

Rational Review #2 Answers

$$1) \frac{4 \cdot \cancel{30x}}{\cancel{4x^2} \cdot \cancel{x}} \cdot \frac{6x^3}{\cancel{12x} \cdot \cancel{2x}} \cdot \frac{5}{\cancel{x}} = \boxed{120x^3}$$

$$2) \frac{2x^2 - 12x + 4}{x^3 - 16x} \cdot \frac{-16 - 4x}{6x - 42} = \frac{\cancel{2}(x+1)\cancel{(x-7)}}{x(x-4)\cancel{(x+4)}} \cdot \frac{\cancel{4}(x+4)}{\cancel{6}(x-7)}$$

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

$$3) \frac{x}{x+4} \cdot \frac{x^2 + 6x + 8}{\frac{x^2}{x+20}} = \frac{x}{x+4} \cdot \frac{x^2 + 6x + 8}{x+10} \cdot \frac{x+20}{x^2}$$

$$= \frac{\cancel{x}}{\cancel{x+4}} \cdot \frac{(x+2)\cancel{(x+4)}}{x+10} \cdot \frac{x+20}{\cancel{x^2}}$$

$$= \boxed{\frac{(x+2)(x+20)}{x(x+10)}}$$

$$4) \frac{x+4}{x^2-9} \div \left(\frac{x^2+4x}{x+3} \cdot \frac{x-3}{x} \right)$$

$$\frac{x+4}{x^2-9} \cdot \frac{x-3}{\frac{x^2+4x}{x+3}} = \frac{\cancel{x+4}}{\cancel{(x+3)}\cancel{(x-3)}} \cdot \frac{\cancel{x-3}}{x} \cdot \frac{\cancel{x+3}}{\cancel{x(x+4)}}$$

$$\boxed{\frac{1}{x^2}}$$

$$\text{LCD} = 4(x-2)$$

$$5 \left| \frac{2 + x + \frac{3}{x-2}}{5 - x - \frac{6}{4(x-2)}} \right.$$

$$\frac{2(4)(x-2) + x(4)(x-2) + 3(4)}{5(4)(x-2) - x(4)(x-2)} = \frac{8x - 16 + 4x^2 - 8x + 12}{20x - 40 - 4x^2 + 8x} =$$

$$\frac{4x^2 - 4}{-4x^2 + 28x - 40} = \frac{4(x+1)(x-1)}{-4(x^2 - 7x + 10)} =$$

$$= \frac{4(x+1)(x-1)}{-4(x-5)(x-2)} = \boxed{\frac{-(x+1)(x-1)}{(x-5)(x-2)}}$$

$$6 \left| \left(\frac{x+4}{3(x-2)(x+2)} + \frac{6}{3(x+2)} \right) \right.$$

$$\left. \frac{-4}{x-2} + \frac{7}{x+2} \right)$$

$$\text{LCD} = 3(x+2)(x-2)$$

$$\frac{x+4 + 6(x-2)}{-4(3)(x+2) + 7(3)(x-2)} = \frac{x+4 + 6x - 12}{-12x - 24 + 21x - 42}$$

$$= \boxed{\frac{7x - 8}{9x - 66}}$$

$$7) \quad y + \frac{2y}{y-1} = 1 + \frac{1}{y} = \frac{y+1}{y}$$

$$y + \frac{2y}{y-1} = y + \frac{2y}{y-1} =$$

$$y + \frac{2y}{y-1} = y + \frac{2y}{y-1} =$$

$$y + \frac{2y}{y-1} \cdot \frac{y+1}{6y^2+y} = y + \frac{2y}{y-1} \cdot \frac{y+1}{y(6y+1)}$$

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

$$\frac{6y^3 - 5y^2 - y + 2y + 2}{(y-1)(6y+1)} = \boxed{\frac{6y^3 - 5y^2 + y + 2}{(y-1)(6y+1)}}$$

$$8) \quad \left(\frac{3}{2} - \frac{3}{x} = \frac{9}{2x} \right) \cdot 2x \quad \text{LCD} = 2x \quad D: x \neq 0$$

$$3x - 6 = 9$$

$$3x = 15$$

$$\boxed{x = 5}$$

$$9) \left(\frac{1}{8} - \frac{1}{x} = \frac{5}{4x^2} \right) \quad \text{LCD} = 8x^2$$

$$D: x \neq 0$$

$$x^2 - 8x = 10$$

$$x^2 - 8x - 10 = 0$$

$$x = \frac{8 \pm \sqrt{(-8)^2 - 4(1)(-10)}}{2}$$

$$x = \frac{8 \pm \sqrt{104}}{2}$$

$$10) \frac{2}{x+3} - \frac{3}{4-x} = \frac{2x+2}{x^2-x-12}$$

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

$$\text{LCD} = (x+3)(x-4)$$

$$D: x \neq -3, 4$$

$$2(x-4) + 3(x+3) = 2(x+1)$$

$$2x - 8 + 3x + 9 = 2x + 2$$

$$3x + 1 = 2$$

$$3x = 1$$

$$x = \frac{1}{3}$$

$$11) \frac{4}{x^2-8x+12} = \frac{x}{x-2} + \frac{1}{x-6}$$

$$(x+2)(x-6) \left(\frac{4}{(x-6)(x+2)} = \frac{x}{x-2} + \frac{1}{x-6} \right)$$

$$\text{LCD} = (x-6)(x+2)$$

$$D: x \neq 6, -2$$

$$4 = x(x-6) + 1(x+2)$$

$$4 = x^2 - 6x + x + 2$$

$$0 = x^2 - 5x - 2$$

$$x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(-2)}}{2}$$

$$x = \frac{5 \pm \sqrt{33}}{2}$$

$$\frac{12}{x+1} \cdot \frac{x-2}{x+1} = \frac{x-3}{x^2-5x+6} - \frac{2x-7}{x-6}$$

$$(x+1)(x-6) \cdot \left(\frac{x-2}{x+1} = \frac{x-3}{(x-6)(x+1)} - \frac{(2x-7)}{(x-6)} \right)$$

$$(x-2)(x-6) = (x-3) - (2x-7)(x+1) \quad \text{LCD} = (x+1)(x-6) \quad \text{D: } x \neq -1, 6$$

$$x^2 - 8x + 16 = x - 3 - (2x^2 - 5x - 7)$$

$$x^2 - 8x + 16 = x - 3 - 2x^2 + 5x + 7$$

$$x^2 - 8x + 16 = -2x^2 + 6x + 4$$

$$3x^2 - 14x + 12 = 0 \quad x = \frac{14 \pm \sqrt{(-14)^2 - 4(3)(12)}}{2(3)}$$

$$(\cancel{3x - 4})(\cancel{x - 3})$$

Doesn't factor

$$x = \frac{14 \pm \sqrt{196 - 144}}{6}$$

$$x = \frac{14 \pm \sqrt{52}}{6}$$

$$x = \frac{14 \pm 2\sqrt{13}}{6}$$

$$x = \boxed{\frac{7 \pm \sqrt{13}}{3}}$$

13) Joey's speed = x
Patty's speed = $x + 15$

$$\frac{130}{x} - \frac{130}{x+15} = \frac{1}{2}$$

$$\text{LCD} = 2x(x+15)$$
$$x \neq 0, -15$$

$$260(x+15) - 260x = x(x+15)$$

$$260x + 3900 - 260x = x^2 + 15x$$

$$\textcircled{1} = x^2 + 15x - 3900$$

$$x = \frac{-15 \pm \sqrt{(15)^2 - 4(1)(-3900)}}{2}$$

$$x \approx \frac{-15 \pm 125.8}{2}$$

Joey's speed is approximately 55.4 mph

14) x = time for the machines to work together

$$\frac{1}{10} + \frac{1}{15} + \frac{1}{20} = \frac{1}{x} \quad \text{LCD} = 60x$$

$$6x + 4x + 3x = 60$$

$$13x = 60$$

$$x = \frac{60}{13} \approx 4.62$$

About 4.62 hours