

The **quadratic formula** is:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

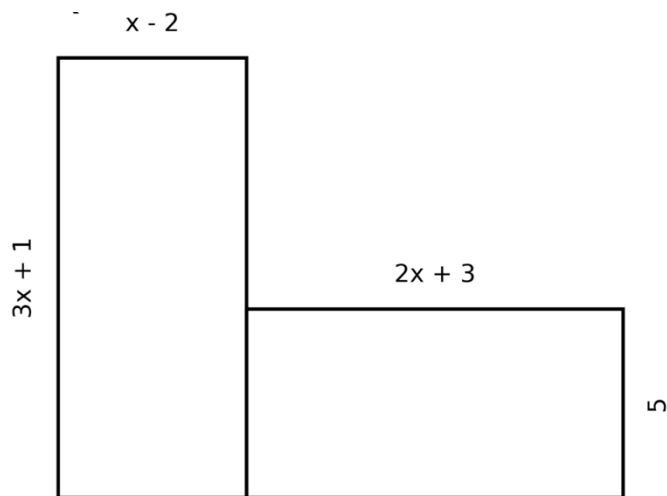
$$ax^2 + bx + c = 0$$

Q1

The L-shape is made from rectangles of sizes  $(x - 2)$  by  $(3x + 1)$  and 5 by  $(2x + 3)$ .  
The total area is  $34 \text{ cm}^2$ .

(a) Show that  $3x^2 + 5x - 21 = 0$ .

(b) Find  $x$  to 3 s.f.

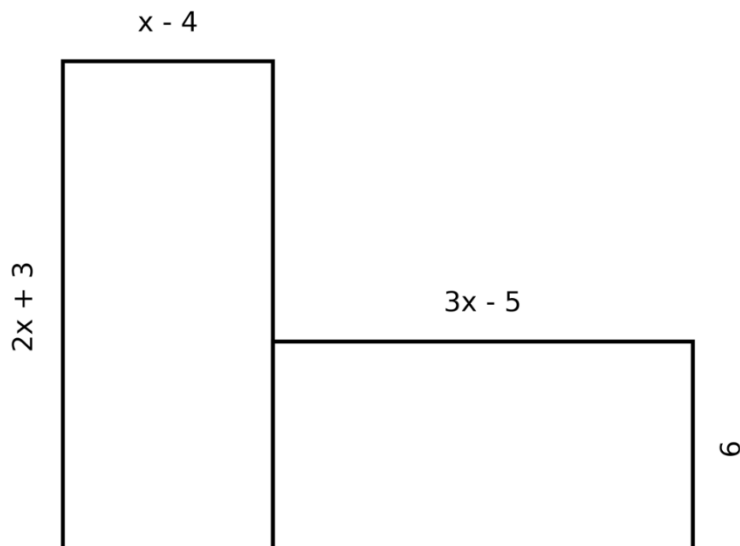


Q2

Rectangles:  $(x - 4)$  by  $(2x + 3)$  and 6 by  $(3x - 5)$ .  
Total area =  $18 \text{ cm}^2$ .

(a) Show that  $2x^2 + 13x - 60 = 0$ .

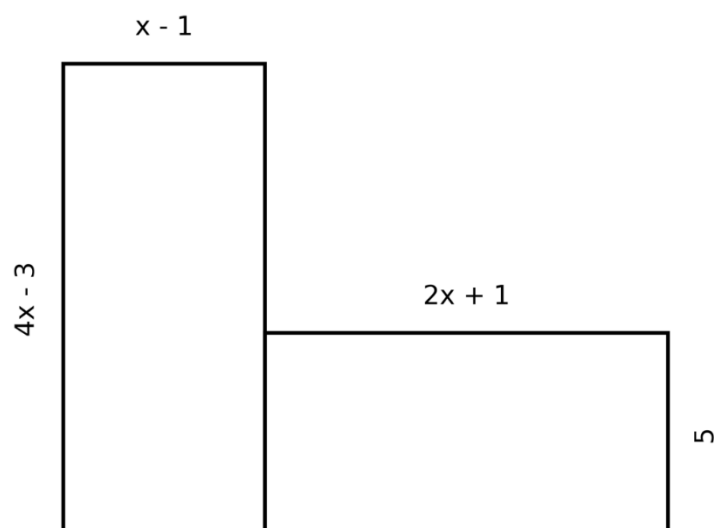
(b) Find  $x$  to 3 s.f.



Q3 Rectangles:  $(x - 1)$  by  $(4x - 3)$  and 5 by  $(2x + 1)$ .  
Total area =  $28 \text{ cm}^2$ .

(a) Show that  $4x^2 + 3x - 20 = 0$ .

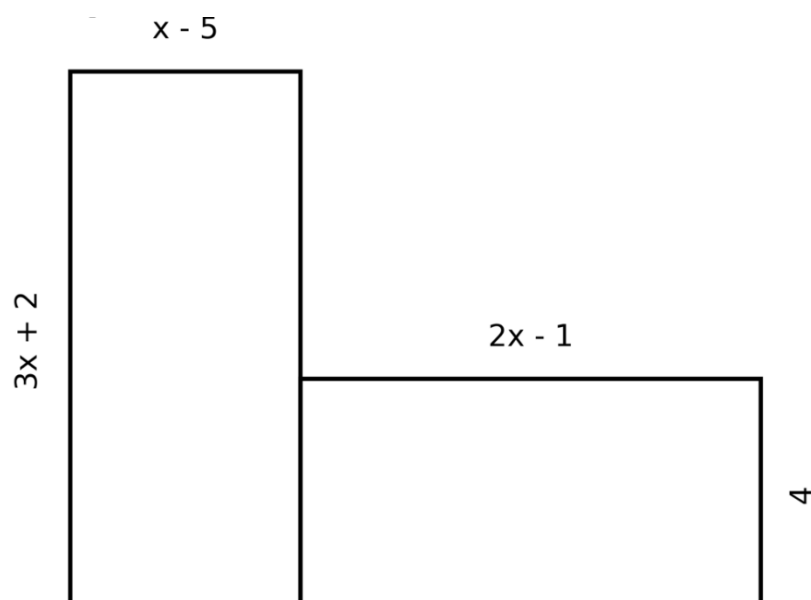
(b) Find  $x$  to 3 s.f.



Q4 Rectangles:  $(x - 5)$  by  $(3x + 2)$  and 4 by  $(2x - 1)$ .  
Total area =  $10 \text{ cm}^2$ .

(a) Show that  $3x^2 - 5x - 24 = 0$ .

(b) Find  $x$  to 3 s.f.



### Q1

Rectangles:  $(x - 2)(3x + 1)$  and  $5(2x + 3)$ . Total area = 34.

1. Area equation:  $(x - 2)(3x + 1) + 5(2x + 3) = 34$
  2. Expand:  $3x^2 - 5x - 2 + 10x + 15 = 34$
  3. Simplify:  $3x^2 + 5x + 13 = 34 \Rightarrow 3x^2 + 5x - 21 = 0$
  4. Solve:  $a = 3, b = 5, c = -21, x = \frac{-5 \pm \sqrt{5^2 - 4 \cdot 3 \cdot (-21)}}{2 \cdot 3} = \frac{-5 \pm \sqrt{277}}{6}$
  5. Roots  $\approx 1.941, -3.607 \rightarrow x = 1.94$  (3 s.f.)
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### Q2

$(x - 4)(2x + 3)$  and  $6(3x - 5)$ . Total = 18.

1.  $(x - 4)(2x + 3) + 6(3x - 5) = 18$
  2.  $2x^2 - 5x - 12 + 18x - 30 = 18$
  3.  $2x^2 + 13x - 42 = 18 \Rightarrow 2x^2 + 13x - 60 = 0$
  4.  $a = 2, b = 13, c = -60: x = \frac{-13 \pm \sqrt{13^2 - 4 \cdot 2 \cdot (-60)}}{4} = \frac{-13 \pm \sqrt{649}}{4}$
  5. Roots  $\approx 3.119, -9.619 \rightarrow x = 3.12$
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### Q3

$(x - 1)(4x - 3)$  and  $5(2x + 1)$ . Total = 28.

1.  $(x - 1)(4x - 3) + 5(2x + 1) = 28$
2.  $4x^2 - 7x + 3 + 10x + 5 = 28$
3.  $4x^2 + 3x + 8 = 28 \Rightarrow 4x^2 + 3x - 20 = 0$
4.  $a = 4, b = 3, c = -20: x = \frac{-3 \pm \sqrt{3^2 - 4 \cdot 4 \cdot (-20)}}{8} = \frac{-3 \pm \sqrt{329}}{8}$
5. Roots  $\approx 1.892, -2.642 \rightarrow x = 1.89$

# Q4

$(x - 5)(3x + 2)$  and  $4(2x - 1)$ . Total = 10.

- $(x - 5)(3x + 2) + 4(2x - 1) = 10$

- $3x^2 - 13x - 10 + 8x - 4 = 10$

- $3x^2 - 5x - 14 = 10 \Rightarrow \boxed{3x^2 - 5x - 24 = 0}$

- $a = 3, b = -5, c = -24: x = \frac{5 \pm \sqrt{(-5)^2 - 4 \cdot 3 \cdot (-24)}}{6} = \frac{5 \pm \sqrt{313}}{6}$

- Roots  $\approx 3.782, -2.115 \rightarrow x = \boxed{3.78}$

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