

Algebra 1 - Factoring Polynomials - Answer Key

Common Core A-SSE.A.2, A-SSE.B.3a, A-APR.B.3 · maths-pdf.fr/en/

This answer key explains every problem on the factoring worksheet. Final answers are in bold, and the lines above them show how each result was found. Use it to correct mistakes and to look for patterns in the errors you make most often.

Algebra 1 · Common Core State Standards: **A-SSE.A.2, A-SSE.B.3a, A-APR.B.3**

Exercise 1 - Greatest common factor

Factors of 12 and 18 share 6 as the greatest. For $8x^2$ and $12x$: GCF of 8 and 12 is 4, and the common variable is x .

6; $4x$

Exercise 2 - Factor out the GCF

The GCF is 6: $12x+18=6(2x+3)$.

Check: $6 \cdot 2x + 6 \cdot 3 = 12x + 18$.

$6(2x+3)$

Exercise 3 - GCF with powers

The GCF is $5x^2$. Divide: $\frac{15x^3}{5x^2} = 3x$ and $\frac{10x^2}{5x^2} = 2$.

$5x^2(3x-2)$

Exercise 4 - Trinomial with positive terms

Factor pairs of 12	Sum
1 and 12	13
2 and 6	8
3 and 4	7

Sums of the factor pairs.

The numbers 3 and 4 have product 12 and sum 7.

$$(x+3)(x+4)$$

Exercise 5 - Another positive trinomial

Find two numbers with product 21 and sum 10: 3 and 7.

$$(x+3)(x+7)$$

Exercise 6 - Negative constant

Product -12 and sum -1 : -4 and 3 .

$$(x-4)(x+3)$$

Exercise 7 - Negative middle term

Factor pairs of 15	Sum
-1 and -15	-16
-3 and -5	-8

Both numbers are negative.

Product 15 and sum -8 : -3 and -5 .

$$(x-3)(x-5)$$

Exercise 8 - Mixed signs

Product -21 and sum 4: 7 and -3 .

$$(x+7)(x-3)$$

Exercise 9 - Trinomial with a equal to 3

Multiply $3 \cdot 6 = 18$. The numbers 2 and 9 add to 11.

Split: $3x^2 + 2x + 9x + 6$. Group: $x(3x+2) + 3(3x+2)$.

$$(3x+2)(x+3)$$

Exercise 10 - Trinomial with a equal to 2

Multiply $2 \cdot 10 = 20$. Find two numbers with product 20 and sum -9 : -4 and -5 .

Split: $2x^2 - 4x - 5x + 10 = 2x(x-2) - 5(x-2)$.

$$(2x-5)(x-2)$$

Exercise 11 - Harder trinomial

Multiply $6 \cdot (-2) = -12$. The numbers 4 and -3 add to 1.

Split: $6x^2 + 4x - 3x - 2 = 2x(3x+2) - 1(3x+2)$.

$$(3x+2)(2x-1)$$

Exercise 12 - Difference of squares

$$x^2 - 49 = x^2 - 7^2.$$

$$(x-7)(x+7)$$

Exercise 13 - Difference of squares with a coefficient

$$4x^2 = (2x)^2 \text{ and } 25 = 5^2.$$

$$(2x-5)(2x+5)$$

Exercise 14 - Perfect square trinomials

$$x^2 + 2(5)x + 5^2 = (x+5)^2. (3x)^2 - 2(3x)(2) + 2^2 = (3x-2)^2.$$

$$(x+5)^2 \text{ and } (3x-2)^2$$

Exercise 15 - Factor completely

Factor out the GCF 2: $2(x^2 - 9)$.

Then x^2-9 is a difference of squares.

$$2(x-3)(x+3)$$

Exercise 16 - Rectangle dimensions

Product 14 and sum 9: 2 and 7.

$$x^2+9x+14=(x+2)(x+7).$$

Width $x+2$ feet and length $x+7$ feet

Exercise 17 - Ball in the air

The GCF is $-16t$: $h(t)=-16t(t-4)$.

Set each factor to 0: $t=0$ or $t=4$.

$-16t(t-4)$; **the ball lands after 4 seconds**

Exercise 18 - Zeros of a function

Product -14 and sum -5 : -7 and 2 , so $f(x)=(x-7)(x+2)$.

Set each factor to 0.

$$x=7 \text{ and } x=-2$$

Exercise 19 - Garden dimensions

The GCF is $3x$: $3x(x+4)$.

Since area = length $\times$ width and the width is $3x$, the length is $x+4$.

Length $x+4$ yards

Exercise 20 - Check by substitution

Expression	Value at $x = 9$
$x^2 - 16$	$81 - 16 = 65$
$(x - 4)(x + 4)$	$5 \times 13 = 65$

Both expressions equal 65.

$$9^2 - 16 = 81 - 16 = 65 \text{ and } (9 - 4)(9 + 4) = 5 \cdot 13 = 65.$$

Both equal 65

Exercise 21 - Mental math

$$51^2 - 49^2 = (51 - 49)(51 + 49).$$

$$= 2 \cdot 100 = 200.$$

200