LESSON MAKER PRO

Factor to Find

Use factors to reveal dimensions and break-even points.

HIGH SCHOOL · FA.A.33

FA.A.33 "Factor polynomials using the greatest common factor and factor quadratics that have only rational zeros."

NAME _____ DATE _____

FACTOR COMPLETELY

First take out the greatest common factor, including x if every term has it. Then factor the remaining quadratic into binomials. Multiply your factors to check that they give the original expression.

WORKED EXAMPLE

Factor $15x^2 + 60x + 45$ completely.

1. Take out the greatest common factor: $15(x^2 + 4x + 3)$.
2. Find two numbers that multiply to 3 and add to 4: 1 and 3.
3. Factor the quadratic: $15(x + 1)(x + 3)$.

Answer: 15(x + 1)(x + 3)

PRACTICE 6 problems

1 Factor $12x^2 + 18x$ completely.

ANSWER _____

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

ANSWER _____

3 Factor $x^2 - 7x - 18$ completely.

ANSWER _____

4 Factor $6x^2 + 17x + 12$ completely.

ANSWER _____

5 Factor $8x^2 - 32x + 32$ completely.

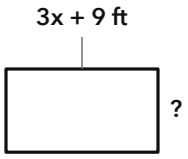
ANSWER _____

6 Factor $9x^2 - 25$ completely.

ANSWER _____

APPLY IT Show your work

1 A student designs the rectangular backdrop shown for a school performance. Its area is $6x^2 + 42x + 72$ square feet. Factor the area expression completely, then find the unknown side length in terms of x.



ANSWER _____

2 A school club sells x merch bundles at a price of (18 - 2x) dollars per bundle. The club pays a $36 setup cost. Its profit is P(x) = x(18 - 2x) - 36 dollars. Factor P(x) completely and find both bundle counts at which the club breaks even.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Factor $18x^3 - 72x^2 + 70x$ completely. Then find every zero of the polynomial.

WORK SPACE AND ANSWER

Factor to Find

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Factor $12x^2 + 18x$ completely.	**6x(2x + 3)**
2	Factor $x^2 + 9x + 20$ completely.	**(x + 4)(x + 5)**
3	Factor $x^2 - 7x - 18$ completely.	**(x - 9)(x + 2)**
4	Factor $6x^2 + 17x + 12$ completely.	**(3x + 4)(2x + 3)**
5	Factor $8x^2 - 32x + 32$ completely.	**8(x - 2)(x - 2)**
6	Factor $9x^2 - 25$ completely.	**(3x - 5)(3x + 5)**

PART 2 · APPLY IT

1. **Area: 6(x + 3)(x + 4) square feet. Unknown side: 2(x + 4) feet.** Factor the area as 6(x + 3)(x + 4). Divide by the given side, 3(x + 3), to get 2(x + 4) feet.
2. **P(x) = -2(x - 3)(x - 6); the club breaks even at 3 or 6 bundles.** Expand and factor $P(x) = -2x^2 + 18x - 36 = -2(x - 3)(x - 6)$. Set each factor equal to zero to find the break-even counts.

CHALLENGE

2x(3x - 5)(3x - 7); zeros: 0, 5/3, 7/3.

Accept factors in any order and equivalent fully factored forms, including $8(x - 2)^2$ for practice problem 5. For the word problems and challenge, require the requested values as well as the factorizations.