Slide 1

Lesson 8

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Slide 2

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: $\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m},\ b \neq 0$

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Slide 3

Product of Powers	Quotient of Powers	Power of Powers
$a^3 \cdot a^8$	$\dfrac{b^8}{b^3}$	$\left(c^3\right)^4$
a^{3+8}	b^{8-3}	$c^{3\cdot 4}$
$\boxed{a^{11}}$	$\boxed{b^5}$	$\boxed{c^{12}}$

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Slide 4

Product of Product	Power of Quotient
$(ab)^5$	$\left(\dfrac{b}{c}\right)^3$
$a^5 b^5$	$\dfrac{b^3}{c^3}$

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Slide 1 — Example 1

Connect — Express as a Single Power

Example 1:

$(x^4)(x^5)$

x^9

$\dfrac{n^6}{n^2}$

n^4

Laws to Remember

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

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

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Slide 2 — Example 2

Connect — Express as a Single Power

Example 2:

$\left(n^2\right)^3$

n^6

$\left(\dfrac{x^2}{y^2}\right)^{-3}$

$\dfrac{x^{-6}}{y^{-6}} = \dfrac{y^6}{x^6}$

Laws to Remember

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: $\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m}, b \neq 0$

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Slide 3 — Example 3

Connect — Express as a Single Power

Example 3:

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

$\left(\dfrac{1}{4x^2 y^3}\right)^3$

$\dfrac{1}{4^3 x^6 y^9}$

$\dfrac{1}{64 x^6 y^9}$

$4^{-3} x^{-6} y^{-9}$

Laws to Remember

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: $\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m}, b \neq 0$

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Slide 4 — Example 4

Connect — Express as a Single Power

Example 4:

$\left(x^{\frac{3}{2}} y^2\right)\left(x^{\frac{1}{2}} y^{-1}\right)$

$x^{\frac{4}{2}} y^1$

$x^2 y$

Laws to Remember

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: $(a^m)^n = a^{mn}$
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Sometimes you need to do more than 1 law to find the answer

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Example 5:

$$\frac{4a^{-2}b^{\frac{2}{3}}}{2a^2b^{\frac{1}{3}}}$$

$$\frac{2\,b^{\frac{1}{3}}}{a^2a^2}$$

$$= \frac{2b^{\frac{1}{3}}}{a^4} \longrightarrow \frac{2\sqrt[3]{b}}{a^4}$$

Laws to Remember

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

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

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Example 6:

$$\left(\frac{100a}{25a^5b^{\frac{1}{2}}}\right)^{\frac{1}{2}}$$

$16^{\frac{1}{4}}$ $\sqrt[4]{16}$

$$\left(\frac{4b^{\frac{1}{2}}}{a^4}\right)^{\frac{1}{2}} \quad \sqrt{2}$$

$$\frac{4^{\frac{1}{2}}b^{\frac{1}{4}}}{a^{\frac{4}{2}}}$$

$$= \frac{\sqrt{4}\,b^{\frac{1}{4}}}{a^2} \longrightarrow \boxed{\frac{2\sqrt[4]{b}}{a^2}}$$

Laws to Remember

Product of powers: $a^m \cdot a^n = a^{m+n}$
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Sometimes you need to do more than 1 law to find the answer

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$\frac{4}{1} \cdot \frac{3}{2} = \frac{12}{2} = 6$

$$(25a^4b^2)^{\frac{3}{2}}$$

$\frac{2}{1} \cdot \frac{3}{2} \qquad \frac{6}{2} = 3$

$$25^{\frac{3}{2}}a^6b^3$$

$$(\sqrt[2]{25})^3 a^6 b^3$$

$$5^3 a^6 b^3$$

$$\boxed{125a^6b^3}$$

$$\left(x^3y^{-\frac{3}{2}}\right)\left(x^{-1}y^{\frac{1}{2}}\right)$$

$$x^2 y^{-\frac{2}{2}} \longrightarrow -\frac{3}{2}+\frac{1}{2} = -\frac{2}{2}$$

$$x^2 y^{-1} = x^2 \cdot \frac{1}{y^1}$$

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

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$$\frac{12x^{-5}y^{\frac{1}{2}}}{3x^2y^{-\frac{1}{2}}}$$

$$4x^{-5-2}\,y^{\frac{1}{2}-(-\frac{1}{2})}$$

$$4x^{-\frac{11}{2}}y^{\frac{2}{2}}$$

$$\frac{4y}{x^{\frac{11}{2}}} = \boxed{\frac{4y}{\sqrt{x^{11}}}}$$

$$\left(\frac{50x^2y^4}{2x^4y^7}\right)^{\frac{1}{2}}$$

$$\left(\frac{25}{x^2y^3}\right)^{\frac{1}{2}}$$

$$\frac{25^{\frac{1}{2}}}{x\,y^{\frac{3}{2}}} = \frac{\sqrt{25}}{x\sqrt[2]{y^3}}$$

$$= \boxed{\frac{5}{x\sqrt{y^3}}}$$

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HOMEWORK!

Textbook Questions:

Page 242 # 11, 14,15,16
Page 243 # 21,22

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