AQA

ELEVISE

GCSE
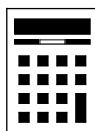# MATHEMATICS

Past Paper Website Home

H

Higher Tier　　　Paper 3　Calculator

Wednesday 8 November 2017　　Morning　　Time allowed: 1 hour 30 minutes

Materials

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

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.

How the Past Papers work

Every past paper question has a corresponding webpage that has the mark scheme and worked solutions for that particular question. There are also helpful links to content for the concepts used to answer the question, quizzes that you can use to try some of the concepts and similar past paper questions. An example of a webpage for a question is given below:

How to get to the webpage
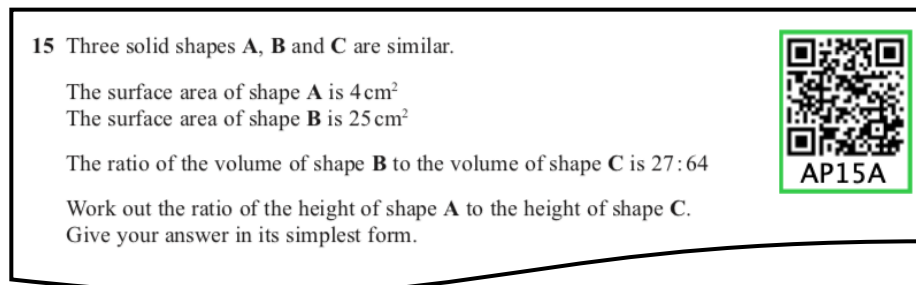
Every past paper question has a QR code next to it, such as:

You can get to the corresponding webpage in 3 different ways:
1) Scanning the QR code with the camera on a smart phone or tablet.
2) Typing the code that is underneath the QR code at the end of www.elevise.co.uk/. For this question, the code is AP15A, so you would type www.elevise.co.uk/AP15A into the address bar to obtain the webpage. If you would like to see the question rather than the answers, you change the A at the end of the code to a Q; you would type www.elevise.co.uk/AP15Q
3) Clicking on the QR code if you are viewing the past paper as a PDF or on a web browser.

www.elevise.co.uk

Answer **all** questions in the spaces provided

AI1A

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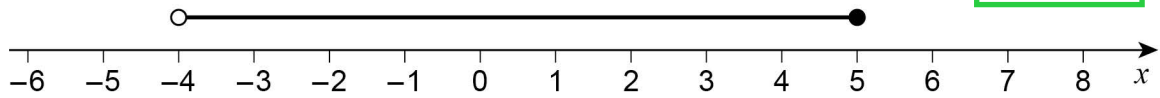
[1 mark]

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

AI2A

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 nth term of the sequence.

[1 mark]

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

AI3A

4   Circle the equation of the line that is parallel to the *x*-axis.

[1 mark]

AI4A

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

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

[2 marks]

AI5A

_____

_____

_____

Answer _____

Turn over for the next question

Turn over ▶

6

6 Show that 268 can be written as the sum of a power of 3 and a square number.

[2 marks]

AI6A

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

AI7A

In which class interval is the median?

Circle your answer.

[1 mark]

$0 < t \leqslant 5$ $\qquad$ $5 < t \leqslant 10$ $\qquad$ $10 < t \leqslant 15$ $\qquad$ $15 < t \leqslant 20$

8 *ABCD* is a parallelogram.

AB = BP

Not drawn accurately
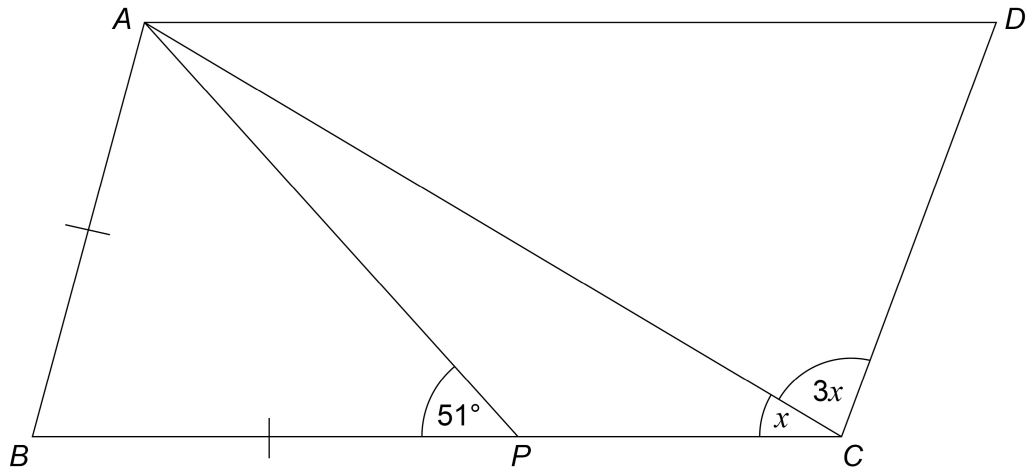
Work out the size of angle x.

[4 marks]

AI8A

_____

_____

_____

_____

_____

_____

_____

Answer _____ degrees

Turn over for the next question

7

Turn over ▶

9 (a) Rearrange $v = u + at$ to make t the subject of the formula.

[2 marks]

AI9A

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]

•
A

•
B

Turn over for the next question

6

Turn over ▶

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]

Voucher   **Gender**

Yes — Men

Women

No — Men

Women

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 for the next question

Turn over ▶

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]

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

Shortest time	30 minutes
Longest time	12 hours

Lower quartile	2 hours
Interquartile range	3 hours
Median time	4 hours

Draw a box plot to show this information.

[3 marks]

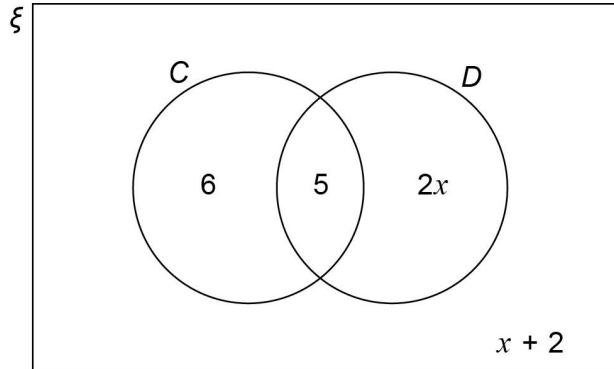Time (hours)

Turn over for the next question

7
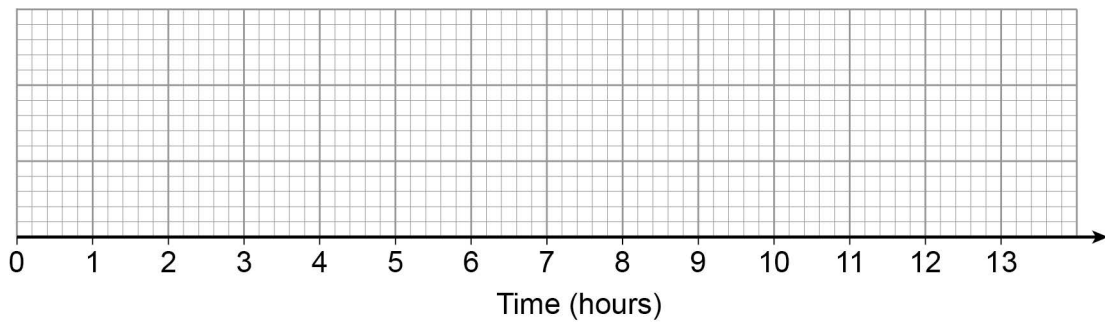
Turn over ▶

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

AI14A

ξ

C   D

6   5   2*x*

x + 2

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 _____

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

[1 mark]

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

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

Circle the value of $f(-3)$

[1 mark]

18 $\qquad$ −18 $\qquad$ 36 $\qquad$ −36

Turn over for the next question

6

Turn over ▶

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]

AI17A

Answer _____

18 Expand and simplify $(3x^2 + 2)(2x + 5) - 6x(x^2 - 3)$
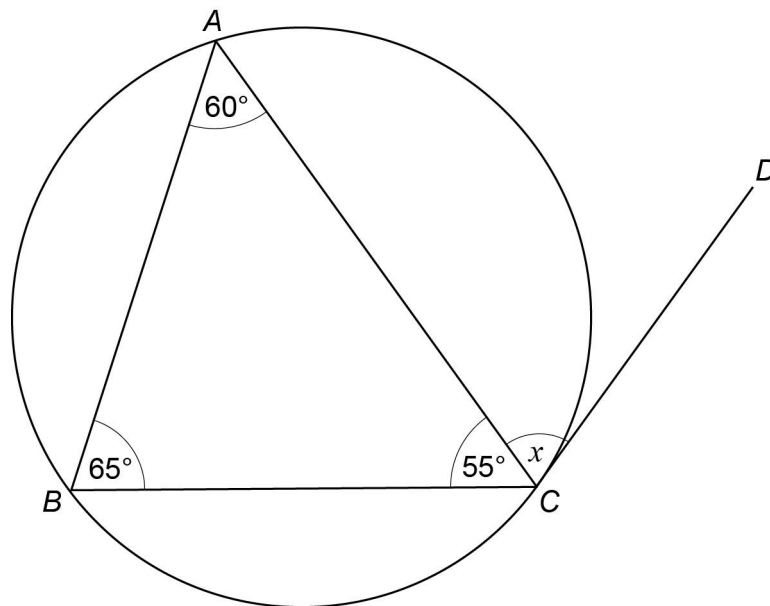
[4 marks]

AI18A

Answer _____

19 *A*, *B* and *C* are points on a circle.

CD is a tangent to the circle.

Not drawn
accurately

Write down the size of angle x.

Give a reason for your answer.

[2 marks]

Answer _____ degrees

Reason _____

Turn over for the next question

9

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.
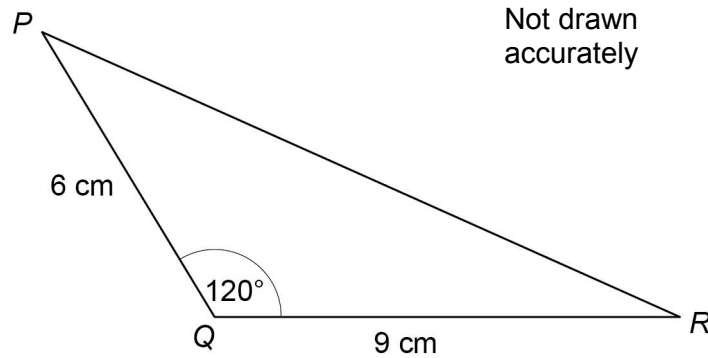
Give your answer in terms of *y*.

[3 marks]

_____

_____

_____

_____

_____

Answer _____

22 Here is a triangle.

P

6 cm

120°

Q   9 cm   R

Not drawn accurately

AI22A

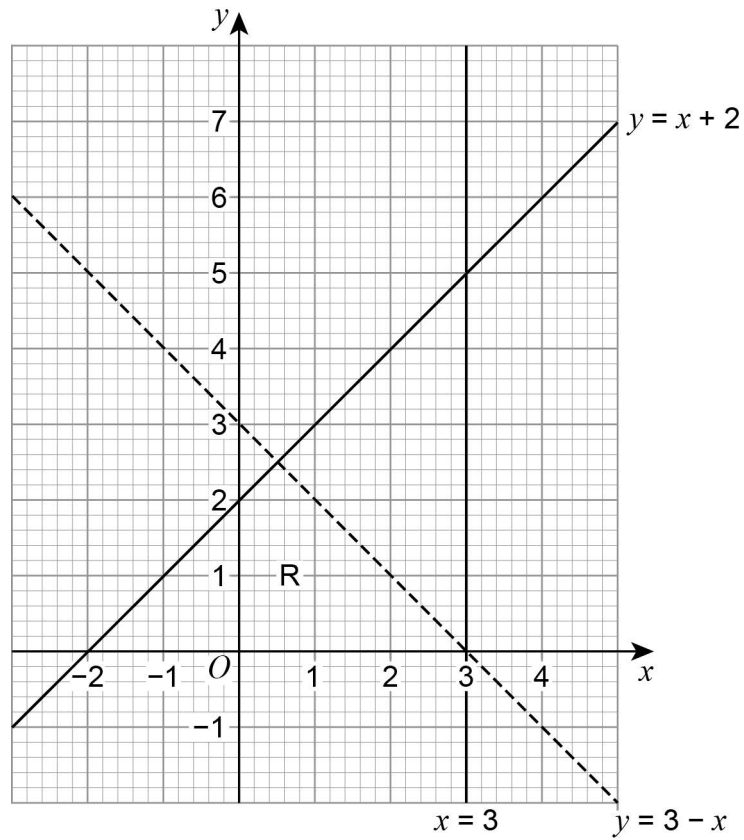Work out the length *PR*.

[3 marks]

Answer _____ cm

Turn over for the next question

7

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

$$y \leqslant x + 2 \quad \text{and} \quad y > 3 - x \quad \text{and} \quad x < 3$$

Make **two** criticisms of his graph.

[2 marks]

Criticism 1 _____

_____

Criticism 2 _____

_____

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

Work out $a : c$ in its simplest form.

[3 marks]

AI24A

Answer _____ : _____

Turn over for the next question

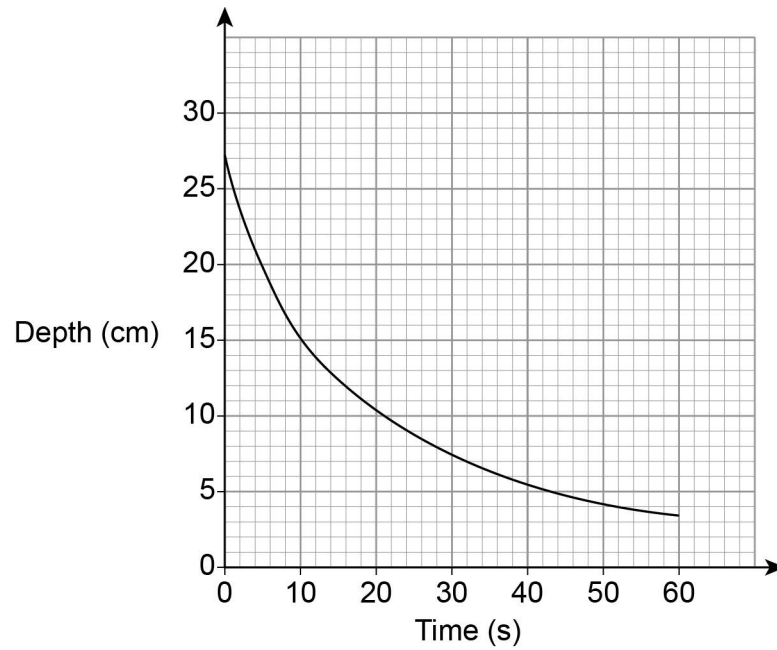**Turn over ▶**

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

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]

AI26A

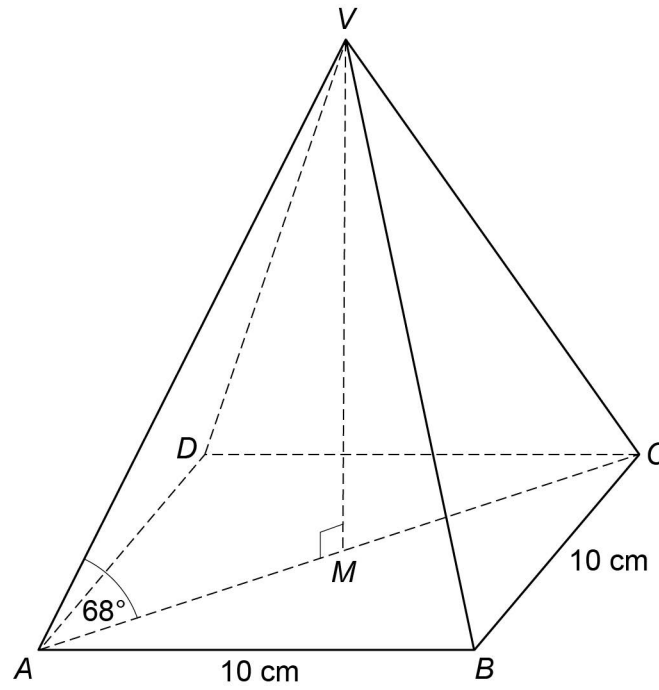**Turn over for the next question**

5

Turn over ▶

27 *VABCD* is a square-based pyramid.

The horizontal base *ABCD* has side length 10 cm and centre *M*.
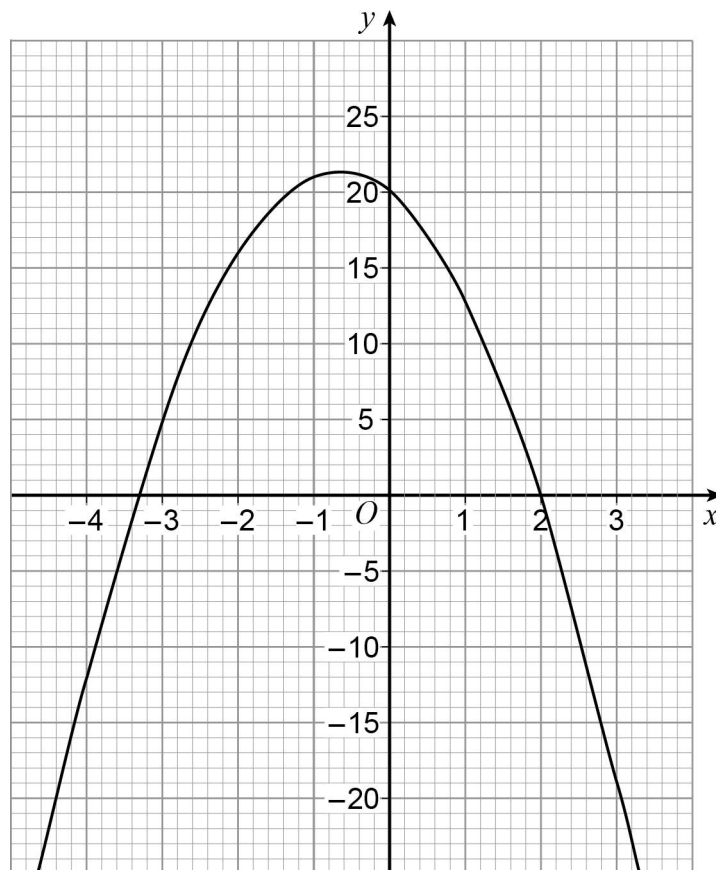
Angle *VMA* is 90°

Angle *VAM* is 68°

AI27A

Volume of pyramid = $\frac{1}{3}$ × area of base × perpendicular height

Work out the volume of the pyramid.

[6 marks]

Answer _____ cm^3

Turn over for the next question

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 _____

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 _____

Turn over for the next question

Turn over ▶

30 $f(x) = \dfrac{x}{3} + 4$ 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 _____

END OF QUESTIONS