\frac{384}{7}$

54,86 (km/h)

- (b) (i)  $\frac{72}{10,8}$   
6,667 (l)
- (ii)  $\frac{312}{12,5}$   
24,96 (l)
- (iii)  $2 \times (\text{their (i)} + \text{their (ii)})$   
63,25 (i)
- (c) their (iii)  $\times$  figs 195  
(\$) 12 000 000 or \$12 m

Anw. (a) 1 (b)(i) 1 (ii) 1 (iii) 1 (c) 1 [12]

- 8 (a) Quadrilateral A B C D correctly drawn -1 each error
- (b) Quadrilateral  $A_1 B_1 C_1 D_1$  correctly drawn with vertices at drawn with vertices at (-3; -4), (-9; 0), (-9; 2) and (-3; 2) -1 each error
- (c) (i)  $A_2 (2; 3)$ ,  $B(0; 6)$ ,  $C (-1; 6)$   $D_2 (-1; 3)$  -1 each error  
(even in matrix form)
- (ii) Quadrilateral  $A_2 B_2 C_2 D_2$  correctly drawn -1 each error
- (iii) Reflection (-and no other transformation stated) in the line  $y = x$
- (d) Quadrilateral  $A_3 B_3 C_3 D_3$  correctly drawn with vertices (3; 6), (6; 0), (6; -3) and (3; -3) -1 each error

Anw: No diagram 0 except for (c)(i) 2 (iii) 1 + 1 [12]

- 9 (a) The nine points correctly plotted, correct curve, not grossly thick, passing within 1 mm of correct points
- (b) (i) (min. value =) -26
- (ii)  $x < -7,2$  or  $x > 3,2$  or equiv
- (iii) tangent drawn at  $x = 0$   
(gradient =) 4,2

3,8

(c) Straight line drawn passing through the points (-8; 0) and (0; -8),

$$(x =) -7 \text{ or } 2$$

Anw. No graph: zero with graph (a) no penalty, (b)(i) 1

(ii) 2 (iii) 1 (c) 2 [12]

10 (a) (i)  $(\overline{XZ} =) 2p - q$

(ii)  $(\overline{XY} =) p$

(iii)  $(\overline{YZ} =) p - q$

(b)  $(\overline{WT} =) h(2p + q)$

(c)  $(\overline{WT} =) (1 + 2k) p + (1 - k) q$

(d)  $2h = 1 + 2k$

$h = 1 - k$

$0 = 1 - 4k$

$k = \frac{1}{4}$

$h = \frac{3}{4}$

For both seen

(e)  $(\overline{TZ} =) \frac{3}{2}p - \frac{3}{4}q$

(f) (i)  $(n =) 3$

(ii) They are parallel

Anw: (a) (b) (c) No penalty (d) 1 + 1  
(e), (f) No penalty [12]

11 (a) (i)  $(p =) 39$

(ii) 38

(b) Pts (30; 4), (35; 10), (40; 22), (45; 32)  
(50; his P), (55; 40), correctly plotted

-1 each error



(c) Horizontal line drawn at  $y = 20,5$

$$39,0^5$$

(d)  $\frac{3k}{10k}$

(e)  $\frac{12}{40} \times \frac{11}{39}$  or equivalent

$$\frac{11k}{130k}$$

Anw: (a) No penalty (b), (c) No graph 0 (d)(e) No penalty [12]

12 (a) (DM = )  $4 \tan 30^\circ$  or equiv

$$2,309 \text{ (cm)}$$

(b)(i) (VM = )  $\sqrt{10^2 + \text{their DM}^2}$  or equiv

$$10,26 \text{ (cm)}$$

(ii) ( $\hat{\text{VMD}} =$ )  $\tan^{-1}\left(\frac{10}{\text{their DM}}\right)$  or equiv

$$77^{(o)}$$

(iii) (Volume = )  $\frac{1}{3} \times \frac{1}{2} \times 8 \times 8 \times \sin 60^\circ \times 10$  or equiv

$$92,38 \text{ (cm}^3\text{)}$$

(iv) (Area of VAC =)  $\frac{1}{2} \times 8 \times \text{their VM}$  or equiv

$$41,05 \text{ (cm}^2\text{)}$$

Anw: (a) 2 (b)(i) 1 (ii) 1 (iii) 1  
(iv) 1

[12]

Candidate Name

Centre Number

Candidate Number



# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

**MATHEMATICS**  
PAPER 1

**4008/1, 4028/1**

**NOVEMBER 2009 SESSION**

**2 hours 30 minutes**

Candidates answer on the question paper.

Additional materials:

Geometrical instruments

**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.

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.

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**

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**This question paper consists of 24 printed pages.**

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

For  
Examiner's  
Use

1 Find the value of

- (a) (i)  $\frac{7}{8} - \frac{5}{6}$ , giving your answer as a common fraction in its lowest terms,
- (ii)  $0,004 \div 0,8$ , giving your answer as a decimal.
- (b) Express 0,085 as a percentage.

*Answer* (a) (i) \_\_\_\_\_ [1]  
(ii) \_\_\_\_\_ [1]  
(b) \_\_\_\_\_ % [1]

- 2 (a) State the number of significant figures in the number 0,000320.
- (b) A rectangle measures  $(x + 2)$  cm by  $(2x - 1)$  cm. Given that  $x = 3$ , correct to the nearest whole number, find the minimum possible area of the rectangle.

For  
Examiner's  
Use

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

3 Factorise completely

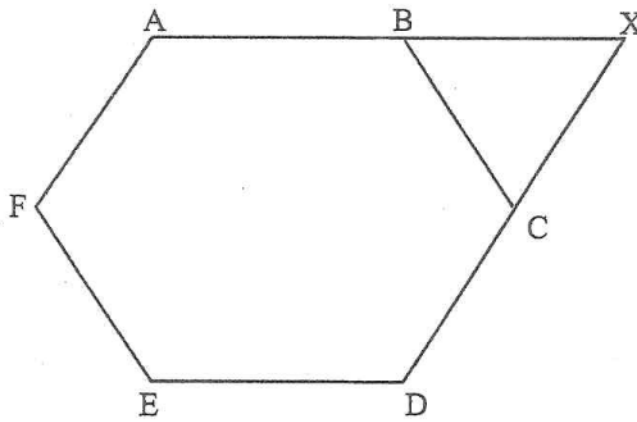
(a)  $x^2 - 12x + 27,$

(b)  $cx - dx - 4cy + 4dy.$

For  
Examiner  
Use

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

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



ABCDEF is a regular polygon. AB and DC are produced to meet at X.

- (a) Calculate
- (i)  $\hat{X}BC$ ,
  - (ii)  $\hat{BXC}$ .
- (b) Give the special name for triangle BXC.

*Answer*

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

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

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

5 Simplify

(a)  $(2x)^3$ ,

(b)  $(8^{-\frac{2}{3}})^{\frac{1}{2}}$ .

6

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

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

6  $\mathbf{X} = \begin{pmatrix} 2 & 0 \\ 0 & 6 \end{pmatrix}$  and  $\mathbf{Y} = \begin{pmatrix} p & q \\ 0 & r \end{pmatrix}$ .

Given that  $\mathbf{XY} = \mathbf{X} + \mathbf{Y}$ , find

(a)  $p$ ,

(b)  $q$ ,

(c)  $r$ .

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

(b)  $q =$  \_\_\_\_\_ [1]

(c)  $r =$  \_\_\_\_\_ [1]

7 A bicycle wheel has a diameter of 70 cm. Taking  $\pi$  to be  $\frac{22}{7}$ , calculate

- (a) the circumference of the wheel,  
(b) the number of revolutions made by the wheel in travelling 55 km.

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

8 From the following list of numbers, write down the irrational numbers:

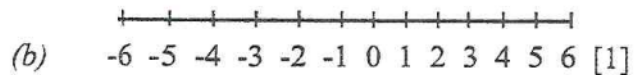
0,5; 36;  $\pi$ ;  $\sqrt{81}$ ;  $\sqrt{2}$ ;  $\sqrt{5}$ ; -6,392;  $\frac{3}{4}$

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



- 9 (a) Solve the inequality  $5x - 5 \leq 10x < 8x + 10$ .
- (b) Illustrate your solution to (a) on the number line below.

*Answer* (a) \_\_\_\_\_  $\leq x <$  \_\_\_\_\_ [2]



- 10 A shop assistant is paid a basic wage of \$3 600 000 per week. In addition she is paid a commission of  $2\frac{1}{2}\%$  of the value of the goods which she sells.

During a certain week she sells goods worth \$52 000 000. Calculate

- (a) the amount of commission she gets,
- (b) her total earnings for that week.

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

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

11 Two towns X and Y are such that the bearing of X from Y is  $031^\circ$ .

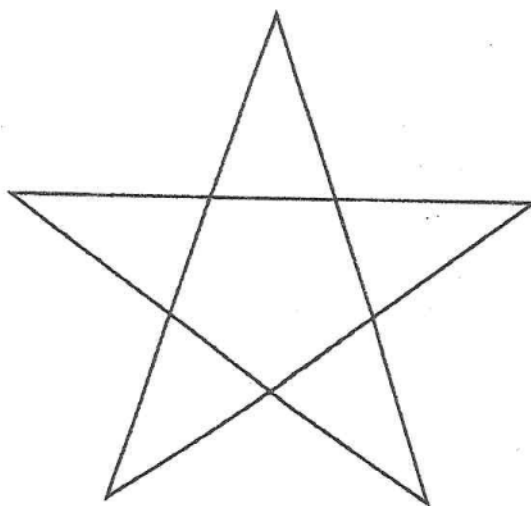
- (a) Find the bearing of Y from X.  
(b) A third town Z is on a bearing of  $300^\circ$  from Y.

Find  $\hat{Z}YX$ .

For  
Examiner's  
Use

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

(b)  $\hat{Z}YX =$  \_\_\_\_\_ [2]



The diagram above is a regular pentagonal star.

- (a) State the order of rotational symmetry of the pentagonal star.
- (b) Draw in all the lines of symmetry of the pentagonal star.

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

(b) on the diagram. [2]

- 13 Solve the following simultaneous equations.

$$\begin{aligned} 3x + 2y &= 0, \\ 2x + y &= -1. \end{aligned}$$

For  
Examiner's  
Use

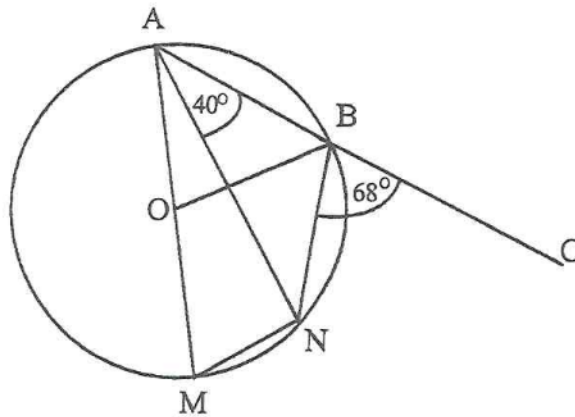
*Answer*       $x =$  \_\_\_\_\_  
                           $y =$  \_\_\_\_\_ [3]

- 14 Given that  $\overrightarrow{OA} = \begin{pmatrix} 10 \\ -2 \end{pmatrix}$ ,  $\overrightarrow{OB} = \begin{pmatrix} 1 \\ 10 \end{pmatrix}$  and X is the midpoint of OA,

- (a) express  $\overrightarrow{OX}$  as a column vector,  
 (b) find  $|\overrightarrow{AB}|$ .

*Answer*      (a)  $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$  [1]  
                          (b) \_\_\_\_\_ [2]

15

For  
Examiner  
Use

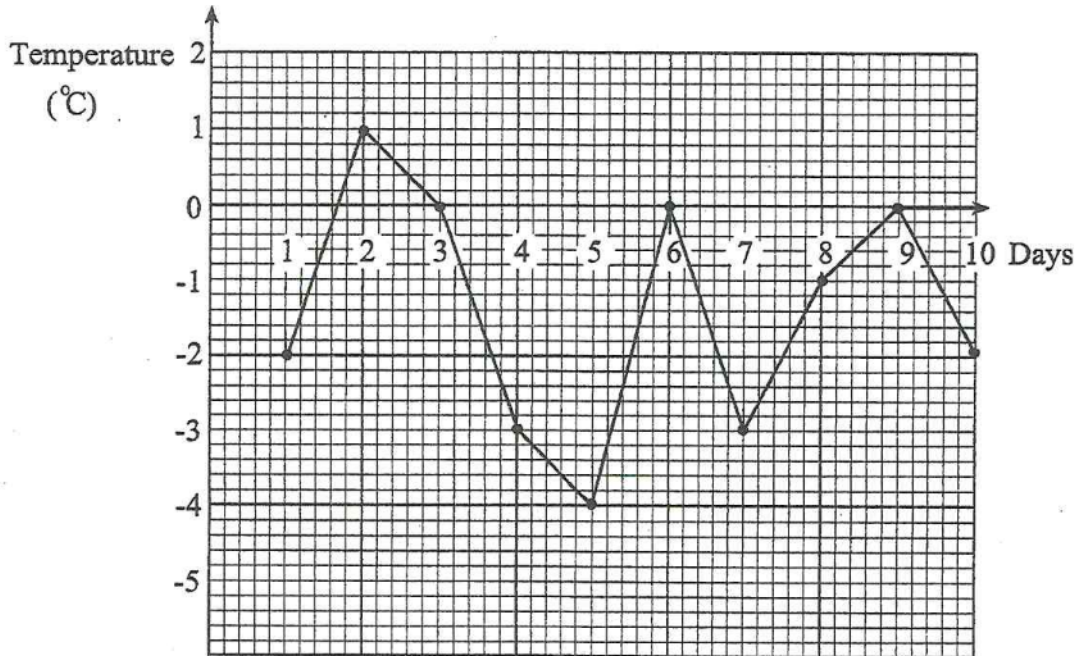
In the diagram,  $ABC$  and  $AOM$  are straight lines and  $O$  is the centre of the circle. Given that  $\hat{NBC} = 68^\circ$  and  $\hat{NAB} = 40^\circ$ , calculate

- (a)  $\hat{AMN}$ ,  
 (b)  $\hat{MAN}$ ,  
 (c)  $\hat{BOM}$ .

*Answer*

(a)  $\hat{AMN} =$  \_\_\_\_\_ [1]  
 (b)  $\hat{MAN} =$  \_\_\_\_\_ [1]  
 (c)  $\hat{BOM} =$  \_\_\_\_\_ [1]

- 16 The graph below shows the minimum daily temperatures taken over a period of 10 days at a very cold place.

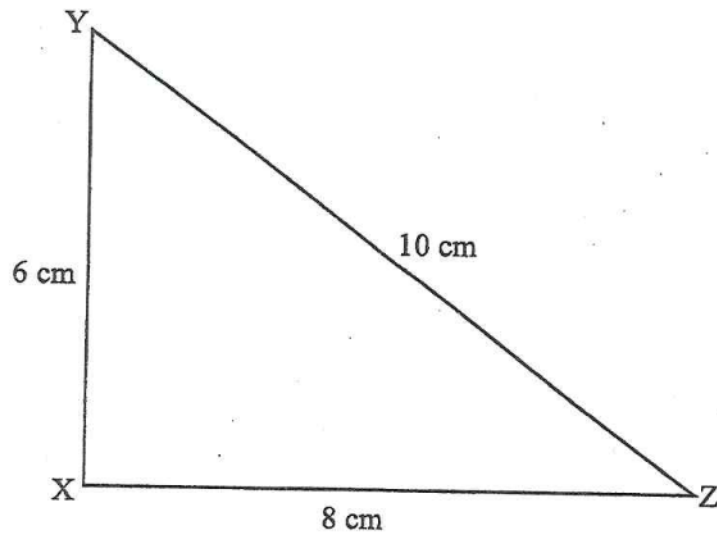


From the 10 recorded temperatures, find

- the modal temperature,
- the median temperature,
- the temperature range.

Answer (a) \_\_\_\_\_ °C [1]  
 (b) \_\_\_\_\_ °C [1]  
 (c) \_\_\_\_\_ °C [1]

17



For  
Examiner's  
Use

On triangle XYZ above, use ruler and compasses only to construct the Locus of points which are

- (a) equidistant from Y and Z,
- (b) 5 cm from the mid-point of YZ.

*Answer* (a) on the diagram [2]  
(b) on the diagram [1]

18 A varies directly as the square of  $r$ .

(a) Write down an equation connecting  $A$ ,  $r$  and a constant  $k$ .

(b) Given that  $A = 38\frac{1}{2}$  when  $r = 3\frac{1}{2}$ , find the value of the constant  $k$ .

For  
Examiner's  
Use

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

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



19 Given that  $\log 7 = 0,845$  and  $\log 2 = 0,301$ , calculate

(a)  $\log 14$ ,

(b)  $\log \sqrt{2}$ .

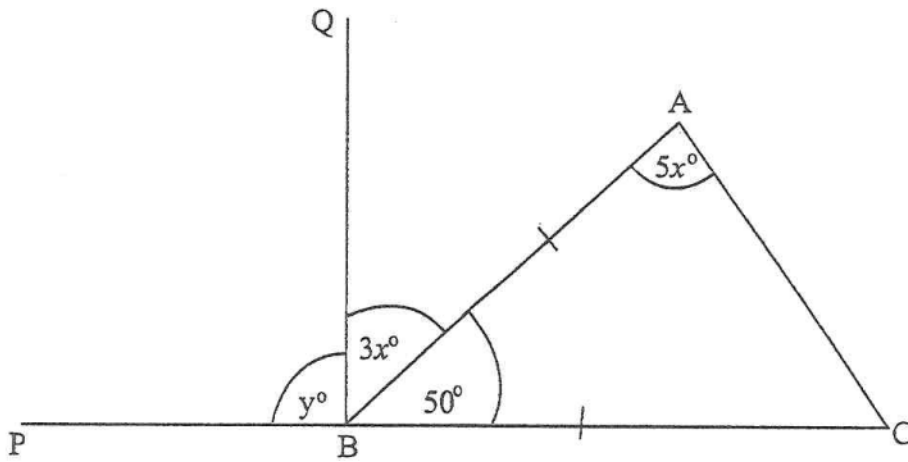
*Answer* (a) \_\_\_\_\_ [1]  
(b) \_\_\_\_\_ [2]

---

20 (a) Express  $3 \times 10^{-4}$  as a common fraction of  $5 \times 10^{-2}$  in its simplest form.

(b) Express  $1002_3$  as a number in base 7.

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



In the diagram,  $ABC$  is an isosceles triangle in which  $AB = BC$ ,  $\hat{ABC} = 50^\circ$  and  $\hat{BAC} = 5x^\circ$ .

$\hat{PBQ} = y^\circ$ ,  $\hat{QBA} = 3x^\circ$  and  $PBC$  is a straight line.

Find the value of

- (a)  $x$ ,
- (b)  $y$ .

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

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

- 22 (a) Mrs Muleya and Mrs Moyo share 50 kg of mealie-meal in the ratio 2 : 3. Find the mass of mealie-meal Mrs Moyo gets.
- (b) A motorist covers a certain distance in 15 minutes when his average speed is 60 km/h.

Calculate the time taken by a pedestrian walking at an average speed of 5 km/h, to cover the same distance.

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

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

23 Given that  $\tan x^\circ = \frac{5}{12}$ , find, as a common fraction,

(a)  $\sin x^\circ$ ,

(b)  $\cos(180 - x)^\circ$ .

*Answer* (a)  $\sin x^\circ =$  \_\_\_\_\_ [2]

(b)  $\cos(180 - x)^\circ =$  \_\_\_\_\_ [2]

---

24 A fair six-sided die is thrown two times. Find the probability that

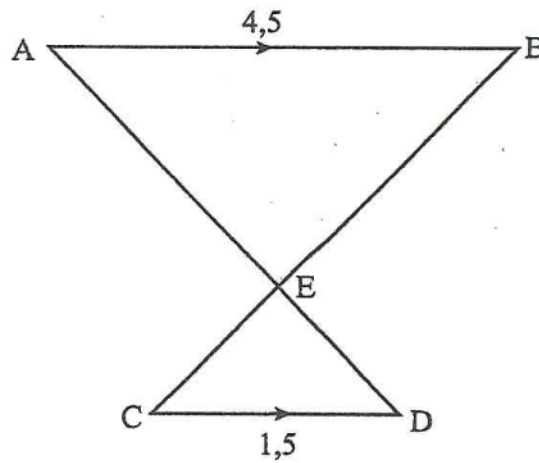
(a) the total score is at least four,

(b) the two outcomes are different.

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

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

25



For  
Examiner's  
Use

In the diagram, AB is parallel to CD,  $AB = 4,5$  cm,  $CD = 1,5$  cm and AD and BC intersect at E.

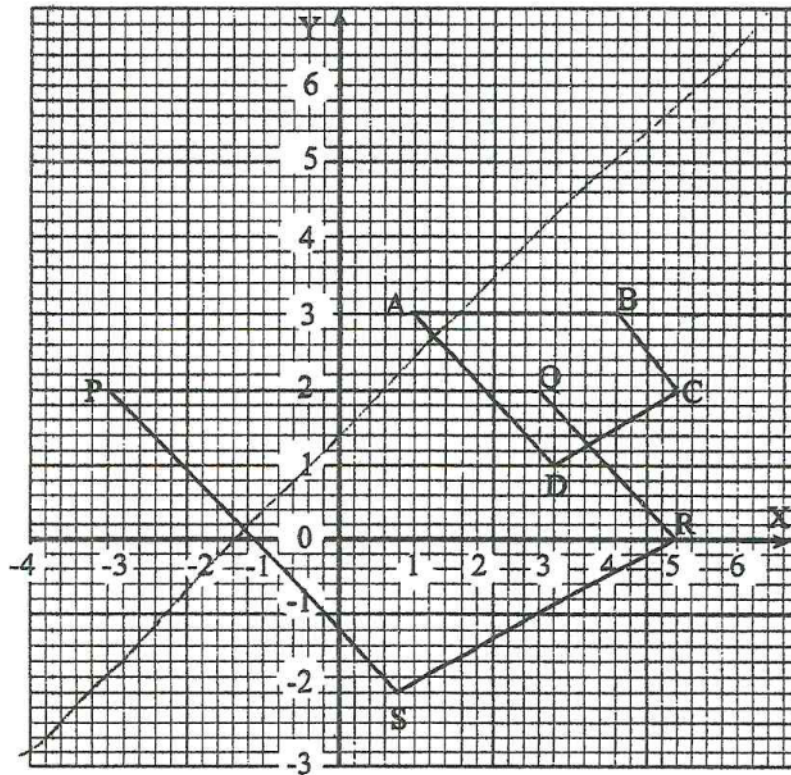
- (a) Name the triangle that is similar to triangle ABE.
- (b) If  $AD = 10$  cm, find AE.

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

(b)  $AE =$  \_\_\_\_\_ [3]

- 26 In the diagram, quadrilateral PQRS is the image of quadrilateral ABCD under a single transformation.

For  
Examiner's  
Use



- (a) Describe fully the single transformation which maps ABCD onto PQRS:
- (b) Write down the ratio of area of PQRS to area of ABCD in the form  $n : 1$ .

Answer

(a)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[3]

(b)

\_\_\_\_\_

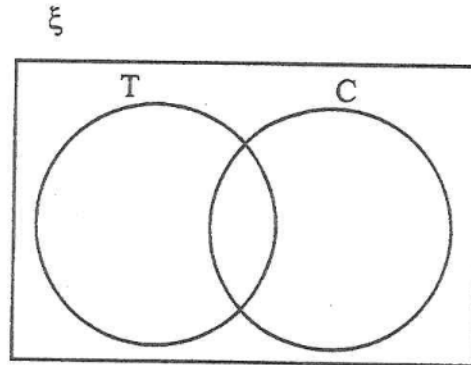
[1]

27 Among the members of staff at a school,

21 take tea (T),

12 take coffee (C)

5 take neither tea nor coffee and  $x$  take both tea and coffee.



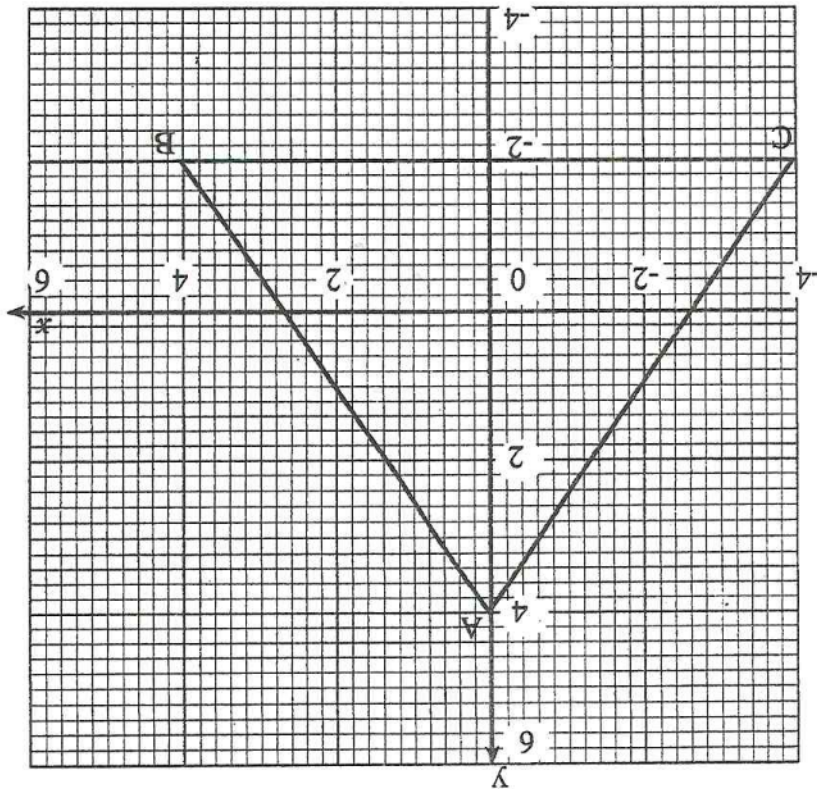
- (a) Complete the Venn diagram to show the number of elements in each subset.
- (b) If there are 35 members of staff at the school, find
- (i) the value of  $x$ ,
  - (ii) the actual number of members of staff who take tea but not coffee.

Answer (a) on the diagram [2]

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

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

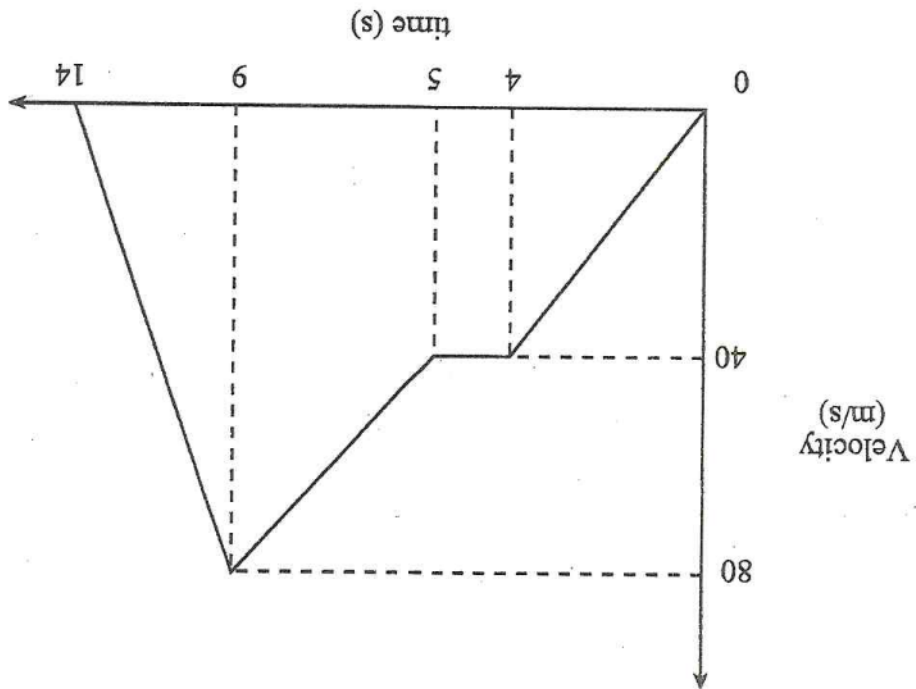
28 In the diagram below, triangle ABC has vertices  $A(0; 4)$ ,  $B(4; -2)$  and  $C(-4; -2)$ .



- (a) Find the equation of the line AB.  
 (b) Calculate  
 (i) the length of the line AC leaving your answer in surd form,  
 (ii) the area of triangle ABC.

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





The diagram is the velocity – time graph for an electric train. The train accelerates uniformly from rest until it reaches a speed of 40 m/s in 4 seconds. It maintains this speed for a second before accelerating again for a further 4 seconds. After reaching a speed of 80 m/s, it decelerates to rest in 5 seconds.

Calculate

- (a) the velocity of the train at the end of the 8<sup>th</sup> second,
- (b) the deceleration during the last 5 seconds.
- (c) the total distance travelled by the train during the 14 seconds.

*Answer*

- (a) \_\_\_\_\_ m/s [2]
- (b) \_\_\_\_\_ m/s<sup>2</sup> [1]
- (c) \_\_\_\_\_ m [2]

Candidate's  
Number

Centre Number

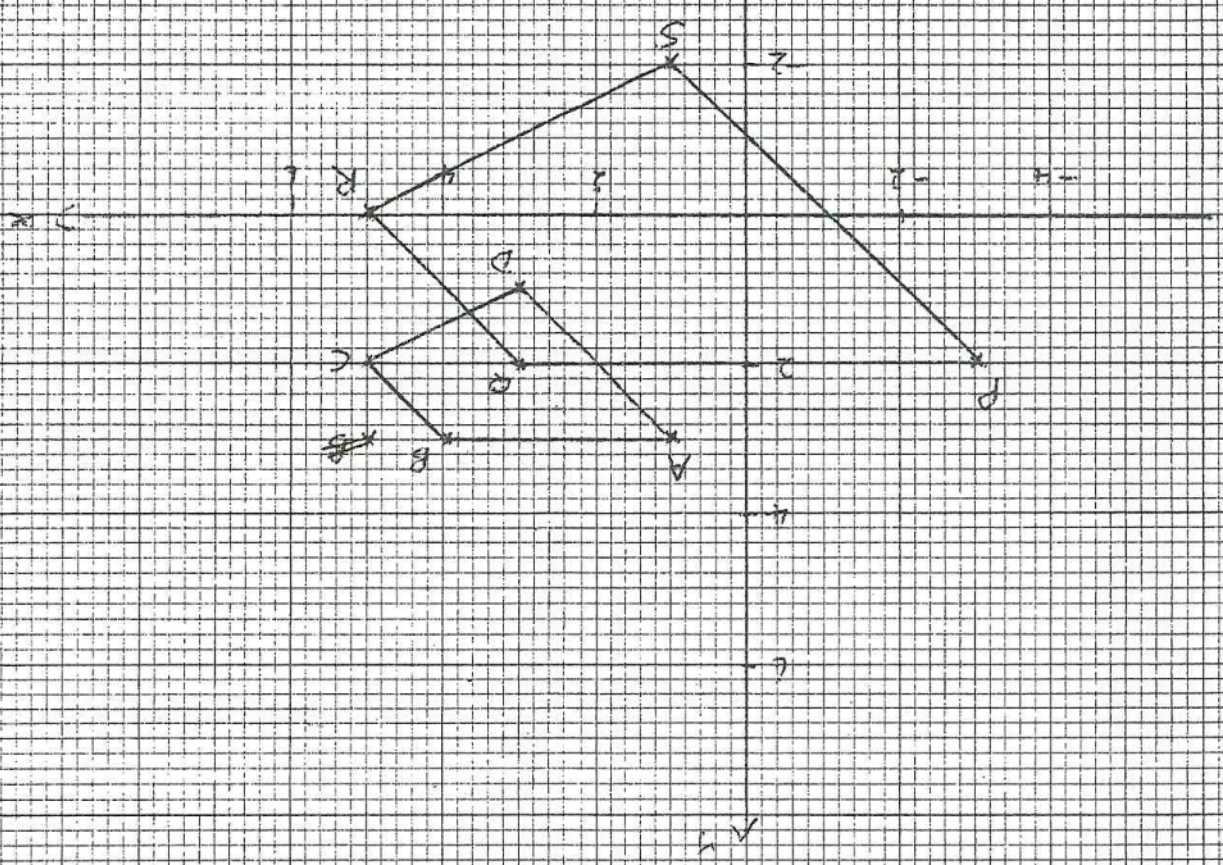
Candidate Name .....

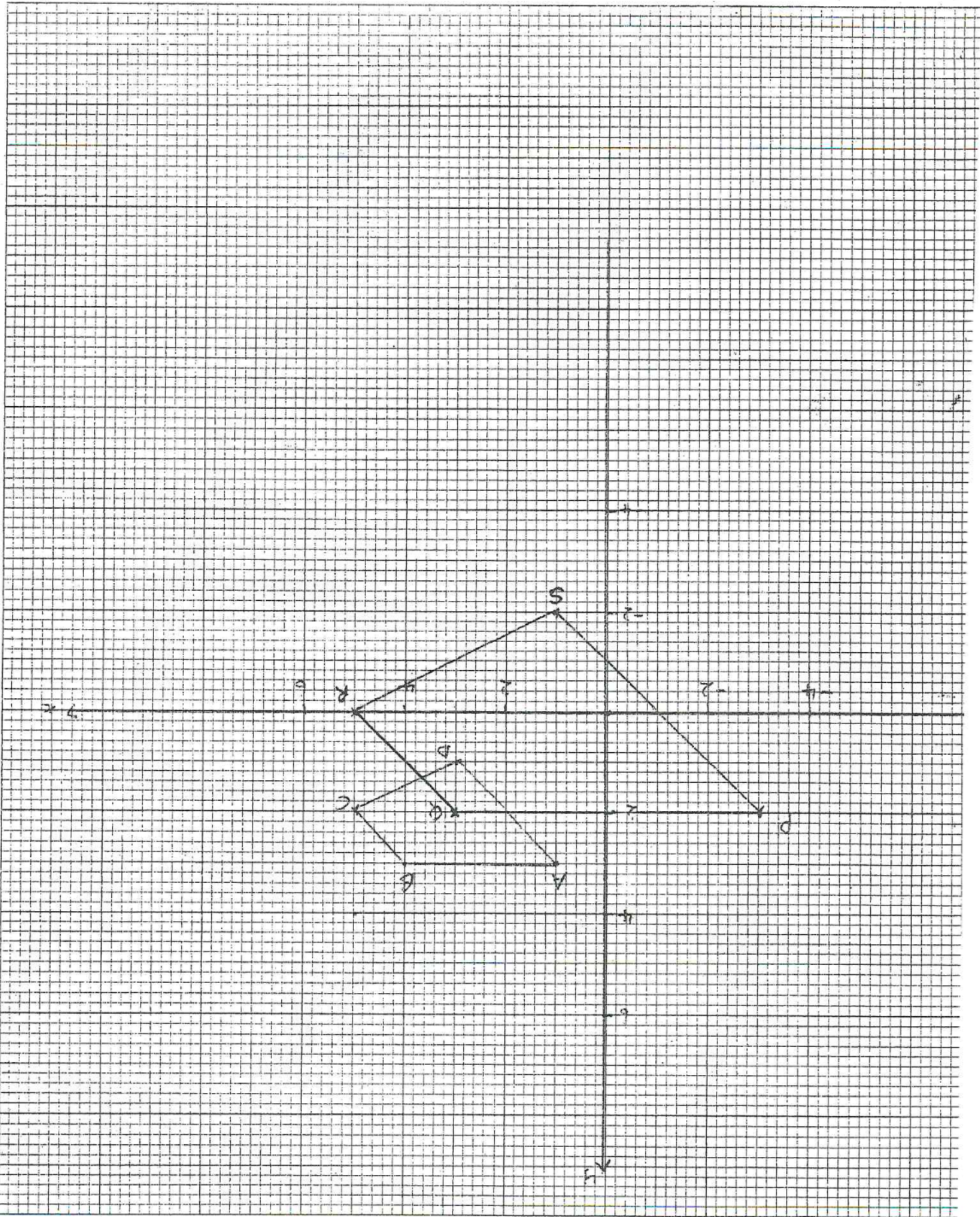
Subject .....

Paper

Question No .....

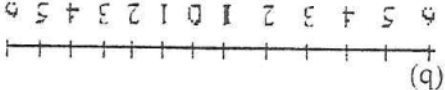
26 N 2009





Candidate's Number	Centre Number
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Candidate Name: .....  
 Paper: .....  
 Question No: 26 N2009

7	(a) 220 (b) * 25 000	1 2	
8	$\pi; \sqrt{2}; \sqrt{5}$	3	
9	(a) * $-1 \leq x < 5$ (b) 	2 1	
*10	(a) 1 300 000 (b) 4 900 000	2 1	
11	(a) 211° or equiv. (b) * 91°	1 2	
12	(a) 5 (b) 5 correctly drawn lines	1 2	



	19	(a)	1,446	(b)	*(0),1505	2	1	2
	*20	(a)	$\frac{500}{3}$	(b)	41(7)	2	2	2
	*21	(a)	13	(b)	91	2	2	2
	*22	(a)	30	(b)	3	2	2	2
	*23	(a)	$\frac{5}{13}$	(b)	$\frac{12}{13}$	2	2	2

---

	2 2 1	27 (a)  *(b) (i) 3 (ii) 18
	2 1 2	28 *(a) $y = \frac{-3x}{2} + 4$ or equiv. (b) (i) $\sqrt{52}$ or $2\sqrt{13}$ (ii) 24
	2 1 2	29 *(a) 70 (b) 16 (c) *560





MARKING SCHEME

NOVEMBER 2009 SESSION

MATHEMATICS

01	4008 4028
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1	(a) (i)	$\frac{1}{24}$	1	1	
	(ii)	(0),005	1	1	
	(b)	$8,5$ or $8\frac{1}{2}$	1	1	
2	(a)	3	1	2	
	*(b)	18	1	2	
3	(a)	$(x-3)(x-9)$ or equiv.	1	1	
	*(b)	$(c-d)(x-4y)$ or equiv.	2	2	
4	(a) (i)	$60^\circ$	1	1	
	(ii)	$60^\circ$	1	1	
	(b)	equilateral	1	1	
5	(a)	$8x^3$	1	1	
	*(b)	$\frac{1}{2}$ or 0,5	2	2	
6	(a)	2	1	1	
	(b)	0	1	1	
	(c)	$\frac{1}{5}$ or 1,2	1	1	

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

**MATHEMATICS**

PAPER 2

NOVEMBER 2009 SESSION

2 hours 30 minutes

4008/2

Additional materials:

Answer paper

Geometrical instruments

Graph paper (3 sheets)

Mathematical tables

Plain paper (1 sheet)

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.

Electronic calculators must not be used.

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

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**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.

This question paper consists of 13 printed pages and 3 blank pages.

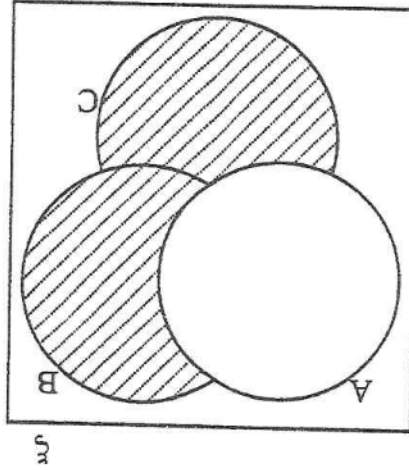
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[Turn over



[2]



(b) Write down, in set notation, the set represented by the shaded region in the Venn diagram.

[3]

(ii)  $3^{(m+4)} = 9^{(m-1)}$

[2]

(i)  $7(h+3) - 2(h-4) = 4$

(a) Solve the equations

2

[3]

(ii) Evaluate  $(\text{Log}_8 81) \times (2 \text{Log}_4 8)$ .

[3]

(i) Find the L.C.M. of  $15y^2, 25xy^3$  and  $(x^3 - x^2)$ .

[2]

(b) Expand  $(1-2x)(x+3)$ .

[2]

(a) Simplify  $8 - 24 \div 6 + 3 \times 4$ .

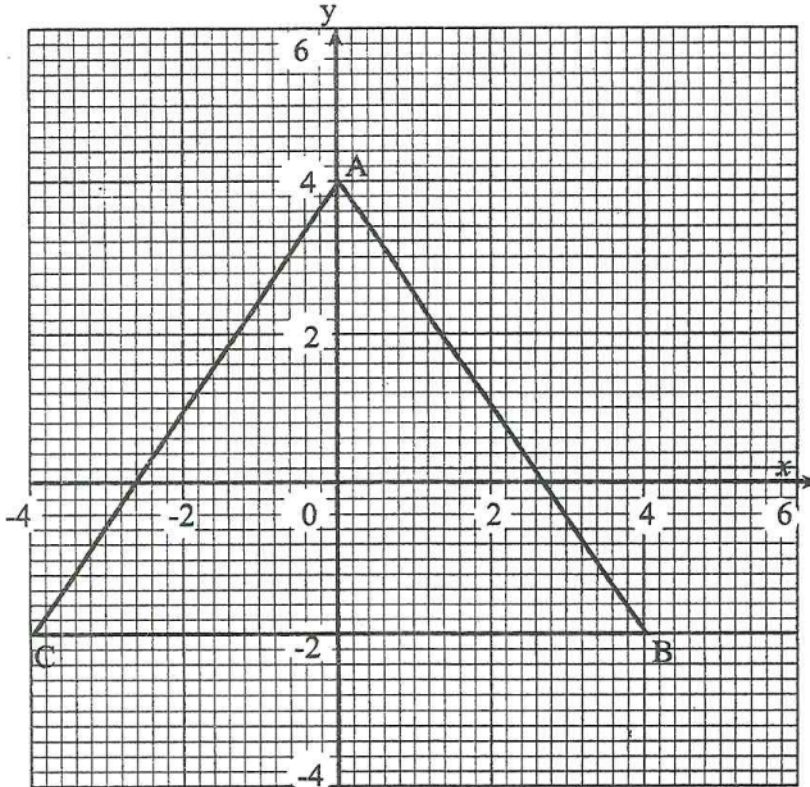
1

Answer all the questions in this section.

Section A [64 marks]

- 28 In the diagram below, triangle ABC has vertices A(0; 4), B(4; -2) and C(-4; -2).

For  
Examiner's  
Use

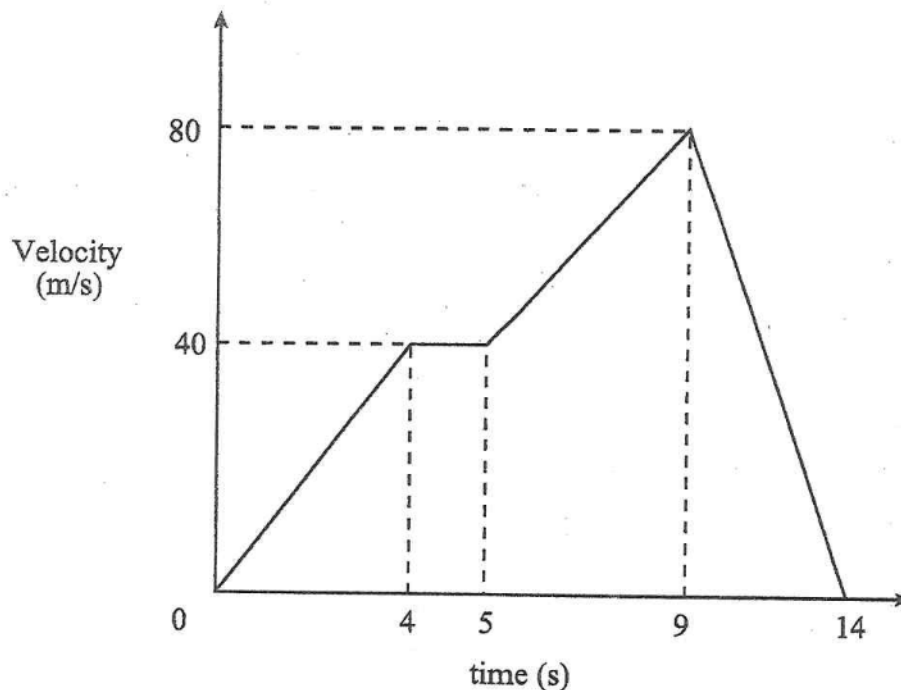


- (a) Find the equation of the line AB.
- (b) Calculate
- (i) the length of the line AC leaving your answer in surd form,
- (ii) the area of triangle ABC.

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

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

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



The diagram is the velocity – time graph for an electric train. The train accelerates uniformly from rest until it reaches a speed of 40 m/s in 4 seconds. It maintains this speed for a second before accelerating again for a further 4 seconds. After reaching a speed of 80 m/s, it decelerates to rest in 5 seconds.

Calculate

- the velocity of the train at the end of the 8<sup>th</sup> second,
- the deceleration during the last 5 seconds.
- the total distance travelled by the train during the 14 seconds.

Answer

(a)		m/s [2]
(b)		m/s <sup>2</sup> [1]
(c)		m [2]

Candidate Name.....

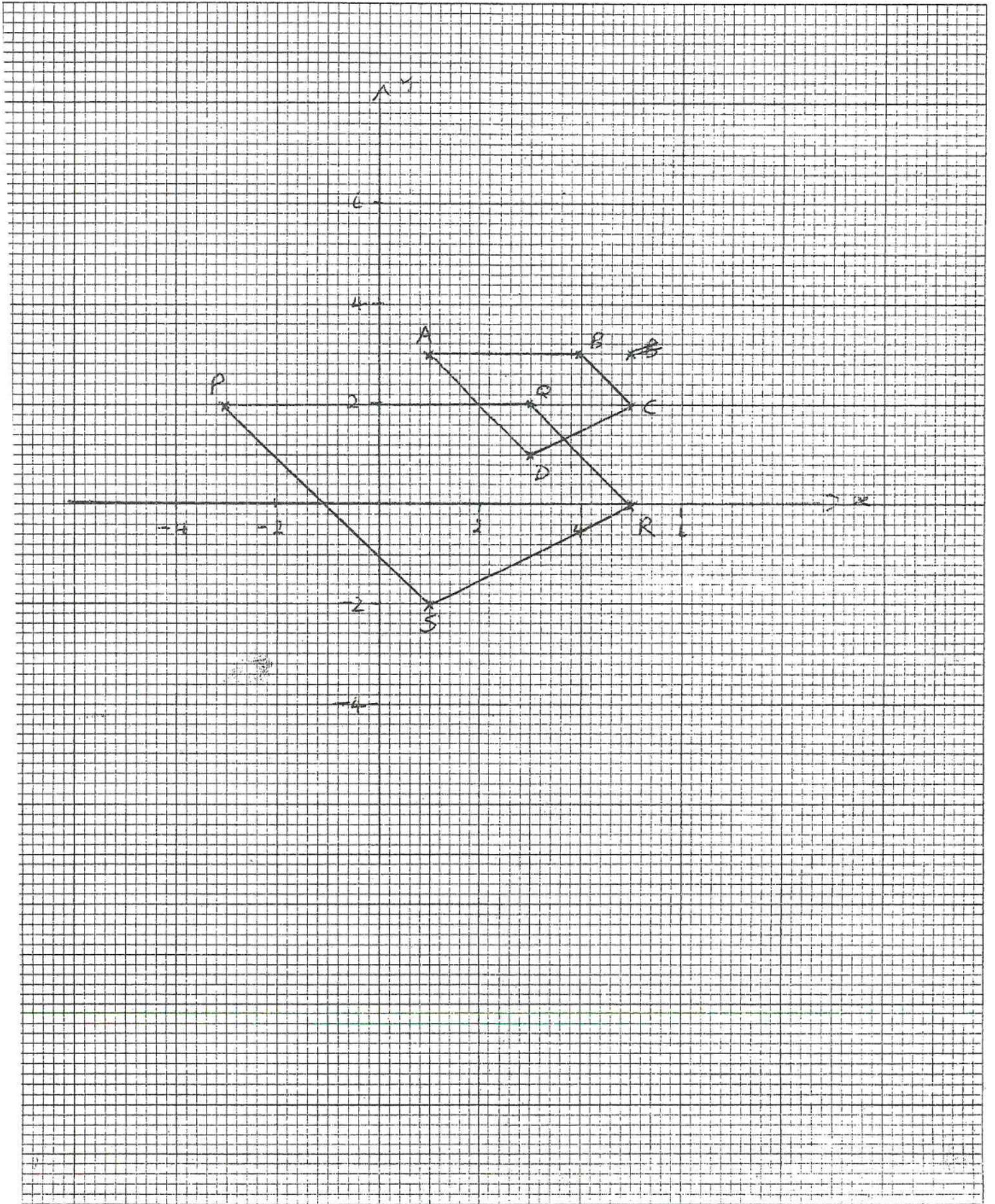
Centre Number

Candidate's  
Number

Subject..... Paper.....

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Question No 26 N 2009





Candidate Name.....

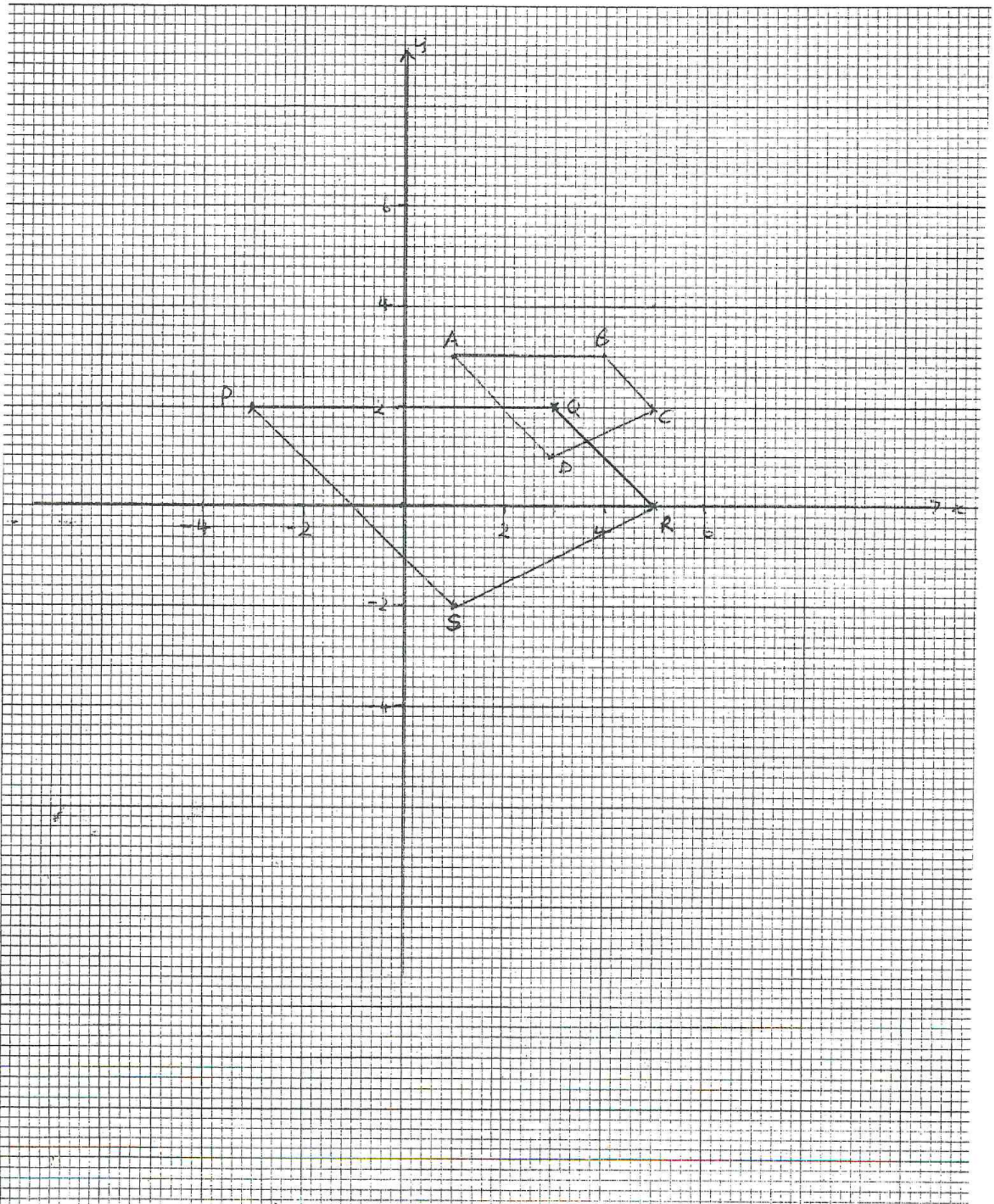
Centre Number

Candidate's Number

Subject..... Paper.....

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Question No 26 N2009



**ZIMBABWE SCHOOL EXAMINATIONS COUNCIL**  
**GENERAL CERTIFICATE OF EDUCATION ORDINARY LEVEL**

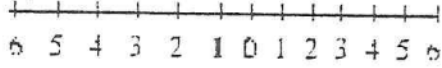
**MARKING SCHEME**

**NOVEMBER 2009 SESSION**

**MATHEMATICS**

4008	01
4028	

1	(a) (i)	$\frac{1}{24}$	1	
	(ii)	(0),005	1	
	(b)	8,5 or $8\frac{1}{2}$	1	
2	(a)	3	1	
	*(b)	18	2	
3	(a)	$(x-3)(x-9)$ or equiv.	1	
	*(b)	$(c-d)(x-4y)$ or equiv.	2	
4	(a) (i)	$60^\circ$	1	
	(ii)	$60^\circ$	1	
	(b)	equilateral	1	
5	(a)	$8x^3$	1	
	*(b)	$\frac{1}{2}$ or 0,5	2	
6	(a)	2	1	
	(b)	0	1	
	(c)	$1\frac{1}{5}$ or 1,2	1	

7	(a) 220 *(b) 25 000	1 2	
8	$\pi$ ; $\sqrt{2}$ ; $\sqrt{5}$	3	
9	*(a) $-1 \leq x < 5$  (b) 	2  1	
*10	(a) 1 300 000  (b) 4 900 000	2  1	
11	(a) $211^\circ$ or equiv.  *(b) $91^\circ$	1  2	
12	(a) 5  (b) 5 correctly drawn lines	1  2	

*13	$x = -2$ $y = 3$	3	
14	(a) $\begin{pmatrix} 5 \\ -1 \end{pmatrix}$  *(b) 15	1  2	
15	(a) $68^\circ$  (b) $22^\circ$  (c) $124^\circ$	1  1  1	
16	(a) 0  (b) $-1\frac{1}{2}$ or $-1,5$  (c) 5	1  1  1	
17	(a) correct mediator  (b) correct circle	2  1	
18	(a) $A = kr^2$  *(b) $\frac{22}{7}$ or equiv.	1  2	

19	(a)	1,446	1	
	*(b)	(0),1505	2	
*20	(a)	$\frac{3}{500}$	2	
	(b)	41 <sub>(7)</sub>	2	
*21	(a)	13	2	
	(b)	91	2	
*22	(a)	30	2	
	(b)	3	2	
*23	(a)	$\frac{5}{13}$	2	
	(b)	$\frac{12}{13}$	2	



27	(a)	2
	*(b) (i) 3	2
	(ii) 18	1
28	*(a) $y = \frac{-3x}{2} + 4$ or equiv.	2
	(b) (i) $\sqrt{52}$ or $2\sqrt{13}$	1
	*(ii) 24	2
29	*(a) 70	2
	(b) 16	1
	(c) *560	2







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

**MATHEMATICS**

**4008/2**

PAPER 2

**NOVEMBER 2009 SESSION**

2 hours 30 minutes

Additional materials:

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

**TIME** 2 hours 30 minutes

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**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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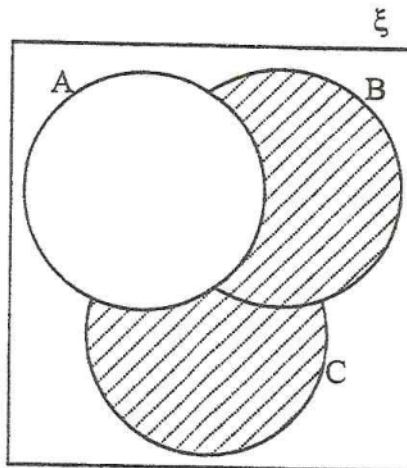
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## Section A [64 marks]

Answer *all* the questions in this section.

- 1 (a) Simplify  $8 - 24 + 6 + 3 \times 4$ . [2]
- (b) Expand  $(1 - 2x)(x + 3)$ . [2]
- (c) (i) Find the L.C.M. of  
 $15y^2, 25xy^3$  and  $(x^3 - x^2)$ . [3]
- (ii) Evaluate  $(\text{Log}_9 81) \times (2\text{Log}_4 8)$ . [3]

- 2 (a) Solve the equations
- (i)  $7(h + 3) - 2(h - 4) = 4$ , [2]
- (ii)  $3^{(m+4)} = 9^{(m-1)}$ . [3]
- (b) Write down, in set notation, the set represented by the shaded region in the Venn diagram.



[2]

(c) It is given that

$$\xi = \{x : 2 \leq x \leq 20, x \text{ is an integer}\},$$

$$P = \{x : x \text{ is a prime number}\} \text{ and}$$

$$Q = \{x : 4 \leq x < 17\}.$$

(i) List the elements of P. [2]

(ii) Find  $n(Q^1 \cap P)$ . [2]

3 (a) Simplify  $\frac{n-3}{6} + \frac{n^2-9}{4}$ . [2]

(b) Given that  $A = \begin{pmatrix} 2 & 3 \end{pmatrix}$  and  $B = \begin{pmatrix} 4 & -1 \\ 5 & 6 \end{pmatrix}$ ,

find

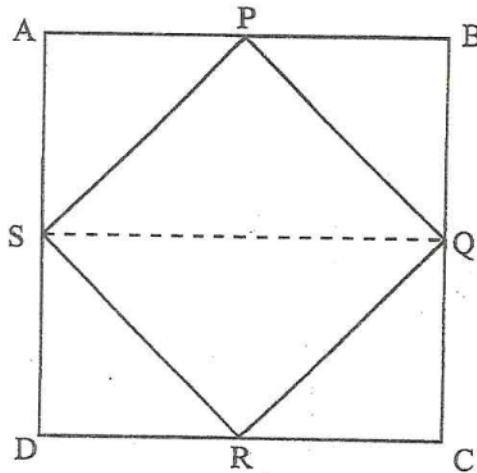
(i)  $AB$ ,

(ii)  $B^{-1}$ . [3]

(c) If  $\begin{pmatrix} -2 & p \\ p+3 & -4p \end{pmatrix}$  is singular, find the two possible values of  $p$ . [2]

(d) A company invested money in a bank at 270% simple interest per annum. Given that after 8 months, the total value of its investment was \$840 million, calculate the amount invested. [3]

4 (a)



The diagram shows two squares ABCD and PQRS. Given that  $AB = 12$  cm, calculate

- (i) the perimeter of PQRS, [2]
- (ii) the area of  $\triangle QRS$ . [2]
- (b) Sibongile's weekly wage  $W$  (in thousands of dollars), is partly constant and partly varies as the number of hours  $N$  of overtime she works per week.
- (i) Express  $W$  in terms of  $N$  and constants  $h$  and  $k$ . [1]
- (ii) Given that when  $W = 80$ ,  $N = 10$  and when  $W = 60$ ,  $N = 6$ , find the value of  $h$  and the value of  $k$ . [3]
- (iii) Sibongile's normal working time is 44 hours in a week.

Find the total number of hours worked in a week in which she was paid \$90 thousand. [3]

- 5 (a) The volume,  $V$ , of material needed to make a cylindrical tube of internal radius  $r$ , external radius  $R$  and length  $h$  is given by the formula

$$V = \pi(R^2 - r^2)h.$$

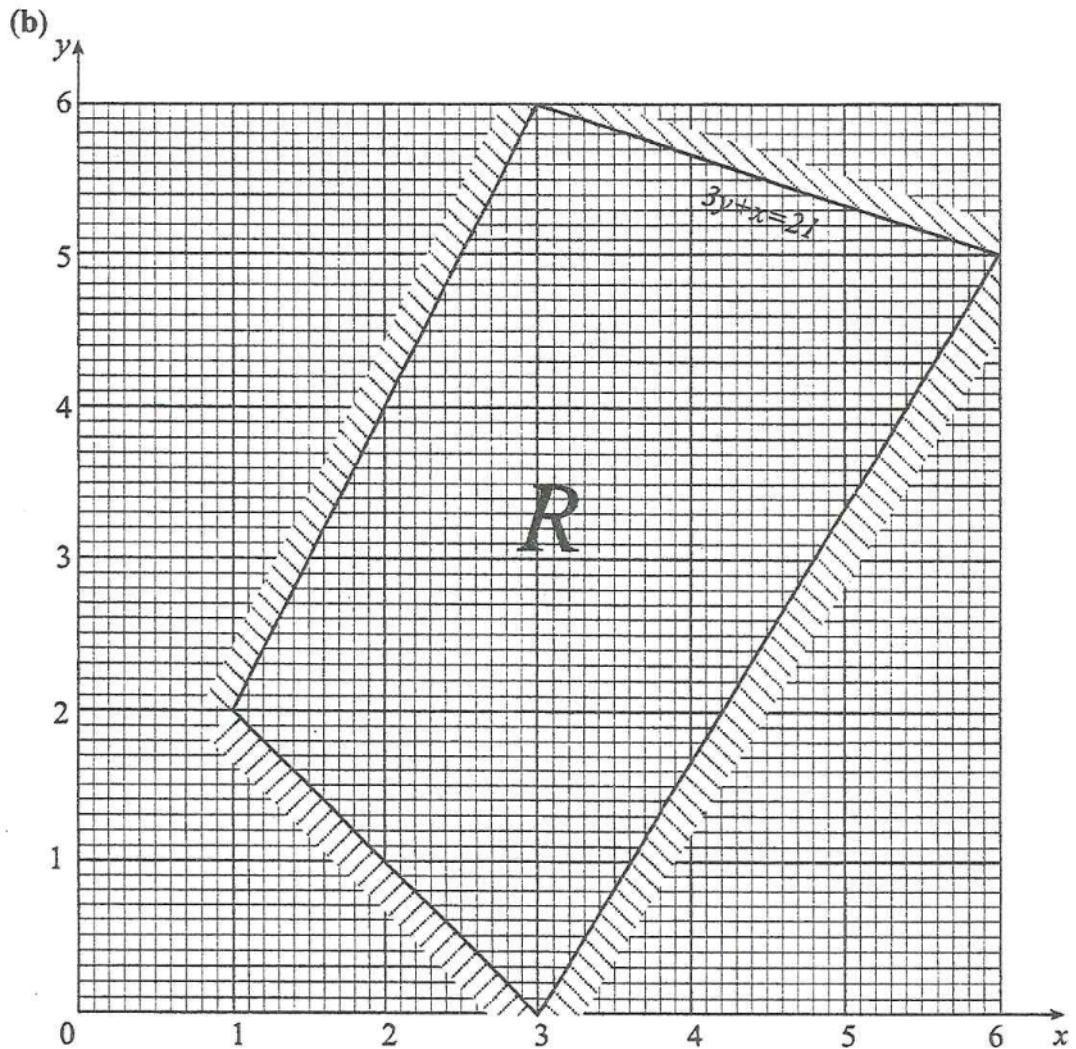
- (i) Taking  $\pi$  to be  $\frac{22}{7}$ , find the value of  $V$  when  $R = 4$  cm,  $r = 3$  cm and  $h = 150$  cm. [2]
- (ii) Make  $R$  the subject of the formula. [3]
- (b) A solid cuboid of density  $0.7$  g/cm<sup>3</sup> measures  $8$  cm by  $7$  cm by  $x$  cm and has a total surface area of  $442$  cm<sup>2</sup>.

Calculate

- (i) the value of  $x$ , [3]
- (ii) the mass of the solid. [2]
-

- 6 (a) Factorise completely  $3p^2 + 7p - 6$ .

[2]



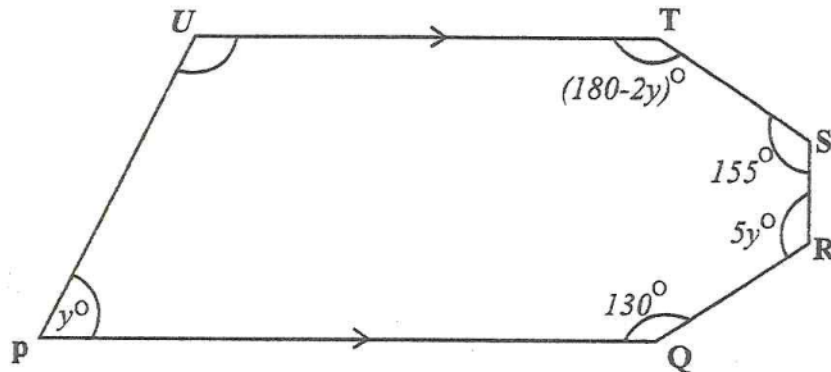
- (i) Using the graph, write down three inequalities other than  $3y + x \leq 21$  which satisfy the region  $R$ . [6]
- (ii) Find the maximum value of  $5y - x$  for integer values of  $x$  and  $y$  in  $R$ . [2]

## Section B [36 marks]

Answer any *three* questions in this section.

Each question carries 12 marks.

7 (a)



In the hexagon  $PQRSTU$ , the lines  $PQ$  and  $UT$  are parallel.  $\widehat{UPQ} = y^\circ$ ,  $\widehat{PQR} = 130^\circ$ ,  $\widehat{QRS} = 5y^\circ$ ,  $\widehat{RST} = 155^\circ$  and  $\widehat{STU} = (180 - 2y)^\circ$ .

- (i) Write down an expression, in terms of  $y$ , for  $\widehat{P\hat{U}T}$ . [1]
- (ii) Using the sum of interior angles of the hexagon, form an equation in terms of  $y$  and solve it. [3]
- (iii) Hence, write down the numerical value of  $\widehat{QRS}$ . [1]
- (b) (i) Show that the equation

$$\frac{1}{2x-5} + \frac{2}{3} = \frac{1}{x+3}$$

reduces to  $4x^2 - x - 6 = 0$ . [2]

- (ii) Hence solve the equation  $4x^2 - x - 6 = 0$ , giving your answers correct to two decimal places. [5]

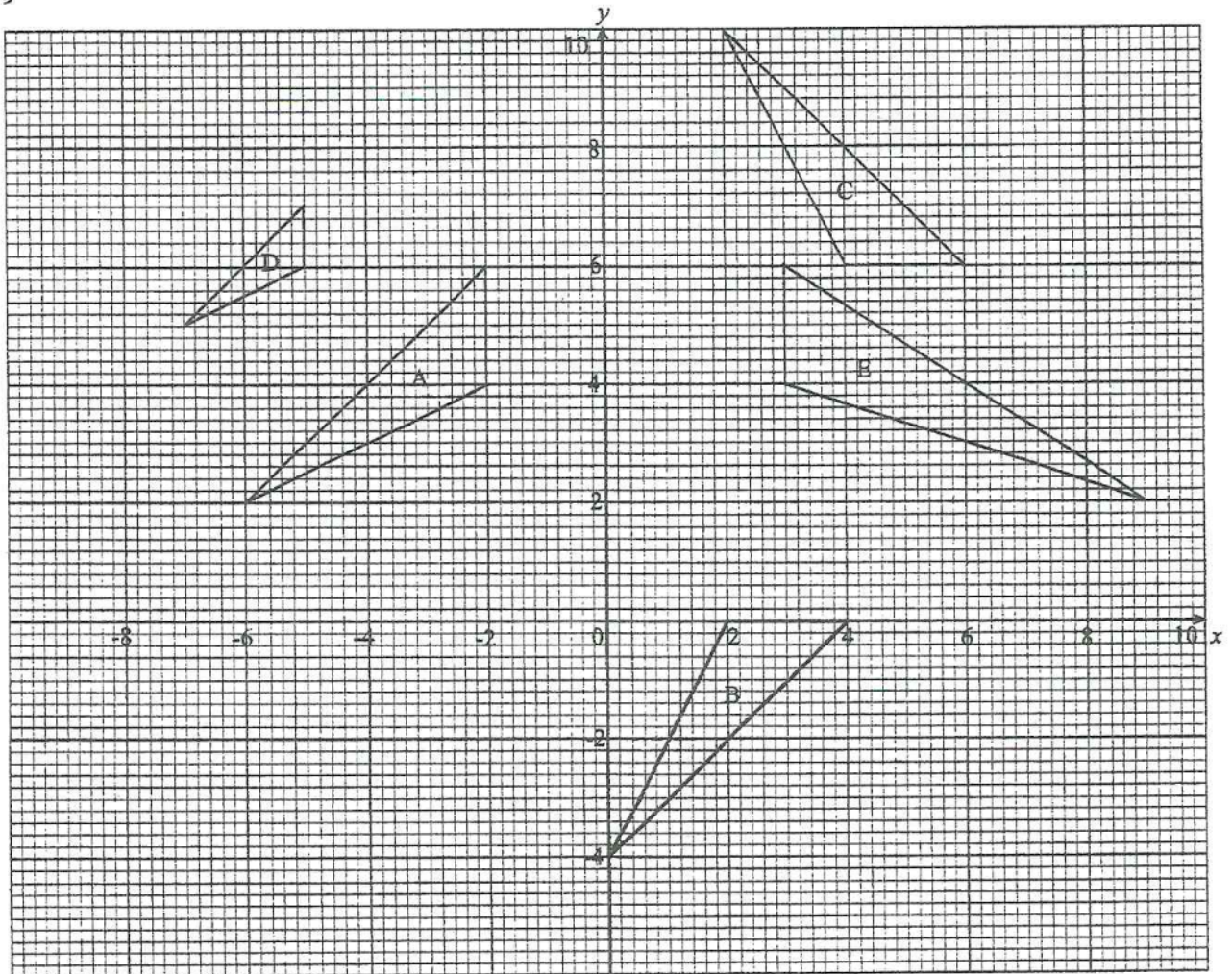


8 Answer the whole of this question on a sheet of plain paper.

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

A landmine-infested area is in the form of a quadrilateral PQRS with  $PQ = 14$  km,  $QR = 12$  km,  $PS = 17$  km,  $\hat{PQR} = 90^\circ$  and  $\hat{QPS} = 120^\circ$

- (a) Using a scale of 1 cm to represent 2 km, construct quadrilateral PQRS. [6]
- (b) For safety reasons, resettled families are to be at least 6 km from QR.  
Construct the locus of points 6 km from QR. [1]
- (c) Two landmines were located such that they were each equidistant from PS and SR and 10 km from P.
- (i) Construct the locus of points equidistant from PS and SR. [2]
- (ii) Construct the locus of points 10 km from P. [1]
- (d) (i) Label  $M_1$  and  $M_2$  the two positions of the landmines. [1]
- (ii) Find the actual distance between the landmines. [1]
-



Use the diagram to answer the following questions.

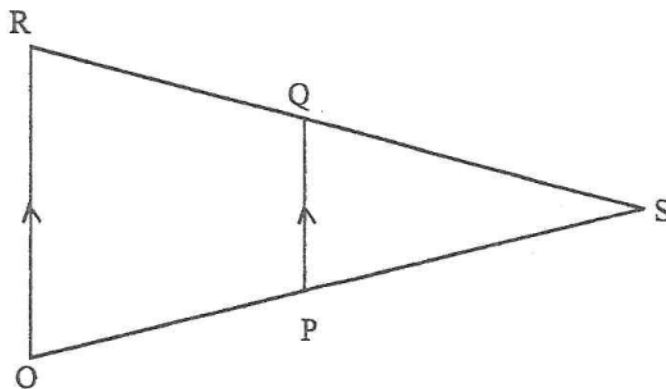
- (a)  $\Delta B$  is a reflection of  $\Delta A$ .
- (i) Write down the equation of the mirror line. [2]
- (ii) Given that  $(k; 8)$  is one of the invariant points under this reflection, find the value of  $k$ . [1]
- (b) Describe fully the single transformation which maps  $\Delta A$  onto  $\Delta C$ . [3]

- (c)  $\Delta D$  is the image of  $\Delta A$  under an enlargement, centre origin followed by a translation.

Write down

- (i) the scale factor of the enlargement, [1]  
 (ii) the translation vector. [2]  
 (d) Describe fully the single transformation which maps  $\Delta A$  onto  $\Delta E$ . [3]

10 (a)



In the diagram,  $OR$  is parallel to  $PQ$  and  $\frac{PQ}{OR} = \frac{2}{3}$ .  $OP$  and  $RQ$  produced meet at  $S$ .  $\overline{OP} = p$  and  $\overline{PQ} = q$ .

- (i) Express in terms of  $p$  and/or  $q$ .
- (a)  $\overline{OR}$ , [1]  
 (b)  $\overline{RQ}$ . [2]
- (ii) Write down, in its lowest terms, the ratio
- (a)  $\frac{QS}{RS}$ , [1]  
 (b)  $\frac{\text{area of } \Delta PQS}{\text{area of trapezium } OPQR}$ . [2]

- (b) (i) A shop that makes and sells curtains supplied the following price quotation to a customer:

Curtaining material/metre.....	\$700 000-00
Labour	10% of the total cost of the material
<b>Quotation valid for 2 weeks</b>	

A customer bought 150 metres of material and had the curtains made at the shop.

Calculate the amount she paid altogether.

[2]

- (ii) Three weeks later she requested another quotation and she got the following:

Curtaining material/metre	\$840 000-00
Labour	15% of the total cost the material
<b>Quotation valid for 2 weeks.</b>	

She bought another 150 metres of material and had the curtains made at the shop.

Calculate

- (a) the total amount she paid then, [1]
- (b) the percentage increase, correct to three significant figures. [3]

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

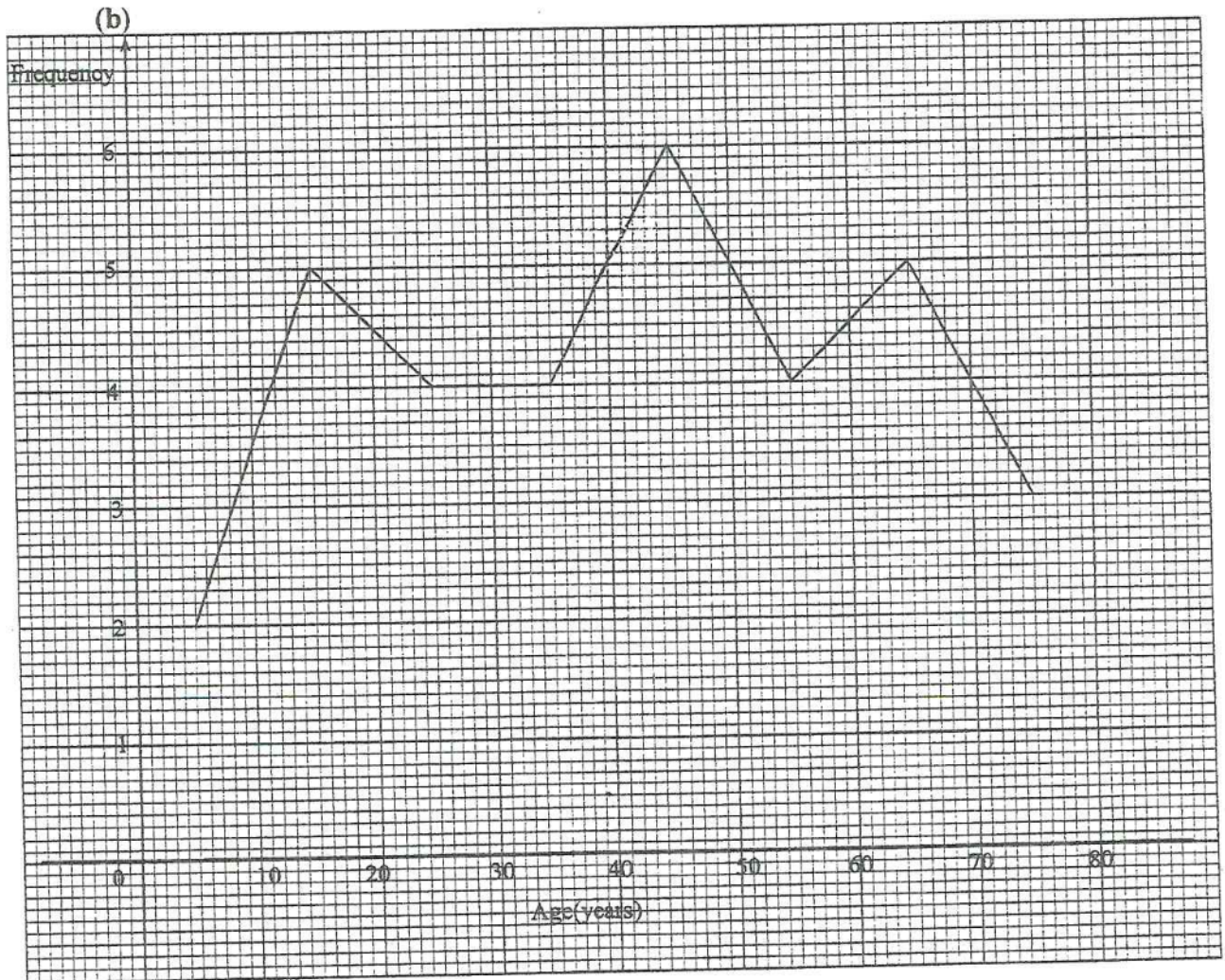
A boy playing on a swing has his velocity  $V$  m/s at time  $t$  seconds given by  $V = t^2 - 4t + 4$ .

The following is an incomplete table of values for  $V = t^2 - 4t + 4$

$t(\text{s})$	0	0,5	1	1,5	2	3	4
$v(\text{m/s})$	4	p	1	0,25	0	1	4

- (a) Find the value of p. [1]
- (b) Using a scale of 2 cm to represent 0,5 seconds on the horizontal and 2 cm to represent 1 m/s on the vertical axis, draw the graph of  $v = t^2 - 4t + 4$  for  $0 \leq t \leq 4$ . [4]
- (c) Use your graph to estimate
- (i) the time when the velocity was 1,5 m/s, [2]
- (ii) the acceleration when  $t = 3$ . [2]
- (d) Using the same axes, draw the graph of  $v = 10t$ . [1]
- (e) The function  $v = 10t$  represents the velocity of a falling object.
- (i) Use your graph to find the time when the boy and the object had the same speed. [1]
- (ii) Given that the boy and the object collided at the same time they had the same speed, use your graph to find the distance the object had travelled. [1]

- 12 (a) Natsai's average mark for two tests is 63,5%. Find his mark in the third test if his average for the three tests is 66%. [3]



The frequency polygon shows the age distribution of a group of people living in a certain village. Their ages range from 0 to 80 years.

- (i) Find the number of people living in this village. [2]
- (ii) State the modal age group. [2]
- (iii) Calculate the percentage of people who are older than 50 years. [2]
- (iv) Two people were chosen at random from the village to be questioned about the damage to a neighbour's hut.

Calculate the probability that they were each older than 10 years but less than or equal to 30 years, giving your answer as a fraction in its lowest terms. [3]



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

**POSSIBLE ANSWERS**

**NOVEMBER 2009**

**MATHEMATICS**

**4008/2,  
4028/2**



- 1 (a)  $8 - 4 + 12$  or equiv.  
16 [2]
- (b)  $3 - 5x - 2x^2$  [2]
- (c) (i)  $x - 1$  soi  
 $75x^2y^3(x - 1)$  or equiv. [3]
- (ii) 2 soi  
3 soi  
6 [3]
- Anw: No penalty [10]
- 

- 2 (a) (i)  $7h + 21 - 2h + 8 = 4$   
(h =) - 5
- (ii)  $3^2$  soi  
 $m + 4 = (m - 1)$  or equiv. soi  
(m =) 6
- (b)  $A' \cap (B \cup C)$  or equiv.
- (c) (i) Accept use of commas and missing { }  
{2; 3; 5; 7; 11; 13; 17; 19}
- (ii) 4  
(Q' =) {2; 3; 7; 18; 19; 20}
- Anw: No penalty
- 

- 3 (a)  $\frac{4}{(n-3)(n+3)}$  soi  
 $\frac{2}{3(n+3)}$  or equiv. [2]

(b) (i)  $(AB =) \quad (23 \quad 16)$

(ii)  $(B^{-1} =) \frac{1}{29} \begin{pmatrix} 6 & 1 \\ -5 & 4 \end{pmatrix}$

Sc: After B0 give SCB1 for  $\frac{1}{29} \begin{pmatrix} p & q \\ r & s \end{pmatrix}$  where  
 $p, q, r, s \in B$  even asc.

Or for  $\frac{1}{\text{their det}} \begin{pmatrix} 6 & 1 \\ -5 & 4 \end{pmatrix}$  [5]

(c)  $(p =) \quad 0 \text{ or } 5$  [2]

(d)  $p + \frac{270}{100} \times \frac{8p}{12} = 840$  or equiv.

$(p =) \quad \$300$  (million) [3]

Anw: (a) 1 (b), (c) no penalty (d) 1. [12]

4 (a) (i)  $4\sqrt{6^2 + 6^2}$  or equiv.

33,94 (cm)

(ii) (Area =)  $\frac{1}{2} \sqrt{72} \times \sqrt{72}$  or equiv.

36 (cm<sup>2</sup>) [4]

(b) (i)  $W = h + kN$  or equiv.

(ii)  $80(000) = h + 10k$  and  $60(000) = h + 6k$  or equiv.

$k = 5(000); \quad h = 30(000)$

(iii)  $90(000) = 30(000) + 5(000)N$  or equiv.

$(N =) \quad 12$

56 (hours) [7]

Anw: (a)(i) 1 (ii) 2 (b)(i) 1 (ii) 2 (iii) 2 [11]

5 (a) (i)  $\pi(4^2 - 3^2)150$  or equiv.

3 300 (cm<sup>3</sup>)

(ii)  $\frac{V}{\pi h} = R^2 - r^2$

$\frac{V}{\pi h} + r^2 = R^2$

$\sqrt{\frac{V}{\pi h} + r^2} = R$

[5]

(b) (i)  $x(8 + 7 + 8 + 7) + 2(8 \times 7) = 442$  or equiv.

(x =) 11(cm)

(ii)  $0,7 \times 8 \times 7 \times$  their (i)

431,2 (g)

[5]

Anw: (a)(i) 1 (ii) 1 (b)(i) 2 (ii) no penalty  
[10]

6 (a)  $(p+3)(3p-2)$

(x =) (\$) 300 (million)

[3]

(b) (i)  $x + y = 3$  soi  
 $x + y \geq 3$  or equiv.

$y = 2x$  soi  
 $y \leq 2x$  or equiv.

$y = \frac{5x}{3} - 5$  soi

$y > \frac{5x}{3} - 5$  or equiv.

(ii) 30 - 3

27  
Anw: No penalty

[8]  
[10]

- 7 (a) (i)  $(180 - y)^{(0)}$   
 (ii)  $y + 130 + 5y + 155 + 180 - 2y + \text{their (i)}$   
 $= 4 \times 180 \text{ or equiv.}$   
 $3y = 720 - 645 \text{ or equiv. soi}$   
 $(y =) 25^{(0)}$

(iii)  $125^{(0)}$  [5]

(b) (i)  $3(x + 3) + 2(2x - 5)(x + 3) = 3(2x - 5)$

Correct deduction, and nww seen, to  
 $4x^2x - 6 = 0$

(ii) Formula: provided a purely numerical

$\frac{p \pm (or + or -) \sqrt{q}}{r}$  (but not  $\pm p$ ) is seen or used, give B1 for  
 $p = 1$ , B1 for  $q = 97$  or  $\sqrt{q} = 9,845$  and B1 for  $r = 8$  soi by  
 correct ans.

(b) Comp sq:  $\left(x - \frac{1}{8}\right)^2$  B1;  $\frac{97}{64}, 1\frac{33}{64}, 1,231$   $\frac{9,845}{8}$

$$x = \frac{1}{8} \pm \frac{\sqrt{97}}{8} \text{ or } \frac{1 \pm \sqrt{97}}{8} \text{ or}$$

$$\frac{1 \pm 9,849}{8}$$

FA [nww but condone PA if correct answers reached]

1,36 B1 -1,11 B1

If wrongly or not corrected give SCB1 for both 1,356 and -1,106 seen

Anw: (a)(i) 1 (ii) 2 (iii) 1

(b)(i) 0 (iii) 1 + 1

[12]

- 8 Scale drawing  $\geq$  half size  $Q_0$  but marks available.  $<$  half size no marks.
- (a) An angle of  $120^\circ \pm 2^\circ$   
Correct construction arcs seen
- An angle of  $90^\circ \pm 2^\circ$   
Correct construction arcs seen
- Quad with sides  $7 \pm 0,2$  cm,  $6 \pm 0,2$  cm  
 $8,5 \pm 0,2$  cm,  $\hat{QPS} = 120^\circ \pm 2^\circ$  and  $\hat{PQR} = 90^\circ \pm 2^\circ$  [6]
- (b) Line at least 3 cm long, outside quad and parallel to their QR and  $3 \pm 0,2$  cm at ends of their QR with correct construction arcs seen. [1]
- (c) (i) Bisector of their  $\hat{PSR}$  ruled at least 3 cm long with tolerance  $\pm 2^\circ$   
Correct construction arcs seen
- (ii) Arc inside quad and at least 3 cm by eye centre their P and radius  $5 \pm 0,2$  cm [3]
- (d) (i) M1 and M2 labelled at intersection of their C(i) and C(ii)
- (ii)  $12 \pm 0,4$  (km) [2]  
[12]
- Anw: No diagram 0.

- 9 (a) (i)  $y = x + 2$  or equiv.
- (ii)  $(k =) 6$  [3]
- (b) Rotation and no other transformation mentioned
- $90^\circ$  clockwise  
centre  $(2; 2)$  [3]
- (c) (i)  $\frac{1}{2}$  or 0,5
- (ii)  $\begin{pmatrix} -4 \\ 4 \end{pmatrix}$  [3]

- (d) Stretch and no other transformation mentioned  
y-axis invariant or equiv.

$$SF = \frac{-3}{2} \text{ or equiv.}$$

[3]

[12]

Anw: No penalty

- 10 (a) Condone missing underlines or squiggles.

(i) (a)  $\frac{3}{2}q$

(b)  $p + q$  – their (i) (a) simplified

(ii) (a)  $\frac{2}{3}$

(b)  $\frac{4}{5}$

After B0 give SC B1 for  $\left(\frac{2}{3}\right)^2$  seen

- (b) (i)  $1,1 \times 150 \times 700\,000$  or equiv.  
(\$) 115 500 000-00

(ii) (a) (\$)144 900 000-00

(b)  $\frac{1,15 \times 840\,000 - 1,1 \times 700\,000}{1,1 \times 700\,000}$  or equiv.

$$\left[ \frac{1,15 \times 840\,000 - 1,1 \times 700\,000}{1,1 \times 700\,000} \right] 100 \text{ soi}$$

25,5(%) c.a.o.

After M0 give Sc B1 for  $1,15 \times 840\,000$  (150) seen

[12]

Anw: (a) No penalty (b)(i) 1 (ii) 1

- 11 (a) (p =) 2,25 [1]
- (b) The 6 given points together with their point correctly plotted  
Smooth curve and not grossly thick passing through the correct  
7 points (provided within 1 mm) dep on P3. [4]
- (c) (i) 0,8  
0,7 (s)  
 $3,3$  (s)
- (ii) Tangent drawn at  $\frac{1}{x} = 3$   
 $2 \pm 0,2$  (m/s<sup>2</sup>) [4]
- (d) Line  $V = 10t$  correctly drawn at least 3 cm long [1]
- (e) (i)  $\frac{0,32}{0,26}$  (s)
- (ii)  $\frac{5}{0,42}$  (m) [2]  
[12]

Anw: No graph (a) 1 (b) 0 (c) 0 (d) 0 (e) 0  
With graph (a) 1 (b) No penalty (c)(i) 2 (ii) with no tangent 0  
(d), (e) No penalty.

- 12 (a)  $63,5 + [(66 - 63,5) \times 3]$  or equiv. soi  
71 [3]
- (b) (i)  $2 + 5 + 4 + 4 + 6 + 4 + 5 + 3$  soi  
33
- (ii) (Modal =) 40 to 50 (yrs) or equiv.
- (iii)  $\frac{12}{\text{their(b)(i)}}$  or equiv. soi  
 $36\frac{4}{11}$  (%) or  
36,36 (%)

(iv)  $\frac{9}{\text{their (b)(i)}} \times \frac{8}{\text{their (b)(i)-1}}$  or equiv.

$$\frac{3}{44} \text{ c.a.o}$$

[9]

[12]

Anw. (a) 1 (b) (i) (ii) (iii) No penalty (iv) 2

---





Candidate Name

Centre Number

Candidate Number



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

**MATHEMATICS**  
**PAPER 1**

**4008/1, 4028/1**

**JUNE 2010 SESSION**

**2 hours 30 minutes**

Candidates answer on the question paper.

Additional materials:

Geometrical instruments

**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.

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.

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 30 printed pages and 2 blank pages.**

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**[Turn over**

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

For  
Examin  
Use

- 1 (a) Express 0,096
- (i) correct to two decimal places,
  - (ii) as a common fraction, giving your answer in its lowest terms.
- (b) Express 36 minutes as a percentage of two hours.

*Answer* (a) (i) \_\_\_\_\_ [1]  
(ii) \_\_\_\_\_ [1]  
(b) \_\_\_\_\_ % [1]

- 2 (a) Write down, in ordinary form, the value of  $4,32 \times 10^4$ .
- (b) Given that  $M = 3,6 \times 10^2$  and  $N = 8 \times 10^{-1}$ , find in standard form, the value of
- (i)  $MN$ ,
- (ii)  $M + N$ .

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

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

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

- 3 (a) For the expressions  $12 m^3 n^2$  and  $18 m^2 n^3$ , find
- (i) the H.C.F,
  - (ii) the L.C.M.
- (b) Simplify  $6x + 12x + 3$ .

For  
Exami:  
Use

*Answer*

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

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

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

4

- (a) Convert 408 to a number in base 6.
- (b) Write down  $2 \times 3^4 + 1 \times 3^2 + 2 \times 3^1$  as a number in base 3.
- (c) Given that  $42_x + 53_x = 125_x$ , find the value of  $x$ .

For  
Examiner's  
Use

*Answer*

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

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

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

5 Given that  $m = \frac{1}{2}$ ,  $n = 0$  and  $r = 3$ , evaluate

(a)  $(mr)^n$ ,

(b)  $\left(2\frac{1}{4}\right)^m$ ,

(c)  $\sqrt[4]{-64}$ .

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

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

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

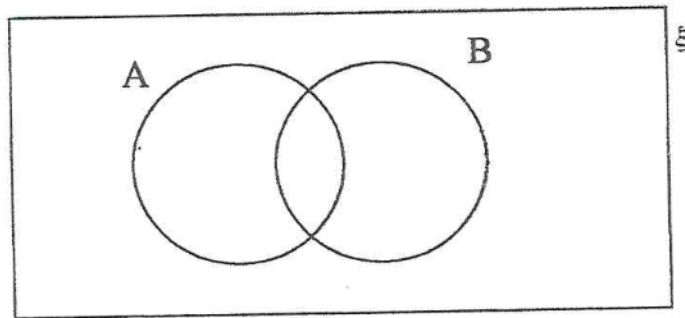
- 6 (a) Given that  $12 : d = 3 : 7$ , find the value of  $d$ .
- (b) A sum of money is divided in the ratio  $2 : 3 : 7$ . Given that the largest share is \$224 000, calculate the smallest share

Answer (a)  $d =$  \_\_\_\_\_ (1)

(b) \$ \_\_\_\_\_ (2)



- 7 Given that  $n(\xi) = 25$ ,  $n(A) = 12$ ,  $n(B') = 6$  and  $n(A \cup B)' = 2$ , complete the Venn Diagram to show the number of elements in each subset.



Answer on diagram

[3]

- 8 (a) Simplify  $\sqrt{50}$ , leaving your answer in the form  $a\sqrt{b}$ .
- (b) Find, in km/h, the rate at which a car travels if it covers 24 metres in 1 second.

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

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

10

9 Solve the simultaneous equations

$$\frac{1}{2}x + 3y = 4,$$

$$3x + 2y = 8.$$

For  
Exami  
Use

*Answer*

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

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

- 10 A company director went to Britain and America on business. Her company gave her an allowance of £2000.
- (a) While in Britain she spent  $\frac{1}{5}$  of her allowance. Calculate the amount she spent.
- (b) On arrival in America she converted all her remaining allowance into US\$ at the rate of £1 to US\$1.92. Calculate the amount she received in US\$.

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

11 Solve the following equations:

(a)  $\frac{3}{y} = \frac{12}{11}$

(b)  $x^2 + 5x = 24$

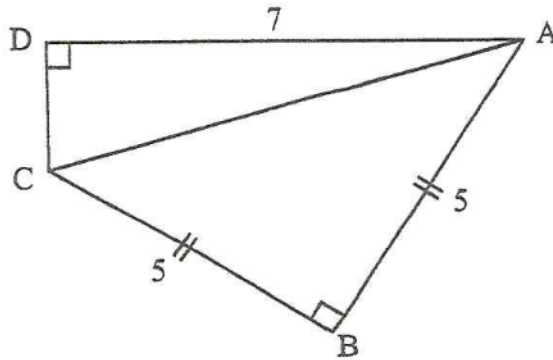
For  
Examin  
Use

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

(b)  $x = \underline{\hspace{2cm}}$  or  $\underline{\hspace{2cm}}$  [2]

12

13

For  
Examiner's  
Use

In the diagram,  $\hat{A}BC = \hat{A}DC = 90^\circ$ ,  $AB = BC = 5$  cm and  $AD = 7$  cm.

- (a) Write down the value of  $\tan \hat{B}AC$ .
- (b) Calculate the length of the line DC.

Answer (a)  $\tan \hat{B}AC =$  \_\_\_\_\_ [1]

(b)  $DC =$  \_\_\_\_\_ cm [2]

13 It is given that  $\mathbf{p} = \begin{pmatrix} 4 \\ -6 \end{pmatrix}$  and  $\mathbf{q} = \begin{pmatrix} 6 \\ x \end{pmatrix}$ .

Find

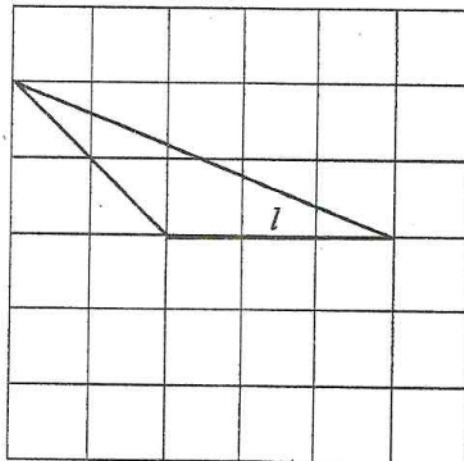
- (a)  $x$ , if  $p$  is parallel to  $q$ ,
- (b)  $|\mathbf{p}|$ , leaving you answer in surd form.

For  
Exami:  
Use

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

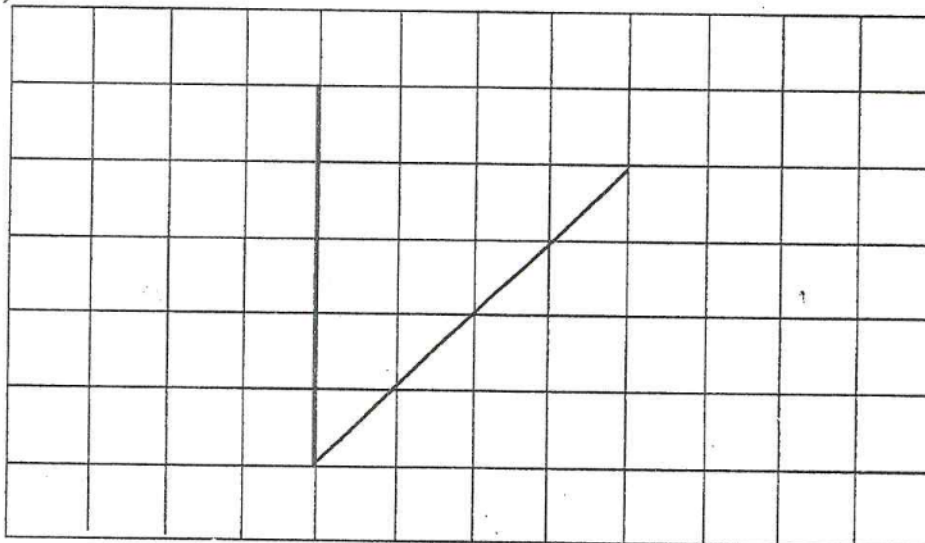
(b)  $|\mathbf{p}| =$  \_\_\_\_\_ [2]

14 (a)



In the diagram,  $l$  is a line of symmetry of a quadrilateral. On the diagram, complete the quadrilateral.

(b)



In the diagram, add **one** line so that the completed diagram has rotational symmetry of order 2.

*Answer* (a) on diagram. [1]

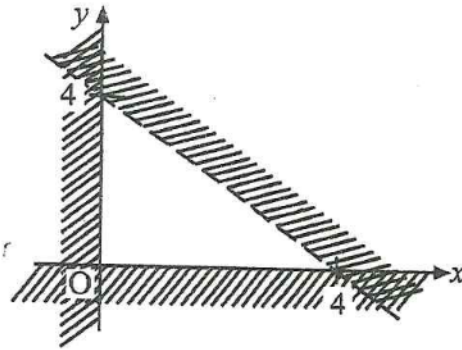
(b) on diagram. [2]



- 15 (a) Given that  $x \geq 0,5$ ; state the least possible value of  $x$  if  $x$  is a prime number.

For  
Examin  
Use

(b)



The diagram shows the region defined by three inequalities, two of which are  $x \geq 0$  and  $y \geq 0$ .

Find the third inequality.

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

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

16 It is given that  $\mathbf{D}$  is a 2 by 2 matrix such that  $\mathbf{D} + \begin{pmatrix} -6 & -8 \\ 3 & 4 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ .

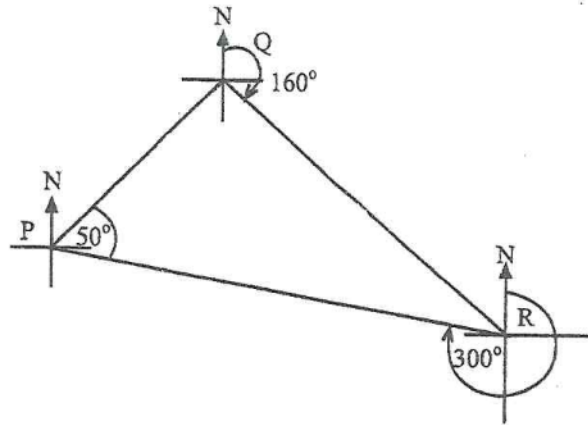
(a) Find  $\mathbf{D}$ .

(b) Write down the determinant of  $\begin{pmatrix} -6 & -8 \\ 3 & 4 \end{pmatrix}$ .

For  
Examiner's  
Use

*Answer* (a)  $\mathbf{D} = \begin{pmatrix} & \\ & \end{pmatrix}$  [2]

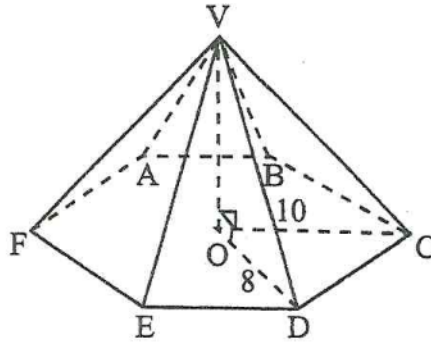
(b) \_\_\_\_\_ [1]



P, Q and R are three points on level ground. The bearing of R from Q is  $160^\circ$ , the bearing of P from R is  $300^\circ$  and  $\angle PQR = 50^\circ$ . Find the three figure bearing of

- (a) Q from R,  
(b) Q from P.

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



The diagram shows a right pyramid whose base ABCDEF is a regular hexagon of centre O.  $OD = 8\text{ m}$ ,  $VD = 10\text{ m}$  and the area of triangle  $DOC = 15,6\text{ m}^2$ .

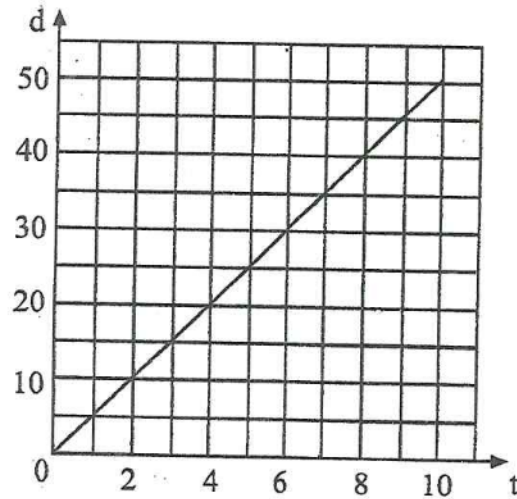
- (a) Show that the height (VO) of the pyramid is 6 m.
- (b) Find the volume of the pyramid.

[Volume of pyramid =  $\frac{1}{3}$  base area x height]

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

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

19

For  
Examin  
Use

The graph shows the relationship between two variables  $t$  and  $d$ . Use the graph to find the value of

- (a)  $d$  when  $t = 7$ ,  
 (b)  $t$  when  $d = 20$ ,  
 (c)  $k$  when  $t = kd$ .

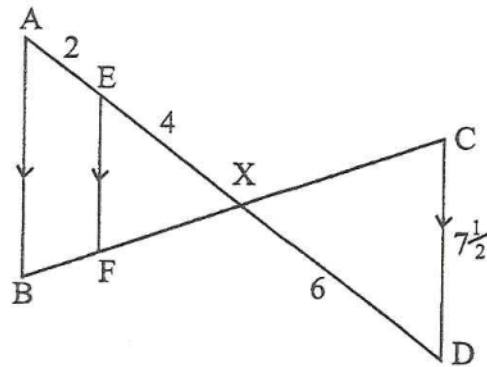
*Answer*

(a)  $d =$  \_\_\_\_\_ [1]  
 (b)  $t =$  \_\_\_\_\_ [1]  
 (c)  $k =$  \_\_\_\_\_ [2]

- 20 A map is drawn to a scale of 1 : 100 000.
- (a) Find the distance on the map between two villages which are 24 km apart on the ground, giving your answer in *cm*.
- (b) Calculate the actual area of a farm in hectares, which is represented by 408 *cm*<sup>2</sup> on the map.

*Answer* (a) \_\_\_\_\_ *cm* [1]  
(b) \_\_\_\_\_ *ha* [3]

21

For  
Examine  
Use

In the diagram, AEXD and BFXC are straight lines.  $AE = 2 \text{ cm}$ ,  $EX = 4 \text{ cm}$ ,  $XD = 6 \text{ cm}$  and  $CD = 7\frac{1}{2} \text{ cm}$ . AB, EF and CD are parallel.

- (a) Name, in correct order, the triangle which is
- (i) congruent to  $\triangle XCD$ ,
  - (ii) similar, *but not congruent*, to  $\triangle XCD$ .
- (b) Find the length of EF.

*Answer*

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

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

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

22 Simplify as far as possible

(a)  $\log 9 \div \log 3,$

(b)  $4 \log 2 + \log 20 - \log 3, 2.$

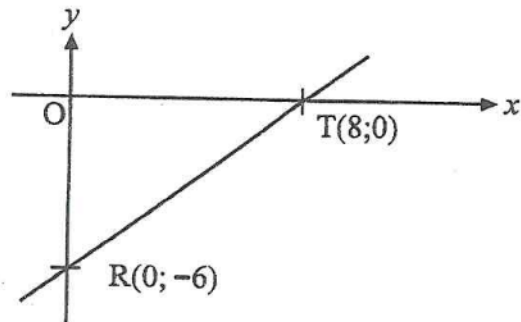
*Answer* (a) \_\_\_\_\_ [1]

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



- 23 (a) A line passes through the points  $A(2; 4)$  and  $B(x; y)$  and has gradient  $1\frac{1}{2}$ .  
Given that  $B$  lies on the  $y$ -axis, find the coordinates of  $B$ .

(b)



In the diagram,  $O$  is the origin,  $T$  is the point  $(8; 0)$  and  $R$  is the point  $(0; -6)$ . Calculate the area of triangle  $TOR$ .

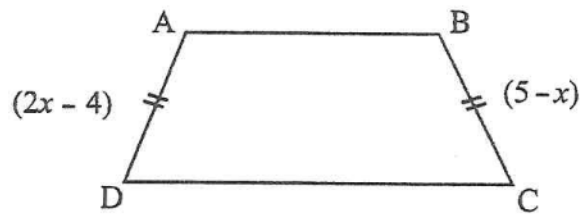
Answer (a) \_\_\_\_\_ (\_\_\_\_; \_\_\_\_\_) [2]  
(b) \_\_\_\_\_ units<sup>2</sup> [2]

24 It is given that  $t = 2\pi\sqrt{\frac{d}{g}}$ .

- (a) Find  $t$  when  $\pi = \frac{22}{7}$ ,  $d = 490$  and  $g = 10$ .
- (b) Make  $d$  the subject of the formula.

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

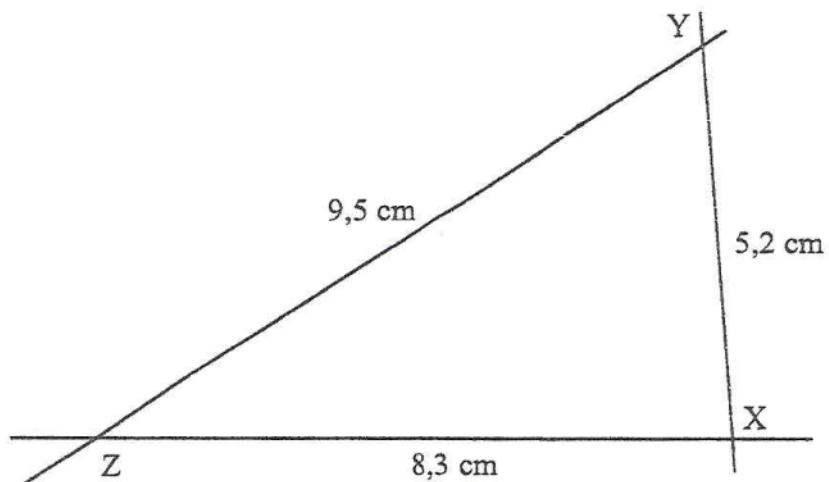
(b)  $d =$  \_\_\_\_\_ [2]



ABCD is an isosceles trapezium with  $AD = BC$ .

- (a) Given that  $AD = (2x - 4)\text{cm}$  and  $BC = (5 - x)\text{cm}$ , form an equation in  $x$  and solve it.
- (b) Given also that  $AB = (2x + 6)\text{cm}$  and  $DC = 14\text{ cm}$ , find the numerical value of the perimeter of the trapezium.

*Answer* (a) Equation: \_\_\_\_\_ [1]  
 $x =$  \_\_\_\_\_ [1]  
 (b) \_\_\_\_\_ cm [2]

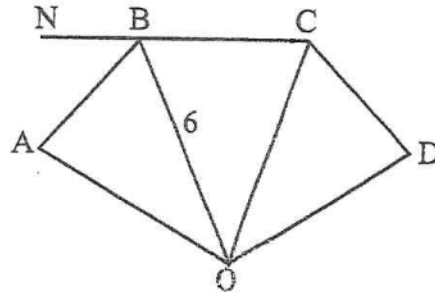


On the diagram, **use ruler and compasses only** to construct

- (a) the perpendicular from X to YZ,
- (b) the locus of point 2,2 cm from YZ and on the same side of YZ as X.

*Answer*      (a)    on diagram    [2]  
                          (b)    on diagram    [2]

27

For  
Examiner  
Use

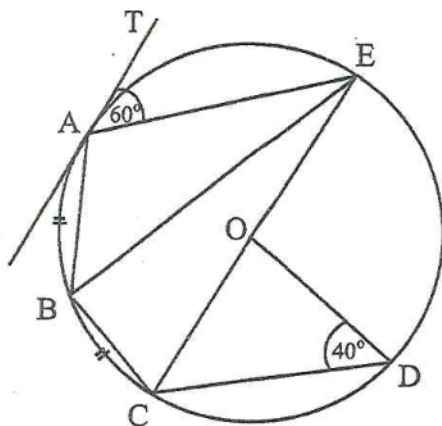
AB, BC and CD are adjacent sides of a regular octagon with centre O.  $OB = 6 \text{ cm}$  and CB is produced to N.

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

- (a)  $\hat{NBA}$ ,  
 (b)  $\hat{AOB}$ ,  
 (c) the area of  $\triangle AOB$ .

[ $\sin 45^\circ = \cos 45^\circ = 0,7$ ;  $\tan 45^\circ = 1$ ]

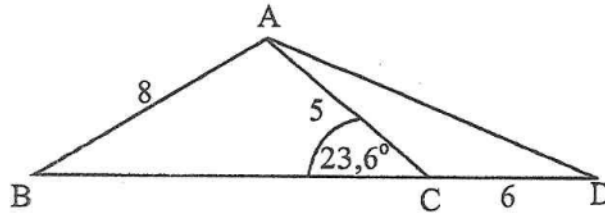
- Answer*
- (a)  $\hat{NBA} = \underline{\hspace{4cm}}$  [1]  
 (b)  $\hat{AOB} = \underline{\hspace{4cm}}$  [1]  
 (c) Area of  $\triangle AOB = \underline{\hspace{4cm}} \text{ cm}^2$  [2]



In the diagram, COE is a diameter of the circle ABCDE, centre O and TA is a tangent to the circle at A.  $\hat{TAE} = 60^\circ$ ,  $\hat{ODC} = 40^\circ$  and arc AB = arc BC. Find

- (a)  $\hat{CBE}$ ,  
 (b)  $\hat{ABE}$ ,  
 (c)  $\hat{BEC}$ ,  
 (d)  $\hat{EOD}$ .

- Answer (a)  $\hat{CBE} =$  \_\_\_\_\_ [1]  
 (b)  $\hat{ABE} =$  \_\_\_\_\_ [1]  
 (c)  $\hat{BEC} =$  \_\_\_\_\_ [2]  
 (d)  $\hat{EOD} =$  \_\_\_\_\_ [1]



In the diagram, BCD is a straight line,  $AB = 8$  cm,  $AC = 5$  cm,  $CD = 6$  cm and  $\hat{ACB} = 23,6^\circ$ .

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

- (a) the value of  $\sin \hat{ABC}$ , giving your answer as a common fraction in its lowest terms,
- (b)  $AD^2$ .

$[\sin 23,6^\circ = 0,40; \cos 23,6^\circ = 0,92; \tan 23,6^\circ = 0,44]$ .

Answer (a)  $\sin \hat{ABC} =$  \_\_\_\_\_ [2]

(b)  $AD^2 =$  \_\_\_\_\_ [3]

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

**POSSIBLE ANSWERS**

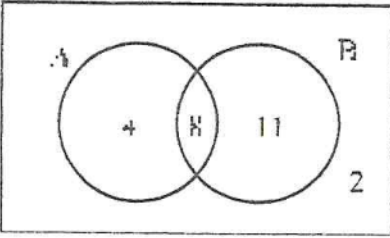
**JUNE 2010**

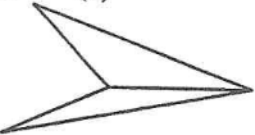

**MATHEMATICS**

4008	
4028	01



1	(a)	(i)	(0),10	1	
		(ii)	$\frac{12}{125}$	1	
	(b)		30	1	
2	(a)		43 200	1	
	(b)	(i)	$2,88 \times 10^2$	1	
		(ii)	$3,608 \times 10^2$	1	
3	(a)	(i)	$6 m^2 n^2$	1	
		(ii)	$36 m^3 n^3$	1	
	(b)		$10 x$	1	
4	(a)		$1520_{(6)}$	1	
	(b)		$20\ 120_{(3)}$	1	
	(c)		7	1	
5	(a)		1	1	
	(b)		$\frac{3}{2}$ or $1\frac{1}{2}$ or 1,5	1	
	(c)		-4	1	
6	(a)		28	1	
	(b) *		64 000	2	

<p>7*</p> 	3	
<p>8</p> <p>(a) <math>5\sqrt{2}</math></p> <p>(b)* 86,4</p>	1 2	
<p>9*</p> <p><math>x = 2</math></p> <p><math>y = 1</math></p>	3	
<p>10</p> <p>(a) 400</p> <p>(b)* 3 072</p>	1 2	
<p>11</p> <p>(a) <math>2\frac{3}{4}</math> or 2,75</p> <p>(b) - 8 or 3</p>	1 1 + 1	
<p>12</p> <p>(a) 1</p> <p>(b)* 1</p>	1 2	
<p>13</p> <p>(a) - 9</p> <p>(b)* <math>\sqrt{52}</math> or <math>2\sqrt{13}</math></p>	1 2	

<p>14 (a)</p>  <p>(b)</p> 	<p>1</p> <p>2</p>	
<p>15 (a) 2</p> <p>(b)* <math>x + y \leq 4</math> or equiv</p>	<p>1</p> <p>2</p>	
<p>16* (a) <math>\begin{pmatrix} 6 &amp; 8 \\ -3 &amp; -4 \end{pmatrix}</math></p> <p>(b) 0</p>	<p>2</p> <p>1</p>	
<p>17 (a) <math>340^\circ</math></p> <p>(b)* <math>070^\circ</math></p>	<p>1</p> <p>2</p>	
<p>18 (a) <math>V_0 = \sqrt{10^2 - 8^2}</math> or equiv.</p> <p>(b)* 187,2</p>	<p>1</p> <p>2</p>	
<p>19 (a) 35</p> <p>(b) 4</p> <p>(c)* <math>\frac{1}{5}</math> or equivalent</p>	<p>1</p> <p>1</p> <p>2</p>	

20	(a) 24	1	
	(b)* 40 800	3	
21	(a) (i) XBA	1	
	(ii) XFE	1	
	(b)* 5	2	
22	(a) 2	1	
	(b)* 2	3	
23	(a) (0; 1)	1 + 1	
	(b)* 24	2	
24*	(a) 44 condone $\pm 44$	2	
	(b) $\frac{t^2 g}{4\pi^2}$ or equiv	2	
	Accept $\frac{49t^2 g}{1936}$		

25	(a)	$2x - 4 = 5 - x$ or equiv	1	
		$x = 3$	1	
	(b)*	30	2	
26*	(a)	Perp. line correctly	2	
	(b)	Line parallel to YZ at $2,2 \pm 0,2$ cm from YZ with construction arcs.	2	
27	(a)	$45^\circ$	1	
	(b)	$45^\circ$	1	
	(c)*	12,6	2	
28	(a)	$90^\circ$	1	
	(b)	$60^\circ$	1	
	(c)*	$15^\circ$	2	
	(d)	$80^\circ$	1	
29*	(a)	$\frac{1}{4}$	2	
	(b)	116,2	3	



# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

**MATHEMATICS**

**4008/2**

PAPER 2

JUNE 2010 SESSION

2 hours 30 minutes

Additional materials:

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

**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.

**Electronic calculators must not be used.**

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 may be used to evaluate explicit numerical expressions.

**This question paper consists of 12 printed pages.**

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## Section A [64 marks]

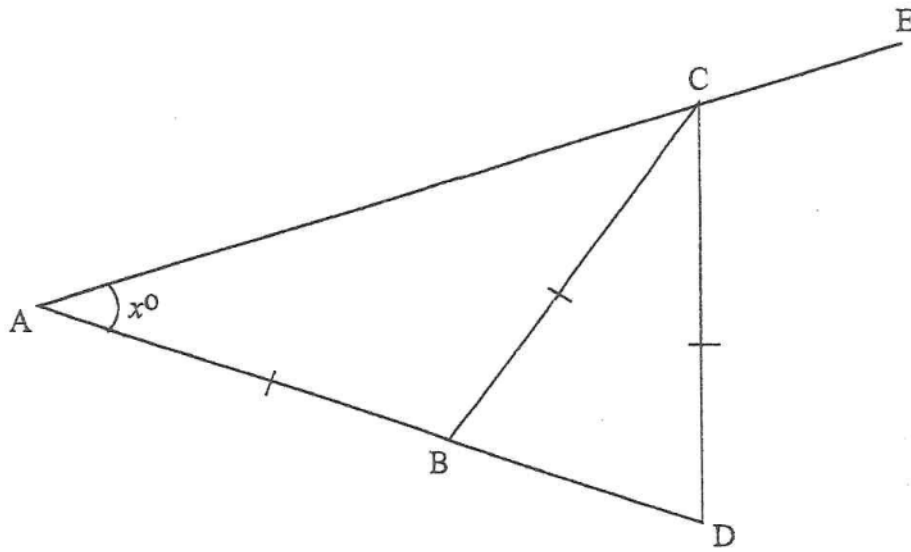
Answer *all* the questions in this section.

- 1 (a) Remove brackets and simplify the expression  $3(5 - x) - 2x(x + 3)$ . [2]
- (b) Integers  $x$ ,  $y$  and  $z$  are such that  
 $x \leq 6$ ,  $y \geq -2$  and  $-6 \leq z \leq 4$ .  
 Find (i) the **least** possible value of  $yz^2$   
 (ii) the **greatest** possible value of  $x - y$ . [4]
- (c) Factorise completely  $125p^3 - 5p$ . [3]
- [Total :9]
- 

- 2 (a) Express 252 as a product of its prime factors. [2]
- (b) 120 kg of a certain metal has a volume of  $0,4 \text{ m}^3$ . Find the density of the metal, giving your answer in  $\text{g/cm}^3$ . [2]
- (c) It is given that  $\xi = \{1; 2; 3; 5; 7; 8; 9; \}$ ,  
 $A = \{3; 5\}$ ,  $B = \{1; 3; 7; 9\}$  and  $C = \{1; 7; 9\}$
- (i) Draw a fully labelled Venn diagram to show **all** the elements in each subset. [3]
- (ii) Write down the elements of the following subsets
- (a)  $A \cap B \cap C'$ ,
- (b)  $(A \cup B)' \cap C$ . [3]
- [Total:10]
-

3 (a)

3



In the diagram, ACE and ABD are straight lines,  $AB = BC = CD$  and  $\hat{BAC} = x^\circ$

(i) Express in terms of  $x$

(a)  $\hat{CBD}$ ,

(b)  $\hat{DCE}$ ,

(c)  $\hat{BCD}$ .

[3]

(ii) If  $AC = AD$ , find the numerical value of  $x$ .

[2]

(b) Given that  $M = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ ,  $N = \begin{pmatrix} 4 & -2 \\ 3 & 0 \end{pmatrix}$  and  $3M + N = M$ , find

(i) the matrix  $M$ ,

[3]

(ii)  $N^2$ .

[2]

[Total:10]



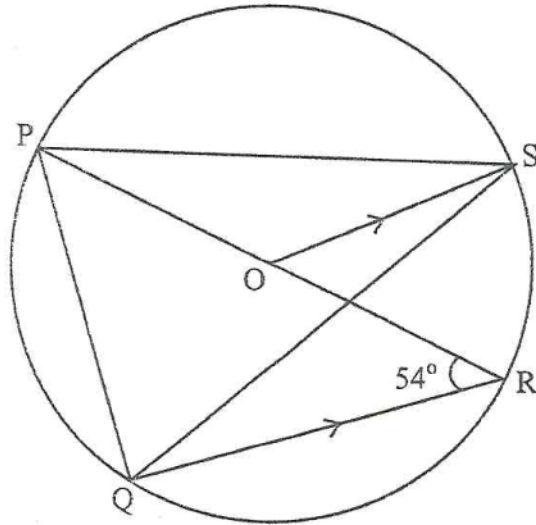
- 4 Two variables  $R$  and  $V$  are connected by the equation  $R = kV + c$ , where  $k$  and  $c$  are constants.
- (a) Write down the type of variation between  $R$  and  $V$ . [1]
- (b) If the graph of  $R = kV + c$  is drawn with  $R$  on the vertical axis, write down, in terms of  $k$  and/or  $c$  the coordinates of the point where the graph crosses
- (i) the vertical axis, [2]
- (ii) the horizontal axis. [2]
- (c) Make  $V$  the subject of the equation  $R = kV + c$ . [2]
- (d) Given that  $R = 14$  when  $V = 6$  and that  $R = 8$  when  $V = 2$ ,
- (i) form a pair of simultaneous equations in  $k$  and  $c$ , [1]
- (ii) hence find the numerical value of  $k$  and the numerical value of  $c$ . [3]

[Total:11]

- 
- 5 (a) In a school with 1 050 pupils,  $\frac{4}{7}$  of the pupils were boys. One quarter of the boys were suspended for misbehaviour.
- (i) Find the number of boys suspended. [2]
- (ii) Express the number of girls as a fraction of the remaining pupils. [2]
- (iii) If two pupils were chosen at random from the remaining pupils to testify, find the probability that the two pupils were of the same sex. [3]

5

(b)



In the diagram, P, Q, R and S are points on the circumference of the circle with centre O. OS is parallel to QR and  $\hat{P}RQ = 54^\circ$ . POR is a straight line.

Calculate

- (i)  $\hat{R}OS$ , [1]
- (ii)  $\hat{R}PS$ , [1]
- (iii)  $\hat{P}QS$ . [2]

[Total:11]

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

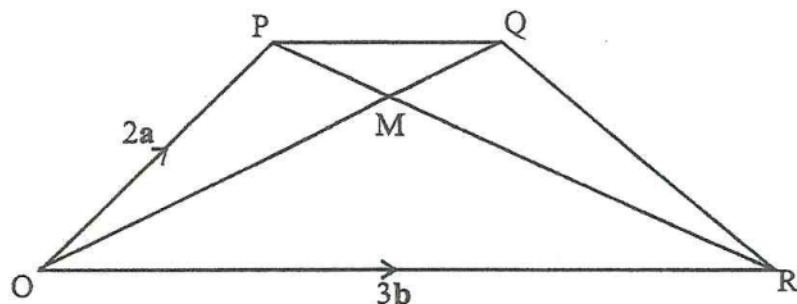
- 6 Use ruler and compasses only for all constructions and show all construction lines and arcs.
- (a) Construct on a single diagram
- (i) quadrilateral ABCD in which  $AB = 8$  cm,  $\hat{ABC} = 90^\circ$ ;  $\hat{BCD} = 120^\circ$ ,  $BC = 10$  cm and  $CD = 5$  cm, [6]
  - (ii) the locus of points equidistant from B and C, [2]
  - (iii) the locus of points equidistant from DC and DA. [2]
- (b)
- (i) Mark and label the point P which is equidistant from B and C and equidistant from DC and DA. [1]
  - (ii) Draw a circle with centre P and radius PC. [1]
  - (iii) Measure and write down the length of PC. [1]

[Total:13]

## Section B [36 marks]

Answer any *three* questions in this section.

7



In the diagram, PQ is parallel to OR,  $PM = \frac{1}{3}PR$ ,  $\overrightarrow{OP} = 2\mathbf{a}$  and  $\overrightarrow{OR} = 3\mathbf{b}$ .

- (a) Express in terms of  $\mathbf{a}$  and/or  $\mathbf{b}$
- $\overrightarrow{PR}$ ,
  - $\overrightarrow{PM}$ ,
  - $\overrightarrow{OM}$ . [4]
- (b) (i) Given that  $PQ = hOR$ , write down in terms of  $h$ ,  $\mathbf{a}$  and/or  $\mathbf{b}$  an expression for
- $\overrightarrow{PQ}$ ,
  - $\overrightarrow{OQ}$ .
- (ii) Given also that  $OQ = kOM$ , write down another expression for  $\overrightarrow{OQ}$  in terms of  $\mathbf{a}$ ,  $\mathbf{b}$  and  $k$ . [3]
- (c) Using the two expressions for  $\overrightarrow{OQ}$ , form an equation and use it to find the value of  $k$  and the value of  $h$ . [3]
- (d) Write down  $\overrightarrow{OQ}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$  only. [1]
- (e) Find the ratio  $\frac{\text{area of } \triangle OPQ}{\text{area of trapezium OPQR}}$ . [1]

[Total:12]

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

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

(a) The letter V has a vertex at  $A(-2; 2)$  and the ends at  $B(-3; 5)$  and  $C(-1; 5)$ .  
Draw and label the shape ABC. [1]

(b) The shape ABC is mapped onto  $A_1B_1C_1$  with coordinates  $A_1(1,2; 0,4)$ ,  $B_1(4,2; 1,4)$  and  $C_1(3; 3)$  by a certain transformation.

(i) Draw and label shape  $A_1B_1C_1$ .  
(ii) Describe completely the **single** transformation which maps shape ABC onto  $A_1B_1C_1$ . [5]

(c) Shape ABC is enlarged by a scale factor  $-\frac{1}{2}$  with the origin as centre onto  $A_2B_2C_2$ .

Draw and label  $A_2B_2C_2$ . [3]

(d) A shear with  $y$  - axis invariant and scale factors 2 maps shape ABC onto  $A_3B_3C_3$ .

Draw and label  $A_3B_3C_3$ . [3]

[Total:12]

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

- 9 The table below shows the marks obtained by 40 students in a Mathematics test.

Mark ( $x$ )	$8 < x \leq 10$	$10 < x \leq 11$	$11 < x \leq 12$	$12 < x \leq 14$	$14 < x \leq 16$	$16 < x \leq 19$
Frequency	5	5	7	14	6	3

The following is a cumulative frequency table for this distribution.

Mark ( $x$ )	$x \leq 10$	$x \leq 11$	$x \leq 12$	$x \leq 14$	$x \leq 16$	$x \leq 19$
Cumulative Frequency	5	$q$	17	31	37	40

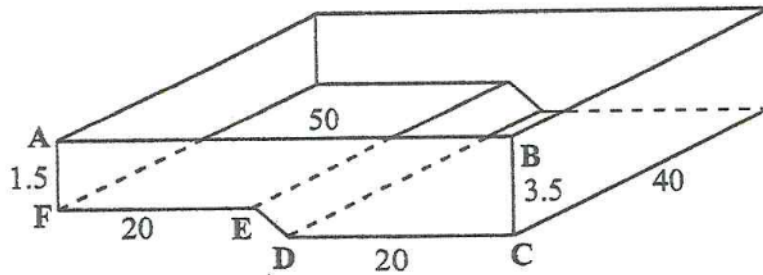
- (a) Find the value of  $q$ . [1]
- (b) State the modal class. [1]
- (c) Using a scale of 1 cm to represent 1 mark on the  $x$ -axis and 2 cm to represent 5 students on the  $y$ -axis, draw the cumulative frequency curve for the marks. [3]
- (d) Use your graph to estimate
- (i) the median mark,
- (ii) the number of students who got 15 or more marks. [4]
- (e) Calculate an estimate of the mean mark. [3]

[Total:12]

- 10 (a) (i) Solve the inequality  $-3 < 2x - 7 \leq 7$ .
- (ii) Illustrate your solutions on a number line. [4]
- (b) Triangle ABC is such that  $BC = x$  metres and the perpendicular distance of A from BC is  $(3x - 5)$  metres. Given that the area of the triangle ABC is  $4 \text{ m}^2$ ,
- (i) form an equation in  $x$  and show that it reduces to  $3x^2 - 5x - 8 = 0$ , [2]
- (ii) solve this equation for  $x$ , giving your answers correct to 2 decimal places, [5]
- (iii) hence write down the distance of A from BC. [1]

[Total:12]

---



The diagram shows a swimming pool of uniform cross-section ABCDEF, of length 50 m and breadth 40 m.

$AB = 50\text{ m}$ ,  $BC = 3,5\text{ m}$ ,  $DC = FE = 20\text{ m}$ ,  $AF = 1,5\text{ m}$  and  
 $\hat{BAF} = \hat{AFE} = \hat{BCD} = \hat{ABC} = 90^\circ$

- (a) Calculate
- (i) the cross sectional area ABCDEF, [3]
  - (ii) the capacity of the swimming pool, giving your answer in kilolitres, [1]
  - (iii) the length of DE. [2]
- (b) The vertical walls of the pool are to be painted. Given that 7 litres of paint is needed to cover  $10\text{ m}^2$  of wall surface and that the paint is sold in 5 litre tins at a cost of \$27 000 per tin.
- CALCULATE*
- (i) the total area to be painted, [2]
  - (ii) the number of tins of paint to be bought, [3]
  - (iii) the amount of money needed to buy the paint. [1]

[Total:12]



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

- 12 (a) The following is an incomplete table of values for the function

$$y = \frac{3}{x+2}$$

x	-6	-5	-4	-3	-2,5	-1	0	1	2
y	$-\frac{3}{4}$	-1	p	-3	-6	3	$1\frac{1}{2}$	1	$\frac{3}{4}$

- (i) Calculation the value of p. [1]
- (ii) Using a scale of 2 cm to represent 1 unit on both axes draw the graph of  $y = \frac{3}{x+2}$  for  $-6 \leq x \leq 2$ . [4]
- (b) On the same axes draw the graph of the function  $y = 2x + 3$  to intersect with the graph of  $y = \frac{3}{x+2}$ . [2]
- (c) Write down, in the form  $ax^2 + bx + c = 0$  (where a, b and c are constants), the equation whose roots are the x coordinates of the points of intersection of the two graphs. [2]
- (d) By drawing a suitable tangent, find the gradient of the graph  $y = \frac{3}{x+2}$  at the point (1; 1). [3]

[Total:12]

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

**POSSIBLE ANSWERS**

**JUNE 2010**

**MATHEMATICS**

**4008/2,  
4028/2**

1 (a)  $15 - 3x - 2x^2 - 6x$

$15 - 9x - 2x^2$

(b) (i)  $-2 \times (-6)^2$

$-72$

(ii)  $6 - -2$

$8$

(c)  $5p(5p - 1)(5p + 1)$

- 1 each error

anw 1 (a) 2 (b) (i) 2 (ii) 2 (c) 3

[9]

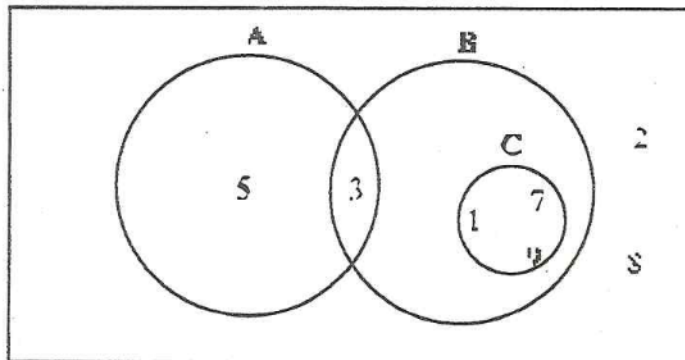
2 (a)  $2 \times 2 \times 3 \times 3 \times 7$

After BO give ScB1 for  $4 \times 9 \times 7$  seen

(b) (Density =)  $\frac{\text{figs } 12}{\text{fig } 4}$

$30 \text{ (g/cm}^3\text{)}$

(c)(i)



(ii) {3}

(iii) {1; 2; 7; 8; 9}

- 1 each error

anw 2(a) 2 (b) 1 (c) (i) 3 (ii) 1 (iii) 2

[Total:10]

- 3 (a) (i) (a)  $(\hat{C}\hat{B}\hat{D} =) 2x^{(e)}$   
 (b)  $(\hat{D}\hat{C}\hat{E} =) 3x^{(e)}$   
 (c)  $(\hat{B}\hat{C}\hat{D} =) 80^{(e)} - 4x^{(e)}$

(ii)  $x + 2x + 2x = 180$  or equiv  
 $(x =) 36^{(e)}$

- (b) (i)  $\begin{pmatrix} -2 & 1 \\ -\frac{3}{2} & 0 \end{pmatrix}$  - 1 each error

SC: After BO give SCB1 for any two of the equations

$$3a + 4 = a,$$

$$3b - 2 = b,$$

$$3c + 3 = c,$$

$$3d = d, \text{ seen.}$$

- (ii)  $\begin{pmatrix} 10 & -8 \\ 12 & -6 \end{pmatrix}$  - 1 each error

anw (a) (i) 1 + 1 + 1 (ii) 2 (b) No penalty

[Total:10]

- 4 (a) Partial variation

- (b) (i)  $(0; c)$  ----- - 1 each error

- (ii)  $\left(\frac{-c}{k}; 0\right)$  - 1 each error

(c)  $kV = R - c$

$$(V =) \frac{R - c}{k}$$

- (d) (i)  $14 = 6k + c$   
 and  
 $8 = 2k + c$

(ii)  $2c = 10$  or

$4k = 6$

$c = 5$

$k = 1\frac{1}{2}$

[Total:11]

ANW (a), (b) no penalty. (c) 1 (d) (i) 0 (ii) 1 + 1

5 (a) (i)  $\frac{1}{4} \times \frac{4}{7} \times 1050$  or equiv

150

(ii) (No of girls  $\Rightarrow$ ) 450 seen

$\frac{1}{2}$  or  $\frac{k}{2k}$

(iii)  $\frac{450}{900} \times \frac{449}{899}$

$2 \times \frac{450}{900} \times \frac{449}{899}$

$\frac{449}{899}$  or 0,4994

(b) (i)  $(R\hat{O}S) = 54^{(c)}$

(ii)  $(R\hat{P}S) = 27^{(c)}$

(iii)  $90^{(c)} - \text{their } 27^{(c)}$

$63^{(c)}$

Anw (a) (i) 1 (ii) 1 + 1 (iii) 1 (b) No penalty.

[Total:11]

6 Scale drawing :  $\geq \frac{1}{2}$  size D2 $\leq \frac{1}{2}$  size DO but marks are available

- (a) Angle of  $90^\circ \pm 2^\circ$   
 Correct construction arcs  
 Angle of  $120^\circ \pm 2^\circ$   
 Correct construction arcs

Quadrilateral with sides 8 cm 10 cm and 5 cm and angles  $120^\circ \pm 2^\circ$   
 And  $90^\circ \pm 2^\circ$ .

- (ii) Ruled perpendicular bisector of their BC, at least 3 cm long  
 and with  $\pm 2^\circ$ ,  
 Correct construction arcs
- (iii) Ruled bisector of their  $\hat{CDA}$  at least 3 cm long and within  $\pm 2^\circ$ .  
 Correct construction arcs.

- (b) (i) P marked and labelled at intersection of the perpendicular and  
 angle bisectors.
- (ii) Circles: Centre their P passing through their B and their C.
- (iii) (Radius = )  $5,2^\circ \pm 0,2$  cm

Anw No diagram : zero

[3]

[Total:13]

(a) (i)  $-2a + 3b$

(ii)  $-\frac{2}{3}a + b$

(iii)  $2a - \frac{2}{3}a + b$

$\frac{4}{3}a + b$

(b) (i) (a)  $3hb$

(b)  $2a + 3hb$

(ii)  $K \frac{4}{3}(a+b)$

(c)  $2 = \frac{4}{3}k$  of  $3h = k$

$k = \frac{3}{2}$

$$h = \frac{1}{2}$$

(d)  $2a + \frac{3}{2}b$  or equiv

(e)  $\frac{1}{3}$

Anw : (a) 1 + 1 + 1    (b) 1 + 1 + 1    (c) 1 + 1    (d) 1    (e) 1

[Total:12]

8 **Penalties:** Wrong scale(s) – 1 once, axes reversed – 1 if not labelled, non uniform scale – 1, lined or plain paper, extended tolerance to 2 mm.

(a) ABC correctly drawn

(b)  $A_1B_1C_1$  correctly drawn, – 1 each error  
Reflection and no other transformation stated  
In the line  $y = 2x + 2$

(c)  $A_2B_2C_2$  correctly drawn with vertices at  $(1; -1)$ ,  $(1\frac{1}{2}; -2\frac{1}{2})$  and  $(\frac{1}{2}; -2\frac{1}{2})$   
-1 each error

(d)  $A_3B_3C_3$  correctly drawn with vertices at  $(-2; -2)$  ends at  $(-3; -1)$  and  $(-1; 3)$ , – 1 each error

SC. For (c) and (d): [3]

After EO or SO, give SC B1 for all three correct coordinates stated even in vector form, or for all three points plotted but wrongly or not joined.

Answ: No diagram zero [12]

9 (a)  $(q = ) 10$

(b)  $12 < x \leq 14$

(c) The six given points plus their  $(5; q)$  correctly plotted,  
– 1 each error.  
Smooth curve, not grossly thick passing through the correct points  
(provided within 1 mm)

(d) (i) Attempt to find median seen by horizontal line drawn or  
point marked at  $y = 20,5$   
(median =) 12,2

- (ii) Line drawn or point marked at  $x = 15$   
(No of students =) 5

(e)

$$\left[ \text{their} \times \frac{8+10}{2} \times 5 + \text{their} \frac{10+11}{2} \times 5 + \text{their} \frac{11+12}{2} \times 7 + \text{their} \frac{12+14}{2} \times 14 + \text{their} \frac{16+19}{2} \times 3 \right] \div 40$$

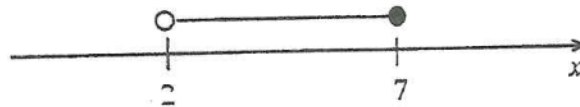
12,5625.

Anw : (a) 1 (b) 1 (c) and (d) No diagram zero (e) 1

12

10 (a) (i)  $7-3 < 2x$  or  $2x \leq 7+7$

$x > 2$  and  $x \leq 7$



(ii)

- 1 each error

(b) (i)  $\frac{1}{2}x(3x-5) = 4$

correct reduction to  $3x^2 - 5x - 8$  nww

(ii) Formula provided purely numerical  
 $\frac{p \pm (or + or -) \sqrt{q}}{r}$  but not  $\frac{\pm p \sqrt{q}}{r}$  is

seen or used.

$p = 5$        $q = 131$  or  $\sqrt{q} = 11,45$

$r = 6$  B1

camp square

$$\left(x - \frac{5}{6}\right)^{(2)} \qquad \frac{71}{36}$$

Their  $\frac{5}{6} \pm \sqrt{\text{Their} \frac{71}{36}}$

FA but condone PA if correct answers are reached  
Nww 2,74      - 1,07

After BO Bo give Sc B1 for both  
 $2,74\bar{1}$  and  $-1,074$  seen



(iii)  $3,22\overset{5}{4}$

Anw : a(i) 1 (ii) 2 b(i) 0 (ii) 1 + 1 (iii) 1 [12]

11 (a) (i)  $20 \times (1,5 + 3,5) + \frac{1}{2} \times 10 \times (1,5 + 3,5)$  or equiv

125 (m<sup>2</sup>)

(ii) Their a(i)  $\times 40$

5 000

(iii) (DE =)  $\sqrt{(\text{Their}(3,5 - 1,5))^2 + 10^2}$

10,2 (m)

(b) (i)  $2 \times \text{Their a(i)} + 40 \times 3,5 + 40 \times 1,5$

350 (m<sup>2</sup>)

(ii) Their b(i)  $\times \frac{7}{5} \times \frac{1}{10}$

49

(iii) Their b(ii)  $\times 27\ 000$   
\$1 323 000

Anw a(i) 2 (ii) 1 (iii) 1 b(i) (ii) 1 (iii) [12]

12 (a) (i) (p =)  $-1\frac{1}{2}$

(ii) The eight given points and (-4, their p) correctly plotted

-1 each error

Smooth curve not grossly thick passing within 1 mm of correct points.

(a) Correct line intersecting graph of  $y = \frac{3}{x+2}$  at least once

(c)  $2x + 3 = \frac{3}{x+2}$

correct reduction to :  $2x^2 + 7x + 3 = 0$  nww

- (d) Tangent drawn at (1; 1)  
Correct method of finding gradient of their tangent s.o.i.

$3, \frac{5}{1}$

Anw : a(i) 1 (ii) No graph 0 (b) No graph 0  
(c) 0 (d) No tangent 0

[12]

---



Candidate Name

Centre Number

Candidate Number



# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

**MATHEMATICS**  
**PAPER 1**

**4008/1, 4028/1**

**NOVEMBER 2010 SESSION**

**2 hours 30 minutes**

Candidates answer on the question paper

Additional materials:

Geometrical instruments

**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.

Answer **all** questions

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

If working is needed for any questions 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 26 printed pages and 6 blank pages.**

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

For  
Examiner's  
Use

1 Evaluate

(a)  $(16^{\frac{1}{2}})^{\frac{3}{2}}$ ,

(b)  $7^{-\frac{1}{2}} \times 7^{\frac{5}{2}} \times 7$ ,

(c)  $(\frac{1}{5})^{-2}$

*Answer*

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

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

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

2 Factorise completely

(a)  $x^2 + 5x - 6$ ,

(b)  $8m^3n - 2mn^3$ .

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

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

---

3 Given that  $m = 2 \times 10^3$  and  $n = 5 \times 10$ , evaluate, giving your answer in standard form.

(a)  $m + n$ ,

(b)  $\frac{n}{m}$ .

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

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

- 4 (a) In a certain month £1 402 was equivalent to US\$2 000.

Calculate the exact value of the exchange rate in the form  
US\$1 = £ $n$ .

- (b) In another month the exchange rate was US\$1 = £0,69. Calculate  
the equivalent of £2 760 in US\$.

*Answer:* (a) US\$1 = £ \_\_\_\_\_ [1]

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

For  
Examiner  
Use

- 5 The dimensions of a rectangle measuring 32 cm by 24 cm are enlarged in the ratio 5 : 2. Find the new dimensions.

*Answer:* \_\_\_\_\_ cm by \_\_\_\_\_ cm [3]



6 Given that  $\overline{AB} = \begin{pmatrix} 10 \\ -4 \end{pmatrix}$  and  $\overline{BC} = \begin{pmatrix} 2 \\ -8 \end{pmatrix}$ ,

- (a) write down  $\overline{AC}$  as a column vector,
- (b) find  $|\overline{BC}|$  leaving your answer in surd form.

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

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

- 7 (a) Find the gradient of the line  $\ell$  which passes through (6; 8) and (0; 5).
- (b) Find the equation of the line which is parallel to line  $\ell$  in (a) and passes through (4; -5).

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

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

---

- 8 By correcting each number to 1 significant figure, estimate the value of

$$\frac{371 + 849}{\sqrt{668 - 643}}$$

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

- 
- 9 D is proportional to the cube of  $n$ .
- (a) Express D in terms of  $n$  and a constant  $k$ .
- (b) Given that  $n = 3$  when  $D = 21,6$ ; find D when  $n = 5$ .

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

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

- 10 A map has a scale of 1 : 250.
- (a) A building on the map has a length of 6 cm. Calculate the actual length of the building in metres.
- (b) The area of a pool on the map is  $10 \text{ cm}^2$ . Calculate the actual area of the pool in  $\text{m}^2$ .

*Answer:* (a) \_\_\_\_\_ m [1]  
(b) \_\_\_\_\_  $\text{m}^2$  [2]

---

11 (a) The bearing of A from B is  $243^\circ$ . Write down the three-figure bearing of B from A.

(b) From the list of numbers below, choose the rational numbers.

$$\frac{22}{7}; \pi; 2,3; \sqrt{48}; \sqrt[3]{-8}$$

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

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

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

Answer: \_\_\_\_\_ [3]

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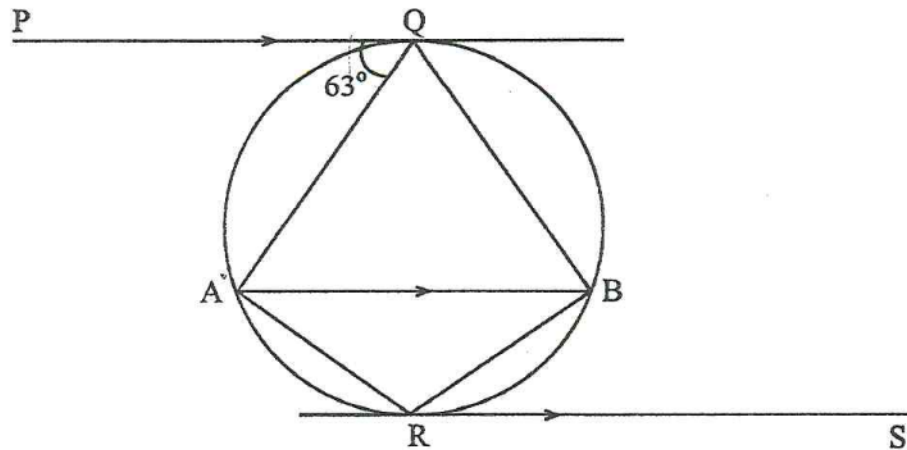
- 13 Solve the simultaneous equations

$$0,4x + 3y = 2,6$$

$$x - 2y = 4,6.$$

Answer:  $x =$  \_\_\_\_\_  
 $y =$  \_\_\_\_\_ [3]

---



In the diagram PQ and RS are parallel tangents to the circle AQBR. Chord AB is also parallel to the two tangents and  $\hat{PQA} = 63^\circ$ .

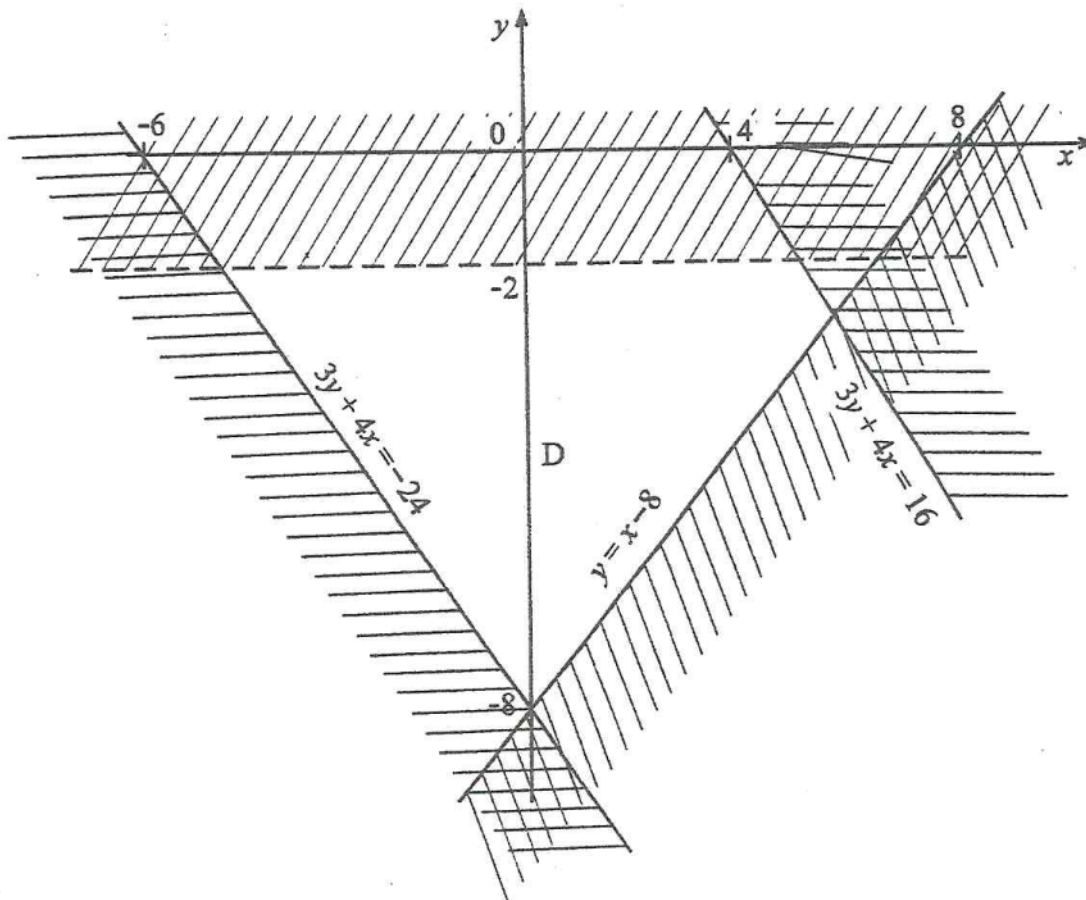
- (a) Find
- (i)  $\hat{QAB}$ ,
  - (ii)  $\hat{BAR}$ .
- (b) Write down the special name of the cyclic quadrilateral AQBR.

Answer: (a) (i)  $\hat{QAB} =$  \_\_\_\_\_ [1]

(ii)  $\hat{BAR} =$  \_\_\_\_\_ [2]

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

15



Write the 4 inequalities which define the unshaded region D.

- Answer:
- (a) \_\_\_\_\_ [1]
  - (b) \_\_\_\_\_ [1]
  - (c) \_\_\_\_\_ [1]
  - (d) \_\_\_\_\_ [1]



16 The length,  $\ell$  cm, of the edge of a cube is given as 5,1 cm correct to one decimal place.

- (a) Give the limits for  $\ell$ .
- (b) Find the least possible surface area of the cube.

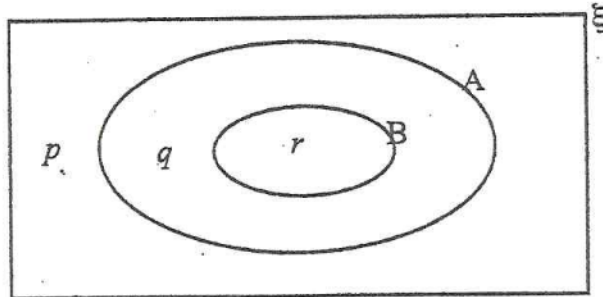
*Answer:* (a) \_\_\_\_\_  $\leq \ell <$  \_\_\_\_\_ [2]

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

---

17 It is given that  $n(A) = 18$ ,  $n(B) = 11$  and  $n(A \cup B)^c = 0$ .

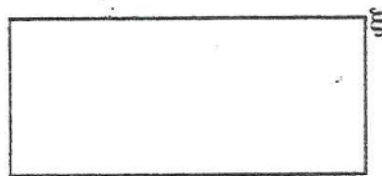
- (a) If this information was shown on the Venn diagram below, write down the values of  $p$ ,  $q$  and  $r$ , the number of elements in each region.



- (b) For the same given information, complete the Venn diagram to show the number of elements in each region where  $n(A \cup B) = 29$ .

Answer: (a)  $p =$  \_\_\_\_\_  
 $q =$  \_\_\_\_\_  
 $r =$  \_\_\_\_\_ [2]

(b)



[2]

18 M and N are  $2 \times 2$  matrices such that  $M = \begin{bmatrix} 2 & -2 \\ -1 & 3 \end{bmatrix}$  and  $MN = \begin{bmatrix} 4 & -2 \\ 0 & 7 \end{bmatrix}$

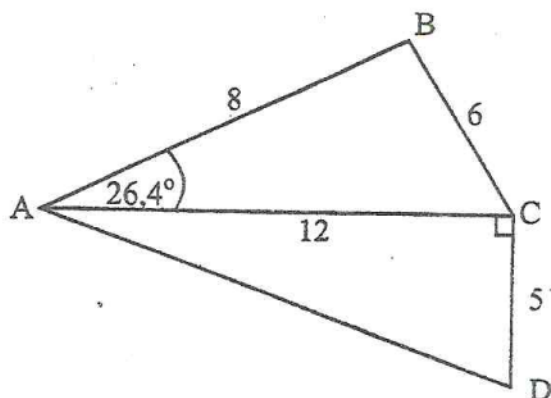
Find

(a)  $M^{-1}$ ,

(b) N

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

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



In the diagram  $AB = 8$  cm,  $BC = 6$  cm,  $AC = 12$  cm,  $CD = 5$  cm,  
 $\hat{BAC} = 26,4^\circ$  and  $\hat{ACD} = 90^\circ$ .

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

- (a) the area of triangle ABC,  
 (b) AD.

$$[\sin 26,4^\circ = 0,44; \cos 26,4^\circ = 0,90; \tan 26,4^\circ = 0,50]$$

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

20 It is given that  $T = 2\pi \sqrt{\frac{\ell}{g}}$ .

- (a) Find  $T$  when  $\ell = 156,8$ ;  $g = 9,8$  and  $\pi = 3,1$ .
- (b) Make  $\ell$  the subject of the formula.

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

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

- 21 (a) Simplify, giving your answer in base 8,

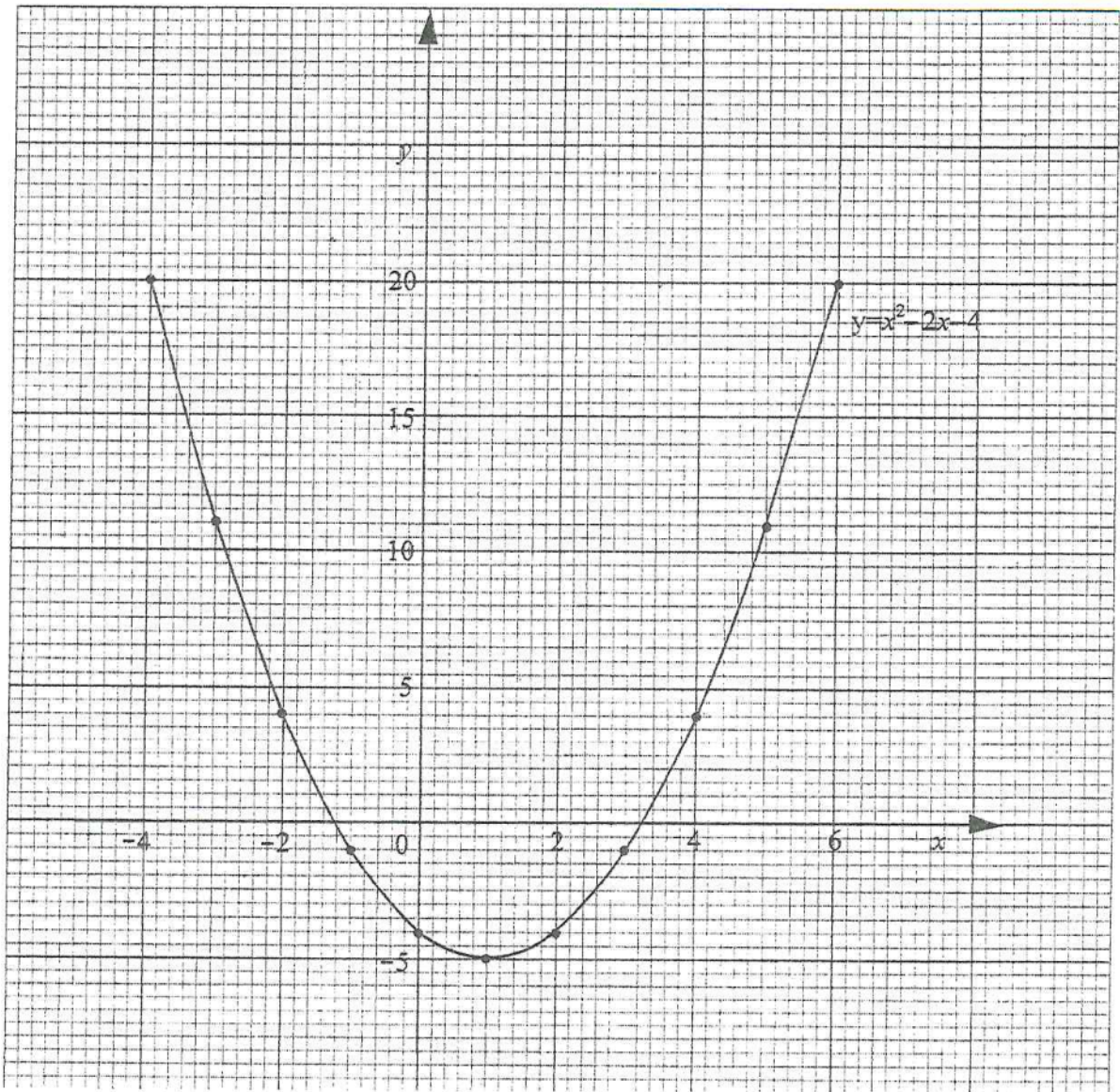
$$503_8 - (226_8 + 167_8).$$

- (b) Evaluate  $\frac{\log 3 + \log 9}{\log 405 - \log 5}$ .

For  
Examiner's  
Use

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

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



The diagram shows the graph of  $y = x^2 - 2x - 4$ .

- (a) On the diagram draw the graph of  $y = 10 - 2x$ .
- (b) Use the graphs to estimate the solution of the equation  $x^2 - 2x - 4 = 10 - 2x$ .
- (c) State the range of values of  $x$  for which  $x^2 - 2x - 4 \leq 14$ .

*Answer:* (a) On diagram [1]

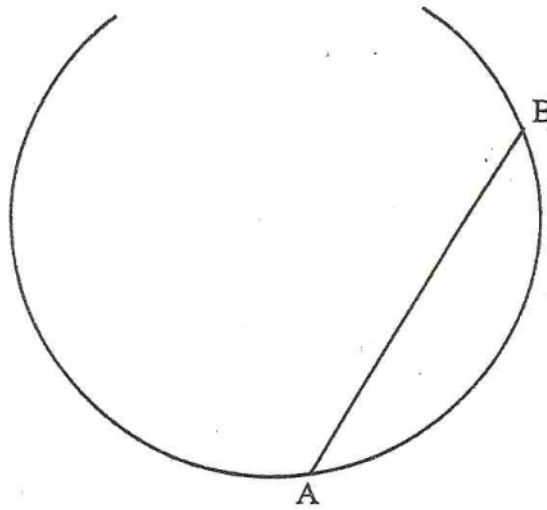
(b)  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [2]

(c) \_\_\_\_\_  $\leq x \leq$  \_\_\_\_\_ [2]

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- 23 On this question use ruler and compasses only for all constructions and show clearly all construction lines and arcs.



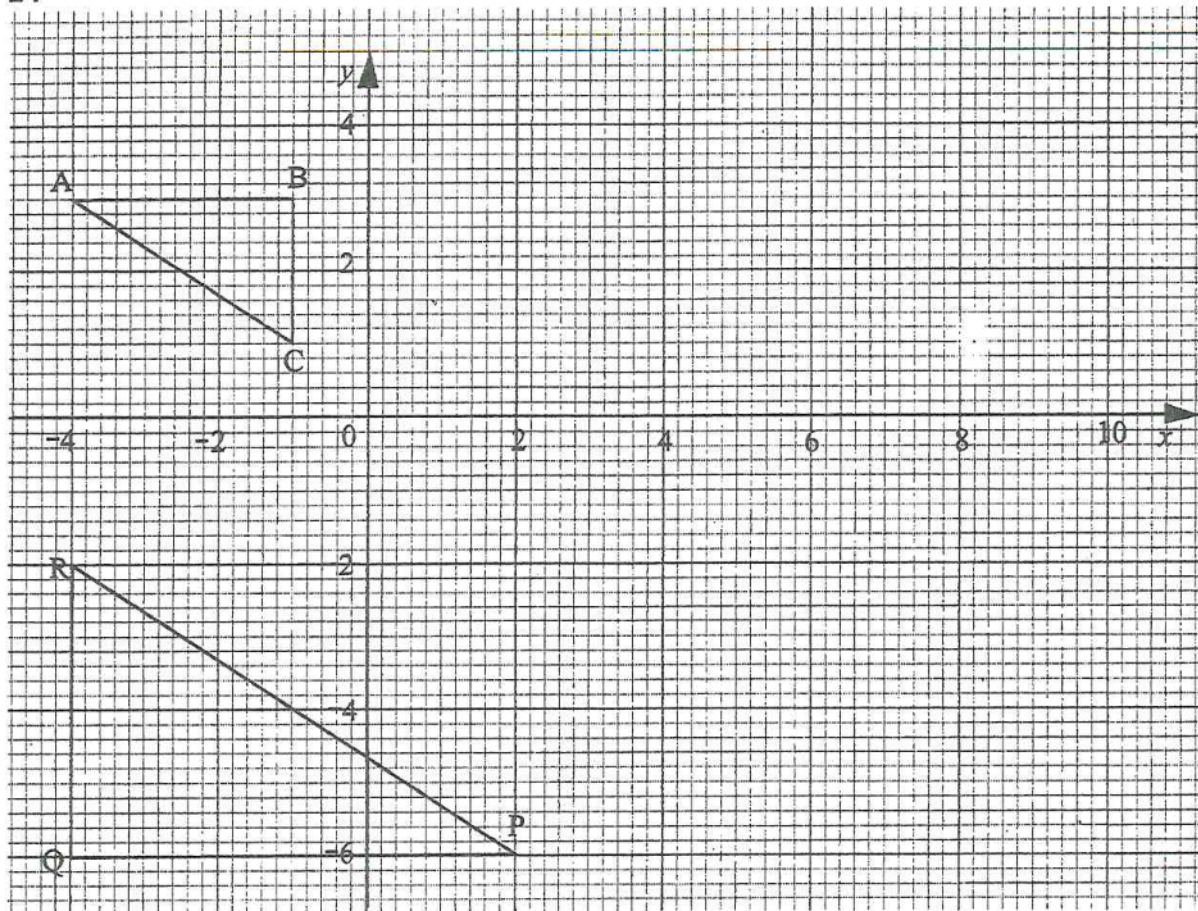
The diagram shows an arc of a circle in which AB is a chord.

- Construct the locus of points equidistant from A and B.
- C is another point on the arc such that  $\hat{BAC} = 90^\circ$ . By construction mark and label the point C.
- Write down the radius of the circle.

*Answer:*

(a)	On diagram	[2]
(b)	On diagram	[2]
(c)	_____ cm	[1]

24

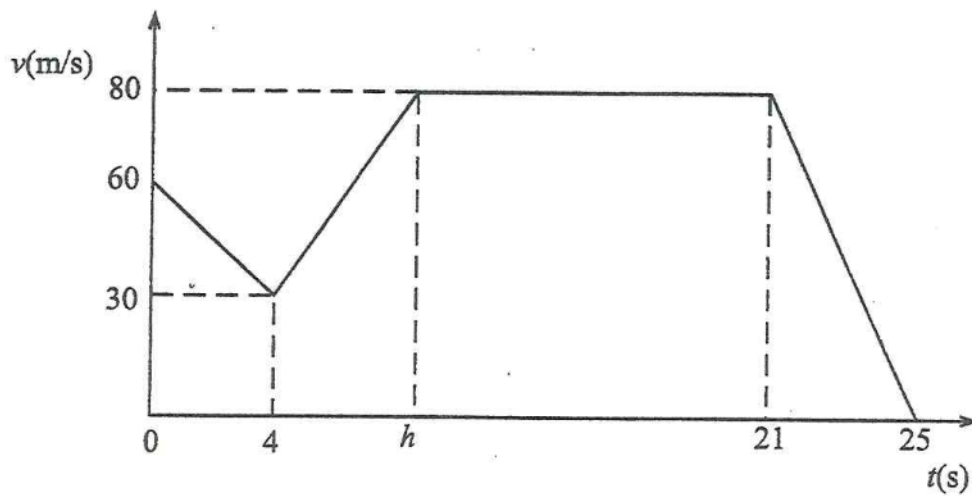


- (a) Draw the image of  $\triangle ABC$  under a reflection in the line  $x = 2$ .
- (b) Describe fully the **single** transformation which maps  $\triangle ABC$  onto  $\triangle PQR$ .

*Answer:* (a) On the diagram. [2]

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

25



The diagram is a velocity time graph of a particle.

- (a) Find the acceleration of the particle during the first 4 seconds.
- (b) Calculate, in terms of  $h$ , the distance covered from
- $t = 4$  to  $t = h$ ,
  - $t = h$  to  $t = 25$ .
- (c) Given that the distance covered from  $t = 4$  to  $t = 25$  is 1,395 km, find the value of  $h$ .

Answer: (a) \_\_\_\_\_  $\text{m/s}^2$  [2]

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

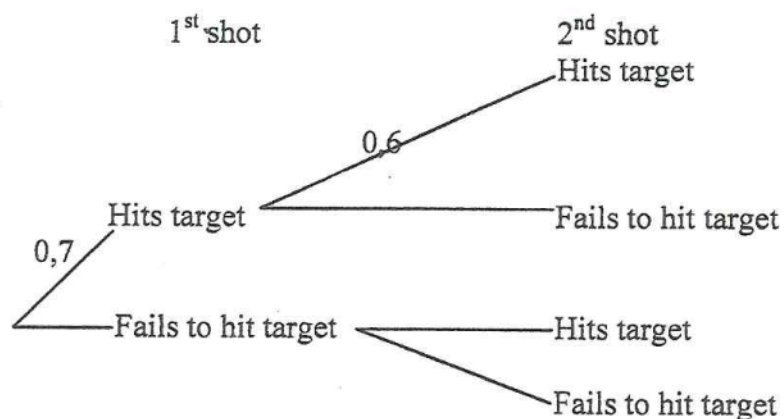
(ii) \_\_\_\_\_ m [1]

(c)  $h =$  \_\_\_\_\_ [2]

- 26 In a shooting game Nyarai is allowed two shots. The probability that she hits the target first time is 0,7.

If she hits the target first time, the probability that she hits the target second time is 0,6 otherwise it is 0,3.

- (a) Complete the tree diagram below to represent all this information.



- (b) Calculate the probability that she hits the target

- (i) twice,  
(ii) once.

*Answer:* (a) On diagram [3]  
(b) (i) \_\_\_\_\_ [2]  
(ii) \_\_\_\_\_ [2]

# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

GENERAL CERTIFICATE OF EDUCATION ORDINARY LEVEL

## MARKING SCHEME

NOVEMBER 2010 SESSION

**MATHEMATICS**

**4008/01**

**4028/01**

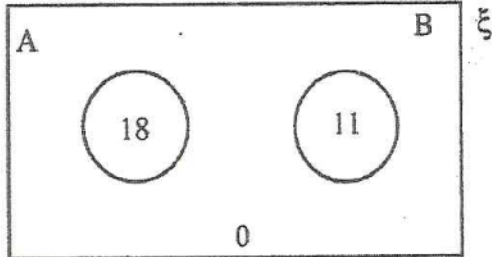
### **IMPORTANT NOTICE**

Marking Schemes have been issued on the basis of ONE copy per assistant examiner and TWO Copies per Team Leader

1	(a) 8 (b) 49 (c) 25	2	(a) $(x-1)(x+6)$ or equiv. *(b) $2mn(2m-n)(2m+n)$ or equiv.
3	(a) $2,05 \times 10^3$ *(b) $2,5 \times 10^{-2}$	4	(a) 0,701 (b) 4 000
5	80cm by 60cm	6	(a) $\begin{pmatrix} 12 \\ -12 \end{pmatrix}$ *(b) $\sqrt{68}$ or equiv
7	(a) $\frac{3}{6}$ or equiv *(b) $2y + 14 = x$ or equiv	8	$\frac{1}{20}$ or 0,05
9	(a) $(D=)kn^3$ (b) 100	10	(a) 15 (b) 62,5
11	(a) $063^\circ$ (b) $\frac{22}{7}; 2,3; \sqrt[3]{-8}$	12	$\frac{11-x}{(x-2)(x+1)}$ or equiv
13	$x = 5$ $y = 0,2$ or $\frac{1}{5}$ or equiv	14	(a) (i) $63^\circ$ (ii) $27^\circ$ (b) kite
15	$y < -2$ or equiv $3y + 4x \leq 16$ or equiv $y \geq x - 8$ or equiv $3y + 4x \geq -24$ or equiv	16	(a) $5,05 \leq \ell < 5,15$ (b) 153,015

17 (a)  $p = 0$   
 $q = 7$   
 $r = 11$

(b)



18 (a)  $\frac{1}{4} \begin{pmatrix} 3 & 2 \\ 1 & 2 \end{pmatrix}$

(b)  $\begin{pmatrix} 3 & 2 \\ 1 & 3 \end{pmatrix}$

19 (a) 21,12

(b) 13

20 (a) 24,8

(b)  $\ell = \frac{r^2 g}{4\pi^2}$

21 (a)  $66_{(8)}$

(b)  $\frac{3}{4}$  or equiv

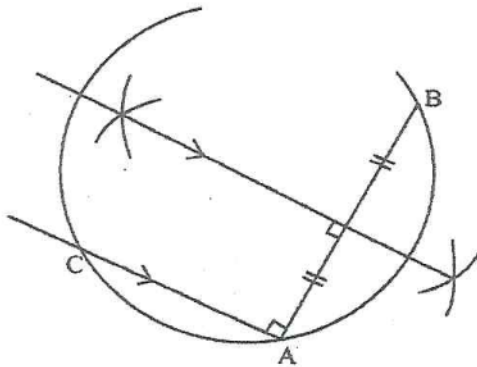
22 (a) Line passing through (0;10) and (5;0)

(b) -3,7 or 3,7

(c)  $-3,4 \leq x \leq 5,4$



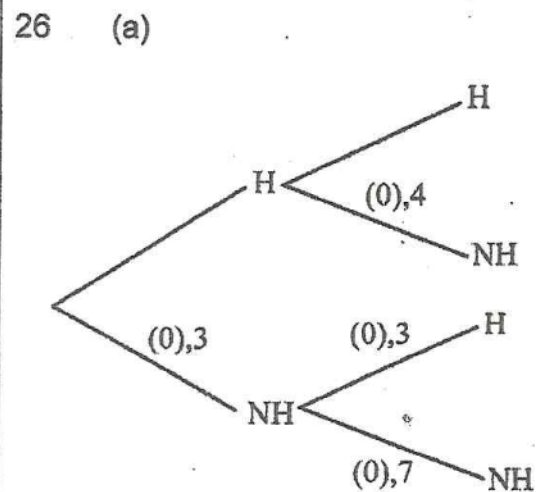
23



- (a) Perpendicular bisector of AB with construction arcs
- (b)  $90^\circ$  correctly constructed C correctly marked
- (c) 3,4

- 24 (a) Triangle with vertices at (8; 3) (5; 3) and (5; 1)
- (b) Enlargement, centre (-2; 0) and factor -2

- 25 (a) -7,5
- (b)(i)  $\frac{h-4}{2}(30 + 80 \text{ or equiv})$
- (ii)  $\frac{80}{2}(21 - h + 25 - h) \text{ or equiv}$
- (c) 9



- (b) (i) 0,42
- (ii) 0,37



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

**MATHEMATICS**

**4008/2**

PAPER 2

**NOVEMBER 2010 SESSION**

2 hours 30 minutes

Additional materials:

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

**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.

**Electronic calculators must not be used.**

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 may be used to evaluate explicit numerical expressions.

**This question paper consists of 12 printed pages.**

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2  
Section A [64 marks]

Answer all questions in this section.

1 (a) Find the value of  $\frac{1}{3} + 1\frac{7}{9} \div 2\frac{2}{3}$ . [3]

(b) During a sale, the price of a camera was reduced from \$160 to \$148,80.

Calculate the percentage decrease in price. [3]

(c) Given that  $f(x) = x^2 - 4x + 3$ , find all the values of  $x$  for which  $f(x) = 0$ . [4]

---

2 (a) Express  $\frac{1}{x-1} + \frac{2}{x+1}$  as a single fraction in its simplest form.

Hence or otherwise, solve the equation

$$\frac{1}{x-1} + \frac{2}{x+1} = \frac{3}{x}. \quad [4]$$

(b) Solve the inequality

$$y - 4 < 3y + 2 \leq 6 - y.$$

Hence list the integral values of  $y$  that satisfy the inequality. [4]

(c) In an Olympiad test, there were 26 questions. Eight points were given for each correct answer and five points were deducted for each wrong answer.

Tamara answered all questions and scored zero. Find the number of questions she had got correct. [4]

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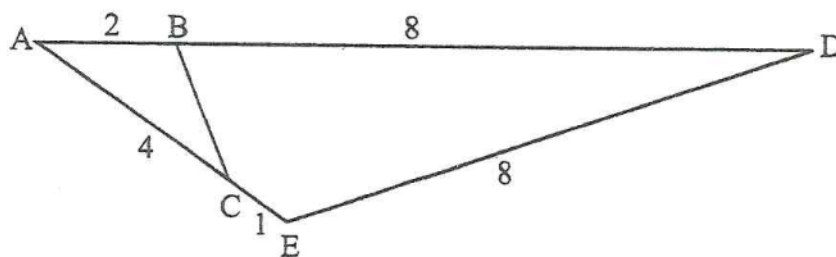
3 (a) It is given that  $s = ut - \frac{1}{2}gt^2$ .

(i) Find the value of  $s$  if  $g = 9,8$ ;  $u = 20$  and  $t = 2$ .

(ii) Make  $g$  the subject of the formula.

[5]

(b)



In the diagram, ADE is a triangle, B is a point on AD such that  $AB = 2$  cm and  $BD = 8$  cm. C is a point on AE such that  $AC = 4$  cm and  $CE = 1$  cm,  $DE = 8$  cm.

(i) Name the triangle that is similar to  $\triangle ABC$ .

(ii) Calculate the length of BC.

[4]

4 (a) It is given that  $P$  varies directly as  $T$  and inversely as  $V$ .

(i) Write down an equation connecting  $P$ ,  $V$ ,  $T$  and a constant  $k$ .

(ii) Given that  $P = 2 \times 10^5$  when  $V = 1 \times 10^{-3}$  and  $T = 300$ , calculate the value of  $k$ .

(iii) Calculate  $P$  if  $V = 0,0025$  and  $T = 300$ .

[5]

(b) Given that  $M = \begin{pmatrix} 3 & -2 \\ -1 & 4 \end{pmatrix}$ ,  $N = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$  and  $R = (3 \ -1)$ ,

find (i)  $MN$

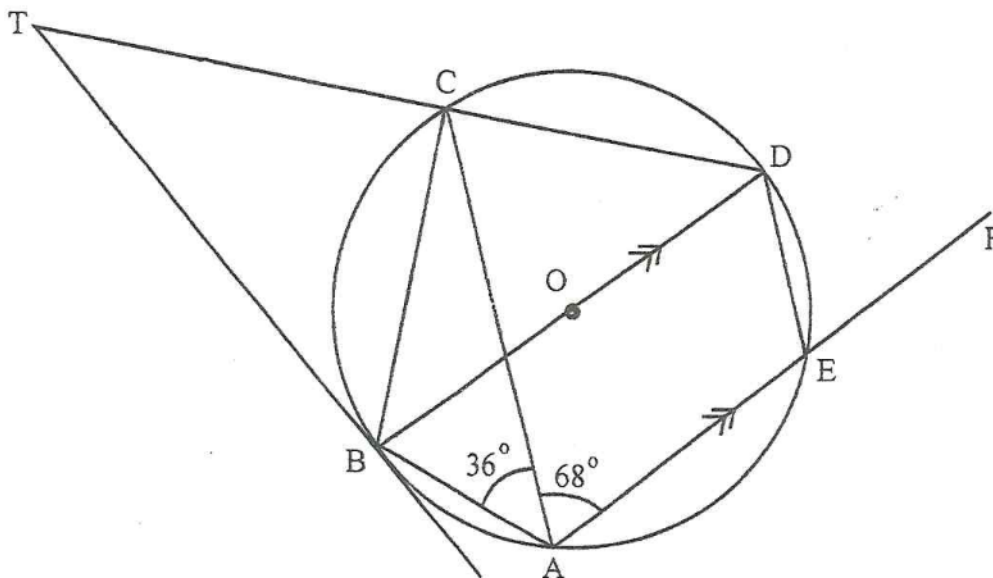
(ii)  $M^{-1}$

(iii)  $RN$ .

[6]

5

(a)



In the diagram, A, B, C, D and E are points on the circumference of a circle centre O. BT is a tangent to the circle and TCD and AEF are straight lines.  $\hat{CAE} = 68^\circ$ ,  $\hat{CAB} = 36^\circ$  and BD is parallel to AE.

Find the size of

- (i)  $\hat{CBO}$ ,
- (ii)  $\hat{BTC}$ ,
- (iii)  $\hat{DEF}$ ,
- (iv)  $\hat{ACB}$ .

[6]

(b) In a recipe for an apple pie, 500 g of apples and 200 g of flour are needed in making an apple pie for 4 people.

- (i) If an apple pie was to be made for 6 people, calculate the quantity of apples needed.
- (ii) If the apple pie was to be made for 3 people, calculate the quantity of flour needed.

[4]

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

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

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

6 A farmer has a plot in the shape of a quadrilateral ABCD, in which  $AB = 110$  m,  $BC = 100$  m,  $CD = 60$  m,  $AD = 70$  m and  $\hat{A}BC = 60^\circ$ .

(a) Using a scale of 1 cm:10 m, construct the quadrilateral ABCD. [5]

(b) Draw the locus of points

(i) 30 m from AB,

(ii) equidistant from A and B,

(iii) inside the quadrilateral which are 60 m from B. [5]

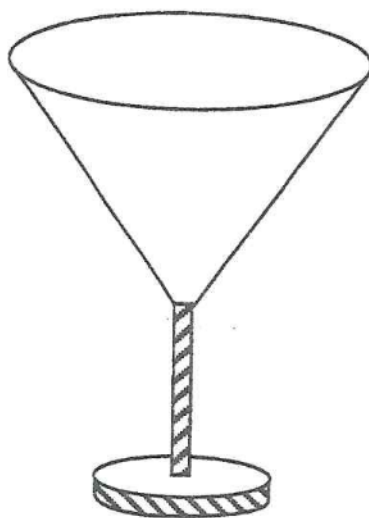
(c) The farmer wishes to dig a well inside the plot such that it is at least 30 m from AB, at least 60 m from B and nearer to A than to B.

Shade the region in which the well must be. [2]

6  
SECTION B [36 marks]

*Answer three questions in this section*

7 (a)



The diagram shows a wine glass in the shape of a cone mounted on a stand. The depth of the cone is equal to its diameter at the top.

- (i) Write down an expression for the volume of the cone in terms of its radius  $r$  and  $\pi$ .
- (ii) If the wine glass can hold 20 ml of wine when full, calculate the radius of the wine glass at the top.
- (iii) Wine is bought in bottles of volume 750 ml. Calculate the number of wine glasses that can be filled from one bottle.

[5]

[Volume of cone =  $\frac{1}{3}$  base area  $\times$  height.  $\pi = \frac{22}{7}$ ]

(b) The base of a triangle is  $x$  cm and its height is  $(x - 7)$  cm.

- (i) Write down an expression for the area of the triangle.
- (ii) If the area of the triangle is  $6 \text{ cm}^2$ , form an equation in  $x$  and show that it reduces to  $x^2 - 7x - 12 = 0$ .

[3]

(c) Solve the equation  $x^2 - 7x - 12 = 0$ , giving your answers correct to 2 decimal places.

[4]

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

- 8 The following is a table of values for the graph of the function

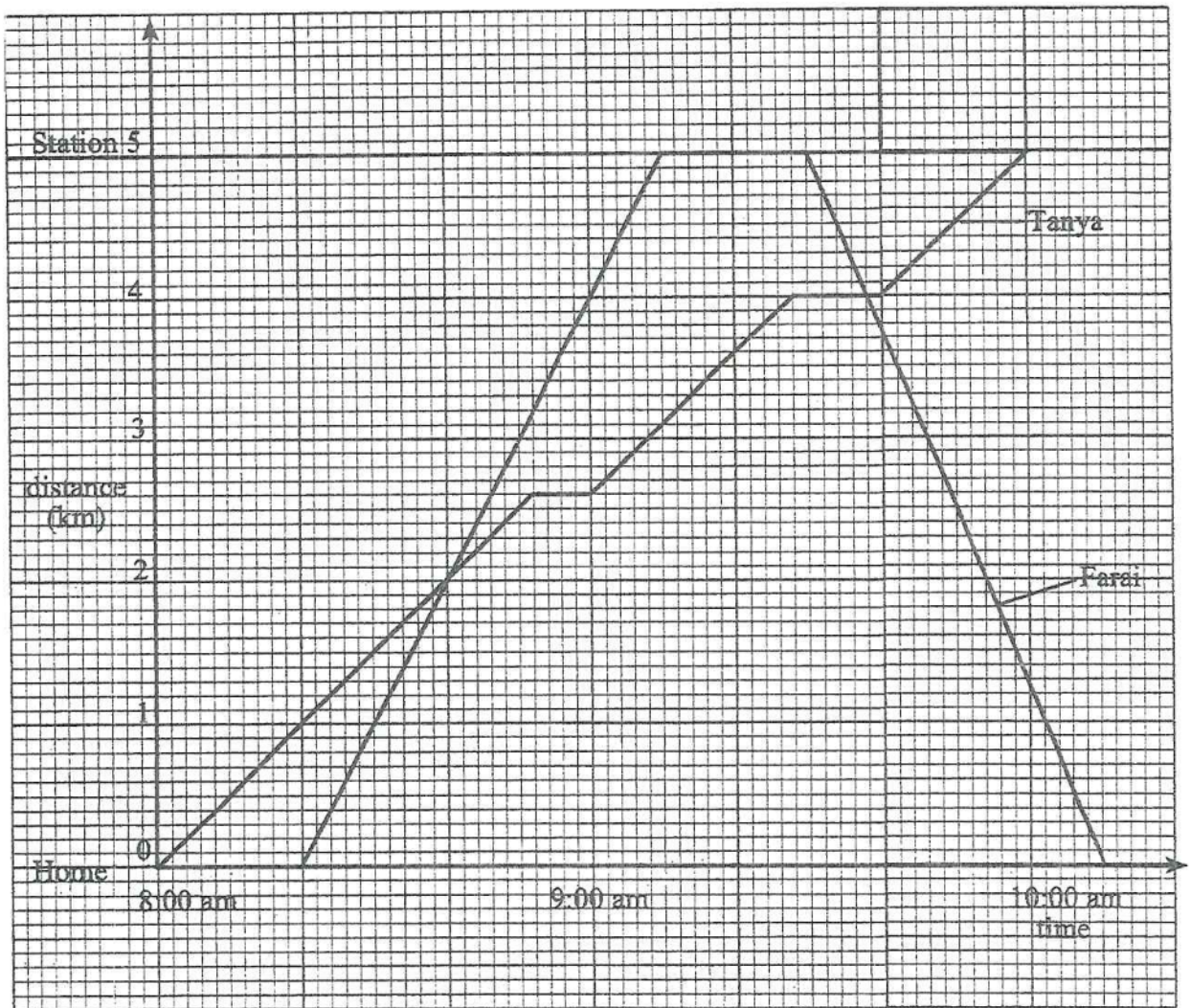
$$y = 7 - 5x - x^2$$

$x$	-7	-6	-5	-4	-3	-2	-1	0	1	2
$y$	-7	1	7	11	13	13	11	7	1	-7

- (a) Using a scale of 2 cm to represent 1 unit on the horizontal axis and 2 cm to represent 5 units on the vertical axis, draw the graph of the function  $y = 7 - 5x - x^2$  for  $-7 \leq x \leq 2$ . [4]
- (b) Use your graph to answer the following questions.
- (i) State the maximum value of the function  $y = 7 - 5x - x^2$ .
- (ii) Solve the equation  $7 - 5x - x^2 = 0$ .
- (iii) Solve the equation  $-5x - x^2 = 2$ .
- (iv) Find the gradient of the curve at the point where  $x = 0$ . [8]



- 9 (a) The diagram shows the distance-time graph of a cyclist, Farai and a pedestrian, Tanya, who travelled from their home to the train station which was 5 km away. After sometime Farai came back home.

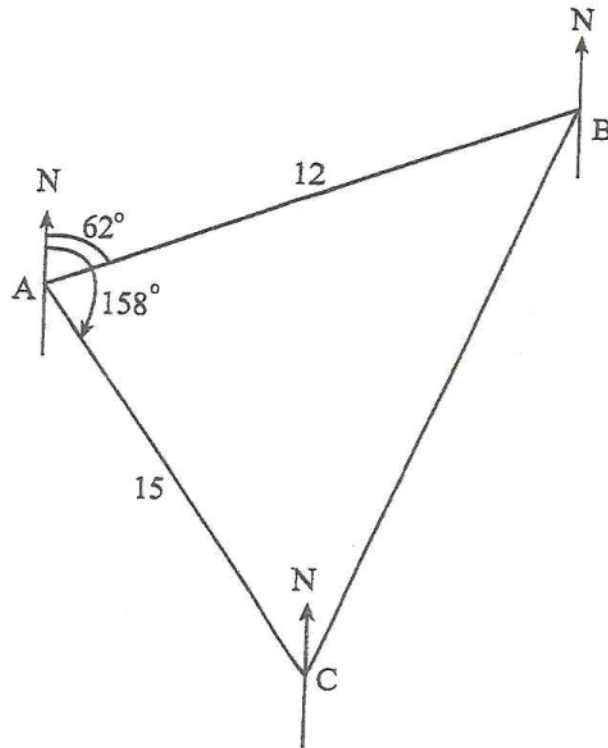


Use the diagram to answer the following questions.

- (i) Find Farai's speed on the outward journey.

[2]

- (ii) State
1. the time when, Tanya arrived at the station,
  2. the time when Farai overtook Tanya on the way to the station,
  3. the distance that Tanya had covered when she was overtaken,
  4. the total time that Farai was resting,
  5. the distance that Tanya had left to cover when Farai met her the second time. [5]
- (iii) Calculate Tanya's average speed for the whole journey. [2]
- (b) Two cards were picked at random from a pack of 52 playing cards with replacement.
- Find the probability that one was a Court card (i.e. J, K or Q) and the other was an Ace (A). [3]
-



In the diagram, A, B and C are three points on level ground. B is 12 km from A on a bearing of  $062^\circ$  and C is 15 km from A on a bearing of  $158^\circ$ .

Calculate (i) the distance from B to C,

[5]

(ii)  $\hat{A}CB$  to the nearest degree,

[3]

(iii) the bearing of C from B.

[4]

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

11 A builder wishes to build houses and flats on 6 000 m<sup>2</sup> plot of land.

- (a) The City Council insists that there must be more than 6 houses and that there must be more flats than houses.

Taking  $x$  to represent the number of houses and  $y$  to represent the number of flats, write down two inequalities, other than  $x > 0$  and  $y > 0$ , which satisfy these conditions.

[2]

- (b) The builder allows 300 m<sup>2</sup> for each flat and 400 m<sup>2</sup> for each house. Write down another inequality which satisfies this condition and show that it reduces to  $4x + 3y \leq 60$ .

[1]

- (c) The point  $(x; y)$  represents  $x$  houses and  $y$  flats. Using a scale of 2 cm to represent 5 units on both axes, draw the  $x$  and  $y$  axes for  $0 \leq x \leq 20$  and  $0 \leq y \leq 20$ .

Construct and show by shading the **unwanted** regions, the region in which  $(x; y)$  must lie.

[5]

- (d) Use your graph to find

- (i) the maximum number of flats that can be built,  
(ii) the maximum number of houses that can be built,  
(iii) the values of  $x$  and  $y$  which give the maximum number of dwelling units.

[4]

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

- 12 The vertices of  $\Delta PQR$  are  $P(3; 1)$ ,  $Q(4; 1)$  and  $R(4; 3)$ .
- (a) Taking 2 cm to represent one unit on both axes, draw the  $x$  and  $y$  axes for  $-3 \leq x \leq 5$  and  $-6 \leq y \leq 5$ . Draw and label  $\Delta PQR$ . [1]
- (b) A certain transformation maps  $\Delta PQR$  onto  $\Delta P_1Q_1R_1$  where  $P_1(-2; -3)$ ,  $Q_1(-1; -3)$  and  $R_1(-1; -1)$ .
- (i) Draw and label  $\Delta P_1Q_1R_1$ .
- (ii) Describe completely the **single** transformation which maps  $\Delta PQR$  onto  $\Delta P_1Q_1R_1$ . [3]
- (c)  $\Delta P_2Q_2R_2$  is the image of  $\Delta PQR$  under a reflection in the line  $y = x$ . Draw and label  $\Delta P_2Q_2R_2$ . [3]
- (d)  $\Delta PQR$  is enlarged with centre  $(0; 1)$  and scale factor  $-\frac{1}{2}$  onto  $\Delta P_3Q_3R_3$ .  
Draw and label  $\Delta P_3Q_3R_3$ . [3]
- (e) A stretch represented by the matrix  $\begin{pmatrix} 1 & 0 \\ 0 & -2 \end{pmatrix}$  maps  $\Delta PQR$  onto  $\Delta P_4Q_4R_4$ .  
Draw and label  $\Delta P_4Q_4R_4$ . [2]

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

**POSSIBLE ANSWERS**

**NOVEMBER 2010**

**MATHEMATICS**

**4008/2,  
4028/2**

1 (a)  $\frac{1}{3} + \frac{16}{9} \times \frac{3}{8}$

$$\frac{1}{3} + \frac{2}{3} \text{ soi}$$

1

(b) figs 16 — figs 1488

$$\frac{\text{their figs } 112}{\text{figs } 16}$$

7 (%)

(c)  $(x-1)(x-3) (= 0)$

$$(x =) 1; 3$$

other methods score full marks.

[10]

ANW: 1 (a) 1 (b) 1 (c) no penalty

2 (a)  $\frac{x+1+2(x-1)}{(x-1)(x+1)}$  or equivalent

$$\frac{3x-1}{(x-1)(x+1)}$$

$$(3x-1)x = 3(x^2-1) \text{ or equivalent}$$

$$(x =) 3$$

(b)  $y-4 < 3y+2$  and  $3y+2 < 6-y$

$$-6 < 2y \text{ or } 4y \leq 4$$

$$-3 < y \leq 1$$

$$(y =) -2; -1; 0; 1$$

(c)  $8x$  or  $26 - x$

$8x - 5(26 - x) = 0$  or equivalent

$8x + 5x = 5 \times 26$  or equivalent

$(x =) 10$

ANW (a) 2 (b) 2 (c) 1

[12]

3 (a) (i)  $40 - 2 \times 9,8$  or equivalent

20,4

(ii)  $\frac{1}{2}gt^2 = ut - s$  or equivalent

$gt^2 = 2(ut - s)$

$g = \frac{2(ut - s)}{t^2}$  or equivalent

(b) (i)  $(\Delta)AED$

(ii)  $(BC =) 4 \times \frac{8}{10}$

3,2(cm)

ANW (a) (i) 1 (ii) 1 (b) 1 (ii) 1

[9]

4 (a) (i)  $PV = kT$  or equivalent

(ii)  $(k =) \frac{2 \times 10^5 \times 1 \times 10^{-3}}{300}$

$\frac{2}{3}$



$$(BC =) 20,16(\text{km})$$

$$(ii) \quad (\sin \hat{A}CB =) \frac{12 \sin 96}{\text{their } 20,2} \text{ or equivalent}$$

$$36,3^{(\circ)}$$

$$(iii) \quad \text{their } 36,3^{\circ} - 22^{\circ} \text{ simplified}$$

$$180^{\circ} + \text{their } 14,3^{\circ}$$

$$194,3^{\circ}$$

[12]

ANW (i) 2 (ii) 1 (iii) 2.

$$11 \quad (a) \quad x > 6$$

$$y > x$$

$$(b) \quad 400x + 300y \leq 6000 \text{ or equivalent}$$

$$(c) \quad \text{line } x = 6 \text{ drawn, at least 3cm long}$$

$$\text{line } y = x \text{ drawn, at least 3cm long}$$

$$\text{line } 4x + 3y = 60 \text{ drawn, at least 3cm long}$$

Region bounded by dotted line  $x = 6$ , dotted line  $y = x$   
and solid line  $4x + 3y = 60$ .

-1 each error.

$$(d)(i) \quad (y \text{ max } =) 12$$

$$(ii) \quad (x \text{ max } =) 8$$

$$(iii) \quad x = 6$$

$$y = 12$$

[12]

- 12 (a)  $\Delta PQR$  correctly drawn  
 $\Delta 1$
- (b)  $\Delta P_1Q_1R_1$  correctly drawn  
Translation and no other transformation stated  
Vector  $\begin{pmatrix} -5 \\ -4 \end{pmatrix}$
- (c)  $\Delta P_2Q_2R_2$  correctly drawn with vertices at  
(1;3), (1;4) and (3;4)
- (d)  $\Delta P_3Q_3R_3$  correctly drawn with vertices at  
 $(-1\frac{1}{2}; 1)$ ,  $(-2; 1)$  and  $(-2; 0)$
- (e)  $\Delta P_4Q_4R_4$  correctly drawn with vertices at  
(3; -2), (4; -2) and (4; -6).

—1 each error.

ANW No diagram 0.

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