

1.5 Simplifying Rational Expressions

Feb 9 HW

MCR 3U

$$1a) \frac{15a}{39a^{21}} = \frac{5}{13a}$$

$\overset{5}{\cancel{15}} \text{ b/c } 15 \div 3 = 5$
 $\underset{13}{\cancel{39}} \rightarrow \text{b/c } 39 \div 3 = 13$

$$1b) \frac{35y^2z}{14yz^2} = \frac{5y}{2z}$$

$\text{b/c } 35 \div 7 = 5$
 $\underset{2}{\cancel{14}} \text{ b/c } 14 \div 7 = 2$

9. Ratio of $\frac{\text{Volume}}{\text{SA}} = ?$

$$\begin{aligned} \text{Volume} &= l \cdot w \cdot h = (2x+4)(x+2)(4x+8) \\ &= 8(x+2)(x+2)(x+2) \\ &= 8(x+2)^3 \end{aligned}$$

$$\begin{aligned} \text{SA} &= 2(2x+4)(x+2) + 2(4x+8)(2x+4) + 2(4x+8)(x+2) \\ &= 4(x+2)^2 + 16(x+2)^2 + 8(x+2)^2 \\ &= 28(x+2)^2 \end{aligned}$$

$$\frac{V}{\text{SA}} = \frac{8(x+2)^3}{28(x+2)^2} = \frac{2(x+2)}{7}, \quad x \neq -2$$

$$3. a) \frac{4x-12}{5x-15} = \frac{4(x-3)}{5(x-3)} = \frac{4}{5}, \quad x \neq 3$$

$\overset{4}{\cancel{4x-12}}$
 $\underset{5}{\cancel{5x-15}}$

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$$\frac{(x+3)(x-6)}{(x+4)(x+5)} \div \frac{(x-6)(x+8)}{(x+4)(x-7)}$$

$$= \frac{(x+3) \cdot \cancel{(x-6)} \cdot \cancel{(x+4)} \cdot (x-7)}{(x+4) \cdot (x+5) \cdot \cancel{(x-6)} \cdot (x+8)}$$

$$= \frac{(x+3)(x-7)}{(x+5)(x+8)}$$

$$, x \neq 7, -4, -5$$

$$1d) \frac{-\cancel{1} a^{\cancel{2}} b^{\cancel{3}/2}}{\cancel{2} a^{\cancel{3}/2} b} = -\frac{b^2}{3a^3}, a \neq 0, b \neq 0$$

$$1f) \frac{5\cancel{1}b}{34a^{\cancel{3}/2}(a+3)} = \frac{51b}{34a^2(a+3)}, a \neq 0, a \neq -3$$

$$2.b) \frac{\cancel{x}(x+2)}{x^{\cancel{2}1}} = \frac{(x+2)}{x}, x \neq 0$$

$$2d) \frac{4a}{3a+a^2} = \frac{4\cancel{a}}{\cancel{a}(3+a)} = \frac{4}{3+a}, a \neq 0$$

$$3b) \frac{y+3y^2}{3y+1} = \frac{y(\cancel{3y+1})}{(\cancel{3y+1})} = \frac{y}{1} = y$$

$$3d) \frac{2x^2+2y}{5x^2+5y} = \frac{2(x^2+y)}{5(x^2+y)} = \frac{2}{5}, y \neq -x^2$$

$$\neq 5x^2+5y \neq 0$$

$$5y \neq -5x^2$$

$$y \neq -x^2$$

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$$\begin{aligned} 4b) \quad \frac{(x+3)(3-x)}{(x-3)(x-3)} &= \frac{(x+3) - \cancel{(x-3)}}{(x-3) \cancel{(x-3)}} = \frac{-1(x+3)}{(x-3)} \\ &= \frac{-(x+3)}{(x-3)}, \quad x \neq 3 \end{aligned}$$

$$\begin{aligned} 4d) \quad \frac{14b-21}{15-10b} &= \frac{7(2b-3)}{5(3-2b)} = \frac{\cancel{7(2b-3)}}{-5 \cancel{(2b-3)}} \\ &= -\frac{7}{5}, \quad b \neq \frac{3}{2} \end{aligned}$$

* $15 - 10b \neq 0$ (Restriction)

$$-10b \neq -15$$

$$b \neq \frac{-15}{-10} \div 5 \quad b \neq \frac{-3}{-2} \text{ or } \frac{3}{2}$$

$$\begin{aligned} 5b) \quad \frac{(a-3)}{a^2-7a+12} &\rightarrow a^2-7a+12 \rightarrow ac=12 \rightarrow -4 \times -3 \\ &= (a-4)(a-3) \quad b=-7 \leftarrow \text{yes} \\ &= \frac{\cancel{(a-3)}}{(a-4) \cancel{(a-3)}} \\ &= \frac{1}{(a-4)}, \quad a \neq 4; a \neq 3 \end{aligned}$$

$$\begin{aligned} 5d) \quad \frac{x^2-2x-15}{x^2-x-12} &= \frac{(x-5) \cancel{(x+3)}}{(x-4) \cancel{(x+3)}} = \frac{(x-5)}{(x-4)} \\ &= \frac{(x-5)}{(x-4)}, \quad x \neq 4, x \neq -3 \end{aligned}$$

$$6d) \frac{x+3}{x^2+8x+7} = \frac{(x+3)}{(x+7)(x+1)}$$

$$(x+7) \neq 0$$

$$x+1 \neq 0$$

$$x \neq -7$$

$$x \neq -1$$

$$\therefore x \neq -7, x \neq -1$$