



# Warm Up

Express each as a radical then evaluate:

$$a) (216)^{\frac{2}{3}} = \left( \sqrt[3]{216} \right)^2$$

$\swarrow$  radicand  
 $\searrow$  index  
 $= (6)^2$   
 $= 36$

$$b) (1024)^{\frac{3}{5}} = \left( \sqrt[5]{1024} \right)^3$$

$(4)^3$   
 $64$

Express each as a power:

$$a) \sqrt[4]{625} = 625^{\frac{1}{4}}$$

$$= 5$$

$$b) \left( \sqrt[5]{32} \right)^7 = 32^{\frac{7}{5}}$$

Express each in simplest radical form: (Entire  $\rightarrow$  Mixed)

$$a) \sqrt{405} = \frac{\sqrt{81 \times 5}}{\sqrt{81 \times 5}}$$

$$= 9\sqrt{5}$$

$$b) \sqrt[3]{500} = \frac{\sqrt[3]{125 \times 4}}{\sqrt[3]{125 \times 4}}$$

$$= 5\sqrt[3]{4}$$

Write the radical for the power and evaluate: (Use calculator but show work)

$$a) 64^{\frac{2}{3}}$$

$$= \left( \sqrt[3]{64} \right)^2$$

$$= (4)^2$$

$$= 16$$

$$b) 7776^{\frac{3}{5}} = \left( \sqrt[5]{7776} \right)^3$$

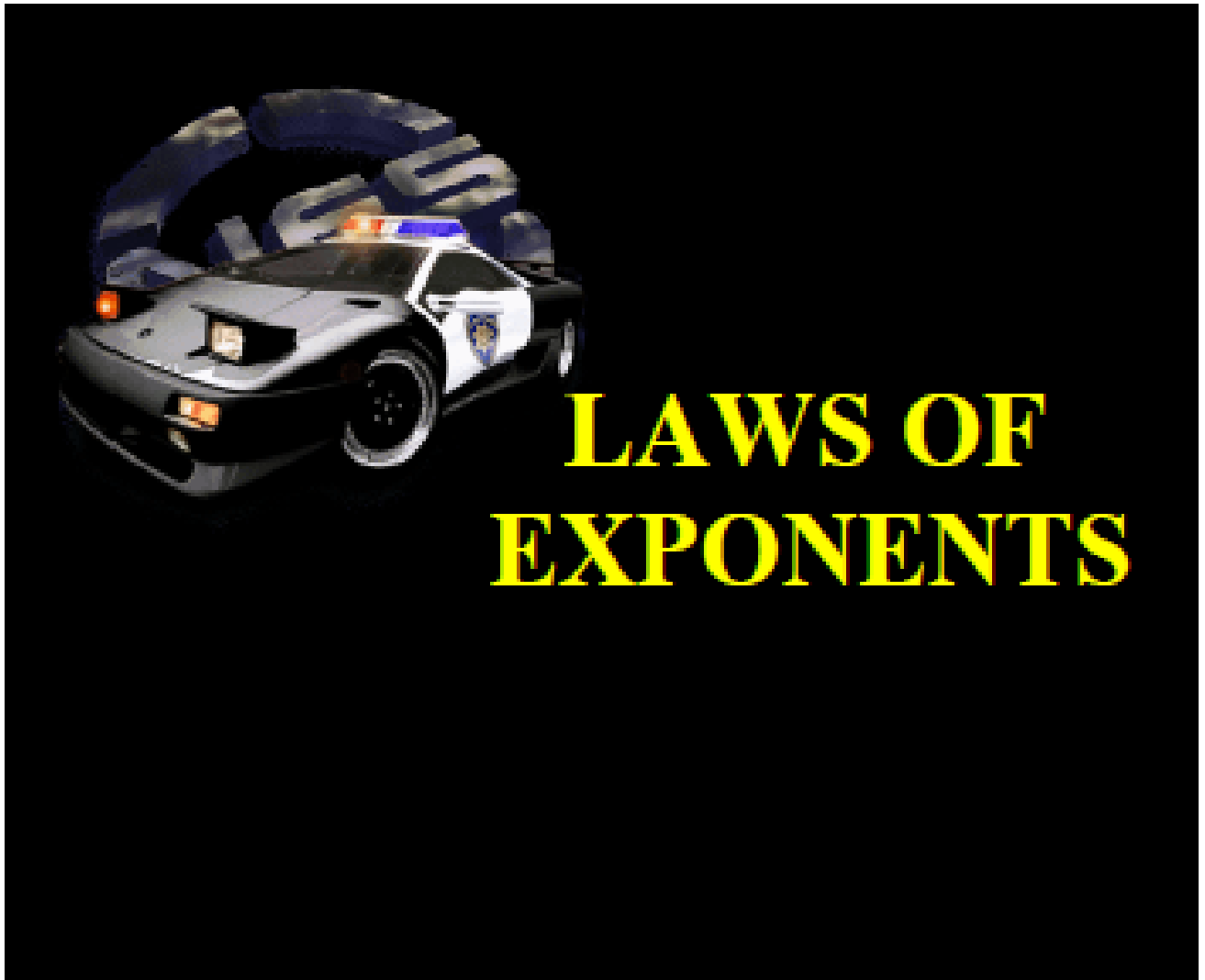
$$= (6)^3$$

$$= 216$$

Any Homework Questions?

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3(adf), 4(acd), 5(abc), 6ac), 8a,b,c, 9, 12  
(a,b,c), 15



## Laws Of Exponents



### Law #1: Product Rule

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

- when multiplying powers with the same base you add the exponents

Exercise:

Simplify the following using the laws of exponents

a)  $3^2 \times 3^4$

$$3^{2+4}$$

$$3^6$$

b)  $4^3 \times 3^4$

↑ ↑  
Base  
are  
diff  
so  
leave

c)  $(q^7)(q)$

$$q^{7+1}$$

$$q^8$$

d)  $p \times p^3 \times p^2$

$$p^{1+3+2}$$

$$p^6$$

e)  $(2x^3)(4x^2)$

$$2 \cdot 4 \cdot x^3 \cdot x^2$$

$$8 x^{3+2}$$

$$8 x^5$$

f)  $(3z^3)(6z^{12})$

$$3 \cdot 6 \cdot z^3 \cdot z^{12}$$

$$\underline{18} z^{3+12}$$

$$18 z^{15}$$

## Law #2: Quotient Rule

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

- when dividing powers with the same base you subtract the exponents

Exercise:

Simplify the following using exponent laws

a)  $5^{23} \div 5^{12}$

$$5^{23-12}$$

$$5^{11}$$

b)  $\frac{x^{34}}{x^{19}} = x^{34-19}$   
 $= x^{15}$

c)  $c^3 \div e^2$

↑  
diff base  
so leave

d)  $\frac{12x^3}{4x}$

$$= \frac{12}{4} x^{3-1}$$

$$3x^2$$

e)  $\frac{25c^{30}}{5c^{23}} = \frac{25}{5} c^{30-23}$

$$5c^7$$

### Law #3: Power Rule

when raising a power to another power...MULTIPLY the exponents."

$$(b^m)^n = b^{mn}$$

### Law #4: Power of Product

when a product is raised to a power, each of the factors are raised to the power."

$$(ab)^m = a^m b^m$$

- when brackets are involved you must multiply the exponents

Exercise:

Simplify the following using Laws of Exponents

a)  $(m^3)^4$

$$m^{3 \times 4}$$

$$m^{12}$$

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

$$x^{2 \times 3} \cdot y^{4 \times 3}$$

$$x^6 \cdot y^{12}$$

c)  $(2d^3)^3$

$$2^3 \cdot d^{3 \times 3}$$

$$8 d^9$$

d)  $(2m^2 n)^2 (m^3 n^2)$

$$2^2 m^{4 \times 2} n^{1 \times 2} \cdot (m^3 n^2)$$

$$4 m^8 n^2 \cdot m^3 n^2$$

$$4 m^8 m^3 n^2 n^2$$

$$4 m^{8+3} n^{2+2}$$

$$4 m^{11} n^4$$

***Law #5: Power of Quotient Rule***

when a quotient is raised to a power, both the divisor and the dividend are raised to the power."

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

***Law #6: Zero Rule***

$$b^0 = 1$$

- any power raised to the exponent 0 (zero) is equal to 1

# Homework: Worksheet Review of Laws of exponents





## Attachments

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grade\_10\_nrf\_worksheet\_exponent\_laws\_assignment\_1\_pdf.pdf