AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

H

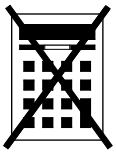
Higher Tier Paper 1 Non-Calculator

Thursday 2 November 2017 Morning 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.
- 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.
- 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 Work out $\sqrt{2^6 + 6^2}$

Circle your answer.

[1 mark]

10 14 50 100

2 What is 800 million in standard form?

Circle your answer.

[1 mark]

800×10^6 8×10^8 8×10^9 0.8×10^{10}

3 Circle the expression that is equivalent to $\left(4a^5\right)^2$

[1 mark]

$16a^{10}$ $16a^7$ $8a^{10}$ $8a^7$

4 $y = \frac{10}{x}$

If the value of x doubles, what happens to the value of y?

Circle your answer.

[1 mark]

÷ 2 × 2 ÷ 5 × 5

5 (a) Factorise $x^2 - 100$

[1 mark]

Answer _____

5 (b) Solve $7x + 6 > 1 + 2x$

[2 marks]

Answer _____

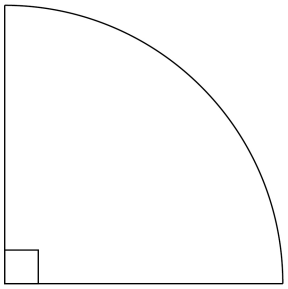
7

6 Work out the value of $\left(\sqrt{3}\right)^2 \times \left(\sqrt{2}\right)^2$

[2 marks]

Answer _____

7 Here is a quarter circle of radius 6 cm



Not drawn accurately

Work out the area of the quarter circle.

Give your answer in terms of π.

[2 marks]

Answer _____ cm^2

8 Three **whole** numbers are each rounded to the nearest 10

The sum of the rounded numbers is 70

Work out the **maximum** possible sum for the original three numbers.

[2 marks]

Answer _____

9 Circle the expression for the range of n consecutive integers.

[1 mark]

$\frac{n+1}{2}$ $n-1$ n $n+1$

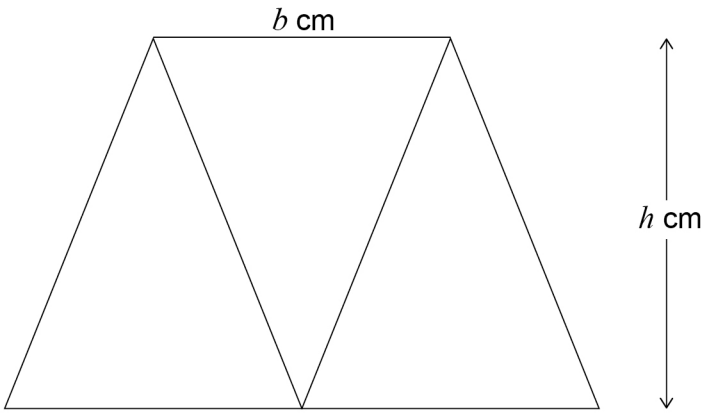
Turn over for the next question

7

10 Three identical isosceles triangles are joined to make this trapezium.

Each triangle has base b cm and perpendicular height h cm

Not drawn accurately



10 (a) Work out an expression, in terms of b and h, for the area of the trapezium.

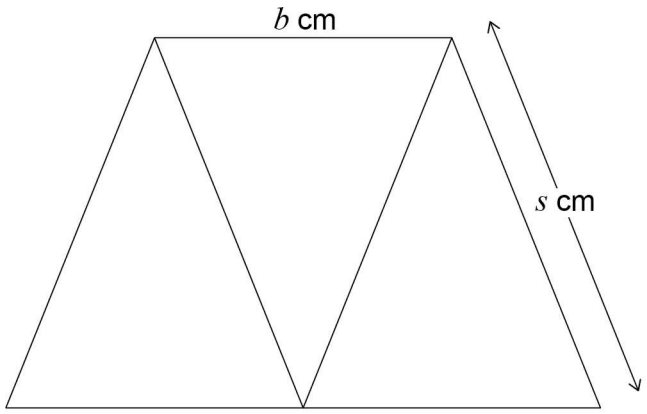
Give your answer in its simplest form.

[2 marks]

Answer _____ cm^2

10 (b) This diagram shows the same trapezium.

Not drawn accurately



$b : s = 2 : 3$

Work out an expression, in terms of b, for the perimeter of the trapezium.

[2 marks]

Answer _____ cm

Turn over for the next question

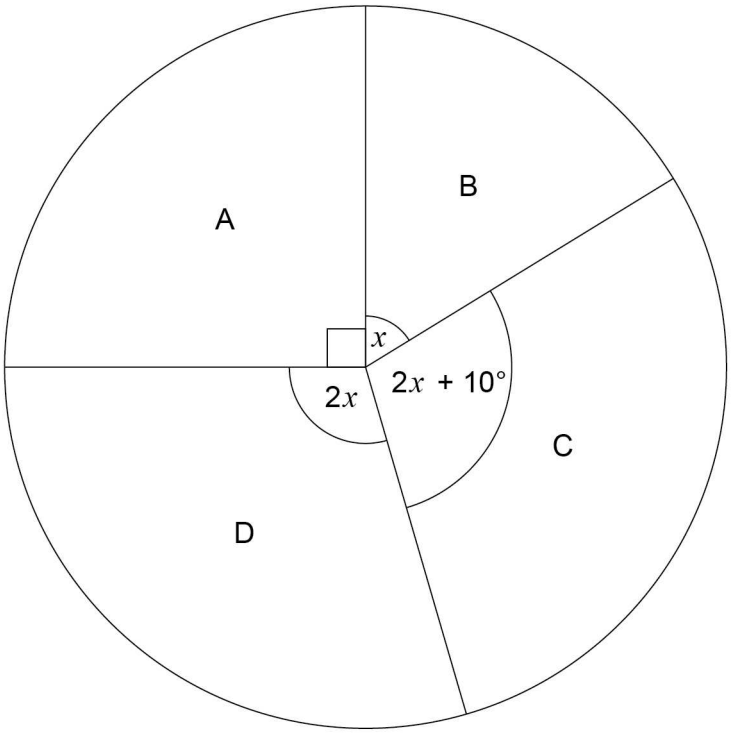
4

11 The four candidates in an election were A, B, C and D.

The pie chart shows the proportion of votes for each candidate.

Proportion of votes

Not drawn accurately



Work out the probability that a person who voted, chosen at random, voted for C.

[4 marks]

Answer _____

12 Use approximations to 1 significant figure to estimate the value of

$$\frac{0.526 \times 39.6^2}{\sqrt{97.65}}$$

You **must** show your working.

[3 marks]

Answer _____

Turn over for the next question

7

13 $x : y = 7 : 4$

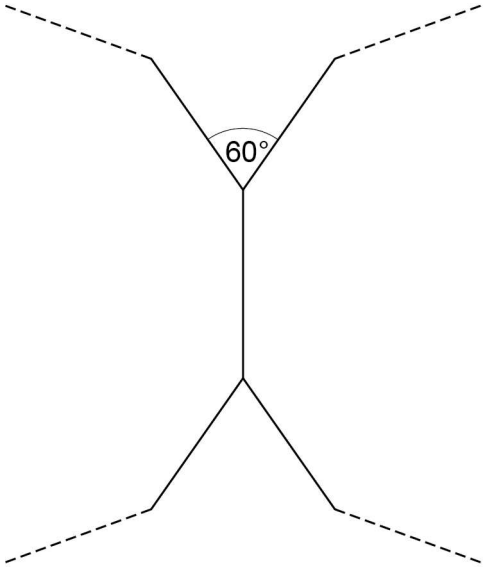
$x + y = 88$

Work out the value of $x - y$

[3 marks]

Answer _____

14 Two congruent regular polygons are joined together.



Not drawn accurately

Work out the number of sides on each polygon.

[3 marks]

Answer _____

Turn over for the next question

6

15

Meal Deal

Choose one sandwich, one drink and one snack

There are

7 different sandwiches

5 different drinks

and

3 different snacks.

15 (a) How many different Meal Deal combinations are there?

[2 marks]

Answer _____

15 (b) Two of the sandwiches have cheese in them.

Three of the drinks are fizzy.

Eva picks a Meal Deal at random.

Work out the probability that the sandwich has cheese in it **and** the drink is fizzy.

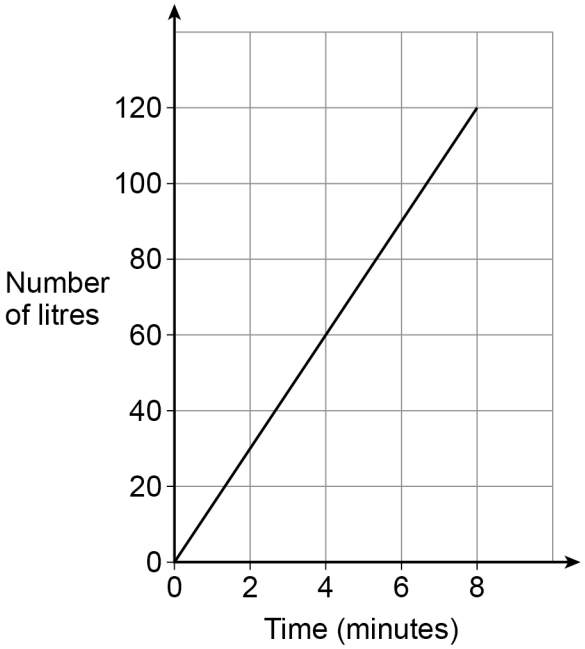
Give your answer as a fraction.

[2 marks]

Answer _____

16 Water is poured into a tank.

The graph shows the number of litres of water in the tank.



How much water is poured into the tank each minute?

Circle your answer.

[1 mark]

1.5 litres | 15 litres | 30 litres | 120 litres

Turn over for the next question

5

17 A and B are **similar** solids.

Solid	length (cm)
A	l
B	$2l$

Alex says,

''The volume of B is double the volume of A
because the length of B is double the length of A.''

Is he correct?

Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

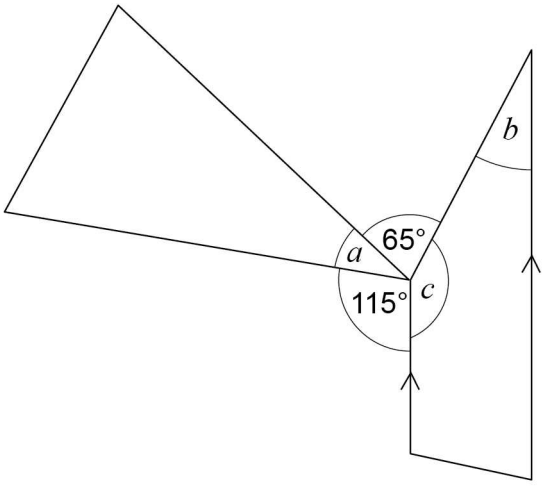
[1 mark]

18 Circle the **two** roots of $(2x + 3)(5x - 2) = 0$

[1 mark]

$-\frac{3}{2}$ $-\frac{2}{5}$ $\frac{2}{5}$ $\frac{3}{2}$

19 The diagram shows a triangle and a trapezium.



Not drawn accurately

Prove that $a = b$

[3 marks]

Turn over for the next question

5

20 In one month, the number of hours of exercise taken by 10 people are

4 7 2 8 6 5 1 82 3 9

Which is the appropriate average to use in this situation?

Tick a box.

☐ Mean ☐ Median ☐ Mode

Give one reason for each of the other two averages as to why they are **not** appropriate.

[2 marks]

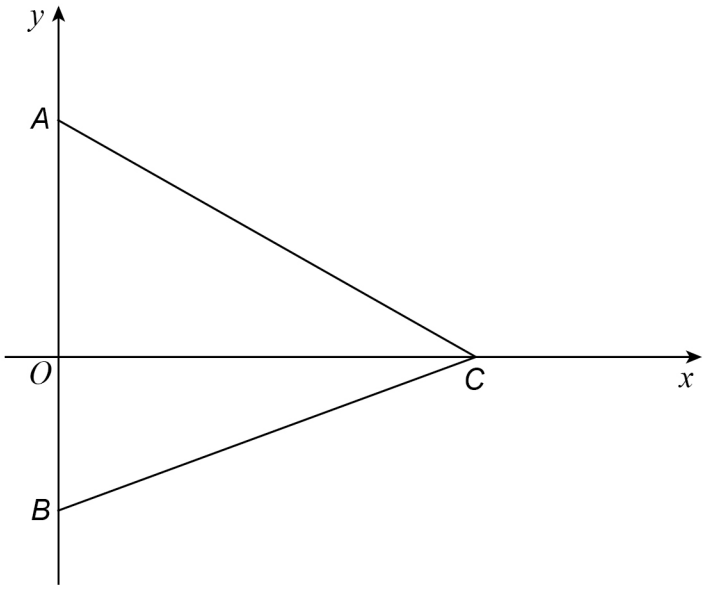
Reason 1 _____

_____

Reason 2 _____

_____

21 *A*, *B* and *C* are points on the axes as shown.



Not drawn accurately

The area of triangle *ABC* is 28 square units.

Work out possible coordinates for *A*, *B* and *C*.

[2 marks]

A (_____ , _____) *B* (_____ , _____) *C* (_____ , _____)

Turn over for the next question

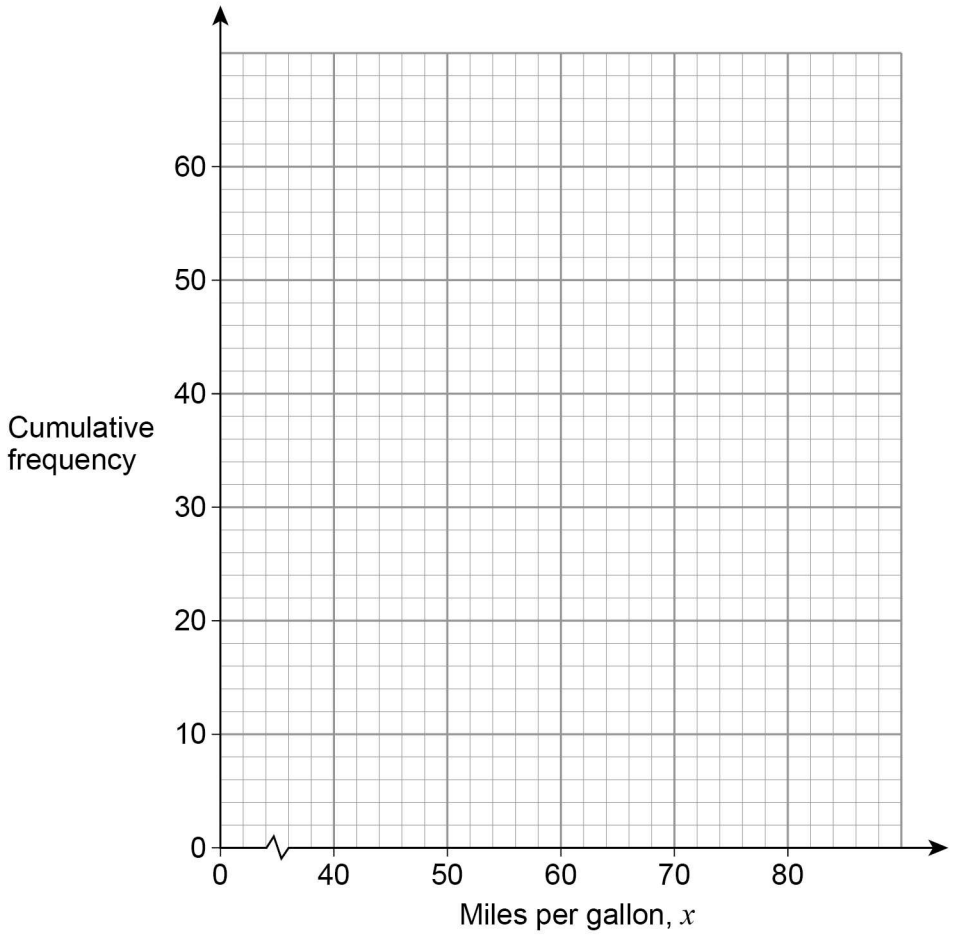
4

22 Here is some information about the miles per gallon of 60 cars.

Miles per gallon, x	**Frequency**
$40 < x \leqslant 50$	6
$50 < x \leqslant 60$	16
$60 < x \leqslant 70$	28
$70 < x \leqslant 80$	10

22 (a) Draw a cumulative frequency graph.

[3 marks]



22 (b) Use the graph to work out the interquartile range.

[2 marks]

Answer _____ miles per gallon

23 The equation of a curve is $y = (x + 3)^2 + 5$

Circle the coordinates of the turning point.

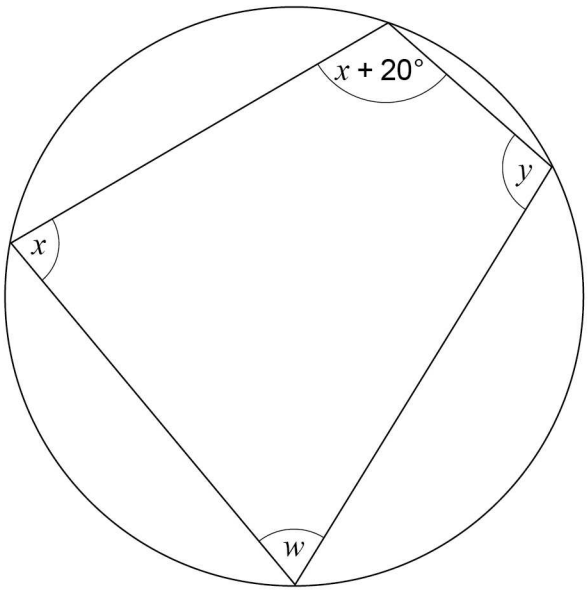
[1 mark]

(5, 3) (5, –3) (3, 5) (–3, 5)

Turn over for the next question

6

24 Here is a cyclic quadrilateral.



Not drawn accurately

$x : y = 5 : 7$

Work out the size of angle w.

[4 marks]

Answer _____ degrees

25 15 machines work at the same rate.

Together, the 15 machines can complete an order in 8 hours.

3 of the machines break down after working for 6 hours.

The other machines carry on working until the order is complete.

In total, how many hours does **each** of the other machines work?

[3 marks]

Answer _____ hours

Turn over for the next question

7

26 (a) $0.\dot{7} = \frac{7}{9}$

Use this fact to show that $0.0\dot{7} = \frac{7}{90}$

[1 mark]

26 (b) Using part (a) or otherwise, convert $0.2\dot{7}$ to a fraction.

Give your answer in its simplest form.

[3 marks]

Answer _____

27 There are 11 pens in a box.

8 are black and 3 are red.

Two pens are taken out at random **without** replacement.

Work out the probability that the two pens are the **same** colour.

[4 marks]

Answer _____

8

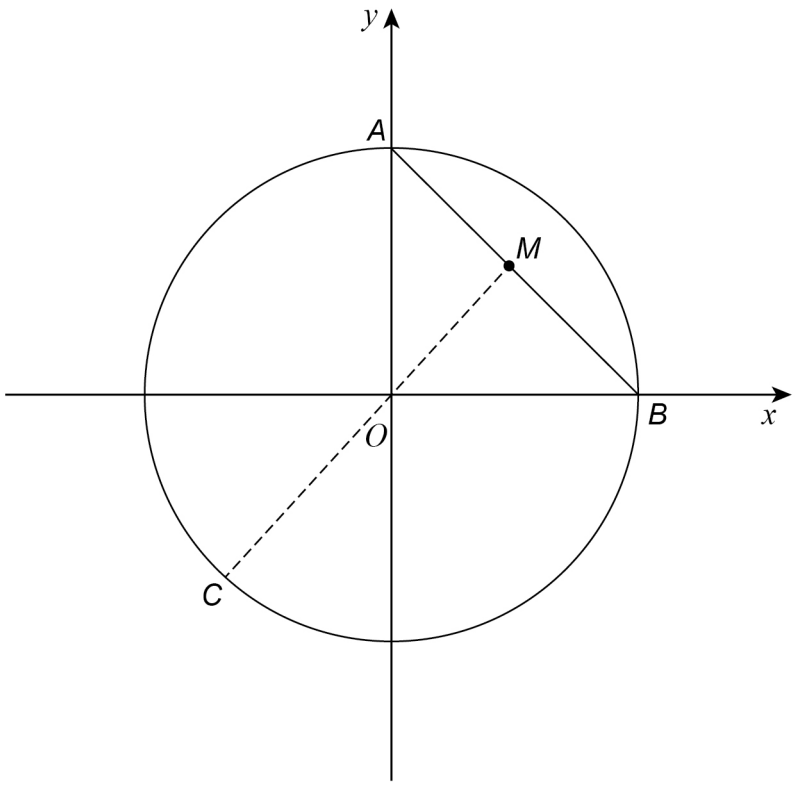
28 *A, B* and *C* are points on the circle $x^2 + y^2 = 36$ as shown.

A is on the y-axis.

B is on the x-axis.

M is the midpoint of *AB*.

COM is a straight line.



28 (a) Show that the coordinates of *A* are (0, 6)

[1 mark]

28 (b) Work out the coordinates of *B*.

[1 mark]

Answer (_____ , _____)

28 (c) Show that the equation of the straight line passing through C, O and M is $y = x$

[2 marks]

28 (d) Work out the coordinates of C.

Give your answers in surd form.

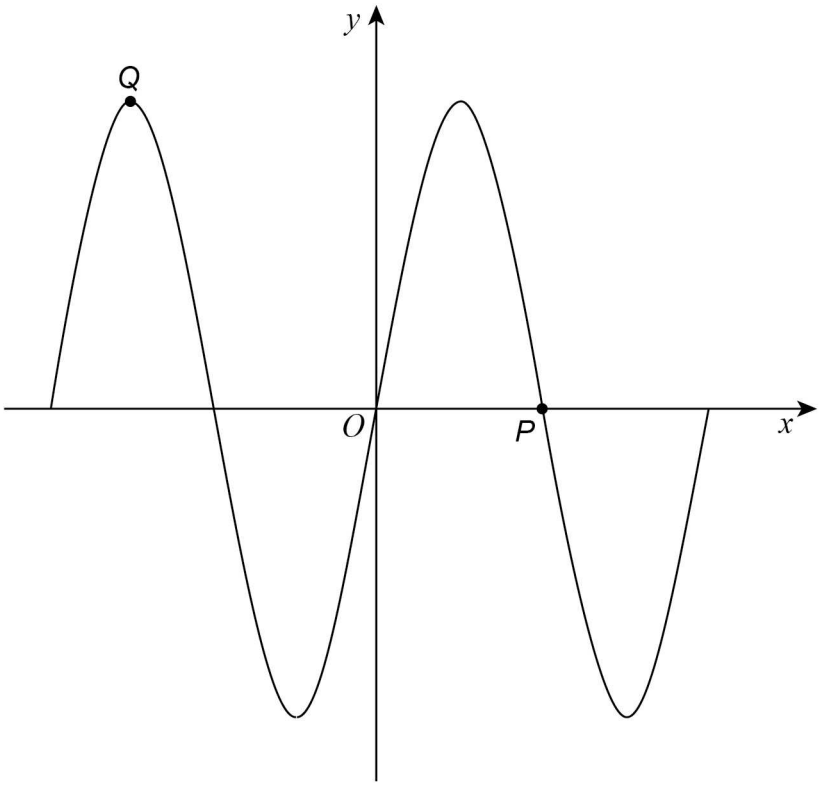
[3 marks]

Answer (_____ , _____)

Turn over for the next question

7

29 Here is a sketch of $y = \sin x°$ for $-360 \leqslant x \leqslant 360$



29 (a) Write down the coordinates of *P*.

[1 mark]

Answer (_____ , _____)

29 (b) Write down the coordinates of *Q*.

[1 mark]

Answer (_____ , _____)

30 (a) Work out the value of $81^{-\frac{1}{4}}$

[2 marks]

Answer _____

30 (b) Write 16×8^{2x} as a power of 2 in terms of x.

[3 marks]

Answer _____

END OF QUESTIONS

7

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED