10 d)

$$\frac{\frac{1}{x+4}+\frac{1}{x-4}}{\frac{x}{x^2-16}+\frac{1}{x+4}} = \frac{\frac{1}{x+4}\cdot\frac{(x-4)}{(x-4)}+\frac{1}{(x-4)}\frac{(x+4)}{(x+4)}}{\frac{x}{(x+4)(x-4)}+\frac{1}{(x+4)}\frac{(x-4)}{(x-4)}}$$

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

$$= \boxed{\frac{x}{x-2}}$$

6e, 10a, 11a, 12

6e) $\frac{2h}{h^2-9}+\frac{h}{h^2+6h+9}-\frac{3}{h-3}$ $\boxed{h \neq \pm 3}$

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

$= \frac{2h(h+3)+h(h-3)-3(h^2+6h+9)}{(h+3)^2(h-3)}$

$= \frac{\cancel{2h^2}+\cancel{6h}+\cancel{h^2}-\cancel{3h}-\cancel{3h^2}-\cancel{18h}-27}{(h+3)^2(h-3)}$

$= \frac{-15h-27}{(h+3)^2(h-3)} = \frac{-3(5h+9)}{(h+3)^2(h-3)}$

10a) $\frac{\frac{2x}{1x}-\frac{6}{x}}{\frac{1x^2}{1x^2}-\frac{9}{x^2}}$

$= \frac{2x-6}{x} \div \frac{x^2-9}{x^2}$

$= \frac{2\cancel{(x-3)}}{\cancel{x}} \cdot \frac{x^{\cancel{2}}}{(x+3)\cancel{(x-3)}} = \boxed{\frac{2x}{x+3}}$

$x \neq 0$

$1-\frac{9}{x^2} \neq 0$

$1 \neq \frac{9}{x^2}$

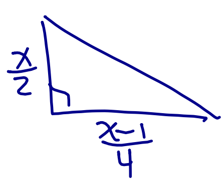
$\sqrt{x^2} \neq \pm\sqrt{9}$

$\boxed{x \neq \pm 3}$

11a) $\frac{\frac{AD}{B}+\frac{C \cdot B}{B}}{D} = \frac{A}{B}+\frac{C}{D}$

$LS = \frac{\frac{AD+CB}{B}}{\frac{D}{1}} = \frac{AD+CB}{B} \cdot \frac{1}{D} = \frac{AD+CB}{BD} = \frac{A\cancel{D}}{B\cancel{D}}+\frac{C\cancel{B}}{\cancel{B}D}$

12.



$h^2=a^2+b^2$

$h=\sqrt{\left(\frac{x}{2}\right)^2+\left(\frac{x-1}{4}\right)^2}$

$=\sqrt{\frac{4x^2}{4\cdot 4}+\frac{(x-1)^2}{16}}$

$=\frac{\sqrt{4x^2+x^2-2x+1}}{\sqrt{16}} = \frac{\sqrt{5x^2-2x+1}}{4}$

6.4 Rational Equations

* When solving a rational equation, it is often easiest if all expressions have the same denominator

ex. $\frac{2}{x^2 - 4} + \frac{10}{6x + 12} = \frac{1}{x - 2}$

$$\frac{2}{(x+2)(x-2)} + \frac{10}{6(x+2)} = \frac{1}{x-2}$$

$$\frac{2\cdot 6}{6(x+2)(x-2)} + \frac{10(x-2)}{6(x+2)(x-2)} = \frac{1\cdot 6(x+2)}{6(x-2)(x+2)}$$

$$\left[\frac{12}{6\cancel{(x+2)(x-2)}} + \frac{10x-20}{6\cancel{(x+2)(x-2)}} = \frac{6x+12}{6\cancel{(x-2)(x+2)}}\right]$$

$$10x - 8 = 6x + 12$$

$$\frac{4x}{4} = \frac{20}{4}$$

$$\boxed{x = 5}$$

* restrictions

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

*when we multiply through by the CD, it cancels out everywhere

• $6\cancel{(x-2)(x+2)}$

* domain

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

Your turn pg. 343

$$\boxed{x \neq 3, 6}$$

$$\frac{9}{y-3} - \frac{4}{y-6} = \frac{18}{y^2 - 9y + 18}$$

$$\left[\frac{9(y-6)}{(y-3)(y-6)} - \frac{4(y-3)}{(y-6)(y-3)} = \frac{18}{(y-3)(y-6)}\right](y-3)(y-6)$$

$$9(y-6) - 4(y-3) = 18$$

$$9y - 54 - 4y + 12 = 18$$

$$5y = 18 - 12 + 54$$

$$\frac{5y}{5} = \frac{60}{5} \Rightarrow \boxed{y = 12}$$

ex. $\frac{4x-1}{x+2} - \frac{x+1}{x-2} = \frac{x^2-4x+24}{x^2-4}$

* restrictions $\boxed{x \neq \pm 2}$

$$\left[\frac{(4x-1)(x-2)}{(x+2)\cancel{(x-2)}} - \frac{(x+1)(x+2)}{(x-2)\cancel{(x+2)}} = \frac{x^2-4x+24}{\cancel{(x+2)(x-2)}}\right](x+2)(x-2)$$

$\_ \cdot \_ = 24$
$\_ + \_ = -4$

not factorable

* domain

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

$$4x^2-8x-x+2-(x^2+3x+2) = x^2-4x+24$$
$$3x^2-12x = x^2-4x+24$$
$$(2x^2-8x-24=0)\div 2$$
$$x^2-4x-12=0$$
$$(x-6)(x+2)=0$$

$\boxed{x=6}$; $\boxed{\cancel{x=-2}}$

only answer

Your turn pg. 344

$$\frac{3x(x-3)}{(x+2)(x-3)} - \frac{5(x+2)}{(x-3)(x+2)} = \frac{-25}{(x-3)(x+2)}$$
$$3x^2-9x-(5x+10) = -25$$
$$3x^2-9x-5x-10 = -25$$
$$3x^2-14x+15=0$$

$-9 \cdot -5 = 45$
$-9 + -5 = -14$

$$(3x^2-9x)+(-5x+15)=0$$
$$3x(x-3)+-5(x-3)=0$$
$$(3x-5)(x-3)=0$$

Homefun: pg. 348 #(2, 3)ac, 5, 8, 12-14, 17, 20, 21, 26

$3x-5=0$ $x-3=0$ but $\boxed{x \neq 3, -2}$
$3x=5$ $\boxed{\cancel{x=3}}$
$\boxed{x=5/3}$ ✓

∴ The average speed on the way there is 20 mph.

See example 4 on pg. 346

F.F.   speed $= v$ Pao
$d = 70$
speed $= v-6$

$t_{total} = 8.5$ hrs
$v = ?$

$t_{there} + t_{back} = 8.5$

but $t = \frac{d}{v}$

$t_{there} = \frac{70}{v}$, $t_{back} = \frac{70}{v-6}$

$$\frac{70}{v} + \frac{70}{v-6} = 8.5$$
$$\frac{70(v-6)}{v(v-6)} + \frac{70v}{(v-6)v} = \frac{8.5v(v-6)}{v(v-6)}$$
$$70v-420+70v = 8.5v^2-51v$$
$$0 = 8.5v^2-191v+420$$

The Quadratic Formula gives $\boxed{v=20}$ or $v = \frac{42}{17} \doteq \cancel{2.5}$

since on the way back, speed is $v-6$, the answer $v \doteq 2.5$ makes no sense...