LESSON MAKER PRO

Factors Reveal Features

Rewrite expressions to uncover zeros, costs, and minimum values.

HIGH SCHOOL · A1P.AF.A

A1P.AF.A "Expressions can be rewritten in equivalent forms by using algebraic properties, including properties of addition, multiplication, and exponentiation, to make different characteristics or features visible."

NAME _____ **DATE** _____

THE BIG IDEA

Factoring rewrites a sum as an equivalent product. For $x^2 + bx + c$, find two numbers whose sum is b and whose product is c. A factored form makes zeros easier to find because a product is zero when one of its factors is zero.

WORKED EXAMPLE

Factor $x^2 + 23x + 126$.

1. Find two numbers with a sum of 23 and a product of 126: 9 and 14.
2. Split the middle term: $x^2 + 9x + 14x + 126$.
3. Group terms: $x(x + 9) + 14(x + 9)$.
4. Factor the common binomial: $(x + 9)(x + 14)$.

Answer: $(x + 9)(x + 14)$

PRACTICE 6 problems

1 Factor $6x + 18$.

ANSWER _____

2 Factor $8x^2 + 12x$.

ANSWER _____

3 Factor $x^2 + 7x + 10$.

ANSWER _____

4 Factor $x^2 - 49$.

ANSWER _____

5 Factor $3x^2 + 15x + 18$ completely.

ANSWER _____

6 Factor $4x^2 - 25$.

ANSWER _____

APPLY IT Show your work

1 A school club sells x tickets at $x each and collects $2 in donations per ticket. After a $35 venue fee, its profit is $x^2 + 2x - 35$ dollars. Factor the profit expression and find the number of tickets needed to break even.

WORK SPACE

ANSWER _____

2 An esports club buys x player jerseys and 6 coach jerseys at $x per jersey. Its total cost is $x^2 + 6x$ dollars. Factor the cost and state what each factor represents.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Rewrite $x^2 - 6x - 16$ in two equivalent forms: a product that shows its zeros and a square plus or minus a number that shows its minimum value. State both zeros and the minimum value.

WORK SPACE AND ANSWER

Factors Reveal Features

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Factor $6x + 18$.	**$6(x + 3)$**
2	Factor $8x^2 + 12x$.	**$4x(2x + 3)$**
3	Factor $x^2 + 7x + 10$.	**$(x + 5)(x + 2)$**
4	Factor $x^2 - 49$.	**$(x - 7)(x + 7)$**
5	Factor $3x^2 + 15x + 18$ completely.	**$3(x + 2)(x + 3)$**
6	Factor $4x^2 - 25$.	**$(2x - 5)(2x + 5)$**

PART 2 · APPLY IT

1. **$(x + 7)(x - 5)$; 5 tickets** The factors have a sum of 2 and a product of -35. Set the profit to zero and use the nonnegative solution, $x = 5$.
2. **$x(x + 6)$; x is the price per jersey in dollars, and $x + 6$ is the total number of jerseys.** Factor out the common x. The product is the price per jersey times the number of jerseys.

CHALLENGE

$(x - 8)(x + 2)$ and $(x - 3)^2 - 25$; zeros: -2 and 8; minimum value: -25

Accept factors in either order. For the challenge, the minimum occurs at $x = 3$.