

# Exponent Power Moves

*Rewrite exponential expressions into useful equivalent forms.*

**HIGH SCHOOL • AI-A.SSE.3.c**

**AI-A.SSE.3.c** "Use the properties of exponents to rewrite exponential expressions."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## EXPONENT RULES

When you multiply powers with the same base, add the exponents. When you divide powers with the same base, subtract the exponents. When a power is raised to a power, multiply the exponents, and distribute an outside exponent to every factor inside parentheses.

## WORKED EXAMPLE

Rewrite  $(7x^5)^6$  in simplest form.

1. Apply the power of a product:  $7^6(x^5)^6$ .
2. Multiply the exponents on  $x$ :  $7^6x^{30}$ .
3. Evaluate  $7^6$ :  $117649x^{30}$ .

**Answer:  $117649x^{30}$**

## PRACTICE 6 problems

**1** Rewrite  $x^{13} \cdot x^9$  as one power of  $x$ .

**ANSWER** \_\_\_\_\_

**2** Rewrite  $x^{28} / x^{17}$  as one power of  $x$ .

**ANSWER** \_\_\_\_\_

**3** Rewrite  $(x^{10})^2$  as one power of  $x$ .

**ANSWER** \_\_\_\_\_

**4** Rewrite  $(8x)^3$  in simplest form.

**ANSWER** \_\_\_\_\_

**5** Rewrite  $((1/8)x^2)^2$  in simplest form.

**ANSWER** \_\_\_\_\_

**6** Rewrite  $(x^{11})^4 / x^{15}$  as one power of  $x$ .

**ANSWER** \_\_\_\_\_

## APPLY IT Show your work

- 1** A game tournament models a player's bonus score by  $(10x^2)^4$  points, where  $x$  is the player's base skill multiplier. Rewrite the expression to show the numerical coefficient and one power of  $x$ .

WORK SPACE

ANSWER \_\_\_\_\_

- 2** A music-sharing app models the number of playlist shares after  $x$  promotion cycles as  $4^x \cdot 4^9$ . Rewrite the expression as one power of 4 to show the total exponent.

WORK SPACE

ANSWER \_\_\_\_\_

## CHALLENGE One step up

Rewrite  $((x^8)^3 \cdot x^{11}) / x^{17}$  as one power of  $x$ . Explain how you combined the exponents.

WORK SPACE AND ANSWER

## PART 1 • PRACTICE

| # | PROBLEM                                             | ANSWER      |
|---|-----------------------------------------------------|-------------|
| 1 | Rewrite $x^{13} \cdot x^9$ as one power of $x$ .    | $x^{22}$    |
| 2 | Rewrite $x^{28} / x^{17}$ as one power of $x$ .     | $x^{11}$    |
| 3 | Rewrite $(x^{10})^2$ as one power of $x$ .          | $x^{20}$    |
| 4 | Rewrite $(8x)^3$ in simplest form.                  | $512x^3$    |
| 5 | Rewrite $((1/8)x^2)^2$ in simplest form.            | $(1/64)x^4$ |
| 6 | Rewrite $(x^{11})^4 / x^{15}$ as one power of $x$ . | $x^{29}$    |

## PART 2 • APPLY IT

1.  $10000x^8$  Apply the outside exponent to both factors. Compute  $10^4$  and multiply 2 by 4.
2.  $4^x + 9$  The factors have the same base, so add their exponents:  $x + 9$ .

## CHALLENGE

$x^{18}$ ;  $(x^8)^3 = x^{24}$ , then  $24 + 11 - 17 = 18$ .

Accept any algebraically equivalent form that follows the exponent rules. For the challenge, students should state that exponents are multiplied for a power of a power, added when multiplying like bases, and subtracted when dividing like bases.