

Curriculum Outcome

(N1) Demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by: representing repeated multiplication using powers; using patterns to show that a power with an exponent of zero is equal to one; solving problems involving powers.

(N2) Demonstrate an understanding of operations on powers with integral bases (excluding base 0) and whole number exponents.

Student Friendly:

"Laws of exponents : Reviewing all laws"



Without using
notes fill in

1) Zero Rule

$$(-x)^0 = \underline{1}$$

2) Product of Powers Rule

$$(a)^3 \times (a)^4 = \underline{a^7}$$

3) Quotient Rule

$$(a)^8 \div (a)^3 = \underline{a^5}$$

4) Power to a Power Rule

$$(a^6)^5 = \underline{a^{30}}$$

5) Power of Product Rule

$$[(a^2) \times (b^4)]^6 = \underline{a^{12} \times b^{24}}$$

6) Power of Quotient Rule

With a power of quotient we multiply exponents

$$\left[\frac{(x)^6}{(y)^3} \right]^2 = \frac{x^{12}}{y^6}$$



Use your rules to simplify the following:

$$\left[\frac{(r)^8 \times (r)^6}{(r)^3 \times (r)^9} \right] + \left[\frac{(-y)^7 \times (-y)^5}{(-y)^2 \times (-y)^6} \right] + \left[\frac{r^6}{y^4} \right]^0$$

$$\left[\frac{r^{14}}{r^{12}} \right] + \left[\frac{(-y)^{12}}{(-y)^8} \right] + 1$$

$$r^2 + (-y)^4 + 1$$

LET'S
TRY!

$$\begin{aligned} 1) (2x^2y)^5 &= 2^5 x^{10}y^5 \\ &= 32 x^{10}y^5 \end{aligned}$$

$$2) \frac{15x^3y^4}{5xy} = 3x^2y^3$$

$$\begin{aligned} 3) \frac{(3x^3y^2)^6}{(2xy)^4} &= \frac{3^6 x^{18}y^{12}}{2^4 x^4y^4} \\ &= \frac{729 x^{14}y^8}{16} \end{aligned}$$



$$\frac{(4x^2y^3)^3 (2xy^2)^2}{(2x^2y^3)^3}$$

Top:

$$= (4^3 x^6 y^9) (2^2 x^2 y^4)$$

$$= (64 x^6 y^9) (4 x^2 y^4)$$

$$= 256 x^8 y^{13}$$

Bottom:

$$= 2^3 x^6 y^9$$

$$= 8 x^6 y^9$$

$$= \frac{256 x^8 y^{13}}{8 x^6 y^9}$$

$$= 32 x^2 y^4$$

A graphic with the words "LET'S TRY!" in a bold, bubbly, yellow font with a blue and pink outline, set against a white background.

$$(3x^3y^0)^2 \cdot (2xy^4)$$

$$= (3^2x^6y^0) (2xy^4)$$

$$= (9x^6y^0) (2xy^4)$$

$$= 18x^7y^4$$

A graphic with the words "LET'S TRY!" in a bold, bubbly, yellow font with a blue and pink outline, set against a white background.

$$\frac{(4x^5y^2)^2}{(2x^2y)^3}$$

$$= \frac{4^2 x^{10} y^4}{2^3 x^6 y^3}$$

$$= \frac{16 x^4 y}{8}$$

$$= 2 x^4 y$$

A graphic with the text "LET'S TRY!" in a bold, bubbly, yellow font with a blue and pink outline, set against a white background.

$$\frac{x^6}{x^8}$$

$$= x^{-2}$$

Negative Exponent Law

If you have a negative exponent move it to the denominator

Example: $x^{-2} = \frac{1}{x^2}$

Example:

a) $3rx^{-5} = \frac{3r}{x^5}$

b) $2x^{-5}y^6 = \frac{2y^6}{x^5}$

**LET'S
TRY!**

$$\frac{(2x^3) \cdot (3x^5y)}{(2x^2y^3)^2}$$

Top:

$$(2x^3)(3x^5y)$$

$$6x^8y$$

Bottom:

$$(2x^2y^3)^2$$

$$2^2x^4y^6$$

$$4x^4y^6$$

$$\frac{6x^8y}{4x^4y^6} = \frac{3x^4y^{-5}}{2} = \frac{3x^4}{2y^5}$$



Class/Homework

Worksheet 1

Worksheet 2

Worksheet 3 (Optional)

Worksheet 1:

Math 9B (Sem 1)

Name _____

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Laws of Exponents Intro

Date _____ Per _____

Simplify. Your answer should contain only positive exponents.

1) $2b^4 \cdot b^3$

2) $4n^3 \cdot 4n^4$

3) $3m \cdot 3m^4$

4) $4x^4 \cdot 3x^3$

5) $b^4b^2 \cdot 3b^0$

6) xx^3

7) $4p^0 \cdot 3p^3 \cdot p^2$

8) $2b^2 \cdot 3b^2$

9) x^3

10) $(2k^3)^3$

11) $(3x)^4$

12) $(4n^0)^2$

13) $(a^3)^3$

14) $(2n^2)^3$

15) $(p^0)^2$

16) $(3r^4)^4$

17) $\frac{v^2}{4v^4}$

18) $\frac{6x^3}{3x^0}$

19) $\frac{4x^0}{5x^0}$

20) $\frac{6n}{3n^2}$

21) $\frac{3n^4}{n^2}$

22) $\frac{x^5}{3x^4}$

23) $\frac{6v^5}{v^3}$

24) $\frac{6p}{p^6}$

Worksheet 2:

Math 9B (Sem 1)

Name _____

ID: 1

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Intro to Laws of Exponents

Date _____ Period _____

Simplify. Your answer should contain only positive exponents.

1) $x^2 \cdot 3x$

2) $v^4 \cdot 2v^2$

3) $3x^2 \cdot 2x$

4) $x^3 \cdot 3x^4$

5) $(2n^4)^0$

6) $(3a^2)^2$

7) $(p^2)^4$

8) $(4n^0)^0$

9) $\frac{4k^3}{k}$

10) $\frac{x^4}{2x^3}$

11) $\frac{3x^4}{2x^3}$

12) $\frac{3a^4}{a^4}$

13) $(n^2)^2 \cdot n^4$

14) $2n^3 \cdot n^3$

15) $(m^0 \cdot (2m)^4)^2$

16) $n^3 n^2 \cdot (2n^4)^3$

17) $(2x^3)^2 \cdot x^4 \cdot 2x^3$

18) $(2x^3)^2 \cdot x \cdot 2x$

19) $\frac{b}{2b^4 \cdot 2b^2}$

20) $\frac{3n}{4n^4 \cdot 4n^3}$

21) $\frac{4x^4 \cdot 3x^3}{4x^2 \cdot x}$

22) $\frac{x^2 x^3}{x^4}$

23) $\frac{3x^2}{2x^4 \cdot 4x^2}$

24) $\frac{mn^4}{3n^3}$

25) $\frac{2x^2}{(2x^4)^4}$

26) $\left(\frac{n^2}{n}\right)^3$

27) $\frac{(2m^2)^3}{m^4}$

28) $\frac{2m}{(m^3)^0}$

29) $\frac{2x^3}{x^0}$

30) $\frac{n^4}{n^3}$

31) $\left(\frac{2x^3 \cdot 2x^0}{2x^3}\right)^2$

32) $\frac{n^4 \cdot 2n^4}{(2n^0)^3}$

33) $\frac{(b^4)^2}{b^3 \cdot b}$

34) $\frac{x^4}{(2x^4 \cdot x)^4}$

35) $\left(\frac{(n^4)^3}{n^3 \cdot 2n^2}\right)^0$

36) $\frac{(2k^3)^3}{2k^2 \cdot 2k^2}$

Worksheet 3:

Math 9B (Sem 1)

Name _____ ID: 1

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Intro to Laws of Exponents 2

Date _____ Period _____

Simplify. Your answer should contain only positive exponents.

1) $3u^0v^2 \cdot v$

2) $v^3 \cdot 2v^3$

3) $4y^0 \cdot x^2$

4) $4x^2y^4 \cdot x^3y^2 \cdot 2yx^2$

5) $(4x^2y^3)^3$

6) $(4ba^3)^2$

7) $(2u^3)^2$

8) $(2m^4n^0)^2$

9) $\frac{2u^2}{4u^2v^2}$

10) $\frac{3x^2y^0}{4x^2y^3}$

11) $\frac{4yx^3}{4yx^2}$

12) $\frac{vu^4}{4u^3}$

13) $(2x^3y^0)^2 \cdot 2y^3$

14) $(m^0)^2 \cdot 2m^3n^2$

15) $((2xy)^0 \cdot 2x^2y^2)^3$

16) $(nm^3)^4 \cdot m^4n^2$

17) $x^2y^4 \cdot 2x^2y^3 \cdot (x^4)^4$

18) $(2m^3)^4 \cdot 2n^0$

19) $\frac{2x^4}{4yx^2 \cdot x^2y^2}$

20) $\frac{m}{2m^0n^2 \cdot 2m^3}$

21) $\frac{4ba^3 \cdot ab^2}{3a^4}$

22) $\frac{3xy^4 \cdot x^2}{2xy^3}$

23) $\frac{x^4y^4}{2xy \cdot 4yx^3}$

24) $\frac{yx^4}{4xy^0}$