

# **Section 2.4**

# **Exponent Laws I**

Write each expression as a product [Repeated multiplication] and then evaluate:

*Single Power*

$$1) 3^2 \times 3^2 \quad (3 \times 3) \times (3 \times 3) = 81 \quad 3^4$$

$$3 \times 3 \times 3 \times 3$$

$$2) 2^2 \times 2^5 \quad (2 \times 2) \times (2 \times 2 \times 2 \times 2 \times 2) = 128 \quad 2^7$$

$$3) (-5)^2 \times (-5)^4 = 15625$$

$$(-5 \times -5) \times (-5 \times -5 \times -5 \times -5)$$

$$(-5)^6$$

Do you notice anything???



## Exponent Law for a Product of Powers

To multiply powers with the same base, add the exponents.

$$a^m \times a^n = a^{m+n}$$

\* \* must be the same base \* \*

$$3^4 \times 3^3 = 3^{4+3}$$

$$3^7$$

single power

## Warm-Up

## October 22, 2015

1. Write as a single power.
2. Evaluate

1)  $7^2 \times 7^4$

$$7^{2+4}$$

$$7^6$$

$$117649$$

single power  
Evaluate

2)  $(-2)^5 \times (-2)^3$

$$(-2)^{5+3}$$

$$(-2)^8$$

$$256$$

3)  $4^5 \times 4^1$

$$4^{5+1}$$

$$4^6$$

$$4096$$

Write as a repeated multiplication

1)  $\frac{2^6}{2^2} = \frac{\cancel{2} \times \cancel{2} \times 2 \times 2 \times 2 \times 2}{\cancel{2} \times \cancel{2}} = 2^4$  Single Power

2)  $\frac{7^6}{7^4} = \frac{\cancel{7} \times \cancel{7} \times \cancel{7} \times \cancel{7} \times 7 \times 7}{\cancel{7} \times \cancel{7} \times \cancel{7} \times \cancel{7}} = 7^2$

Express as a single power.

$$\frac{(-5)^7}{(-5)^3} = (-5)^{7-3} = (-5)^4$$

## Exponent Law for a Quotient of Powers

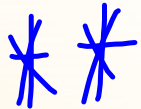
← division



To divide powers with the same base, subtract the exponents.

$$a^m \div a^n = a^{m-n}$$

**The base must be the same!**



Express as a **single power** then **evaluate**

a)  $\frac{5^8}{5^2} = 5^{8-2} = 5^6$  (single power)  
 Evaluate: 15625

b)  $\frac{(-2)^3}{(-2)^0} = (-2)^{3-0} = (-2)^3$   
 Evaluate: -8

c)  $8^7 \div 8^4 = 8^{7-4} = 8^3$   
 Evaluate: 512

Write as a repeated multiplication

$$\frac{3^2}{3^2}$$

Express as a single power.

$$a) 3^2 \times 3^4 \div 3^3 = 3^{2+4-3}$$
$$3^3$$

$$b) (-4)^8 \div (-4)^3 \times (-4)^2 = (-4)^{8-3+2}$$
$$(-4)^7$$



Express as a single power:

1.  $3^4 \times 3^6 \div 3^2$

$$3^{4+6-2}$$
$$3^8$$

2.  $\frac{3^8 \times 3^9 \times 3^1}{3^4 \times 3^2}$

$$\frac{3^{8+9+1}}{3^{4+2}}$$

$$\frac{3^{18}}{3^6} = 3^{12}$$

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## Questions 4-9

#4.  
a)  $5^5 \times 5^4$   
 $5^{5+4}$   
 $5^9$

#5.a)  $4^5 \div 4^3$   
 $4^{5-3}$   
 $4^2$