

EXAMINATIONS COUNCIL OF ESWATINI
Junior Certificate Examination

CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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MATHEMATICS

309/02

Paper 2

October/November 2023

2 hours 30 minutes

Candidate answer on the Question Paper.

Additional materials: Geometrical Instruments
Mathematical Tables

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on the spaces provided.

Write in dark blue or black pen in the spaces provided on the Question Paper.

You may use a pencil for any diagrams or graphs.

Do **not** use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

All working should be clearly shown below each question.

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

Calculators should **not** be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures.

Give answers in degrees to one decimal place.

3-figure tables may be used in any question where necessary.

The total of the marks for this paper is 100.

For Examiner's Use	
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10	

1 (a) Work out.

(i) $-2(-9 \ 1 \ 15)$

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

(ii) $\begin{pmatrix} -1 & 5 \\ 0 & 4 \end{pmatrix} - \begin{pmatrix} -3 & 2 \\ 2 & -1 \end{pmatrix}$

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

(b) Given the matrix $\begin{pmatrix} -1 & 2 \\ 3 & -2 \\ 0 & 3 \end{pmatrix}$,

State the entry that is in row 2, column 1.

Answer (b)[1]

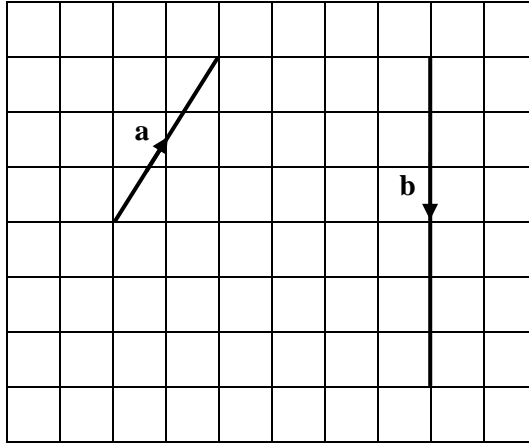
(c) The point T has coordinates $(5, 7)$.

The vector $\overrightarrow{ST} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$.

Find the coordinates of S .

Answer (c)[2]

- (d) The grid shows vectors **a** and **b**.



Given that vector $\mathbf{c} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$,

Use the grid to show that $\mathbf{a} + \mathbf{b} = \mathbf{c}$.

[3]

- 2 (a) You are given the distribution of numbers.

19 7 21 17 13 5 11 27

Use the distribution to find

- (i) a cube number,

Answer (a)(i) [1]

- (ii) the range,

Answer (a)(ii) [1]

- (iii) a prime number that is a factor of 34,

Answer (a)(iii) [1]

- (iv) the highest common factor of 21 and 35.

Answer (a)(iv) [1]

- (b) You are given the sequence

17, 13, 9, 5, 1,

- (i) Find the next three terms of the sequence.

Answer (b)(i),, [2]

- (ii) State the term-to-term rule of the sequence.

Answer (b)(ii) [1]

- 3 A staff bus took 3 trips transporting workers from Mbabane to Matsapha on a particular day. The distance between Mbabane and Matsapha is 36 km.

The timetable shows the times of the 3 trips.

<i>Trips</i>		<i>Trip 1</i>	<i>Trip 2</i>	<i>Trip 3</i>
Mbabane	Departure	0715	1120	
Matsapha	Arrival	0750	1150	1730

- (a) Find the duration of trip 1.

Answer (a) minutes [1]

- (b) A worker arrives in Mbabane at 0740 hours.
How long will the worker wait to get the bus for the next trip to Matsapha?
Write your answer in **hours** and **minutes**.

Answer (b) hours minutes [2]

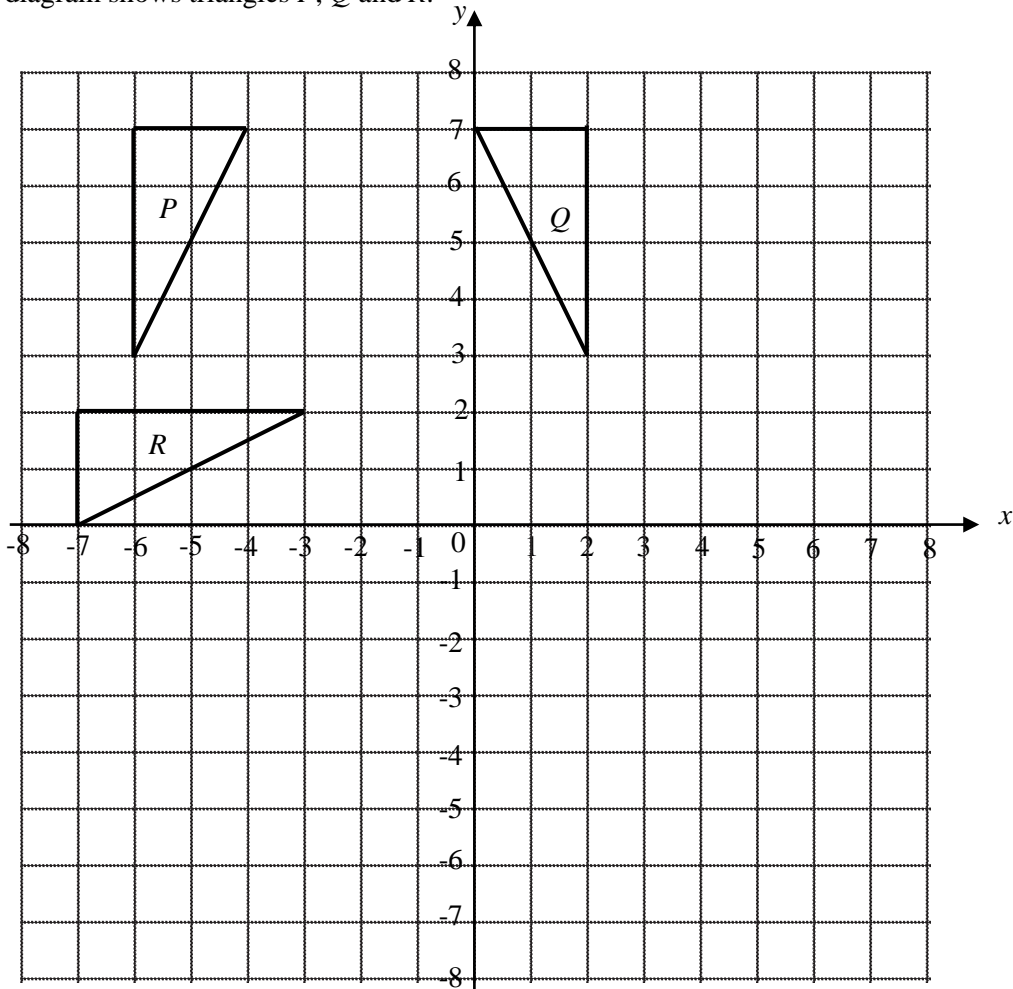
- (c) Calculate the average speed of the bus in Trip 2.

Answer (c) km/h [2]

- (d) The average speed of the bus in Trip 3 is 90 km/h.
Write the departure time for Trip 3 in the table.
Show all your working.

[4]

4 The diagram shows triangles P , Q and R .



(a) Describe fully the single transformation that maps

(i) P onto Q ,

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

(ii) Q onto R .

Answer (a)(ii)
..... [3]

(b) On the grid,

(i) translate triangle P using vector $\begin{pmatrix} 0 \\ -9 \end{pmatrix}$. Label the image T . [2]

(ii) enlarge triangle P using scale factor -1 about the origin. Label the image E . [2]

- 5 (a) Given that $R = 3p + q^2$,
Find the value of R when $p = 2$ and $q = -3$.

Answer (a) [2]

- (b) Factorise completely.
 $6ab + 33bc$

Answer (b) [2]

- (c) Solve the equations.
(i) $8x - 16 = 3x + 4$

Answer (c)(i)..... [2]

(ii) $\frac{3}{b} - \frac{2}{3} = \frac{1}{3b}$

Answer (c)(ii) [3]

(d) Simplify.

$$\frac{x+3}{3} - \frac{x-2}{5}$$

Answer (d) [3]

- (e) John, Peter, and Jacob are siblings.
Peter is twice as old as John.
Jacob is three years younger than Peter.

(i) John is x years old.

Find an expression in terms of x for Jacob's age.

Answer (e)(i) [2]

(ii) The sum of their ages is 97 years.

Form an equation and solve it to find John's age.

Answer (e)(ii)years [3]

6 (a) Express 15 cm as a percentage of 0.5 m.

Answer (a) [2]

(b) Maxwell borrowed E5 000 from a bank at 5% simple interest per annum.

(i) Calculate how much he will pay after 3 years.

Answer (b)(i) E..... [3]

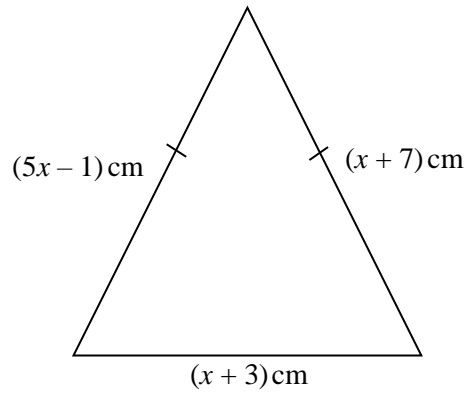
(ii) Maxwell decided to change E3 100 to US dollars.

The exchange rate was US\$1 = E15.50.

Calculate how much he got in dollars.

Answer (b)(ii) US\$..... [2]

- 7 (a) The diagram shows an isosceles triangle.



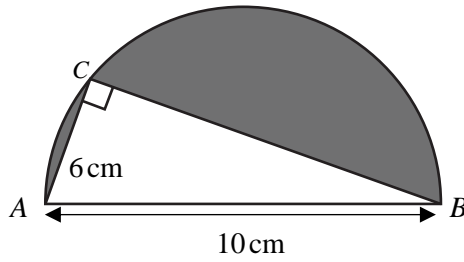
- (i) Find the value of x .

Answer (a)(i) $x = \dots\dots\dots \text{ cm}$ [3]

- (ii) Calculate the perimeter of the triangle.

Answer (a)(ii) $\dots\dots\dots \text{ cm}$ [3]

- (b) The diagram shows triangle ABC in a semi-circle.
 AB is the diameter of the semicircle.
 $AB = 10\text{ cm}$, $AC = 6\text{ cm}$ and angle $ACB = 90^\circ$.



NOT TO SCALE

- (i) Show that $BC = 8\text{ cm}$.

[2]

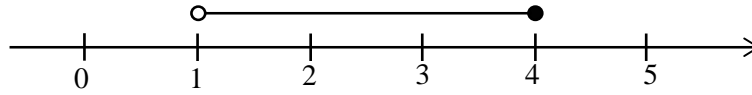
- (ii) Calculate angle ABC .

Answer (b)(ii)° [3]

- (iii) Calculate the area of the shaded region.
 Take π as 3.14 for this question.

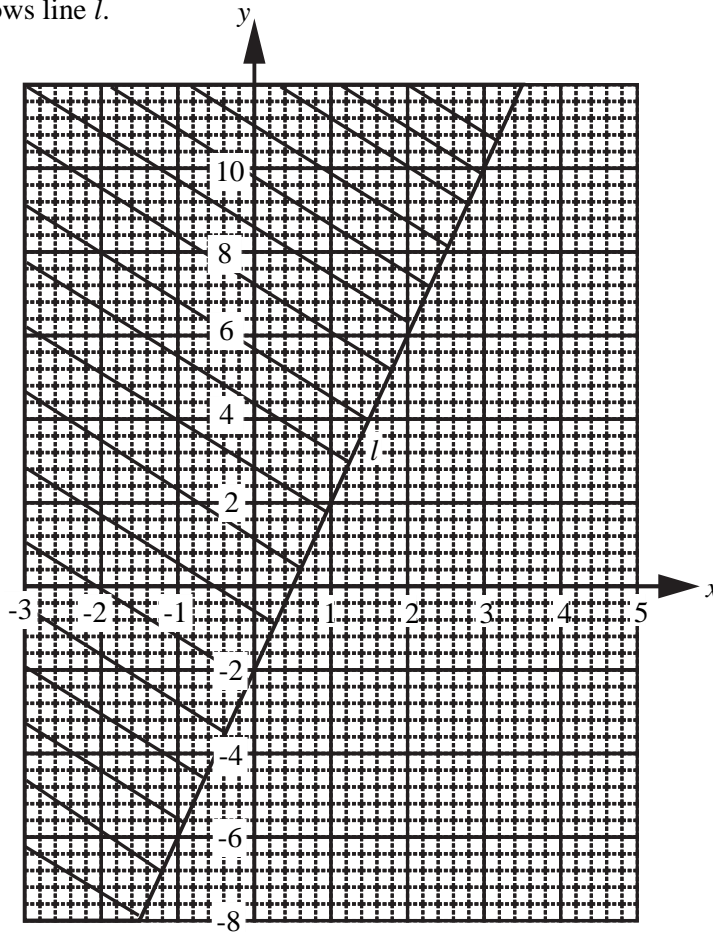
Answer (b)(iii) cm^2 [4]

- 8 (a) Write down the inequality represented by the number line.



Answer (a) [2]

- (b) The diagram shows line l .



- (i) State the y -intercept of line l .

Answer (b)(i) [1]

- (ii) Find the equation of line l .

Answer (b)(ii) [2]

- (iii) Write down the inequality represented by the shaded region.

Answer (b)(iii) [2]

- 9 The density of a small open box is 2 g/cm^3 .
The mass of the box is 700 g.
The base of the box measures 5 cm by 7 cm.

(a) Calculate the volume of the box.

Answer (a) cm^3 [2]

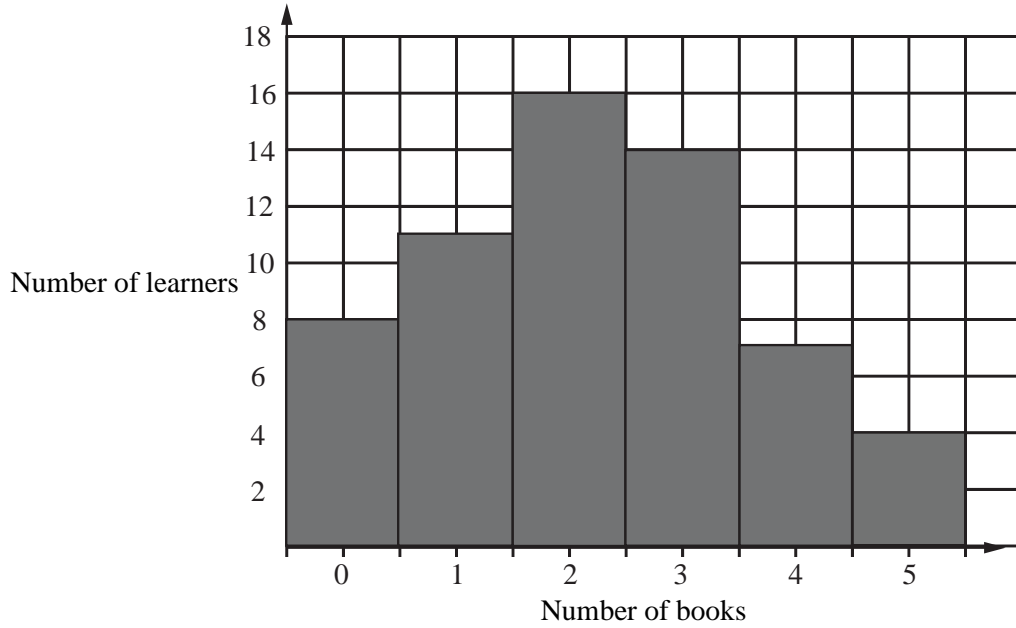
(b) Find the height of the box.

Answer (b) cm [2]

(c) Draw a sketch of the net of the **open box**.

[2]

10 The bar chart shows the number of books lost by a group of learners in one school.



(a) Use the bar chart to complete the frequency table.

Number of books	0	1	2	3	4	5
Number of learners		11				

[3]

(b) Find the total number of learners.

Answer (b) [2]

(c) State the mode.

Answer (c) [1]

(d) Calculate the mean.

Answer (d) [3]

- (e) A pie chart is to be drawn from the given data.
Calculate the sector angle for the number of learners who lost 5 books.

Answer (e) [2]

- (f) A learner is chosen at random.
Find the probability that the learner lost more than 3 books.

Answer (f) [2]

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