

Admissions Test

2025 Sample paper 1

1½ hours

This admissions test is designed to assess your mathematical thinking.

All questions require no more than the content of GCSE mathematics, but they may not be of the style you are accustomed to.

You may find some of the questions challenging. As schools teach the GCSE mathematics content in different orders, there may be a small number of questions that you have not yet covered in your maths lessons. You may be able to work out how to do these questions anyway.

Remember that if you find something challenging, it is likely that others are finding it similarly challenging.

Consider carefully how to distribute your time across the three sections.

Instructions to candidates

Please read these instructions carefully, but do not open the paper until you are told to do so.

Answer **all** questions.

You may **not** use a calculator.

Enter your answers in the appropriate spaces in the answer booklet.

If you run out of space, you may ask for additional paper.

The test is in three parts. There are 60 marks in total.

Section A is worth 20 marks. It consists of 10 multiple choice questions which test your understanding of GCSE Mathematics content.

Section B is worth 20 marks. It consists of 10 multiple choice questions which test your reasoning and thinking skills.

Section C is worth 20 marks. It consists of 3 multi-part questions which test your understanding of mathematical arguments and your ability to analyse a mathematical situation.

There are no marks for showing working out but you can do working on the paper to help you find the correct answer.

If you change your mind about the answer to a multiple choice question, make it clear which answer you are choosing.

If you require more space for working, you may ask for additional paper.

You should not discuss the content of this paper with anyone, either online or in person. Any candidates found to have shared details about this paper may have their applications terminated, or offer or place at the school withdrawn.

Section A

20 marks

Answer all questions

Each question is worth 2 marks.

Put a circle around the one correct answer in the answer booklet. If you change your mind about an answer, make it clear which answer you are choosing.

- 1 A teacher asks students to suggest an algebraic expression which gives the value 3 when $x = 7$.

The following expressions are suggested.

One of the expressions does **not** give the value 3 when $x = 7$. Which one?

A $3(x - 6)^2$

B $\frac{x + 5}{4}$

C $1 - (9 - x)$

D $\frac{x^2 - 1}{16}$

E $7 - \frac{(x - 5)^3}{2}$

- 2 $(3 \times 10^4)^m = 2.7 \times 10^n$ where m and n are whole numbers.

What are the correct values of m and n ?

A $m = 3, n = 13$

B $m = 3, n = 12$

C $m = 3, n = 7$

D $m = 9, n = 7$

E $m = 9, n = 37$

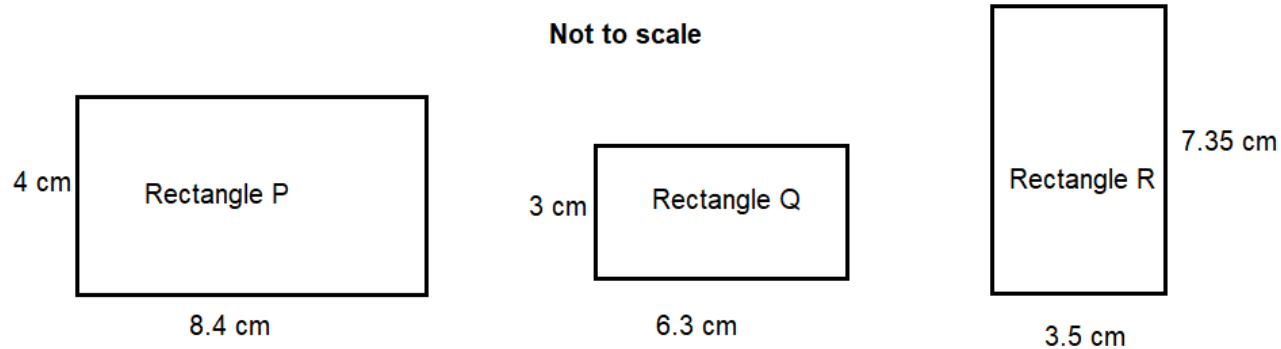
- 3 $3x - 5 < 84$ where x is a positive whole number.

How many possible values of x are there?

- A 89 B 88 C 30 D 29 E 28

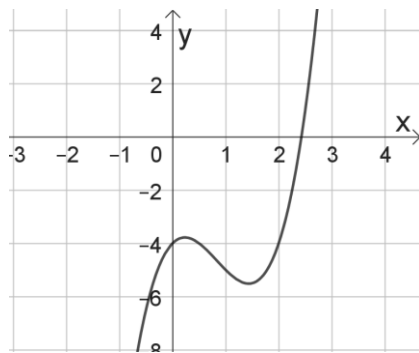
- 4 Three rectangles are shown below.

Which of the rectangles are similar to each other?



- A None of them
B P and Q only
C P and R only
D Q and R only
E All of them

- 5 Which of the following could be the equation of the graph of the curve below?



- A** $y = x^2 - 4$
- B** $y = x^3 - 4$
- C** $y = 2x^2 - 4x - 4$
- D** $y = 2x^3 - 4x^2 + 4$
- E** $y = 2x^3 - 5x^2 + 2x - 4$
- 6 $x = -2$ satisfies the quadratic equation $ax^2 + x = 6$, where a is a constant.
Find the other value of x that satisfies the equation.

- A** -3 **B** 3 **C** -1.5 **D** 1.5 **E** 2

7 Two linear sequences are described below.

The first sequence has first term 3. Each term after this is 4 more than the term before.

3, 7, 11, ...

The second sequence has first term 10. Each term after this is 3 more than the term before.

10, 13, 16,

Both sequences continue. Which of the following statements is correct?

- A** 2023 is not a term in either sequence.
- B** 2023 is a term in both sequences and occurs earlier in the first sequence.
- C** 2023 is a term in both sequences and occurs earlier in the second sequence.
- D** 2023 is a term in the first sequence but not the second.
- E** 2023 is a term in the second sequence but not the first.

8 How many of the formulae listed below are correct rearrangements of the formula

$$V = \frac{\pi h}{6}(3a^2 + 3b^2 + h^2)?$$

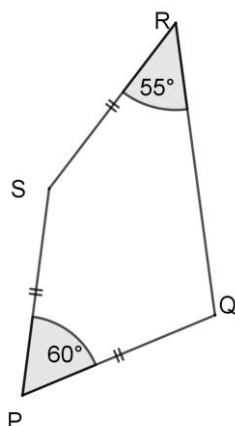
- $a = \sqrt{\frac{2V}{\pi h} - b^2 - \frac{h^2}{3}}$
- $a = \sqrt{\frac{6V - 3\pi h b^2 - \pi h^3}{3\pi h}}$
- $b = \sqrt{\frac{6V}{\pi h} - 3b^2 - h^2}$
- $h = \sqrt[3]{\frac{6V}{\pi} - 3a^2 - 3b^2}$

- A** 0 **B** 1 **C** 2 **D** 3 **E** 4

- 9 Quadrilateral PQRS has $PQ = PS = SR$ as shown in the diagram below.

Angle QPS is 60° .

Angle SRQ is 55° .



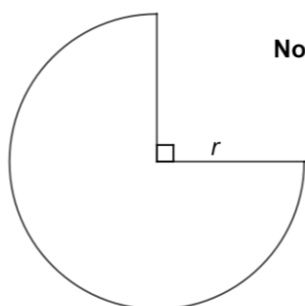
Not to scale

Find the size of angle PSR. You will find it helpful to add an extra line to the diagram.

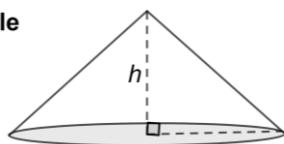
- A 115° B 120° C 122.5° D 125° E 130°

- 10 A circle of radius r has a quarter removed.

The straight edges of the remaining sector are joined to form a cone of height h .



Not to scale



Which of the following is a correct formula for h in terms of r ?

- A $h = \frac{r\sqrt{7}}{4}$
 B $h = \frac{3r}{4}$
 C $h = \frac{r\sqrt{15}}{4}$
 D $h = r$
 E $h = \frac{5r}{4}$

Section B starts on the next page.

Section B

20 marks

Answer all questions

Each question is worth 2 marks.

Put a circle around the one correct answer in the answer booklet. If you change your mind about an answer, make it clear which answer you are choosing.

- 11** A teacher is planning a coach trip.
There is one coach with seats for 60 people.
There has to be at least one adult for every 10 children on the trip.
What is the largest number of children that can go on the trip?

A 50 **B** 51 **C** 52 **D** 54 **E** 55

- 12** Which is the correct order for the answers to the three calculations, from smallest to largest?

A	smallest		largest
	40% of 89	89% of 41	90% of 30
B	smallest		largest
	90% of 30	89% of 41	40% of 89
C	smallest		largest
	40% of 89	90% of 30	89% of 41
D	smallest		largest
	90% of 30	40% of 89	89% of 41
E	smallest		largest
	89% of 41	40% of 89	90% of 30

- 13** Alex is making biscuits.

She has prepared some mixture and will use it all.

She could use it all to make 18 large biscuits and 5 small biscuits or to make 6 large biscuits and 53 small biscuits.

All large biscuits are identical to each other, and all small biscuits are identical to each other.

If Alex used all the mixture for small biscuits, how many could she make?

- A** It is impossible to make a whole number of small biscuits
- B** 19
- C** 48
- D** 60
- E** 77

- 14** A thin metal rectangle measures 495 cm by 110 cm.

It is cut into equal sized squares without wasting any of the metal.

The squares are as large as possible.

How many squares are there?

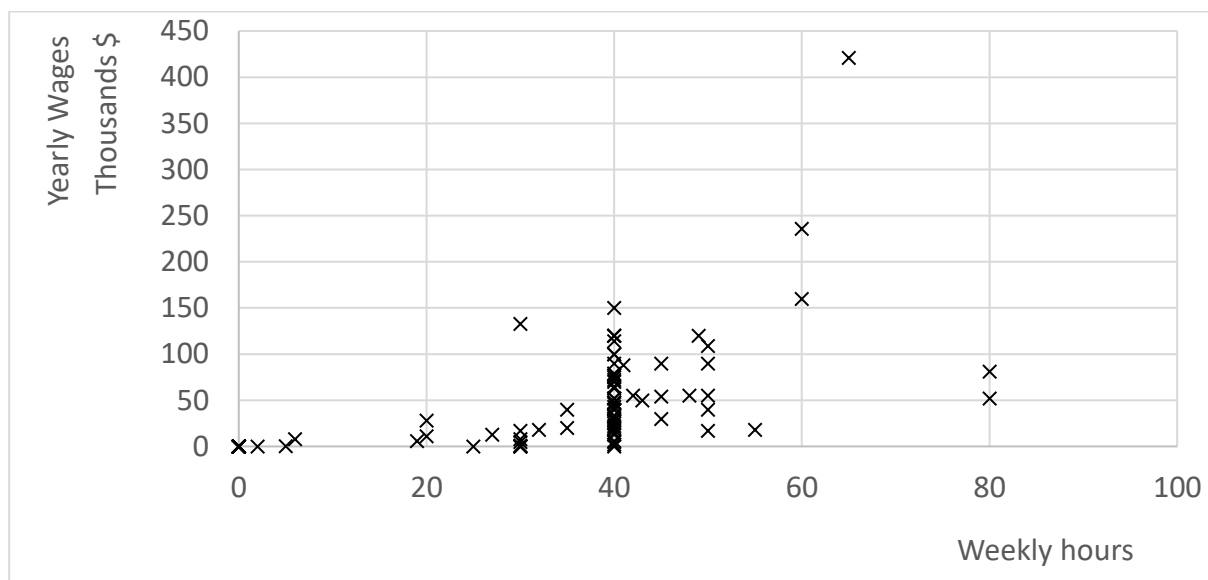
- A** 5 **B** 11 **C** 18 **D** 121 **E** 2178

15 How many of the four sets of numbers below have a mean of £34.50?

- £31, £38
- £15, £34, £35, £40
- £10, £30, £39, £59
- £30, £31, £32, £33, £34, £35, £36, £37, £38, £39

A 4 B 3 C 2 D 1 E 0

16 The scatter diagram below shows the typical weekly hours worked and the yearly wages for 100 American adults.



How many of the following statements are clearly **false** for the adults in the scatter diagram?

- The modal number of hours worked is 40 a week.
- There are some people who work but don't earn a wage.
- There is positive correlation between the number of hours worked and the wages.
- There is a person who doesn't work and doesn't earn a wage.

A 0 B 1 C 2 D 3 E 4

- 17** Sam decides to walk 5 miles every day.

The equator is a circle on the surface of the earth that cuts the surface into two equal halves.

Find the approximate time before the total distance Sam walked is equivalent to walking the whole length of the equator?

Assume that the earth is a sphere with radius 3959 miles.

- A** Longer than a typical lifetime
- B** 13 years
- C** 7 years
- D** 4 years
- E** 2 years

- 18** A stall sells two kinds of sweet.

Large sweets cost 15p and small sweets cost 9p.

How many ways is it possible to spend exactly £2.20?

- A** 0
- B** 1
- C** 2
- D** 3
- E** 4

- 19** A lock on a suitcase needs a 3-digit code to be entered to unlock the case.

Each digit can be 0 to 9 but no digit can be repeated.

How many possible codes are there?

--	--	--

- A** 999
- B** 960
- C** 800
- D** 720
- E** 648

- 20** Two lorries are each 10 metres long.

The lorries are travelling in the same direction in different lanes on the same road.

One lorry is travelling at 50 km per hour. The other lorry is travelling at 90 km per hour.

The front of the faster lorry draws level with the back of the slower lorry.

How many seconds does it take for the faster lorry to completely overtake the slower lorry?

The faster lorry has completely overtaken the slower lorry when the back of the faster lorry is level with the front of the slower lorry.

- A** 0.5
- B** 0.9
- C** 1.8
- D** 9
- E** 12

Section C starts on the next page.

Section C

20 marks

Answer all questions

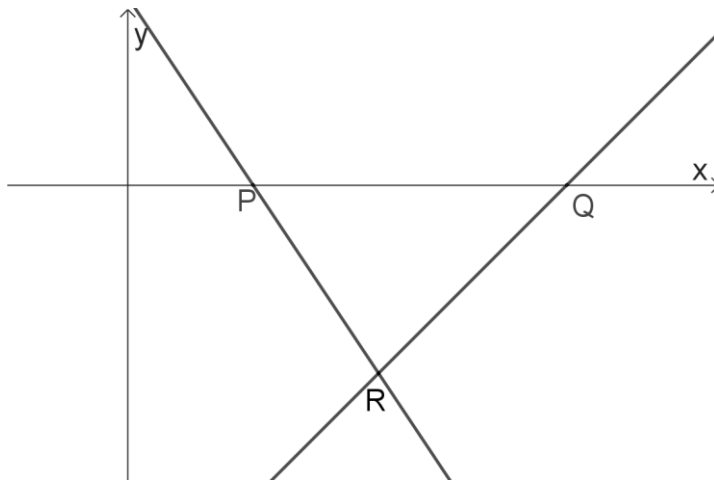
It is important to show full working in this section. Write your full answers to each question in the answer booklet.

Mark allocations are shown in square brackets [].

- 21** The diagram below shows the lines $3x + 2y = 6$ and $x - y = 7$.

The lines cross the x -axis at points P and Q.

The lines cross each other at point R.



- 21a** The coordinates of the point P are

[1]

A (2,0) **B** (3,0) **C** (5,0) **D** (6,0) **E** (7,0)

- 21b** The coordinates of the point Q are

[1]

A (2,0) **B** (3,0) **C** (5,0) **D** (6,0) **E** (7,0)

- 21c** The coordinates of the point R are

[1]

A (3, -3) **B** (3, -4) **C** (4, -3) **D** (4, -4) **E** (4.5, -3)

The curve with equation $y = ax^2 + bx + c$ passes through points P, Q and R.

21 The value of $a + b + c$ is

[2]

- A** 5.5 **B** 4.5 **C** 4 **D** 3.5 **E** 3

Four students make statements about the curve $y = ax^2 + bx + c$

Anita says “ $x = 4.5$ is a line of reflection symmetry”

Bharat says “it never goes below the line $y = -3$ ”

Christian says “it touches the line $2y = x - 10$ at only one point”

Daniela says “the y intercept is $(0, 7)$ ”

21e Two of the statements are **not correct**.

Whose statements are **not correct**?

[2]

- A** Anita and Bharat only
B Anita and Daniela only
C Bharat and Christian only
D Bharat and Daniela only
E Christian and Daniela only

22 Three fair coins are tossed.

22a The probability of getting exactly one head on the three coins is

[1]

A $\frac{1}{3}$

B $\frac{1}{4}$

C $\frac{3}{8}$

D $\frac{1}{2}$

E $\frac{2}{3}$

One of the coins is replaced with a coin that is not fair. This coin has a probability p of landing heads.

The other two coins remain fair.

The probability of getting exactly one head on the three coins is $\frac{4}{9}$.

22b The value of p is

[2]

A $\frac{1}{3}$

B $\frac{1}{6}$

C $\frac{3}{8}$

D $\frac{1}{9}$

E $\frac{2}{9}$

Paul has three coins. One of the coins is not fair.

The probability of getting exactly two heads when the three coins are tossed is $\frac{7}{24}$

Here are some statements about Paul's dice:

- I. The probability of getting at least two tails when the three coins are tossed is $\frac{2}{3}$
- II. The probability of getting tails on the unfair coin is $\frac{2}{3}$.
- III. The probability of getting exactly two tails when the three coins are tossed is $\frac{11}{24}$
- IV. The probability of getting at least one heads when the three coins are tossed is $\frac{5}{6}$

22c Which of the statements are correct?

[2]

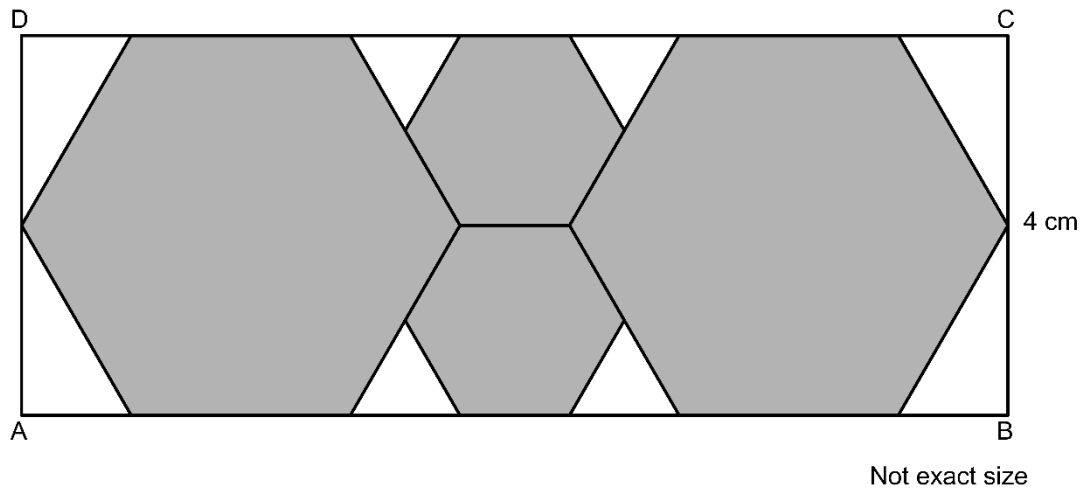
- A** I and II only.
- B** I and III only.
- C** II and III only.
- D** II and IV only.
- E** III and IV only.

23 ABCD is a rectangle.

$$BC = 4 \text{ cm.}$$

Two large regular hexagons and two small regular hexagons fit into the rectangle, as shown in the diagram below.

The two large hexagons are the same size and the two small hexagons are the same size.



23a What is the length in centimetres of one side of one of the large hexagons?

[1]

- A 3.
- B $\sqrt{3}$.
- C $2\sqrt{3}$.
- D $\frac{\sqrt{3}}{3}$.
- E $\frac{4\sqrt{3}}{3}$.

23b What fraction of the shaded area is the area of **one** of the small hexagons?

[1]

A $\frac{1}{12}$.

B $\frac{1}{10}$.

C $\frac{1}{8}$.

D $\frac{1}{6}$.

E $\frac{1}{5}$.

Four students are trying to find the area of the rectangle ABCD.

Adam says “the length of the side AB is 9 times the side length of one of the small hexagons.”

Bailey says “the length of side AB is $2\frac{1}{2}$ times the side length BC.”

Cara says “the length of the side AB is 4 times the side length of one of the large hexagons.”

Dani says “the length of the side AB is $\frac{3}{4}$ of the perimeter of one of the large hexagons.”

Two of the students are correct.

23c Which students are correct?

[2]

A Adam and Bailey.

B Bailey and Dani.

C Cara and Dani.

D Adam and Dani.

E Bailey and Cara.

23d What is the area of the rectangle ABCD in square centimetres?

[2]

A $24\sqrt{3}$.

B 40.

C $\frac{24\sqrt{3}}{3}$.

D $\frac{36}{\sqrt{3}}$.

E $36\sqrt{3}$

23e What fraction of the rectangle's area is the shaded area?

[2]

A $\frac{8}{9}$.

B $\frac{7}{12}$.

C $\frac{2}{3}$.

D $\frac{5}{6}$.

E $\frac{11}{12}$.

End of test.