Quadratic Word Problems

QE10-V1 · storyboard · QE10 Quadratic word problems. Read each picture with its sentences.

Picture 1

A rectangle is 4 cm longer than it is wide. Its area is 60 cm². How wide is it?

$$w(w+4) = 60$$ width w cm, length $w+4$ cm

$$w^2 + 4w - 60 = 0$$

$$(w-6)(w+10) = 0$$ product -60, sum 4

$$w = 6 \quad \text{or} \quad w = -10$$

$$\boxed{w = 6 \text{ cm}}$$ a width can't be negative

1. A rectangle is 4 centimetres longer than it is wide, and its area is 60 square centimetres.
2. How wide is it?
3. Let the width be w centimetres.
4. The length is w plus 4, and width times length is 60.
5. Expand, and get 0 on one side.
6. Product negative 60, sum 4: negative 6 and 10.
7. So w equals 6 or w equals negative 10.
8. A width can't be negative, so the rectangle is 6 centimetres wide, and 10 long.
9. Check: 6 times 10 is 60.

Picture 2

Bracelets sell for €10, 50 a week. For each €1 more, 2 fewer sell. At what prices does the shop take €600 a week?

$$(10 + d)(50 - 2d) = 600 \quad d\text{: the rise in euros}$$

$$-2d^2 + 30d + 500 = 600 \quad \text{expand}$$

$$d^2 - 15d + 50 = 0 \quad \text{subtract 600, divide every term by } -2$$

$$(d - 5)(d - 10) = 0$$

$$\boxed{15 \text{ or } 20 \text{ euros}} \quad \text{the price is } 10 + d$$

10. Bracelets sell for 10 euros, and the shop sells 50 a week.
11. For each euro more, 2 fewer sell.
12. At what prices does the shop take 600 euros a week?
13. Let the price rise by d euros.
14. The price is 10 plus d, the number sold is 50 minus 2 d, and price times number is 600.
15. Expand: negative 2 d squared, plus 30 d, plus 500.
16. Subtract 600, then divide every term by negative 2.
17. That factors, so d equals 5 or 10.
18. But the question asks for the price, which is 10 plus d: 15 euros or 20 euros.
19. Both fit: 15 times 40 is 600, and 20 times 30 is 600.

Picture 3

Trap the price

$\times$ 5 or 10

$\checkmark$ 15 or 20 euros

20. Watch for the trap: 5 and 10 are the rises, not the prices.
21. Answer the question asked: add the rise to 10 euros.

Picture 4

Trap $w = 6$ or $w = -10$

$\times$ $w = -10$ cm

$\checkmark$ $w = 6$ cm

22. Another trap: there is no negative width.
23. Keep only the root that fits the story.