LESSON MAKER PRO

Find the Factors

Use factors to rewrite expressions and solve problems.

HIGH SCHOOL · A2.A.2

A2.A.2 "Generate and evaluate equivalent algebraic expressions and equations using various strategies. Factor polynomial expressions including, but not limited to, trinomials, differences of squares, sum and difference of cubes..."

NAME _____ DATE _____

FACTOR A TRINOMIAL

To factor $x^2 + bx + c$, find two integers whose product is c and whose sum is b. Write the expression as $(x + m)(x + n)$, using those integers for m and n. If the factored expression equals 0, at least one factor must equal 0.

WORKED EXAMPLE

Factor $x^2 + 17x + 66$.

1. Find two integers with a product of 66: 11 and 6.
2. Check their sum: 11 + 6 = 17.
3. Write the factors: $x^2 + 17x + 66 = (x + 11)(x + 6)$.

Answer: (x + 11)(x + 6)

PRACTICE 6 problems

1 Factor $x^2 + 9x + 20$.

ANSWER _____

2 Factor $x^2 - 13x + 40$.

ANSWER _____

3 Factor $x^2 + x - 20$.

ANSWER _____

4 Factor $x^2 - 2x - 35$.

ANSWER _____

5 Solve $x^2 - 8x + 15 = 0$.

ANSWER _____

_____

6 Complete the identity: $x^2 + 14x + 45 = (x + 5)(x + ___)$.

ANSWER _____

APPLY IT Show your work

1 A student designs a rectangular sticker with an area of $x^2 + 12x + 35$ square centimeters. Its width is $x + 5$ centimeters. What is its length?

WORK SPACE

ANSWER _____

2 A student sells custom pins. The profit, in dollars, from selling x packs is modeled by $P(x) = -x^2 + 12x - 27$. How many packs could the student sell to break even?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student claims $x^2 - 4x - 45 = (x - 5)(x + 9)$. Explain the error and give the correct factors.

WORK SPACE AND ANSWER

ANSWER KEY

Find the Factors

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Factor $x^2 + 9x + 20$.	**(x + 4)(x + 5)**
2	Factor $x^2 - 13x + 40$.	**(x - 5)(x - 8)**
3	Factor $x^2 + x - 20$.	**(x + 5)(x - 4)**
4	Factor $x^2 - 2x - 35$.	**(x - 7)(x + 5)**
5	Solve $x^2 - 8x + 15 = 0$.	**x = 3 or x = 5**
6	Complete the identity: $x^2 + 14x + 45 = (x + 5)(x +$ ___).	**9**

PART 2 · APPLY IT

1. **x + 7 centimeters** Factor the area as (x + 5)(x + 7). Divide by the width x + 5 to get the length x + 7.
2. **3 packs or 9 packs** Set profit equal to 0 and factor: 0 = -(x - 3)(x - 9). The profit is zero when x = 3 or x = 9.

CHALLENGE

The numbers -5 and 9 add to 4, not -4. The correct factors are (x - 9)(x + 5), since -9 and 5 add to -4 and multiply to -45.

Accept factors in either order. For the challenge, accept an explanation that expands the incorrect factors to $x^2 + 4x - 45$.