AQA

Please write clearly in block capitals.

Centre number ☐☐☐☐☐   Candidate number ☐☐☐☐

Surname _____

Forename(s) _____

Candidate signature _____
I declare this is my own work.
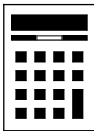
GCSE
MATHEMATICS

H

Higher Tier   Paper 3 Calculator

Monday 8 June 2020   Morning   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 U B   represent in   P(A U B) ?

Circle your answer.

[1 mark]

A or B or both   A but not B

not A and not B   A and B

2 Circle the equation of the line that is parallel to $y = \dfrac{1}{2}x + 3$

[1 mark]

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

3 Work out 320 as a percentage of 80

Circle your answer.

[1 mark]

25%   75%   300%   400%

4   A fair coin is spun four times.

Circle the probability of getting four Heads.

[1 mark]

$$\frac{1}{2} \qquad 2 \qquad \frac{1}{8} \qquad \frac{1}{16}$$

5   To the nearest 1000, there are 18 000 people at a festival.

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

[1 mark]

Answer _____

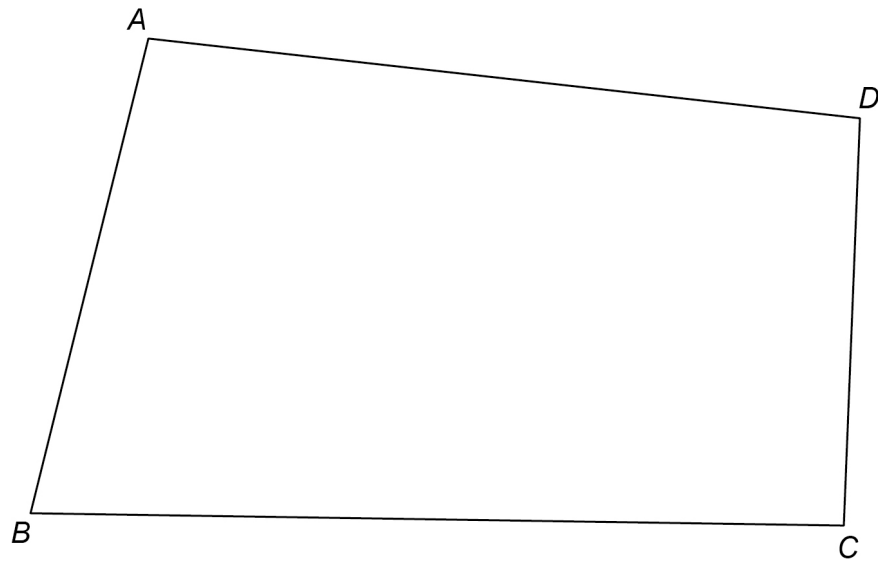**5** **(b)**   Write down the maximum possible number of people at the festival.

[1 mark]

Answer _____

Turn over for the next question

6

Turn over ▶

6 *ABCD* represents the plan of a field.

There is a path across the field that

    starts at *B*
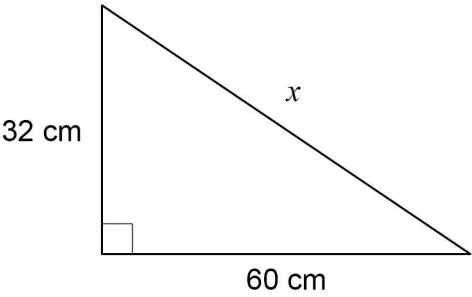
    is the same distance from *BA* and *BC*.

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

32 cm

x

60 cm

[3 marks]

Answer _____ cm

Turn over for the next question

5

Turn over ▶

8 Chris visits a library.

He cycles to the library in half an hour at a speed of 12 miles per hour.

He stays at the library for one hour.

He then cycles home.

The sketch graph represents his visit.
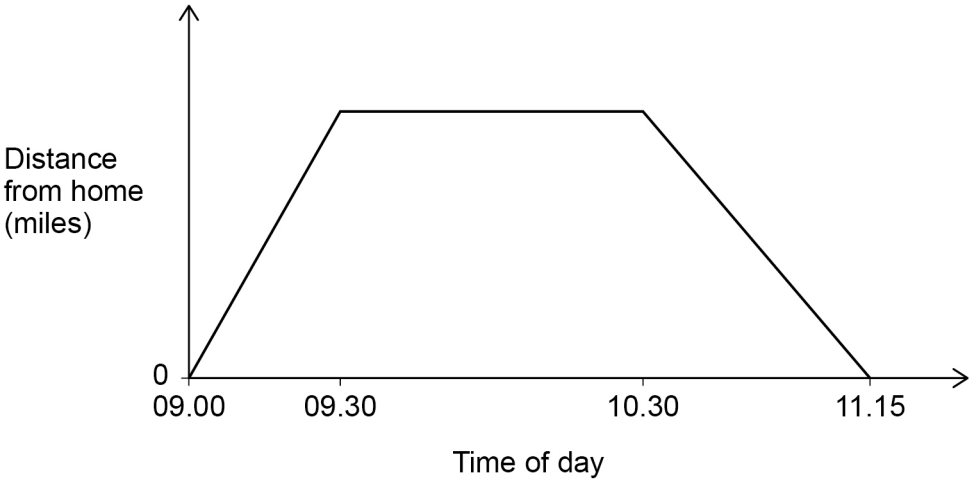
Work out the speed, in miles per hour, at which Chris cycles home.

[3 marks]

Answer _____ mph

9 These two triangles are similar.

Not drawn accurately

12 cm

y

20 cm

x

a

y

16 cm

x
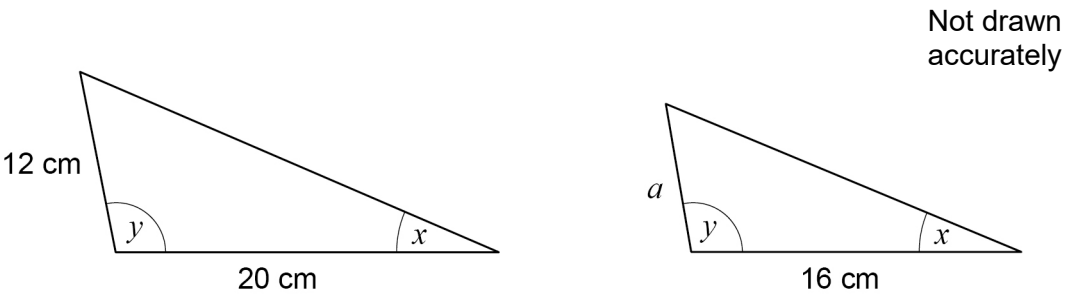
Work out the value of a.

[2 marks]

Answer _____ cm

10 Expand and simplify fully $4(2c + 3) - (5c - 1)$

[2 marks]

Answer _____

Turn over ▶

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

After 350 spins

   relative frequency of red = 0.18

   relative frequency of blue = 0.62

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

[3 marks]

Answer _____

12 Here is some information about 26 houses.

a, b and c are all **different** numbers.

Number of bedrooms	Number of houses
1	7
2	a
3	b
4	c
5	8

The median number of bedrooms is 3.5

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

[3 marks]

$a =$ _____

$b =$ _____

$c =$ _____

6

Turn over ▶

13 (a) Simplify $\dfrac{25a}{8} \times \dfrac{2a}{5}$

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

[2 marks]

Answer _____

13 (b) Sofia is trying to simplify $\dfrac{6c + 10}{2}$

Her method is

divide $6c$ by 2

then

add 10

Evaluate her method.

[1 mark]

14 A rectangle has length 60 cm and width 40 cm

Not drawn accurately

40 cm

60 cm
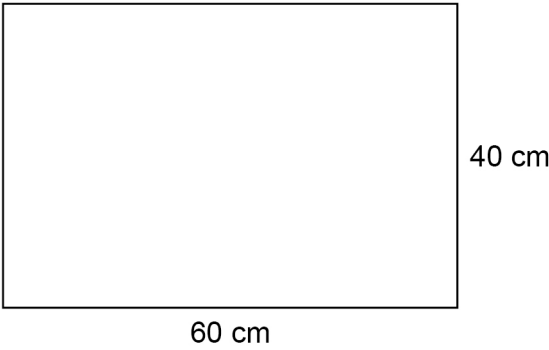
The length decreases by 15%

The width decreases by 10%

Sue says,

"The perimeter decreases by 25% because 15% + 10% is 25%"

Is she correct?

You **must** show calculations to support your answer.

[4 marks]

7

Turn over ▶

15 Solve $4 > 11 - \dfrac{x}{3}$

[2 marks]

Answer _____

16 The number of goals scored by 20 players in a season is shown.

Number of goals	Frequency	Midpoint	
0 to 4	6		
5 to 9	11		
10 to 14	3		
	Total = 20		

Work out an estimate of the mean number of goals per player.

Give your answer as a decimal.

[3 marks]

Answer _____

17   Here are two rectangles.

Not drawn accurately
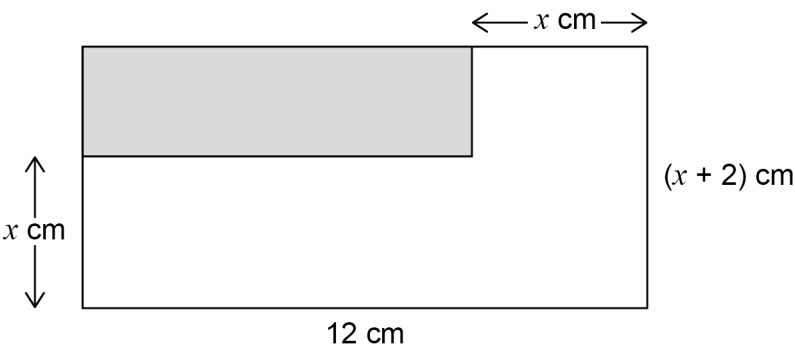
The area of the shaded rectangle is $\frac{1}{4}$ the area of the large rectangle.

Work out the value of x.

[4 marks]

Answer _____

9

Turn over ▶

18   The pressure in a tyre is 30 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/cm^2

19 The sketch shows the lines $x = 1$ and $y = -3$
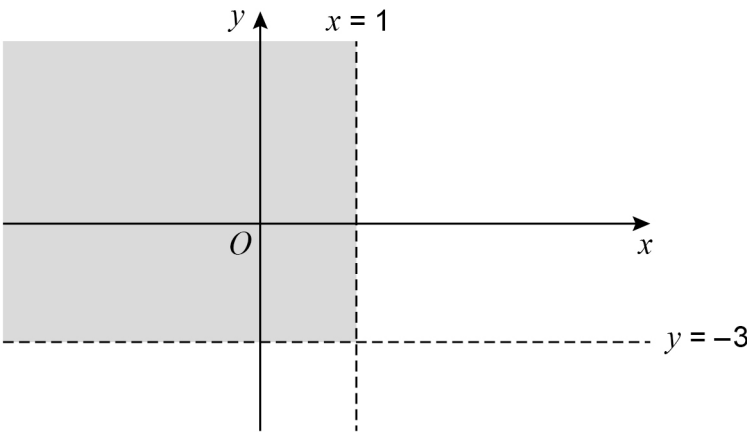
Which pair of inequalities describes the shaded region?

Tick **one** box.

[1 mark]

☐ $x < 1$ and $y < -3$

☐ $x < 1$ and $y > -3$

☐ $x > 1$ and $y > -3$

☐ $x > 1$ and $y < -3$

Turn over for the next question

4

Turn over ▶

20 Amari and Ben each play a game.

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

Lowest 12

Highest 20

Lower quartile 13

Upper quartile 19

Median 17

Draw a box plot to represent his scores.

[2 marks]
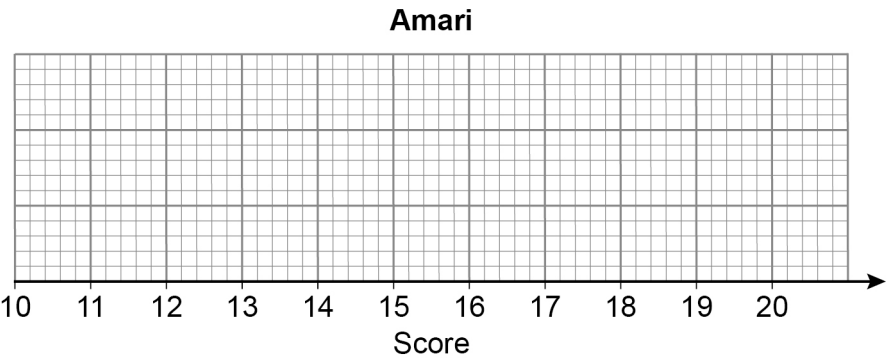
Amari

Score

Do not write outside the box

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

Ben
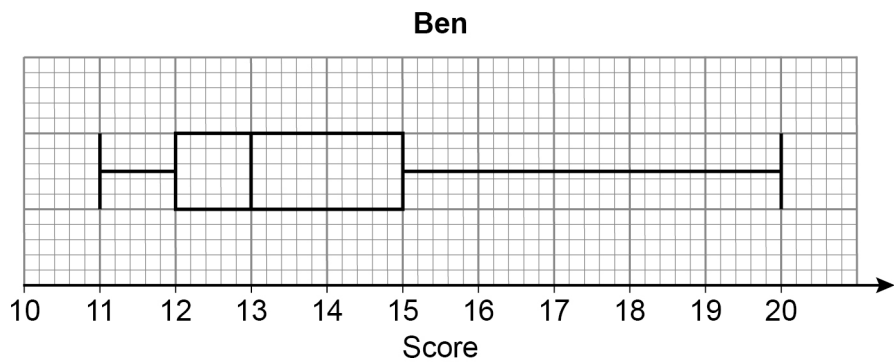
Score

Who had more consistent scores, Amari or Ben?

Work out the interquartile ranges to support your answer.

[2 marks]

_____

_____

_____

_____

_____

_____

_____

Turn over for the next question

4

Turn over ▶

21 (a) *A* and *B* are points on a circle.

PA and *PB* are tangents.
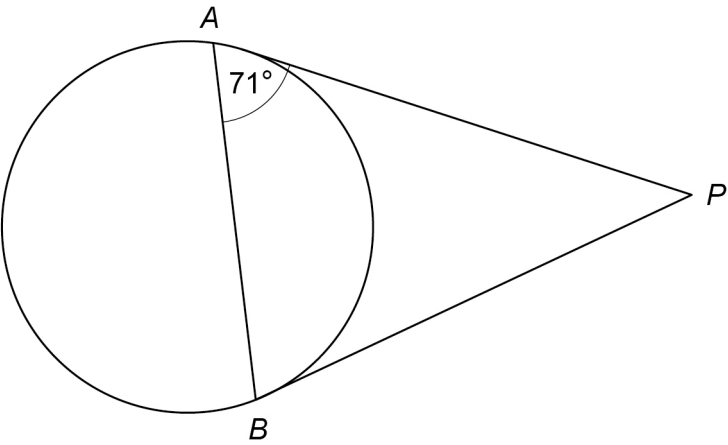
Not drawn accurately

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
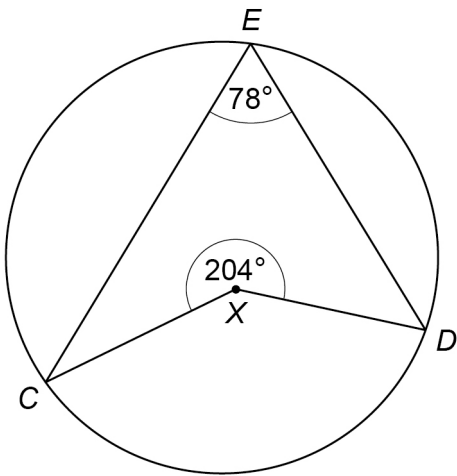
Is *X* the centre of the circle?

Tick a box.

[ ] Yes   [ ] No

Show working to support your answer.

[2 marks]

_____

_____

_____

_____

Turn over for the next question

Turn over ▶

4

22   Visitors to a museum buy a child ticket or an adult ticket.

Here is some information about two groups of visitors.

Group X	250 visitors, including 120 children
Group Y	number of children : number of adults = 17 : 15

One visitor from each group is picked at random.

Is this statement correct?

Probability of picking two children > probability of picking two adults

You **must** show your working.

[4 marks]

Do not write outside the box

23 In triangle *JKL*

M is the midpoint of *JK*

JN : *NL* = 3 : 2

$\overrightarrow{KL}$ = 7**a** $\overrightarrow{NL}$ = 4**b**

Not drawn accurately
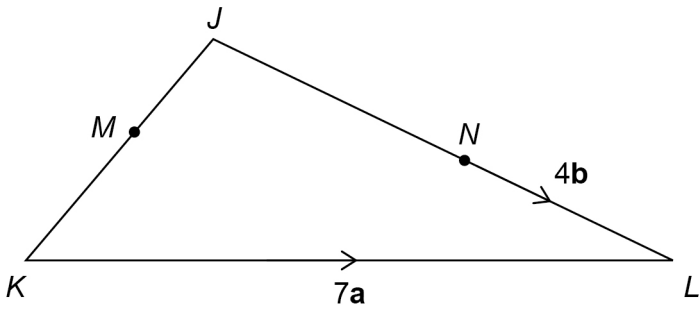
Work out $\overrightarrow{JM}$ in terms of **a** and **b**.

Give your answer in its simplest form.

[3 marks]

Answer

Turn over for the next question

7

Turn over ▶

24   *A* and *B* are points on a curve.

       A is (2, 7)   *B* is (12, 0)
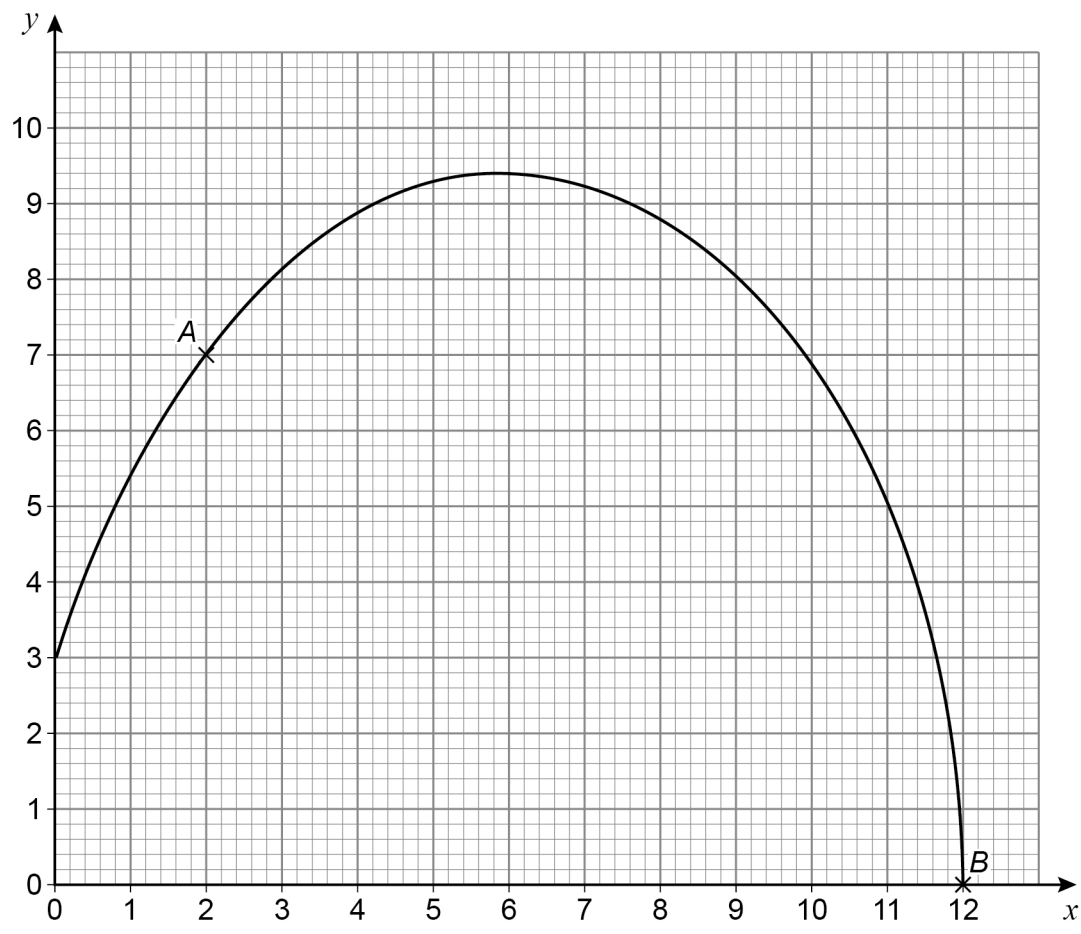
24 (a)   Work out the instantaneous rate of change of y with respect to x at point *A*.

[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 $x^2 + y^2 = 9$

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

Circle your answer.

[1 mark]

| 3 | 6 | 9 | 18 |

Turn over for the next question

4

Turn over ▶

26 Prove algebraically that $3.4\dot{7} = \dfrac{313}{90}$

[3 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

27 The equation of a curve is $y = (x - 1)^2 - 6$

Circle the coordinates of the turning point.

[1 mark]

$(-1, -6)$ $(1, 6)$ $(-1, 6)$ $(1, -6)$

28   Line A has equation $y = 4x - 1$

Line B is

     perpendicular to line A

     and

     passes through the point (8, 5)

Work out the coordinates of the point where line B intersects the x-axis.

[4 marks]

Answer   (_____ , _____)

Turn over for the next question

8

Turn over ▶

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

Not drawn accurately

A

8 cm

114°

B   10 cm   *C*

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

[5 marks]

Answer _____ cm^2

Do not write outside the box

30 $f(x) = \dfrac{1}{2}x$ $g(x) = x - x^2$

Solve $f^{-1}(x) = gf(x)$

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Answer _____

END OF QUESTIONS

9

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

Do not write outside the box

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright information

For confidentiality purposes, all acknowledgements of third-party copyright material are published in a separate booklet. This booklet is published after each live examination series and is available for free download from www.aqa.org.uk.

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team.