

$$11) 2m^2 \cdot 2m^3 = 4m^5$$

$$6) 2x^3y^{-3} \cdot 2x^{-1}y^3 = 4x^2y^0 = 4x^2(1) = 4x^2$$

$$12) (2x^2)^{-4} = 2^{-4}(x^2)^{-4} = \frac{2^{-4}x^{-8}}{1} = \frac{1}{2^4x^8} = \frac{1}{16x^8} \quad \left| \begin{array}{l} (ab)^n = a^n b^n \\ (b^m)^n = b^{mn} \end{array} \right.$$

$$16) (4xy)^{-1} = \frac{1}{4xy}$$

$$\text{OR, } 4^{-1}x^{-1}y^{-1} = \frac{1}{4} \cdot \frac{1}{x} \cdot \frac{1}{y} = \frac{1}{4xy}$$

$$26) \frac{2x^4y^{-4}z^{-3}}{3x^2y^{-3}z^4} = \frac{2x^4y^3}{3x^2y^4z^4z^3} = \frac{2x^2}{3yz^7}$$

$$\left| \frac{b^m}{b^n} = b^{m-n} \right.$$

$$27) \frac{4x^0y^{-2}z^3}{4x} = \frac{y^{-2}z^3}{x} = \frac{z^3}{xy^2}$$

$$\frac{11}{7} \frac{36x^3}{42x^2} = -\frac{6x}{7}$$

$$\frac{21}{16r^3} \frac{16r^2}{16r^3} = r^{-1} = \frac{1}{r}$$

Rational Expressions :

$$\begin{aligned} 7) \quad & \frac{2r-4}{r-2} \\ & = \frac{2(\cancel{r-2})}{(\cancel{r-2})} \\ & = 2 \end{aligned}$$

$$\begin{aligned} 8) \quad & \frac{45}{10a-10} \\ & = \frac{45^9}{\cancel{10}(a-1)} \\ & = \frac{9}{2(a-1)} \end{aligned}$$

$$\frac{\cancel{a.c}}{\cancel{b.c}} = \frac{a}{b}$$

To write a rational expression in lowest terms,

- Factor the numerator & denominator completely.
- Cancel out common factors that appears in both numerator & denominator.

$$\begin{aligned}
 9) \quad & \frac{x-4}{3x^2-12x} \\
 & = \frac{\cancel{x-4}}{3x(\cancel{x-4})} \\
 & = \frac{1}{3x}
 \end{aligned}$$

$$\begin{aligned}
 11) \quad & \frac{v-5}{v^2-10v+25} \\
 & = \frac{\cancel{v-5}}{(v-5)(\cancel{v-5})} \\
 & = \frac{1}{v-5}
 \end{aligned}$$

$$\begin{aligned}
 13) \quad & \frac{27}{27x+18} \\
 & = \frac{\cancel{27}^3}{\cancel{9}(3x+2)} \\
 & = \frac{3}{3x+2}
 \end{aligned}$$

$$\begin{aligned}
 22) \quad & \frac{x^3-x^2-42x}{2x^2-20x+42} \\
 & = \frac{x(x^2-x-42)}{2(x^2-10x+21)} \\
 & = \frac{x(\cancel{x-7})(x+6)}{2(\cancel{x-7})(x-3)} \\
 & = \frac{x(x+6)}{2(x-3)}
 \end{aligned}$$

$$\begin{aligned}
 & \frac{25 \mid x^2 + 2x - 80}{2x^3 - 24x^2 + 64x} \\
 &= \frac{(x+10)(x-8)}{2x(x^2 - 12x + 32)} \\
 &= \frac{(x+10)(x-8)}{2x(x-4)(x-8)} \\
 &= \frac{x+10}{2x(x-4)}
 \end{aligned}$$

Multiplying Rational Expressions

$$\frac{3 \frac{15}{12} \cdot \frac{3}{8}}{4} = \frac{3}{4}$$

- Factor all numerators & denominators completely.
- cancel only common factors that appears in both numerator & denominator.
- Then multiply numerators & then multiply denominators.
- check to make sure final answer is in lowest terms.

$$* \frac{3 \frac{15 \cancel{b}}{12 \cancel{a}} \cdot \frac{3 \cancel{c}}{8 \cancel{d}}}{4} = \frac{3}{4 \cancel{c}}$$

$$* \frac{b^2 c^4}{6c^4} \cdot \frac{8c^4}{5b^4} = \frac{4b^2}{15c^2}$$

$$* \frac{x+3}{4x-12} \cdot \frac{x^2-x-6}{x-2}$$

$$= \frac{x+3}{4(x-3)} \cdot \frac{(x-3)(x+2)}{x-2}$$

$$= \frac{(x+3)(x+2)}{4(x-2)}$$

Dividing Rational Expression

- keep the first fraction
- change the operation to multiplication
- Take the reciprocal of the second fraction.
(flip)

$$\frac{x^2-x-2}{x-3} \div \frac{4x-8}{x-1}$$

$$= \frac{(x-2)(x+1)}{x-3} \cdot \frac{x-1}{4(x-2)}$$

$$= \frac{(x+1)(x-1)}{4(x-3)}$$