Zero Product

QE03-V1 · storyboard · QE03 Zero product: a product is 0 only when a factor is 0. Read each picture with its sentences.

Picture 1

Solve $(x-3)(x+9)=0$.

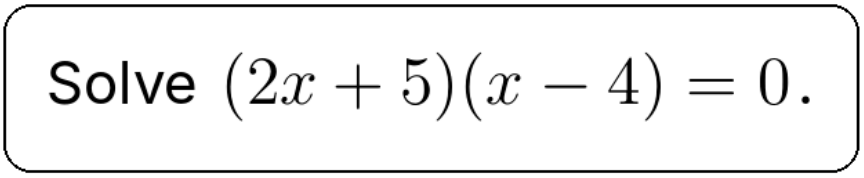
$x-3=0 \quad \text{or} \quad x+9=0$ one factor must be 0

$\boxed{x=3 \quad \text{or} \quad x=-9}$

Check: $x=-9: \quad (-12)(0)=0$ ✓

1. Solve x minus 3, times x plus 9, equals 0.
2. One factor must be 0: x minus 3 is 0, or x plus 9 is 0.
3. So x equals 3 or x equals negative 9.
4. The roots have the opposite signs to the numbers in the brackets.
5. Check negative 9: negative 12 times 0 is 0.

Picture 2



$$2x+5=0 \quad \text{or} \quad x-4=0$$

$$x=-\frac{5}{2} \quad \text{or} \quad x=4$$

$2x=-5$

6. Now a number in front of x: solve 2 x plus 5, times x minus 4, equals 0.
7. Each factor could be 0.
8. 2 x equals negative 5, so x is negative 5 over 2.
9. Or x equals 4.

Picture 3

Solve $r^2 = -18r$.

$r^2 + 18r = 0$ 0 on one side

$r(r + 18) = 0$ take out r

$$r = 0 \quad \text{or} \quad r = -18$$

10. Solve r squared equals negative 18 r.
11. First get 0 on one side: r squared plus 18 r equals 0.
12. Take out the common factor, r.
13. So r equals 0 or r equals negative 18.

Picture 4

Trap $r^2 = -18r$

$\times \; r = -18$

$\checkmark \;\; r = 0 \text{ or } r = -18$

14. Watch for the trap: if you divide by r, you lose a root.
15. Keep the root 0: r equals 0 or r equals negative 18.

Picture 5

Trap $3x - 2 = 0$

$\times \; x = \frac{3}{2}$

$\checkmark \;\; x = \frac{2}{3}$

16. Another trap: 3 x minus 2 equals 0 does not give 3 over 2.
17. Add 2, then divide by 3: x equals 2 over 3.