Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
MATHEMATICS

H

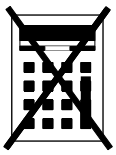
Higher Tier Paper 1 Non-Calculator

Thursday 25 May 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	
TOTAL	

Answer **all** questions in the spaces provided

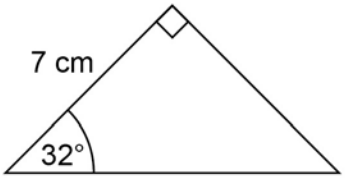
1 Simplify $2^5 \times 2^3$

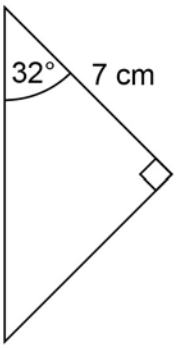
Circle your answer.

[1 mark]

4^8 2^8 2^{15} 4^{15}

2





Not drawn accurately

Circle the reason why these triangles are congruent.

[1 mark]

SSS SAS ASA RHS

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

4 $a : b = 4 : 3$

Circle the correct statement.

[1 mark]

b is $\frac{4}{7}$ of a $\quad$ b is $\frac{3}{7}$ of a $\quad$ b is $\frac{4}{3}$ of a $\quad$ b is $\frac{3}{4}$ of a

5 Write 36 as a product of prime factors.

Give your answer in index form.

[3 marks]

Answer _____

Turn over for the next question

7

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

Time, t (minutes)	**Frequency**
$0 < t \leqslant 20$	1
$20 < t \leqslant 40$	6
$40 < t \leqslant 60$	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]

Answer _____

8 x km/h = y mph

Use 8 km/h = 5 mph to write a formula for y in terms of x.

[2 marks]

Answer _____

Turn over for the next question

8

9 (a) 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) 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

10 Solve the simultaneous equations.

$2x + y = 18$

$x - y = 6$

[3 marks]

Answer _____

Turn over for the next question

5

11 Billy wants to buy these tickets for a show.

4 adult tickets at £15 each

2 child tickets at £10 each

A 10% booking fee is added to the ticket price.

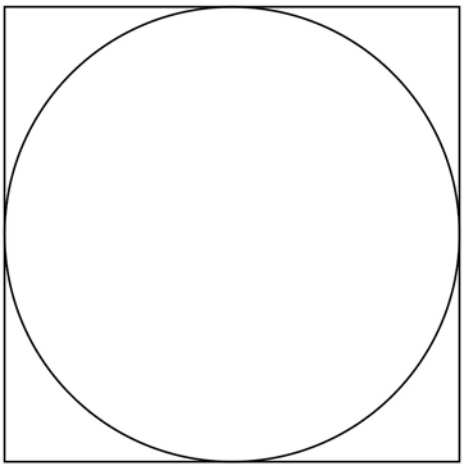
3% is then added for paying by credit card.

Work out the **total** charge for these tickets when paying by credit card.

[5 marks]

Answer £ _____

12 Here is a circle touching a square.



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The area of the square is 64 cm^2

Work out the area of the circle.

Give your answer in terms of π.

[3 marks]

Answer _____ cm^2

Turn over for the next question

8

13 Write the number six million five thousand two hundred in standard form.

[2 marks]

Answer _____

14 Solve $-3x > 6$

[1 mark]

Answer _____

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

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.

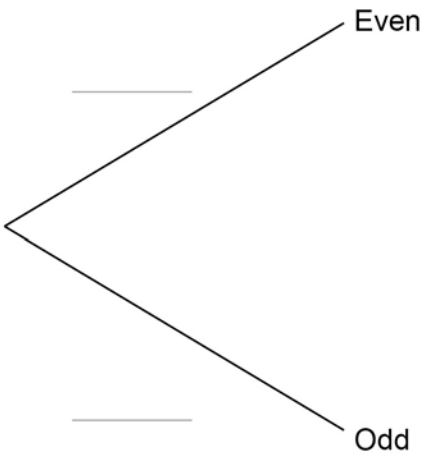
The spinner is spun.

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]

Answer

8

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]

17 (b) *C* is the point (–301, 601)

Does *C* lie on the straight line passing through *A* and *B*?

You **must** show your working.

[2 marks]

Answer

18 Bottles of drink are for sale at three shops.

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

Shop A	**Shop B**	**Shop C**
Buy 1 bottle Get 2 more bottles at half price	Buy 2 bottles Get 3 more bottles at half price	30% off a bottle

What is the cheapest way to buy **exactly** 8 bottles?

You can buy from more than one shop.

You **must** show your working.

[3 marks]

Answer _____

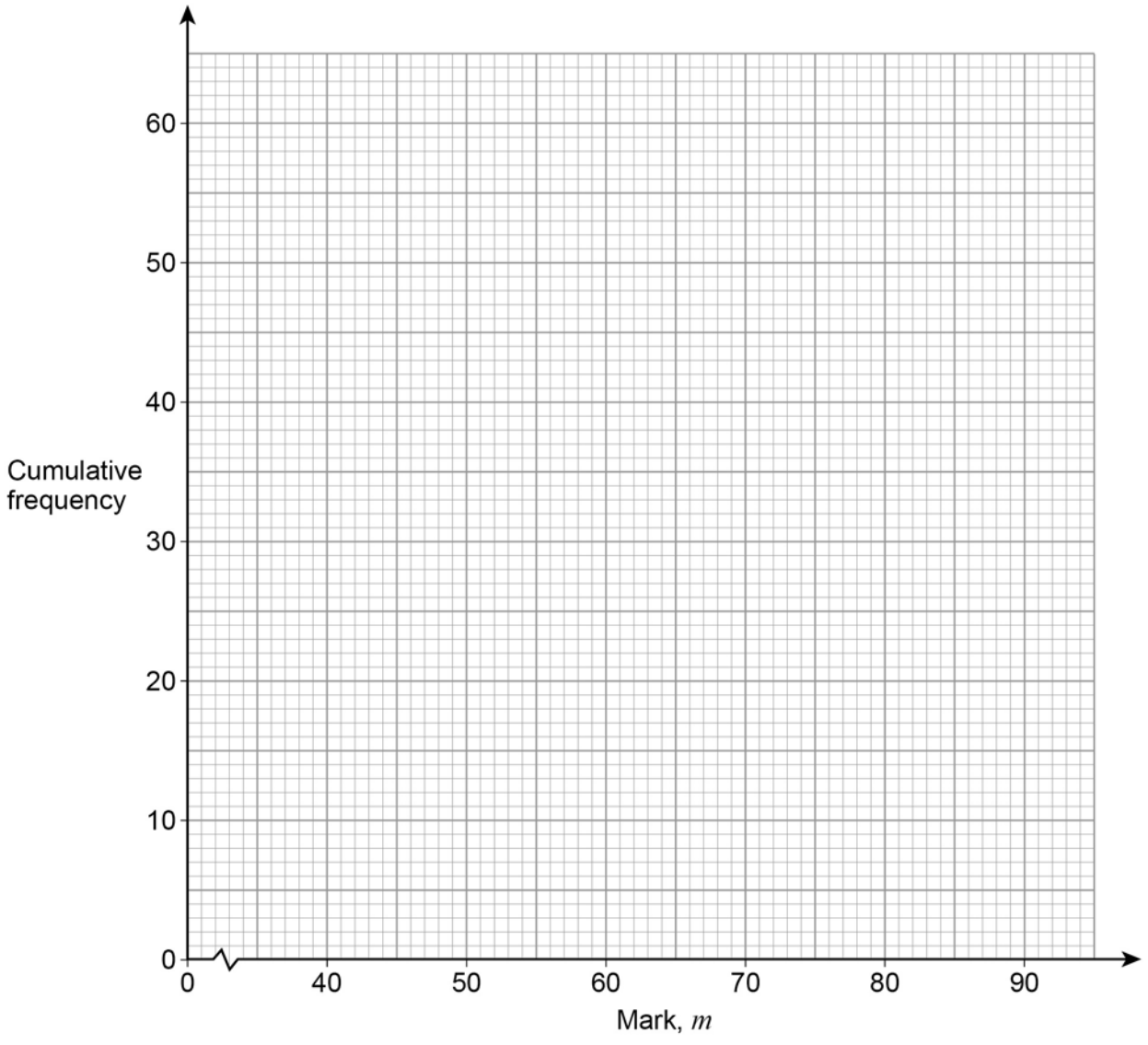
7

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

Mark, m	**Frequency**
$40 < m \leqslant 50$	9
$50 < m \leqslant 60$	16
$60 < m \leqslant 70$	20
$70 < m \leqslant 80$	8
$80 < m \leqslant 90$	7

19 (a) On the grid, draw a cumulative frequency graph.

[3 marks]



19 (b) Use your graph to estimate the lowest mark of the top 20% of students.

[2 marks]

Answer

20 Work out the diameter of the circle $x^2 + y^2 = 64$

Circle your answer.

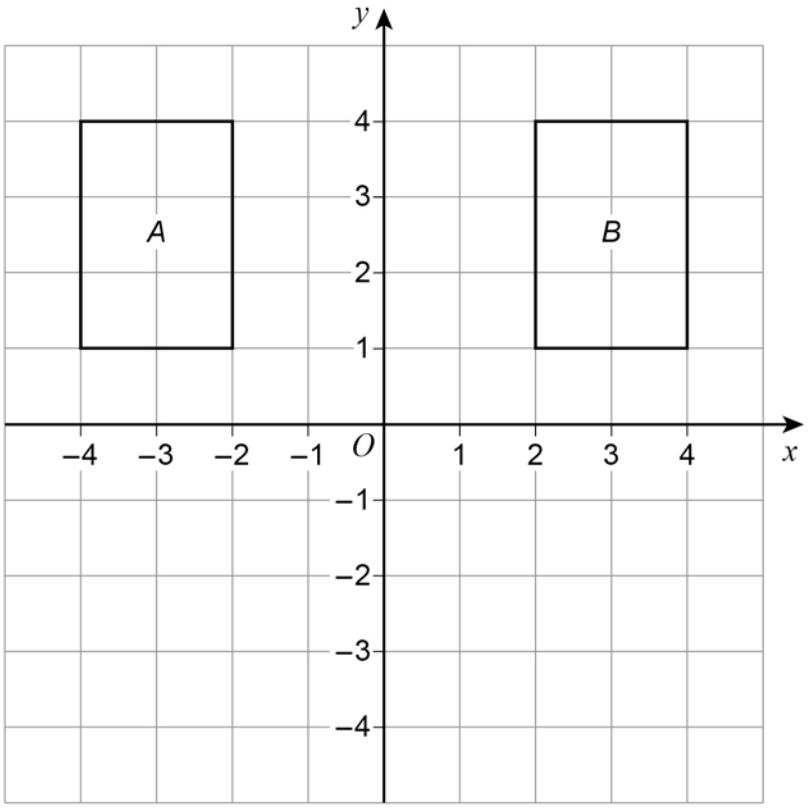
[1 mark]

8 16 32 128

Turn over for the next question

6

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?

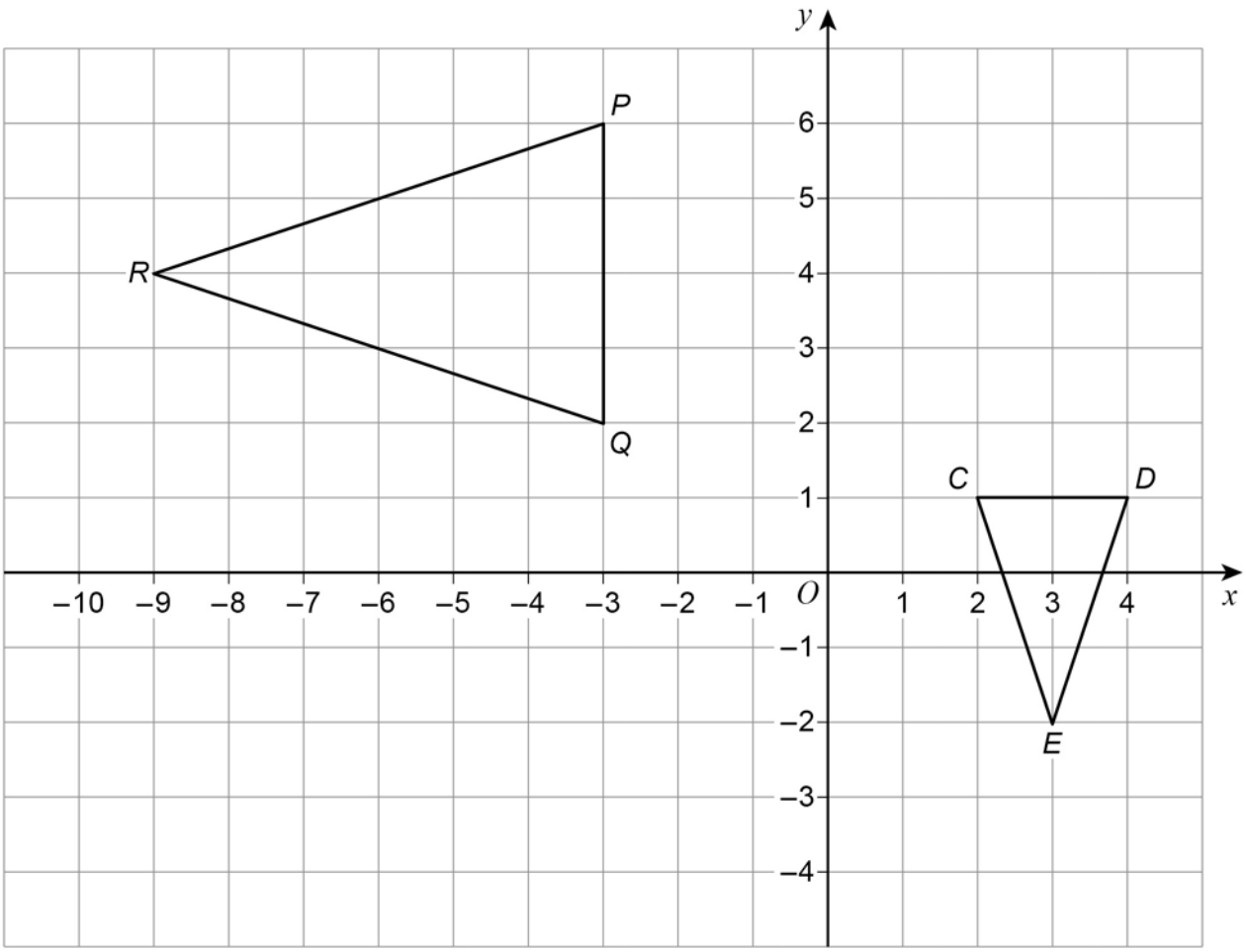
Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

[1 mark]

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 90º anticlockwise about *E*.

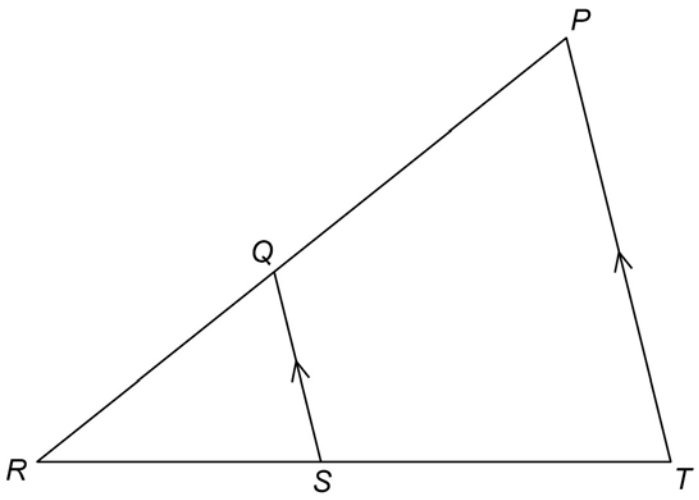
Describe fully the second transformation.

[3 marks]

Turn over for the next question

4

22 *PRT* and *QRS* are similar triangles.



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

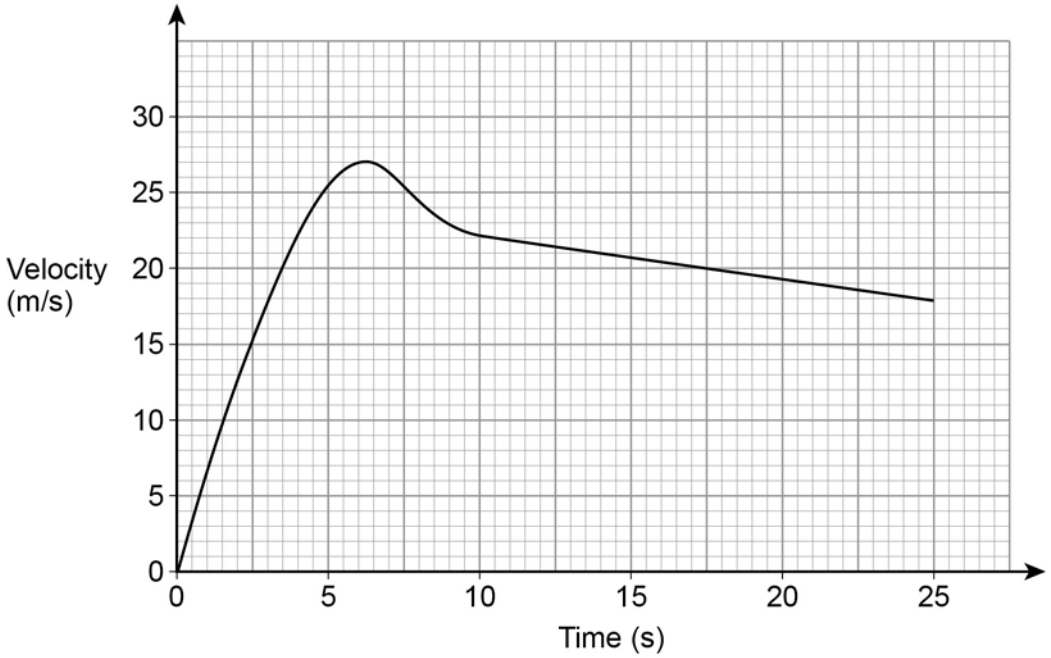
Circle your answer.

[1 mark]

$\frac{RS}{ST}$ $\frac{QS}{PT}$

$\frac{PT}{QS}$ $\frac{RT}{RS}$

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]

Answer metres

4

Turn over ►

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

[1 mark]

Answer

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

[2 marks]

Answer

25 In an office there are twice as many females as males.

$\frac{1}{4}$ of the females wear glasses.

$\frac{3}{8}$ of the males wear glasses.

84 people in the office wear glasses.

Work out the number of people in the office.

[4 marks]

Answer _____

Turn over for the next question

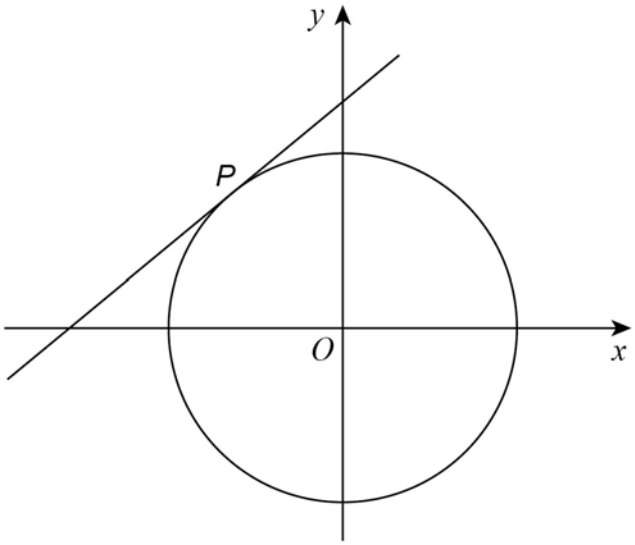
7

26 Expand and simplify $(x - 4)(2x + 3y)^2$

[4 marks]

Answer _____

27 *P* (–1, 4) is a point on a circle, centre *O*



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

Give your answer in the form $y = mx + c$

[4 marks]

Answer _____

8

Turn over ►

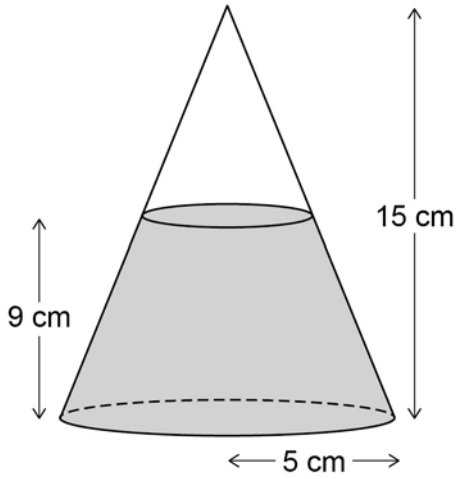
28 Volume of cone = $\frac{1}{3}\pi r^2 h$ where r is the radius and h is the perpendicular height.

A cone has a

horizontal base of radius 5 cm

height of 15 cm

The cone contains water to a depth of 9 cm



Work out the volume of the water, in cm^3

Give your answer in terms of π.

[4 marks]

Answer _____ cm^3

29 Simplify $\dfrac{2\sin 45^\circ - \tan 45^\circ}{4\tan 60^\circ}$

Give your answer in the form $\dfrac{\sqrt{a}-\sqrt{b}}{c}$ where a, b and c are integers.

[4 marks]

Answer _____

END OF QUESTIONS

8

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