Tidy Up First

QE06-V1 · storyboard · QE06 Tidy up first; double roots and missing terms. Read each picture with its sentences.

Picture 1

Solve $56 - x^2 - x = 0$.

$$-x^2 - x + 56 = 0 \quad \text{terms in order}$$

$$x^2 + x - 56 = 0 \quad \text{every term times } -1$$

$$(x + 8)(x - 7) = 0 \quad \text{product } -56\text{, sum } 1$$

$$\boxed{x = -8 \quad \text{or} \quad x = 7}$$

1. Solve 56, minus x squared, minus x, equals 0.
2. Put the terms in order: negative x squared, minus x, plus 56.
3. Multiply every term by negative 1, so the x squared term is positive.
4. Product negative 56, sum 1: 8 and negative 7.
5. So x equals negative 8 or x equals 7.

Picture 2

Solve $3x^2 + 54x + 243 = 0$.

$$x^2 + 18x + 81 = 0$$ divide every term by 3

$$(x + 9)^2 = 0$$

$$\boxed{x = -9}$$ a double root

6. Solve 3 x squared, plus 54 x, plus 243, equals 0.
7. Every term is a multiple of 3, so divide every term by 3.
8. Product 81, sum 18: 9 and 9.
9. That is x plus 9, squared.
10. Both factors give the same root, x equals negative 9: a double root.

Picture 3

Trap $t(t - 5) = 14$

$$\times \; t = 14 \text{ or } t - 5 = 14$$

$$\checkmark \; t^2 - 5t - 14 = 0, \quad t = 7 \text{ or } t = -2$$

11. Watch for the trap: t times t minus 5 equals 14 does not mean t is 14, or t minus 5 is 14.
12. That only works when the other side is 0.
13. Subtract 14 first: t equals 7 or t equals negative 2.

Picture 4

Trap $(x+9)^2 = 0$

$\times \quad x = \pm 9$

$\checkmark \quad x = -9$

14. Another trap: x plus 9, squared, equals 0 does not give plus or minus 9.
15. Both factors are x plus 9, so the only root is negative 9.