

Surname _____

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I declare this is my own work.

GCSE MATHEMATICS

H

Higher Tier

Paper 3 Calculator

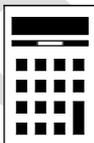
Shadow paper based on 2020 question paper

Time allowed: 1 hour 30 minutes

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 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 | |
| 26–27 | |
| TOTAL | |

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

- 1** What does $A \cup B$ represent in $P(A \cup B)$?
Circle your answer.

[1 mark]

A and B

A or B or both

not A and not B

A but not B

- 2** Circle the equation of the line that is parallel to $y = -\frac{1}{2}x - 3$

[1 mark]

$$y = -3x$$

$$y = 2x$$

$$y = \frac{1}{2}x + 3$$

$$y = -\frac{1}{2}x$$

- 3** Work out 240 as a percentage of 80
Circle your answer.

[1 mark]

33%

75%

200%

300%

4 A fair coin is spun three times.

Circle the probability of getting three Tails.

[1 mark]

$$\frac{1}{2}$$

2

$$\frac{1}{8}$$

$$\frac{1}{16}$$

5 To the nearest 1000, there are 29 000 people at a festival.

5 (a) Write down the maximum possible number of people at the festival.

[1 mark]

Answer _____

5 (b) Write down the minimum possible number of people at the festival.

[1 mark]

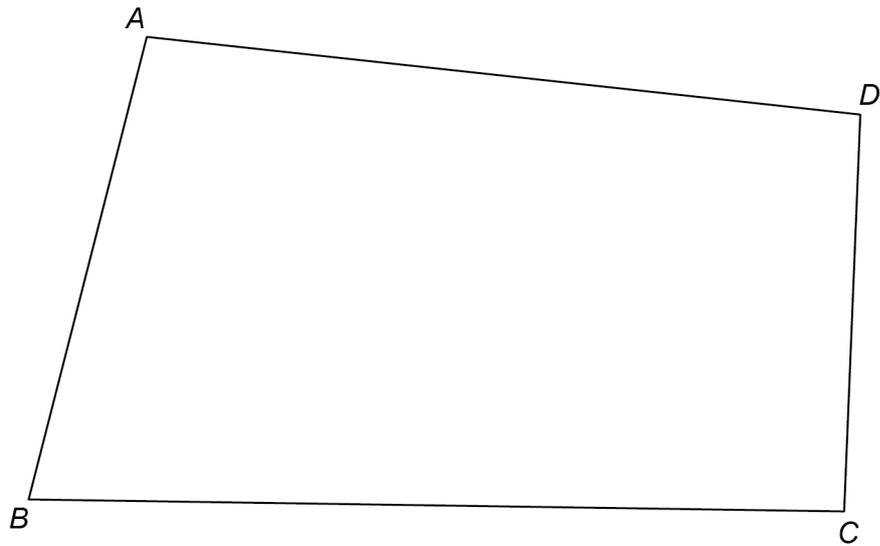
Answer _____

Turn over for the next question

Turn over ►

6

$ABCD$ represents the plan of a field.

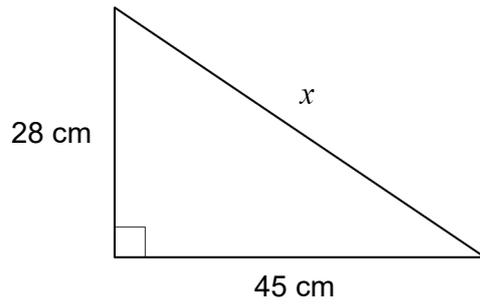


There is a path across the field that
starts at C
is the same distance from BC and CD .

Using ruler and compasses, show the position of the path.

[2 marks]

- 7 Use Pythagoras' theorem to work out the value of x .



Not drawn
accurately

[3 marks]

Answer _____ cm

Turn over for the next question

8

Colin visits a library.

He drives to the supermarket in half an hour at a speed of 30 miles per hour.

He shops at the supermarket for one hour.

He then drives home.

The sketch graph represents his visit.



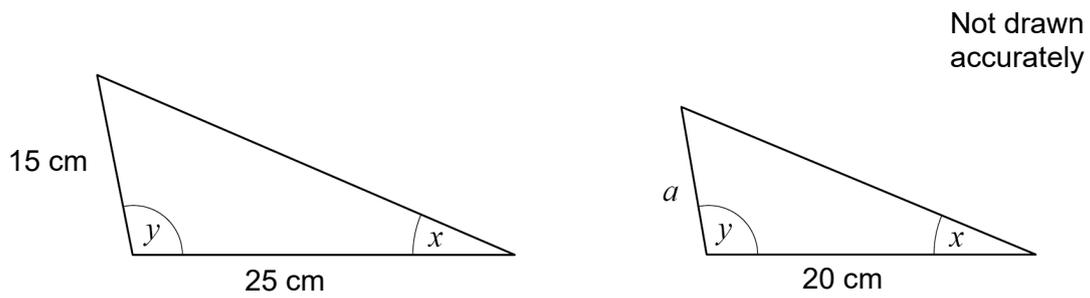
Work out the speed, in miles per hour, at which Colin drives home:

[3 marks]

Answer _____ mph

9

These two triangles are similar.



Work out the value of a .

[2 marks]

Answer _____ cm

10

Expand and simplify fully $5(3x - 2) - (4x + 3)$

[2 marks]

Answer _____

11 A spinner can land on red, blue or green.

After 550 spins

relative frequency of red = 0.28

relative frequency of blue = 0.56

Work out the number of times the spinner landed on green.

[3 marks]

Answer _____

- 12 Here is some information about 30 homes.
 a , b and c are all **different** numbers.

| Number of pets | Number of homes |
|----------------|-----------------|
| 1 | 8 |
| 2 | a |
| 3 | b |
| 4 | c |
| 5 | 9 |

The median number of pets is 3.5

Work out a possible set of values for a , b and c .

[3 marks]

$$a = \underline{\hspace{10em}}$$

$$b = \underline{\hspace{10em}}$$

$$c = \underline{\hspace{10em}}$$

13 (a) Simplify $\frac{42a}{8} \times \frac{4a}{6}$

Give your answer as a single fraction in its simplest form.

[2 marks]

Answer _____

13 (b) Lucien is trying to simplify $\frac{12d - 15}{3}$

His method is

divide $12d$ by 3

then

subtract 15

Evaluate his method.

[1 mark]

15 Solve $3 < \frac{x}{5} - 1$

[2 marks]

Answer _____

16 The number of computer games owned by 25 collectors is shown.

| Number of games | Frequency | Midpoint | |
|-----------------|-----------|----------|--|
| 10 to 14 | 8 | | |
| 15 to 19 | 11 | | |
| 20 to 24 | 4 | | |
| 25 to 29 | 2 | | |
| Total = 25 | | | |

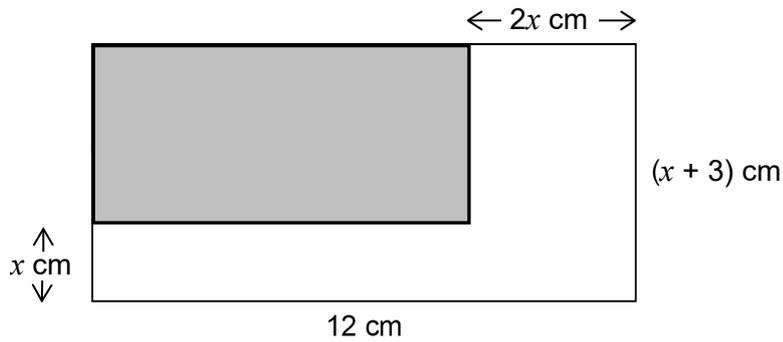
Work out an estimate of the mean number of games per collector.

[3 marks]

Answer _____

17 Here are two rectangles.

Not drawn accurately



The area of the shaded rectangle is **half** the area of the large rectangle.

Work out the value of x .

[4 marks]

Answer _____

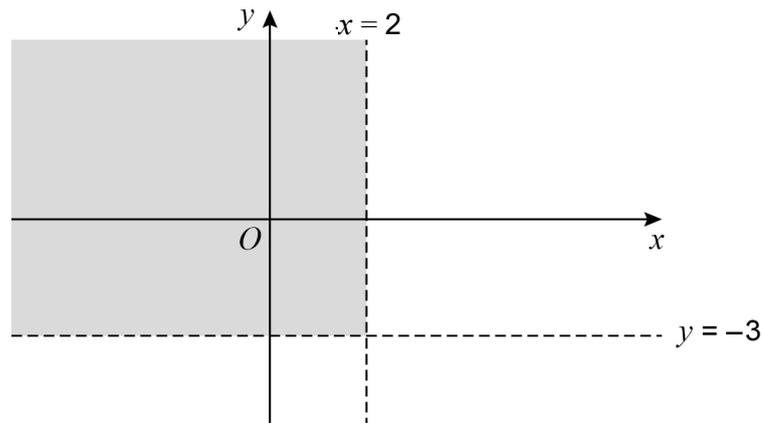
- 18** The pressure in a bicycle tyre is 65 pounds per square inch.
Convert the pressure into kilograms per square centimetre.

Use 1 pound = 0.45 kilograms
and
1 inch = 2.54 centimetres

[3 marks]

Answer _____ kg/cm²

- 19 The sketch shows the lines $x = 2$ and $y = -3$



Which pair of inequalities describes the shaded region?

Tick **one** box.

[1 mark]

$x < 2$ and $y < -3$

$x < 2$ and $y > -3$

$x > 2$ and $y > -3$

$x > 2$ and $y < -3$

Turn over for the next question

Turn over ►

20 Alana and Zak each play a game.

20 (a) Here is some information about Alana's scores.

Lowest 10

Highest 21

Lower quartile 15

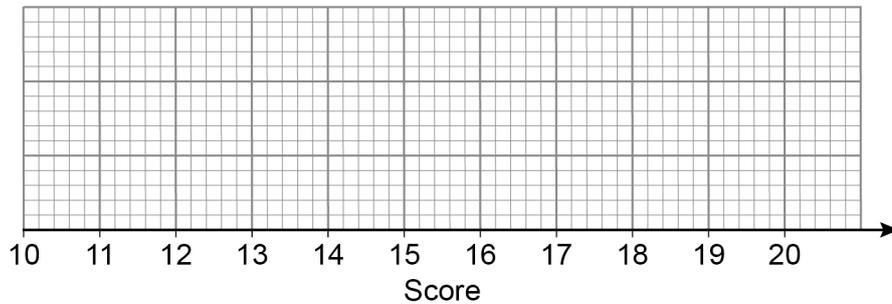
Upper quartile 19

Median 18

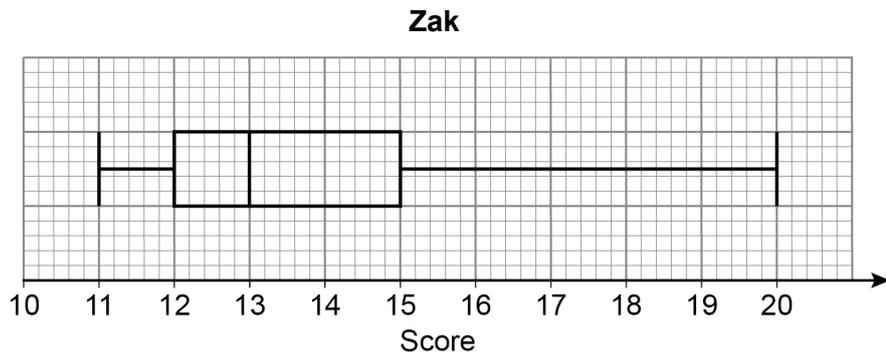
Draw a box plot to represent his scores.

[2 marks]

Alana



20 (b) This box plot represents Zak's scores.



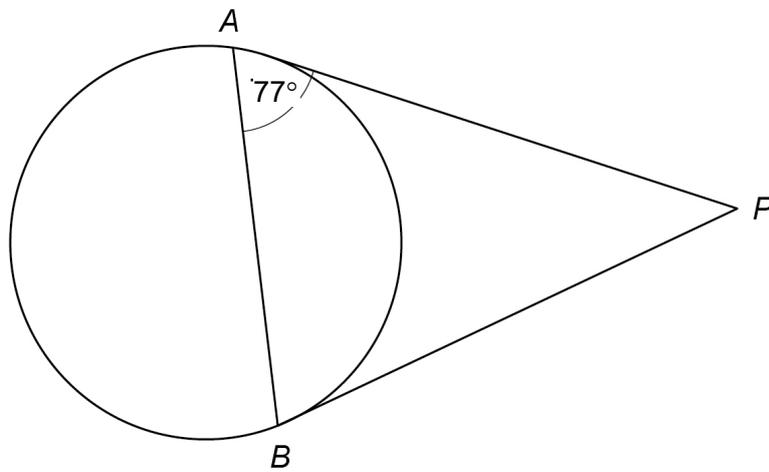
Who had more consistent scores, Alana or Zak?

Work out the interquartile ranges to support your answer.

[2 marks]

Turn over for the next question

- 21 (a) A and B are points on a circle.
 PA and PB are tangents.



Not drawn
accurately

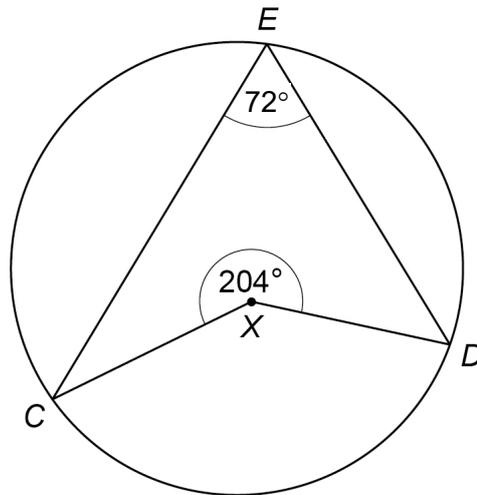
Work out the size of angle APB .

[2 marks]

Answer _____ degrees

21 (b) C , D and E are points on a different circle.

Not drawn accurately



Is X the centre of the circle?

Tick a box.

Yes

No

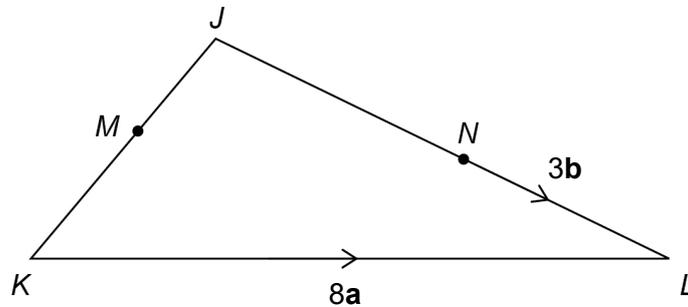
Show working to support your answer.

[2 marks]

Turn over for the next question

Turn over ►

23

In triangle JKL M is the midpoint of JK $JN : NL = 4 : 3$ $\vec{KL} = 8\mathbf{a}$ $\vec{NL} = 3\mathbf{b}$ Not drawn
accuratelyWork out \vec{JM} in terms of \mathbf{a} and \mathbf{b} .

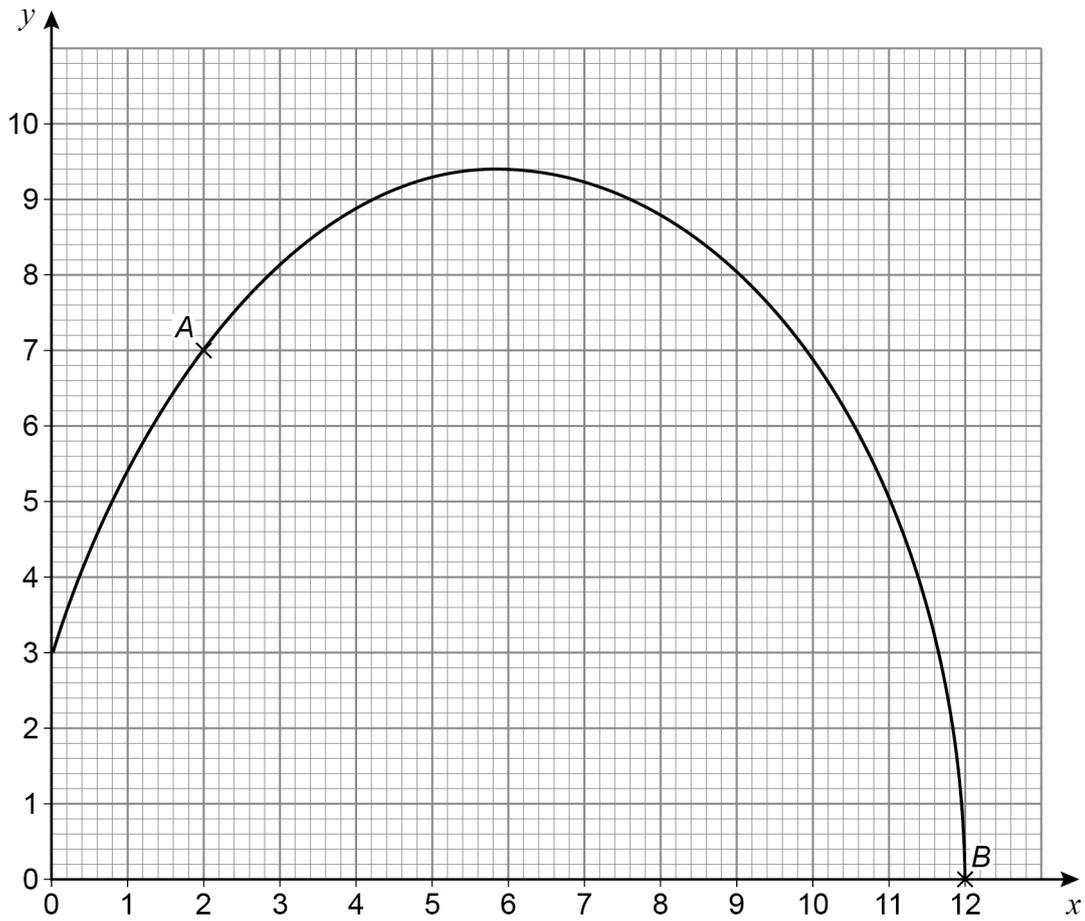
Give your answer in its simplest form.

[3 marks]

Answer _____

Turn over for the next question

- 24** A and B are points on a curve.
 A is $(2, 7)$ B is $(12, 0)$



- 24 (a)** Work out the instantaneous rate of change of y with respect to x at point A .

[2 marks]

Answer _____

24 (b) The average rate of change of y with respect to x between points A and B is worked out.

Which statement is correct?

Tick **one** box.

[1 mark]

It is positive.

It is zero.

It is negative.

You cannot tell if it is positive or negative.

25 The equation of a circle is $x^2 + y^2 = 25$

Work out the length of the **diameter**.

Circle your answer.

[1 mark]

5

10

15

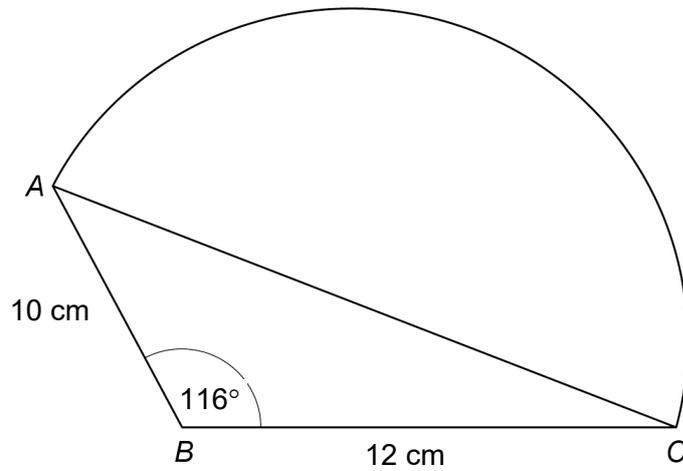
25

Turn over for the next question

29

A shape is made by joining triangle ABC to a semicircle with diameter AC .

Not drawn
accurately



Work out the **total** area of the shape.

[5 marks]

Answer _____ cm^2

There are no questions printed on this page

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