6.1

8d) $\dfrac{10k^2+55k+75}{20k^2-10k-150}$

$\underline{5} \cdot \underline{6} = 30$

$\underline{5} + \underline{6} = 11$

$= \dfrac{5(2k^2+11k+15)}{10(2k^2-k-15)}$

$= (2k^2+5k)+(6k+15)$

$= k(2k+5)+3(2k+5)$

$= (2k+5)(k+3)$

$= \dfrac{5^1(2k+5)(k+3)}{10^2(2k+5)(k-3)}$

$2k+5 \ne 0 \qquad k-3 \ne 0$

$2k \ne -5 \qquad \boxed{k \ne 3}$

$\boxed{k \ne -\dfrac{5}{2}}$

$= \dfrac{k+3}{2(k-3)}$

6.2 8a), 2b), 7b), 2c)

2b) $\dfrac{a+3}{a+1} \times \dfrac{(a+1)(a-1)}{(a+3)(a-3)}$ $\qquad a \ne \pm3, -1$

2c) $\dfrac{(2z+5)(2z-5)}{(2z-5)(z-4)} \cdot \dfrac{z-4}{2(2z+5)} = \dfrac{1}{2}$ $\qquad \dfrac{3k}{3} \ne \dfrac{0}{3}$

$\boxed{k \ne 0}$

7b) $\dfrac{7k-1}{3k} \cdot \dfrac{1}{1-7k}$ $\qquad 1-7k = -7k+1$

$= -(7k-1)$

$= \dfrac{7k-1}{3k} \cdot \dfrac{1}{-(7k-1)} = -\dfrac{1}{3k}$ $\qquad \boxed{k \ne 0}\,\boxed{k = \frac{1}{7}}$

8a) $\dfrac{2w^2-w-6}{3w+6} \div \dfrac{2w+3}{w+2}$ $\longrightarrow \boxed{w \ne -2}$

$= \dfrac{(2w+3)(w-2)}{3(w+2)} \times \dfrac{w+2}{2w+3}$ $\longrightarrow 2w+3 \ne 0$

$2w \ne -3$

$\boxed{w \ne -\frac{3}{2}}$

$= \dfrac{w-2}{3}$

6.3 Adding and Subtracting Rational Expressions

* As with adding fractions, we need a common denominator

$$\frac{3}{5\times 3} + \frac{2}{3\times 5} \quad {}^{\times 3}\ {}^{\times 5}$$

ex. $\dfrac{3}{x+1} + \dfrac{5x}{2x+3}$

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

$$= \frac{(6x+9)+(5x^2+5x)}{(x+1)(2x+3)}$$

$$= \frac{5x^2+11x+9}{(x+1)(2x+3)} \longrightarrow$$

* restrictions

$x+1 \neq 0$

$\boxed{x \neq -1}$

$2x+3 \neq 0$

$2x \neq -3$

$\boxed{x \neq -\frac{3}{2}}$

* domain

$$\{x \in \mathbb{R} \mid x \neq -\tfrac{3}{2}, -1\}$$

check for factors : $9 \cdot 5 = 45$ $9 + 5 \neq 11$

not factorable

final answer

---

ex. $\dfrac{y^2-20}{y^2-4} + \dfrac{y-2}{y+2}$

$$= \frac{y^2-20}{(y+2)(y-2)} + \frac{y-2}{y+2}\cdot\frac{(y-2)}{(y-2)}$$

$$= \frac{y^2-20+(y^2-4y+4)}{(y+2)(y-2)}$$

$$= \frac{2y^2-4y-16}{(y+2)(y-2)}$$

$$= \frac{2(y^2-2y-8)}{(y+2)(y-2)} = \frac{2(y-4)(y+2)}{(y+2)(y-2)} = \boxed{\frac{2(y-4)}{y-2}}$$

* restrictions

$\boxed{y \neq \pm 2}$

* domain $\{x \in \mathbb{R} \mid x \neq \pm 2\}$

Note: we must be careful when subtracting negative rational expressions

ex. $\dfrac{3}{x+5} - \dfrac{(x-4)}{(x+5)}$

$$= \frac{3-(x-4)}{x+5}$$

$$= \frac{7-x}{x+5}$$

* restrictions

$\boxed{x \neq -5}$

* domain

$\{x \in \mathbb{R} \mid x \neq -5\}$

ex. $\dfrac{5x}{x+1} - \dfrac{7x+1}{x-1}$

$x+1 \neq 0$ $x-1 \neq 0$
$x \neq -1$ * restrictions $x \neq 1$

$= \dfrac{5x \cdot (x-1)}{(x+1)(x-1)} - \dfrac{(7x+1) \cdot (x+1)}{(x-1)(x+1)}$

$\boxed{x \neq \pm 1}$

$= \dfrac{(5x^2 - 5x) - (7x^2 + 8x + 1)}{(x+1)(x-1)}$

$\{ x \in \mathbb{R} \mid x \neq \pm 1 \}$

* domain

$= \dfrac{5x^2 - 5x - 7x^2 - 8x - 1}{(x+1)(x-1)}$

$\_ \cdot \_ = 2$ } not
$\_ + \_ = 13$ } factorable

$= \dfrac{-2x^2 - 13x - 1}{(x+1)(x-1)} = -\dfrac{(2x^2 + 13x + 1)}{(x+1)(x-1)}$

ex. $\dfrac{1 + \frac{1}{x}}{x - \frac{1}{x}}$

* restrictions $\boxed{x \neq 0}$

$x - \frac{1}{x} \neq 0$

$= \dfrac{\frac{x}{x} + \frac{1}{x}}{\frac{x^2 - 1}{x}}$

$(x)\, x \neq \frac{1}{x}\, (x)$

$\sqrt{x^2} \neq \pm\sqrt{1}$

$\boxed{x \neq \pm 1}$

$= \dfrac{x+1}{x} \div \dfrac{x^2 - 1}{x}$

* domain

$= \dfrac{x+1}{x} \cdot \dfrac{x}{x^2 - 1}$

$\{ x \in \mathbb{R} \mid x \neq 0, \pm 1 \}$

$= \dfrac{x+1}{x} \cdot \dfrac{x}{(x+1)(x-1)}$

$= \dfrac{1}{x-1}$

Note: $(3-x) = -(-3+x) = -(x-3)$

Homefun: pg. 336 #3, (6-12, 15)ace, 16, 18, 20, 23

Quiz tomorrow
6.1-6.2