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$$1 a) \frac{12m^2f}{8kf} \cdot \frac{15k}{4m} = \boxed{9m \quad c, f, m \neq 0}$$

$$b) \frac{3(a-b)(a-5)(a+5)}{(a-1)(a+5) \cdot \frac{15(a-b)}{5}} = \boxed{\frac{a-5}{5(a-1)} \quad a \neq 1, 5, b}$$

$$c) \frac{(y-7)(y+3)}{(2y-3)(2y+3)} \cdot \frac{4(2y+3)}{(y+3)(y-1)} = \boxed{\frac{4(y-7)}{(2y-3)(y-1)} \quad y \neq \frac{3}{2}, -\frac{3}{2}, 1, -3}$$

$$2 a) \frac{(d+10)(d-10)}{144 \cdot 4} \cdot \frac{36}{d+10} = \boxed{\frac{d-10}{4} \quad d \neq -10}$$

$$b) \frac{a+3}{a+1} \cdot \frac{(a-1)(a+1)}{(a+3)(a-3)} = \boxed{\frac{a-1}{a-3} \quad a \neq -1, 3, -3}$$

$$c) \frac{(2z-5)(2z+5)(z-4)}{(2z-5)(z-4) \cdot 2(2z+5)} = \boxed{\frac{1}{2} \quad z \neq 4, \pm \frac{5}{2}}$$

$$d) \frac{(2p-1)(p+3)(p+1)(p-1)(2p-3)}{(2p-3)(3)(2p-1)(p+3)(p-1)} = \boxed{\frac{p+1}{3} \quad p \neq \frac{1}{2}, \frac{3}{2}, -3, 1}$$

$$3. a) \frac{t}{2} \quad b) \frac{3}{2x-1} \quad c) \frac{3-y}{-8} \quad d) \frac{p-3}{2p-3}$$

or  $\frac{y-3}{8}$

$$4. a) s \neq 0 \quad t \neq 0 \quad b) \frac{r(r-7)}{(r+7)(r-7)} \cdot \frac{r+7}{3r^2} \quad r \neq \pm 7, 0$$

$$c) \frac{5}{n+1} \cdot \frac{(n+1)(n-1)}{10} \cdot \frac{1}{(n-1)} \quad n \neq 1, -1$$

$$5. \frac{2(x-3)}{x+3} \cdot \frac{x+3}{2} = \boxed{x-3 \quad x \neq -3}$$

$$6. \frac{y^2}{y^2-9} \cdot \frac{y-3}{y}$$

$$\frac{y^2}{(y+3)(y-3)} \cdot \frac{y-3}{y}$$

$$\boxed{\frac{y}{y+3} \quad y \neq 3, -3, 0}$$

$$7. a) \frac{3-p}{-1(3-p)} = -1$$

$$b) \frac{7k-1}{3k} \times \frac{1}{1-7k} - 1 = -\frac{1}{3k}$$

$$8a) \frac{(2w+3)(w-2)}{3(w+2)} \cdot \frac{w+2}{2w+3}$$

$$\boxed{\frac{w-2}{3} \quad w \neq -2, -3/2}$$

$$b) \frac{v-5}{v} \cdot \frac{v^3}{(v-5)(v+3)}$$

$$\boxed{\frac{v^2}{v+3} \quad v \neq 0, -3, 5}$$

$$c) \frac{(3x+1)(3x-1)}{x+5} \cdot \frac{2x}{(3x+1)(x-2)} - 1$$

$$\boxed{\frac{3x-1}{-(x+5)} \text{ or } \frac{1-3x}{x+5} \quad x \neq -5, 2, -1/3}$$

$$d) \frac{(4y-3)(2y+1)}{(y+1)(y-1)} \cdot \frac{2(y-1)}{(2y+1)(y-2)} \cdot \frac{y+1}{3-4y} (-1)$$

$$\boxed{\frac{-2}{y-2} \text{ or } \frac{2}{2-y} \quad y \neq 1, -1, -\frac{1}{2}, 2, \frac{3}{4}}$$

9. -3 and 2 are original denominators  
-1 ends up in denominator when you use reciprocal.

10. stack height = number of sheets  $\times$  thickness of sheet

$$\frac{n^2-4}{n+1} = n-2 \times \text{thickness}$$

$$\frac{(n+2)(n-2)}{n+1} \div n-2 = \text{thickness}$$

$$\frac{(n+2)(n-2)}{n+1} \cdot \frac{1}{n-2} = \text{thickness}$$

$$\boxed{\frac{n+2}{n+1} = \text{thickness} \quad n \neq -1, 2}$$

$$11. a) \frac{x-3}{5} \cdot 60 = 12(x-3) \quad \text{or } 12x - 36 \text{ meters.}$$

$$b) v = \frac{d}{t} = \frac{900}{\frac{600}{n+1}} = 900 \cdot \frac{n+1}{600} = 3 \frac{(n+1)}{2} \text{ or } \frac{3n+3}{2} \text{ Km}$$

$n \neq -1$

$$c) h = \frac{v}{xw} = \frac{x^2+2x+1}{(x+1)(2x-3)} \cdot \frac{(x+1)(x+1)}{(x+1)(2x-3)} \quad h = \frac{x+1}{2x-3} \text{ meters}$$

$x \neq -1, \frac{3}{2}$

$$12. \frac{3m+1}{m-1} \div \frac{3m+1}{(m+1)(m-1)} = \frac{3m+1}{m-1} \cdot \frac{(m+1)(m-1)}{3m+1} = m+1$$

$$\frac{3m+1}{(m+1)(m-1)} \div \frac{3m+1}{m-1} = \frac{3m+1}{(m+1)(m-1)} \cdot \frac{(m-1)}{3m+1} = \frac{1}{m+1}$$

they are reciprocals

$$\frac{a}{b} = \frac{1}{b/a}$$

$$13. 2 \text{ yds} \times \frac{36 \text{ in}}{\text{yd}} \times \frac{2.54 \text{ cm}}{\text{in}} = 182.88 \text{ cm}$$

14a) didn't use reciprocal of the correct term

$$b) \frac{(c+6)(c-6)}{2c} \cdot \frac{8c^2}{c+6} = 4c(c-6) \quad c \neq 0, -6$$

c) reciprocal answer (she did  $\frac{b}{a}$  instead of  $\frac{a}{b}$ )

$$15 L = \frac{A}{W} = \frac{(x+3)(x-3)}{(x+1)}$$

$$(x+3)(x-3) \cdot \frac{(x+1)}{(x-3)(x+1)} = x+3 \quad x \neq 3, -1$$

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$$16 \quad A = \frac{1}{2} b h = \frac{1}{2} \frac{(x-8)(x+1)(x+2)}{(x+2)(x-2)(x-8)} = \frac{x+1}{2(x-2)} \quad x \neq \pm 2, 8$$

$$17a) \quad K = \frac{P}{2m} \quad m = \frac{h}{w} \quad 2m = \frac{2h}{w} \quad K = P \div 2m$$

$$K = P \div \frac{2h}{w}$$

$$K = P \cdot \frac{w}{2h}$$

$$K = \frac{wp}{2h} \quad w, h \neq 0$$

$$b) \quad \gamma = \frac{2\pi}{d} \quad x = dr \quad d = \frac{x}{r}$$

$$\gamma = 2\pi \div d$$

$$\gamma = 2\pi \div \frac{x}{r} \quad \gamma = 2\pi \cdot \frac{r}{x}$$

$$\gamma = \frac{2\pi r}{x} \quad r, x \neq 0$$

$$c) \quad a = w^2 r \quad v = wr \quad r = \frac{v}{w}$$

$$a = w^2 \left( \frac{v}{w} \right)$$

$$a = vw, \quad w \neq 0$$

$$18. \quad \frac{V_1}{V_2} = \frac{T_1}{T_2} \quad V_1 = \frac{T_1 V_2}{T_2} \quad \frac{\frac{n-1}{3} \cdot \frac{(n+4)(n-4)}{n-1}}{\frac{n+4}{6}}$$

$$V_1 = \frac{(n+4)(n-4)}{3} \cdot \frac{6}{n+4}$$

$$V_1 = 2(n-4) \quad n \neq 1, \pm 4$$

$$19a) \quad (x+\sqrt{5})(x-\sqrt{5}) = x^2 - 5$$

$$b) \quad \frac{x+\sqrt{3}}{(x+\sqrt{3})(x-\sqrt{3})} \cdot \frac{(x-\sqrt{7})(x+\sqrt{7})}{x-\sqrt{7}} = \frac{x+\sqrt{7}}{x-\sqrt{3}} \quad x \neq \pm\sqrt{3}, \sqrt{7}$$

$$19c) \frac{(x+\sqrt{7})(x-\sqrt{7})}{x-\sqrt{7}} = x+\sqrt{7} \quad (\text{same as in part (b)})$$

$$20. h = \frac{(85)^2 \sin 52^\circ}{2(9.8)} \quad h = 290.5 \text{ m}$$

$$b) \frac{(x+3)(x+3)}{(x-5)(x-5)} \cdot \frac{1}{2} \cdot \frac{1}{2g} = \frac{(x+3)^2}{4g(x-5)^2}$$

$$23 \text{ a) } \tan B = \frac{b}{a}$$

$$b) \frac{\sin B}{\cos B} = \frac{b/c}{a/c} \quad \frac{b}{c} \cdot \frac{c}{a} \quad \frac{\sin B}{\cos B} = \frac{b}{a}$$

$$c) \text{ same } \therefore \tan B = \frac{\sin B}{\cos B}$$