LESSON MAKER PRO

Power Factor Lab

Factor expressions with fractional exponents

HIGH SCHOOL · A3.N.7

A3.N.7 "Factor algebraic expressions containing fractional exponents."

NAME _____ DATE _____

FIND THE SHARED FACTOR

Assume $x > 0$. Find the greatest common factor of the coefficients and the smallest power of x shared by every term. Divide each term by that factor, then put the results in parentheses.

WORKED EXAMPLE

Factor $26x^{11/7} + 39x^{4/7}$.

1. The greatest common factor of 26 and 39 is 13, and the smaller power is $x^{4/7}$.
2. $26x^{11/7} \div 13x^{4/7} = 2x$.
3. $39x^{4/7} \div 13x^{4/7} = 3$.
4. Write the shared factor times the sum: $13x^{4/7}(2x + 3)$.

Answer: $13x^{4/7}(2x + 3)$

PRACTICE 6 problems

1 Factor $6x^{5/2} + 9x^{3/2}$.

ANSWER _____

2 Factor $12x^{7/4} - 18x^{3/4}$.

ANSWER _____

3 Factor $8x^{5/3} + 20x^{2/3}$.

ANSWER _____

4 Factor $15x^{9/4} - 10x^{5/4} + 25x^{1/4}$.

ANSWER _____

5 Factor $16x^{8/3} - 24x^{2/3}$.

ANSWER _____

6 Factor $9x^{13/6} - 27x^{1/6}$.

ANSWER _____

APPLY IT Show your work

1 A game studio estimates that rendering a scene takes $4x^{5/2}$ minutes for lighting and $6x^{3/2}$ minutes for textures, where x is a positive detail setting. Factor the total rendering time. Then find the total when x = 4.

WORK SPACE

ANSWER _____

2 A 3D printer uses $6x^{3/2}$ grams of filament for a phone stand and $10x^{1/2}$ grams for a cable clip, where x is a positive size setting. Factor the total filament used. Then find the total when x = 9.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Factor completely: $18x^{9/4} - 72x^{1/4}$.

WORK SPACE AND ANSWER

Power Factor Lab

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Factor $6x^{5/2} + 9x^{3/2}$.	**$3x^{3/2}(2x + 3)$**
2	Factor $12x^{7/4} - 18x^{3/4}$.	**$6x^{3/4}(2x - 3)$**
3	Factor $8x^{5/3} + 20x^{2/3}$.	**$4x^{2/3}(2x + 5)$**
4	Factor $15x^{9/4} - 10x^{5/4} + 25x^{1/4}$.	**$5x^{1/4}(3x^2 - 2x + 5)$**
5	Factor $16x^{8/3} - 24x^{2/3}$.	**$8x^{2/3}(2x^2 - 3)$**
6	Factor $9x^{13/6} - 27x^{1/6}$.	**$9x^{1/6}(x^2 - 3)$**

PART 2 · APPLY IT

1. **$2x^{3/2}(2x + 3)$ minutes; 176 minutes when x = 4** Add and factor: $4x^{5/2} + 6x^{3/2} = 2x^{3/2}(2x + 3)$. At x = 4, the total is 4(32) + 6(8) = 128 + 48 = 176 minutes.
2. **$2x^{1/2}(3x + 5)$ grams; 192 grams when x = 9** Add and factor: $6x^{3/2} + 10x^{1/2} = 2x^{1/2}(3x + 5)$. At x = 9, the total is 6(27) + 10(3) = 162 + 30 = 192 grams.

CHALLENGE

$18x^{1/4}(x - 2)(x + 2)$

Accept equivalent factored forms in the practice and application items. For the challenge, require both the shared factor and the difference of squares to be factored.