A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE MATHEMATICS

H

Higher Tier Paper 1 Non-Calculator

8300/1H

Tuesday 19 May 2020 Morning

Time allowed: 1 hour 30 minutes

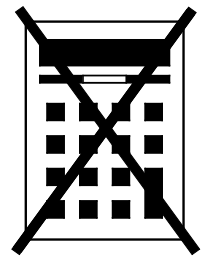
At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

JUN208300 1H 01

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

You must NOT use a calculator.



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.**
- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**
- **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.

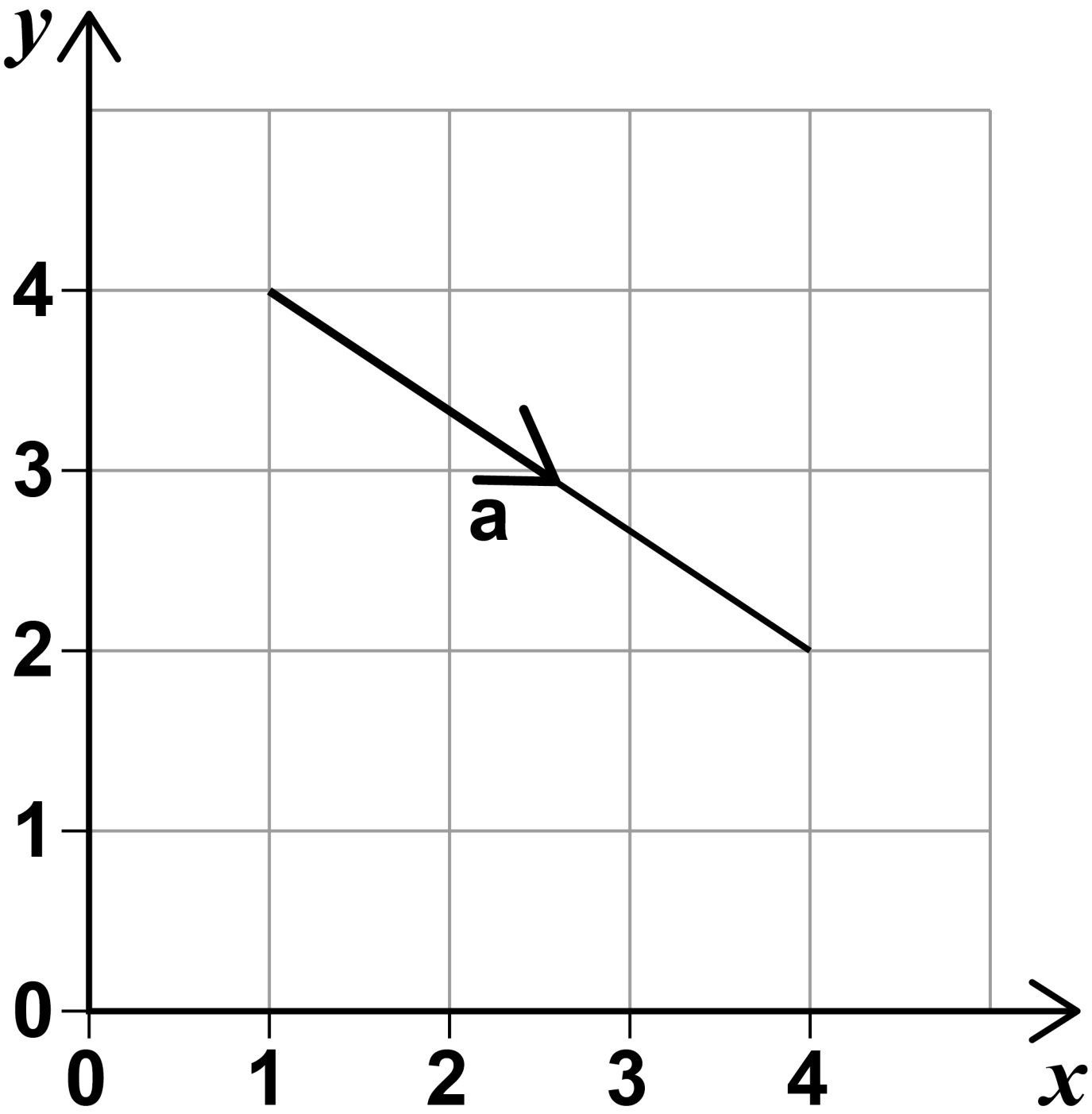
DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided.

1 Circle the fraction that is equivalent to 4.75 [1 mark]

$\frac{15}{4}$ $\frac{19}{4}$ $\frac{21}{4}$ $\frac{23}{4}$

2 **Here is vector a.**



Circle the column vector that represents a. [1 mark]

$\begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$

$\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$

3 Which one of these is a square number AND a cube number?

Circle your answer. [1 mark]

100 1000

10 000 1 000 000

4 Circle the reciprocal of $\frac{5}{6}$ [1 mark]

$\frac{6}{5}$ $\frac{1}{6}$ $-\frac{1}{6}$ $-\frac{6}{5}$

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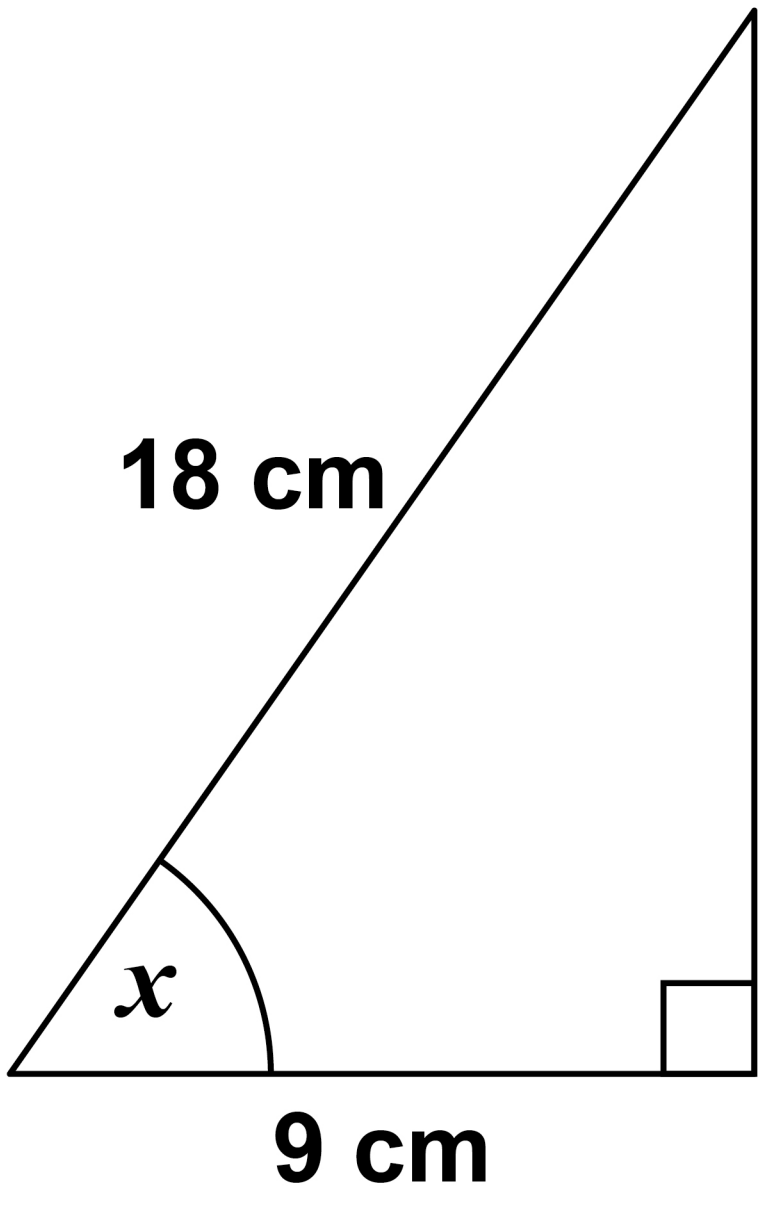
[Turn over]

5 **Use trigonometry to work out the size of angle x. [2 marks]**

The diagram is not drawn accurately.



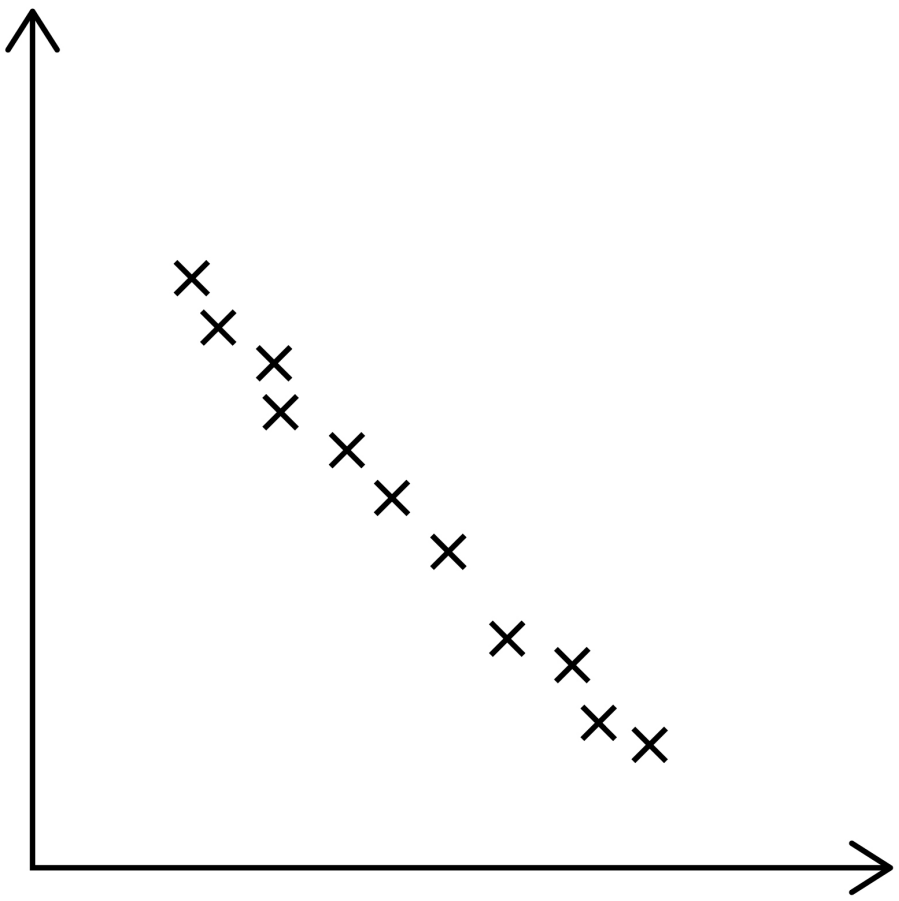
Answer _____ **degrees**

[Turn over]

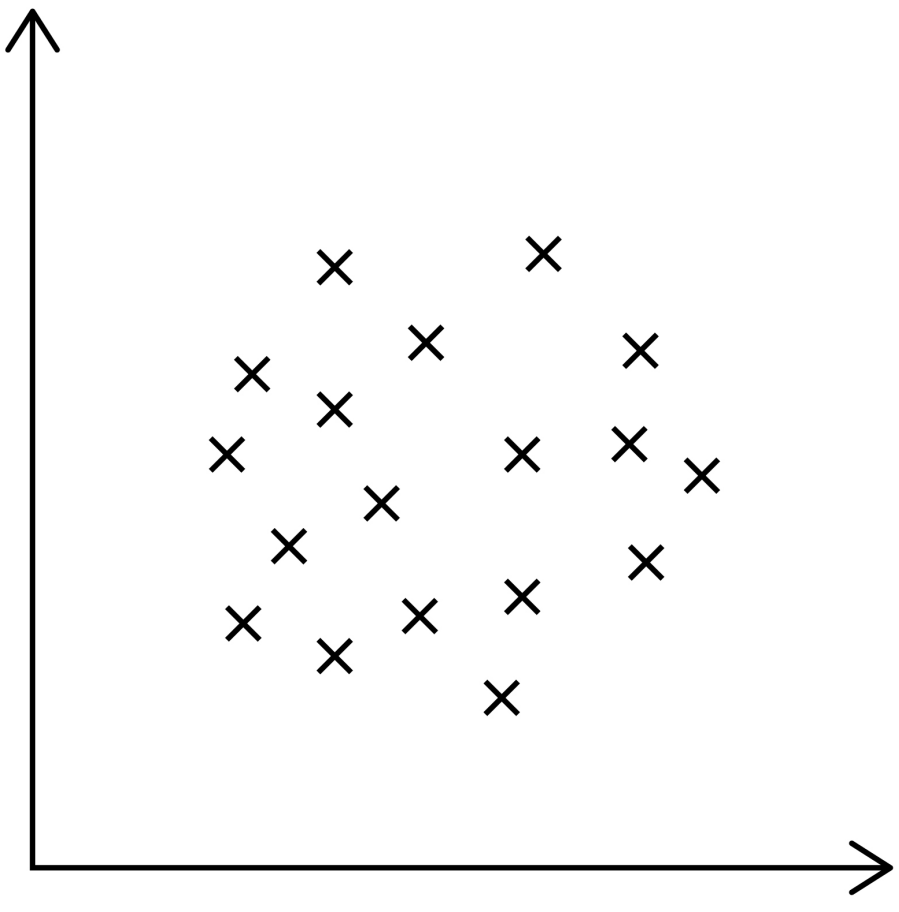
6

6 A and B are scatter graphs.

Graph A



Graph B



What type of correlation is shown by each graph?

Choose from

- **Weak positive**
- **Strong positive**
- **Weak negative**
- **Strong negative**
- **No correlation**

[2 marks]

Graph A _____

Graph B _____

[Turn over]

7 Here is some information about 80 people who play in bands.

12 are singers but not guitar players.

30% are neither a singer nor a guitar player.

$\frac{1}{4}$ of the guitar players are also singers.

Complete the Venn diagram, on page 15, to represent the information. [4 marks]

ξ = 80 people who play in bands

S = singers

G = guitar players

[Turn over]

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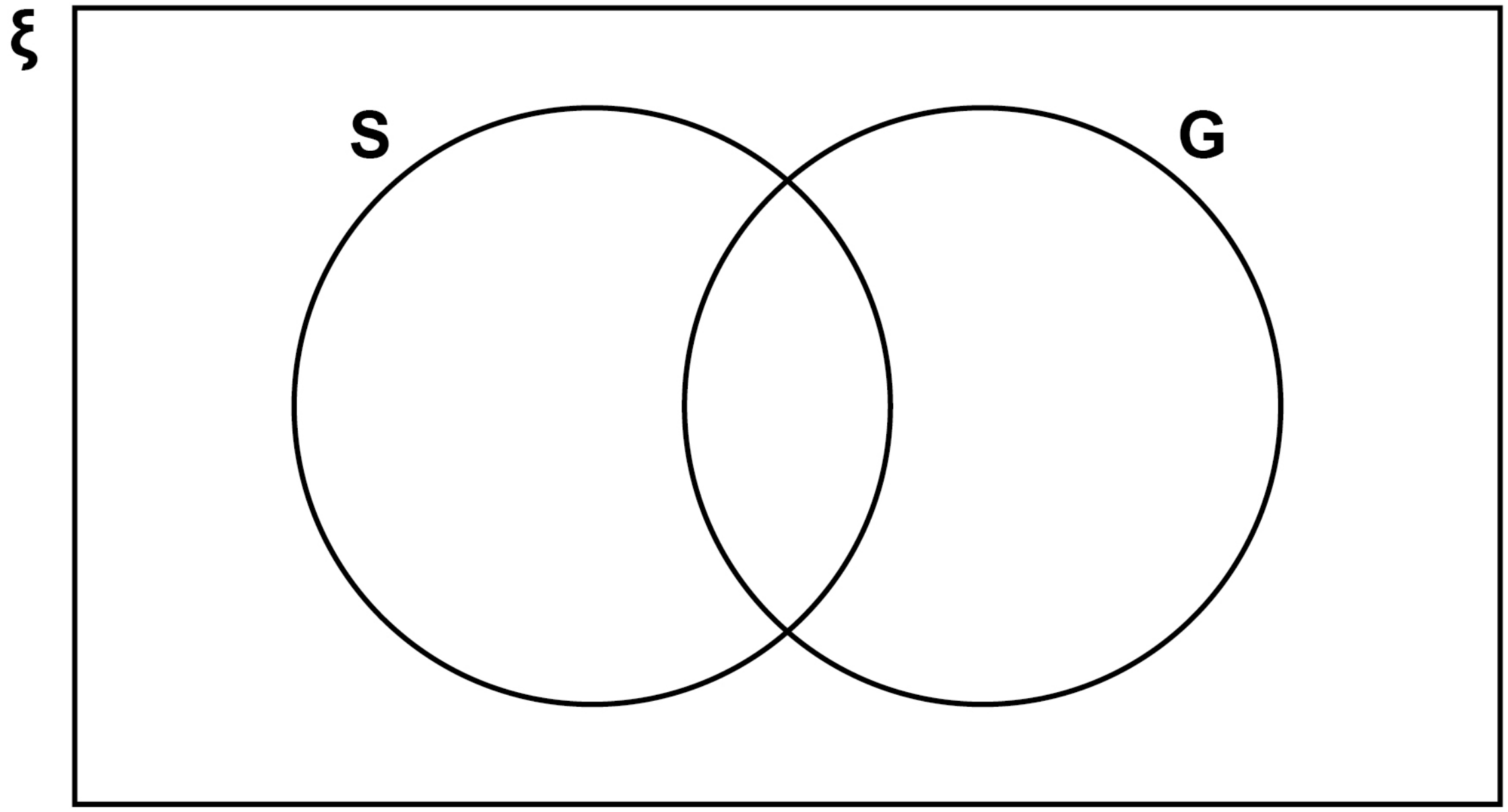


15

[Turn over]

6

15

8 The shorter side of a parallelogram has length 6.5 cm

The diagram is not drawn accurately.

The length of the shorter side is $\frac{1}{9}$ of the perimeter.

Work out the length of the longer side. [3 marks]

Answer _____ **cm**

[Turn over]

9 (a) All the terms of a GEOMETRIC progression are positive.

The second and fourth terms are shown.

..... 4 16

Work out the first and third terms.
[2 marks]

First term _____

Third term _____

9 (b) The first two terms of an ARITHMETIC progression are shown.

p $5p$ .....

The sum of the first three terms is 90

Work out the value of p. [3 marks]

Answer

8

10 The cost of a holiday is £2400

Rana pays a deposit followed by monthly payments, in the ratio

deposit : total of the monthly payments = 3 : 5

She makes 6 equal monthly payments.

Work out her monthly payment.
[4 marks]

Answer £ _____

11 As a decimal $\frac{11}{40}$ = 0.275

Work out $\frac{33}{400}$ as a decimal.

[2 marks]

Answer _____

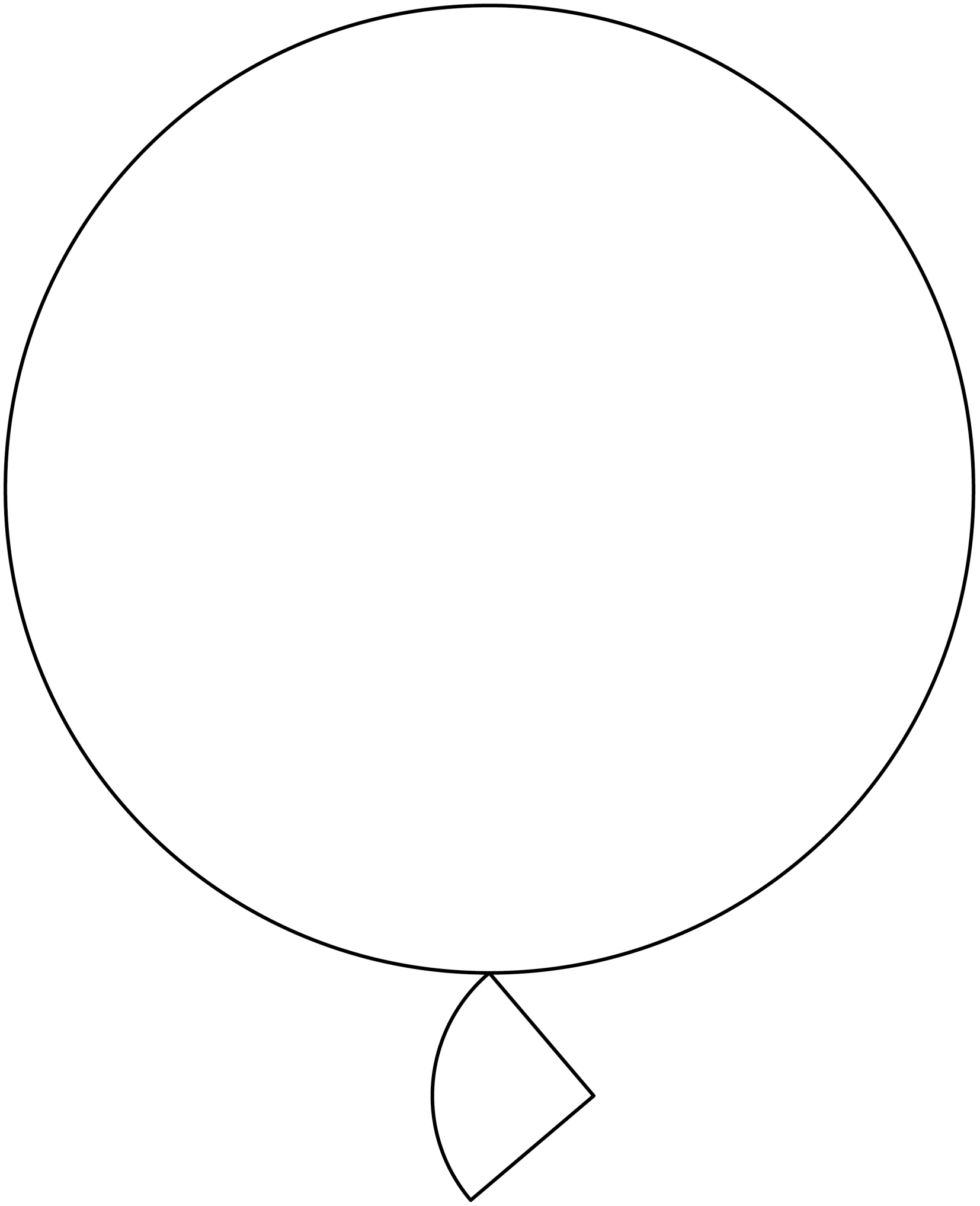
12 **Two wire shapes make an earring.**

The shapes are
a circle with radius 21 mm
and
a quarter circle.

The diagram, on the opposite page, is not drawn accurately.

radius of circle : radius of quarter circle = 7 : 2

12 (a) **Show that the radius of the quarter circle is 6 mm [1 mark]**



[Turn over]

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12 (b) Work out the TOTAL length of the wire in the earring.

Give your answer in the form $a\pi + b$ where a and b are integers.
[4 marks]

Answer _____ mm

5

13 (a) s **and** t **are POSITIVE integers.**

$(x + s)(x - t)$ **is expanded and simplified.**

The answer is $x^2 + kx - 40$ **where** k **is a positive integer.**

Work out the SMALLEST possible value of k**. [2 marks]**

Answer

13 (b) Faisal tries to solve

$(x + 2)(x - 7) = 0$

Here is his working.

	$(x + 2) = 0$	or	$(x - 7) = 0$
Answer	$x = 2$	or	$x = 7$

Give a reason why his answer is wrong. [1 mark]

14 (a) $c = 2^{10} \times 3 \times 5^6$

Work out $18c$.

Give your answer as a product of prime factors in index form.
[2 marks]

Answer

14 (b) Work out $\sqrt[3]{\frac{2^7 \times 11^3}{2}}$

Give your answer as an integer.
[2 marks]

Answer _____

[Turn over]

7

15 $3x = \frac{1}{2}y$

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

6 : 1 1 : 6 3 : 2 2 : 3

16 A sequence of numbers is formed by the iterative process

$$u_{n+1} = \frac{4}{u_n - 1} \qquad u_1 = 9$$

Work out the values of u_2 and u_3

[2 marks]

$u_2 =$

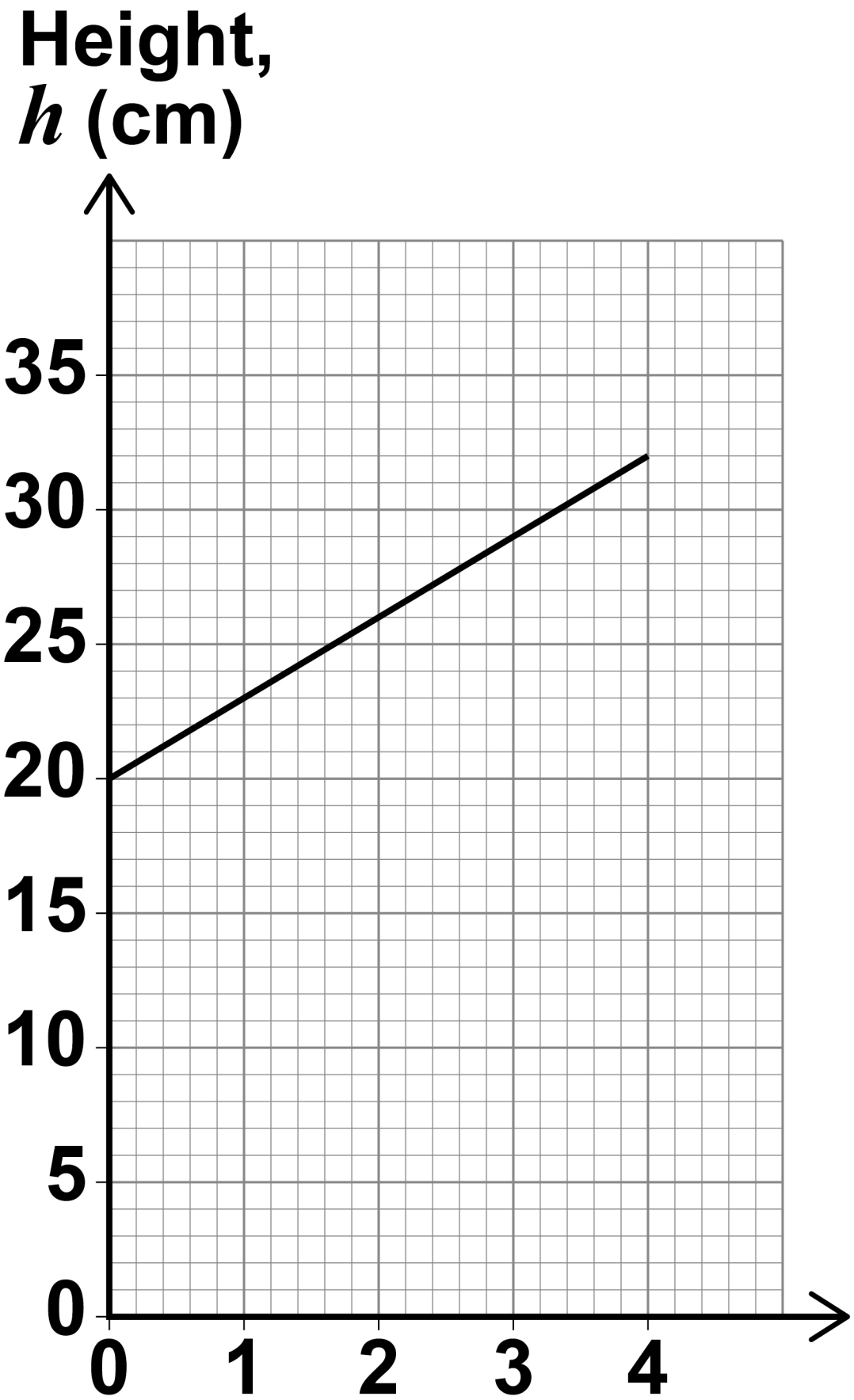
$u_3 =$

17 Jim buys a plant of height 20 cm

The graph, on the opposite page, shows how the height of the plant changes during the next 4 days.

Work out a formula for h in terms of n. [3 marks]

Answer



[Turn over]

6

3 3

18 **Solve the simultaneous equations**

$2x + 4y = -9$

$2y = 4x - 7$ **[4 marks]**

$x =$

$y =$

19 Circle the expression that is equivalent to $\frac{x}{5} + \frac{x}{10}$ [1 mark]

$\frac{3x}{10}$ $\frac{2x}{15}$ $\frac{x}{25}$ $\frac{x^2}{50}$

[Turn over]

20 (a) **Write down the value of 7^0**
[1 mark]

Answer _____

_3

20 (b) **Work out the value of $32^{\frac{5}{}}$**
[2 marks]

Answer _____

8

21 **Write these numbers in order of size.**

15.6 $3\sqrt{23}$ 2.1^4 $\frac{47}{3}$

Start with the smallest. [2 marks]

Smallest _____

Largest _____

22 (a) y **is directly proportional to** x^3

$y = 17$ **when** $x = 4$

Work out an equation connecting y **and** x**. [3 marks]**

Answer

22 (b) m is inversely proportional to $\sqrt{r}$

The value of r is multiplied by 4

Circle what happens to the value of m. [1 mark]

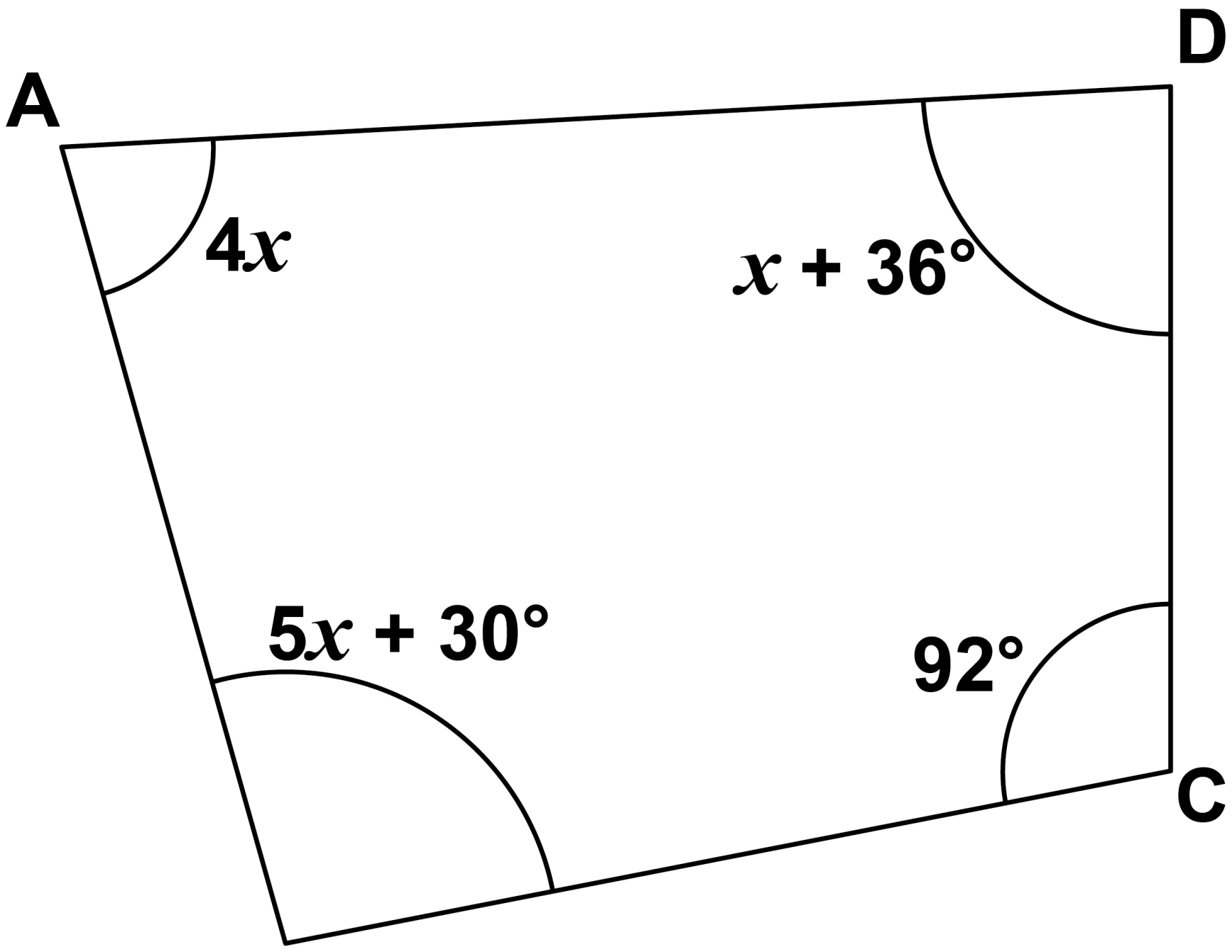
× 2 × 16 ÷ 2 ÷ 16

[Turn over]

6

23 ***ABCD*** **is a quadrilateral.**

The diagram is not drawn accurately.



Prove that *ABCD* is NOT a cyclic quadrilateral. [4 marks]

[Turn over]

24 y **is an obtuse angle.**

Which statement is true?

Tick ONE box. [1 mark]

☐ $\sin y > 0$ and $\cos y > 0$

☐ $\sin y > 0$ and $\cos y < 0$

☐ $\sin y < 0$ and $\cos y > 0$

☐ $\sin y < 0$ and $\cos y < 0$

5

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[Turn over]

25 **A histogram, on page 46, is drawn to represent the heights of a sample of women.**

Three of the four bars are shown.

Question 25 continues on page 46

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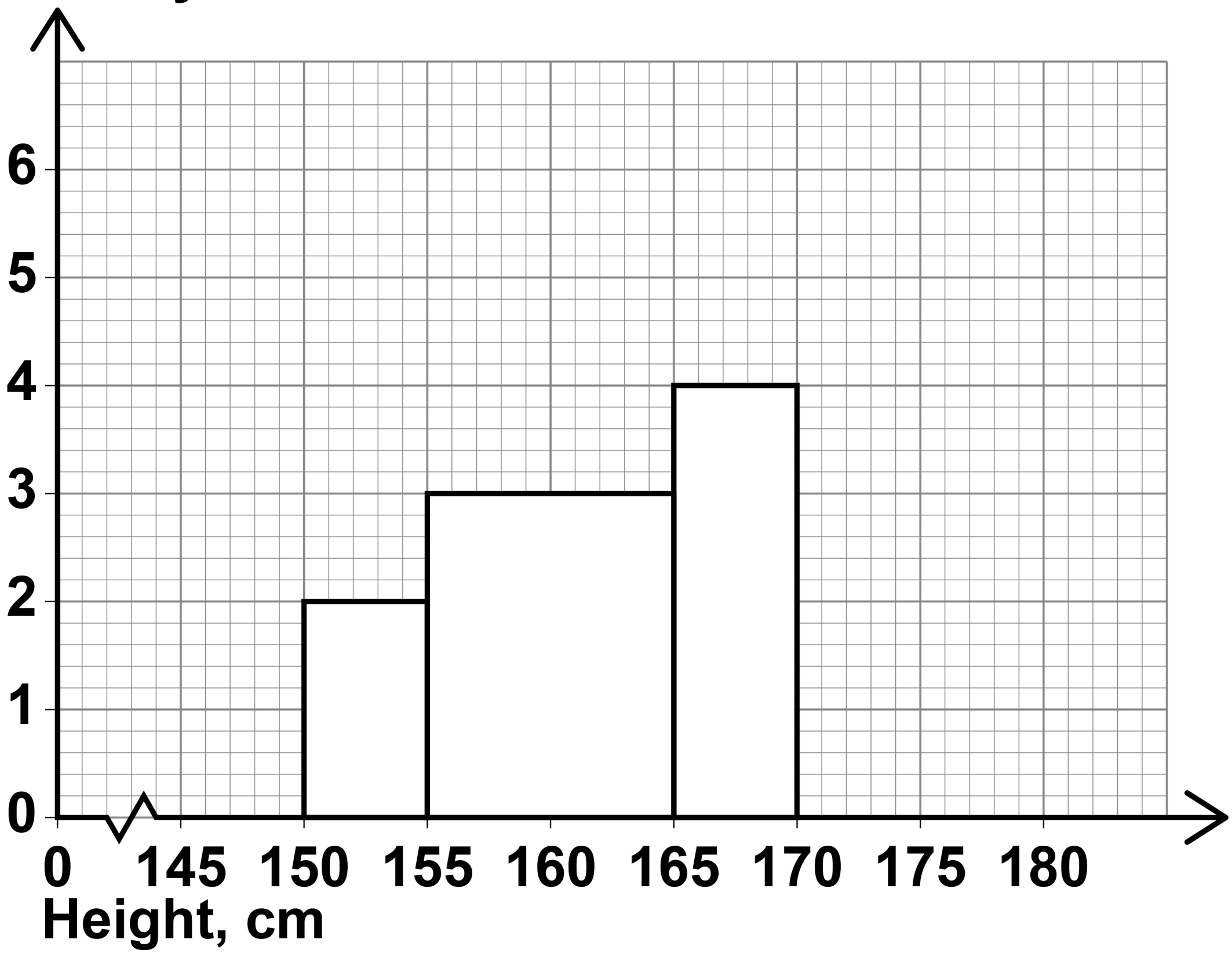
[Turn over]


Frequency density
6
5
4
3
2
1
0
0
145
150
155
160
165
170
175
180
Height, cm

46

The bar for 170 cm ⩽ height < 180 cm is missing.

There are 74 women in the sample.

Complete the histogram on page 46. [4 marks]

[Turn over]

26 (a) Show that $\frac{14}{\sqrt{7}}$ can be written in the form $a\sqrt{b}$ where a and b are integers. [2 marks]

26 (b) Work out $2\sqrt{10} \times \sqrt{80} \times \sqrt{18}$

Give your answer as an integer.
[3 marks]

Answer

9

27 A and B are similar solid cylinders.

base area of A : base area of B = 9 : 25

Complete these ratios. [2 marks]

curved surface area of A :
curved surface area of B =

_____ : _____

height of A : height of B =

_____ : _____

28 **Factorise fully** $144 - 4x^2$ **[2 marks]**

Answer _____

29 The graph of $y = x^3 + 6$ is translated 4 units to the right.

The translated graph has equation $y = f(x)$

Work out $f(x)$.

Give your answer in the form $x^3 + ax^2 + bx + c$ where a, b and c are integers. [4 marks]

Answer _____

END OF QUESTIONS

8

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

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For Examiner's Use	
Pages	Mark
4–9	
10–15	
16–19	
20–21	
22–25	
26–29	
30–33	
34–36	
37–39	
40–42	
44–49	
50–53	
TOTAL	