

EXAMINATIONS COUNCIL OF ESWATINI  
Junior Certificate Examination

CANDIDATE  
NAME

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CENTRE  
NUMBER

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CANDIDATE  
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**MATHEMATICS**

**309/02**

Paper 2

**October/November 2021**

**2 hours 30 minutes**

Candidates 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**

|              |  |
|--------------|--|
| <b>1</b>     |  |
| <b>2</b>     |  |
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| <b>9</b>     |  |
| <b>10</b>    |  |
| <b>Total</b> |  |

This document consists of **15** printed pages and **1** blank pages.

1 (a) Round off the following numbers to the degree of accuracy shown in brackets.

(i) 0.9998 (nearest tenth)

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

(ii) 0.073 (to one decimal place)

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

(iii) 27 358.19 (3 significant figures)

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

(b) The population of town G was found to be 25 000 (correct to the nearest thousand).  
Find the minimum and maximum value of the population of the town.

Answer (b) Minimum.....

Maximum..... [3]

(c) Work out the following, **leaving your answers in standard form**

(i)  $(2 \times 10^6) \div (4 \times 10^3)$ ,

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

(ii)  $1.73 \times 10^5 - 4.2 \times 10^3$ .

*Answer (c)(ii).....[2]*

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- 2 (a) On a certain day, Musa took 45 minutes to walk 3 km to school.  
He left home at 0655 hours.

- (i) Write down the time Musa arrived at school.

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

- (ii) Calculate Musa's walking average speed.

*Answer (a)(ii).....km/h [2]*

- (b) On another day, Musa cycled the 3 km to school at an average speed of 20 km/h.  
Calculate the time in minutes, taken to reach school.

*Answer (b).....minutes [3]*

(c) The time in London is 2 hours behind the time of Durban.

(i) If the time in Durban is 1120 hours, find the time in London.

*Answer (c)(i)..... [1]*

(ii) An aircraft leaves Durban at 1920 hours on Friday and it arrives in London on Saturday at 0605 hours.

Find the time taken by the aircraft to reach London.

*Answer (c)(ii).....hours .....minutes [3]*

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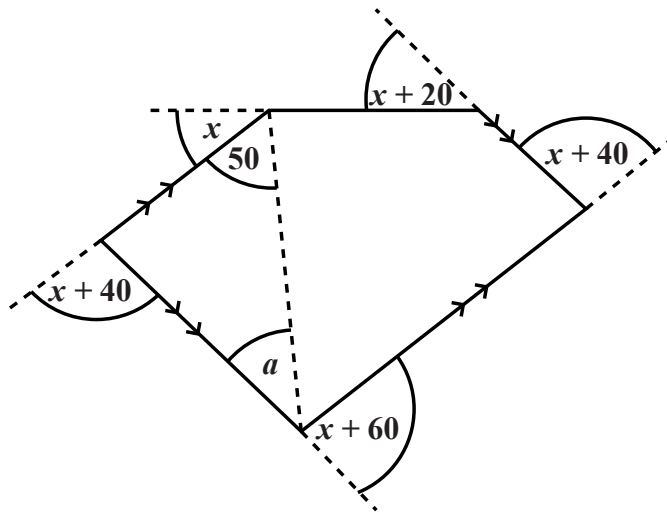
3 (a) Write down the mathematical name for a six sided polygon.

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

(b) Calculate the sum of interior angles in a 6 sided polygon.

*Answer (b).....[2]*

- (c) Fig. 3.1 shows a five sided polygon.  
Opposite sides are parallel and the sizes of exterior angles are given.



NOT TO SCALE

Fig. 3.1

- (i) Show that the expression of the sum of the exterior angles of the polygon is  $5x + 160$ .

[2]

- (ii) Form an equation and solve it to find the value of  $x$ .

Answer (c)(ii)  $x = \dots\dots\dots$  [3]

- (iii) Hence find the value of  $a$ .

Answer (c)(iii)  $a = \dots\dots\dots$  [2]

- 4 (a) Factorise completely.

$$27x^3 - 9x^2$$

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

- (b) Solve the following equations.

(i)  $3x - 4 = 8 - x$

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

(ii)  $\frac{4m - 3}{7} \leq 3$

Answer (b)(ii)  $m =$ .....[3]

- (c) Simplify the expression.

$$3(4x + 4) - 5(2x - 3)$$

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

(d) Express as a single fraction.

(i)  $\frac{3a}{4} \times \frac{2a}{3}$

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

(ii)  $\frac{5}{7x} + \frac{2}{3x}$

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

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- 5 (a) Given that,

$$A = \begin{pmatrix} 3 & 1 \\ 3 & 2 \end{pmatrix}$$

$$B = (3 \ 0 \ 8)$$

$$C = \begin{pmatrix} 4 & -5 \\ -1 & 2 \end{pmatrix}.$$

- (i) State the order of matrix  $B$ .

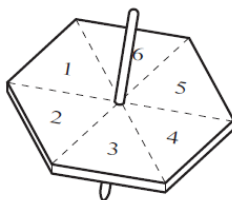
Answer (a)(i)..... [1]

- (ii) Calculate.

$$A - 2C$$

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

- (b) The diagram shows a six sided spinner.



A boy spins the spinner once.

Find the probability that he gets,

- (i) An even number,

Answer (b)(i).....[1]

- (ii) A prime number,

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

- (iii) The number is 7,

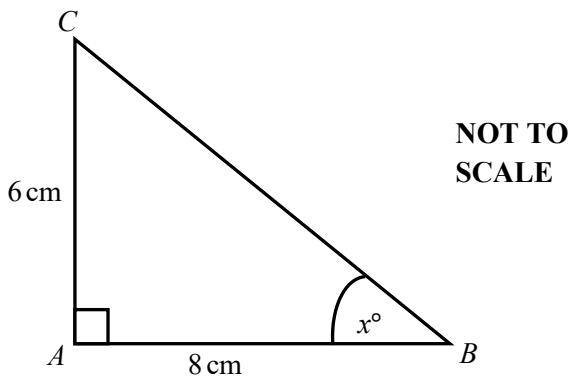
Answer (b)(iii).....[1]

- (iv) A number less than 7.

Answer (b)(iv).....[1]



- 6 Triangle  $ABC$  is right-angled.  
 $AB = 8\text{ cm}$ ,  $AC = 6\text{ cm}$  and angle  $ABC = x^\circ$ .



- (a) Write down the name given to side  $BC$  on a right-angled triangle.

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

- (b) Calculate the length  $BC$ .

Answer (b)..... [2]

- (c) Calculate angle  $x$ .

Answer (c)  $x =$ ..... $^\circ$  [3]

- (d) Given that the bearing of  $B$  from  $C$  is  $127^\circ$ .

Find

- (i) the bearing of  $A$  from  $B$ ,

Answer (d)(i)..... [1]

- (ii) the bearing of  $C$  from  $B$ .

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

- 7 (a) A straight line passes through the points (0,2) and (1,5).  
Find the equation of the straight line.

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

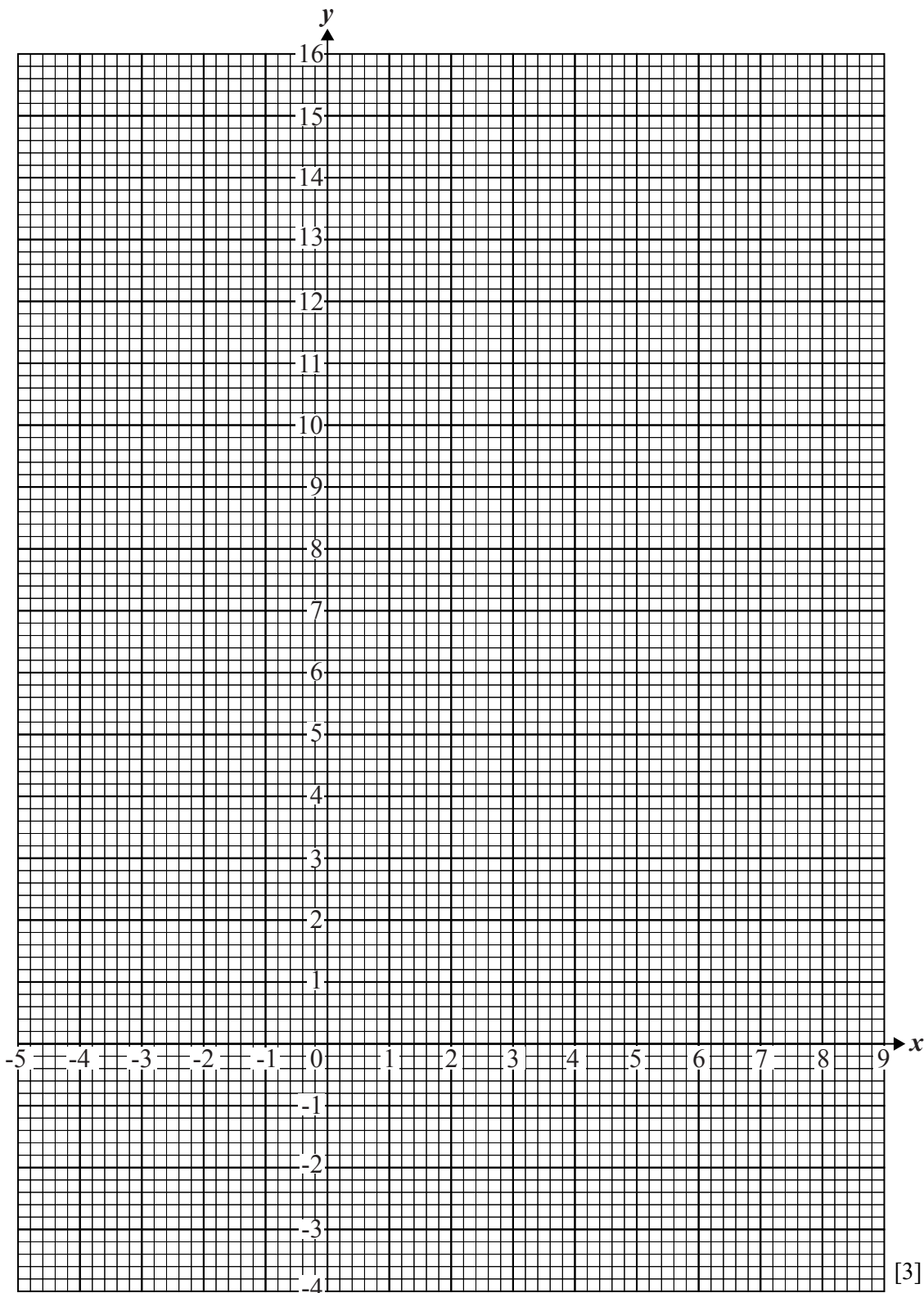
- (b) A school team gets  $x$  points if it wins a game and  $y$  points if it gets a draw.
- (i) If the school team gets a total of 10 points for winning 3 games and drawing a game.  
Form an equation to represent this statement.

Answer (b)(i)..... [1]

- (ii) On another month, the school team gets 32 points for 10 wins and 2 draws.  
Form an equation and show that it reduces to  
$$5x + y = 16.$$

[2]

- (iii) On the grid below, draw the lines of the equations in (b)(i) and (b)(ii), in the range  $-1 \leq x \leq 5$ .



[3]

- (iv) Use the graph to find the value of  $x$  and  $y$  which satisfy both equations.

Answer (b)(iv)  $x = \dots\dots\dots y = \dots\dots\dots$  [2]

8 Cindy records the sizes of 20 pairs of shoes in her class.

7 8 6 7 4 8 5  
5 8 7 5 7 4 4  
6 7 8 5 8 7

(a) (i) Complete the frequency table, using the given data.

| Shoe sizes   | Tally marks | Frequency |
|--------------|-------------|-----------|
| 4            |             |           |
| 5            |             |           |
| 6            |             |           |
| 7            |             |           |
| 8            |             |           |
| <b>Total</b> |             |           |

[3]

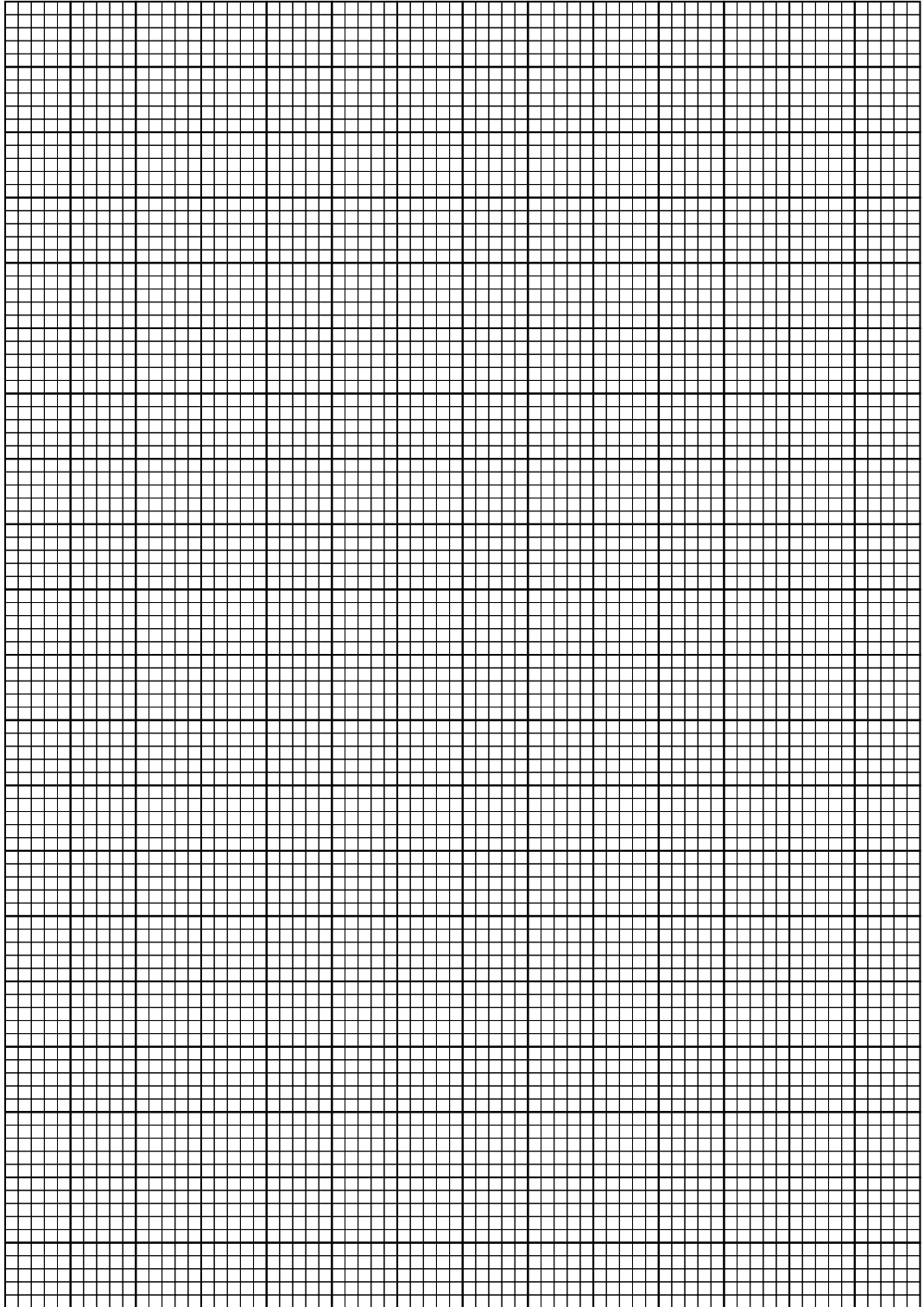
(ii) Work out the median shoe size

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

(iii) Calculate the mean shoe size.

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

(b) On the grid below, draw a bar chart to show the shoe sizes in Cindy's class



[3]

- 9 (a) Express 75 cm as a percentage of 2 m.

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

- (b) Mr Dlamini borrows E10 000 from a bank.

The bank has two options:

**Option 1:** Interest 10% **simple interest** per annum.

**Option 2:** interest 10% **compound interest** per annum.

- (i) Calculate the **total** amount Mr Dlamini would pay after 3 years for **option 1**.

*Answer (b)(i)* E.....[2]

- (ii) Calculate the **total** amount Mr Dlamini would pay after three years for **option 2**.

*Answer (b)(ii)* E..... [3]

- (iii) Suggest which option is cheaper.

*Answer (b)(iii)*..... [1]

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10 A can of beans is a cylinder of radius 5 cm and height  $h$  cm.

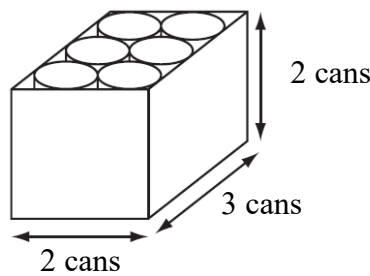
The volume of the cylinder is  $785 \text{ cm}^3$ .

[ For  $\pi$ , use 3. 14]

(a) Calculate the value of  $h$ .

Answer (a)  $h = \dots\dots\dots$  [3]

(b) Twelve cans fit exactly inside a box, as shown the diagram below.



NOT TO SCALE

(i) Write down the length, width and height of the box.

Answer (b)(i) length.....cm [1]

width.....cm [1]

height..... cm [1]

(ii) Calculate the volume of the box.

Answer (b)(ii)..... $\text{cm}^3$  [2]

(iii) Calculate the volume of the box not occupied by the cans.

Answer (b)(iii)..... $\text{cm}^3$  [3]

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