

Feb. 13, 2018

Warmup

$$a) \frac{(2^3 x y^2)^4}{(2^2 x^2 y^2)^3}$$

$$= \frac{2^{12} x^4 y^8}{2^6 x^6 y^6}$$

$$= 2^{12-6} x^{4-6} y^{8-6}$$

$$= \boxed{2^6 x^{-2} y^2}$$

What does  $x^{-2}$  mean?

There are 2 more  $x$ 's  
in the denominator.

$$x^{-2} = \frac{1}{x^2} \rightarrow \frac{x^0}{x^2} = x^{-2}$$

$$2xy^{-3} = \frac{2x}{y^3}$$

$$b) \left[ \frac{2^5 x^8 y^9}{2^3 x^2 y^1} \right]^2$$

$$= \left[ 2^2 x^6 y^8 \right]^2$$

$$= \boxed{2^4 x^{12} y^{16}}$$

$$\begin{aligned} c) \quad & 2^5 2^7 2^8 \\ & = 2^{5+7+8} \\ & = \boxed{2^{20}} \end{aligned}$$

$$\begin{aligned} d) \quad & \frac{3^{18} X^{16}}{3^8 X^{10}} \\ & = 3^{18-8} X^{16-10} \\ & = \boxed{3^{10} X^6} \end{aligned}$$

$$e) (2^5 x^2 y^1)^3$$

$$= \boxed{2^{15} x^6 y^3}$$

$$f) 496382169^0 = 1$$

$$x^0 = 1$$

$$(-3.14)^0 = 1$$

$$\text{anything}^0 = 1$$

$$\boxed{36} \quad 5x^2y(2x^4y^{-3})$$

$$= 10x^6y^{-2}$$

$$= \boxed{\frac{10x^6}{y^2}}$$

37)  $\left( \frac{-7a^2b^3c^0}{3a^3b^4c^3} \right)^{-4}$

$$= \left[ \frac{-7a^{-1}b^{-1}c^{-3}}{3} \right]^{-4}$$

$$= \frac{(-7)^{-4} a^4 b^4 c^{12}}{3^{-4}}$$

$$= \frac{3^4 a^4 b^4 c^{12}}{(-7)^4}$$

$$f) \frac{3^{-2} x^{-3} y^2}{2^{-3} 2^{-2}}$$

$$= \frac{2^3 2^2 y^2}{3^2 x^3}$$



$$38) \left[ \frac{-2a^3b^2c^0}{3a^2b^3c^7} \right]^{-2}$$

$$= \left[ \frac{-2a^1b^{-1}c^{-7}}{3} \right]^{-2}$$

$$= \frac{(-2)^{-2} a^{-2} b^2 c^{14}}{3^{-2}}$$

$$= \frac{3^2 b^2 c^{14}}{(-2)^2 a^2}$$

$$g) \frac{4^2 a^2 b^3 c^4 a^3 4^3 b^4}{a^9 b^9 c^9}$$

$$= \frac{4^5 a^5 b^7 c^4}{a^9 b^9 c^9}$$

$$= 4^5 a^{-4} b^{-2} c^{-5}$$

$$= \boxed{\frac{4^5}{a^4 b^2 c^5}}$$

$$h) \frac{(2^3 x^1 y^2)^3 (2^4 x^2 y^1)^{-2}}{(2^3 x^3 y^4)^{-2}}$$

$$= \frac{2^9 x^3 y^6 \cdot 2^{-8} x^{-4} y^{-2}}{2^{-6} x^{-6} y^{-8}}$$

$$= \frac{2^{9+(-8)} x^{3+(-4)} y^{6+(-2)}}{2^{-6} x^{-6} y^{-8}}$$

$$= \frac{2^1 x^{-1} y^4}{2^{-6} x^{-6} y^{-8}}$$

$$= 2^{1-(-6)} x^{-1-(-6)} y^{4-(-8)}$$

$$= \boxed{2^7 x^5 y^{12}}$$

$$i) \frac{X^{1000} Y^{200} Z^{50} X^{50}}{\phantom{X^{1000} Y^{200} Z^{50} X^{50}}}$$

$$X^{300} Y^{200} Z^{100}$$

$$\therefore \frac{X^{1050} Y^{200} Z^{50}}{\phantom{X^{1050} Y^{200} Z^{50}}}$$

$$X^{300} Y^{200} Z^{100}$$

$$= X^{750} Y^0 Z^{-50}$$

$$\therefore \frac{X^{750} \cdot (1)}{Z^{50}}$$

$$\text{or } \frac{X^{750} Y^0}{Z^{-50}}$$

$$j) \left( \frac{(2^5 a^6 b^{-2} c^3)^3}{(2^{-4} a^2 b c^9)^2} \right)$$

$$= \frac{2^{15} a^{18} b^{-6} c^9}{2^{-8} a^4 b^2 c^{18}}$$

$$= 2^{23} a^{14} b^{-8} c^{-9}$$

$$= \frac{2^{23} a^{14}}{b^8 c^9}$$

$$= \frac{2^{23} a^{14}}{b^8 c^9}$$

$$\boxed{\frac{2^{23} a^{14}}{b^8 c^9}}$$

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