

Name: _____

Maths Genie Stage 11

Test B

Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- **Calculators may not be used.**

Information

- 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

1 Find the value of $16^{-\frac{3}{2}}$

$$\begin{array}{r} 4^{-3} \\ 64^{-1} \\ \frac{1}{64} \end{array}$$

$$\frac{1}{64}$$

(Total for Question 1 is 2 marks)

2 Make x the subject of the formula $3x + a = b(x + 5)$

$$3x + a = bx + 5b$$

$$3x - bx = 5b - a$$

$$x(3 - b) = 5b - a$$

$$x = \frac{5b - a}{3 - b}$$

$$\left[\text{or } x = \frac{a - 5b}{b - 3} \right]$$

$$x = \frac{5b - a}{3 - b}$$

(Total for Question 2 is 3 marks)

3 Expand and Simplify $(x + 5)(x - 2)^2$

$$(x + 5)(x - 2)(x - 2)$$

$$(x^2 - 2x + 5x - 10)(x - 2)$$

$$(x^2 + 3x - 10)(x - 2)$$

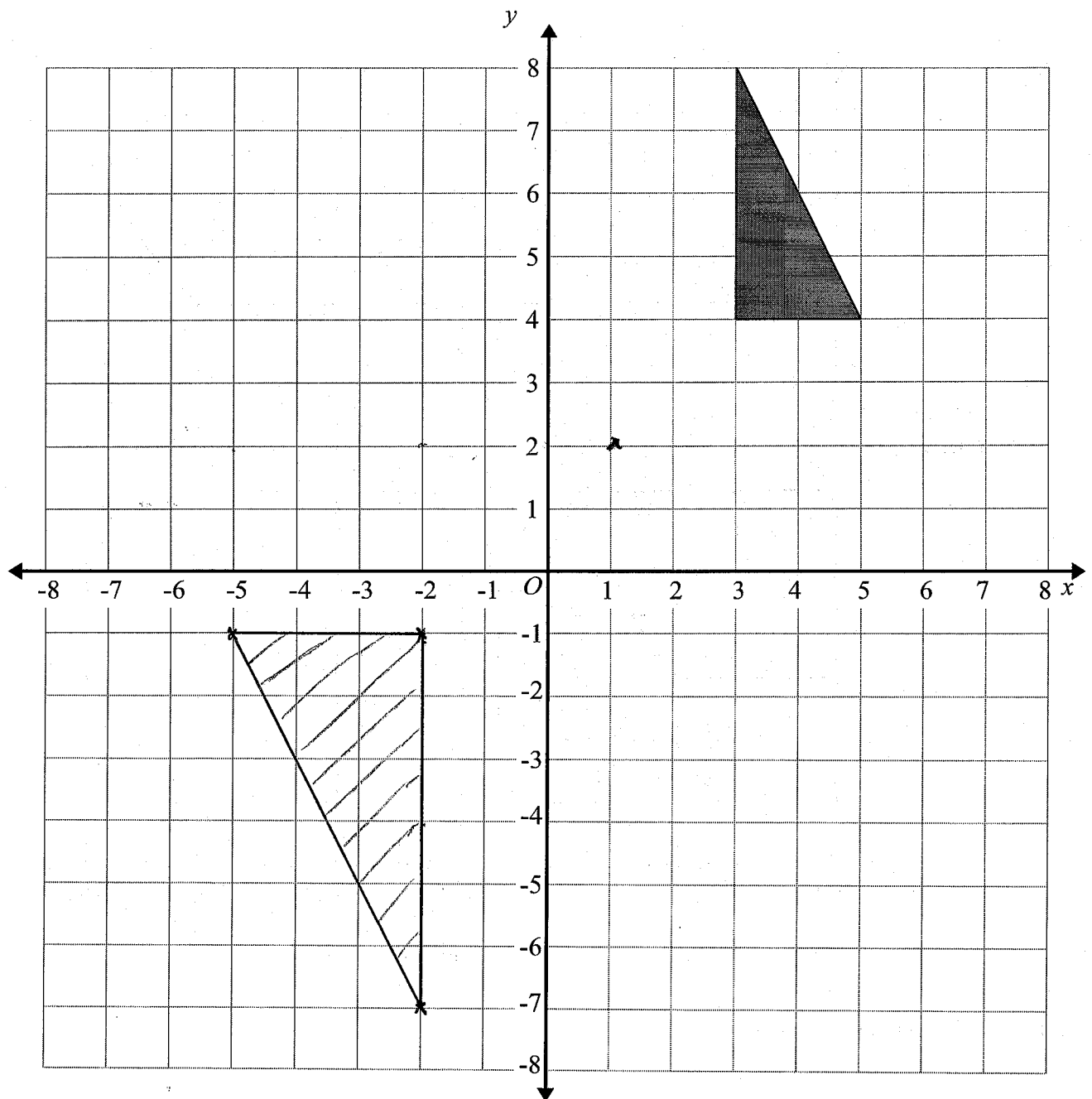
$$x^3 - 2x^2 + 3x^2 - 6x - 10x + 20$$

$$x^3 + x^2 - 16x + 20$$

$$x^3 + x^2 - 16x + 20$$

(Total for Question 3 is 3 marks)

4



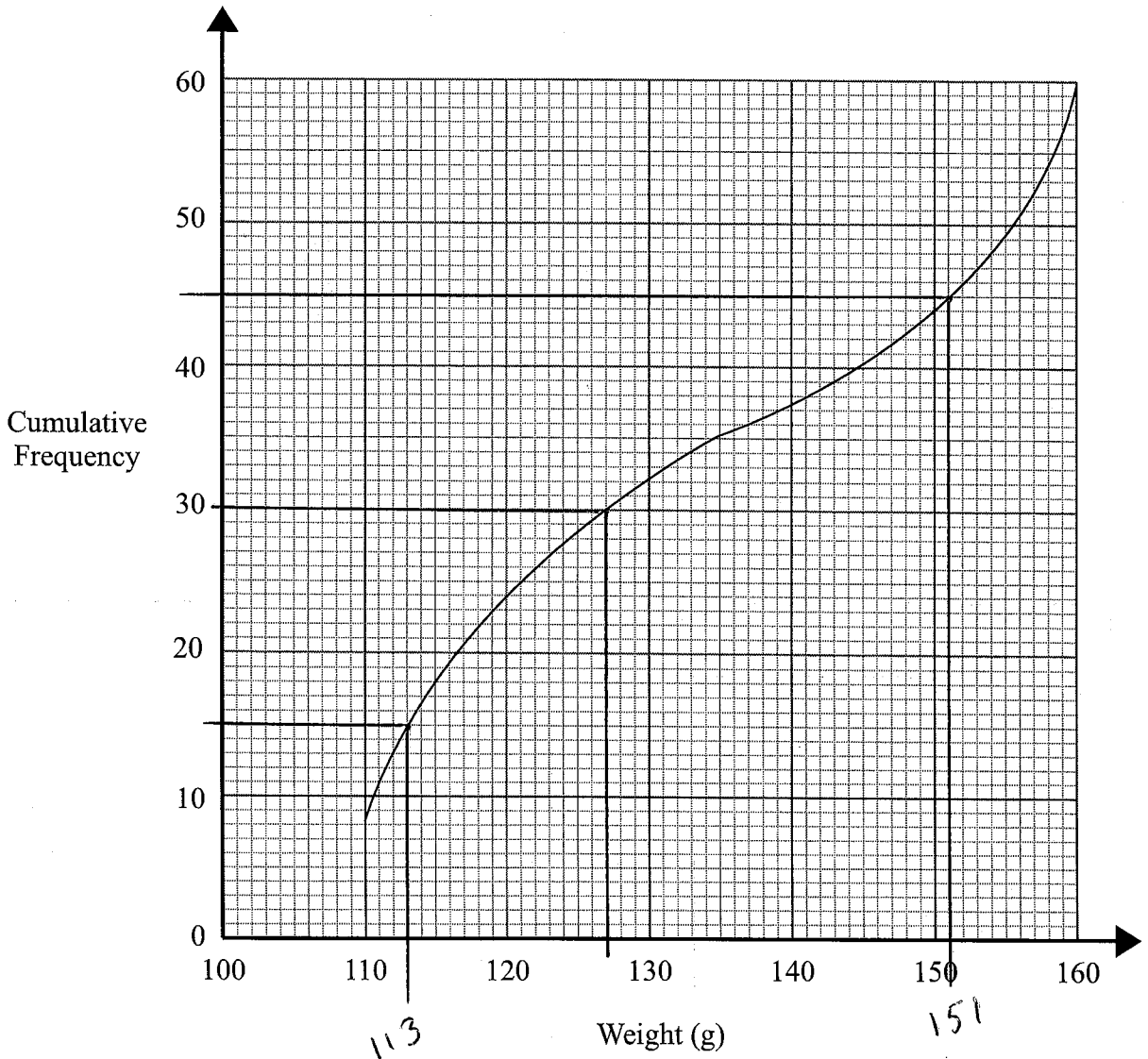
On the grid, enlarge the triangle by scale factor -1.5 , centre $(1, 2)$.

(Total for Question 4 is 2 marks)

$$\begin{pmatrix} 2 \\ 2 \end{pmatrix} \times -1.5 = \begin{pmatrix} -3 \\ -3 \end{pmatrix}$$

$$\begin{pmatrix} 4 \\ 2 \end{pmatrix} \times -1.5 = \begin{pmatrix} -6 \\ -3 \end{pmatrix}$$

$$\begin{pmatrix} 2 \\ 6 \end{pmatrix} \times -1.5 = \begin{pmatrix} -3 \\ -9 \end{pmatrix}$$



(a) Find the median weight.

.....127.....g
(1)

(b) Find the inter quartile range.

$$\begin{array}{r}
 4 \\
 151 \\
 - 113 \\
 \hline
 38
 \end{array}$$

.....38.....g
(2)

(Total for Question 5 is 3 marks)

6 Simplify fully $\frac{7+2\sqrt{5}}{2+\sqrt{5}}$

$$\frac{(7+2\sqrt{5})(2-\sqrt{5})}{(2+\sqrt{5})(2-\sqrt{5})}$$

$$\frac{(7+2\sqrt{5})(2-\sqrt{5})}{(2+\sqrt{5})(2-\sqrt{5})}$$

$$\frac{14 - 7\sqrt{5} + 4\sqrt{5} - 2(5)}{4 - 2\sqrt{5} + 2\sqrt{5} - 5}$$

$$4 - 2\sqrt{5} + 2\sqrt{5} - 5$$

$$\frac{14 - 3\sqrt{5} - 10}{-1}$$

-1

$$\frac{4 - 3\sqrt{5}}{-1} = -4 + 3\sqrt{5}$$

$$-4 + 3\sqrt{5}$$

(Total for Question 6 is 3 marks)

7 Prove algebraically that the recurring decimal $0.3\dot{1}\dot{8}$ can be written as $\frac{7}{22}$

$$0.3\dot{1}\dot{8} = x$$

$$3.\dot{1}\dot{8} = 10x$$

$$318.\dot{1}\dot{8} = 1000x$$

$$315 = 990x$$

$$x = \frac{315}{990}$$

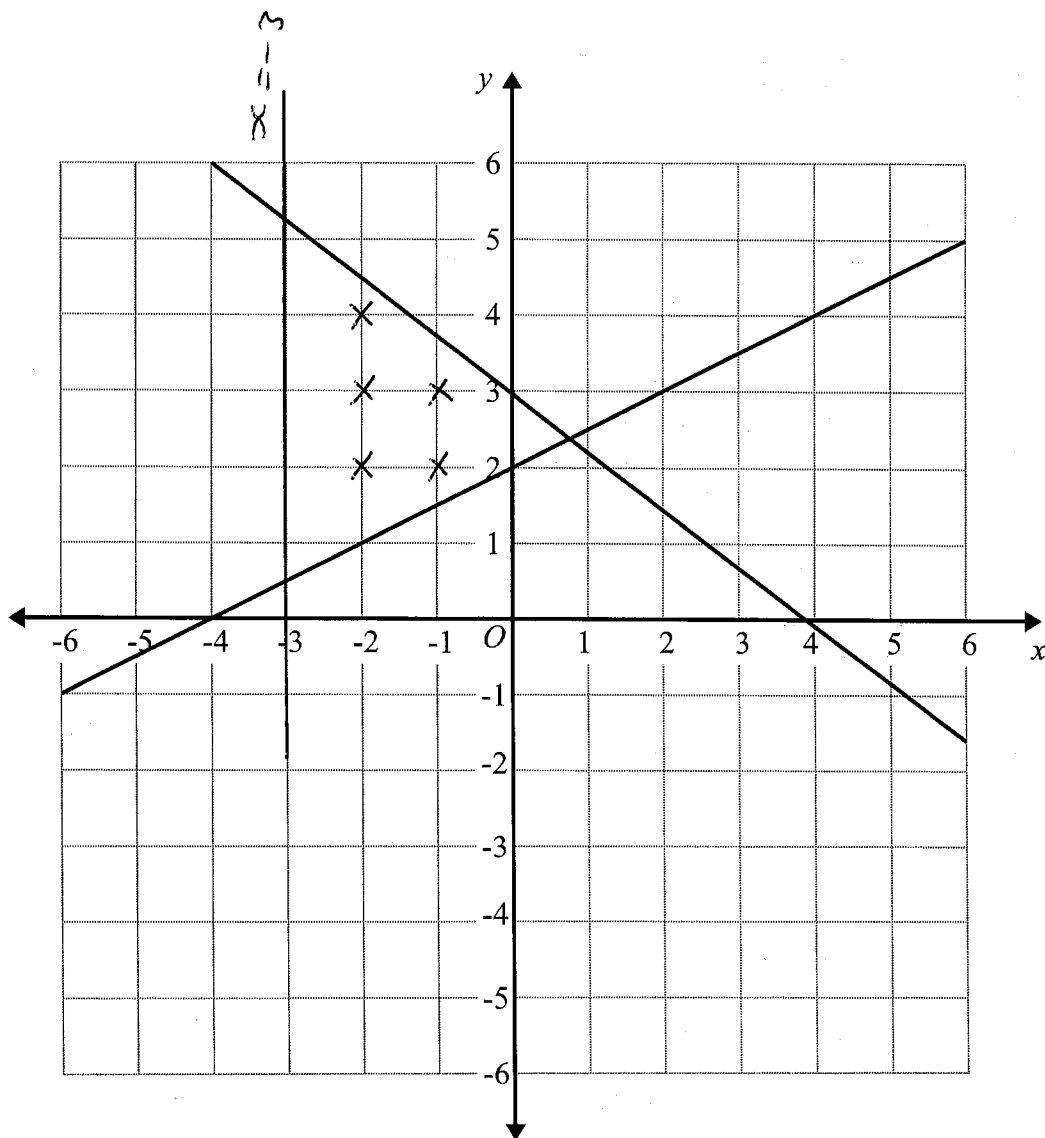
$$x = \frac{315}{990}$$

$$= \frac{105}{330}$$

$$= \frac{21}{66} = \frac{7}{22}$$

(Total for Question 7 is 2 marks)

- 8 The graphs of the straight lines with equations $2y = x + 4$ and $4y + 3x = 12$ have been drawn on the grid.



x and y are both integers.

Mark with a cross (\times) all of the points that satisfies all the inequalities

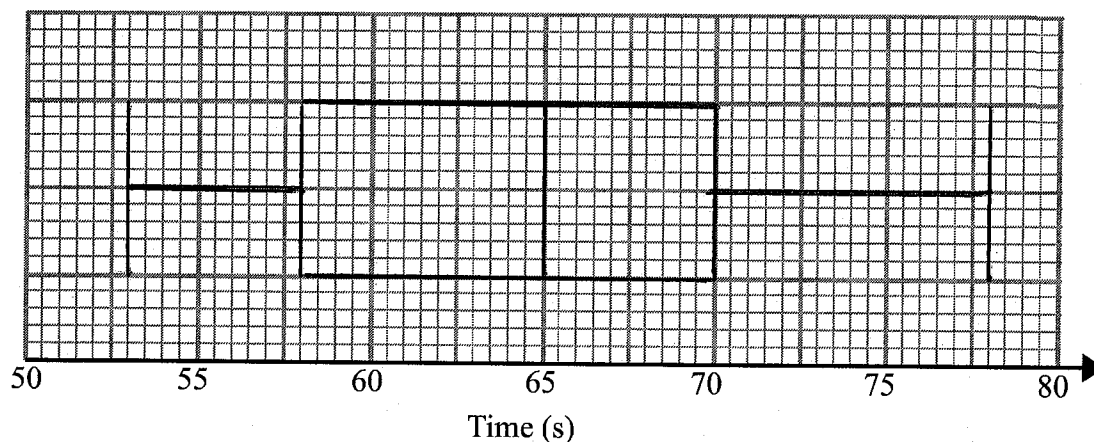
$$2y > x + 4 \quad 4y + 3x < 12 \quad x > -3$$

(Total for Question 8 is 2 marks)

- 9 The times, in seconds, of 15 students running a race are recorded below.

53 54 57 58 58 60 61 65 67 67 68 70 71 71 78

Draw a box plot for this information.



(Total for Question 9 is 2 marks)

- 10 Line A passes through the points $(2, -6)$ and $(12, -1)$
Find the equation of the line perpendicular to A that passes through $(2, 5)$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-1 - -6}{12 - 2}$$

$$= \frac{5}{10}$$

$$= \frac{1}{2}$$

perpendicular gradient = -2

$$y = -2x + c \quad (2, 5)$$

$$5 = -2(2) + c$$

$$5 = -4 + c$$

$$c = 9$$

$$y = -2x + 9$$

(Total for Question 10 is 2 marks)