# GCSE Mathematics Practice Tests: Set 20

# Paper 1H (Non-calculator)

## Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

**Instructions**

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators may be used.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

**Information**

- The total mark for this paper is 80
- Questions are in order of mean difficulty as found by students achieving Grade 7.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.

**Advice**

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

**Answer all TWENTY TWO questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1**  (*a*)  Solve $4y + 5 > 12$

(*b*)  Solve $6x - 5 = \dfrac{4x - 7}{2}$

Show clear algebraic working.

$x =$ ......................................................

**(3)**

**(Total for Question 1 is 5 marks)**

**2** (*a*) Write down the value of $x^0$

.........................................................
**(1)**

Given that $2^{-3} \times 2^9 = 2^n$

(*b*) find the value of $n$

$n =$ .........................................................
**(1)**

Given that $\dfrac{7^{206} \times 7^m}{7^{214}} = 7^{-3}$

(*c*) find the value of $m$

$m =$ .........................................................
**(2)**

**(Total for Question 2 is 4 marks)**

**3** (*a*) Write $5 \times 10^4$ as an ordinary number.

.........................................................
**(1)**

(*b*) Write 0.000 06 in standard form.

.........................................................
**(1)**

**(Total for Question 3 is 2 marks)**

**4**   (*a*)  Complete the table of values for $y = \dfrac{6}{x}$

| *x* | 0.5 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| *y* |  | 6 |  | 2 |  |  | 1 |

**(2)**

(*b*)  On the grid, draw the graph of $y = \dfrac{6}{x}$ for $0.5 \leq x \leq 6$



**(2)**
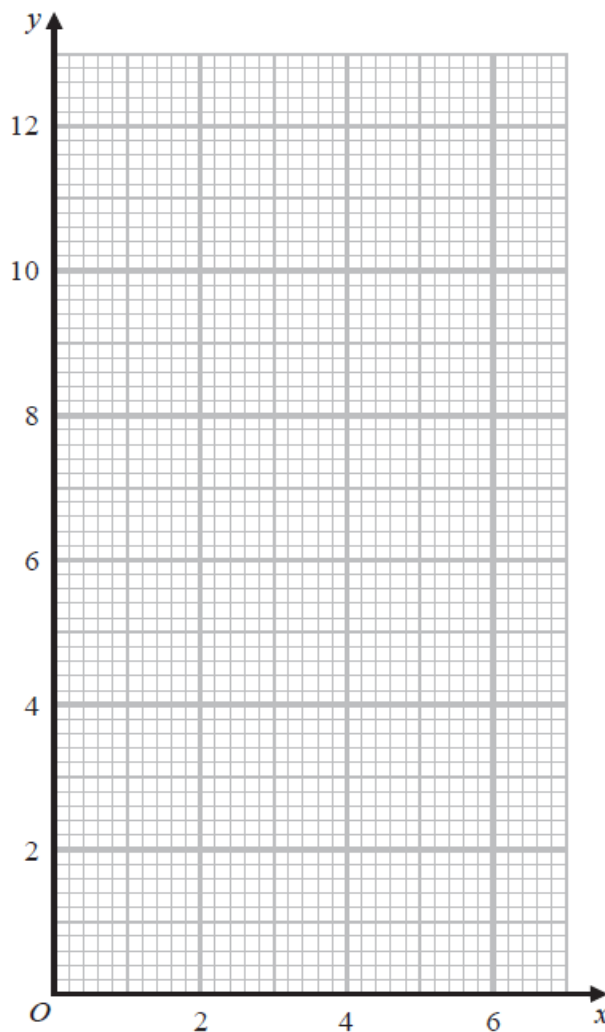
**(Total for Question 4 is 4 marks)**

**5** (*a*) Complete the table of values for $y = x^2 - 4x + 3$

| $x$ | $-2$ | $-1$ | $0$ | $1$ | $2$ | $3$ | $4$ |
|---|---|---|---|---|---|---|---|
| $y$ | | 8 | 3 | | | 0 | |

(2)

(*b*) On the grid, draw the graph of $y = x^2 - 4x + 3$ for values of $x$ from $-2$ to $4$



(2)
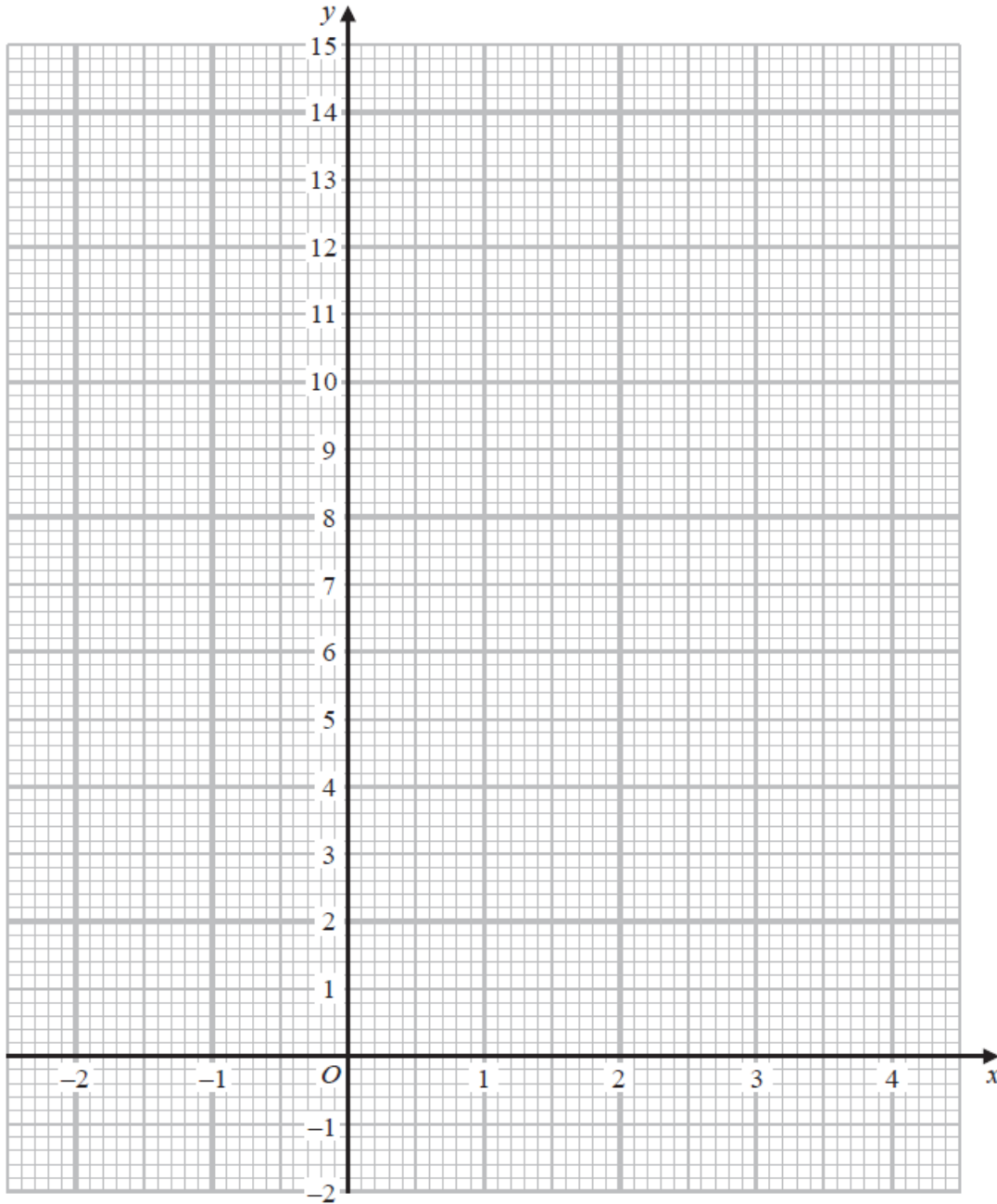
**(Total for Question 5 is 4 marks)**

**6** (*a*) Simplify $x^4 \times x^5$

...................................................
**(1)**

(*b*) Simplify $(4y^2)^3$

...................................................
**(2)**

(*c*) Factorise $n^2 - 7n + 12$

...................................................
**(2)**

**(Total for Question 6 is 5 marks)**

**7** Expand and simplify $n(n - 4)(3n + 5)$
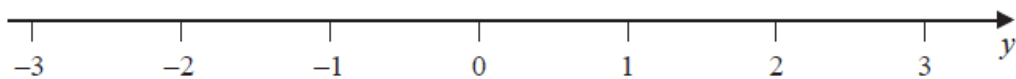
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**(Total for Question 7 is 2 marks)**

**8** $n$ is an integer.

(*a*) Write down all the values of $n$ such that $-2 \leq n < 3$

.......................................................................

**(2)**

(*b*) On the number line, represent the inequality $y \leq 1$
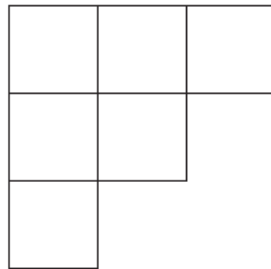


**(1)**

**(Total for Question 8 is 3 marks)**

**9** Write down an equation of the straight line with gradient –3 and which passes through the point with coordinates (0, 5)

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**(Total for Question 9 is 2 marks)**

**10** The diagram shows a shape made from 6 identical squares.
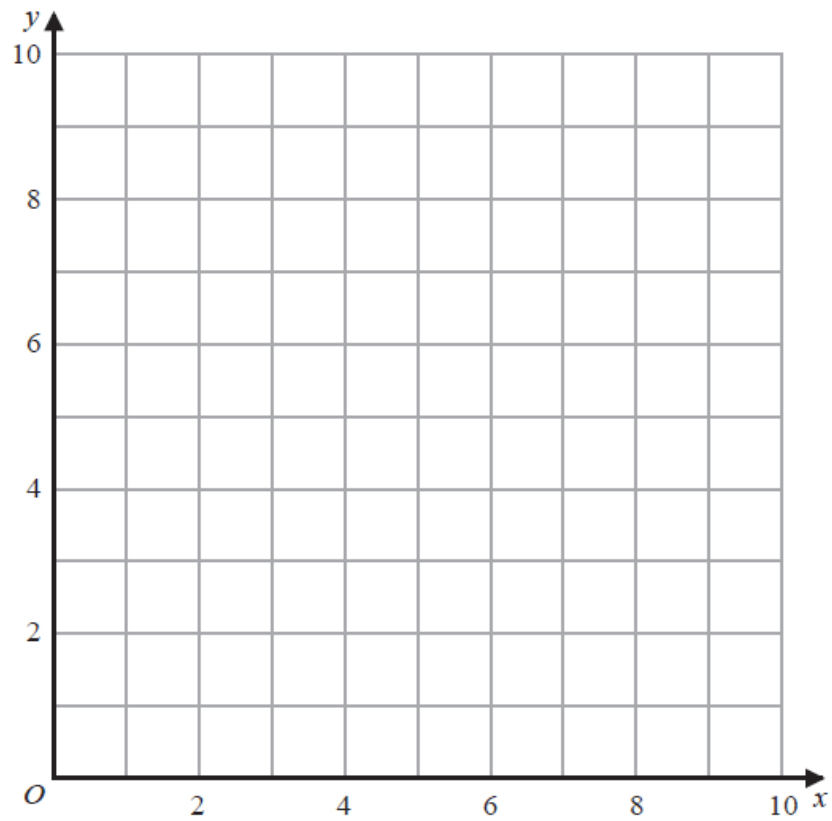


The total area of the shape is 5406 cm$^2$

Find an estimate for the length of one side of each square.
Give your answer correct to the nearest whole number.

....................................................... cm

**(Total for Question 10 is 3 marks)**

**11** Show, by shading on the grid, the region defined by **all three** of the inequalities

$$x \leq 6 \qquad y \geq 2 \qquad y \leq x + 1$$

Label the region **R**



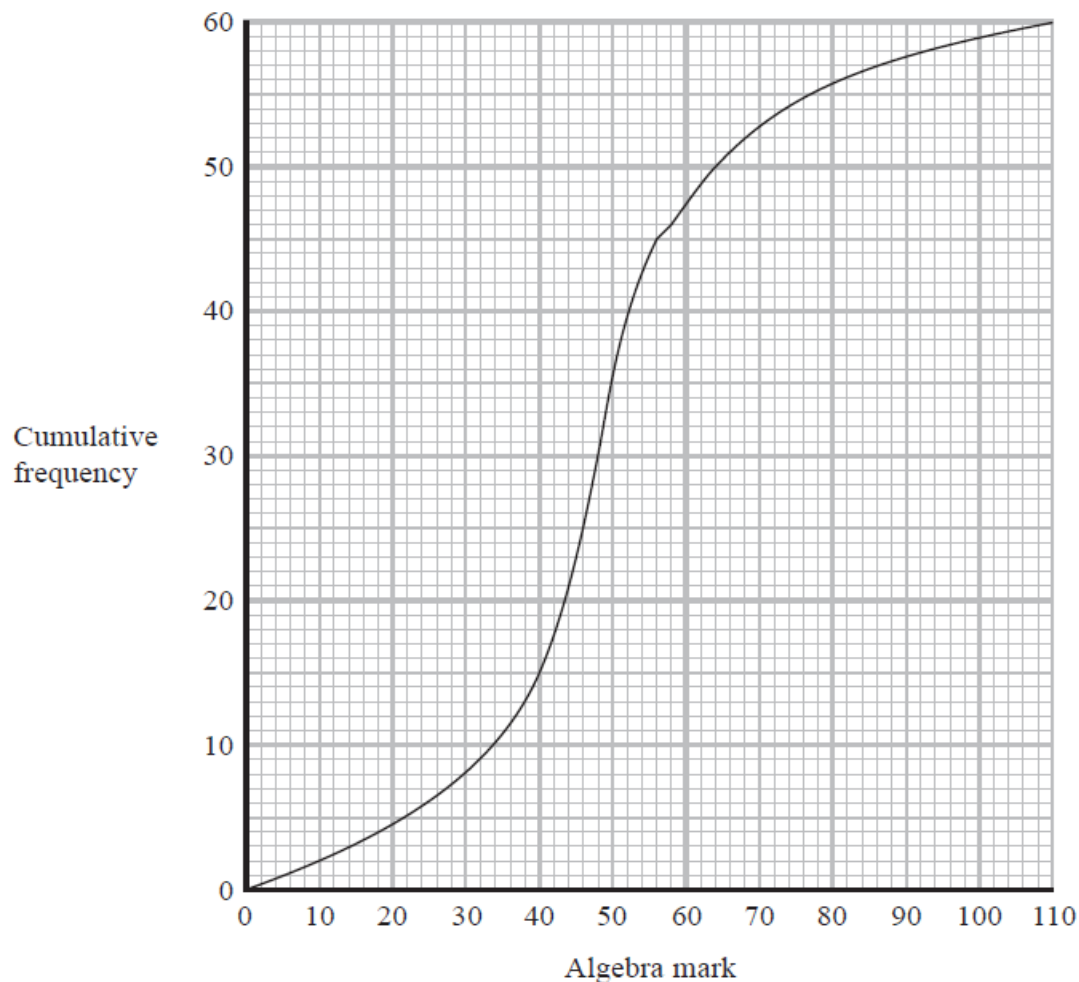**(Total for Question 11 is 3 marks)**

**12** Make $t$ the subject of $n^2 = \dfrac{4d + t^3}{t^3}$

.....................................................

**(Total for Question 12 is 4 marks)**

**TURN OVER FOR QUESTION 13**

**13** A group of 60 students each sat an algebra test and a geometry test.
Each test was marked out of 110

The cumulative frequency graph gives information about the marks gained by the 60 students in the algebra test.



Algebra mark

(a) Use the graph to find an estimate for the median mark in the algebra test.

.......................................................
**(1)**

(b) Use the graph to find an estimate for the number of students who gained 58 marks or less in the algebra test.

.......................................................
**(1)**

(*c*) Use the graph to find an estimate for the interquartile range of the marks gained in the algebra test.

.......................................................
**(2)**

The interquartile range of the marks gained in the geometry test is 9

Luis says

"The students' marks are more spread out in the algebra test than in the geometry test."

(*d*) Is Luis correct?
  Give a reason for your answer.

……………………………………………………………………………………………………

……………………………………………………………..................................................................

**(1)**

To be awarded a grade A in the algebra test, a student had to gain a mark greater than 64

Two students are to be selected at random from the 60 students in the group.

(*e*) Use the graph to find an estimate for the probability that both of these students were awarded a grade A in the algebra test.

.......................................................
**(3)**

**(Total for Question 13 is 8 marks)**

**14** Express $\dfrac{3}{x} + \dfrac{x+2}{2x} + \dfrac{1}{4}$ as a single fraction in its simplest form.

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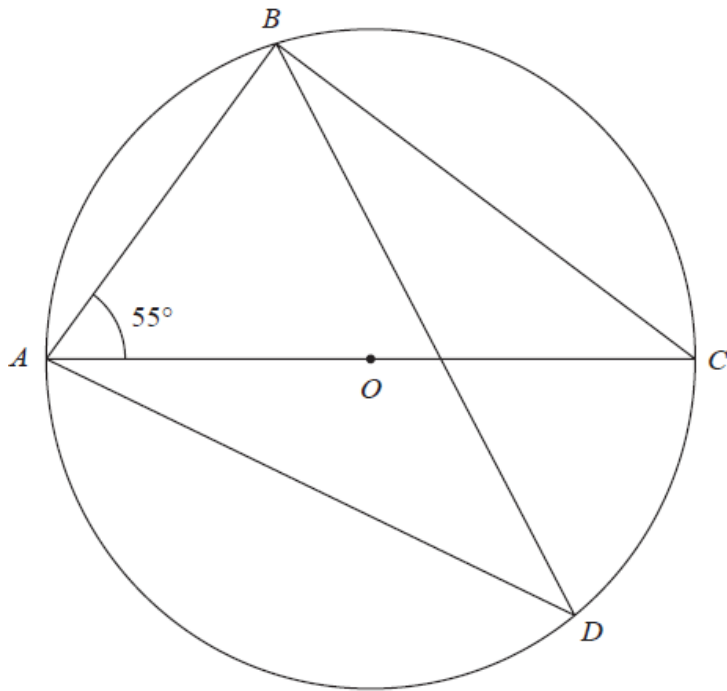**(Total for Question 14 is 3 marks)**

**15**



Diagram **NOT**
accurately drawn

*A*, *B*, *C* and *D* are points on a circle, centre *O*
*AOC* is a diameter of the circle.

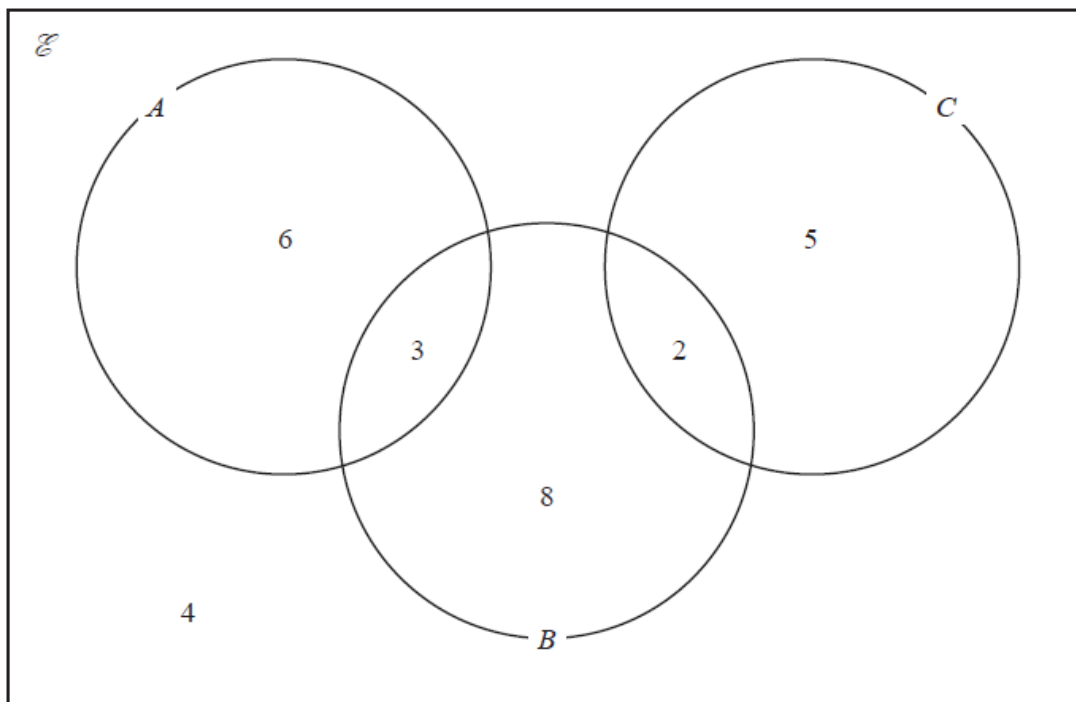Angle *BAC* = 55°

Work out the size of angle *ADB*
Give a reason for each stage of your working.

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**(Total for Question 15 is 4 marks)**

**16** Given that $a$, $b$ and $c$ are integers, express $3x^2 + 12x + 19$ in the form $a(x + b)^2 + c$

.................................................................................

**(Total for Question 16 is 2 marks)**

**17**    The Venn diagram shows a universal set $\mathscr{E}$ and three sets $A$, $B$ and $C$.



6, 3, 8, 2, 5 and 4 represent the **numbers** of elements.

Find

(i)   n($A \cup B$)

.......................................................
**(1)**

(ii)  n($A \cup C$)

.......................................................
**(1)**

(iii) n($B \cap C'$)

.......................................................
**(1)**

(iv) n($A' \cup B' \cup C'$)

.......................................................
**(1)**

**(Total for Question 17 is 4 marks)**

**18** The curve with equation $y = f(x)$ has one turning point.

The coordinates of this turning point are $(-6, -4)$

(*a*) Write down the coordinates of the turning point on the curve with equation
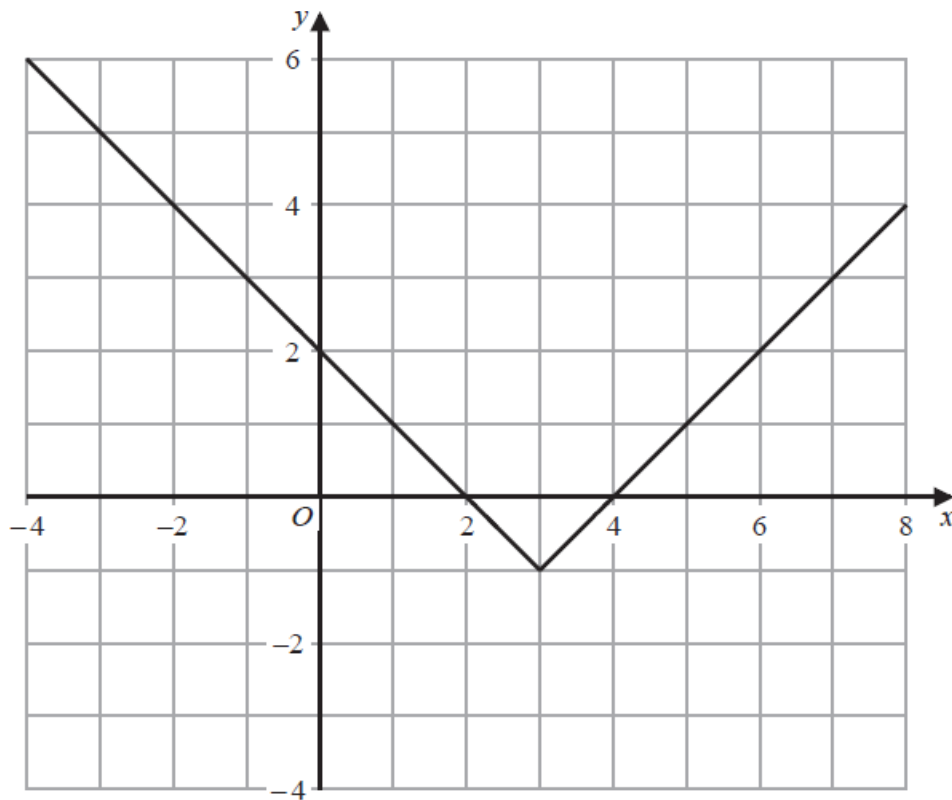
(i) $y = f(x) + 5$

(....................... , .......................)

(ii) $y = f(3x)$

(....................... , .......................)

**(2)**

The graph of $y = g(x)$ is shown on the grid below.



(*b*) On the grid, sketch the graph of $y = 2g(x)$ for $-1 \leq x \leq 7$

**(2)**

The graph of $y = \text{h}(x)$ intersects the *x*-axis at two points.
The coordinates of the two points are $(-1, 0)$ and $(6, 0)$

The graph of $y = \text{h}(x + a)$ passes through the point with coordinates $(2, 0)$, where *a* is a constant.

(*c*)  Find the two possible values of *a*

.......................... , ..........................
**(2)**

**(Total for Question 18 is 6 marks)**

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**19**  Given that $\left( \sqrt[3]{\dfrac{1}{x}} \right)^4 = x^m$, find the value of *m*

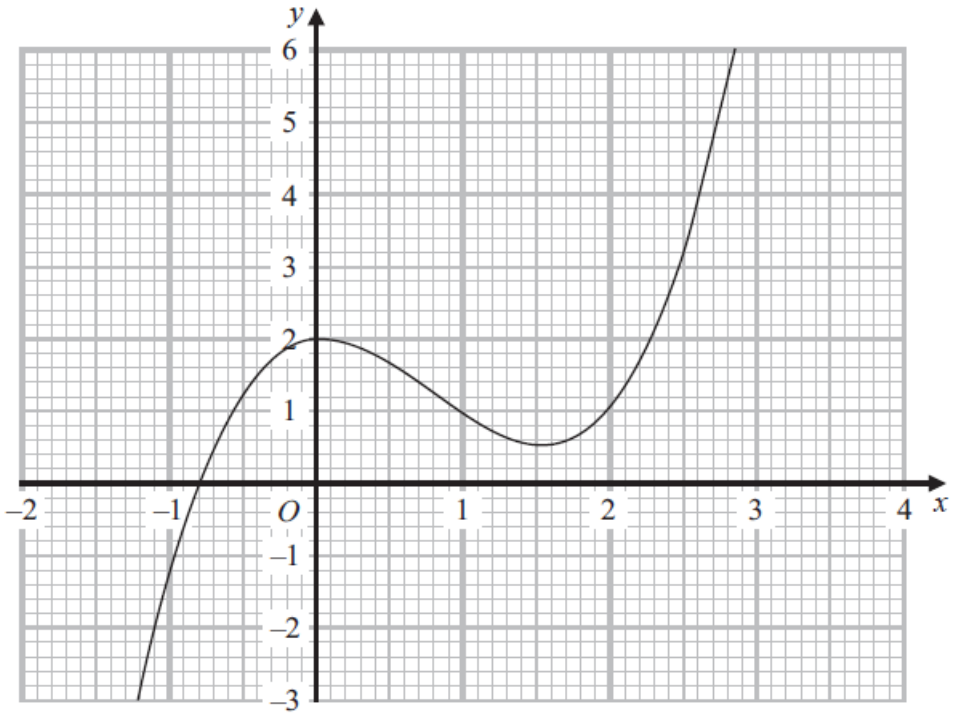*m* = ......................................................

**(Total for Question 19 is 1 mark)**

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**20** Using algebra, prove that, given any 3 consecutive whole numbers, the sum of the square of the smallest number and the square of the largest number is always 2 more than twice the square of the middle number.
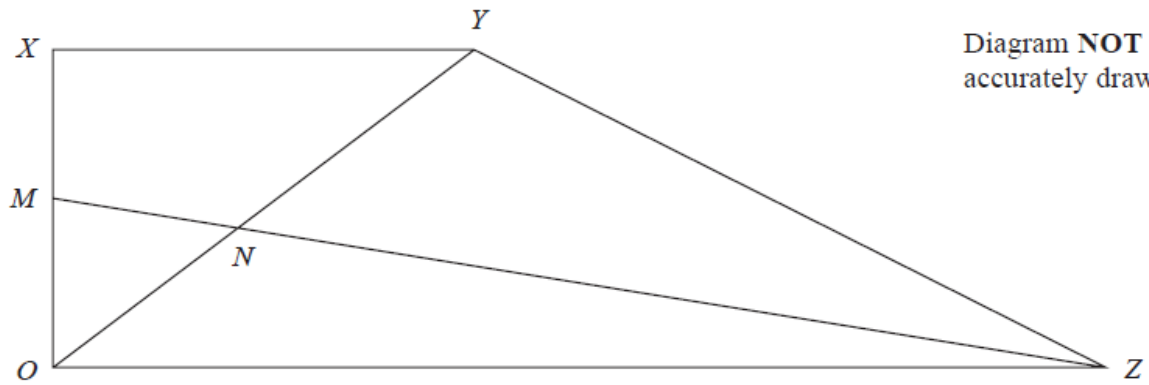
**(Total for Question 20 is 3 marks)**

**21** Part of the curve with equation $y = f(x)$ is shown on the grid.



Find an estimate for the gradient of the curve at the point where $x = 2$
Show your working clearly.

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**(Total for Question 21 is 3 marks)**

**22** *OXYZ* is a trapezium.



Diagram **NOT** accurately drawn

$\overrightarrow{OX} = \mathbf{a}$

$\overrightarrow{XY} = \mathbf{b}$

$\overrightarrow{OZ} = 3\mathbf{b}$

*M* is the midpoint of *OX*

*N* is the point such that *MNZ* and *ONY* are straight lines.

Given that $ON : OY = \lambda : 1$, use a vector method to find the value of $\lambda$

λ = ......................................................

**(Total for Question 22 is 5 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

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