

4.6

Applying the Exponent Laws

Lesson 7

Connect

Exponents Laws

Recall the exponent laws for integers bases and whole number exponents

Product of powers: $a^m \cdot a^n = a^{m+n}$

Quotient of powers: $a^m \div a^n = a^{m-n}, a \neq 0$

Power of a power: $(a^m)^n = a^{mn}$

Power of a product: $(ab)^m = a^m b^m$

Power of a quotient: $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$

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Connect

Simplify as Single Power

Product
of Powers

$2^3 \cdot 2^5$

2^{3+5}

2^8

Quotient
of Powers

$\frac{3^7}{3^4}$

3^{7-4}

3^3

Power
of Powers

$(4^2)^3$

$4^{2 \cdot 3}$

4^6

Connect

Simplify as Single Power

Product
of Product

$(2 \cdot 3)^4$

$2^4 \cdot 3^4$

Power
of Quotient

$\left(\frac{4}{5}\right)^2$

$\frac{4^2}{5^2}$

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Connect	Express as a Single Power
<p>Example 1:</p> $0.3^{-3} \times 0.3^5$ $0.3^{(-3)+(5)}$ <hr style="width: 50%; margin: 10px auto;"/> $\frac{1}{0.3^3} \cdot \frac{0.3^5}{1}$ $\frac{0.3^5}{0.3^3} = \boxed{0.3^2}$	<p>Laws to Remember</p> <p>Product of powers: $a^m \cdot a^n = a^{m+n}$ Quotient of powers: $a^m \div a^n = a^{m-n}, a \neq 0$ Power of a power: $(a^m)^n = a^{mn}$ Power of a product: $(ab)^m = a^m b^m$ Power of a quotient: $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$</p> <p>Sometimes you need to do more than 1 law to find the answer</p>

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Connect	Express as a Single Power
<p>Example 2:</p> $\left[\left(-\frac{3}{2}\right)^{-4}\right]^2 \cdot \left[\left(-\frac{3}{2}\right)^{-2}\right]^3$ $\left(-\frac{3}{2}\right)^{-8} \left(-\frac{3}{2}\right)^{-6}$ $\left(-\frac{3}{2}\right)^{-8+6}$ $\left(-\frac{3}{2}\right)^{-2} = \boxed{\left(-\frac{2}{3}\right)^2}$	<p>Laws to Remember</p> <p>Product of powers: $a^m \cdot a^n = a^{m+n}$ Quotient of powers: $a^m \div a^n = a^{m-n}, a \neq 0$ Power of a power: $(a^m)^n = a^{mn}$ Power of a product: $(ab)^m = a^m b^m$ Power of a quotient: $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$</p> <p>Sometimes you need to do more than 1 law to find the answer</p> <p><i>Putting answer with a positive exponent.</i></p>

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Connect	Express as a Single Power
<p>Example 3:</p> $\frac{(1.4^3)(1.4^4)}{1.4^2}$ $= \frac{(1.4)^{3+4}}{(1.4)^2}$ $= \frac{(1.4)^7}{(1.4)^2}$ $= (1.4)^{7-2}$ $= \boxed{(1.4)^5}$	<p>Laws to Remember</p> <p>Product of powers: $a^m \cdot a^n = a^{m+n}$ Quotient of powers: $a^m \div a^n = a^{m-n}, a \neq 0$ Power of a power: $(a^m)^n = a^{mn}$ Power of a product: $(ab)^m = a^m b^m$ Power of a quotient: $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$</p> <p>Sometimes you need to do more than 1 law to find the answer</p>

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Connect	YOU TRY!
<p>$0.8^2 \times 0.8^{-7}$</p> 0.8^{-5} $\frac{1}{0.8^5}$ $\left(\frac{1}{0.8}\right)^5$	<p>$\left[\left(-\frac{4}{5}\right)^2\right]^3 \cdot \left[\left(-\frac{4}{5}\right)^4\right]^{-5}$</p> $\left(-\frac{4}{5}\right)^{-6} \left(-\frac{4}{5}\right)^{-20}$ $\left(-\frac{4}{5}\right)^{-26}$ $\frac{1}{\left(\frac{5}{4}\right)^{26}}$

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Connect **Express as a Single Power**

Example 4:

$$(x^3y^2)(x^2y^{-4})$$

$$x^3 \cdot x^2 \cdot y^2 \cdot y^{-4}$$

$$x^5 y^{-2}$$

$$\frac{x^5}{1} \cdot \frac{1}{y^2}$$

$$\boxed{\frac{x^5}{y^2}}$$

Laws to Remember

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Sometimes you need to do more than 1 law to find the answer

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Connect **Express as a Single Power**

Example 5:

$$\frac{10a^5b^3}{2a^2b^{-2}}$$

$$\boxed{5a^3b^5}$$

$$b^3 - (-2)$$

$$b^3 + 2$$

$$b^5$$

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Sometimes you need to do more than 1 law to find the answer

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Connect **Express as a Single Power**

Example 5:

$$\frac{21a^4b^3c^{-6}}{7a^{-3}b^4c^{-2}}$$

$$= \frac{3a^4a^3c^2}{bc^6}$$

$$= \boxed{\frac{3a^7}{bc^4}} \cdot 3a^2b^{-1}c^{-4}$$

$$\frac{3a^7}{bc^4}$$

Laws to Remember

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Practice **HOMEWORK!**

Textbook Questions:

Page 241 # 3,4,5,6
 Page 242 # 7,8,9,10

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