A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE MATHEMATICS

H

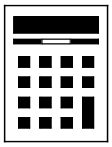
Higher Tier Paper 3 Calculator

8300/3H

Wednesday 8 November 2017 Morning

Time allowed: 1 hour 30 minutes

For this paper you must have:
- **a calculator**
- **mathematical instruments.**



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

[Turn over]

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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, graph paper and tracing paper.**
  These must be tagged securely to this answer book.

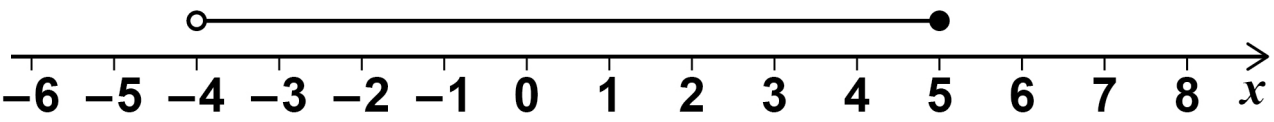
ADVICE

- **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 **Circle the inequality shown by the diagram. [1 mark]**



$-4 \leqslant x < 5$ $-4 \leqslant x \leqslant 5$

$-4 < x < 5$ $-4 < x \leqslant 5$

2 y **is 100% MORE than** x**.**

Circle the ratio $x : y$ **[1 mark]**

1 : 100 **100 : 1** **1 : 2** **2 : 1**

3 **The first four terms of a sequence are**
–10 –8 –6 –4

Circle the expression for the n**th term of the sequence. [1 mark]**

$-12 - 2n$ $-8 - 2n$ $n + 2$ $2n - 12$

4 Circle the equation of the line that is parallel to the x-axis. [1 mark]

$y = -5$ $x - y = 0$ $x = 3$ $x + y = 0$

5 Multiply out and simplify $(x - 8)^2$ [2 marks]

Answer _____

6

6 **Show that 268 can be written as the sum of a power of 3 and a square number. [2 marks]**

Answer _____

7 Here is some information about the times taken by 40 people to fill in a form.

Time, t minutes	Number of people
$0 < t \leqslant 5$	3
$5 < t \leqslant 10$	9
$10 < t \leqslant 15$	11
$15 < t \leqslant 20$	17

In which class interval is the median?

Circle your answer. [1 mark]

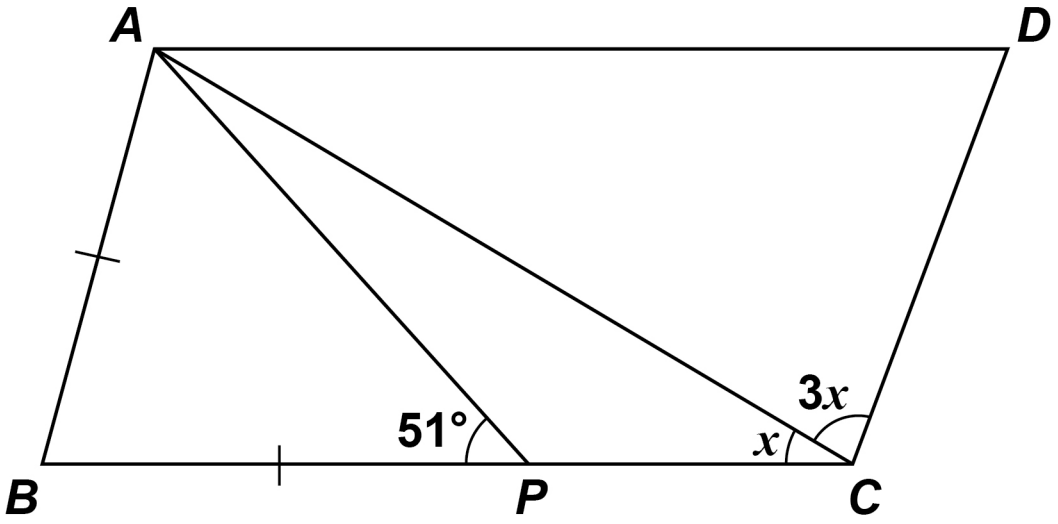
$0 < t \leqslant 5$ $5 < t \leqslant 10$

$10 < t \leqslant 15$ $15 < t \leqslant 20$

8 *ABCD* is a parallelogram.

It is not drawn accurately.

AB = BP



Work out the size of angle x. [4 marks]

Answer _____ **degrees** 7

[Turn over]

9 (a) **Rearrange** $v = u + at$ **to make** t **the subject of the formula. [2 marks]**

Answer _____

9 (b) **Complete this table with consistent metric units. [2 marks]**

Distance	Time	Speed	Acceleration
m	s		

10 **Construct a locus of points that are the same distance from points *A* and *B*. [2 marks]**

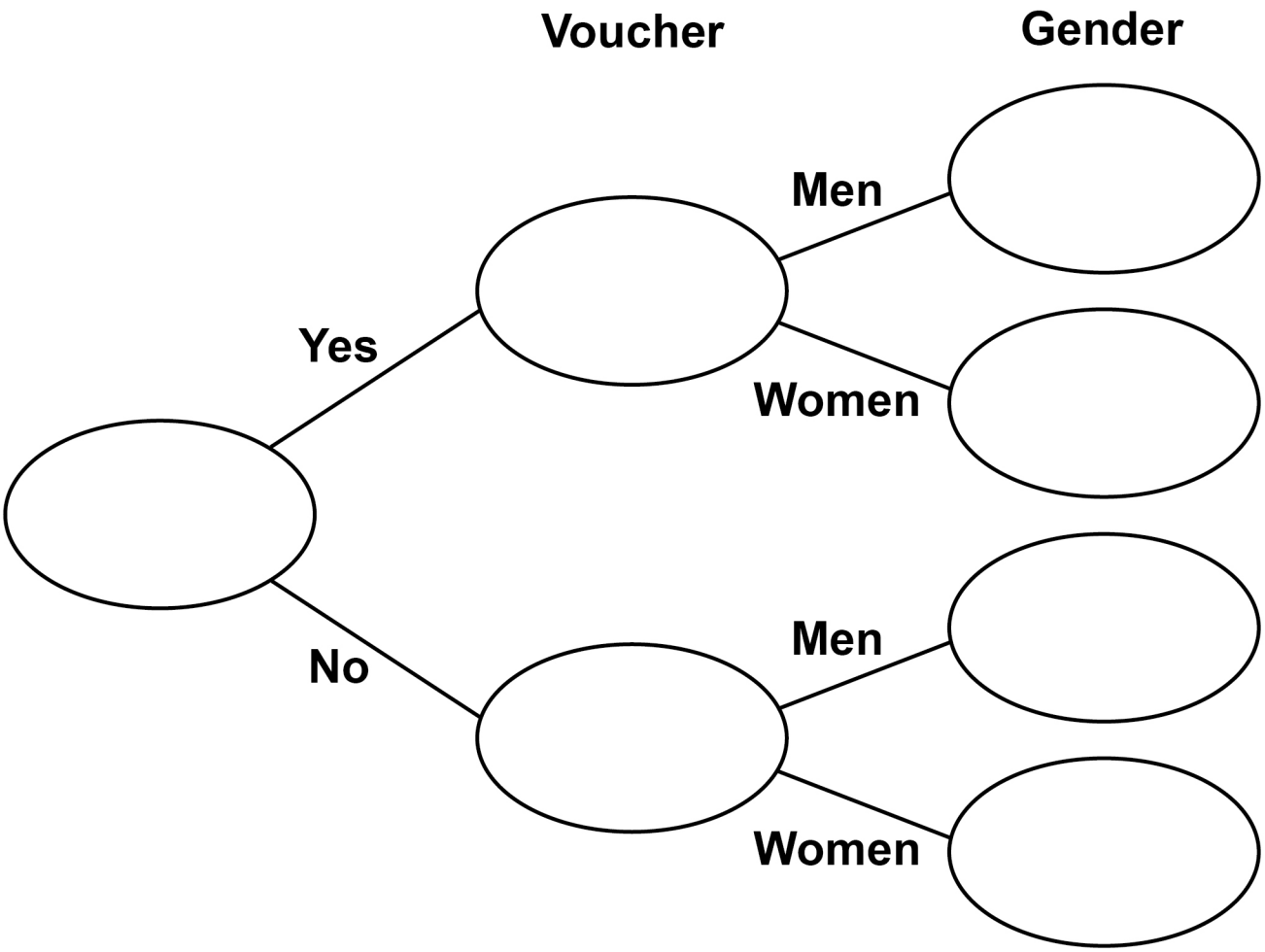
6

11 **42 men and 38 women visit a restaurant.**

44 of these people have a voucher.

Three times as many men as women do NOT have a voucher.

11 (a) **Complete the frequency tree. [4 marks]**



11 (b) **A voucher takes 15% OFF the bill.**

After using the voucher, the bill for a meal is £27.20

How much was the bill before using the voucher? [3 marks]

Answer £ _____

[Turn over]

7

12 **The distance by road from Newport to London is 140 miles.**

Tom travels by coach from Newport to London. The coach leaves Newport at 1.30 pm

12 (a) **He assumes the coach will travel at an average speed of 50 mph**

Use his assumption to work out the arrival time in London. [3 marks]

Answer _____

12 (b) In fact, the coach has a lower average speed.

How does this affect the arrival time? [1 mark]

[Turn over]

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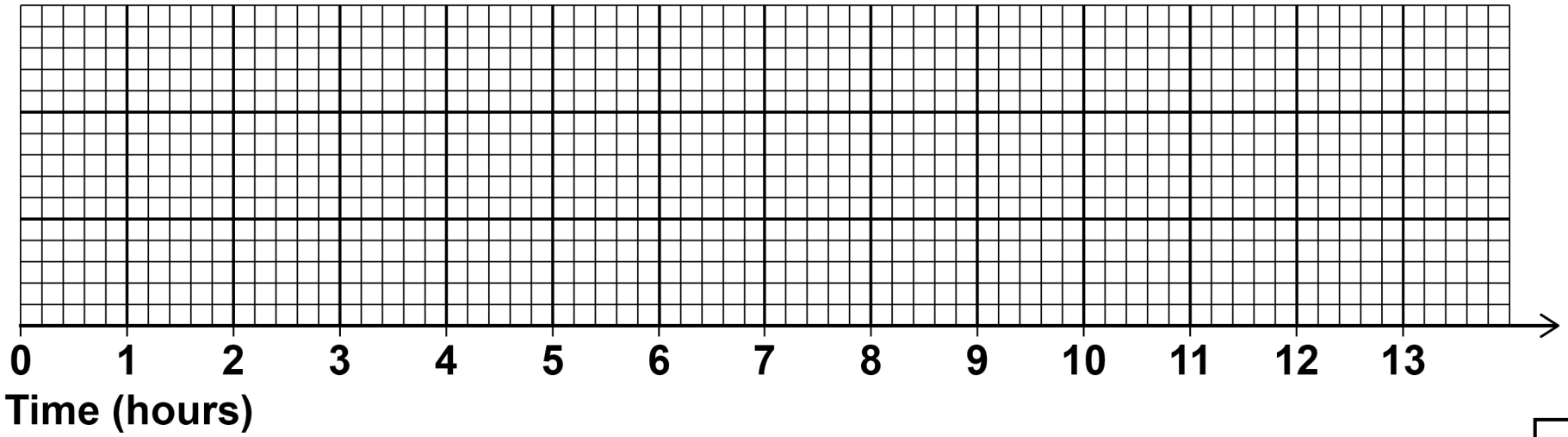
13 Here is some information about the length of time cars stayed in a car park.

Shortest time	**30 minutes**	**Lower quartile**	**2 hours**
Longest time	**12 hours**	**Interquartile range**	**3 hours**
		Median time	**4 hours**

Draw a box plot to show this information. [3 marks]



7

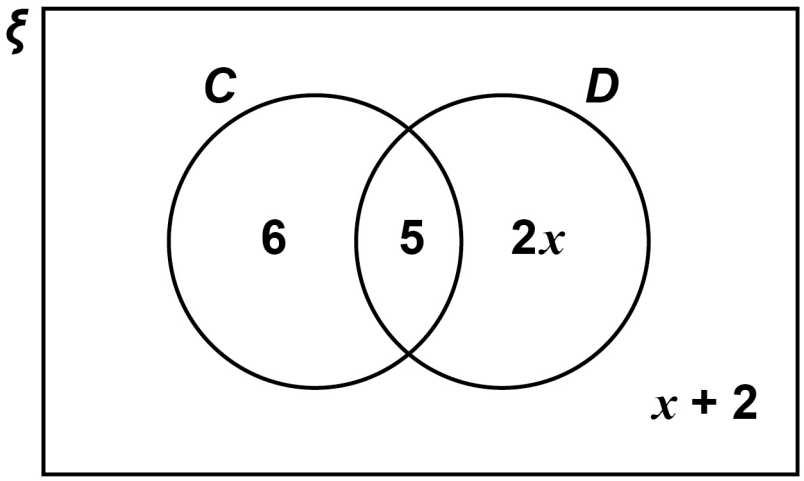
[Turn over]

14 In the Venn diagram

ξ represents 31 students in a class

C is students who have a cat

D is students who have a dog



14 (a) One student from the class is picked at random.

Work out the probability that the student has a dog. [3 marks]

Answer _____

14 (b) **One of the students who has a cat is picked at random.**

Work out the probability that this student has a dog. [1 mark]

Answer _____

[Turn over]

15 Circle the highest common factor (HCF) of $6xy^2$ and $4x^3y$ [1 mark]

$2xy^2$ $2xy$ $12x^3y^2$ $24x^4y^3$

16 $f(x) = x^2 - x^3$

Circle the value of f(–3) [1 mark]

18 –18 36 –36

6

17 **At a football game**

number of men : number of women : number of children = 13 : 5 : 7

There are 4152 MORE men than women.

Work out the number of children at the game.
[3 marks]

Answer _____

[Turn over]

18 **Expand and simplify**

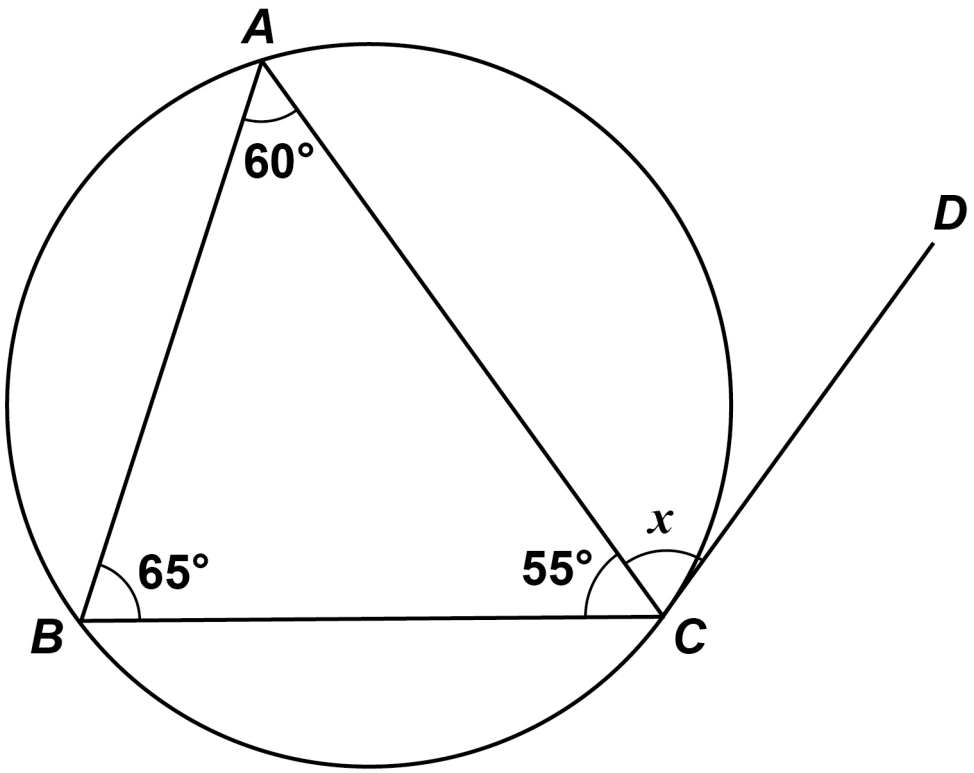
$(3x^2 + 2)(2x + 5) - 6x(x^2 - 3)$

[4 marks]

Answer _____

19 ***A*, *B* and *C* are points on a circle.**
It is not drawn accurately.

***CD* is a tangent to the circle.**



Write down the size of angle x.

Give a reason for your answer. [2 marks]

Answer _____ **degrees**

Reason _____

9

[Turn over]

20 w **is a positive number.**

x **is 10% more than** w**.**

y **is 10% less than** x**.**

Which statement is true?

Tick ONE box. [1 mark]

☐ $w < x$ **and** $w < y$

☐ $w < x$ **and** $w = y$

☐ $x > y$ **and** $w > y$

☐ $x > y$ **and** $w = y$

21 N **is a number.**

As a product of prime factors in index form
$N = 2 \times 3^4 \times y^3$

Work out $3N^2$ **as a product of prime factors in index form.**

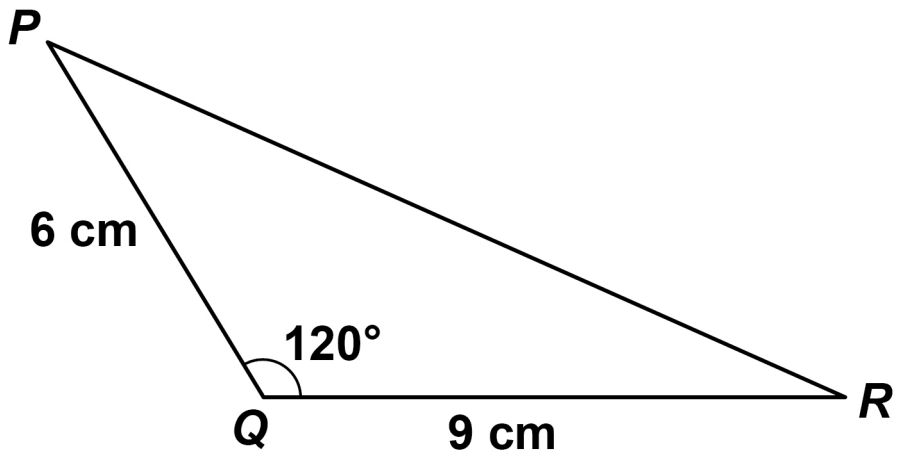
Give your answer in terms of y**. [3 marks]**

Answer _____

[Turn over]

22 **Here is a triangle.**

It is not drawn accurately.



Work out the length *PR*. [3 marks]

Answer _____ **cm**

7

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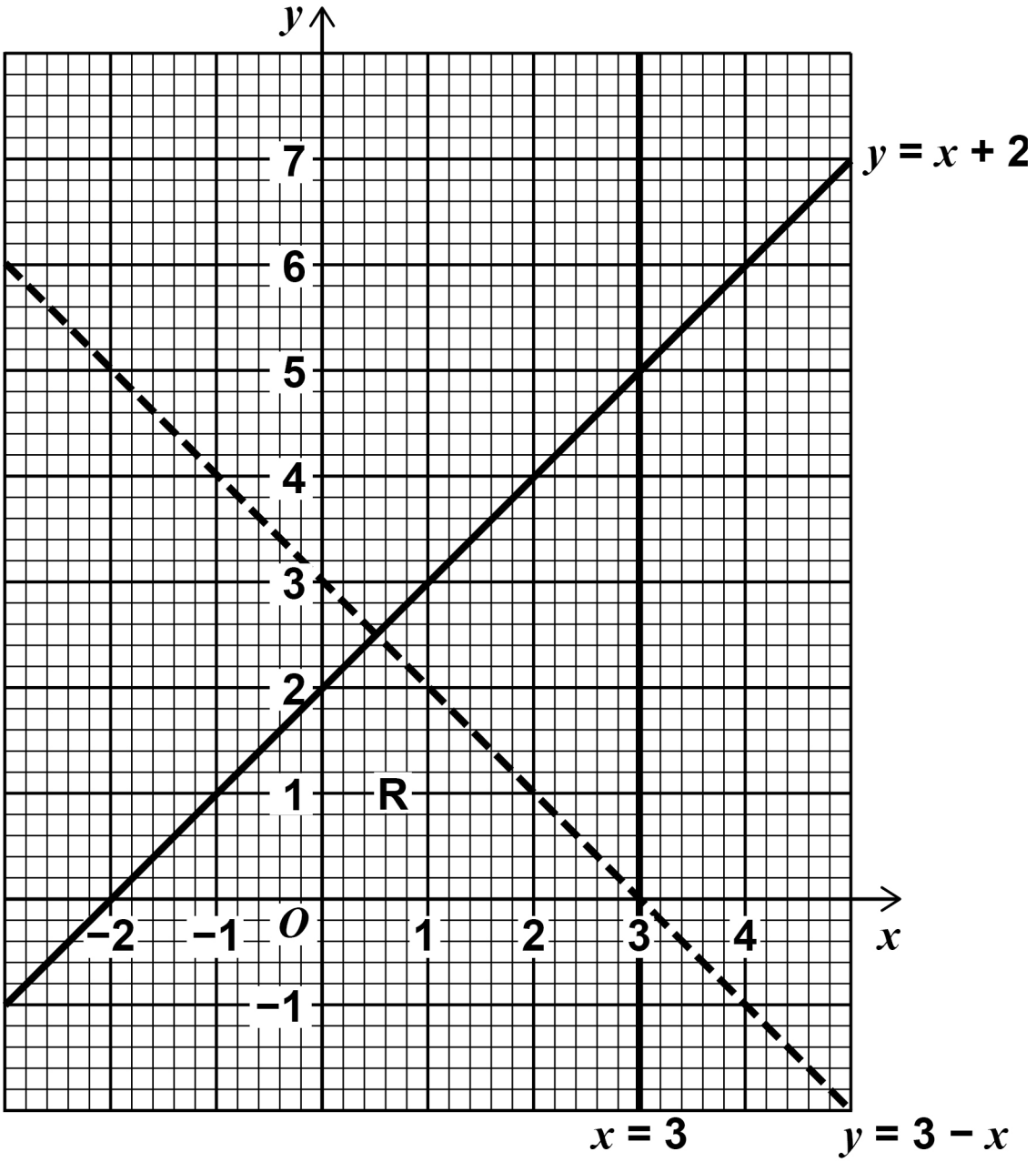
[Turn over]

23 **Joe draws this graph to identify the region R represented by**

$y \leqslant x + 2$ **and** $y > 3 - x$ **and** $x < 3$



Make TWO criticisms of his graph. [2 marks]

Criticism 1 _____

_____

_____

Criticism 2 _____

_____

_____

[Turn over]

24 $a : b = 9 : 4$ **and** $10b = 7c$

Work out $a : c$ **in its simplest form. [3 marks]**

Answer _____ : _____

5

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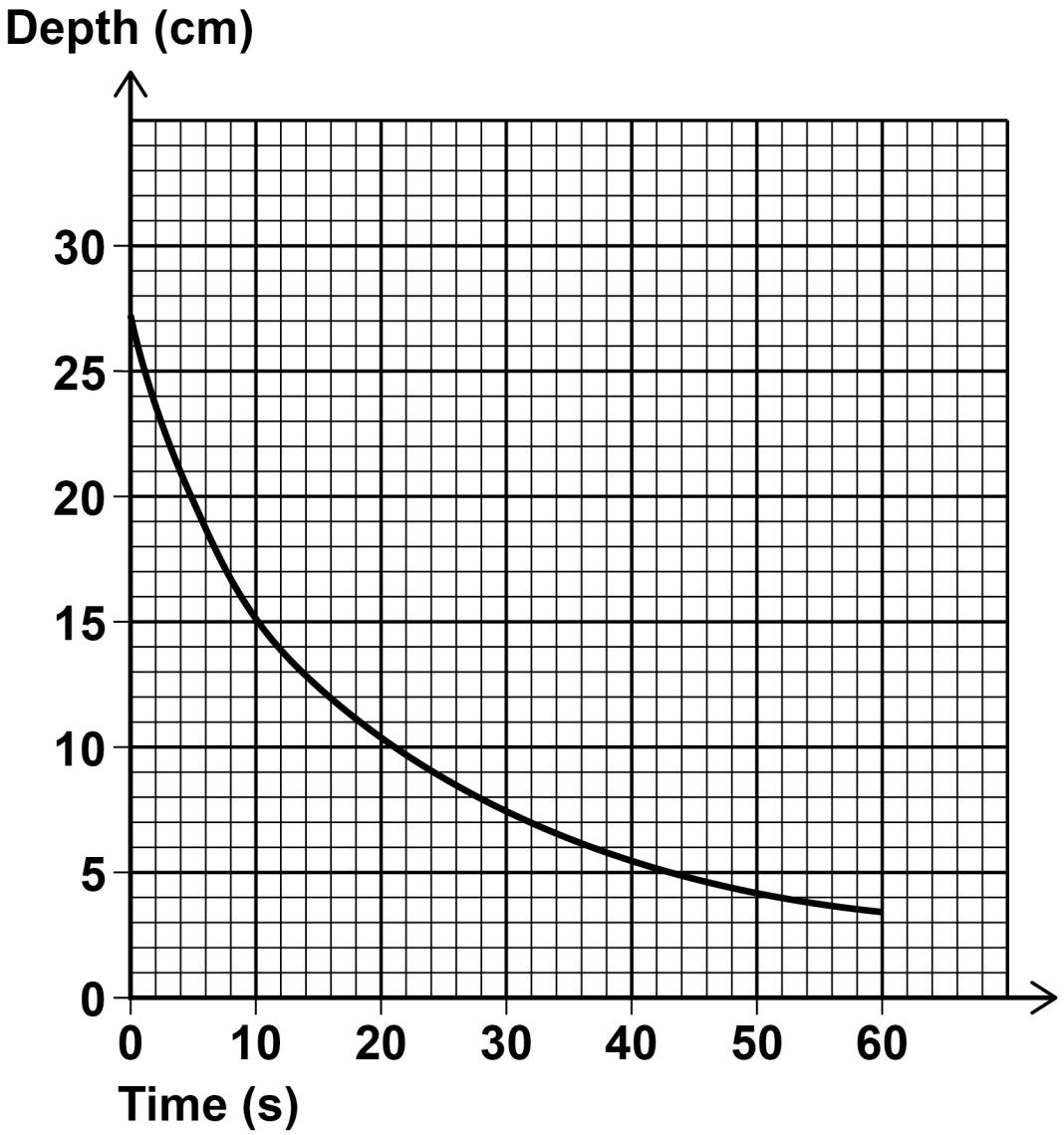
[Turn over]

25 **Liquid is leaking out of a container.**

The graph shows the depth of the liquid for 60 seconds.



Use the graph to work out an estimate of the rate of decrease of depth at 10 seconds.

You MUST show your working. [3 marks]

Answer _____ **cm/s**

[Turn over]

26 $a^2 - b^2 \equiv (a + b)(a - b)$

a and b are positive whole numbers with $a > b$

$a^2 - b^2$ is a PRIME number.

Why are a and b consecutive numbers?
[2 marks]

5

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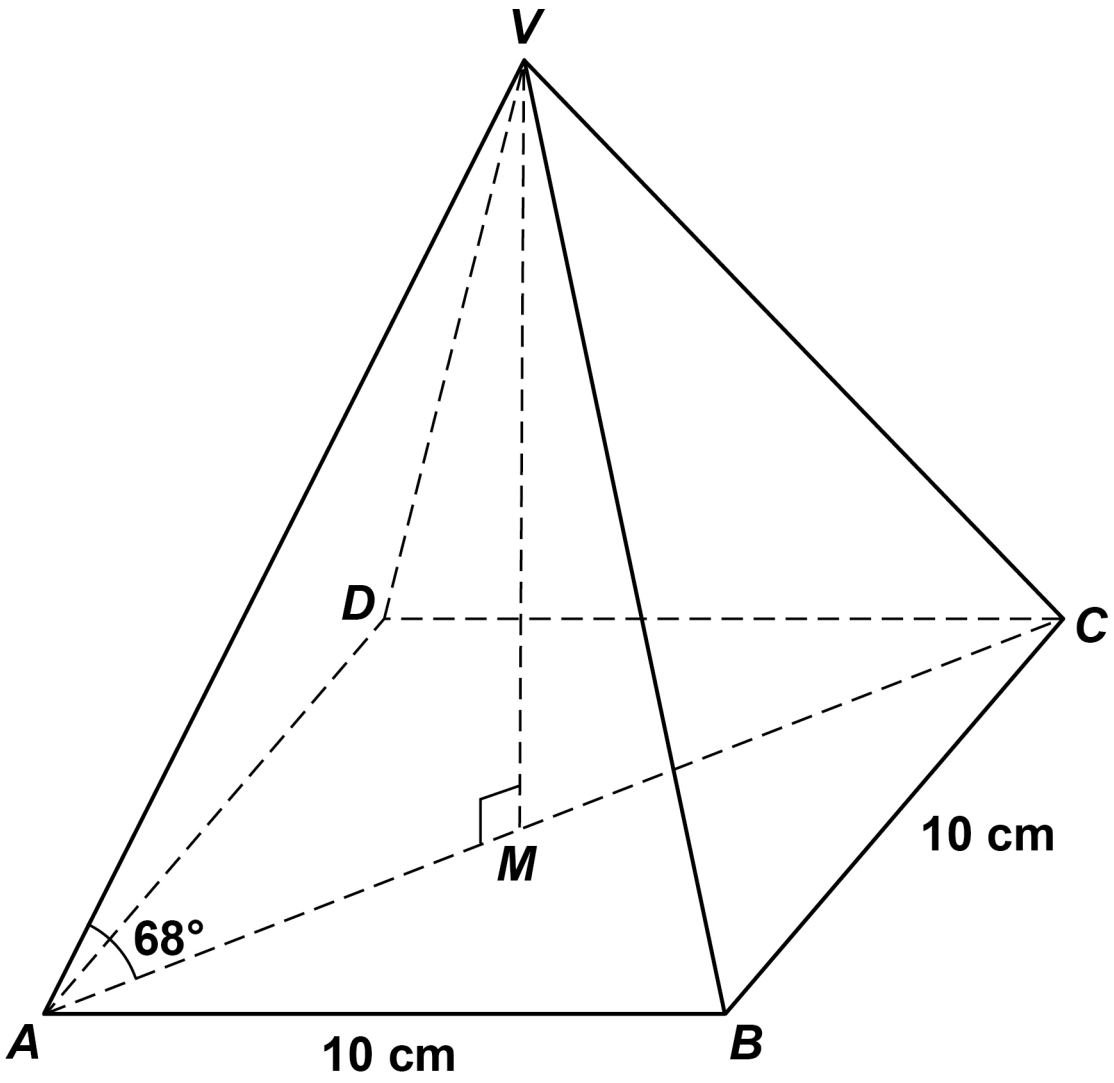
[Turn over]

27 ***VABCD*** **is a square-based pyramid.**

The horizontal base ***ABCD*** **has side length 10 cm and centre** ***M*****.**

Angle ***VMA*** **is 90°**

Angle ***VAM*** **is 68°**



Volume of pyramid

$$= \frac{1}{3} \times \text{area of base} \times \text{perpendicular height}$$

Work out the volume of the pyramid. [6 marks]

Answer _____ **cm^3**

6

28 $y = p \times q^{x-1}$ **where** p **and** q **are numbers.**

$y = 10$ **when** $x = 1$

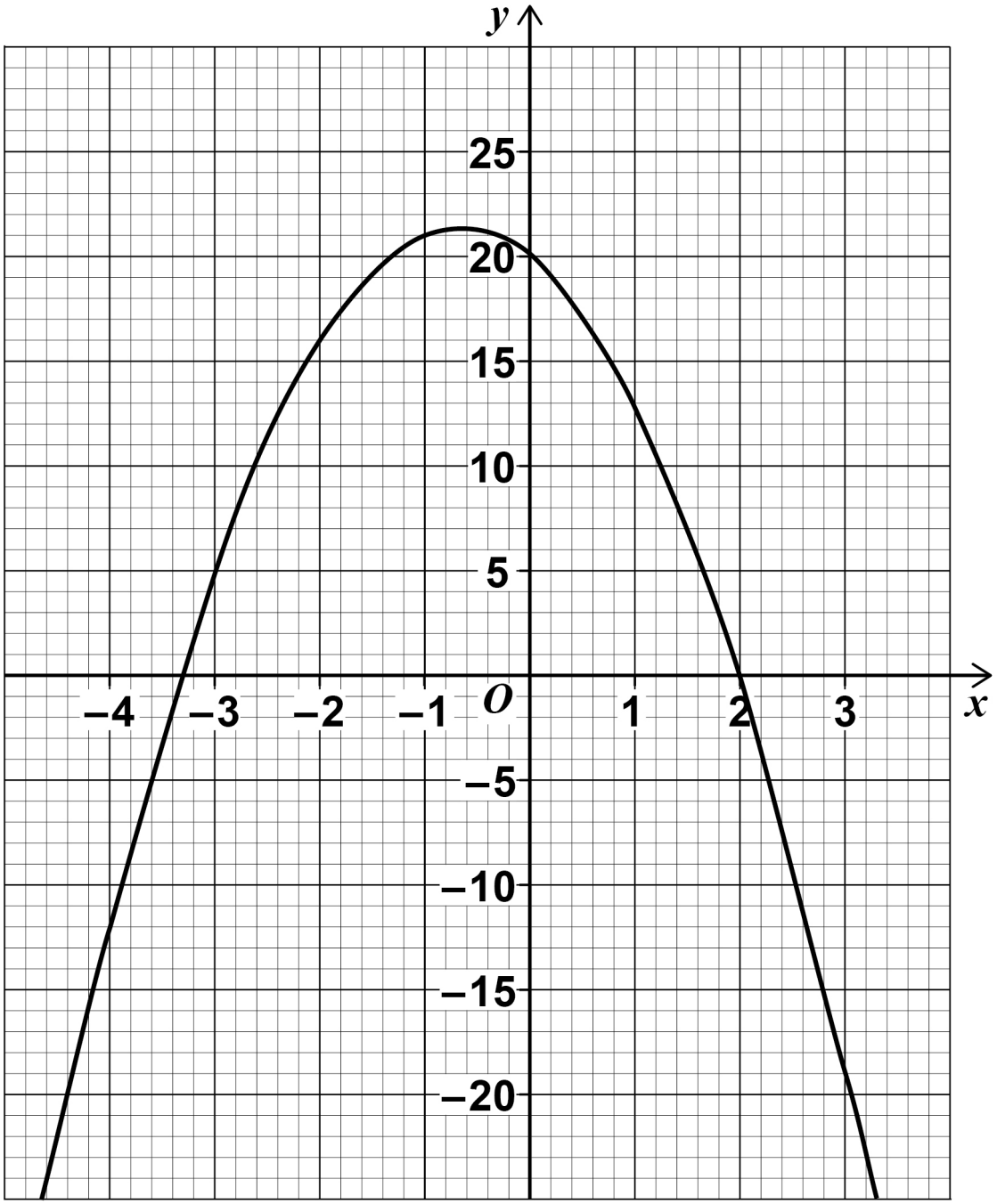
$y = 0.3125$ **when** $x = 6$

Work out the value of y **when** $x = 3$ **[5 marks]**

Answer _____

[Turn over]

29 Here is the graph of $y = f(x)$ where $f(x)$ is a quadratic function.



Write down all the INTEGER solutions of $f(x) \geqslant 0$ [2 marks]

Answer _____

7

[Turn over]

30 $f(x) = \frac{x}{3} + 4$ for all values of x.

$g(x) = 6x^2 + 3$ for all values of x.

Work out $fg(x)$.

Give your answer in the form $ax^2 + b$ where a and b are integers. [2 marks]

Answer _____ 2

END OF QUESTIONS

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For Examiner's Use	
Pages	Mark
4-5	
6-9	
10–11	
12-13	
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18-20	
21-23	
24-26	
28-30	
32-34	
36-38	
39-41	
42	
TOTAL	