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

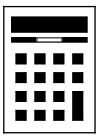
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Higher Tier Paper 3 Calculator

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.

Do not write outside the box

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

[1 mark]

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

3 Work out 320 as a percentage of 80

Circle your answer.

[1 mark]

25% | 75% | 300% | 400%

Do not write outside the box

4 A fair coin is spun four times.

Circle the probability of getting four Heads.

[1 mark]

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

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]

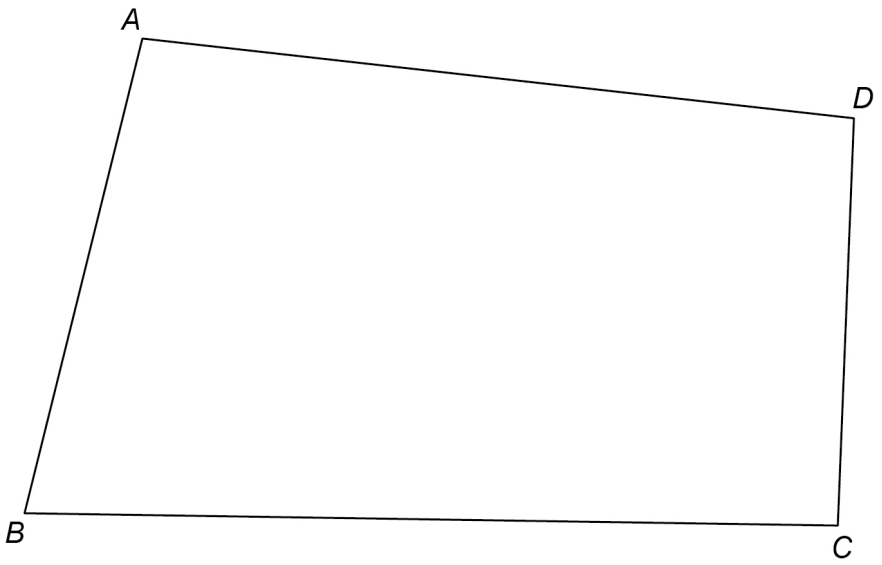
Answer _____

Turn over for the next question

6

Do not write outside the box

6 *ABCD* represents the plan of a field.



There is a path across the field that

starts at *B*

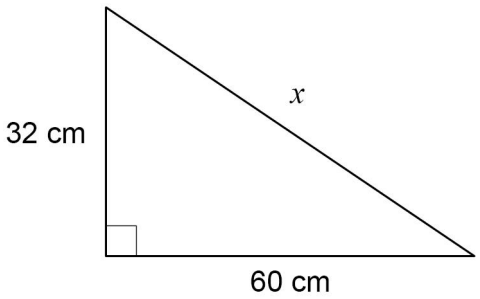
is the same distance from *BA* and *BC*.

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

[2 marks]

Do not write outside the box

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



Not drawn accurately

[3 marks]

Answer _____ cm

Turn over for the next question

5

Turn over ►

Do not write outside the box

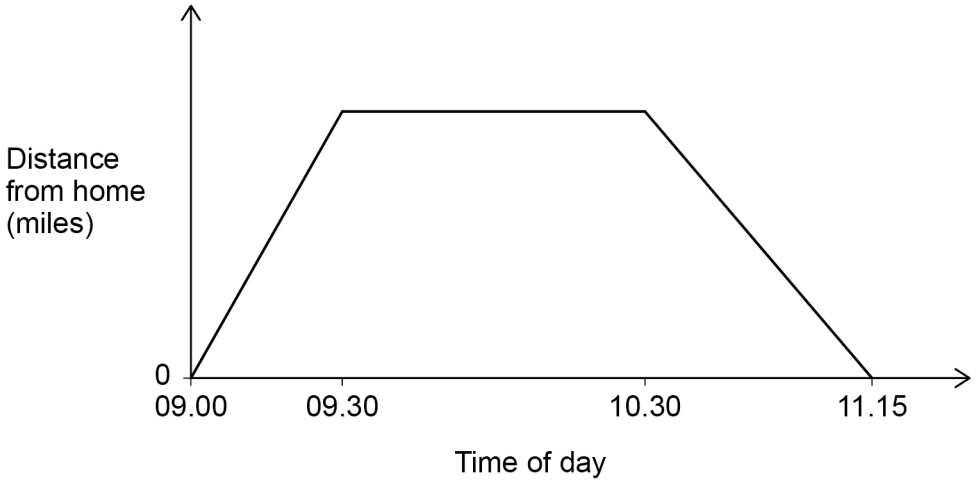
8 Chris visits a library.

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.

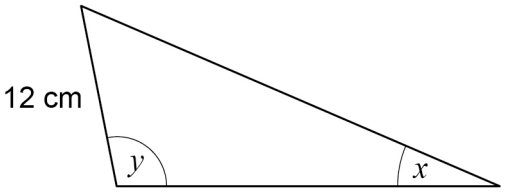
[3 marks]

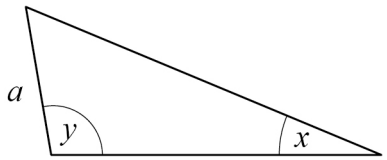
Answer _____ mph

Do not write outside the box

9 These two triangles are similar.

Not drawn accurately





Work out the value of a.

[2 marks]

Answer _____ cm

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

[2 marks]

Answer _____

7

Turn over ►

Do not write outside the box

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 _____

Do not write outside the box

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

Do not write outside the box

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

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

[2 marks]

Answer _____

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

Her method is

divide $6c$ by 2

then

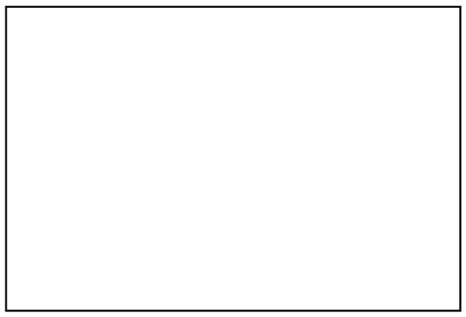
add 10

Evaluate her method.

[1 mark]

Do not write outside the box

14 A rectangle has length 60 cm and width 40 cm



Not drawn accurately

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 ►

Do not write outside the box

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

[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.

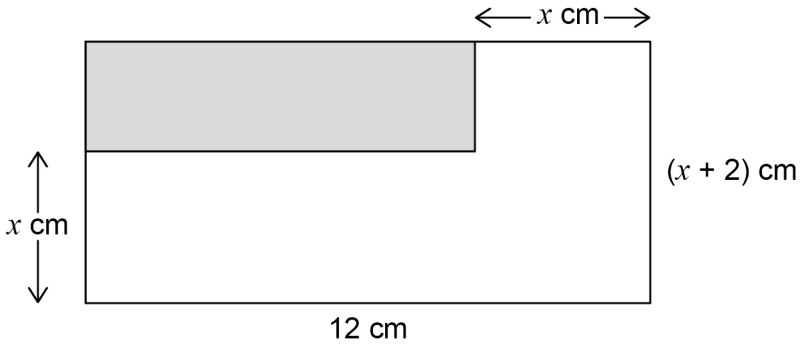
[3 marks]

Answer _____

Do not write outside the box

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 ►

Do not write outside the box

18 The pressure in a tyre is 30 pounds per square inch.

Convert the pressure into kilograms per square centimetre.

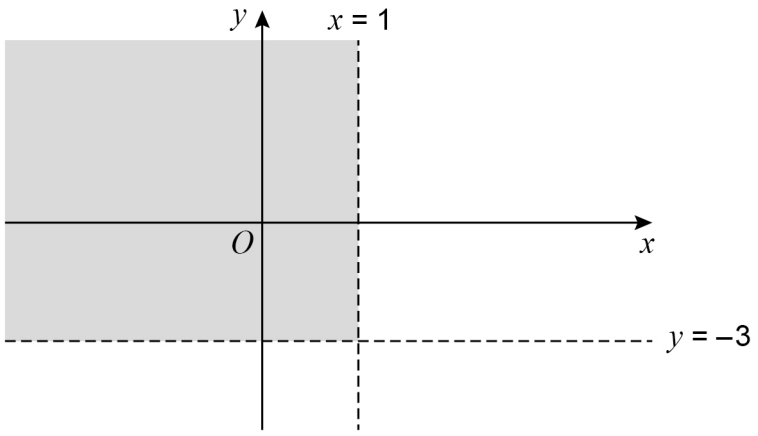
Use	1 pound = 0.45 kilograms and 1 inch = 2.54 centimetres

[3 marks]

Answer _____ kg/cm^2

Do not write outside the box

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

Do not write outside the box

20 Amari and Ben each play a game.

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

Lowest 12

Highest 20

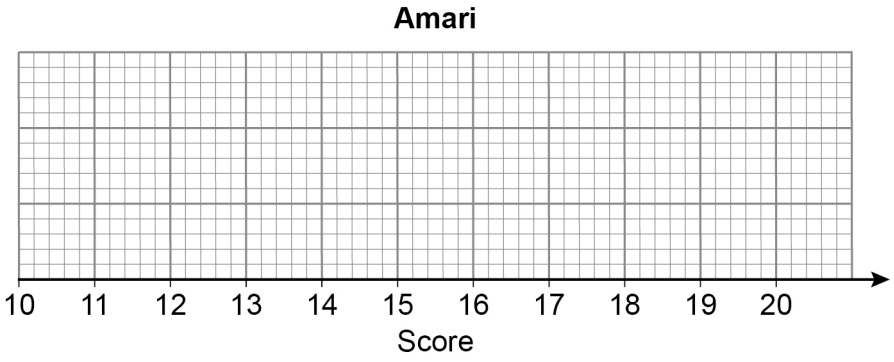
Lower quartile 13

Upper quartile 19

Median 17

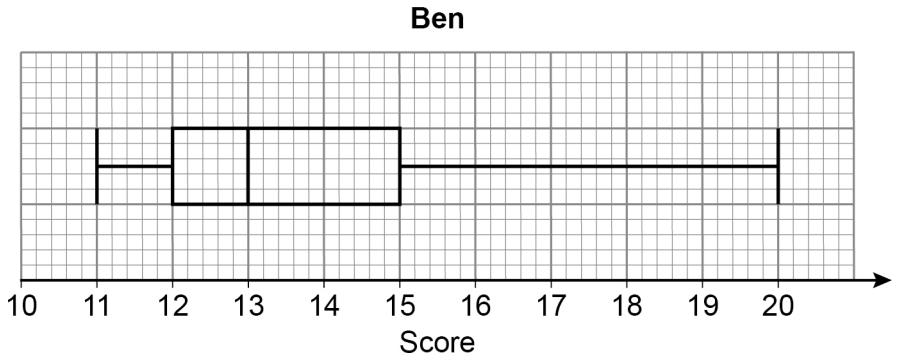
Draw a box plot to represent his scores.

[2 marks]



Do not write outside the box

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



Who had more consistent scores, Amari or Ben?

Work out the interquartile ranges to support your answer.

[2 marks]

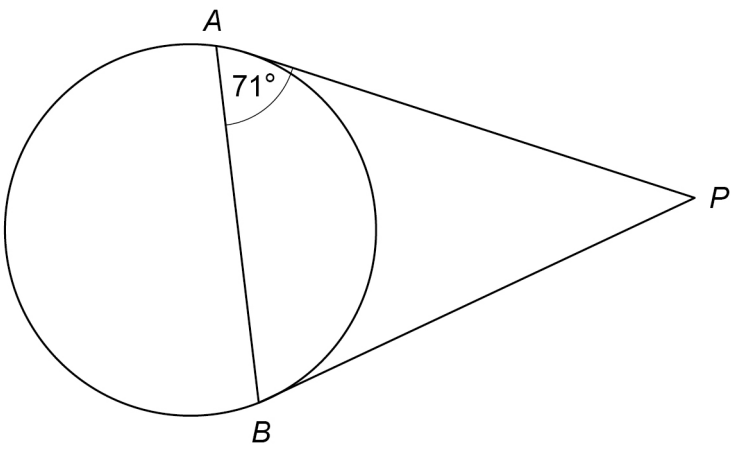
Turn over for the next question

4

Do not write outside the box

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*.

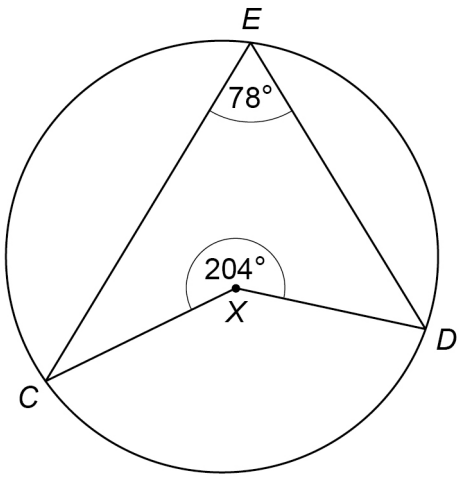
[2 marks]

Answer _____ degrees

Do not write outside the box

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

4

Do not write outside the box

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

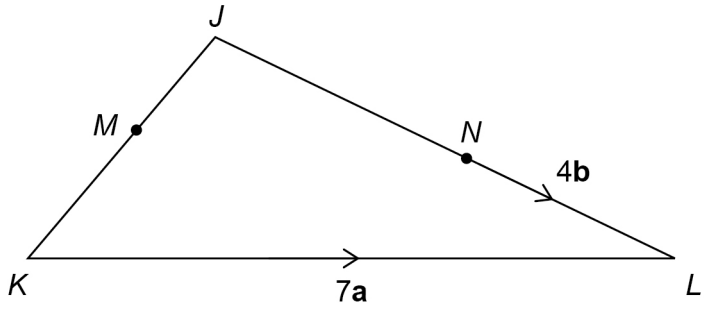
23 In triangle *JKL*

M is the midpoint of *JK*

JN : *NL* = 3 : 2

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

Not drawn accurately



Work out $\overrightarrow{JM}$ in terms of **a** and **b**.

Give your answer in its simplest form.

[3 marks]

Answer _____

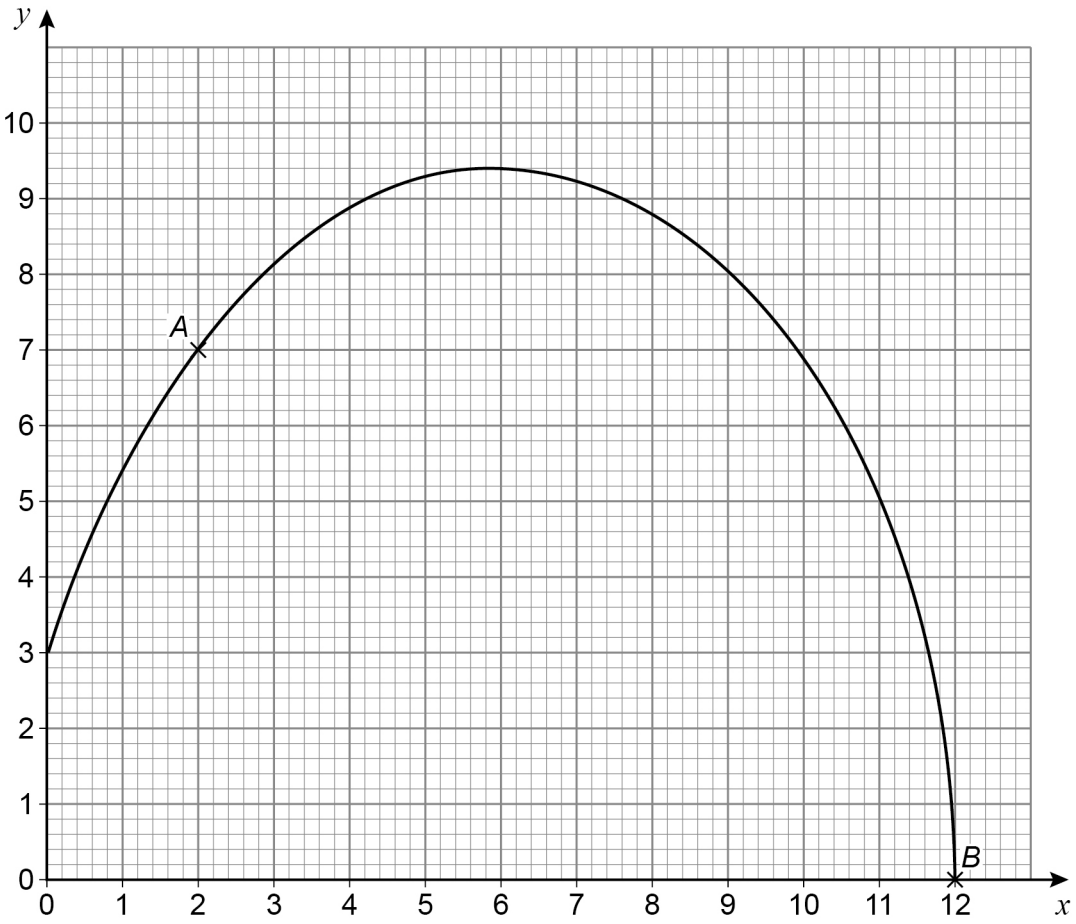
Turn over for the next question

7

Do not write outside the box

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 _____

Do not write outside the box

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

Do not write outside the box

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

[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)

Do not write outside the box

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 (_____ , _____)

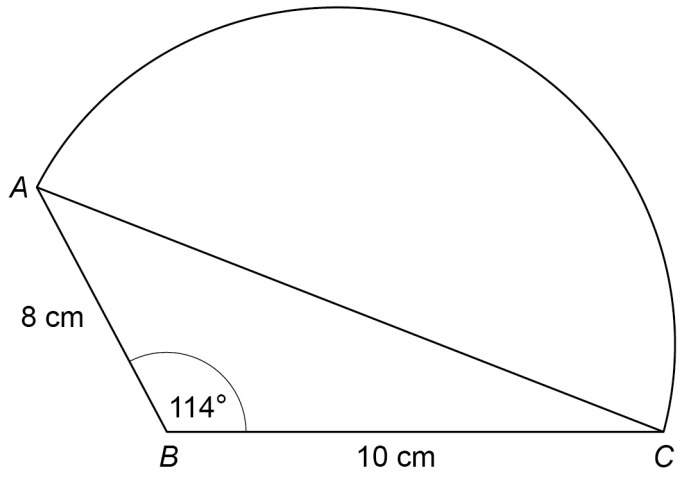
Turn over for the next question

8

Do not write outside the box

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

Do not write outside the box

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

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

[4 marks]

Answer _____

END OF QUESTIONS

9

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