

### 3.3 – Exponent Laws Worksheet #1

MPM1D

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SOLUTIONS

1. Write each expression as a single power and then evaluate.

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

$$= 7^6$$

$$= 117\ 649$$

b)  $3^5 \times 3^3$

$$= 3^8$$

$$= 6561$$

c)  $5 \times 5^2$

$$= 5^3$$

$$= 125$$

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

$$= 3^9$$

$$= 19\ 683$$

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

$$= (-2)^5$$

$$= -32$$

f)  $(-1)^3 \times (-1)^2 \times (-1)$

$$= (-1)^6$$

$$= 1$$

g)  $0.5^3 \times 0.5^2$

$$= 0.5^5$$

$$= 0.03125$$

h)  $\left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right)^3$

$$= \left(\frac{1}{2}\right)^4$$

$$= \frac{1}{16}$$

2. Write each expression as a single power and then evaluate.

a)  $8^6 + 8^4$

$$= 8^2$$

$$= 64$$

b)  $5^5 + 5^3$

$$= 5^2$$

$$= 25$$

c)  $7^7 + 7^2$

$$= 7^5$$

$$= 16807$$

d)  $4^8 + 4^5 + 4$

$$= 4^3 \div 4^1$$

$$= 4^2$$

$$= 16$$

e)  $(-9)^7 + (-9)^6$

$$= (-9)^1$$

$$= -9$$

f)  $0.1^6 + 0.1^4$

$$= 0.1^2$$

$$= 0.01$$

g)  $(-0.3)^4 + (-0.3)$

$$= (-0.3)^3$$

$$= -0.027$$

h)  $\left(\frac{2}{3}\right)^5 + \left(\frac{2}{3}\right)^3$

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

$$= \frac{4}{9}$$

3. Write each expression as a single power and then evaluate.

$$\begin{aligned} \text{a) } (2^2)^4 &= 2^8 \\ &= 256 \end{aligned}$$

$$\begin{aligned} \text{b) } (6^2)^2 &= 6^4 \\ &= 1296 \end{aligned}$$

$$\begin{aligned} \text{c) } (3^3)^2 &= 3^6 \\ &= 729 \end{aligned}$$

$$\begin{aligned} \text{d) } [(-2)^4]^3 &= (-2)^{12} \\ &= 4096 \end{aligned}$$

$$\begin{aligned} \text{e) } [(-1)^8]^6 &= (-1)^{48} \\ &= 1 \end{aligned}$$

$$\begin{aligned} \text{f) } [(-1)^5]^7 &= (-1)^{35} \\ &= -1 \end{aligned}$$

$$\begin{aligned} \text{g) } (0.3^2)^2 &= 0.3^4 \\ &= 0.0081 \end{aligned}$$

$$\begin{aligned} \text{h) } \left[ \left( \frac{2}{5} \right)^2 \right]^2 &= \left( \frac{2}{5} \right)^4 \\ &= \frac{16}{625} \end{aligned}$$

4. Use the exponent laws to simplify each expression. Then, evaluate.

$$\begin{aligned} \text{a) } 4^3 \times 4^4 \div 4^5 &= 4^7 \div 4^5 \\ &= 4^2 \\ &= 16 \end{aligned}$$

$$\begin{aligned} \text{b) } 8^7 \div 8^7 \times 8 &= 8^0 \times 8^1 \\ &= 8^1 \\ &= 8 \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{9^6 \times 9^3}{9^7} &= \frac{9^9}{9^7} \\ &= 9^2 \end{aligned}$$

$$\begin{aligned} \text{d) } \frac{6^5 \times 6^2}{6 \times 6^3} &= \frac{6^7}{6^4} \\ &= 6^3 \\ &= 216 \end{aligned}$$

$$\begin{aligned} \text{e) } (2^4)^2 \times 2^3 &= 2^8 \times 2^3 \\ &= 2^{11} \\ &= 2048 \end{aligned}$$

$$\begin{aligned} \text{f) } \frac{(3^2)^4 \times 3^3}{3^8} &= \frac{3^8 \times 3^3}{3^8} \\ &= \frac{3^{11}}{3^8} \\ &= 3^3 \end{aligned}$$

$$\begin{aligned} \text{g)} \quad & 0.2^6 \times 0.2^5 + (0.2^2)^5 \\ & = 0.2^{11} \div 0.2^{10} \\ & = 0.2^1 \\ & = 0.2 \end{aligned}$$

$$\begin{aligned} \text{h)} \quad & [(-4)^3]^4 \div [(-4)^2]^5 \\ & = (-4)^{12} \div (-4)^{10} \\ & = (-4)^2 \\ & = 16 \end{aligned}$$

5. Simplify.

$$\begin{aligned} \text{a)} \quad & b^5 \times b^3 \\ & = b^8 \end{aligned}$$

$$\begin{aligned} \text{b)} \quad & p^4 \times p^1 \\ & = p^5 \end{aligned}$$

$$\begin{aligned} \text{c)} \quad & w^5 + w^2 \\ & = w^3 \end{aligned}$$

$$\begin{aligned} \text{d)} \quad & x^8 + x^4 \\ & = x^4 \end{aligned}$$

$$\begin{aligned} \text{e)} \quad & (m^5)^2 \\ & = m^{10} \end{aligned}$$

$$\begin{aligned} \text{f)} \quad & (k^2)^3 \times k^2 \\ & = k^6 \times k^2 \\ & = k^8 \end{aligned}$$

$$\begin{aligned} \text{g)} \quad & g^5 \times g^5 + g^7 \\ & = g^{10} \div g^7 \\ & = g^3 \end{aligned}$$

$$\begin{aligned} \text{h)} \quad & (a^6)^3 \div (a^5)^2 \\ & = a^{18} \div a^{10} \\ & = a^8 \end{aligned}$$

5. Simplify

$$\begin{aligned} \text{a)} \quad & 4x^3 \cdot 2x^3 \\ & = 4(2)(x^3)(x^3) \\ & = 8x^6 \end{aligned}$$

$$\begin{aligned} \text{b)} \quad & \frac{8x^{10}}{6x^2} \\ & = \frac{4x^8}{3} \end{aligned}$$

$$\begin{aligned} \text{c)} \quad & (3y^2)^3 \\ & = (3)^3 (y^2)^3 \\ & = 27y^6 \end{aligned}$$

$$\begin{aligned} \text{d)} \quad & \frac{(x^2)^4 \cdot 3x^5}{6x^{10}} = \frac{x^8 \cdot 3x^5}{6x^{10}} = \frac{3x^{13}}{6x^{10}} = \frac{1x^3}{2} = \frac{x^3}{2} \end{aligned}$$

## Answers

1. a)  $7^6 = 117\,649$   
b)  $3^8 = 6561$   
c)  $5^3 = 125$   
d)  $3^9 = 19\,683$   
e)  $(-2)^5 = -32$   
f)  $(-1)^6 = 1$   
g)  $0.5^3 = 0.031\,25$   
h)  $\left(\frac{1}{2}\right)^4 = \frac{1}{16}$

2. a)  $8^2 = 64$   
b)  $5^2 = 25$   
c)  $7^5 = 16\,807$   
d)  $4^2 = 16$   
e)  $(-9)^1 = -9$   
f)  $0.1^2 = 0.01$   
g)  $(-0.3)^3 = -0.027$   
h)  $\left(\frac{2}{3}\right)^2 = \frac{4}{9}$

3. a)  $2^8 = 256$   
b)  $6^4 = 1296$   
c)  $3^6 = 729$   
d)  $(-2)^{12} = 4096$   
e)  $(-1)^{48} = 1$   
f)  $(-1)^{35} = -1$   
g)  $0.3^4 = 0.0081$   
h)  $\left(\frac{2}{5}\right)^4 = \frac{16}{625}$

4. a)  $4^2 = 16$   
b)  $8^1 = 8$   
c)  $9^2 = 81$   
d)  $6^3 = 216$   
e)  $2^{11} = 2048$   
f)  $3^3 = 27$   
g)  $0.2^1 = 0.2$   
h)  $(-4)^2 = 16$

5. a)  $b^8$   
b)  $p^5$   
c)  $w^3$   
d)  $x^4$   
e)  $m^{10}$   
f)  $k^8$   
g)  $g^3$   
h)  $a^8$

6. a)  $8x^6$   
b)  $\frac{4x^8}{3}$   
c)  $27y^6$   
d)  $\frac{x^3}{2}$