

Laws of Exponents

Lesson 1

Law 1: Product Rule

$$x^a x^b = x^{a+b}$$

Click on the link below for a video on the product rule.

https://youtu.be/-TpiL4J_yUA

When the video is finished, please return to the PowerPoint presentation.

Some Practice Problems

- Simplify fully:

1. $z^3 z^9$

4. $(4x^2)(5x)$

2. $7b^3 b^4$

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

3. $(6x^5)(3x)$

6. $7xyz(2x^2y)(3y^9 z^6)$

Answers to Practice Problems

1. z^{12}

4. $20x^3$

2. $7b^7$

5. $24x^3y^2$

3. $18x^6$

6. $42x^3y^{11}z^7$

Law 2: Quotient Rule

$$\frac{x^a}{x^b} = x^{a-b}$$

Click on the link below for a video on the quotient rule.

<https://youtu.be/tvj42WdKIH4>

When the video is finished, please return to the PowerPoint presentation.

Some Practice Problems

- Simplify fully:

$$1. \frac{x^8}{x^5}$$

$$4. \frac{4x^3y^{16}}{5x^2y^5}$$

$$2. \frac{21y^7}{7y^4}$$

$$5. \frac{24x^2y^3(2x^8)}{6xy^2}$$

$$3. \frac{a^6b^9}{a^2b(ab^3)}$$

$$6. \frac{9a^7b(3a^6b^2)}{18a^5b^3}$$

Answers to Practice Problems

1. x^3

2. $3y^3$

3. a^3b^5

4. $\frac{4xy^{11}}{5}$

5. $8x^9y$

6. $\frac{3a^8}{2}$

Law 3: Power Rule

$$(x^a)^b = x^{ab}$$

Click on the link below for a video on the power rule.

<https://youtu.be/Of8ezQj1hRk>

When the video is finished, please return to the PowerPoint presentation.

Some Practice Problems

- Simplify fully:

1. $(x^3)^5$

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

2. $(5z^7)^3$

5. $\frac{7(x^4)^3}{(3x^2)^2}$

3. $3(2a^3)^4$

6. $5(2x^4y^7)^3(x^3y^5)^2$

Answers to Practice Problems

1. x^{15}

4. $108x^{17}y^{10}$

2. $125z^{21}$

5. $\frac{7x^8}{9}$

3. $48a^{12}$

6. $40x^{18}y^{31}$

Summary of Rules Learned

- Product Rule: $x^a x^b = x^{a+b}$

- Quotient Rule: $\frac{x^a}{x^b} = x^{a-b}$

- Power Rule: $(x^a)^b = x^{ab}$

A Worked Example

$$\frac{25(a^3)^3b^2}{5a^2b(b^2)}$$

Click on the link below for a video on this worked example.

<https://youtu.be/X6zD3SoN3iY>

When the video is finished, please return to the PowerPoint presentation.

Last Batch of Practice Problems

- Simplify fully:
 1. $(x^2)^3(x^3)^4$
 2. $\frac{35x^7y^8}{7(xy^2)^3}$
 3. $\frac{(3xyz)^4x^5y^2}{9x^2y^2z}$
 4. $\frac{5x^2y(3xy)^2}{20xy}$
 5. $5(3a^2b)^3(2ab^3)$
 6. $\frac{(2x^3y^4)^5(3x^2y^7)^2}{6x^5y^{15}}$

Answers to Practice Problems

1. x^{18}

4. $\frac{9x^3y^2}{4}$

2. $5x^4y^2$

5. $270a^7b^6$

3. $9x^7y^4z^3$

6. $48x^{14}y^{19}$