Candidate Name	Centre Number	Candidate Number

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

MATHEMATICS 4030/2

PAPER 2

JUNE 2018 SESSION 2 hours 30 minutes

Candidates answer on the question paper.
Additional materials: Geometrical instruments
Mathematical tables/ Electronic calculator

Allow candidates 5 minutes to count pages before the examination.

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

TIME 2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your Name, Centre number and Candidate number in the spaces at the top of this page and your Centre number and Candidate number on the top right corner of every page of this paper.
Check that all the pages are in the booklet and ask the invigilator for a replacement if there are duplicate or missing pages.

Answer *all* questions in Section A and any *three* from Section B.
Write your answers in the spaces provided on the question paper using **black** or **blue** pens.
If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.
Decimal answers which are not exact should be given correct to three significant figures unless stated otherwise. Answers in degrees should be given correct to one decimal place.

INFORMATION FOR CANDIDATES

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

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

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Section A [64 marks]

Answer *all* the questions in this section.

1 **(a)** Simplify $0,8 + 7,2 \div 0,24$.

Answer: *(a)* _____ [2]

(b) By selling an article for \$45, a shopkeeper made a loss of 10 % on the cost price.

Calculate the cost price.

Answer: *(b)* _____ [2]

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1 (c) It is given that $f(k) = 2k^2 - 8$.

Calculate

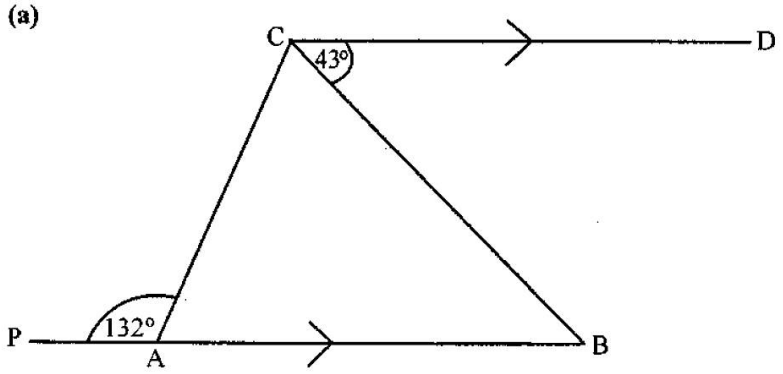
(i) $f(-3)$,

(ii) the values of k for which $f(k) = 0$.

Answer: *(i)* _____ [2]

(ii) _____ or _____ [2]

2 (a)



In the diagram, PAB is a straight line and is parallel to CD.
$P\hat{A}C = 132°$ and $B\hat{C}D = 43°$.

Calculate $A\hat{C}B$.

Answer: *(a)* _____ [2]

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2 **(b)** Factorise completely

(i) $4a^2b - 20ab^2$,

(ii) $3a^2 + 7a - 6$.

Answer: *(i)* _____ [1]

(ii) _____ [2]

(c) It is given that $H = mp + \frac{1}{2}f^2p$.

(i) Calculate the value of H when $m = 2$, $p = 3$ and $f = -4$.

(ii) Make f the subject of the formula.

Answer: *(i)* _____ [2]

(ii) _____ [3]

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3 **(a)** The cost of 3 kg of apples and 7 kg of bananas is \$16.
The cost of 4 kg of apples and 5 kg of bananas is \$17.
Calculate the cost per kg of apples and the cost per kg of bananas.

Answer: *(a)* *apples* \$ _____

bananas \$ _____ [4]

(b) W varies directly as x and inversely as the square root of u.

W = 6, when $x = 2$ and $u = 9$.

(i) Express W in terms of x and u.

(ii) Find W when $x = 8$ and $u = 4$.

Answer: *(i)* _____ [2]

(ii) _____ [1]

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3 (c) Matrix $\mathbf{A} = \begin{pmatrix} 4 & 2 \\ 3 & 1 \end{pmatrix}$ and matrix $\mathbf{B} = \begin{pmatrix} 2 & 0 \\ 1 & -3 \end{pmatrix}$.

Calculate

(i) $\mathbf{A} - 2\mathbf{B}$,

(ii) $\mathbf{AB}$,

(iii) $\mathbf{A}^{-1}$, the inverse of matrix **A**.

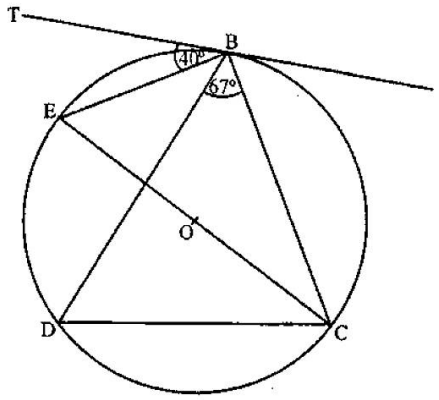
Answer: *(i)* _____ [2]

(ii) _____ [2]

(iii) _____ [2]

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4 (a)



In the diagram, B, C, D and E are points on the circumference of a circle centre O. TB is a tangent to the circle at B, $C\hat{B}D = 67°$ and $E\hat{B}T = 40°$.

Calculate

(i) $E\hat{B}D$,

(ii) $B\hat{C}E$,

(iii) $B\hat{E}C$,

(iv) $B\hat{D}C$.

Answer *(a)* *(i)* _____ [1]

(ii) _____ [1]

(iii) _____ [1]

(iv) _____ [1]

4 **(b)** It is given that the Universal set, ξ is such that $\xi = \{x: -3 \leq x \leq 3, x \text{ is an integer}\}$.

A and **B** are subsets of ξ such that

$\mathbf{A} = \{x: -2 \leq x < 2\}$ and

$\mathbf{B} = \{x: -1 \leq x \leq 3\}$.

(i) List the elements of 1. **A**,

2. $\mathbf{A}' \cup \mathbf{B}'$, where A′ is the complement of set **A**.

(ii) Find $n(\mathbf{A} \cap \mathbf{B})$.

Answer (b) *(i)* 1. _____ [2]

2. _____ [2]

(ii) _____ [1]

4 **(c)** A polygon has n sides. The sum of the interior angles is equal to the sum of the exterior angles.

(i) Find the value of n.

(ii) State the name of the polygon.

Answer: *(i)* _____ [2]

(ii) _____ [1]

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5 **(a)** Peter, John and James share a certain amount of money.

Peter gets $\frac{2}{3}$ of the amount of money,

John gets $\frac{3}{4}$ of the remainder and James gets \$3,00.

Calculate the total amount of money shared.

Answer: *(a)* _____ [4]

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5 **(b)** Three men working at the same rate can dig a trench, 5m long, in 4 hours.

Calculate the time that two men working at the same rate would take to dig a similar trench, 5m long.

Answer: *(b)* _____ [2]

(c) Find the value of n given that

$$111_n = 7_{10}.$$

Answer: *(c)* _____ [3]

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6 **Answer the whole of this question on page 13.**

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

All constructions should be done on a single diagram. Line PQ has been drawn on page 13.

(a) Construct

(i) triangle PQR in which PQ = 7,5 cm, $R\hat{P}Q = 90°$ and $P\hat{Q}R = 30°$, [4]

(ii) the locus of points equidistant from Q and R, [2]

(iii) a circle with diameter QR. [1]

(b) **(i)** Measure and write down the length of the

1. radius of circle in **a(iii)**, [1]

2. side PR in triangle PQR. [1]

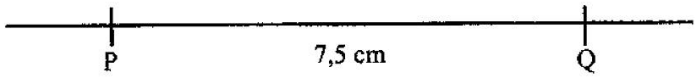
(ii) Mark and label the points X and Y on the circle which are equidistant from Q and R. [2]

(iii) Write down the special name given to quadrilateral PRYQ. [1]

DO NOT WRITE IN THIS SPACE

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6 Answer the whole of question 6 on this page.



Answer *(a)* *(i)* On the diagram [4]
(ii) On the diagram [2]
(iii) On the diagram [1]

(b) *(i)* 1. _____ [1]

2. _____ [1]

(ii) on the diagram [2]

(iii) _____ [1]

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SECTION B [36 marks]

Answer any *three* questions in this section.

Each question carries 12 marks.

7 **(a)** An open cylindrical water container has an internal height of 1,5 m and internal diameter of 0,75 m.

Calculate the

(i) volume of the container, in litres,

(ii) total internal curved surface area of the container.

$$\textbf{\textit{Take}}\ \pi = \frac{22}{7}$$

Answer *(i)* _____ [3]

(ii) _____ [3]

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7 **(b)** **(i)** Show that the equation

$\frac{1}{x} - \frac{1}{x+2} = \frac{1}{3}$ reduces to $x^2 + 2x - 6 = 0$.

[2]

(ii) Solve the equation $x^2 + 2x - 6 = 0$, giving the answers correct to 2 decimal places.

(ii) $x =$ _____ or _____ [4]

8 The following is an incomplete table of values for $y = \frac{1}{2}(15 - x^2)$.

x	−4	−3	−2	−1	0	1	2	3	4
y	[illegible]	m	5,5	7	7,5	7	n	3	−0,5

(a) Calculate the value of

(i) m,

(ii) n.

Answer (i) $m =$ _____ [1]

(ii) $n =$ _____ [1]

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

(b) **(i)** Draw the graph of $y = \frac{1}{2}(15 - x^2)$. [4]

(ii) Draw the line y = 2 to cut the graph at two points. [1]

(c) Use the graph to

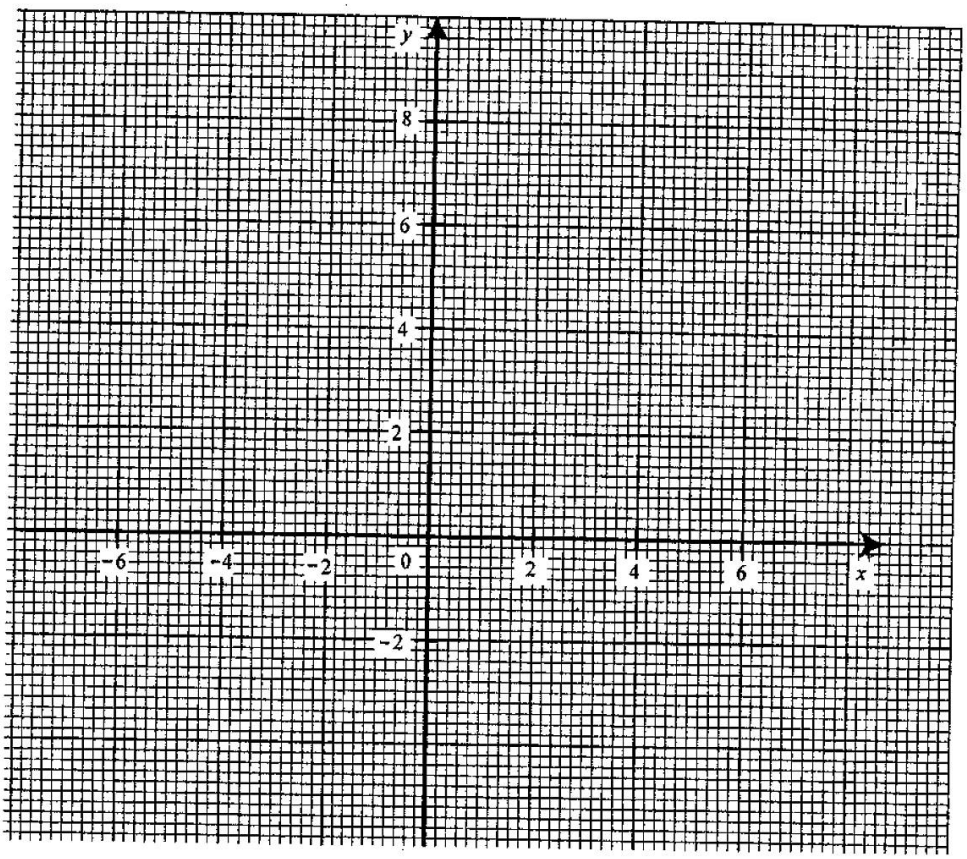
(i) find the equation of the line of symmetry of the curve, [1]

(ii) estimate correct to one decimal place, the solution of the equation $\frac{1}{2}(15 - x^2) = 2$, [2]

(iii) find the gradient of the graph of $y = \frac{1}{2}(15 - x^2)$ at the point where $x = 2$. [2]

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Answer (b) *(i)* On the graph [4]

(ii) On the graph [1]

(c) *(i)* _____ [1]

(ii) $x =$ _____ or _____ [2]

(iii) _____ [2]

9 **(a)** Three points P, X and Y are on level ground and are such that P is 200 m from X on a bearing of 064°. Y is on a bearing of 144° from P and is such that Y is due east of X.

Calculate the

(i) length XY,

(ii) distance P is north of X.

Answer: *(i)* _____ [2]

(ii) _____ [2]

9 (b) Joseph cycles at a speed of 5 metres per second. Calculate the time, in hours, he takes to cycle a distance of 18 km.

Answer (b) _____ hr [2]

(c) A television set has a marked price of $300. A 5 % discount is given for cash payment. Calculate the cash price.

Answer (c) _____ [2]

9 (d) Jane invested a certain amount of money at a rate of 12 % per annum simple interest. After 11 months the money had amounted to \$555,00.

Calculate the amount of money she invested.

Answer (d) _____ [4]

10 Answer the whole of this question on the grid on page 21.

(a) (i) Triangle ABC has vertices at A(1; 1), B(3; 1) and C (1; 3).

Draw and label triangle ABC. [1]

(ii) Triangle $A_1\ B_1\ C_1$ has vertices at $A_1\ (-2; -2)$, $B_1\ (-6; -2)$, and $C_1\ (-2; -6)$.

Draw and label triangle $A_1B_1C_1$. [1]

(iii) Transformation S represents a stretch with invariant line the x – axis and stretch factor 4.

Draw and label triangle $A_2B_2C_2$, the image of triangle ABC under S. [2]

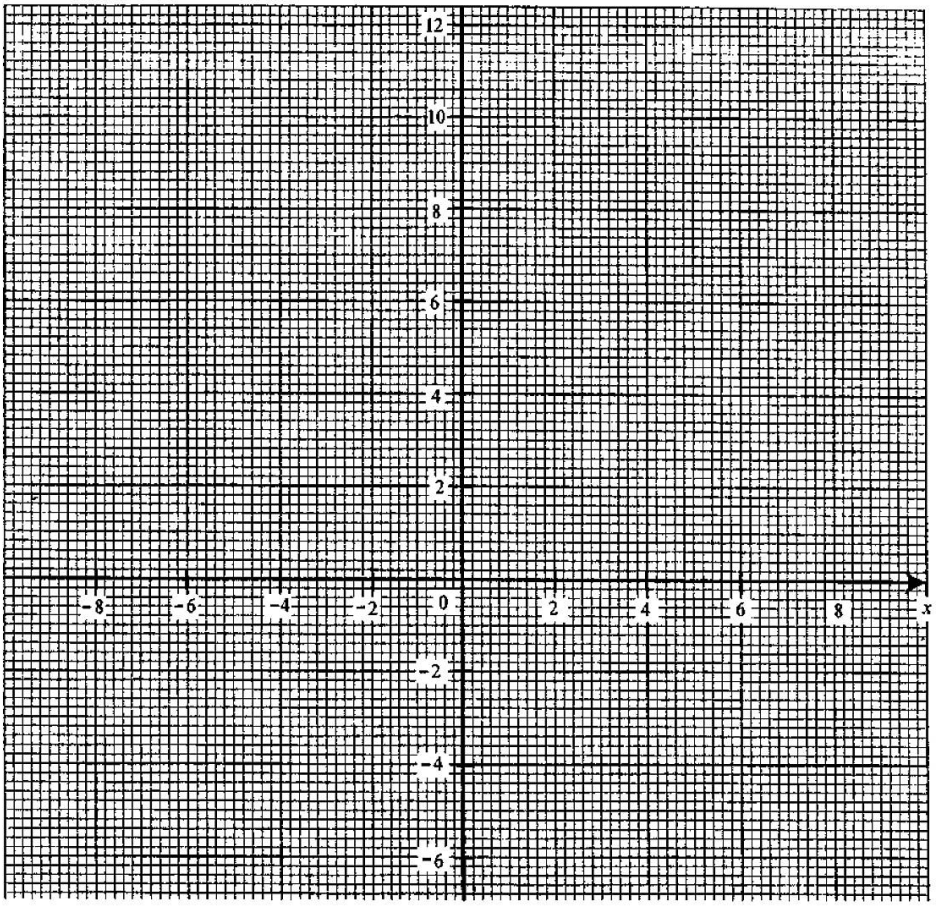
(iv) Transformation R represents a rotation 90° clockwise about the origin.

Draw and label the triangle $A_3B_3C_3$, the image of triangle ABC under R. [3]

(b) (i) Describe **fully** the **single** transformation that maps triangle ABC onto triangle $A_1B_1C_1$. [3]

(ii) Find the matrix which represents the transformation R. [2]

10 Answer the whole of question 10 on this page.



Answer (a) *(i)* On the graph [1]

(ii) On the graph [1]

(iii) On the graph [2]

(iv) On the graph [3]

(b) *(i)* _____

_____

_____ [3]

(ii)

[2]

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11 The table shows the distribution of marks obtained by 30 pupils in a class test.

Mark (x)	$1 < x \leq 5$	$5 < x \leq 10$	$10 < x \leq 15$	$15 < x \leq 20$	$20 < x \leq 25$
Number of pupil (f)	4	8	5	6	7

(a) **(i)** State the modal class.

Answer *(a)* *(i)* _____ [1]

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11 (a) (ii) The table shows entries used to calculate the mean of data using an assumed mean of 12,5.

Class centre (x)	Number of Pupils (f)	Deviation ($x - 12,5$)	$f(x - 12,5)$
3	4	−9,5	−38
7,5	8	−5	p
12,5	5	0	0
q	6	+5	+30
22,5	7	r	+70
	Total = 30		Total = S

Calculate the values of p, q, r and S.

(iii) Hence or otherwise calculate, an estimate of the mean of the distribution.

Answer *(a)* *(ii)* p = _____

q = _____

r = _____

S = _____ [4]

(iii) mean _____ [2]

[Turn over

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11 (b) Two pupils are chosen at random from the class of 30 pupils. Calculate the probability that

(i) one has a mark in the range $10 < x \leq 15$ and the other a mark of at most 10,

(ii) both pupils got marks that are more that 20.

Answer (b) (i) _____ [3]

(ii) _____ [2]

12 Answer the whole of this question on the grid on **page 26**.

(a) Draw the graphs of these inequalities by shading the **unwanted** region.

(i) $2x + y \leq 40$, [2]

(ii) $x + 2y \leq 48$, [2]

(iii) $x \geq 0$ [2]

(iv) $y > 5$. [2]

(b) Mark R the region defined by the four inequalities in **(a)**. [1]

(c) For integral values of x and y,

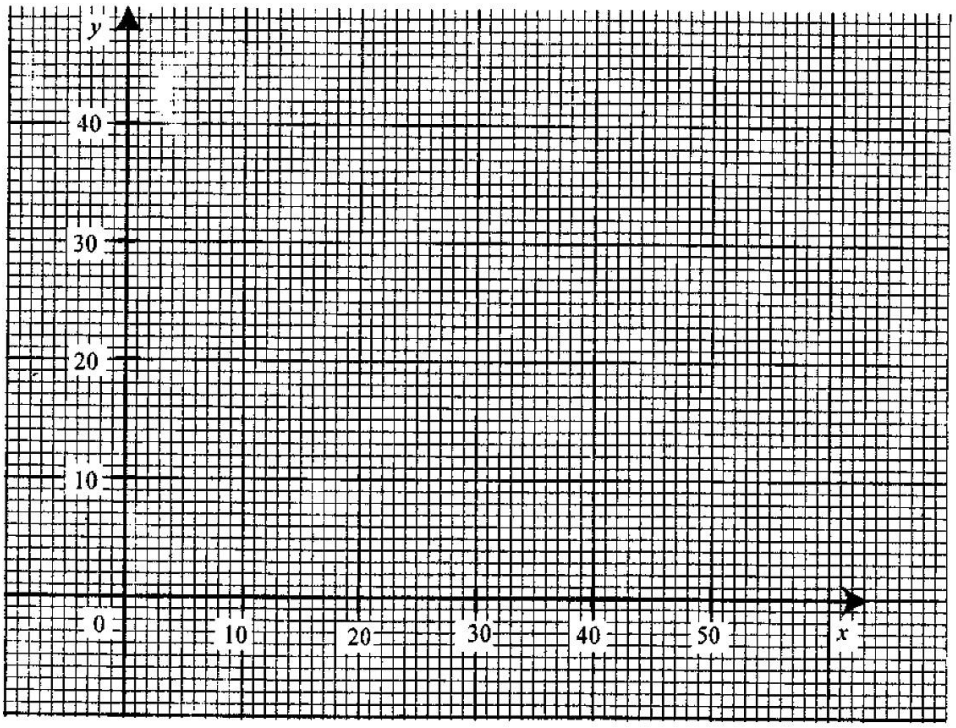
(i) find the coordinates of a point that gives a maximum value of $x + y$, [2]

(ii) state the maximum value of $x + y$. [1]

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12 (a) **Answer the whole of question 12 on this page.**



Answer (a) (i) On the graph [2]

(ii) On the graph [2]

(iii) On the graph [2]

(iv) On the graph [2]

(b) On the graph [1]

(c) (i) _____ [2]

(ii) _____ [1]