



Surname \_\_\_\_\_

Other Names \_\_\_\_\_

Centre Number \_\_\_\_\_

Candidate Number \_\_\_\_\_

Candidate Signature \_\_\_\_\_

For Examiner's Use

# GCSE MATHEMATICS

# H

Higher Tier Paper 1 Non-Calculator

**8300/1H**

Thursday 25 May 2017 Morning

Time allowed: 1 hour 30 minutes

For this paper you must have:  
• mathematical instruments  
You must NOT use a calculator.



At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]



JUN1783001H01

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## 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.
- 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, tracing paper and graph 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 Simplify  $2^5 \times 2^3$

Circle your answer. [1 mark]

$4^8$

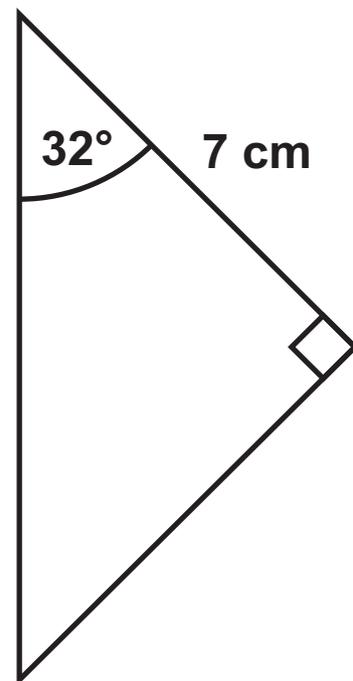
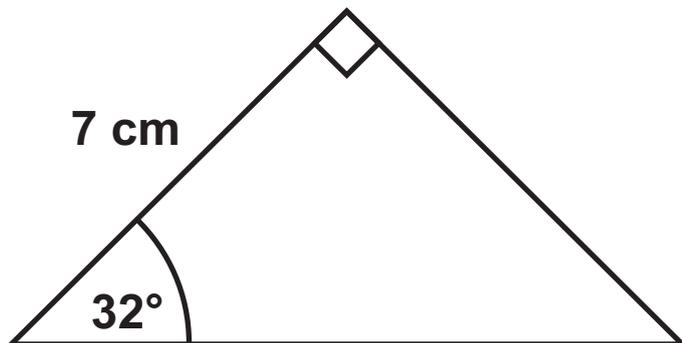
$2^8$

$2^{15}$

$4^{15}$

|   |
|---|
| 1 |
|---|

2 Not drawn accurately



Circle the reason why these triangles are congruent. [1 mark]

SSS

SAS

ASA

RHS

|   |
|---|
| 1 |
|---|



3 Which of these is a geometric progression?

Circle your answer. [1 mark]

2, 4, 6, 8, 10

2, 3, 5, 8, 12

2, 6, 18, 54, 162

2, 6, 10, 14, 18

|   |
|---|
|   |
| 1 |

4  $a : b = 4 : 3$

Circle the correct statement. [1 mark]

$b$  is  $\frac{4}{7}$  of  $a$

$b$  is  $\frac{3}{7}$  of  $a$

$b$  is  $\frac{4}{3}$  of  $a$

$b$  is  $\frac{3}{4}$  of  $a$

|   |
|---|
|   |
| 1 |

5 Write 36 as a product of prime factors.

Give your answer in index form. [3 marks]

Answer \_\_\_\_\_

|   |
|---|
|   |
| 3 |

[Turn over]



- 6 The table shows information about the times for 10 people to complete a task.

| Time, $t$ (minutes) | Frequency |
|---------------------|-----------|
| $0 < t \leq 20$     | 1         |
| $20 < t \leq 40$    | 6         |
| $40 < t \leq 60$    | 3         |

These statements are about the mean and range of the actual times.

Tick the correct box for each statement.  
[4 marks]

True

False



The mean could be less than 20 minutes



The mean could be more than 40 minutes



The mean could be less than 40 minutes



The range could be more than 40 minutes



The range could be less than 40 minutes



The range could be more than 60 minutes



7  $\frac{3}{5}$  of a number is 162

Work out the number. [2 marks]

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Answer \_\_\_\_\_

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| 2 |

[Turn over]



8  $x$  km/h =  $y$  mph

Use 8 km/h = 5 mph to write a formula for  $y$  in terms of  $x$ . [2 marks]

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Answer \_\_\_\_\_

|   |
|---|
|   |
| 2 |



9 (a)  $\text{Density} = \frac{\text{mass}}{\text{volume}}$

The mass of solid A is 6 times the mass of solid B.

The volume of solid A is 3 times the volume of solid B.

Complete the sentence. [1 mark]

The density of solid A is \_\_\_\_\_  
times the density of solid B.

9 (b)  $\text{Average speed} = \frac{\text{distance}}{\text{time}}$

If the distance is halved and the time is doubled, what happens to the average speed?

Circle your answer. [1 mark]

× 2

× 4

no change

÷ 2

÷ 4

[Turn over]



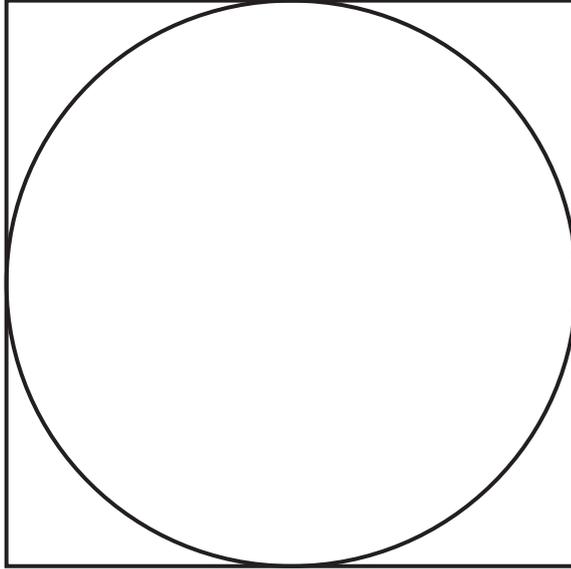




12

Here is a circle touching a square.

Not drawn accurately



The area of the square is  $64 \text{ cm}^2$

Work out the area of the circle.

Give your answer in terms of  $\pi$ .

[3 marks]

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Answer \_\_\_\_\_  $\text{cm}^2$

|   |
|---|
|   |
| 3 |



13

Write the number

six million five thousand two hundred

in standard form. [2 marks]

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Answer

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|   |
|---|
|   |
| 2 |

14

Solve  $-3x > 6$ 

[1 mark]

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Answer

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|   |
|---|
|   |
| 1 |

[Turn over]



15  $\frac{1}{6}$ ,  $\frac{1}{7}$ ,  $\frac{1}{8}$  and  $\frac{1}{9}$  are four fractions.

How many of these fractions convert to a recurring decimal?

Circle your answer. [1 mark]

0

1

2

3

4

|   |
|---|
| 1 |
|---|

16 A fair spinner has five equal sections numbered 1, 2, 3, 4 and 5

A fair six-sided dice has five red faces and one green face.

The spinner is spun.

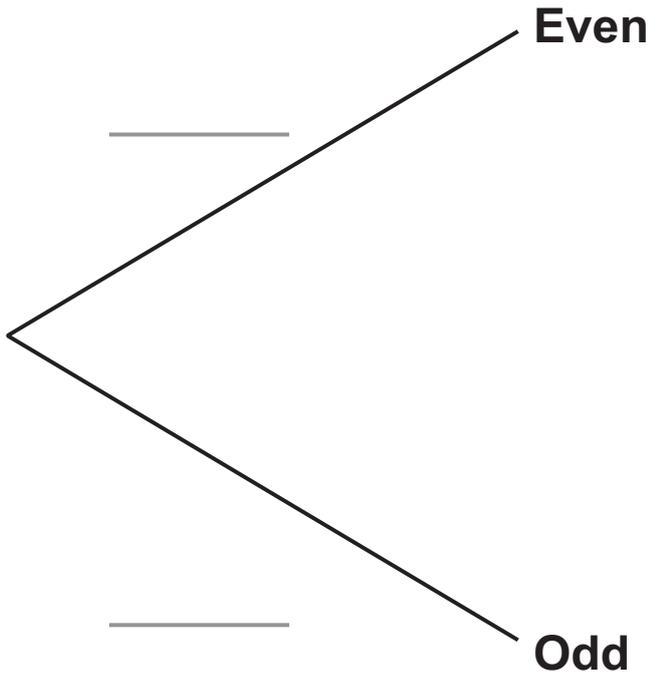
If the spinner shows an even number, the dice is thrown.



16 (a) Complete the tree diagram for the spinner and the dice. [2 marks]

SPINNER

DICE



16 (b) Work out the probability of getting an even number and the colour green. [2 marks]

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Answer \_\_\_\_\_

[Turn over]



17 ***A* is the point (2, -5)**

***B* is the point (4, -9)**

17 (a) **Show that the gradient of the straight line passing through *A* and *B* is -2 [2 marks]**

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**18**      **Bottles of drink are for sale at three shops.**

**The normal price of a bottle is the same at each shop.**

**SHOP A**

**Buy 1 bottle**

**Get 2 more bottles at half price**

**SHOP B**

**Buy 2 bottles**

**Get 3 more bottles at half price**

**SHOP C**

**30% off a bottle**





19

Here is some information about the marks of 60 students in a test.

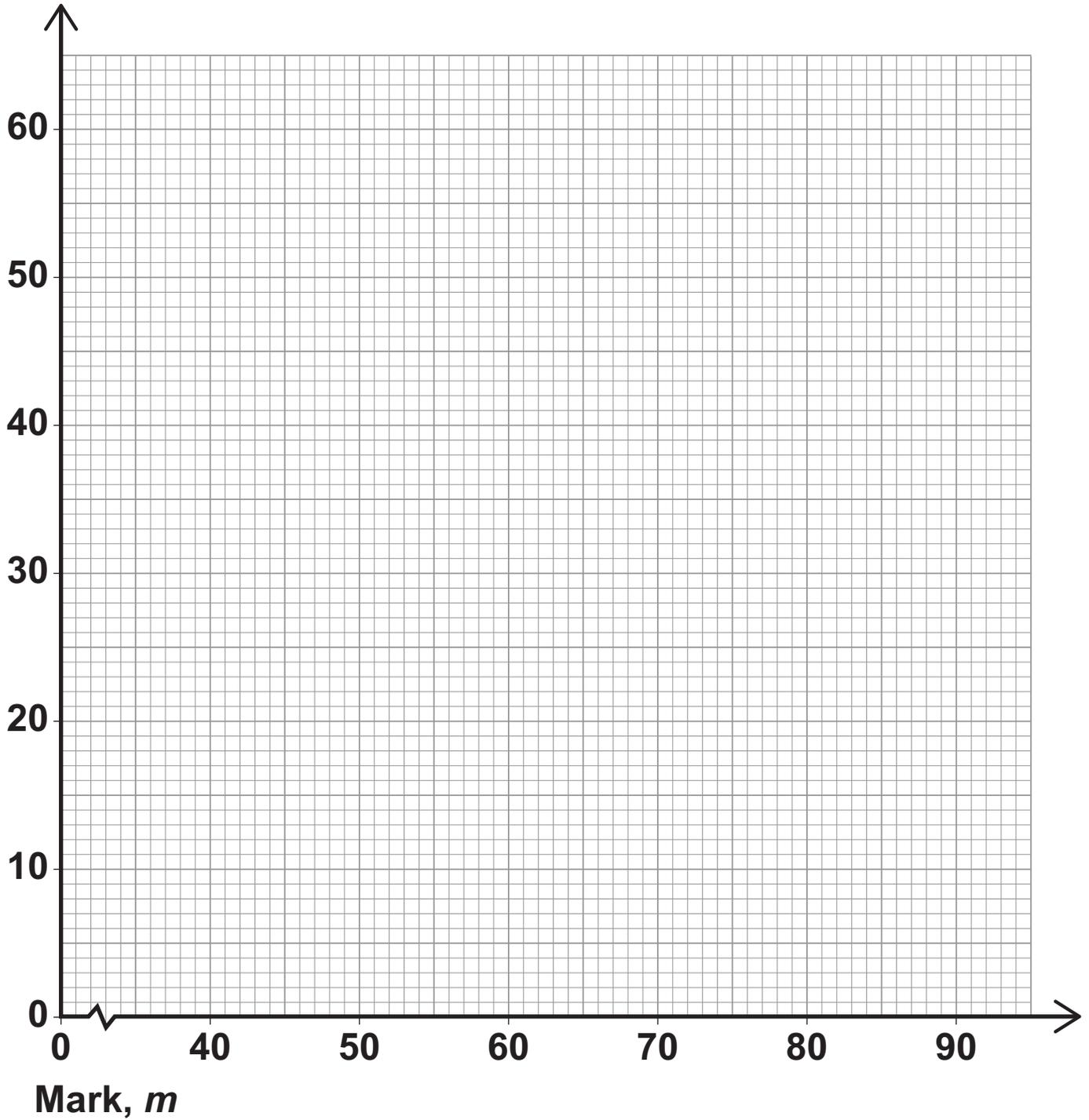
| Mark, $m$        | Frequency |
|------------------|-----------|
| $40 < m \leq 50$ | 9         |
| $50 < m \leq 60$ | 16        |
| $60 < m \leq 70$ | 20        |
| $70 < m \leq 80$ | 8         |
| $80 < m \leq 90$ | 7         |

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- 19(a) On the grid, draw a cumulative frequency graph. [3 marks]

Cumulative  
frequency



[Turn over]



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- 19 (b) Use your graph to estimate the lowest mark of the top 20% of students. [2 marks]

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Answer \_\_\_\_\_

- 20 Work out the diameter of the circle  $x^2 + y^2 = 64$   
Circle your answer. [1 mark]

8

16

32

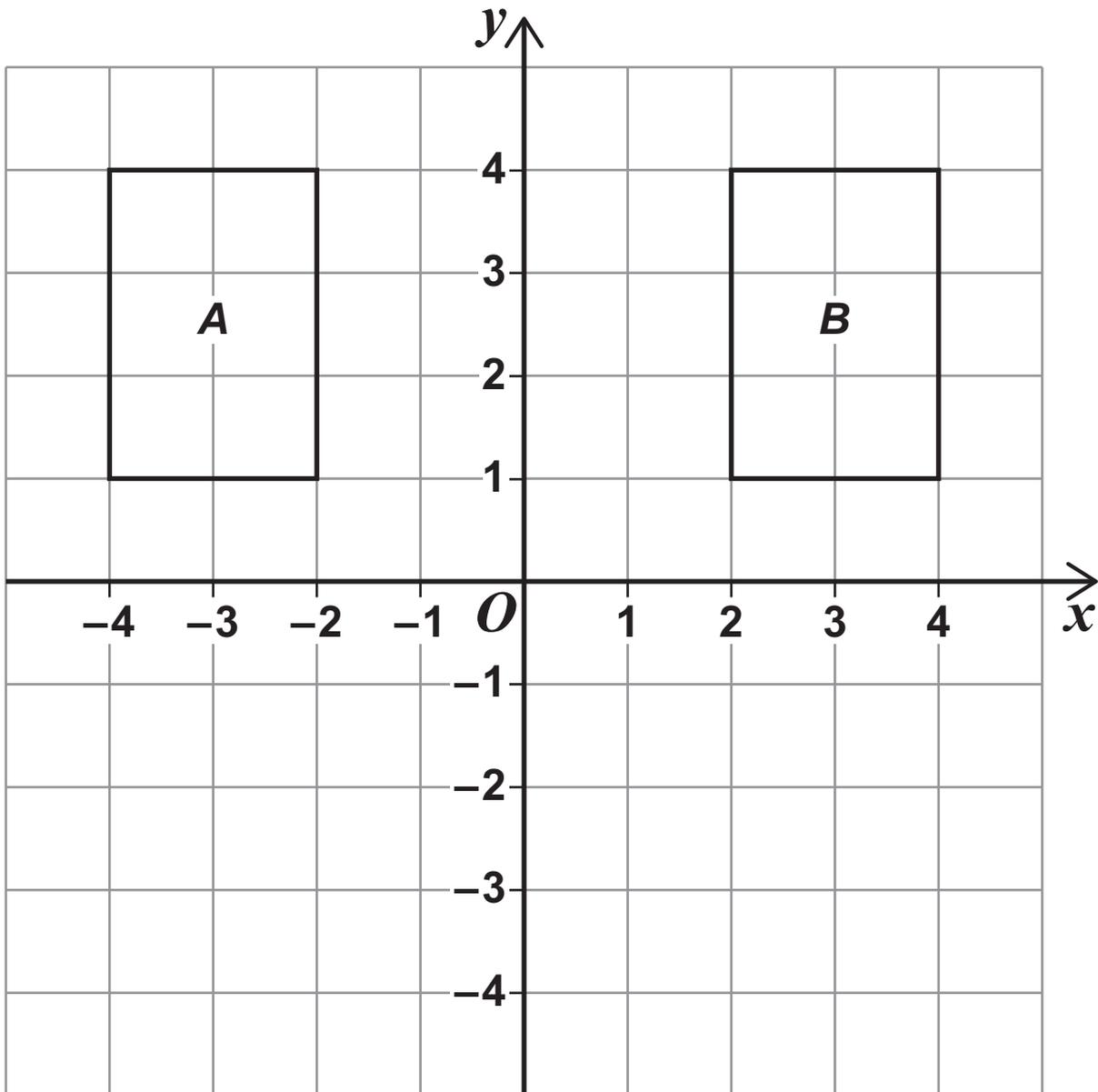
128

|   |
|---|
|   |
| 6 |

[Turn over]



21(a) The diagram shows rectangles *A* and *B*.



Rectangle *A* can be mapped to rectangle *B* by a SINGLE transformation.

Javed says,  
“The ONLY single transformation is a reflection in the *y*-axis because the rectangles are on opposite sides of the *y*-axis.”

Is he correct?

Tick a box.

Yes

No

Give a reason for your answer. [1 mark]

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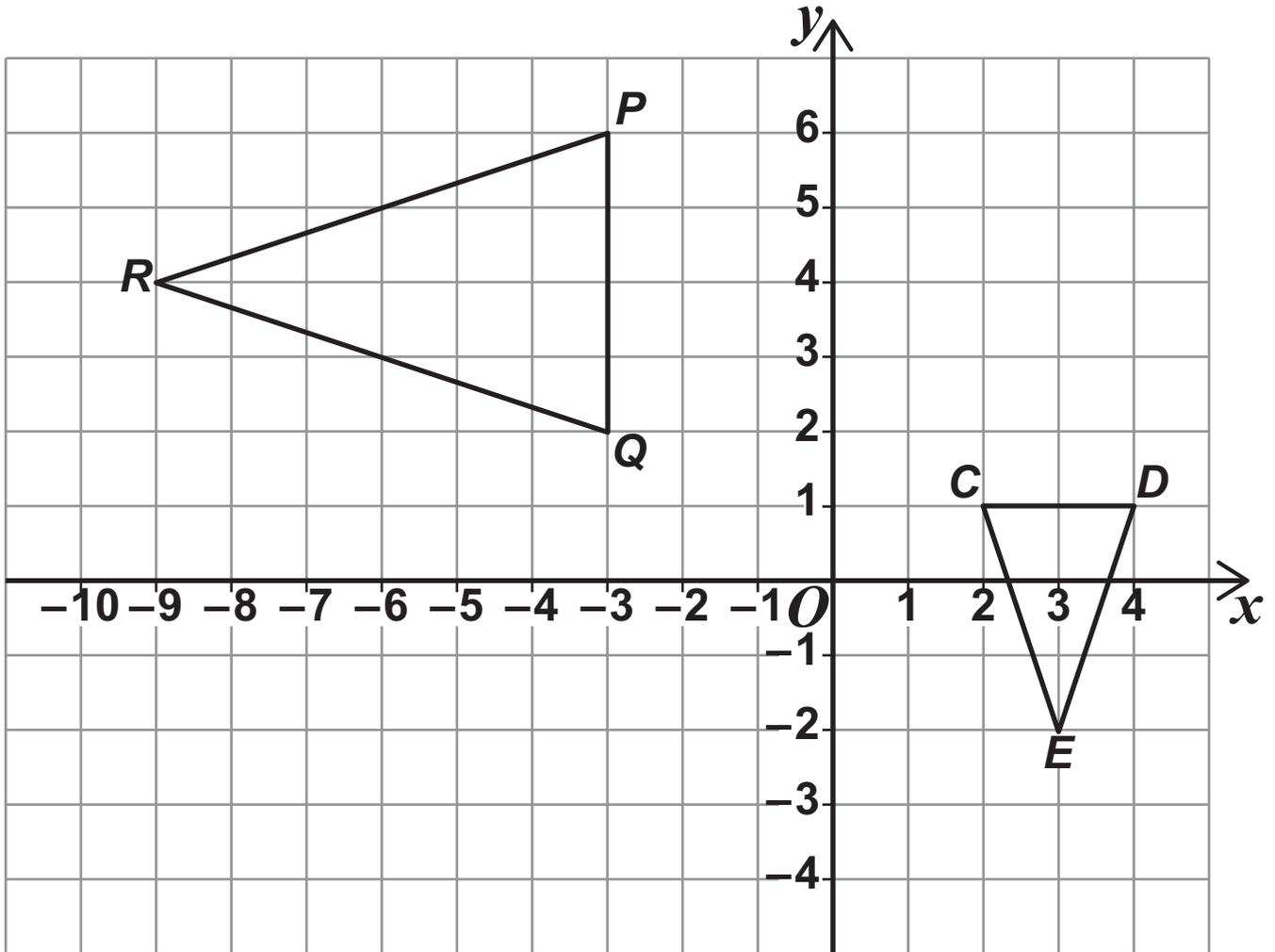
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[Turn over]



21 (b) This diagram shows triangles  $CDE$  and  $PQR$ .



***CDE* is mapped to *PQR* by combining two single transformations.**

**The first is a rotation of  $90^\circ$  anticlockwise about *E*.**

**Describe fully the second transformation.  
[3 marks]**

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| 4 |

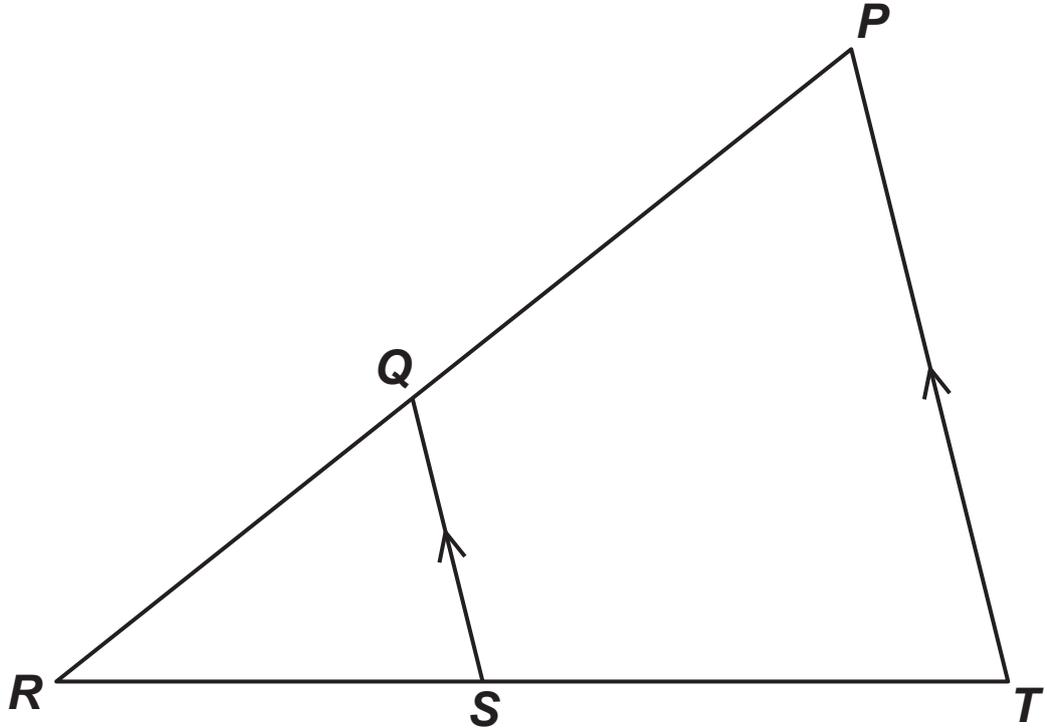
**[Turn over]**



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22

***PRT* and *QRS* are similar triangles.****Not drawn accurately**

Which of these is equivalent to  $\frac{QR}{PR}$ ?

Circle your answer. [1 mark]

$$\frac{RS}{ST}$$

$$\frac{QS}{PT}$$

$$\frac{PT}{QS}$$

$$\frac{RT}{RS}$$

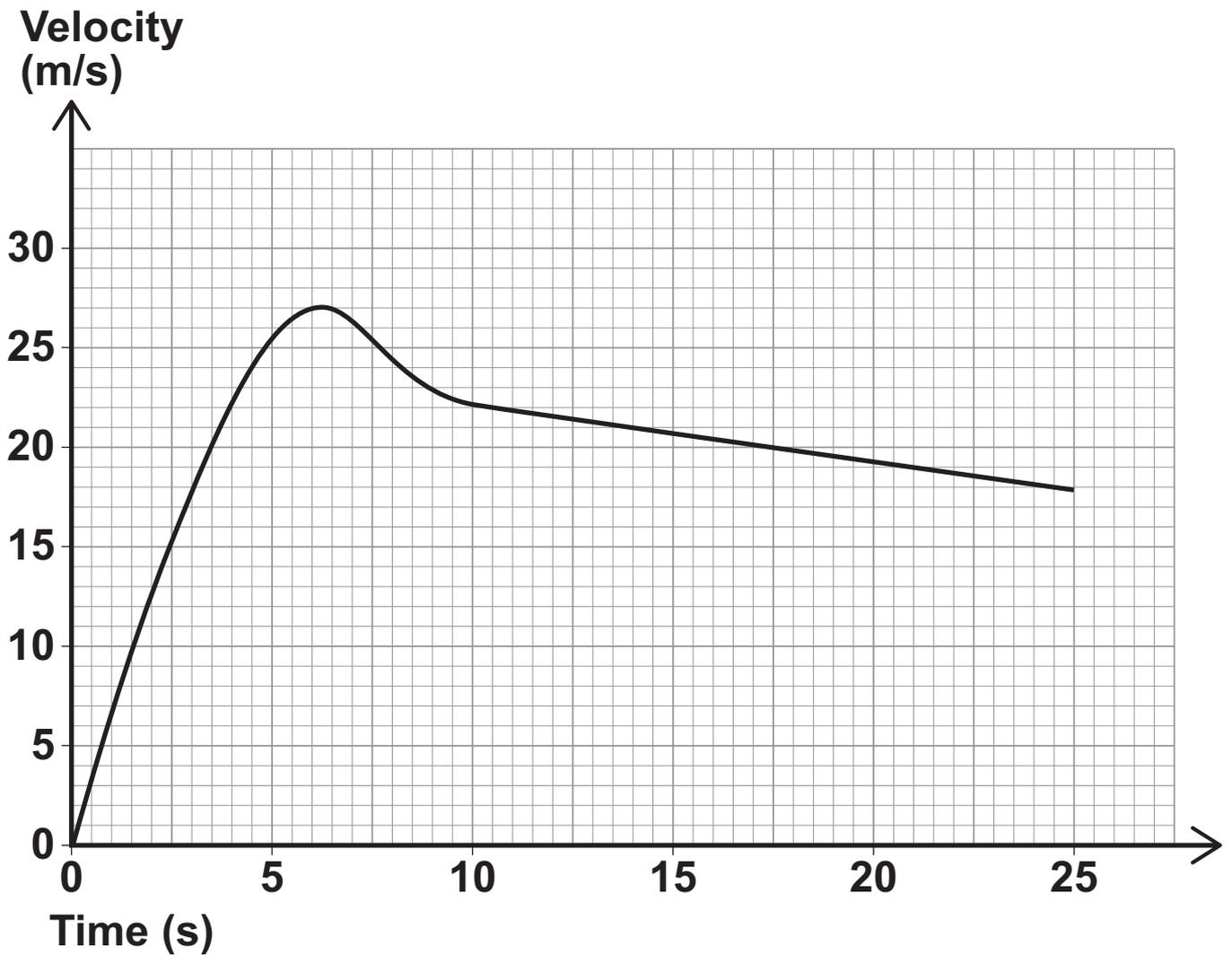
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| 1 |
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[Turn over]



23

Here is a velocity-time graph of a motorbike for 25 seconds.



23 (a)

After how many seconds was the acceleration zero? [1 mark]

Answer \_\_\_\_\_ seconds



23 (b) Work out the distance travelled in the last 15 seconds. [2 marks]

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Answer \_\_\_\_\_ metres

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- 24 (a) Work out  $\sqrt{12\frac{1}{4}}$  as an improper fraction.  
[1 mark]

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Answer \_\_\_\_\_

- 24 (b) Work out  $\sqrt[3]{16}$  as a power of 2  
[2 marks]

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Answer \_\_\_\_\_

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[Turn over]





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Answer \_\_\_\_\_

|   |
|---|
|   |
| 4 |

[Turn over]





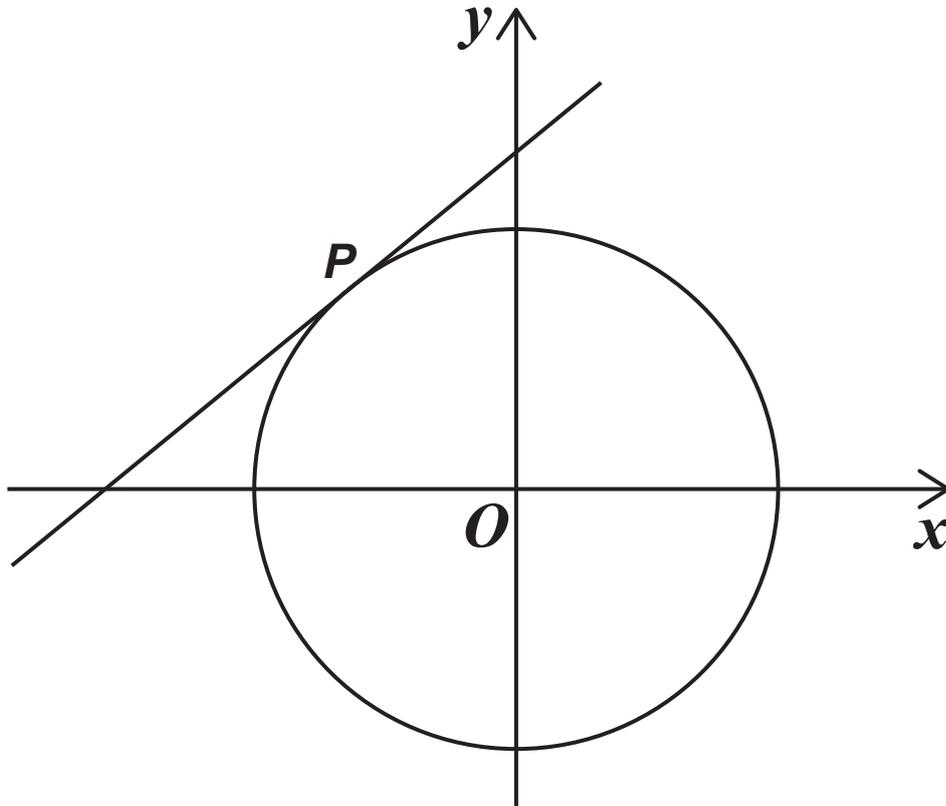
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**[Turn over]**



27  $P(-1, 4)$  is a point on a circle, centre  $O$

Not drawn accurately



Work out the equation of the tangent to the circle at  $P$ .

Give your answer in the form  $y = mx + c$   
[4 marks]

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Answer \_\_\_\_\_

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|---|
|   |
| 4 |

[Turn over]



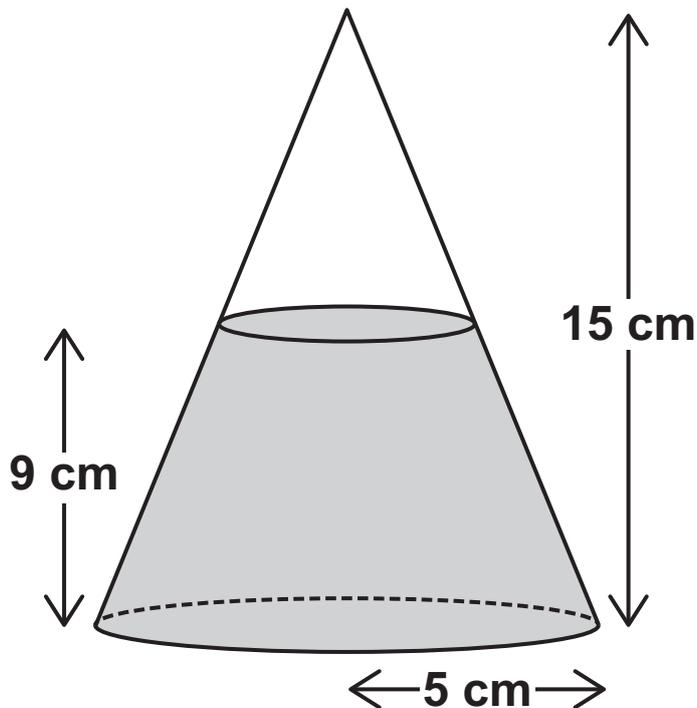
- 28 Volume of cone =  $\frac{1}{3} \pi r^2 h$  where  $r$  is the radius and  $h$  is the perpendicular height.

A cone has a

horizontal base of radius 5 cm

height of 15 cm

The cone contains water to a depth of 9 cm







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| For Examiner's Use  |              |          |      |
|---------------------|--------------|----------|------|
| Examiner's Initials |              |          |      |
| Question            | Mark         | Question | Mark |
| 1                   |              | 16       |      |
| 2                   |              | 17       |      |
| 3                   |              | 18       |      |
| 4                   |              | 19       |      |
| 5                   |              | 20       |      |
| 6                   |              | 21       |      |
| 7                   |              | 22       |      |
| 8                   |              | 23       |      |
| 9                   |              | 24       |      |
| 10                  |              | 25       |      |
| 11                  |              | 26       |      |
| 12                  |              | 27       |      |
| 13                  |              | 28       |      |
| 14                  |              | 29       |      |
| 15                  |              |          |      |
| TOTAL               |              | TOTAL    |      |
|                     | <b>TOTAL</b> |          |      |

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