

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL GCSE

MATHEMATICS

Extension Tier Paper 2E

E

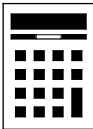
Tuesday 12 November 2024 07:00 GMT

Time allowed: 2 hours

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.
- If your calculator does not have a π button, take the value of π to be 3.142

Advice

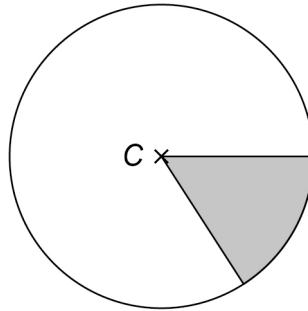
Show all necessary working; otherwise marks for method may be lost.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
26–27	
TOTAL	



Answer **all** questions in the spaces provided.

- 1** Here is a circle with centre C.



Name the shaded part of the circle.

[1 mark]

Answer _____

- 2** How many centimetres are there in one kilometre?

[1 mark]

Answer _____



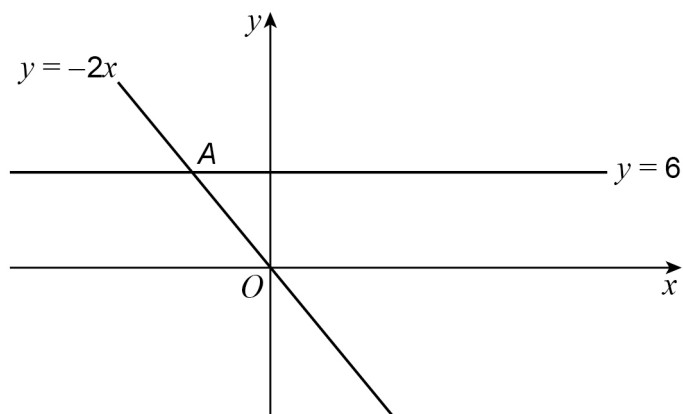
3

 P and Q are two points. P is $(6, 11)$ and Q is $(-8, 3)$ Work out the midpoint of PQ .

[1 mark]

Answer (_____ , _____)

4

Two straight lines intersect at point A .Write down the coordinates of A .

[1 mark]

Answer (_____ , _____)



5 The mass of a potato is 0.2 kilograms.

The mass of a carrot is 75 grams.

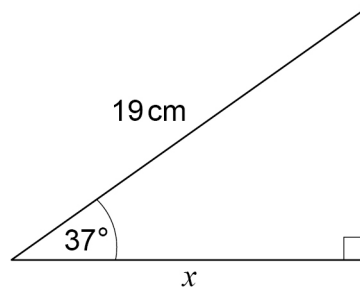
Write the mass of the potato as a **fraction** of the mass of the carrot.

Give your answer in its simplest form.

[2 marks]

Answer _____

6 (a) Use trigonometry to work out the value of x .



Not drawn
accurately

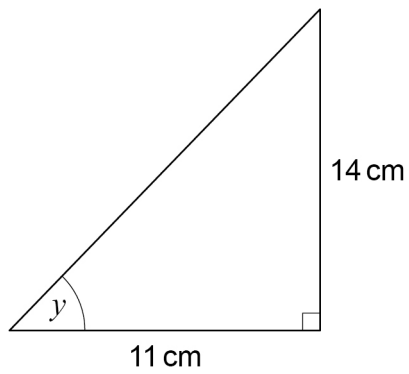
[2 marks]

$x =$ _____ cm



- 6 (b)** Use trigonometry to work out the size of angle y .

Not drawn
accurately



[2 marks]

$$y = \underline{\hspace{4cm}}^\circ$$

Turn over for the next question



- 7** Faisal and Akila saved \$544 in the ratio 10 : 7
Faisal gives Akila some of his money.
Akila now has the same amount as Faisal.

How much does Faisal give Akila?

[3 marks]

Answer \$ _____



- 8 (a)** Show that the lines $y = 5x + 3$ and $2y - 10x = 8$ are parallel.
Do **not** draw the graphs.

[3 marks]

- 8 (b)** Is the point $(-1, -8)$ above, below or on the line $y = 5x + 3$?
Tick **one** box.

☐

Above

☐

Below

☐

On the line

Show working to support your answer.
Do **not** draw the graph.

[2 marks]



9

 x is an integer.

$$-3 < x \leq 4$$

and

$$1 \leq x + 2 < 8$$

Work out all the possible values of x .**[3 marks]**

Answer _____



10 (a) Work out $\frac{1.5 \times 10^{15}}{6 \times 10^{10}}$

Give your answer in standard form.

[2 marks]

Answer _____

10 (b) $8100.09 = (8.1 \times 10^c) + (9 \times 10^d)$

Work out the values of c and d .

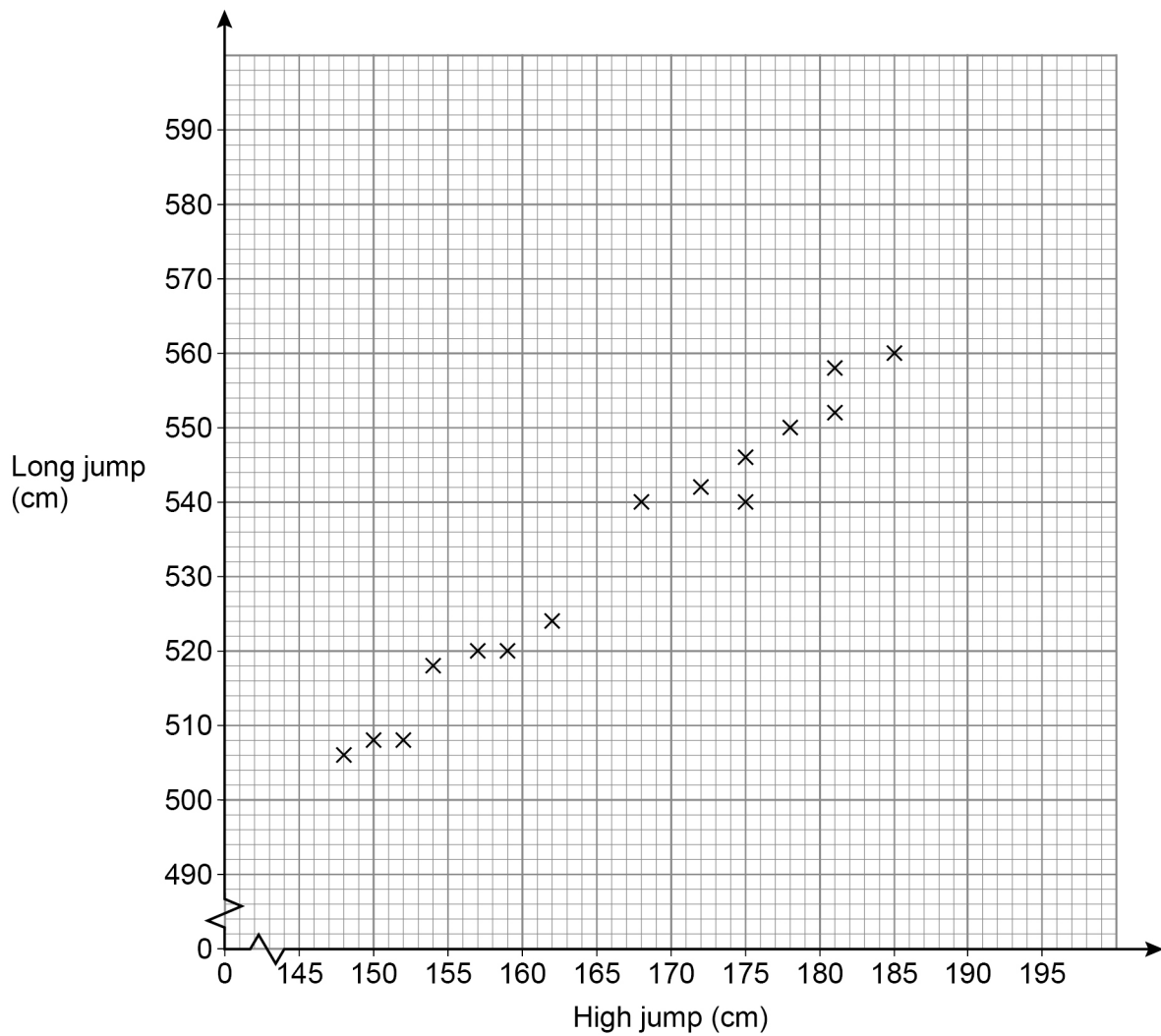
[2 marks]

$c =$ _____ $d =$ _____

Turn over for the next question



- 11** The scatter graph shows the best high jump and the best long jump for 15 boys.



- 11 (a)** Write down the type of correlation shown.

[1 mark]

Answer _____

- 11 (b)** Pran has a best high jump of 164 cm

Use a line of best fit to estimate his best long jump.

[2 marks]

Answer _____ cm



12

Here are two sets of numbers, A and B.

A

168	140
95	117

B

250	180	223
110	155	x

mean of A : mean of B = 5 : 7

Work out the value of x .**[4 marks]**

 $x =$ _____**Turn over for the next question**

13 Two solids, J and K, have the **same** density.

Complete the table.

Include units in your answers.

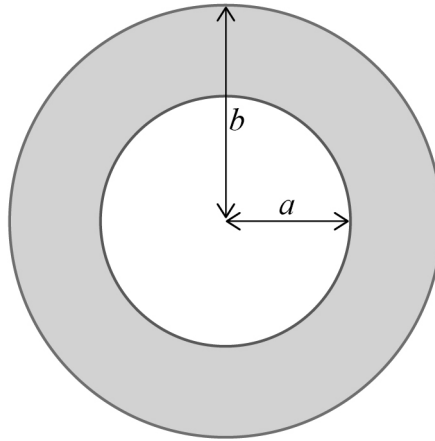
[3 marks]

	J	K
Mass	36 g	90 g
Volume	5 cm ³	
Density		



14

Here is an inflated swimming ring with dimensions in centimetres.



The volume of the ring, $V \text{ cm}^3$, is given by

$$V = 0.25\pi^2 (b + a) (b - a)^2$$

Work out the volume when $a = 26$ and $b = 35$

Give your answer to 3 significant figures.

[3 marks]

Answer _____ cm^3



15

Simplify fully

$$\frac{a^6 b^4}{c^2 d} \times \frac{c^3}{a^2 b^5}$$

[3 marks]

Answer _____

16

A rope has length 40 metres, correct to the nearest half-metre.

A piece of length 2.6 metres, correct to 1 decimal place, is cut off.

Work out the **maximum** possible length of rope left.**[3 marks]**

Answer _____ m



17

Solve $x(4x - 20) = 7$.**[3 marks]**

Answer _____

Turn over for the next question

- 18 Two bags, G and H, contain only blue discs and red discs.

For the number of discs in **bag G**, blue : red = 5 : 6

For the number of discs in **bag H**, blue : red = 2 : 3

Which statement **must** be true?

Tick **one** box.

[1 mark]

☐

Bag H has fewer blue discs than bag G

☐

Bag H has half as many red discs as Bag G

☐

Bag H has the same proportion of blue discs as bag G

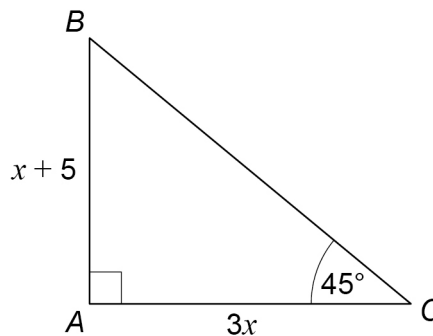
☐

Bag H has a smaller proportion of blue discs than bag G

- 19 ABC is a right-angled triangle.

All lengths are in cm

Not drawn
accurately



Show that $x = 2.5$

[1 mark]



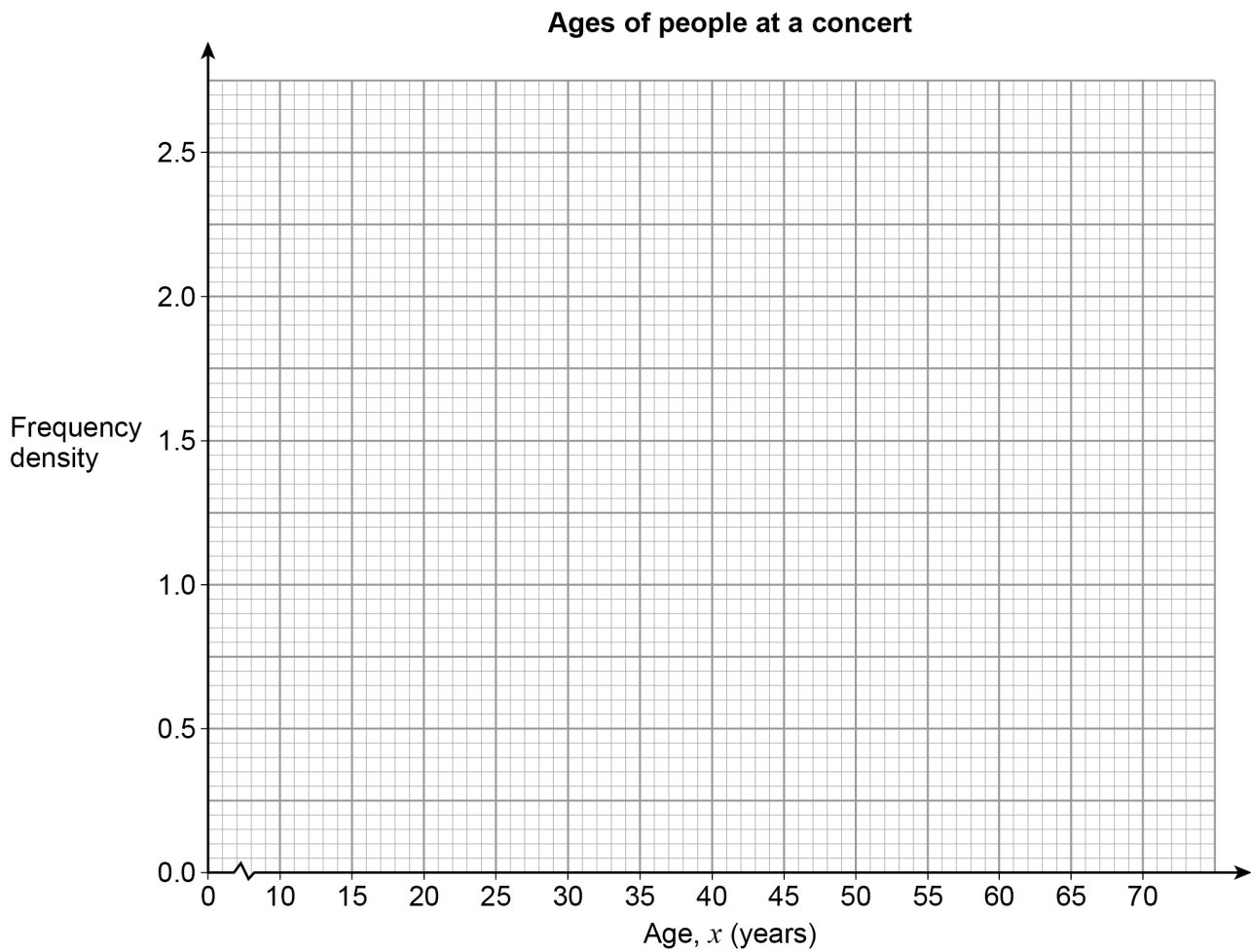
20

Here is some information about the ages of people at a concert.

Age, x (years)	Frequency		
$15 \leq x < 20$	7		
$20 \leq x < 35$	33		
$35 \leq x < 55$	34		
$55 \leq x < 70$	12		

Draw a histogram to represent the information.

[3 marks]



21

A shape is

reflected in the x -axis

then

reflected in the y -axis.Describe a **single** transformation that gives the same result for any shape.**[3 marks]**



22 Expand and simplify fully $(x + 5)(x - 6)(x + 2)$

[4 marks]

Answer _____

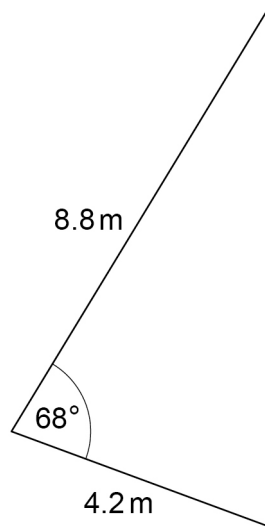
23 Differentiate $\frac{x^7 - 5x^4}{x^2} + x^3$

[3 marks]

Answer _____



24 (a) Here is a triangular sail.



Not drawn
accurately

Aki needs to buy waterproofing liquid for the sail.

He will cover **each** side of the sail **twice** with the liquid.

A litre of liquid covers 7.5 square metres of sail.

The waterproofing liquid is sold in 1 litre bottles.

How many bottles of liquid does Aki need to buy?

You **must** show your working.

[3 marks]

Answer _____



25

Kim makes green paint by mixing blue paint and yellow paint in the ratio

blue : yellow = 3 : 2

She buys blue paint in 50-litre containers, each costing \$390

She buys yellow paint in 20-litre containers, each costing \$160

She wants to

- sell the green paint in 2.5-litre tins.
- make 30% profit on each tin.

How much should she sell each tin for?

[5 marks]

Answer \$ _____



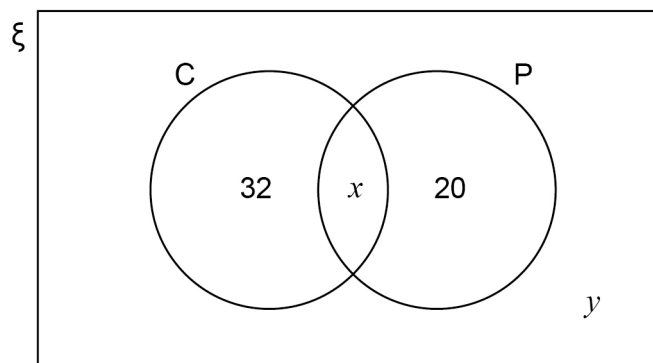
26

The Venn diagram shows some information about 120 students.

$\xi = 120$ students

C = students who study Chemistry

P = students who study Physics



The probability that a Physics student, chosen at random, also studies Chemistry is $\frac{7}{12}$

One of the 120 students is chosen at random.

Work out the probability that the student does **not** study Chemistry or Physics.

[4 marks]

Answer _____



27

Show that $(9\sqrt{6} - \sqrt{24})^2$ simplifies to an integer.

[3 marks]

28

$$f(x) = \frac{3x}{7} - 4$$

Work out the value of $f^{-1}(5) + f(-1.4)$

[5 marks]

Answer _____



Work out the two points of intersection of the curve and the straight line with equations

and

$$y = x + 9$$

[5 marks]

[illegible]

Answer (_____ , _____) and (_____ , _____)

Turn over for the next question



30

A transformation is given by the matrix $\begin{pmatrix} 4 & -3 \\ -1 & 2 \end{pmatrix}$

The image of the point (x, y) is $(3, 8)$

Work out x and y .

[4 marks]

$x =$ _____ $y =$ _____



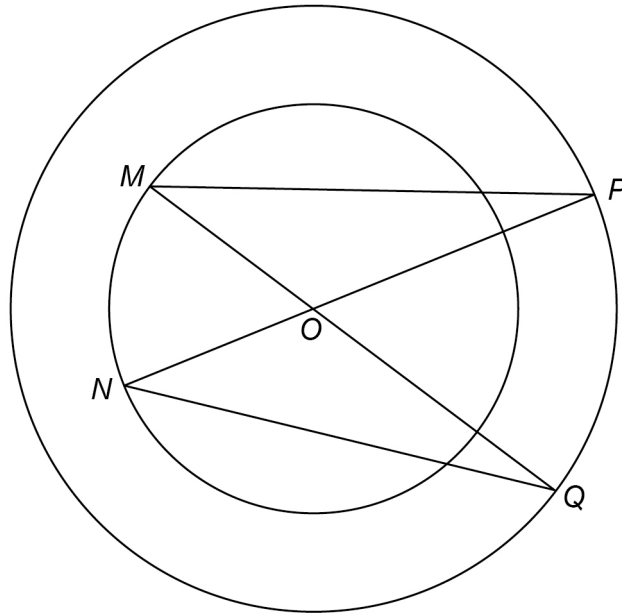
31

Two circles have the same centre, O .

M and N lie on the circumference of the small circle.

P and Q lie on the circumference of the large circle.

MOQ and NOP are straight lines.



Use congruent triangles to prove that $MP = NQ$

[4 marks]

END OF QUESTIONS



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