



## 4.1 Multiplication of Exponents

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### Need To Know



- Recall exponents
- The idea of exponent properties
- Apply exponent properties



## Exponents

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Exponents mean repeated multiplication.

$$4^3 \qquad \left(-\frac{2}{3}\right)^2$$

$$-2^4 \qquad (-2)^4$$



## Exponent Properties - Multiply

Use the pattern to discover the property.

Simplify:

$$5^2 \cdot 5^6$$

$$x^3 \cdot x^7$$

Exponent Properties

1)



## Exponent –Division of Same Base

Use the pattern to discover the property.

Simplify:

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

$$\frac{x^{11}}{x^5}$$

Exponent Properties

1)  $a^r \cdot a^s = a^{r+s}$

2)

## Exponent – Zero Power

Look at the pattern and draw a conclusion.

$3^4$	
$3^3$	
$3^2$	
$3^1$	

### Exponent Properties

1)  $a^r \cdot a^s = a^{r+s}$

2)  $\frac{a^r}{a^s} = a^{r-s}$

3)

## Exponent - Power on Power

Use the pattern to discover the property.

Simplify:

$(3^2)^4$

$(x^3)^5$

### Exponent Properties

1)  $a^r \cdot a^s = a^{r+s}$

2)  $\frac{a^r}{a^s} = a^{r-s}$

3)  $a^0 = 1$ , for all  $a$  except 0.

4)

## Exponent – Power on Product

Use the pattern to discover the property.

Simplify:

$$(2b)^3$$

$$(xy)^5$$

Exponent Properties

$$1) a^r \cdot a^s = a^{r+s}$$

$$2) \frac{a^r}{a^s} = a^{r-s}$$

$$3) a^0 = 1, \text{ for all } a \text{ except } 0.$$

$$4) (a^m)^n = a^{mn}$$

$$5)$$

## Exponent – Power on Fractions

Use the pattern to discover the property.

Simplify:

$$\left(\frac{2}{3}\right)^4$$

$$\left(\frac{a}{z}\right)^2$$

Exponent Properties

$$1) a^m \cdot a^n = a^{m+n}$$

$$2) \frac{a^r}{a^s} = a^{r-s}$$

$$3) a^0 = 1, \text{ for all } a \text{ except } 0.$$

$$4) (a^m)^n = a^{mn}$$

$$5) (ab)^n = a^n b^n$$

$$6) \left(\frac{a}{b}\right)^r = \frac{a^r}{b^r}$$

Hand out worksheet