LESSON MAKER PRO

Factor It Out

Find the factors that build each expression.

HIGH SCHOOL · A1.A.3.3

A1.A.3.3 "Factor common monomial factors from polynomial expressions and factor quadratic expressions with a leading coefficient of 1."

NAME _____ DATE _____

TWO FACTORING MOVES

First, divide every term by its greatest common monomial factor, then write that factor outside parentheses. To factor x^2+bx+c, find two integers that multiply to c and add to b. If taking out a common factor leaves a quadratic, factor that too.

WORKED EXAMPLE

Factor $x^2+17x+60$.

1. Find two integers with a product of 60 and a sum of 17.
2. The integers are 5 and 12.
3. Write one integer in each factor: (x+5)(x+12).

Answer: (x+5)(x+12)

PRACTICE 6 problems

1 Factor completely: $6x+18$.

ANSWER _____

2 Factor completely: $14x^2-21x$.

ANSWER _____

3 Factor completely: x^2+7x+6.

ANSWER _____

4 Factor completely: x^2-x-6.

ANSWER _____

5 Factor completely: $x^2-9x+14$.

ANSWER _____

6 Factor completely: $3x^3+18x^2+27x$.

ANSWER _____

APPLY IT Show your work

1 A school club makes a rectangular photo backdrop for a concert. Its area is x^2+6x+8 square feet, and one side is $x+2$ feet. Factor the area expression to find the length of the other side.

WORK SPACE

ANSWER _____

2 A student has $6x$ short videos and $9x$ photos from a school event, where x is a positive whole number. They want to make the greatest possible number of identical posts, using every video and photo. Factor $6x+9x$ to find the number of posts and how many videos and photos go in each post.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student claims that $4x^3+4x^2-24x=4x(x+2)(x-3)$. Is the claim correct? If not, give the correct complete factorization and explain the error.

WORK SPACE AND ANSWER

ANSWER KEY

Factor It Out

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Factor completely: $6x+18$.	**$6(x+3)$**
2	Factor completely: $14x^2-21x$.	**$7x(2x-3)$**
3	Factor completely: x^2+7x+6.	**$(x+1)(x+6)$**
4	Factor completely: x^2-x-6.	**$(x-3)(x+2)$**
5	Factor completely: $x^2-9x+14$.	**$(x-7)(x-2)$**
6	Factor completely: $3x^3+18x^2+27x$.	**$3x(x+3)(x+3)$**

PART 2 · APPLY IT

1. **$x^2+6x+8=(x+2)(x+4)$, so the other side is $x+4$ feet.** Find two integers that multiply to 8 and add to 6. The factors are $x+2$ and $x+4$, so the missing side is $x+4$ feet.
2. **$6x+9x=3x(2+3)$. The student can make 3x posts, each with 2 videos and 3 photos.** The greatest common factor of $6x$ and $9x$ is $3x$. Dividing each amount by $3x$ gives 2 videos and 3 photos per post.

CHALLENGE

No. The correct factorization is $4x(x+3)(x-2)$. After taking out $4x$, the quadratic is x^2+x-6, but $(x+2)(x-3)$ gives x^2-x-6.

Accept factors in either order and equivalent notation such as $3x(x+3)^2$ for practice problem 6. In the challenge, the explanation should identify the incorrect sign of the x term.