

Centre number	<input style="width: 20px; height: 20px;" type="text"/>	Candidate number	<input style="width: 20px; height: 20px;" type="text"/>
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Forename(s)			
Candidate signature			
I declare this is my own work.			

GCSE MATHEMATICS

H

Higher Tier Paper 1 Non-Calculator

Shadow paper based on November 2023 question paper

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- mathematical instruments



You must **not** use a calculator.

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 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice

In all calculations, show clearly how you work out your answer.

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	
TOTAL	

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

1 Work out the lowest common multiple (LCM) of 12 and 20

[1 mark]

Answer _____

2 Work out the size of an **exterior** angle of a regular pentagon.

[1 mark]

Answer _____ °

3 A is $(8, 0)$ and B is $(0, -6)$

Work out the midpoint of AB .

[1 mark]

Answer (_____ , _____)

4 Simplify $5a + 7a \div a$

[1 mark]

Answer _____

5 Work out the value of $(2^3 \times 2^4) \div (2^{10} \div 2)$

Give your answer as a decimal.

[3 marks]

Answer _____

Turn over for the next question

7

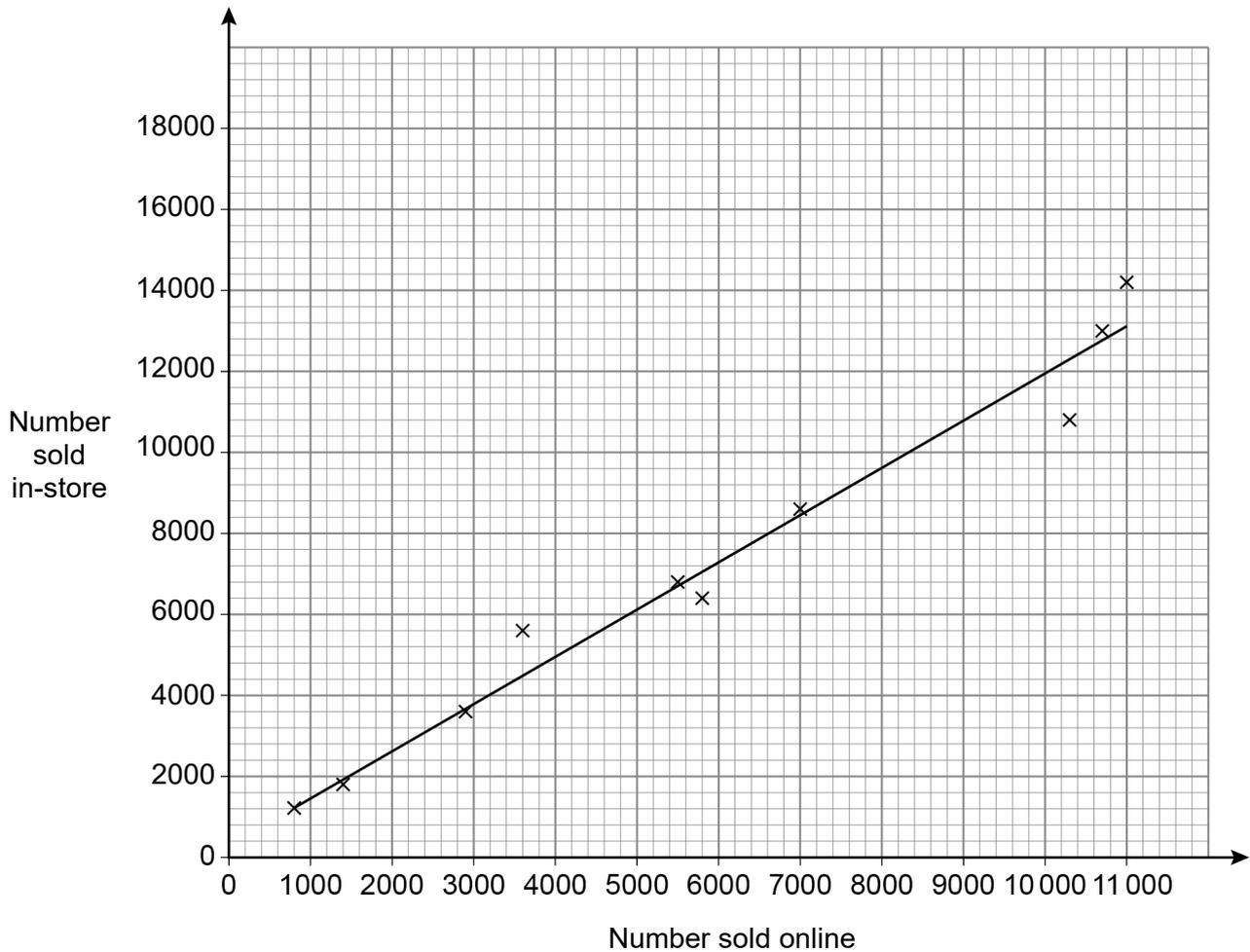
Turn over ►

6

A company sells 10 new products.

The scatter graph shows, for each product,
the number sold online in the first week
and
the number sold in-store in the first week.

A line of best fit has been drawn on the scatter graph.



6 (a) The scatter graph shows positive correlation.

Describe the relationship between number of products sold online and in-store.

[1 mark]

6 (b) The company earns
£2 for each product sold online
and
£1.50 for each product sold in-store.

The company releases another product.
In the first week it has 8000 sales online.

Estimate the **total** amount the company earns from sales online and in-store in the first week.

[3 marks]

Answer £ _____

7

40% of a number is 120

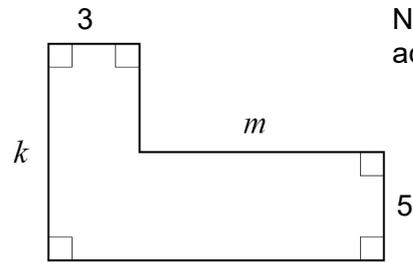
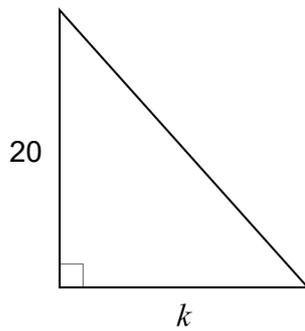
Work out 130% of the number.

[3 marks]

Answer _____

8

In the diagrams, all lengths are in centimetres.

Not drawn
accurately

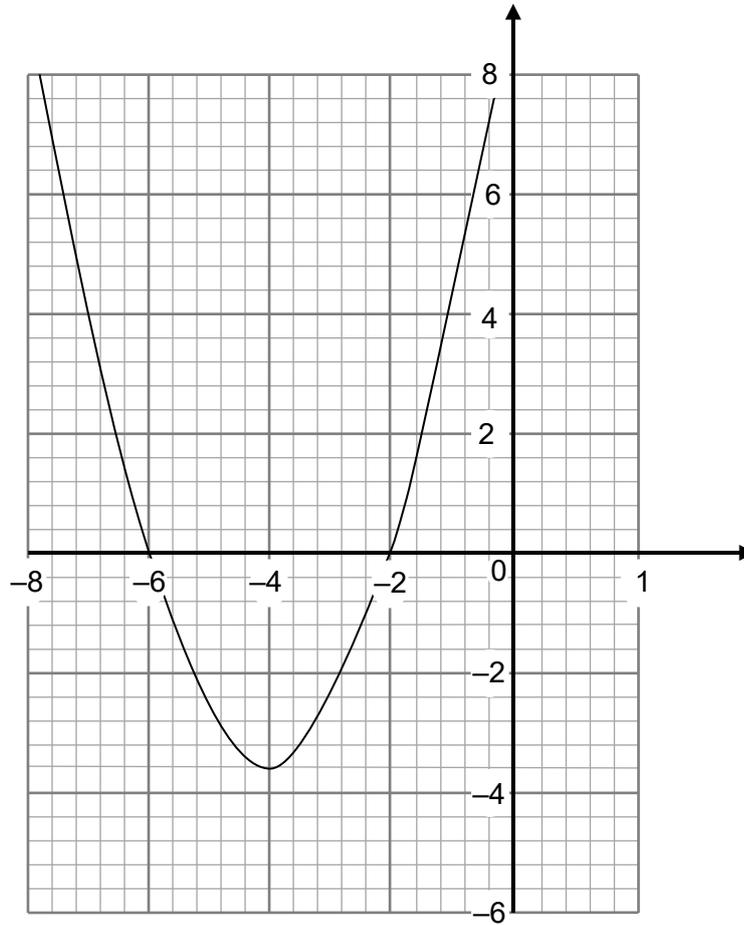
The two shapes have equal areas.

Work out $k : m$ **[3 marks]**

Answer _____ : _____

Turn over for the next question

9 Here is the graph of $y = x^2 + 8x + 12$



Use the graph to estimate the solutions of $x^2 + 8x + 12$

[2 marks]

Answer _____

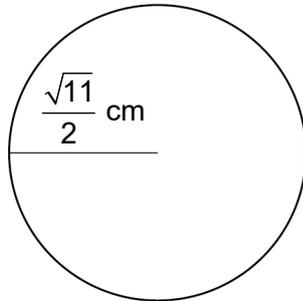
10

Shape A is a circle with radius $\frac{\sqrt{11}}{2}$ cm

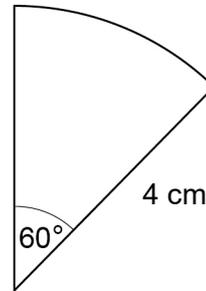
Shape B is a sector of a circle with radius 4 cm

Not drawn
accurately

Shape A



Shape B



Which shape has the greater area, A or B?

You **must** show your working.

[5 marks]

Answer _____

11 Factorise $x^2 - 7x + 12$

[2 marks]

Answer _____

12 (a) Write 1.2×10^4 as an ordinary number.

[1 mark]

Answer _____

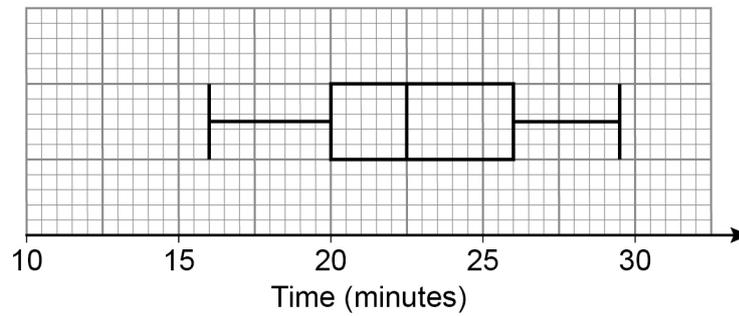
12 (b) Simplify $(1.2 \times 10^4) : (2.5 \times 10^{-1})$

Give your answer in the form $n : 1$

[2 marks]

Answer _____ : 1

- 15** A race was run in 2019 and in 2020
The box plot shows information about the finishing times in 2019



- 15 (a)** In 2019, what was the slowest time?

[1 mark]

Answer _____ minutes

15 (b) The table shows information about the finishing times in 2020

Lower quartile	20 minutes
Median	25 minutes
Upper quartile	28 minutes

Use the data to comment on each of the following statements.

[4 marks]

On average, times were faster in 2020 than 2019

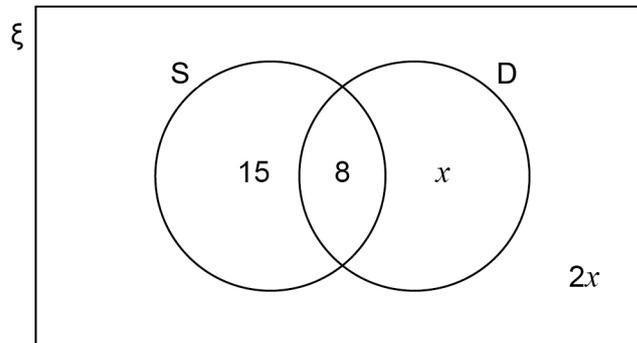
Times were more consistent in 2019 than in 2020

16 The Venn diagram shows information about 50 people who went to a restaurant.

$\xi = 50$ people

S = people who bought a starter

D = people who bought a dessert



16 (a) One person is chosen at random.

Work out the probability that they bought a dessert.

[3 marks]

Answer _____

16 (b) One person who bought a starter is chosen at random.

Work out the probability that they bought a dessert.

[1 mark]

Answer _____

17 x and y are integers.

$$6 \leq 3x \leq 18 \quad \text{and} \quad y - 2x < 16$$

Work out the **largest** possible value of y .

[3 marks]

Answer _____

Turn over for the next question

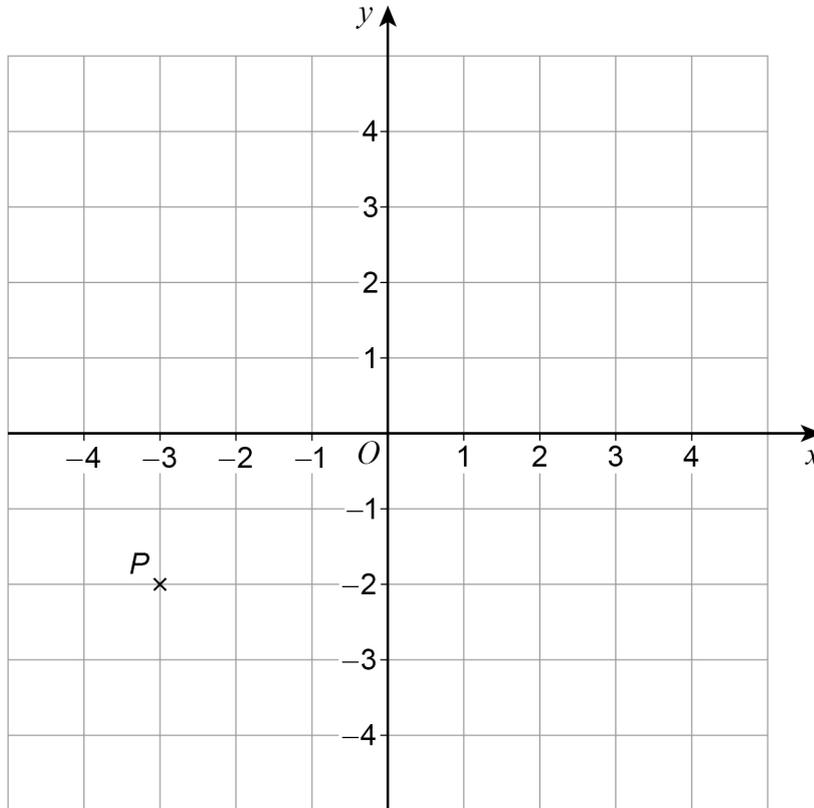
7

Turn over ►

18 (a) P and Q are points.

$P(-3, -2)$ is mapped to Q by a rotation about $(-1, 0)$ through 90° clockwise.

Q is mapped back to P by a **single** transformation.



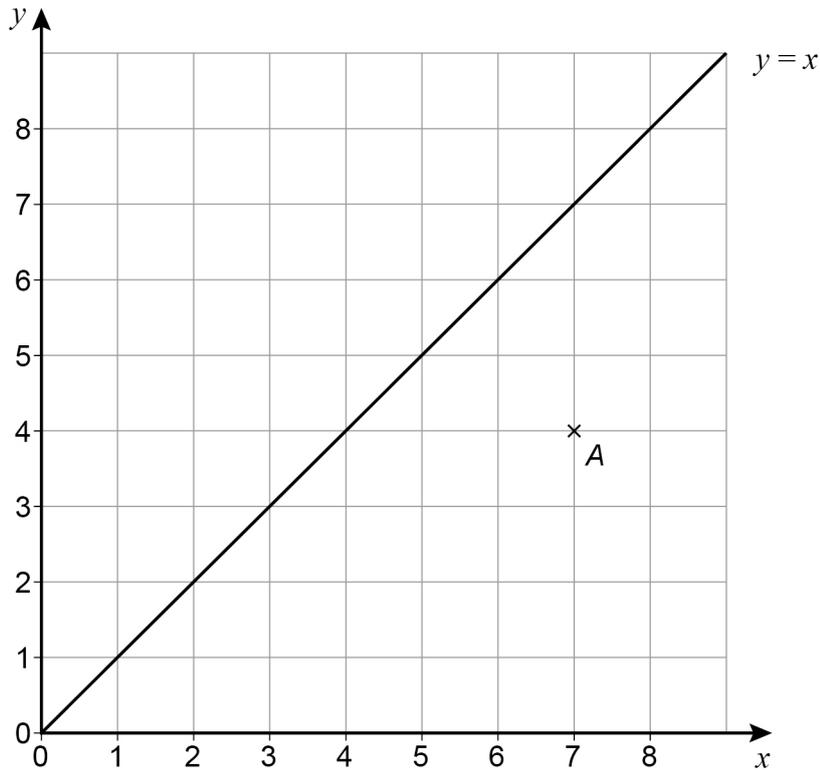
Complete these two **single** transformations that each map Q back to P .

[2 marks]

Rotation about $(-1, 0)$ _____

Translation _____

18 (b) Point $A(7, 4)$ and the line $y = x$ are shown on the grid.



B and C are points on the grid, each having positive **integer** coordinates.

BAC is an isosceles triangle.

When BAC is reflected in the line $y = x$ side BC is invariant.

Work out **one** possible set of coordinates for B and C .

[1 mark]

B (_____ , _____) C (_____ , _____)

Turn over for the next questions

20

 x and y are acute angles.

$$\cos x = \frac{\sqrt{3}}{2} \qquad \sin y = 1$$

$$w = 4x - y$$

Work out the value of $\tan w$ You **must** show your working.**[3 marks]**

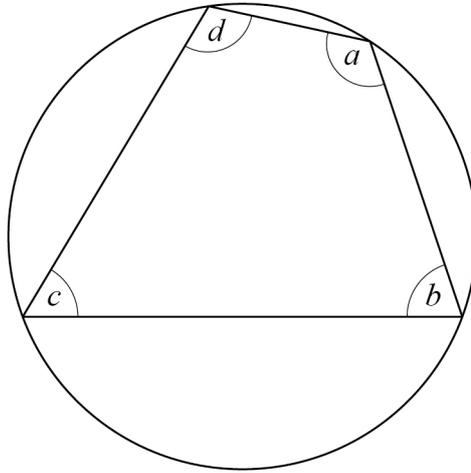
Answer _____

Turn over for the next question**Turn over ►**

22

Here is a cyclic quadrilateral.

$$a : b : c = 8 : 3 : 2$$

Not drawn
accuratelyWork out the size of angle d .**[3 marks]**

$$d = \underline{\hspace{2cm}}^\circ$$

Turn over for the next questions**Turn over ►**

24 Line A is perpendicular to line B.

The gradient of line A is $-\frac{1}{3}$

Work out the gradient of line B.

[1 mark]

Answer _____

25 The n th term of a geometric progression is r^n where $r > 0$

The second term is $\frac{18}{25}$

Work out the third term.

Give your answer in the form $\frac{c\sqrt{2}}{d}$ where c and d are integers.

[2 marks]

Answer _____

Turn over for the next question

26 (a) Work out the value of $\left(15\frac{5}{8}\right)^{\frac{1}{3}}$

[2 marks]

Answer _____

26 (b) Write $(16^m)^{1.5}$ as a power of 2 in terms of m .

[2 marks]

Answer _____

27 Write down the solution of $x^2 > 49$

[1 mark]

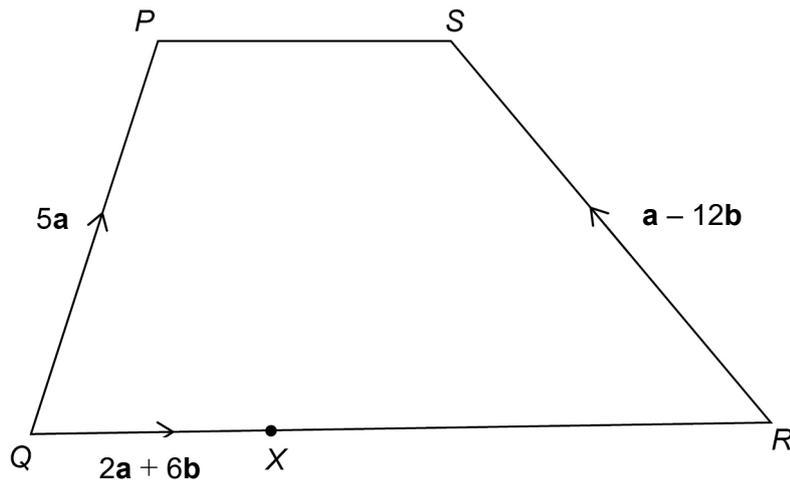
Answer _____

28

 $PQRS$ is a quadrilateral. PQ is not parallel to SR . X is a point on QR .

$$QX : XR = 2 : 3$$

$$\overrightarrow{QX} = 2\mathbf{a} + 6\mathbf{b}$$

Not drawn
accuratelyProve that $PQRS$ is a trapezium.**[3 marks]**

Turn over ►

29 Here are the equations of three graphs.

$$y = \sin x$$

$$y = \cos x$$

$$y = \tan x$$

29 (a) Which statement is true?

Tick **one** box.

[1 mark]

$y = \sin x$ passes through $(180^\circ, 1)$

$y = \cos x$ passes through $(180^\circ, 1)$

$y = \tan x$ passes through $(180^\circ, 1)$

None of the graphs pass through $(180^\circ, 1)$

29 (b) Which statement is true?

Tick **one** box.

[1 mark]

$y = \sin x$ passes through $(270^\circ, -1)$

$y = \cos x$ passes through $(270^\circ, -1)$

$y = \tan x$ passes through $(270^\circ, -1)$

None of the graphs pass through $(270^\circ, -1)$

END OF QUESTIONS

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