

RB Rational Exponents

Negative Exponents $a^{-n} = \frac{1}{a^n}$

Cross the line, change the sign

$$\frac{1}{a^{-n}} = a^n$$

$$\text{Ex 1 (a)} \quad 4^{-2} = \frac{1}{4^2} = \boxed{\frac{1}{16}}$$

$$\text{(b)} \quad -4^{-2} = -\frac{1}{4^2} = \boxed{-\frac{1}{16}}$$

$$\text{(c)} \quad \left(\frac{2}{5}\right)^{-3} = \left(\frac{5}{2}\right)^3 = \boxed{\frac{125}{8}}$$

$$\frac{2^{-3}}{5^{-3}} = \frac{5^3}{2^3}$$

$$\text{(d)} \quad (xy)^{-3} = \frac{1}{(xy)^3} = \boxed{\frac{1}{x^3 y^3}}$$

$$\text{(e)} \quad xy^{-3} = \boxed{\frac{x}{y^3}}$$

Quotient Rule

$$\frac{a^m}{a^n} = a^{m-n}$$

Day 1 (2)

Ex 2 (a) $\frac{12^5}{12^2} = 12^{5-2} = 12^3 = 1,728$

$$\frac{12 \quad 12 \cancel{/} \quad 12 \cancel{/} \quad 12 \quad 12}{12 \quad 12} = 12^3$$

(b) $\frac{a^5}{a^{-8}} = a^{5-(-8)} = a^{5+8} = a^{13}$

(c) $\frac{16m^{-9}}{12m^{11}} = \frac{4 \cdot \cancel{4}}{3 \cdot \cancel{4} m^{11-(-9)}} = \frac{4}{3 m^{20}}$

(d) $\frac{25r^7 z^5}{10r^9 z} = \frac{5 \cdot \cancel{5} z^{5-1}}{2 \cdot \cancel{8} r^{9-7}} = \frac{5 z^4}{2 r^2}$

Ex 3 (a) $(3x^{-2})(4^{-1}x^{-5})^2 = \frac{3 \cdot 4^{-2} x^{-10}}{x^2}$
 $= \frac{3}{x^2 \cdot 4^2 x^{10}} = \frac{3}{x^2 \cdot 16 x^{10}} = \boxed{\frac{3}{16 x^{12}}}$

(b) $\frac{12p^3q^{-1}}{8p^{-2}q} = \frac{4 \cdot 3 p^{3+2}}{4 \cdot 2 q^{1-1}} = \boxed{\frac{3p^5}{2q^2}}$

(c) $\frac{(3x^2)^{-1}(3x^5)^{-2}}{(3^{-1}x^{-2})^2} = \frac{1}{(3x^2)^1 (3x^5)^2 (3^{-2}x^{-4})}$
 $= \frac{\cancel{3^2} x^4}{3 x^2 \cancel{3^2} x^{10}} = \frac{x^4}{3 x^{12}} = \frac{1}{3 x^{12-4}}$
 $= \boxed{\frac{1}{3 x^8}}$