Warm Up

Express each as a radical then evaluate:

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

$= (6)^2$

$= 36$

b) $(1024)^{\frac{3}{5}}$

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

$= (4)^3$

$= 64$

Express each as a power:

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

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

$32^{\frac{7}{5}}$

Express each in simplest radical form:

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

$= \sqrt{81} \times \sqrt{5}$

$= 9\sqrt{5}$

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

$= \sqrt[3]{125}\ \sqrt[3]{4}$

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

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

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

$= \sqrt[3]{64}^2$

$= 4^2$

$= 16$

b) $7776^{\frac{3}{5}}$

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

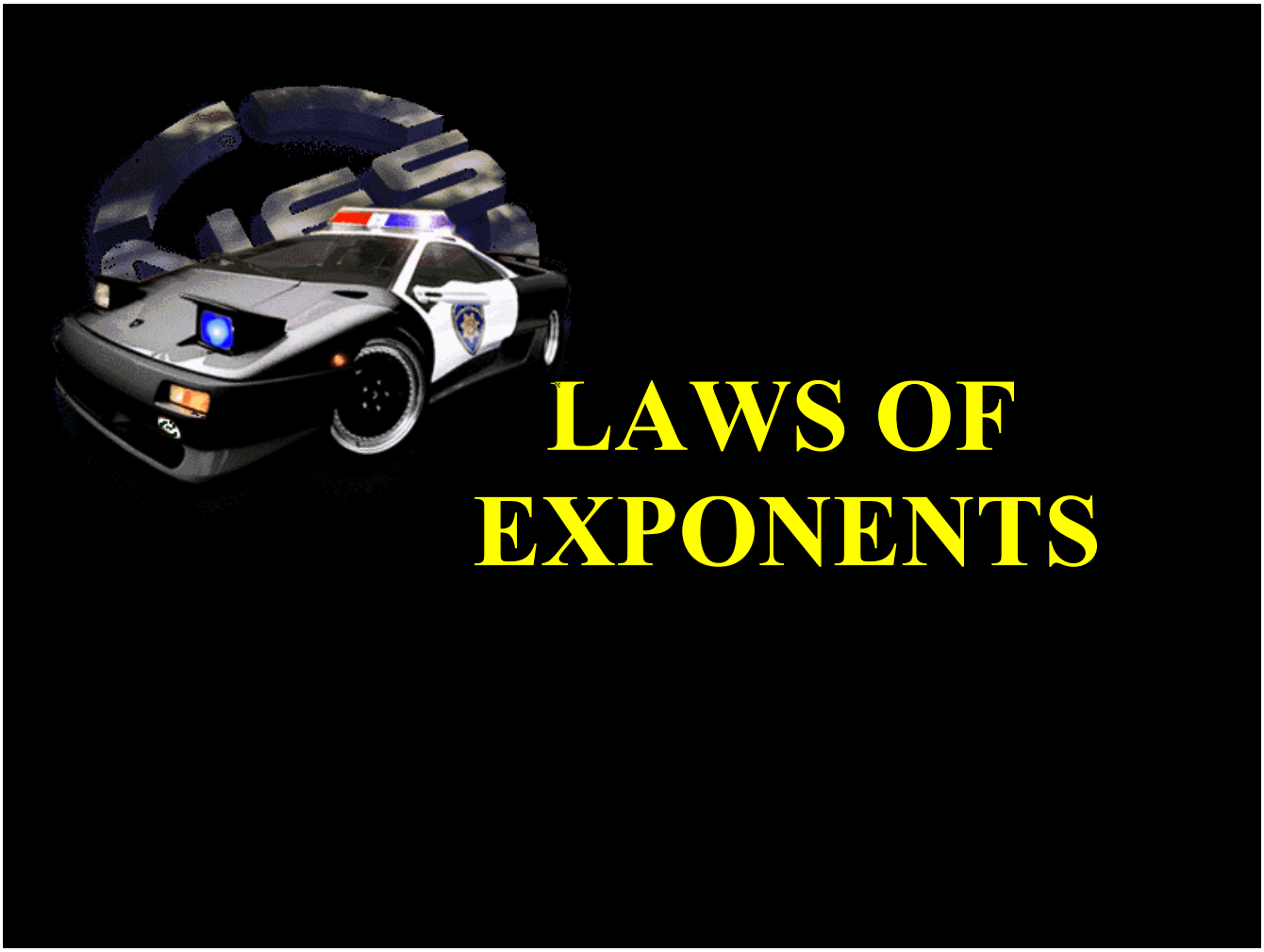
$(6)^3$

216

Any Homework Questions?

page 227

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


LAWS OF
EXPONENTS

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) $3^2 \times 3^4$

$= 3^{2+4}$

$= 3^6$

$= 729$

b) $4^3 \times 3^4$ Not same base

64×81

5184

c) $(q^7)(q)$ understood 1

q^{7+1}

q^8

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

p^{1+3+2}

p^6

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

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

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

$8x^5$

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

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

add exponent

$18\, z^{15}$

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) $\dfrac{x^{34}}{x^{19}}$ $= x^{34-19}$

$= x^{15}$

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

Not like bases so Leave

d) $\dfrac{12x^3}{4x}$ ← Subtract exponents on like bases

$3x^2$

e) $\dfrac{25c^{30}}{5c^{23}}$

$5c^7$

Law #3: Power Rule

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

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

$(n^7)^3 = n^{21}$

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

$(2n^3y^2)^5 = 2^5 n^{15} y^{10}$

$= 32\, n^{15} y^{10}$

Exercise:

Simplify the following using Laws of Exponents

a) $(m^3)^4$

m^{12}

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

$x^6 y^{12}$

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

$= 2^3 d^9$

$= 8d^9$

d) $(2m^4n)^2(m^3n^2)$

$= 2^2 m^8 n^2 (m^3 n^2)$

$= 4\, m^8 m^3 n^2 n^2$

multiply like bases so add exponents

$= 4\, m^{11} n^4$

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

1 to 10 on Worksheet

1) $2v^4 \cdot 3u^4v^3 \cdot 3u^2v^2$

$2 \cdot 3 \cdot 3 \; v^4v^3v^2 \; u^4u^2$

$18 \; v^9 \; u^6$

3) $2x^2(2yx^3)^2$

$2x^2 \; 2^2y^2x^6$

$2 \cdot 2^2 \; x^2 \; y^2 \; x^6$

$8 \; x^8y^2$

5) $\dfrac{3m^{-1}n^2}{m^{-3}n^{-1}}$

watch sign

$3 \; m^{-1--3} \; n^{2--1}$

$3 \; m^{-1+3} \; n^{2+1}$

$3 \; m^2 \; n^3$

Attachments

grade_10_nrf_worksheet_exponent_laws_assignment_1_pdf.pdf