1 Circle the multiplier that is equivalent to a percentage increase of 15%

[1 mark]

0.015   0.15   1.015   1.15

2 (a) Write 280 as a product of its prime factors.

[2 marks]

2 (b) $588 = 2^2 \times 3 \times 7^2$

Work out the highest common factor of 280 and 588

[2 marks]

3 (a) Write $\dfrac{11^{13} \times 11^{3}}{11^{7}}$ as a single power of 11

[1 mark]

3 (b) Write $(4^3)^5$ as a single power of 2

[1 mark]

4   Write 224 as the sum of two cube numbers.

                                                                                          [1 mark]

5   Solve the equation $x^2 - 1 = 48$

                                                                                          [2 marks]

6   Estimate the square root of 90

                                                                                          [1 mark]

7   Circle the fraction that is a recurring decimal.

                                                                                          [1 mark]

$$\frac{3}{8} \qquad \frac{8}{9} \qquad \frac{9}{10} \qquad \frac{13}{16}$$

8   Circle the value of $27^{\frac{1}{3}}$

                                                                                          [1 mark]

$$\frac{1}{9} \qquad \frac{1}{3} \qquad 3 \qquad 9$$

9   Write $0.4\dot{5}$ as a fraction in its lowest form

[2 marks]

10   The attendance at a football match is 30 400, to 3 significant figures.

10 (a) Circle the minimum possible attendance.

[1 mark]

30 349	30 350	30 394	30 395

10 (b) Circle the maximum possible attendance.

[1 mark]

30 404	30 405	30 449	30 450

11   Here are five numbers.

| 47 000 | 4.5×10^4 | 5×10^3 | 2.8×10^5 | 125 000 |

Work out the difference between the largest and smallest numbers.

Give your answer in standard form.

[3 marks]

12   Circle the value that is equivalent to $6\sqrt{15} \div 3\sqrt{5}$
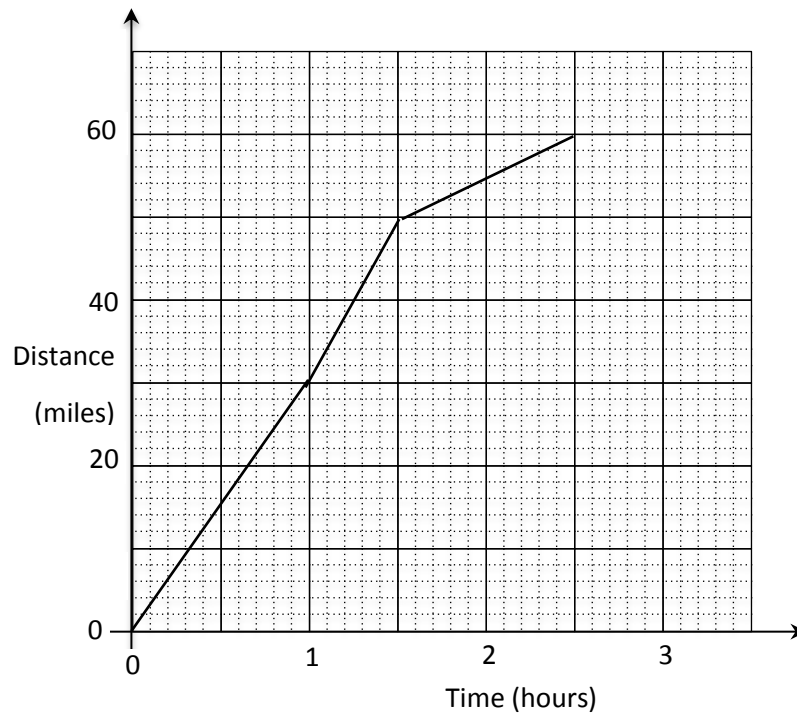
[1 mark]

| $2\sqrt{3}$ | $3\sqrt{3}$ | $3\sqrt{5}$ | $3\sqrt{10}$ |

13   Here is a distance-time graph.

14 (a) During what times does the graph show the fastest speed?

[1 mark]

14 (b) Work out the average speed of the whole journey.

[2 marks]

15 $x : y = 5 : 1$

Circle the equation of y as a function of x.

[1 mark]

$y = \dfrac{x}{6}$ $y = \dfrac{x}{5}$ $y = 5x$ $y = 6x$

Booster day: Algebra

1   Here is a linear sequence.

$$5 \qquad 13 \qquad 21 \qquad 29$$

Circle the expression for the nth term of the sequence.

[1 mark]

$$n + 8 \qquad\qquad 5n + 8 \qquad\qquad 8n \qquad\qquad 8n - 3$$

3   Circle the quadratic sequence.

[1 mark]

$$2 \quad 8 \quad 14 \quad 22 \qquad\qquad 1 \quad 8 \quad 27 \quad 64$$

$$2 \quad 4 \quad 8 \quad 16 \qquad\qquad 1 \quad 4 \quad 9 \quad 16$$

8 (a)   Here are the fourth and fifth terms of a Fibonacci-type sequence.

$$\underline{\hphantom{xxx}} \qquad \underline{\hphantom{xxx}} \qquad \underline{\hphantom{xxx}} \qquad 28 \qquad 43$$

Each term is the sum of the previous two terms.

Show that the first term is 2

[2 marks]

10   Expand and simplify $(y + 5)(y - 4)$

[2 marks]

2   Expand $3x^2(2x - 5)$

Circle your answer.

[1 mark]

$$-9x \qquad\qquad 6x^3 - 5 \qquad\qquad 5x^3 - 8x^2 \qquad\qquad 6x^3 - 15x^2$$

5   Factorise fully $9a^2 - 6a$

[2 marks]

5   Solve $\dfrac{x}{3} - 9 = 12$

[2 marks]

6 (a)   Solve the inequality $\dfrac{3x}{2} \leqslant 9$

[2 marks]

6 (b)   Solve the inequality $4(x + 2) > 12$

[2 marks]

6 (c)   Represent the solution set that satisfies **both** answers to parts (a) and (b) on the number line.
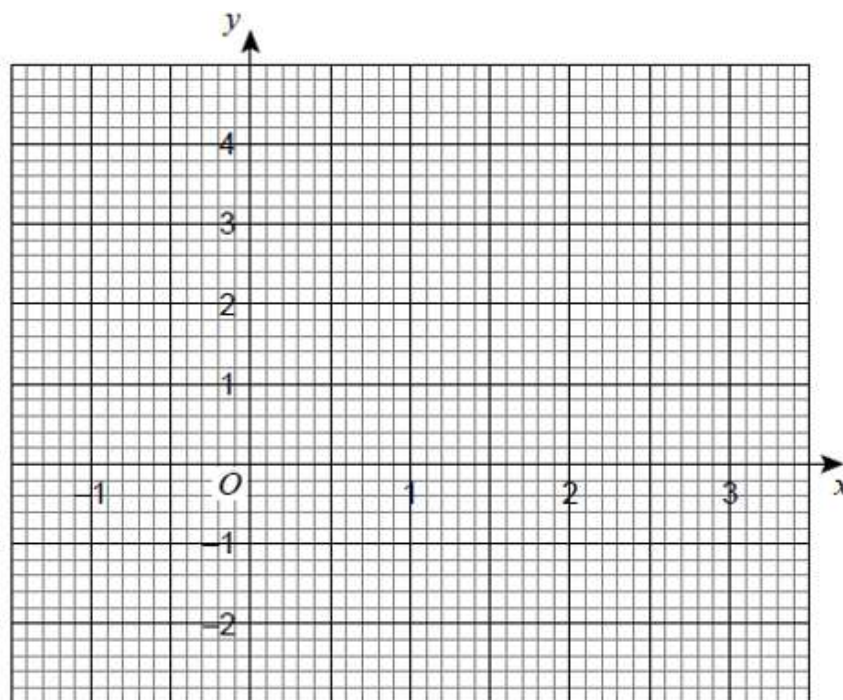
[1 mark]
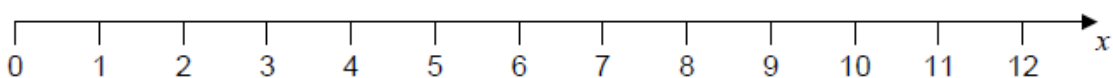
10 (a) Complete the table of values for $y = x^2 - 2x$

[2 marks]

x	−1	0	1	2	3
y		0	−1		

10 (b) Draw the graph of $y = x^2 - 2x$ for values of x from −1 to 3

[2 marks]

10 (c) Write down the coordinates of the turning point of the graph.

[1 mark]

The grid shows the graph of $y = x + 2$
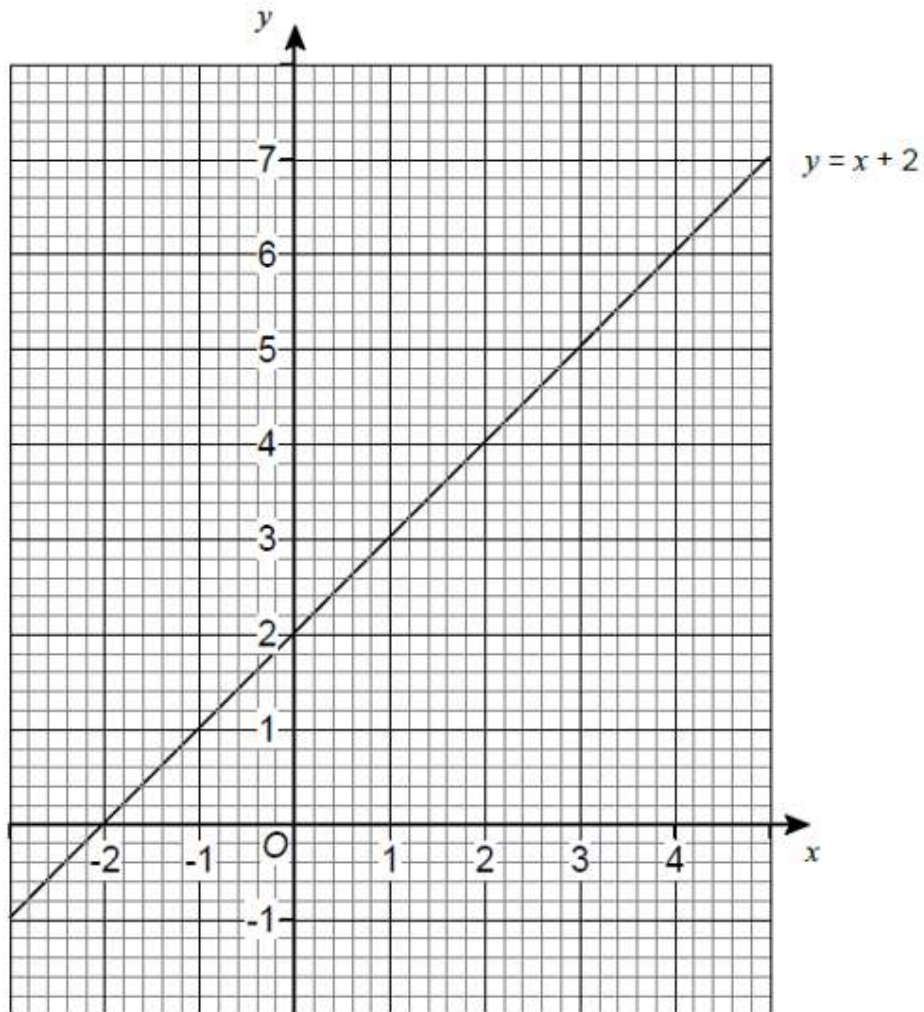
On the grid, identify the region represented by

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

Label the region R.

[3 marks]

13 A circle has equation $x^2 + y^2 = 4$

Circle the length of its radius.

[1 mark]

2   4   8   16

1 The equation of a line is $y = 2x - 1$

Circle the point that is the intercept with the y-axis.

[1 mark]

$(0, -1) \qquad\qquad (-1, 0) \qquad\qquad (0, \frac{1}{2}) \qquad\qquad (\frac{1}{2}, 0)$

1   *AB = AC = AD*

Angle *BAD* = 90°   Not drawn accurately
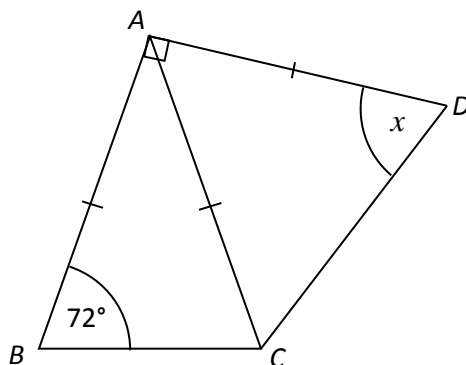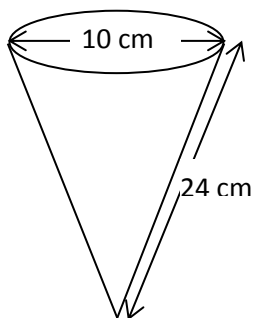

Work out the size of angle x.

You **must** show your working which may be on the diagram.

[4 marks]

2   The diagram shows a solid cone.

Not drawn accurately

You are given that   curved surface area of a cone = $\pi \times$ radius × slant height

Work out the **total** surface area of the cone in terms of π.

[4 marks]

1 Which of these is **not** a condition for congruent triangles?
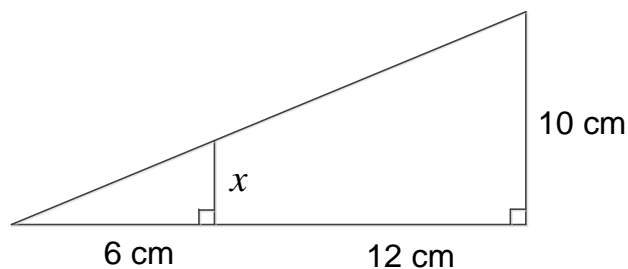
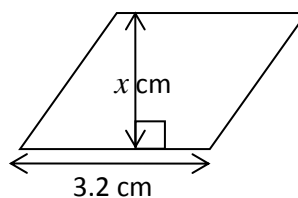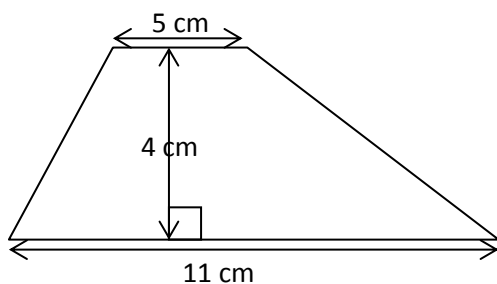Circle the correct answer.

[1 mark]

SSS   AAA   ASA   RHS

2

Not drawn accurately

10 cm

x

6 cm   12 cm

Work out the length x.

[2 marks]

2

Not drawn accurately

5 cm

4 cm

11 cm

x cm

3.2 cm

The area of the trapezium is four times the area of the parallelogram.

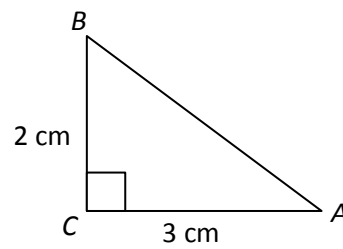Work out the value of x.

[3 marks]

2 (a) Work out the exterior angle of a hexagon.

[2 marks]

2 (b) Write down the interior angle.

[1 mark]

1 What is the value of sin A for this triangle?

Not drawn
accurately
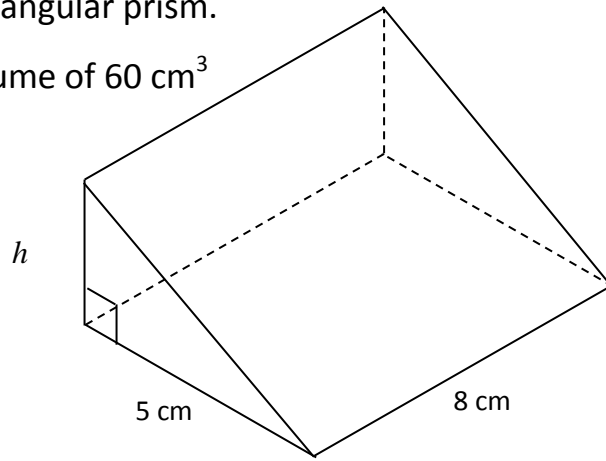
Circle your answer.

[1 mark]

$$\frac{2}{3} \qquad \frac{2}{5} \qquad \frac{2}{\sqrt{13}} \qquad \frac{3}{\sqrt{13}}$$

1   Here is a triangular prism.

It has a volume of 60 cm^3

Work out the height, h.

[3 marks]

7 50 people took a test.

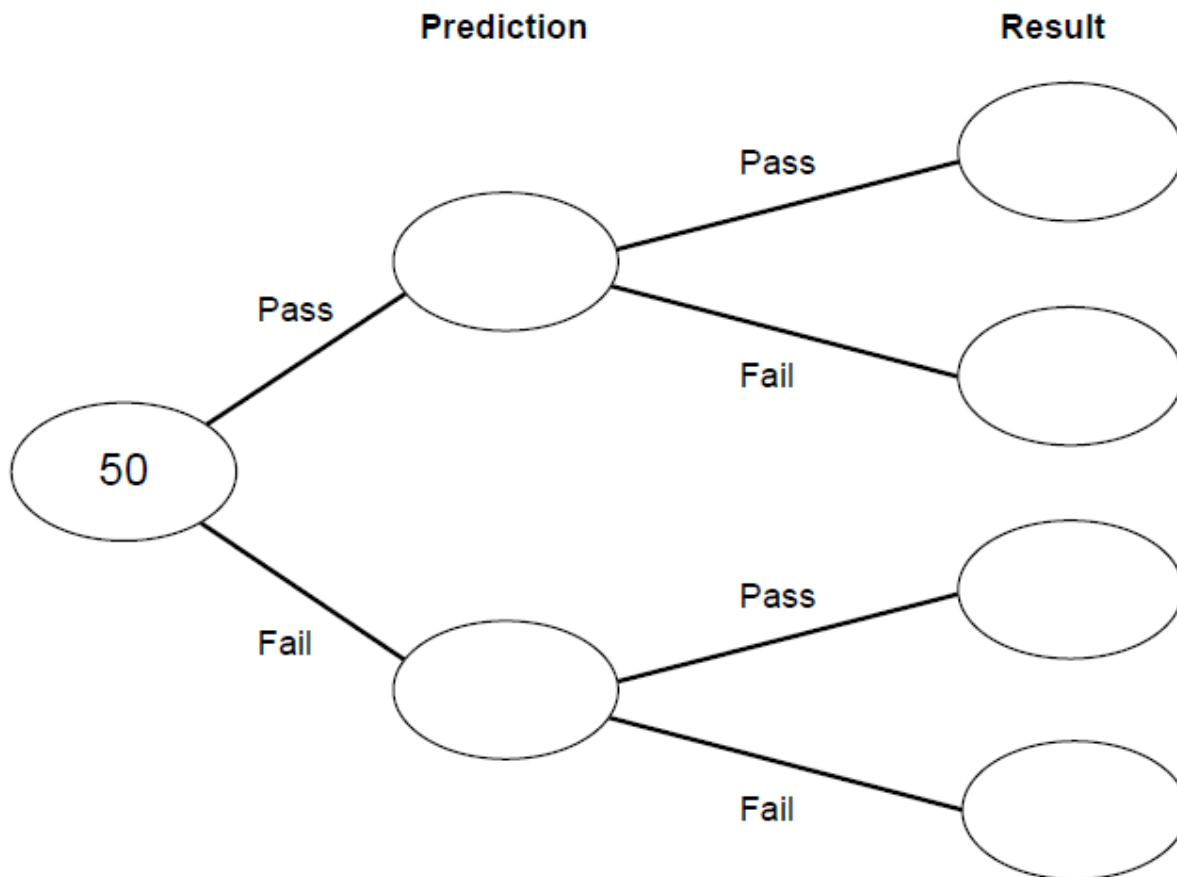Before the test, they predicted whether they would pass or fail.

30 people predicted they would pass.

36 people did pass.

Of these 36 people, three times as many predicted pass as predicted fail.

Complete the frequency tree.

[3 marks]

Prediction   **Result**

Pass

Pass

Fail

50

Pass

Fail

Fail

---

2 The probability that a biased coin lands on heads is $\dfrac{2}{3}$

The coin is spun twice.

Circle the probability of two heads.

[1 mark]

$\dfrac{2}{9}$ $\dfrac{4}{6}$ $\dfrac{4}{9}$ $\dfrac{4}{3}$

5   A spinner lands on red, blue or green.

The relative frequencies after 400 spins are shown.

Colour	red	blue	green
Relative frequency	0.35	0.5	0.15

How many more times did it land on red than green?

[2 marks]

11   Two ordinary fair dice are rolled.

11 (a)   Complete the tree diagram.

[1 mark]

1st dice   2nd dice

11 (b) Circle the probability that **both** dice land on 4

[1 mark]

$$\frac{1}{4} \qquad \frac{2}{12} \qquad \frac{2}{6} \qquad \frac{1}{12} \qquad \frac{1}{36}$$

11 (c) Work out the probability that at least one of the dice does **not** land on 4

[2 marks]

18 The probability that Gina goes to the gym on Saturday is 0.9

The probability that Dave goes to the gym on Saturday is 0.6

These probabilities are **independent**.

18 (a) Calculate the probability that **both** Gina and Dave go to the gym on Saturday.

[1 mark]

18 (b) If Gina goes to the gym on Saturday the probability that she goes on Sunday is 0.2

If Gina does **not** go to the gym on Saturday the probability that she goes on Sunday is 0.7

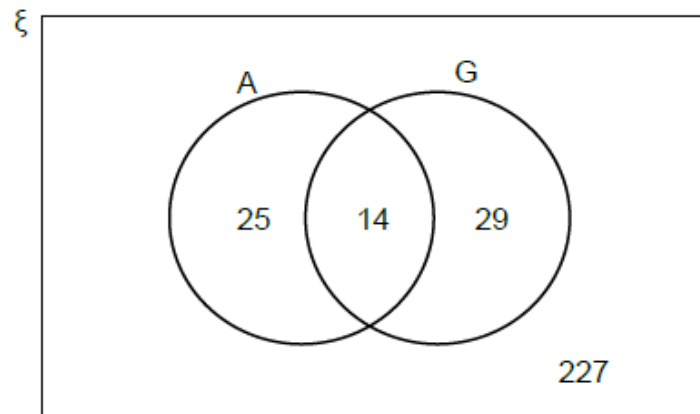Calculate the probability that Gina goes to the gym on exactly **one** of the two days.

[4 marks]

25 In the Venn diagram

ξ = 295 students in a college

A = students who take Art

G = students who take Geography

25 (a) One student is chosen at random.

Work out the probability the student takes Art.

[1 mark]

25 (b) One student who takes Geography is chosen at random.

Work out the probability the student **also** takes Art.

[1 mark]

7   At a nursery, the mean age of 4 children is 31 months.

Katy joins the nursery.

The mean age of **all** 5 children is now 30 months.

Work out the age of Katy.

[4 marks]

9   Here is a frequency table for the times taken to solve a puzzle.

Times, t (min)	Frequency
$0 < t \leqslant 1$	38
$1 < t \leqslant 2$	16
$2 < t \leqslant 3$	17
$3 < t \leqslant 4$	15
$4 < t \leqslant 5$	14
	Total = 100

Circle the class interval that contains the median.

[1 mark]

$0 < t \leqslant 1$ $1 < t \leqslant 2$ $2 < t \leqslant 3$ $3 < t \leqslant 4$

10   A charity collection was made.

Information about the amounts given by men is shown in the table.

Amount, x (£)	Midpoint	Number of men	
$0 \leqslant x < 5$		11	
$5 \leqslant x < 10$		7	
$10 \leqslant x < 15$		2	
		Total = 20	

The mean amount given by **women** was £6.30 per person.

Compare the mean amounts given by men and women.

[4 marks]

11   Five integers have
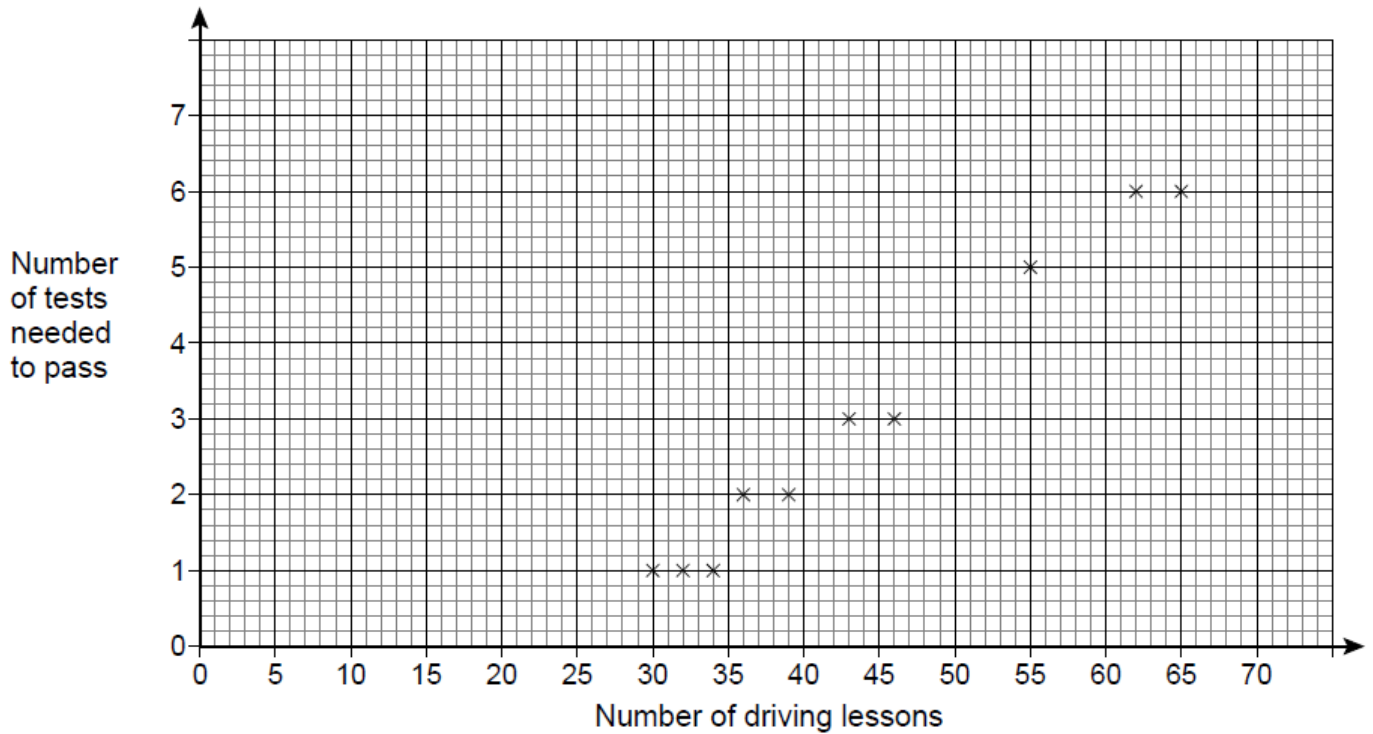
a mode of 6
a median of 8
a mean of 10

What is the **greatest** possible range of the five integers?

You **must** show your working.

[3 marks]

5   The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people.

5   (a)   Describe the correlation.

Circle your answer.

[1 mark]

strong positive   weak positive   weak negative   strong negative

5   (b)   Use a line of best fit to estimate the number of tests needed to pass by a person who has 50 lessons.

[2 marks]

5   (c)   Meera says,

"I can use the trend to predict the number of driving tests needed to pass for any number of driving lessons."
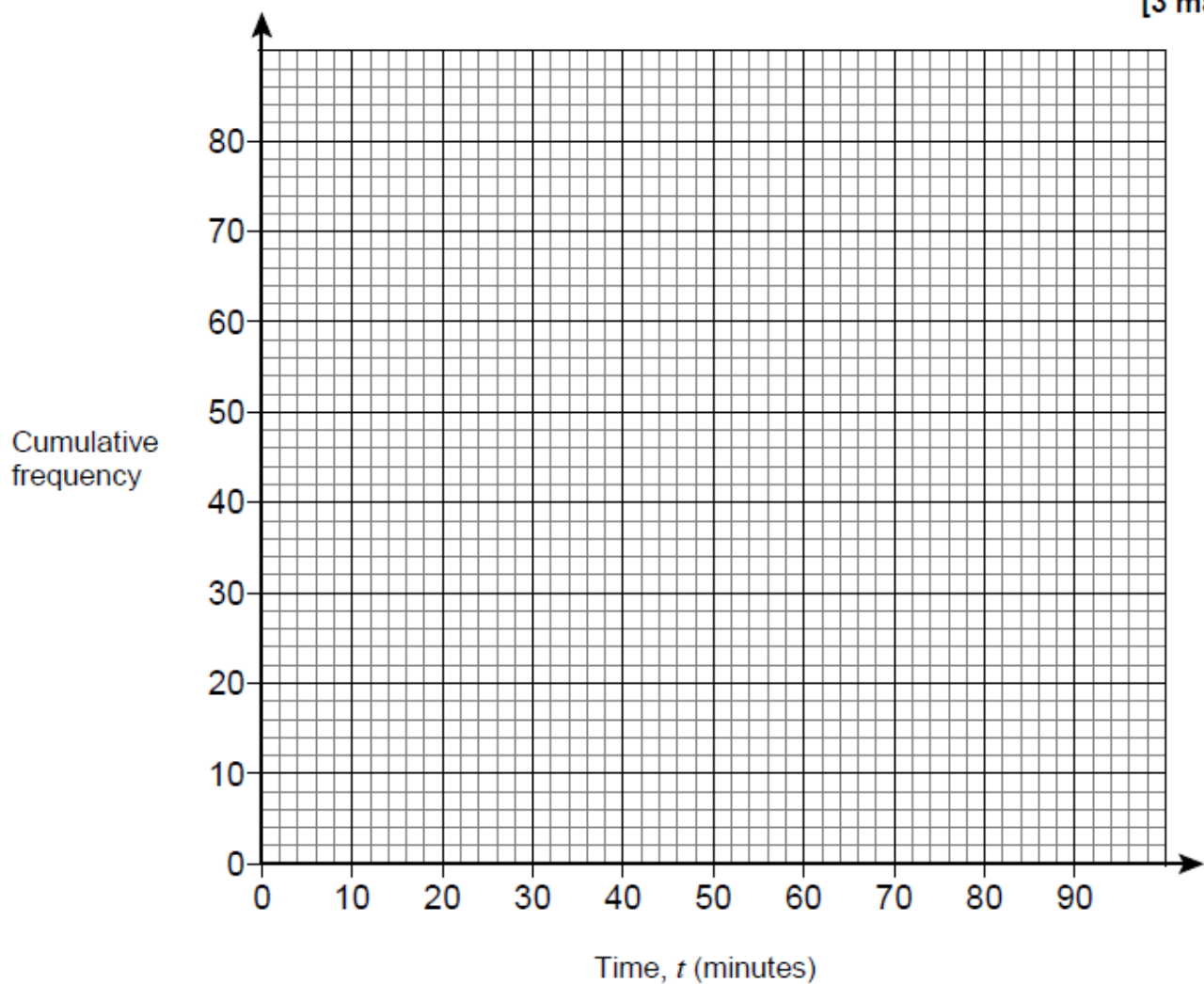
Comment on her statement.

[1 mark]

_____

_____

_____

18 Here is some information about the times, in minutes, 80 teachers took to get to work.

Time t (minutes)	Frequency		
$0 < t \leqslant 20$	12		
$20 < t \leqslant 40$	32		
$40 < t \leqslant 60$	25		
$60 < t \leqslant 90$	11		

18 (a) On the grid, draw a cumulative frequency graph.
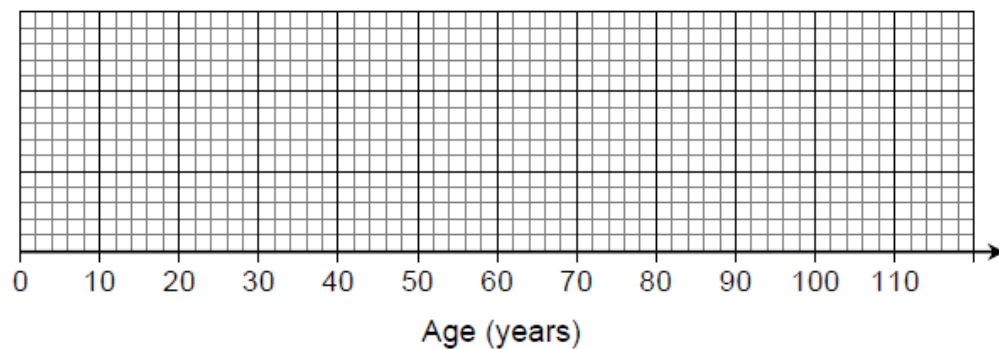
[3 marks]

Time, t (minutes)

18 (b) Estimate the number of teachers who took between 50 minutes and 70 minutes to travel to work.

19 In the UK in 2000

25% of the population were under 24 years old

50% of the population were under 37 years old

the inter-quartile range of the ages was 32 years

the oldest person was 107 years old.

19 (a) Show the information on a box plot.

[3 marks]

Age (years)

19 (b) It is predicted that in 2050 the age distribution in the UK will have

lower quartile   26 years

median   44 years

upper quartile   66 years

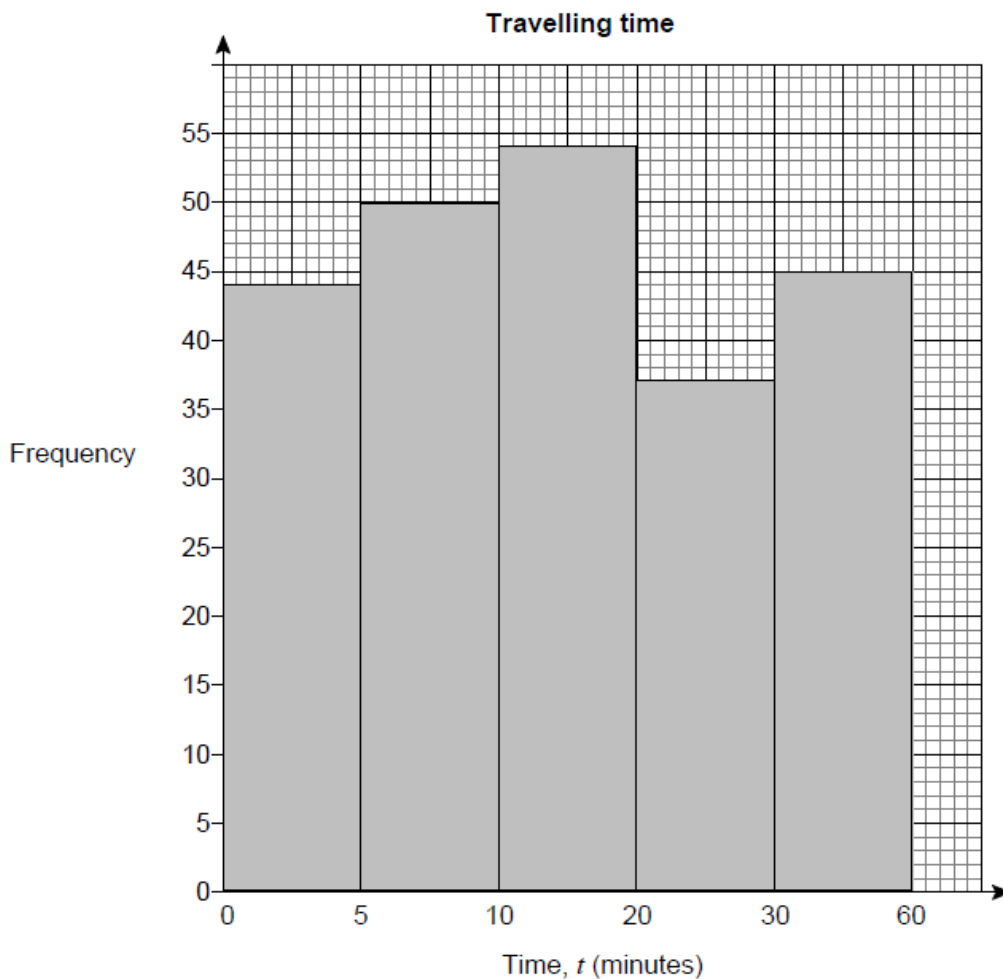Make **two** comments about the predicted change in the age distribution in the UK from 2000 to 2050

[2 marks]

17   Joe asked 230 students how long it took them to travel to school.

The results are shown in the table.

Travelling time, t (minutes)	Number of students
$0 < t \leqslant 5$	44
$5 < t \leqslant 10$	50
$10 < t \leqslant 20$	54
$20 < t \leqslant 30$	37
$30 < t \leqslant 60$	45

This is Joe's attempt to draw a histogram to show the data.

Make **two** criticisms of his histogram.

[2 marks]