



Surname _____

Forename(s) _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

MATHEMATICS

H

Higher Tier Paper 1 Non-Calculator

8300/1H

Friday 19 May 2023

Morning

Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.

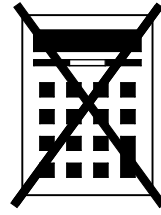
[Turn over]



MATERIALS

For this paper you must have:

- mathematical instruments
- the Formulae Sheet (enclosed).



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 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.

DO NOT TURN OVER UNTIL TOLD TO DO SO



Answer ALL questions in the spaces provided.

1 (a) Work out 0.7×0.5 [1 mark]

Answer _____

1 (b) Work out $\frac{5}{6} \div 3$ [1 mark]

Answer _____



1 (c) Work out $27 \div 0.6$ [1 mark]

Answer _____

2 Solve $2x < 26$ [1 mark]

Answer _____

[Turn over]



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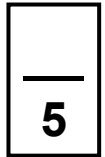


3 Work out the value of $\left(\frac{3}{2}\right)^2$

Give your answer as a mixed number. [1 mark]

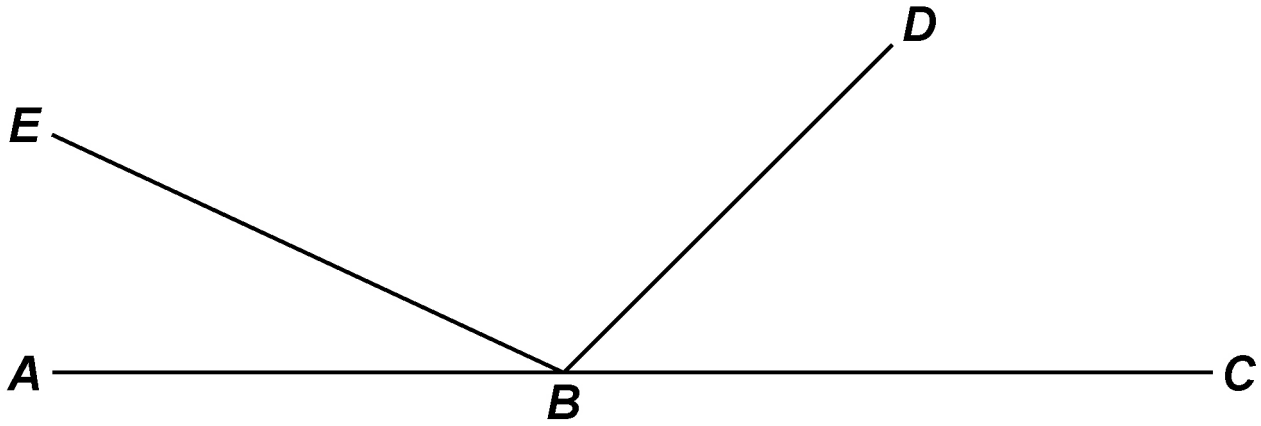
Answer _____

[Turn over]



4 *ABC*, *BD* and *BE* are straight lines.

The diagram is not drawn accurately.



angle *EBD* = $5 \times$ angle *ABE*

angle *DBC* = $3 \times$ angle *ABE*

Work out the size of angle *EBD*. [3 marks]



Answer _____ °

[Turn over]



5 Two prime numbers are multiplied together.

The answer is an EVEN number between
50 and 60

Complete the calculation. [3 marks]

$$\square \times \square = \square$$

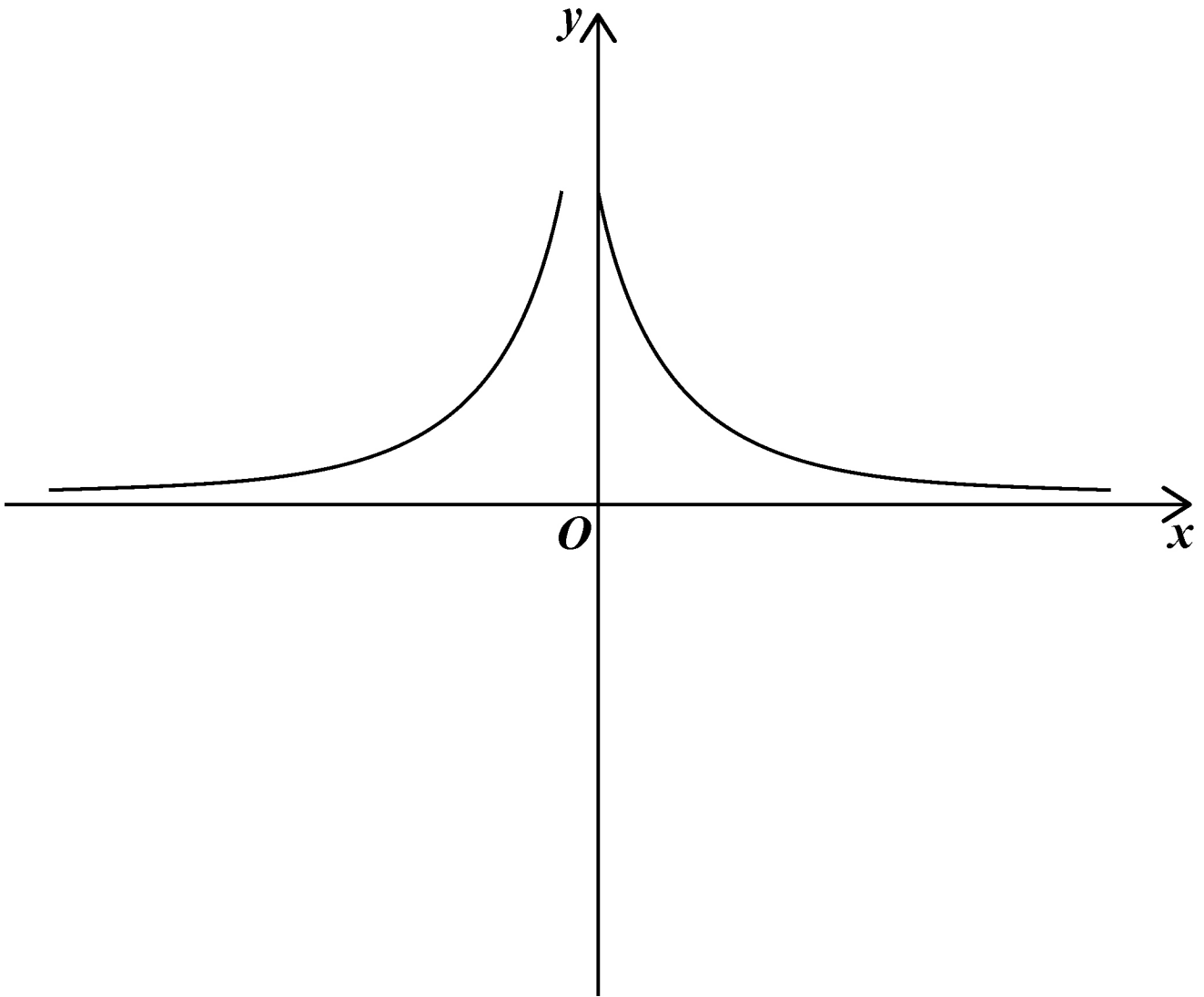
- 8 Expand and simplify fully $5(3x + 4) - 2(x - 1)$
[2 marks]

Answer _____

[Turn over]



- 9 Erika tries to sketch the graph $y = \frac{1}{x}$ with $x \neq 0$



**Make TWO different criticisms of her sketch.
[2 marks]**

Criticism 1 _____

Criticism 2 _____

[Turn over]

— 7

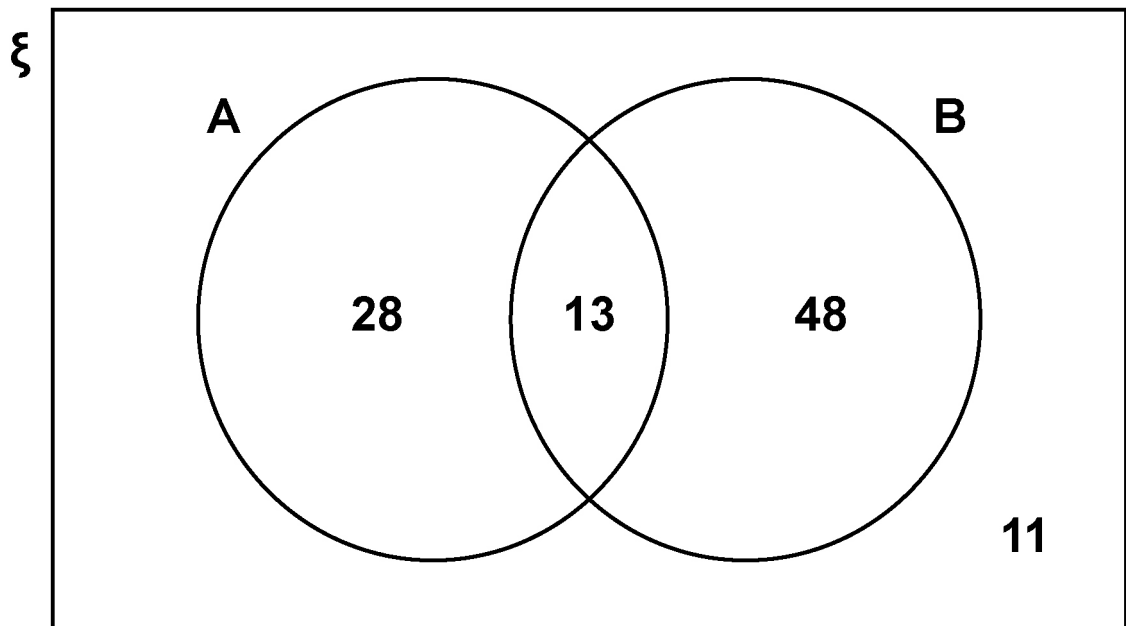


Answer _____

[Turn over]



11 The Venn diagram represents 100 items.



11(a) Write down $P(A \cap B)$ [1 mark]

Answer _____

11(b) Work out $P(A')$ [1 mark]

Answer _____



11(c) Work out $P(A \cup B)$ [1 mark]

Answer _____

[Turn over]

8



12(a) $a \times 10^n$ is a number in standard form.

Complete the inequality for the value of a .
[1 mark]

_____ $\leq a <$ _____



12(b) $b \times 10^n$ is the number 7200 written in standard form.

Work out $b \times 10^{-n}$

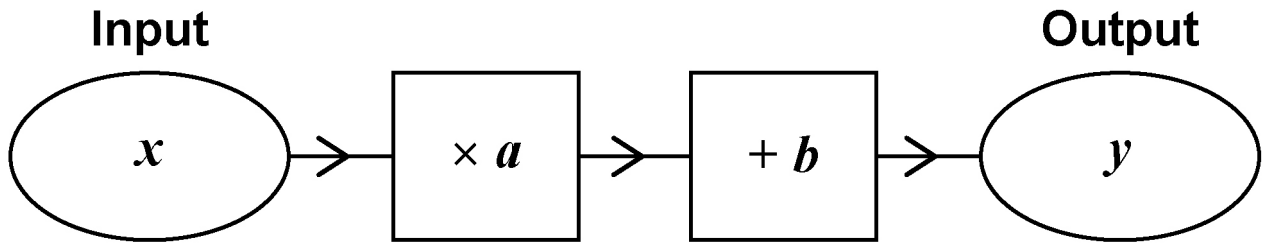
Write your answer as an ordinary number.
[2 marks]

Answer _____

[Turn over]



13(a) Here is a number machine.



Show that when the input increases by 2 the output increases by $2a$. [2 marks]



13(b) $f(x) = kx^2$ where k is a constant.

Kai says that $\frac{f(6)}{f(2)}$ is equal to $f(3)$ because $\frac{6}{2} = 3$

Is he correct?

Show working to support your answer. [2 marks]

[Turn over]

7



- 14 Here is a list of 11 whole numbers in numerical order.

The lower quartile, median, upper quartile and highest value are missing.

5	8		13	19		25	28		34	
---	---	--	----	----	--	----	----	--	----	--

- median = $2 \times$ lower quartile
- upper quartile = $2.5 \times$ lower quartile
- range = $2 \times$ interquartile range

Complete the list. [2 marks]



[Turn over]



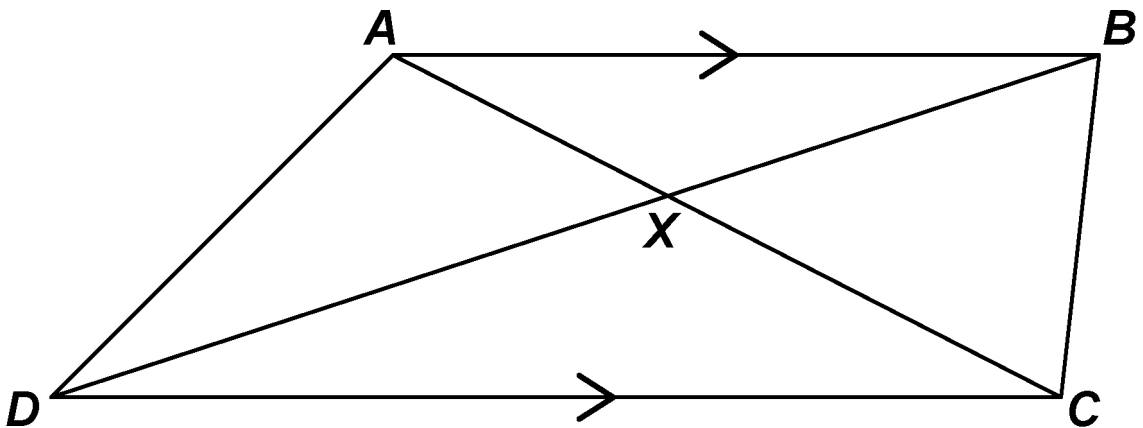
15 $ABCD$ is a trapezium.

All four sides are different lengths.

AB is parallel to CD .

The diagonals intersect at X .

The diagram is not drawn accurately.



For each statement, tick the correct box. [4 marks]

	TRUE	MAY BE TRUE	NOT TRUE
Triangles AXB and CXD are similar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Triangles AXD and BXC are congruent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angle $ADB =$ angle BDC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Area of triangle $ABC =$ area of triangle ABD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[Turn over]

6



16 Solve the simultaneous equations

$$2x - 5y = 13$$

$$3x + 4y = 8$$

[4 marks]

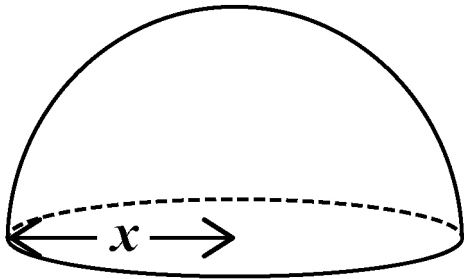
$x =$ _____ $y =$ _____

[Turn over]



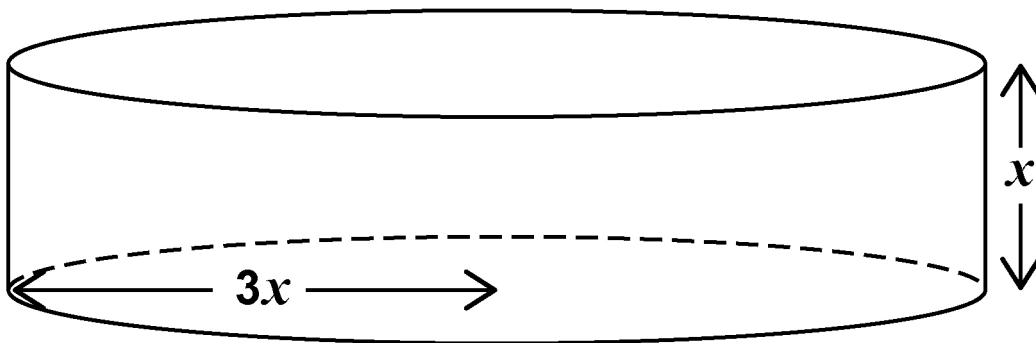
17 A solid hemisphere has radius x .

A solid cylinder has radius $3x$ and height x .



Surface area of a sphere = $4\pi r^2$

where r is the radius



Work out the ratio

total surface area of the hemisphere : total surface area of the cylinder

Give your answer in its simplest form.

You **MUST** show your working. [3 marks]



Answer _____ :

[Turn over]



18 $6 < \sqrt[3]{x} < 7$

Circle the possible value of x . [1 mark]

1.9

20

45

290



19 Work out how many 5-digit ODD numbers can be made using these digits ONCE each.

2 4 6 7 9

Do NOT list them. [2 marks]

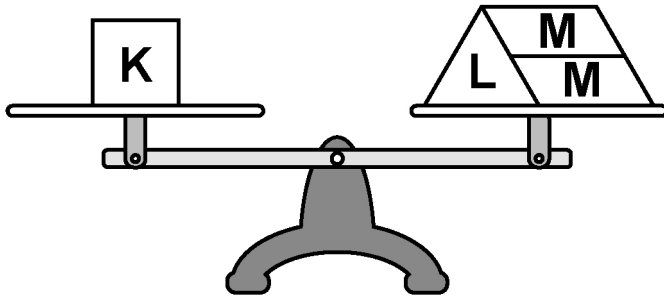
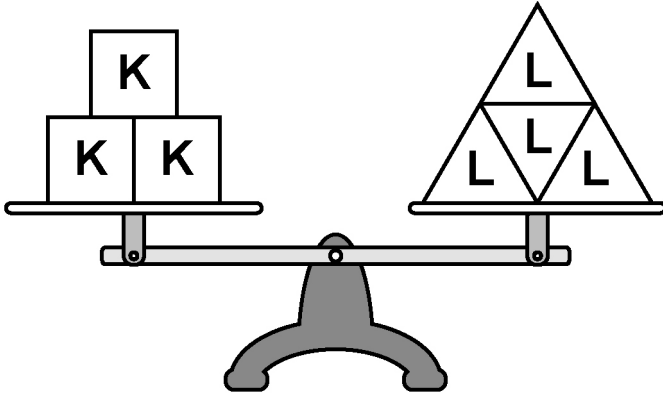
Answer _____

[Turn over]



20 K, L and M are weights.

Both of the scales balance exactly.



How many M weights are needed to balance ONE L weight? [3 marks]

Answer _____

[Turn over]

—
6

- 21 Express $x^2 - 6x - 15$ in the form $(x - a)^2 - b$ where a and b are integers. [2 marks]

Answer _____



22 $a = \sqrt{2}$ and $b = \sqrt{18}$

Match each expression to its value.

One has been done for you. [3 marks]

a^2	2
$a + b$	3
ab	6
$\frac{b}{a}$	36
	$4\sqrt{2}$
	$10\sqrt{20}$

[Turn over]



23 Write $0.1\dot{3}$ as a fraction in its simplest form.
[3 marks]



Answer _____

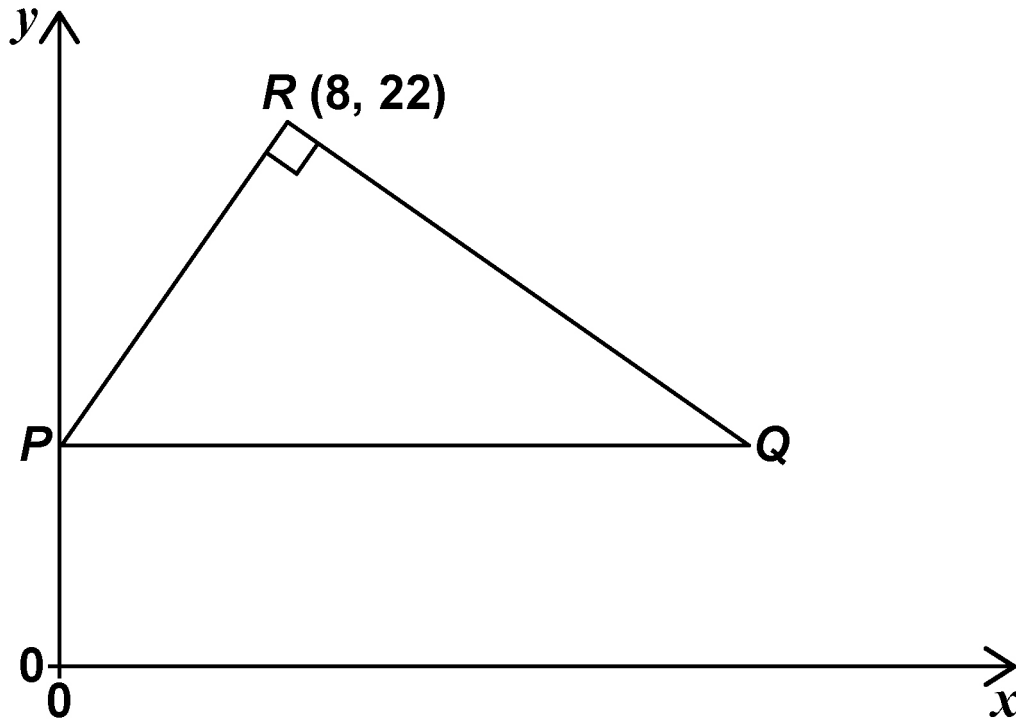
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8



24 Points P , Q and $R (8, 22)$ form a triangle.

The diagram is not drawn accurately.



PQ is a horizontal line, with P on the y -axis.

Angle PRQ is a right angle.

The gradient of PR is 2

Work out the coordinates of Q . [5 marks]

Answer (_____ , _____)

[Turn over]



- 25 Show that $\frac{4 \sin 30^\circ - \tan 45^\circ}{2 \cos 30^\circ}$ can be written as $\tan x$, where x is an acute angle. [4 marks]



[Turn over]

9

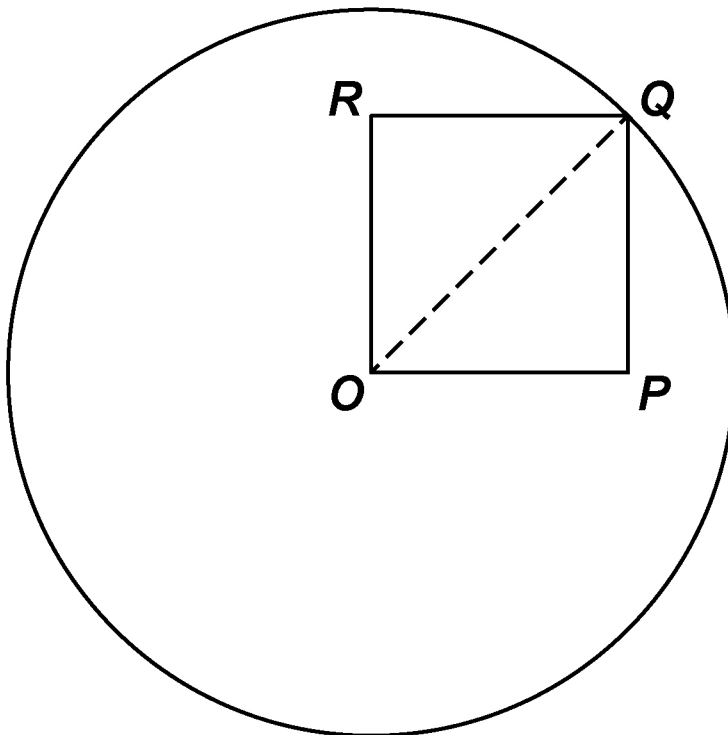


26 A circle, centre O , has circumference 20π cm

Q is a point on the circle.

$OPQR$ is a SQUARE.

The diagram is not drawn accurately.



perimeter of the square : circumference of the circle = $\sqrt{a} : \pi$ where a is an integer.

Work out the value of a .

You MUST show your working. [4 marks]



$a =$ _____

[Turn over]



27 A journey has two stages.

	DISTANCE (km)	AVERAGE SPEED (km/h)	TIME (h)
STAGE 1	30	a	$\frac{30}{a}$
STAGE 2	30	b	$\frac{30}{b}$

Show that the average speed for the **WHOLE** journey, in km/h, is $\frac{2ab}{a+b}$ [3 marks]

END OF QUESTIONS

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7



Additional page, if required.

Write the question numbers in the left-hand margin.



Additional page, if required.

Write the question numbers in the left-hand margin.

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For Examiner's Use	
Pages	Mark
4–7	
8–11	
12–15	
16–19	
20–23	
24–27	
28–31	
32–35	
36–39	
40–43	
44–47	
TOTAL	

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