



ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Ordinary Level

MATHEMATICS
PAPER 1

4004/1

NOVEMBER 2019 SESSION

2 hours 30 minutes

Candidates answer on the question paper

Additional materials:
Mathematical Instruments

Allow candidates 5 minutes to count pages before the examination.

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

Time 2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your Name, Centre number and Candidate number in the spaces at the top of this page.

Write your centre and candidate number in the box 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.

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 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.

This question paper consists of 27 printed pages and 1 blank page.

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

1. Express

(a) 2460 cm^3 in litres,

Answer(a) [1]

(b) 1 hectare as a percentage of $0,25 \text{ km}^2$.

Answer(b) [2]

2. (a) Evaluate $(-8)^{\frac{2}{3}}$.

Answer(a) [1]



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- (b) Simplify $\sqrt{147} + \sqrt{108}$. Leave the answer in the form $m\sqrt{n}$ where m and n are integers.

Answer(b) [2]

3. Solve the simultaneous equations:

$$3x - y = 2$$

$$5x - 2y = 0$$

Answer [3]



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4. It is given that $q = -6$, $r = -1$ and $t = 2$.
Evaluate

(a) $\frac{qr}{t}$,

Answer(a) [1]

(b) $qt - r$,

Answer(b) [1]

(c) $(q + r)^t$.

Answer(c) [1]



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5. (a) State the order of rotational symmetry of a rhombus.

Answer(a) [1]

.....

- (b) Four of the interior angles of a 12 sided polygon are each x° .
The other angles are $2x^\circ$ each.
Calculate the value of x .

Answer(b) [2]



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6. (a) Calculate $\frac{2}{3}$ of 54 km.

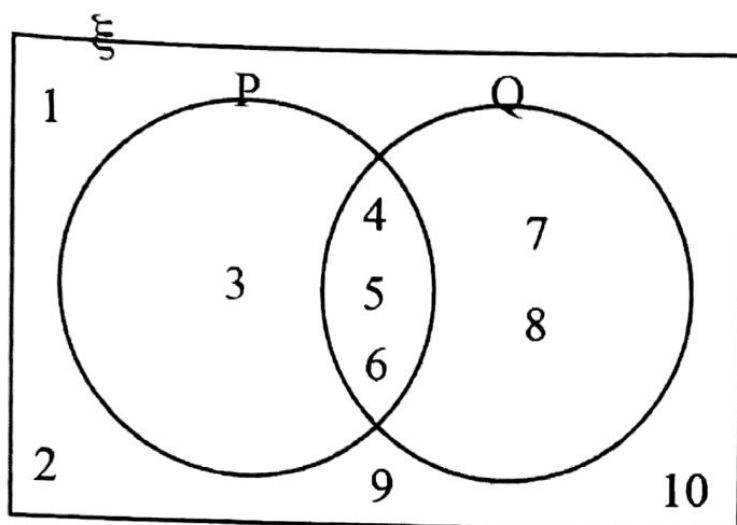
Answer(a) [1]

- (b) Kin, Munashe and Chipu shared sweets in the ratio 5 : 3 : 7.
Calculate the total number of sweets shared if Chipu got 35 sweets.

Answer(b) [2]



7. (a)



The Venn diagram consists of the universal set ξ , and subsets P and Q with their respective elements.

(i) List the element of $P' \cap Q$.

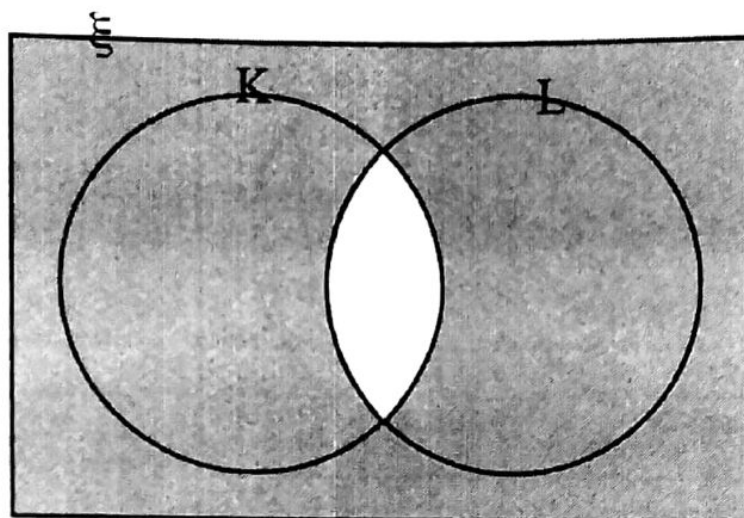
Answer (a)(i) [1]

(ii) Find $n(P \cup Q)$.

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



(b)



The Venn diagram consists of the universal ξ , and subset **K** and **L**.
Describe the shaded region in set notation.

Answer(b) [1]

8. Factorise completely

(a) $x^2 - \frac{1}{4}$

Answer(a) [1]

(b) $x(x - 2) - 2xy + 4y$.

Answer(b) [2]



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9. (a) Express 2214_5 in powers of 5.

Answer(a) [1]

- (b) Find n given that $101_n = 37_{10}$.

Answer(b) [2]

10. (a) P is a 2×3 matrix, Q is a 3×1 matrix and $PQ = H$.
State the order of matrix H .

Answer(a) [1]

(b) Matrix $A = \begin{pmatrix} 2 & 1 \\ 3 & -3 \end{pmatrix}$

Find A^2 .

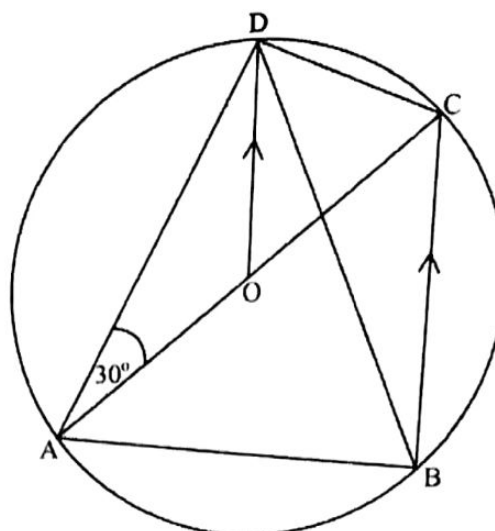
Answer(b) [2]



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11.



In the diagram, points **A**, **B**, **C** and **D** are on the circumference of a circle centre **O**. **AOC** is a straight line, **OD** is parallel to **BC** and $\angle DAO = 30^\circ$. Calculate

(a) $\angle ODB$,

Answer(a) [1]

(b) $\angle ABD$,

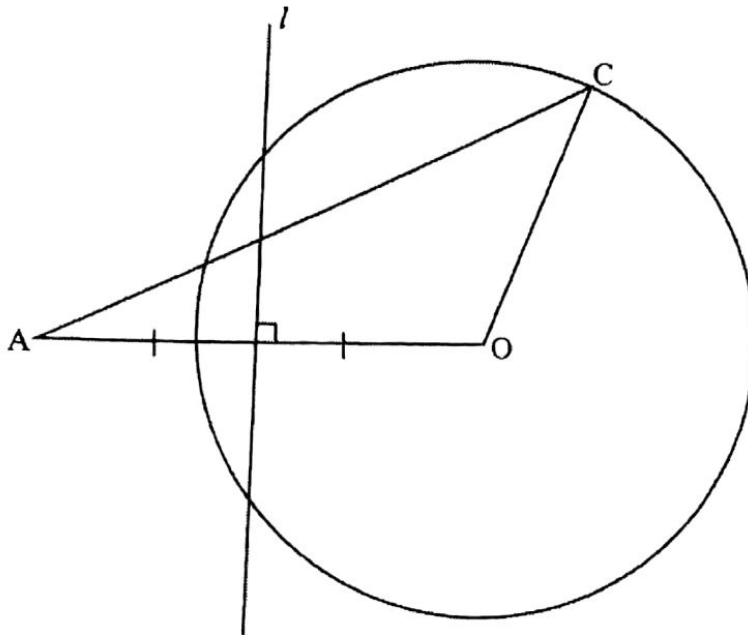
Answer(b) [1]

(c) $\angle ACB$.

Answer(c) [1]



12.



The diagram shows triangle AOC and a circle with centre O , $OC = 4\text{cm}$ and line, l , is the perpendicular bisector of AO .

(a) Describe fully the locus represented on the diagram by the

(i) circle,

Answer (a)(i)
 [1]

(ii) line l .

Answer (a)(ii)
 [1]

(b) P is both inside the circle and inside triangle AOC but nearer to A than O .
 Show by shading in the diagram the region in which P must lie.

Answer (b) On the diagram [1]



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13. (a) Convert US \$5,40 to South African Rands.
Use an exchange rate of US \$1 to 12 Rands,

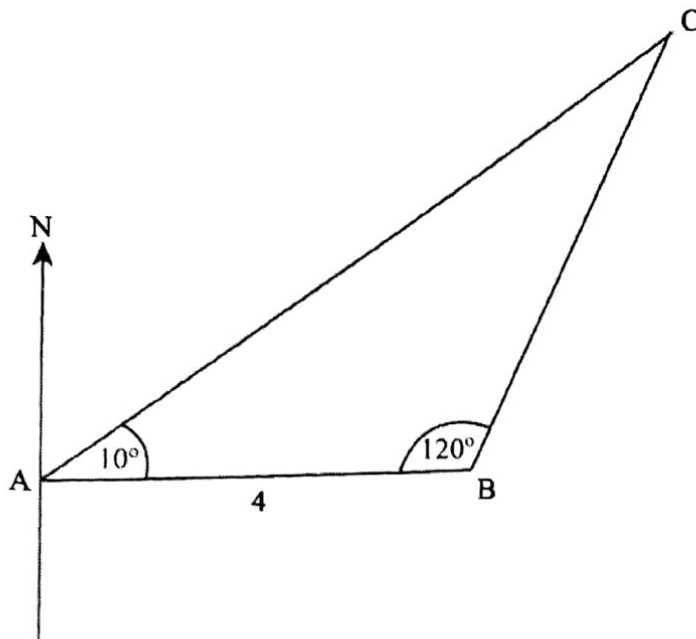
Answer(a) [1]

- (b) A farmer borrowed \$2000 at a simple interest rate of 20% per annum.
Calculate the total amount payable after 2 years.

Answer(b) [3]



14.



In the diagram A, B and C are points on level ground.
Point B is 4km due east of A. $\angle BAC = 10^\circ$ and $\angle ABC = 120^\circ$

- (a) State the bearing of B from C.

Answer(a) [1]

- (b) Using as much of the information given below as is necessary to calculate BC.

$$[\sin 10^\circ = 0,2 \quad \cos 10^\circ = 1,0 \quad \tan 10^\circ = 0,2]$$

$$[\sin 50^\circ = 0,8 \quad \cos 50^\circ = 0,6 \quad \tan 50^\circ = 1,2]$$

Answer(b) [3]

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15. (a) Evaluate $\log_3 \frac{1}{243}$

Answer(a) [2]

(b) Solve the equation $\text{Log}_3 81 = (2x - 1)$.

Answer(b) [2]

16.

h	1	2	3	...	q
V	3	24	81	...	648

The table shows some corresponding values of h and V such that $V \propto h^3$.
Find the

(a) equation connecting V and h ,

Answer(a) [2]



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(b) value of q .

Answer(b) [2]

17. Point A (4; 2) is mapped onto A_1 , by a transformation represented by matrix $\begin{pmatrix} 1 & 0 \\ -3 & 1 \end{pmatrix}$.

(a) Calculate the coordinates of point A_1 .

Answer(a) [1]

(b) Describe fully the transformation represented by the matrix

$$\begin{pmatrix} 1 & 0 \\ -3 & 1 \end{pmatrix}$$

Answer(b)

[3]

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18. (a) Solve the inequality
 $3x - 6 \leq 2x - 3 < 4x + 1$.

Answer(a) [3]

- (b) Illustrate the solution in (a) on a number line.

Answer(b) [1]



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19.

It is given that $g = \sqrt{\frac{h-4}{5+h}}$.

(a) Find g when $h = 20$.

Answer(a) [2]

(b) Express h in terms of g .

Answer(b) [3]

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20. It is given that $\mathbf{OA} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and $\mathbf{OB} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$
are position vectors of **A** and **B** relative to an origin **O**.

(a) Express **AB** in column form.

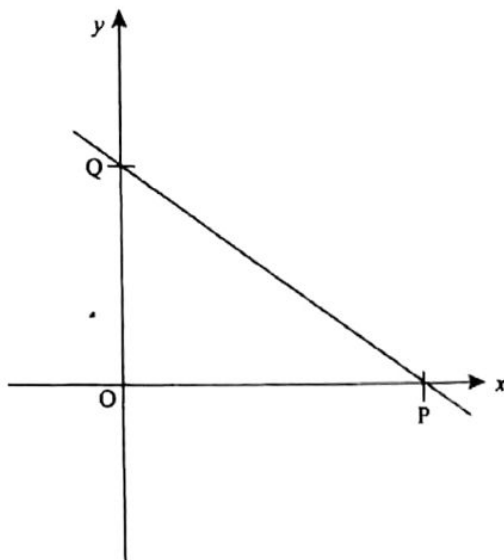
Answer(a) [2]

- (b) **P** is a point such that $\mathbf{BP} = \mathbf{OA} + 2\mathbf{OB}$.
Find the coordinates of point **P**.

Answer(b) [3]



21.



The diagram shows the straight line $3x + 4y = 12$ which cuts the x -axis at P and y -axis at Q.

(a) State the coordinates of point

(i) P,

Answer (a)(i) [1]

(ii) Q.

Answer (a)(ii) [1]

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(b) Calculate the

(i) gradient of line $3x + 4y = 12$.

Answer (b)(i) [1]

(ii) length of line PQ.

Answer (b)(ii) [2]

22.

Height (h cm)	$20 < h \leq 30$	$30 < h \leq 40$	$40 < h \leq 50$	$50 < h \leq 60$	$60 < h \leq 70$
Number of plants	4	6	10	2	8

The table shows the heights of 30 plants in a school garden.

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

Answer (a(i)) [1]



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(ii) Estimate the mean height of the plants.

Answer (a)(ii) [3]

(b) A plant is chosen at random from the garden.

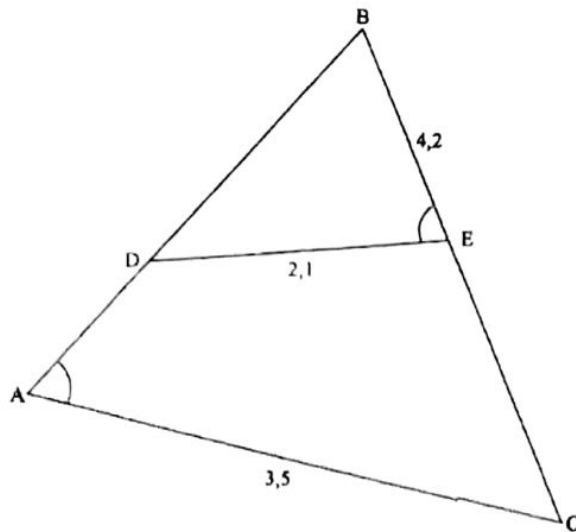
Find the probability that its height is more than 40cm but less or equal to 60cm.

Answer(b) [1]



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23.



The diagram shows triangle ABC in which point D and E are on BA and BC respectively $AC = 3,5\text{cm}$, $BE = 4,2\text{cm}$, $DE = 2,1\text{cm}$ and $\hat{BAC} = \hat{BED}$.

(a) Name the triangle which is similar to triangle ABC .

Answer(a) [1]

(b) Calculate

i) AB ,

Answer (b)(i) [2]



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- (ii) the area of triangle ABC, given that the area of triangle **BDE** is $22,5\text{cm}^2$.

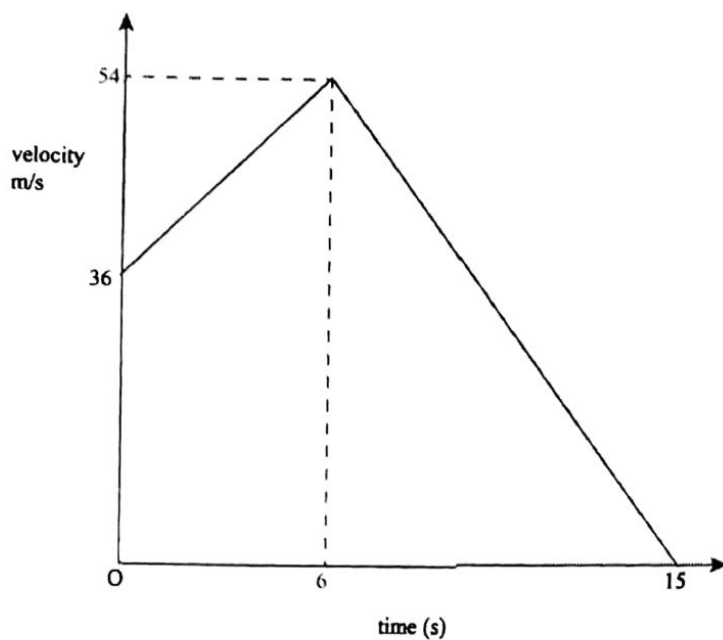
Answer (b)(ii) [3]



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24.



The diagram shows the velocity-time graph of a moving object which accelerates uniformly from 36 m/s to a velocity of 54 m/s in 6 seconds. It then retards uniformly to rest in a further 9 seconds.

Calculate the

- (a) acceleration during the first 6 seconds,

Answer(a) [2]

- (b) velocity after 10 seconds,

Answer(b) [2]



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(c) average speed of the object for the 15 seconds.

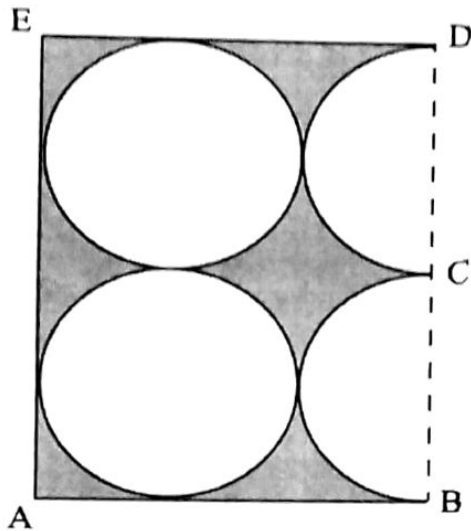
Answer(c) [3]



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[In this question take π to be $\frac{22}{7}$]

Two identical circular and 2 semi-circular discs of radii 3,5 cm were cut off from a rectangular sheet of metal as shown in the diagram.

AE = 14cm and **ED** = 10,5cm.

Calculate the

- (a) circumference of one of the circular discs,

Answer(a) [2]



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(b) perimeter of ABCDE,

Answer(b) [2]

(c) area of the shaded part.

Answer(c) [3]



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