The Sum and Product Game

QE05-V1 · storyboard · QE05 Factor x² + bx + c. Read each picture with its sentences.

Picture 1

Factor $x^2 + 7x + 12$.

$3 \times 4 = 12, \quad 3 + 4 = 7$ product 12, sum 7

$$\boxed{(x + 3)(x + 4)}$$

1. Factor x squared, plus 7 x, plus 12.
2. We need two numbers with product 12 and sum 7.
3. 1 and 12 add to 13, 2 and 6 add to 8, and 3 and 4 add to 7.
4. So it is x plus 3, times x plus 4.

Picture 2

Solve $y^2 - 5y - 24 = 0$.

$$-8 \times 3 = -24, \quad -8 + 3 = -5$$

opposite signs: the bigger one is negative

$$(y - 8)(y + 3) = 0$$

$$\boxed{y = 8 \quad \text{or} \quad y = -3}$$

change the signs

Check: $y = 8: \quad 64 - 40 - 24 = 0$ ✓

5. Solve y squared, minus 5 y, minus 24, equals 0.
6. The product is negative 24, so the two numbers have opposite signs.
7. The sum is negative 5, so the one farther from 0 is negative: negative 8 and 3.
8. So y minus 8, times y plus 3, equals 0.
9. For the roots, change the signs: y equals 8 or y equals negative 3.
10. Check 8: 64 minus 40 minus 24 is 0.

Picture 3

Trap $x^2 + 8x + 15$

$\times$ $(x - 3)(x - 5)$

✓ $(x + 3)(x + 5)$

11. Watch for the trap: right numbers, wrong signs.
12. x minus 3, times x minus 5, gives minus 8 x.
13. We need plus 8 x, so it is x plus 3, times x plus 5.

Picture 4

Trap $(x+5)(x-3)=0$

$\times$ $x=5$ or $x=-3$

✓ $x=-5$ or $x=3$

14. Another trap: the roots are not the numbers in the brackets.
15. x plus 5 is 0 when x is negative 5.
16. So the roots are negative 5 and 3.