



**Surname** \_\_\_\_\_

**Other Names** \_\_\_\_\_

**Centre Number** \_\_\_\_\_

**Candidate Number** \_\_\_\_\_

**Candidate Signature** \_\_\_\_\_

**I declare this is my own work.**

**Level 2 Certificate**

**FURTHER MATHEMATICS**

**Paper 2 Calculator**

**8365/2**

**Time allowed: 1 hour 45 minutes**

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

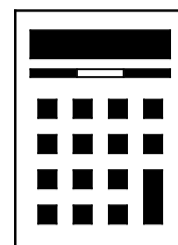
**[Turn over]**



J U N 2 2 8 3 6 5 2 0 1

**For this paper you must have:**

- a calculator
- mathematical instruments
- the Formulae Sheet (enclosed).



## **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.



- **In all calculations, show clearly how you work out your answer.**

## **INFORMATION**

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 80.**
- **You may ask for more graph paper and tracing paper. These must be tagged securely to this answer book.**
- **The use of a calculator is expected but calculators with a facility for symbolic algebra must NOT be used.**

**DO NOT TURN OVER UNTIL TOLD TO DO SO**



**Answer ALL questions in the spaces provided.**

**1 Factorise fully  $12w + 18w^2$  [2 marks]**

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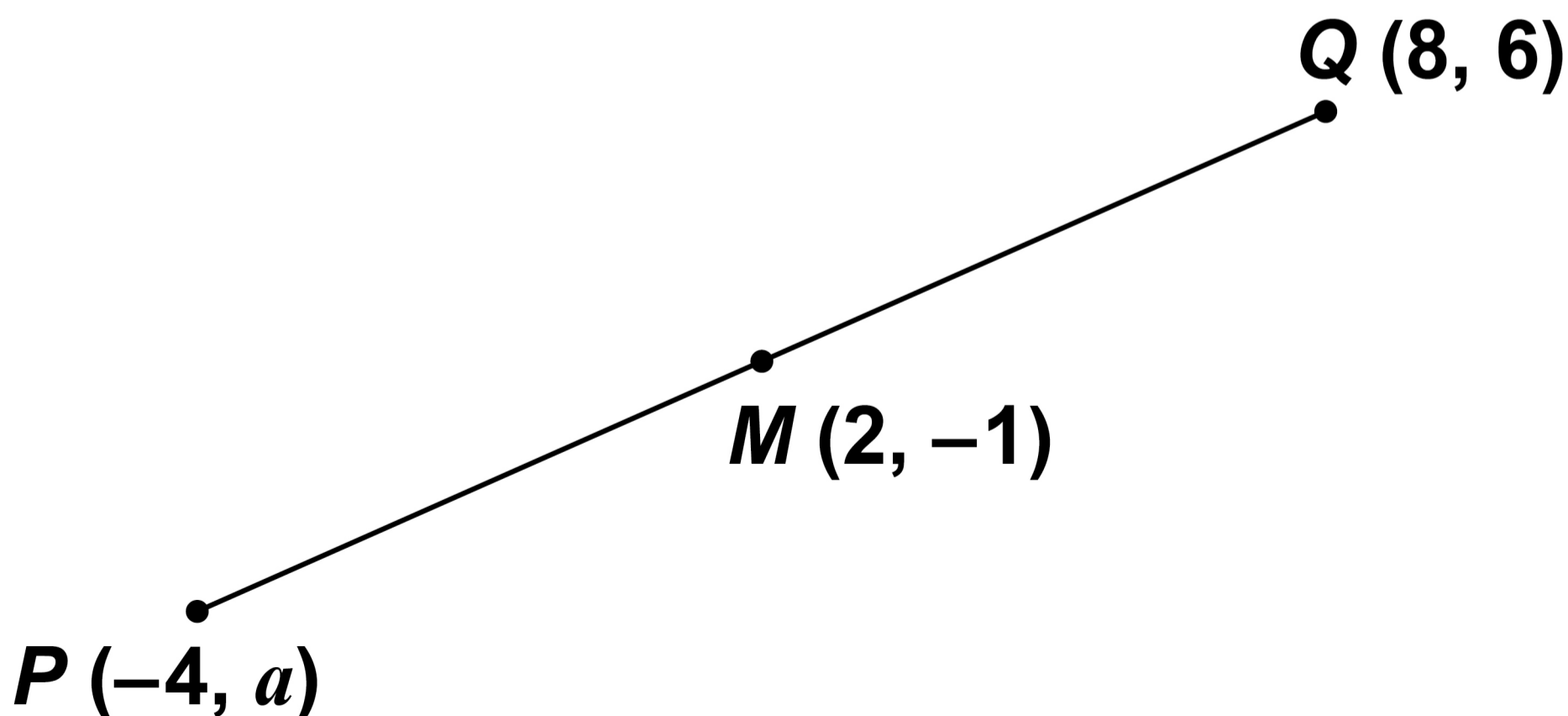
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**Answer** \_\_\_\_\_

**2  $M$  is the midpoint of  $PQ$ .**

**The diagram is not drawn accurately.**



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Work out the value of  $a$ . [2 marks]

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Answer \_\_\_\_\_

[Turn over]



3(a) Work out  $3 \begin{pmatrix} 4 & 2 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 2 & 0 \\ -1 & 5 \end{pmatrix}$

**Give your answer as a single matrix.  
[3 marks]**

**Answer** \_\_\_\_\_



$$3(b) \begin{pmatrix} 7 & a^2 \\ b & -5 \end{pmatrix} \begin{pmatrix} 2 \\ a \end{pmatrix} = \begin{pmatrix} 78 \\ 12 \end{pmatrix}$$

**Work out the values of  $a$  and  $b$ .**  
**[3 marks]**

$$a = \underline{\hspace{10em}} \quad b = \underline{\hspace{10em}}$$

**[Turn over]**



**4 Line A has equation  $y + 4x = 6$**

**Line B is parallel to line A and passes through the point  $(2, 1)$**

**The point  $(d, 2d)$  lies on line B.**

**Work out the value of  $d$ . [4 marks]**

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**Answer** \_\_\_\_\_





- 5 Work out all the NEGATIVE integer values of  $x$  for which  $3x^2 < 48$   
[3 marks]**

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**Answer** \_\_\_\_\_

**[Turn over]**





**7 How many integers between 200 000 and 400 000 can be formed using only the digits**

**1 2 3 5 8 9**

**with no repetition of any digit?  
[2 marks]**

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**Answer** \_\_\_\_\_

**[Turn over]**

<b>12</b>



**8** A curve has equation  $y = x^3 - 5x^2$

**At two points on the curve, the rate of change of  $y$  with respect to  $x$  is 4**

**8(a)** Work out an equation, in terms of  $x$ , to represent this information.

**Give your answer in the form**

**$ax^2 + bx + c = 0$  where  $a$ ,  $b$  and  $c$  are integers. [2 marks]**

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**Answer** \_\_\_\_\_



**8(b) Hence, work out the two possible values of  $x$ .**

**Give your answers to 3 significant figures. [2 marks]**

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**Answer** \_\_\_\_\_

**[Turn over]**



**9 The first three terms of a linear sequence are**

$$30 \quad 30 + 4k \quad 30 + 8k$$

**where  $k$  is a constant.**

**9(a) Work out an expression, in terms of  $k$ , for the 4th term.**

**Give your answer in its simplest form. [1 mark]**

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**Answer** \_\_\_\_\_



**9(b) The 100th term of the sequence  
is 525**

**Work out the value of  $k$ . [3 marks]**

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**Answer** \_\_\_\_\_

**[Turn over]**

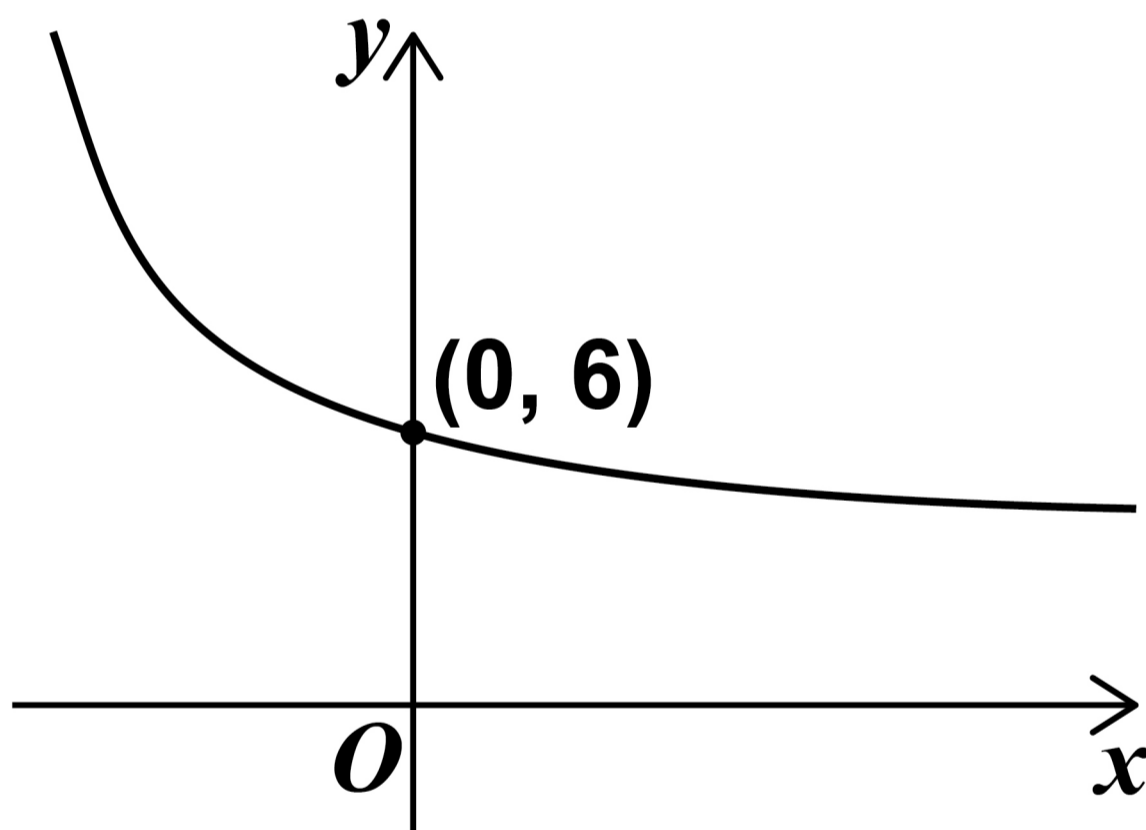
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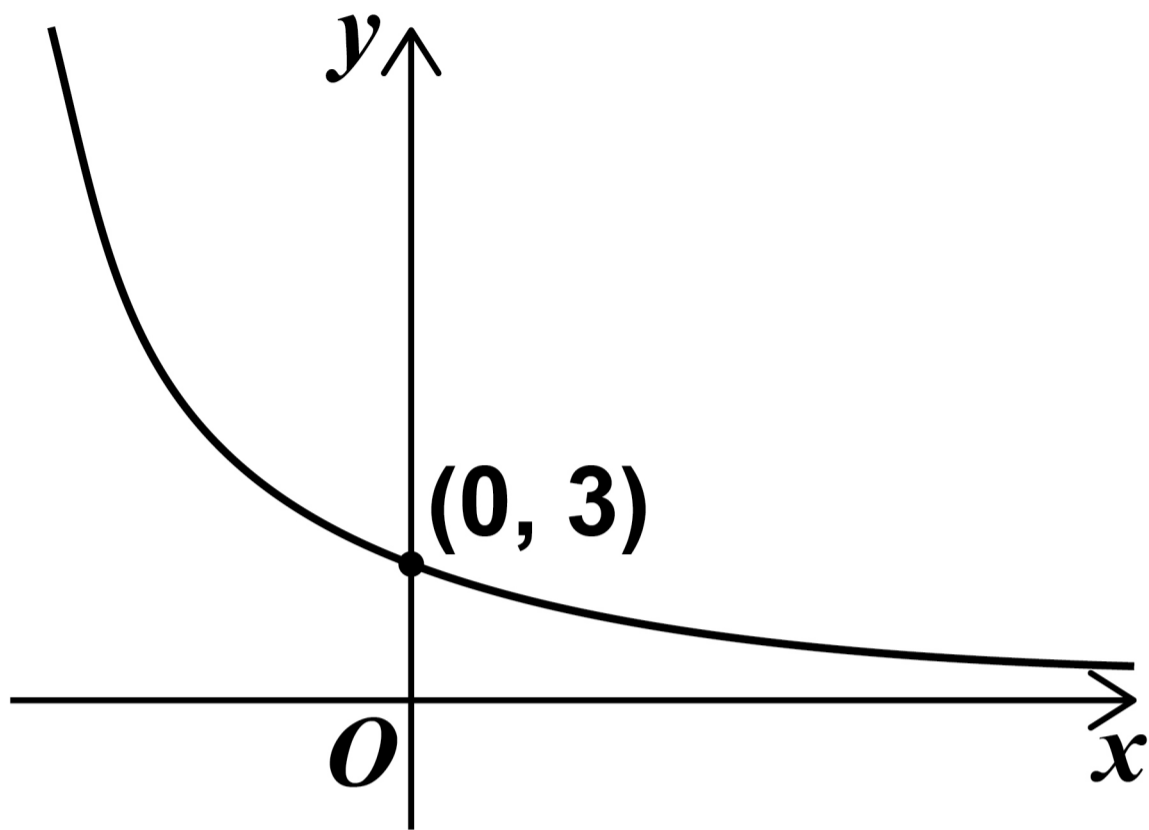
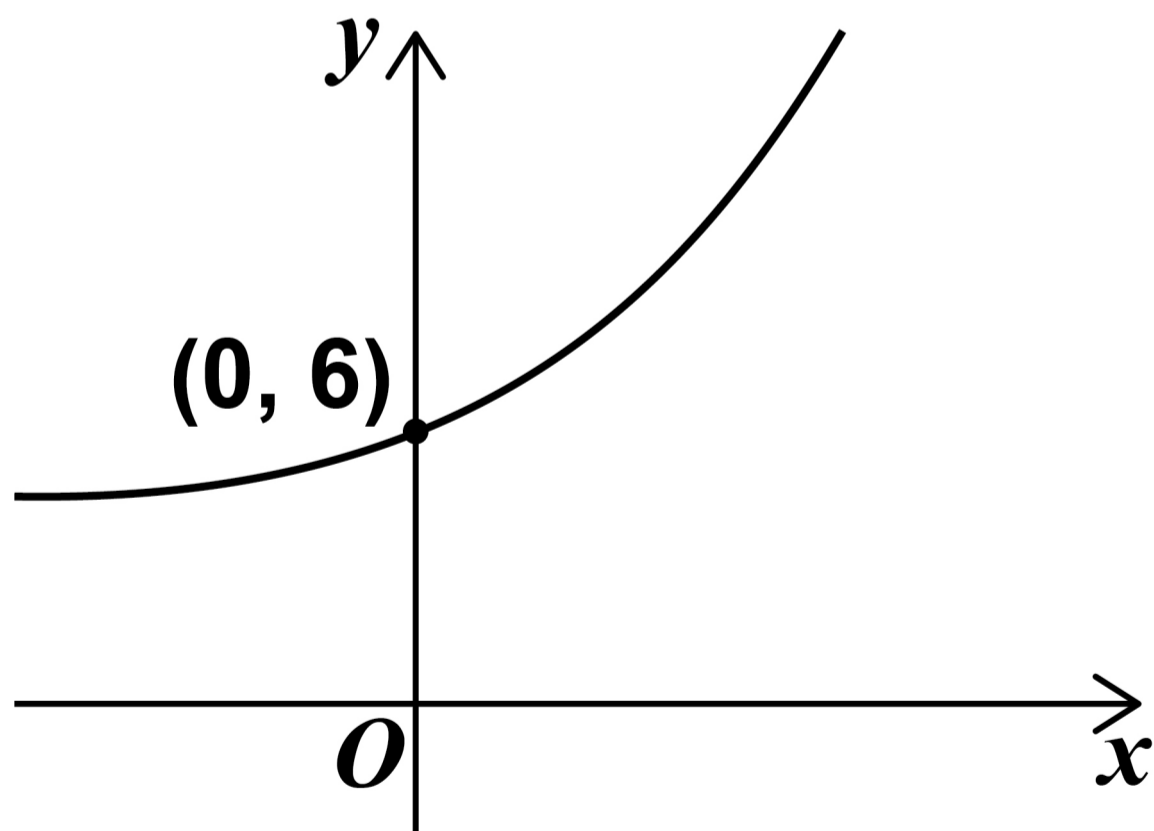
10 There are four sketch graphs on pages 16–18.

Circle the letter of the sketch graph that represents  $y = 3 \times 2^x$  [1 mark]

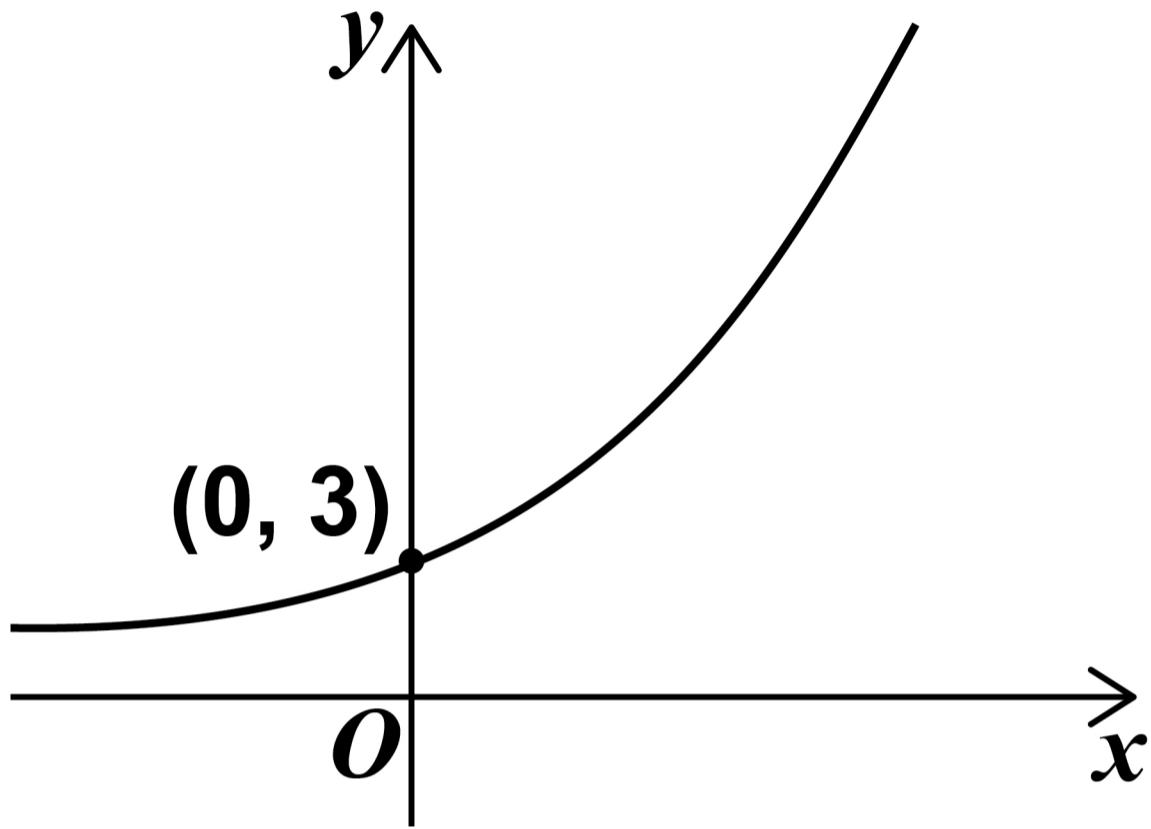
A





**B****C****[Turn over]**

D



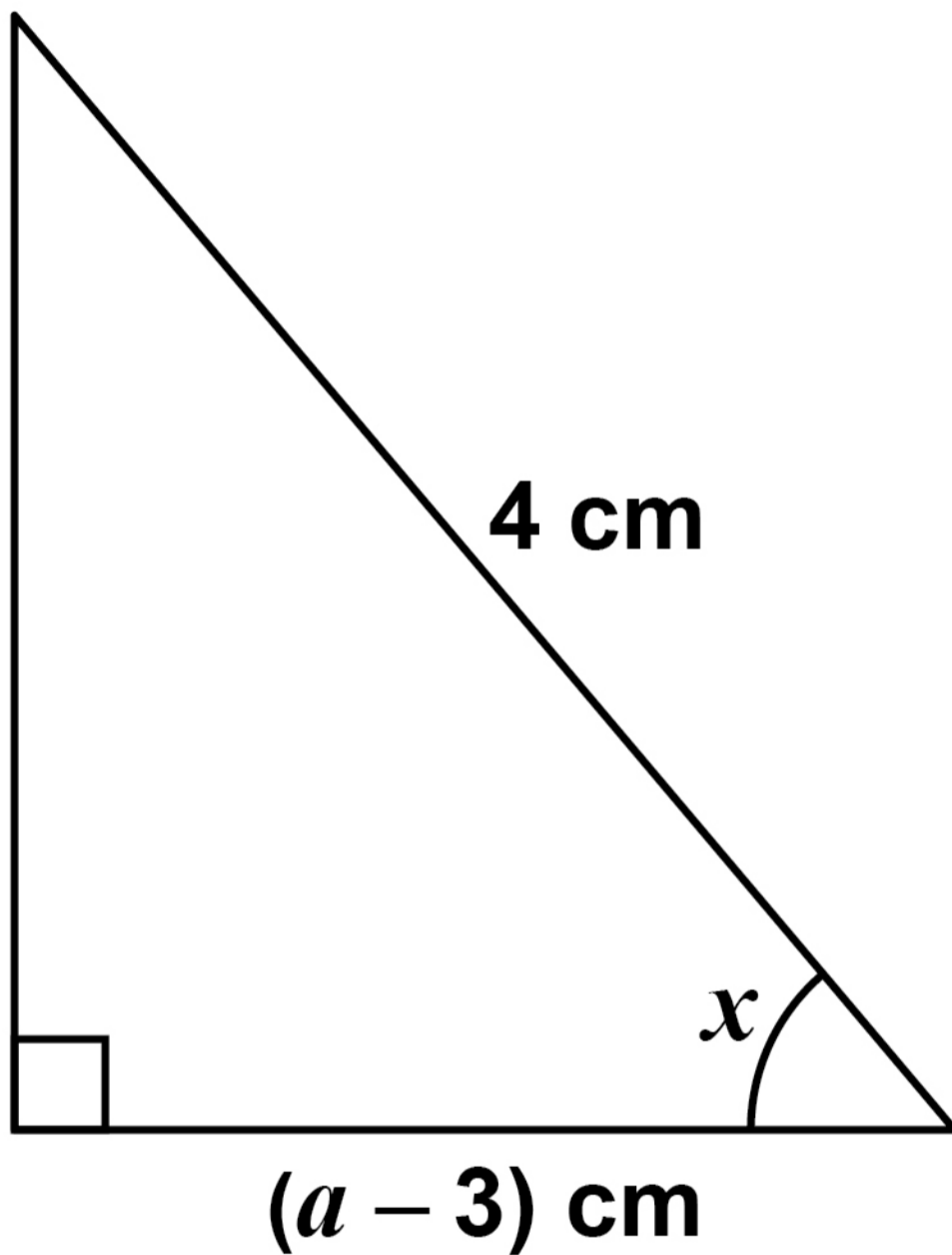
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**[Turn over]**



**11 Here is a right-angled triangle.**

**The diagram is not drawn accurately.**



You are given that  $a > 5$

Use trigonometry to work out the range of values of  $x$ . [2 marks]

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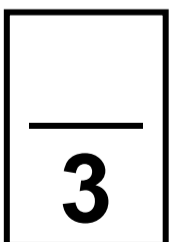
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Answer \_\_\_\_\_

[Turn over]



**12 Work out the gradient of the curve**

$$y = \frac{12x^3 - 8x + 3}{4x^2}$$

**at the point where  $x = -1$**

**You MUST show your working.**  
**[5 marks]**

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**Answer** \_\_\_\_\_

**[Turn over]**



- 13  $A(-2, 5)$  and  $B(4, 13)$  are points on a circle.

$AB$  is a diameter.

Work out the equation of the circle.

Give your answer in the form

$(x - a)^2 + (y - b)^2 = c$  where  $a$ ,  $b$  and  $c$  are integers. [3 marks]

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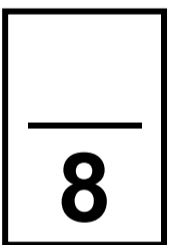
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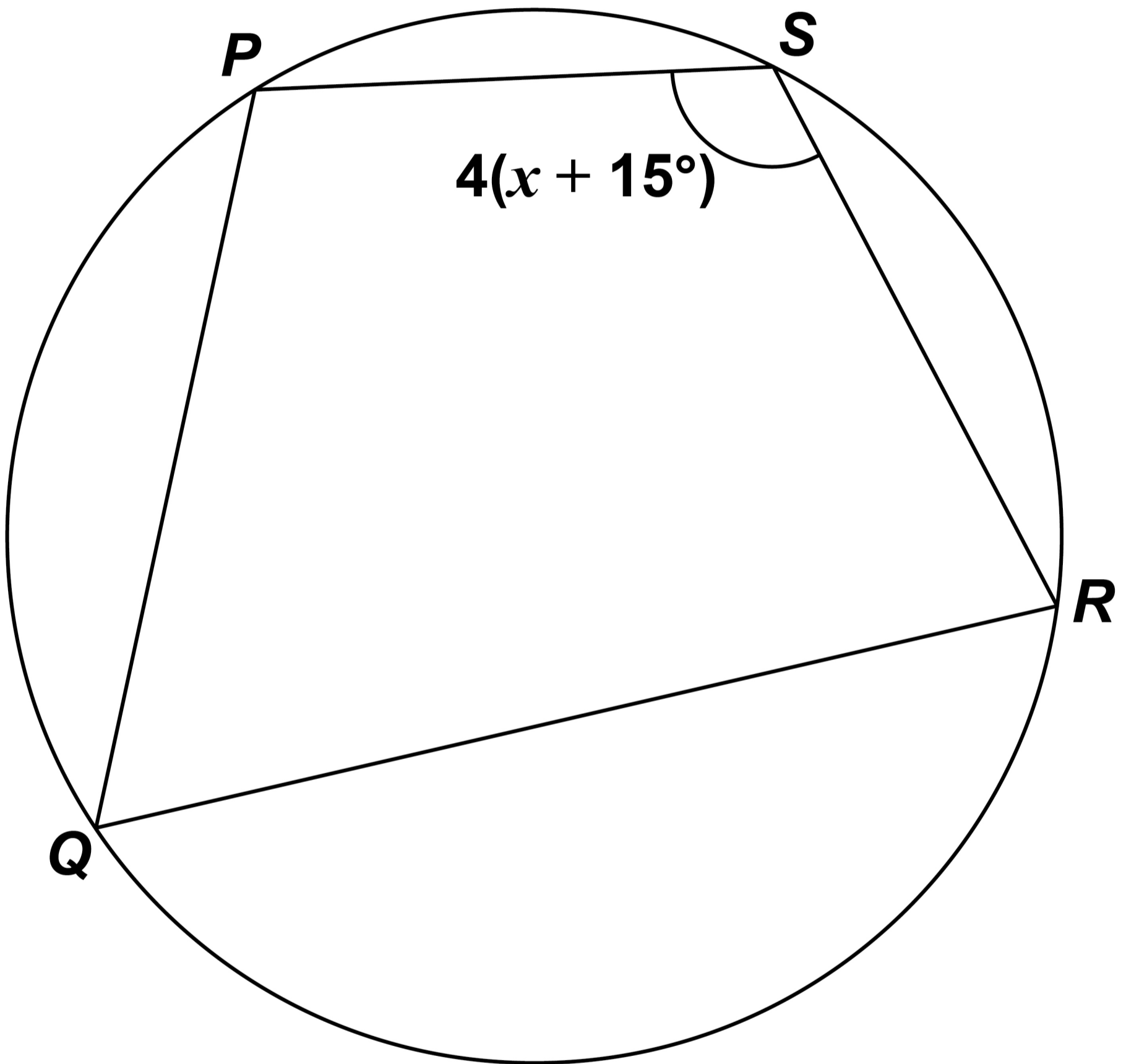
**Answer** \_\_\_\_\_

**[Turn over]**



14 *PQRS* is a cyclic quadrilateral.

The diagram is not drawn accurately.



Angle  $PSR = 4(x + 15^\circ)$

Angle  $PQR$  is  $40^\circ$  smaller than angle  $PSR$ .

Work out the value of  $x$ . [3 marks]

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Answer \_\_\_\_\_ degrees

[Turn over]





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**Answer** \_\_\_\_\_

**[Turn over]**

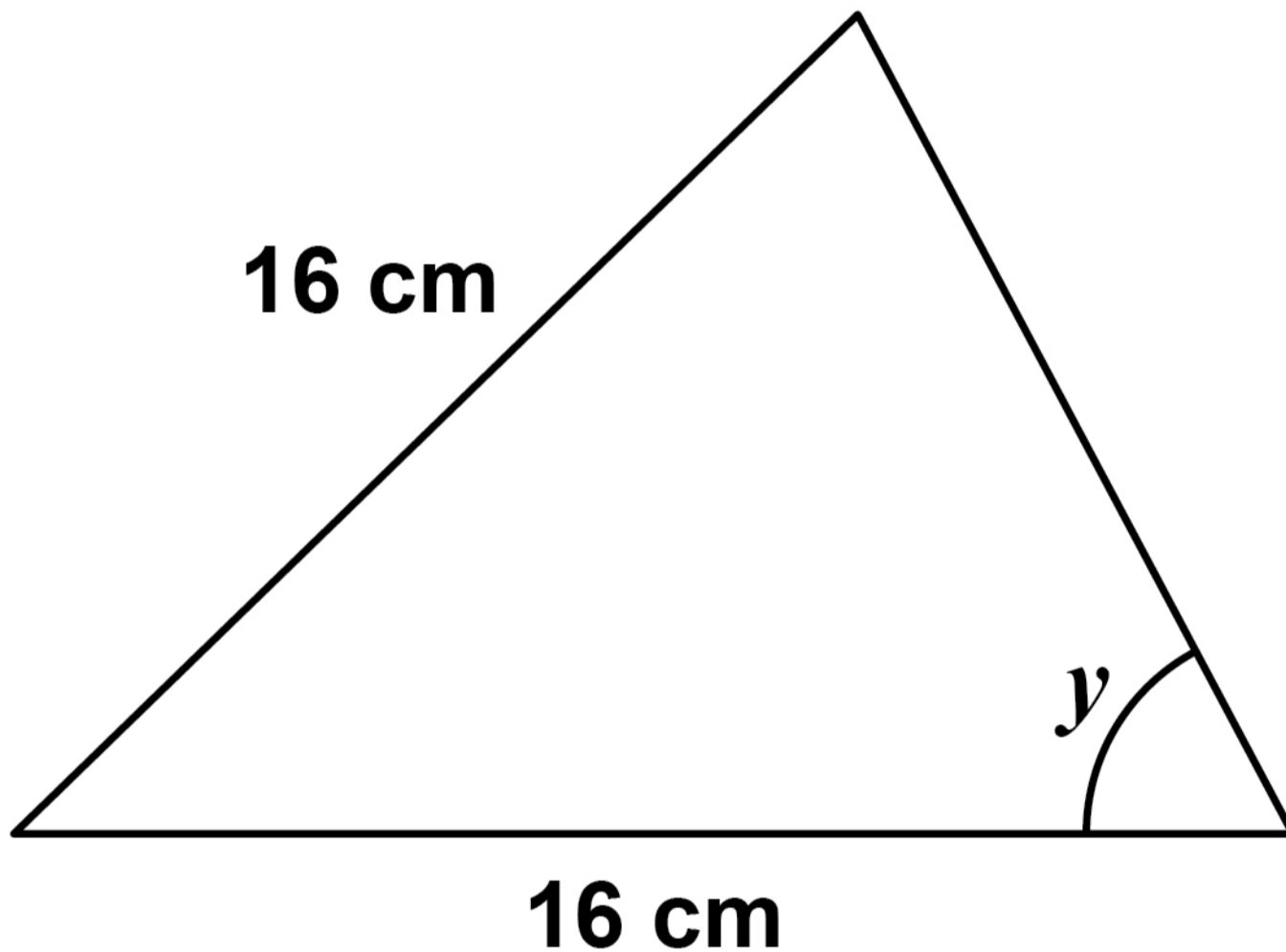
8



**16 Here is an isosceles triangle.**

**All the angles are acute.**

**The diagram is not drawn accurately.**



**The area of the triangle is  $120 \text{ cm}^2$**

**Work out the size of angle  $y$ .**

**[4 marks]**

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**Answer** \_\_\_\_\_ **degrees**

**[Turn over]**



**17 Solve the simultaneous equations**

$$a + 3b - 2c = 4$$

$$4a - 3b + 5c = -5$$

$$2a + b + 3c = 9$$

**Do NOT use trial and improvement.**

**You MUST show your working.**

**[5 marks]**

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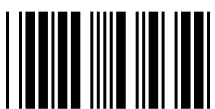
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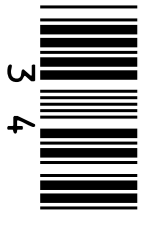
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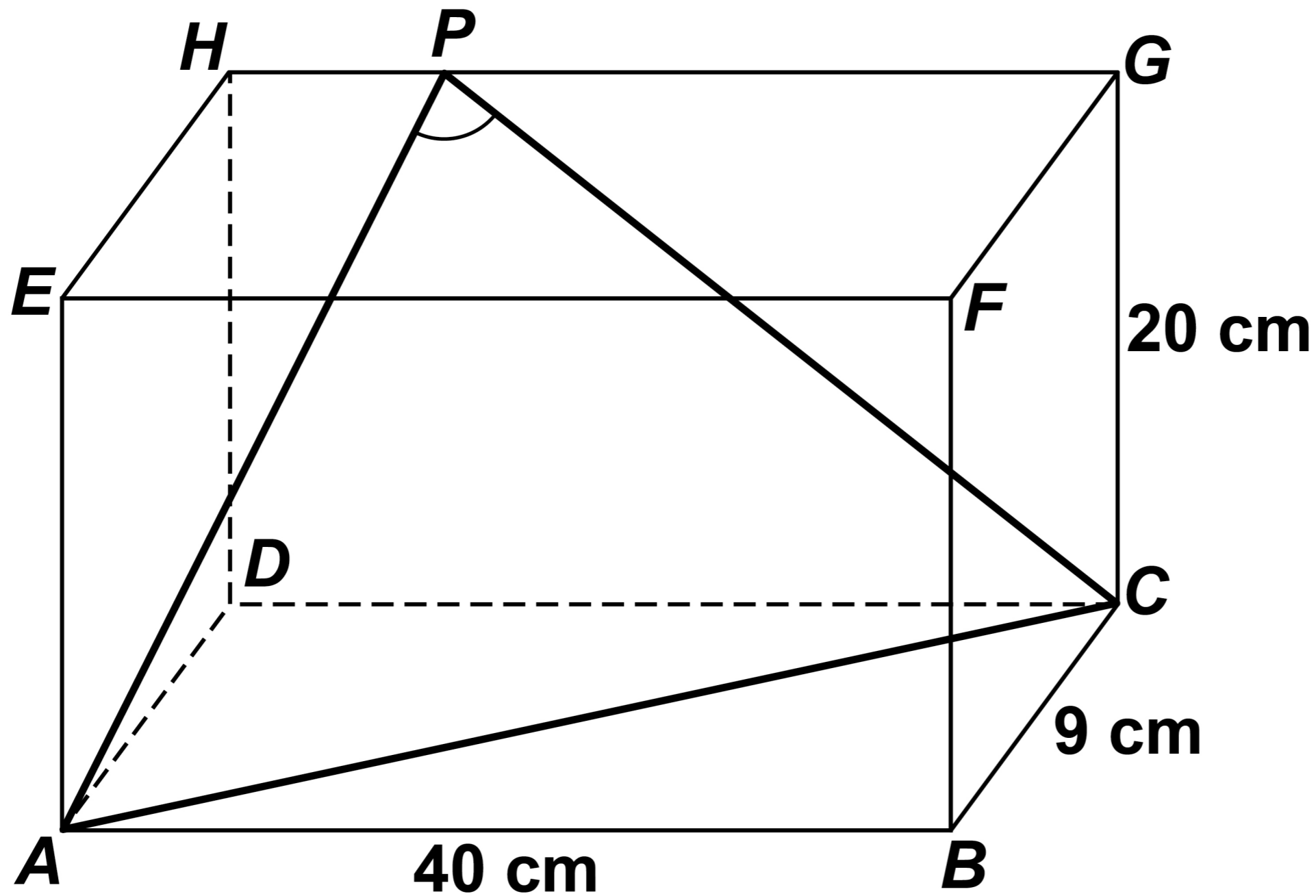
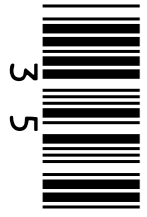


**18** *ABCDEFGH* is a cuboid, on the opposite page.

$$AB = 40 \text{ cm} \quad BC = 9 \text{ cm} \quad CG = 20 \text{ cm}$$

*P* is a point on *HG* such that  $HP : PG = 3 : 7$

$$AP = 25 \text{ cm}$$



[Turn over]



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**Work out the size of angle *APC*. [5 marks]**

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**[Turn over]**



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**Answer** \_\_\_\_\_ **degrees**



**19** Expand and simplify fully  $(3x + 4)(2x - 3)(5x - 2)$   
[3 marks]

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**Answer** \_\_\_\_\_

**39**

**[Turn over]**

8

**20**       $f(x) = 2x^3 + 11x^2 + 12x - 9$

**20(a)**    Use the factor theorem to show that  $(2x - 1)$  is a factor of  $f(x)$ .  
[2 marks]

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**20(b)**    Show that  $f(x) = 0$  has EXACTLY TWO solutions. [4 marks]

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**Answer** \_\_\_\_\_

**[Turn over]**

<b>10</b>





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**Answer** \_\_\_\_\_

**END OF QUESTIONS**

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<b>4</b>







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For Examiner's Use	
Pages	Mark
4–7	
8–11	
12–15	
16–21	
22–25	
26–29	
30–33	
34–39	
40–43	
44–45	
<b>TOTAL</b>	

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