

9D - 1.3 Exponent Laws part 1 and part 2

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Pg 126 # 1, 2, 3, 4, 9 ad
Pg 127 # 5, 6, 7, 8, 9, 10

2 a) $3^4 \times 3^7$
 $= 3^{4+7}$
 $= 3^{11}$
 $= 177147$

b) $2^4 \times 2 \times 2^3$
 $= 2^{4+1+3}$
 $= 2^8$
 $= 256$

c) $(-1)^5 \times (-1)^6$
 $= (-1)^{11}$
 $= -1$

d) $\left(\frac{2}{5}\right)^3 \times \left(\frac{2}{5}\right)^3$
 $= \left(\frac{2}{5}\right)^{3+3}$
 $= \left(\frac{2}{5}\right)^6$
 $= \frac{64}{15625}$

3 a) $11^7 \div 11^5 = 11^{7-5}$
 $= 11^2$

4 a) $12^8 \div 12^2$
 $= 12^{8-2}$
 $= 12^6$
 $= 2985984$

b) $(-6)^5 \div (-6)^2 \div (-6)^2$
 $= (-6)^{5-2-2}$
 $= (-6)^1$
 $= -6$

c) $\left(-\frac{3}{4}\right)^4 \div \left(-\frac{3}{4}\right)$
 $= \left(-\frac{3}{4}\right)^{4-1}$
 $= \left(-\frac{3}{4}\right)^3$
 $= -\frac{27}{64}$

d) $\frac{0.1^6 \div 0.1^4}{0.1^2}$
 $= \frac{0.1^{6-4}}{0.1^2}$
 $= \frac{0.1^2}{0.1^2}$
 $= 1$

9 a) $12 k^2 m^8 \div 4 km^5$
 $= 3 k^{2-1} m^{8-5}$
 $= 3 k^1 m^3$
 $= 3 km^3$

d) $\frac{4d^4 w^3 \times 6 dw^4}{3d^3 w \times 8 dw^2}$
 $= \frac{24 d^5 w^7}{24 d^4 w^3}$
 $= dw^4$

5. $(5^4)^8 = 5^{4 \times 8}$
 $= 5^{32}$

6. a) $(4^1)^8 = 4^{1 \times 8}$
 $= 4^8$

b) $[(-3)^3]^2 = (-3)^{3 \times 2}$
 $= (-3)^6$

c) $[(0.1)^4]^2 = (0.1)^{4 \times 2}$
 $= (0.1)^8$

d) $\left[\left(\frac{3}{2}\right)^3\right]^2 = \left(\frac{3}{2}\right)^{3 \times 2}$
 $= \left(\frac{3}{2}\right)^6$

7 a) $5^2 \times 5^3 \div 5^4$
 $= 5^{2+3-4}$
 $= 5^1$
 $= 5$

b) $3^7 \div 3^5 \times 3$
 $= 3^{7-5+1}$
 $= 3^3$

c) $\frac{(0.5^3)^4}{0.5^6 \times 0.5^4}$
 $= \frac{0.5^{12}}{0.5^{10}}$
 $= 0.5^2$

d) $(-2)^4 \times (-2)^5 \div [(-2)^3]^2$
 $= (-2)^4 \times (-2)^5 \div (-2)^6$
 $= (-2)^{9-6}$
 $= (-2)^3$
 $= -8$

8. a) $y^4 \times y^2 = y^{4+2}$
 $= y^6$

b) $m^2 \div m^5 = m^{2-5}$
 $= m^{-3}$
 $= \frac{1}{m^3}$

c) $k^2 \times k^3 \times k^5 = k^{2+3+5}$
 $= k^{10}$

d) $(c^3)^4 = c^{3 \times 4}$
 $= c^{12}$

$$8. a) y^4 \times y^2 = y^{4+2} = y^6 \quad b) m^2 \div m^5 = m^{2-5} = m^{-3} \quad c) k^2 \times k^3 \times k^5 = k^{2+3+5} = k^{10} \quad d) (c^3)^4 = c^{12}$$

$$e) a^2 b^2 \times a^3 b = a^{2+3} b^{2+1} = a^5 b^3 \quad f) (2uv^2)^3 = 2^3 u^3 v^6 \quad g) m^2 n \times mn^2 = m^{2+1} n^{1+2} = m^3 n^3 \quad h) h^2 h^3 \div ht = h^{2+3-1} t^{3-1} = h^4 t^2$$

$$i) (-a^3 b)^2 = -1^2 a^6 b^2 = a^6 b^2$$

$$9. a) 12k^2 m^3 \div 4km^5 = \frac{3k^2 m^3}{3km^5} = \frac{k^2 m^3}{km^5} = \frac{k m^{-2}}{m^3} = \frac{k}{m^5} \quad b) -8a^5 \times (2a^3)^2 = -8a^5 \times 4a^6 = -32a^{11} \quad c) (-x^2)^3 \times (3x^2)^2 = -1^3 x^6 \times 9x^4 = -9x^6 \times 9x^4 = -81x^{10}$$

$$d) \frac{4d^4 w^3 \times 6dw^4}{3d^3 w \times 8dw^2} = \frac{24d^5 w^7}{24d^4 w^3} = dw^4 \quad e) \frac{3f^4 g^3 \times 8fg^4}{(6f^2 g^3)^2} = \frac{24f^5 g^7}{36f^4 g^6} = \frac{2fg}{3} \quad f) (3a^2 b)^2 \div (ab)^2 = 9a^4 b^2 \div a^2 b^2 = 9a^2$$

$$g) \frac{5c^3 d \times 4c^2 d^2}{(2c^2 d)^2} = \frac{20c^5 d^3}{4c^4 d^2} = 5cd \quad h) \frac{(3xy^2)^3 \times (-4x^2 y)}{(2x^2 y^2)^2} = \frac{(27x^3 y^6) \times (-4x^2 y)}{4x^4 y^4} = \frac{-108x^5 y^7}{4x^4 y^4} = -27xy^3 \quad i) \frac{30g^2 h \times (2gh)^3}{5gh^2 \times 6gh} = \frac{30g^2 h \times 8g^3 h^3}{3gh^2 \times 6gh} = \frac{120g^5 h^4}{30g^2 h^3} = 40g^3$$

$$10. \frac{5xy^2 \times 2x^2 y}{2(xy)^2} = \frac{5(3)(-1)^2 \times 2(3)^2(-1)}{2(-3)^2} \quad \text{or} \quad \frac{10x^3 y^3}{2x^2 y^2} = \frac{10(3)^3(-1)^3}{2(3)^2(-1)^2} = \frac{15(-18)}{2(9)} = \frac{10(27)(-1)}{2(9)(1)} = \frac{-270}{18} = -15$$