Look Before You Expand

QE07-V1 · storyboard · QE07 Use the factored form: common factors first. Read each picture with its sentences.

Picture 1

Solve $(x-4)(x+1)=6(x-4)$.

$$(x-4)(x+1)-6(x-4)=0$$ everything on one side

$$(x-4)(x+1-6)=0$$ take out $x-4$

$$(x-4)(x-5)=0$$

$$\boxed{x=4 \quad \text{or} \quad x=5}$$

1. Solve x minus 4, times x plus 1, equals 6 times x minus 4.
2. Move everything to one side.
3. Both terms have the factor x minus 4.
4. Take out x minus 4: what is left is x plus 1 minus 6.
5. That is x minus 4, times x minus 5.
6. So x equals 4 or x equals 5.

Picture 2

Trap $(x-4)(x+1) = 6(x-4)$

$\times \quad x+1 = 6, \quad x = 5$

$\checkmark \quad x = 4 \text{ or } x = 5$

7. Watch for the trap: if you cancel x minus 4, you get only x equals 5.
8. But x minus 4 is 0 when x is 4, and you cannot divide by 0.
9. So 4 is a root as well.

Picture 3

$e \approx 2.72$. Is $e^2 - 5e + 6$ positive, zero or negative?

$e^2 - 5e + 6 = (e-2)(e-3)$ factor it

$e - 2 > 0, \quad e - 3 < 0$ e is between 2 and 3

$\text{positive} \times \text{negative} < 0$

10. The number e is about 2.72.
11. Is e squared, minus 5 e, plus 6, positive, zero, or negative?
12. Factor it: e minus 2, times e minus 3.
13. e is between 2 and 3, so e minus 2 is positive, and e minus 3 is negative.
14. Positive times negative: the product is negative, without working out e squared at all.

Picture 4

Trap $(3r-2)(2r-5)+(r-7)(3r-2)$

$\times$ $(3r-2)(2r-5)(r-7)$

✓ $(3r-2)(3r-12)$

15. Another trap: taking out the common factor 3 r minus 2 does not give a product of three brackets.
16. Add what is left: 2 r minus 5, plus r minus 7, which is 3 r minus 12.