

Green

$$\textcircled{1} \frac{x^2 - 8x + 15}{x^2 - x - 6}$$
$$\frac{(\cancel{x-3})(x-5)}{(\cancel{x-3})(x+2)}$$

$$\frac{x-5}{x+2}$$

Peach

$$\textcircled{1} \frac{x^2 - 6x + 9}{x^2 - x - 6}$$
$$\frac{(\cancel{x-3})(x-3)}{(\cancel{x-3})(x+2)}$$

$$\frac{x-3}{x+2}$$

G

②

$$\frac{x+1}{x^2-4} \div \frac{2x+2}{x+2}$$

$$\frac{x+1}{x^2-4} \cdot \frac{x+2}{2x+2}$$

$$\frac{(\cancel{x+1})(\cancel{x+2})}{(x-2)(\cancel{x+2})2(\cancel{x+1})}$$

$$\frac{1}{2(x-2)}$$

P

$$\frac{11}{x-2} \div \frac{22}{2x^2-8}$$

$$\frac{11}{x-2} \cdot \frac{2x^2-8}{\cancel{22}}$$

$$\frac{\cancel{11}(x^2-4)}{\cancel{11}(x-2)}$$

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

$$(x+2)$$

6

LCD: $3x(x+3)$

$$\frac{1}{x} + \frac{x}{3x+9} - \frac{2}{x^2+3x}$$

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

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

done $\frac{x^2 + 3x + 3}{3x(x+3)}$

Peach ③ $\frac{1}{x} + \frac{x}{2x+4} - \frac{2}{x^2+2x}$ LCD = $2x(x+2)$

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

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

$$\frac{x^2 + 2x}{2x(x+2)}$$

$$\frac{\cancel{x}(x+2)}{\cancel{2x}(x+2)}$$

$$\frac{1}{2}$$

Green

(4)

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

$$x = -3, -2$$

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

$$5(x+3) + x+2 = -1$$

$$5x+15 + x+2 = -1$$

$$6x + 17 = -1$$

$$\begin{array}{r} -17 \quad -17 \\ \hline \end{array}$$

$$\frac{6x}{6} = \frac{-18}{6}$$

$$x = -3$$

oops

no solutions

P④, $\frac{3}{x-1} + \frac{2}{x+3} = \frac{-3}{x^2+2x-3}$, LCD = $(x+3)(x-1)$, $x = -3, 1$

$$(x+3)\cancel{(x-1)} \frac{3}{\cancel{x-1}} + \frac{2\cancel{(x+3)}\cancel{(x-1)}}{\cancel{x+3}} = \frac{-3\cancel{(x+3)}\cancel{(x-1)}}{(\cancel{x+3})(\cancel{x-1})}$$

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

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

$$5x + 7 = -3$$

$$\quad \quad -7 \quad \quad -7$$

$$\frac{5x}{5} = \frac{-10}{5}$$

$$x = -2$$

$$\textcircled{5} \quad x^2(1) - \left(\frac{16}{x^2}\right)x^2, \quad \text{LCD} = x^2$$

$$\frac{x^2(1) - \left(\frac{2}{x}\right)x^2}{x^2(1) - \left(\frac{2}{x}\right)x^2}$$

$$\frac{x^2 - 16}{x^2 - 2x}$$

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

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

$$\textcircled{5} \quad y^2(1) - \frac{9(y^2)}{y^2}, \quad \text{LCD} = y^2$$

$$\frac{y^2(1) - \left(\frac{4}{y}\right)y^2}{y^2(1) - \left(\frac{4}{y}\right)y^2}$$

$$\frac{y^2 - 9}{y^2 + 4y}$$

$$\frac{(y-3)(y+3)}{y(y+4)}$$

$$\frac{(y-3)(y+3)}{y(y+4)}$$

$$P \textcircled{6} \quad \frac{5}{5x+20} + \frac{x}{x+4}$$

$$\frac{5}{5(x+4)} + \left(\frac{x}{x+4}\right)\frac{5}{5}$$

$$\frac{5 + 5x}{5(x+4)}$$

$$\frac{\cancel{5}(1+x)}{\cancel{5}(x+4)}$$

$$\frac{1+x}{x+4}$$

$$G \textcircled{6}$$

$$\frac{5}{4x+20} + \frac{x}{x+5}$$

$$\frac{5}{4(x+5)} + \frac{x}{x+5} \left(\frac{4}{4}\right)$$

$$\frac{5 + 4x}{4(x+5)}$$

G ⑦ $\sqrt{64x^4}$ same on
 $8x^2$

⑧ fill 8min
 empty 6min

let t = time to empty with faucet &
 drain open,

$$\frac{3}{(24t)} - \frac{4}{(24t)} = -\frac{1}{t}$$

$$\begin{array}{r} 2 \cdot 2 \cdot 2 \\ 2 \cdot 3 \\ \hline 2 \cdot 2 \cdot 2 \cdot 3 \end{array}$$

$$3t - 4t = -24$$

$$\frac{-t}{-1} = \frac{-24}{-1}$$

$$t = 24$$

So, it will take
 24 minutes to
 empty with
 both open.

fill 10min let t = time to empty with
empty 8min both open

$$\frac{40t}{10} - \frac{40t}{8} = -\frac{40t}{t}$$

$$4t - 5t = -40$$

$$-t = -40$$

$$t = 40$$

So, it will take
40 min to
empty.

P. ⑨

$$\sqrt{x^3} + x\sqrt{x}$$

same on Green

$$\sqrt{x^2 \cdot x} + x\sqrt{x}$$

$$x\sqrt{x} + x\sqrt{x}$$

$$2x\sqrt{x}$$

Peach
⑩

$$\sqrt{20ab^2} - b\sqrt{45a}$$

same on Green

$$\sqrt{4.5ab^2} - b\sqrt{9.5a}$$

$$2b\sqrt{5a} - 3b\sqrt{5a}$$

$$-b\sqrt{5a}$$

$$G \text{ ⑪ } \sqrt{6} \cdot \sqrt{3}$$

$$\sqrt{18}$$

$$\sqrt{9 \cdot 2}$$

$$3\sqrt{2}$$

$$\sqrt{a}\sqrt{a} = a$$

$$P \text{ ⑪ } \sqrt{6} \cdot \sqrt{2}$$

$$\sqrt{12}$$

$$\sqrt{4 \cdot 3}$$

$$2\sqrt{3}$$

$$G \text{ ⑫ } \frac{\sqrt{5}(\sqrt{5} + \sqrt{2})}{5 + \sqrt{10}}$$

$$P \text{ ⑫ } \frac{\sqrt{2}(\sqrt{3} + \sqrt{2})}{\sqrt{6} + 2}$$

$$G(14) \quad \sqrt{2x-3} - 4 = 3$$

$$\quad \quad \quad +4 \quad +4$$

$$(\sqrt{2x-3})^2 = (7)^2$$

$$2x-3 = 49$$

$$\quad +3 \quad +3$$

$$\frac{2x}{2} = \frac{52}{2}$$

$$x = 26$$

Check

$$\sqrt{2(26)-3} - 4 = 3$$

$$\sqrt{52-3} - 4 = 3$$

$$\sqrt{49} - 4 = 3$$

$$7 - 4 = 3$$

$$3 = 3 \checkmark$$

$$p \quad (\sqrt{y-4})^2 = (y-6)^2$$

$$\begin{array}{r} y-4 = y^2 - 12y + 36 \\ -y+4 \quad \quad -y^2+4 \\ \hline 0 = y^2 - 13y + 40 \end{array}$$

$$0 = y^2 - 13y + 40$$

$$0 = (y-8)(y-5)$$

$$\textcircled{y=8} \text{ or } y=5$$

check

$$y=8$$

$$\sqrt{8-4} = 8-6$$

$$\sqrt{4} = 2$$

$$2 = 2 \checkmark$$

$$y=5$$

$$\sqrt{5-4} = 5-6$$

$$\sqrt{1} = -1$$

$$1 \neq -1$$

$$6 \quad (\sqrt{x-3})^2 = (x-3)^2$$

$$\begin{array}{r} x-3 = x^2-6x+9 \\ -x+3 \quad -x+3 \\ \hline \end{array}$$

$$0 = x^2 - 7x + 12$$

$$0 = (x-4)(x-3)$$

$$x=4, x=3$$

$$(x-3)(x-3)$$

$$x^2 - 6x + 9$$

Check $x=4$

$$\sqrt{4-3} = 4-3$$

$$\sqrt{1} = 1$$

$$1 = 1 \checkmark$$

$$x=3$$

$$\sqrt{3-3} = 3-3$$

$$\sqrt{0} = 0$$

$$0 = 0$$

G (15)

$$\frac{2 \sqrt[3]{5}}{\sqrt[3]{25} \sqrt[3]{5}}$$

$$\frac{2 \sqrt[3]{5}}{\sqrt[3]{125}}$$

$$\frac{2 \sqrt[3]{5}}{5}$$

P.

$$\frac{2 \sqrt[3]{3}}{\sqrt[3]{9} \sqrt[3]{3}}$$

$$\frac{2 \sqrt[3]{3}}{\sqrt[3]{27}}$$

$$\frac{2 \sqrt[3]{3}}{3}$$

$$\textcircled{16} \quad \text{P} \quad \left(\frac{\sqrt{2}}{\sqrt{5}-2} \right) \left(\frac{\sqrt{5}+2}{\sqrt{5}+2} \right) = \frac{\sqrt{10} + 2\sqrt{2}}{5-4} = \sqrt{10} + 2\sqrt{2}$$

$$\textcircled{6} \quad \frac{\sqrt{2}}{\sqrt{5}-3} \left(\frac{\sqrt{5}+3}{\sqrt{5}+3} \right) = \frac{\sqrt{10} + 3\sqrt{2}}{5-9} = \frac{\sqrt{10} + 3\sqrt{2}}{-4}$$

(17)

$$\frac{x^2 + 8x + 16}{x^2 + x - 12} \div \frac{x^2 - 16}{x^2 - x - 6}$$

$$\frac{x^2 + 8x + 16}{x^2 + x - 12} \cdot \frac{x^2 - x - 6}{x^2 - 16}$$

$$\frac{\overset{1}{\cancel{(x+4)}} \overset{1}{\cancel{(x+4)}} (x+2) \overset{1}{\cancel{(x-3)}}}{\underset{1}{\cancel{(x+4)}} \underset{1}{\cancel{(x-3)}} \underset{1}{\cancel{(x+4)}} (x-4)}$$

$$\frac{x+2}{x-4}$$

9.1

$$x^2 = 9$$

$$x = \sqrt{9}$$

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

$$x = -\sqrt{9}$$

$$x = \pm 3$$

SQUARE ROOT
PROPERTY.

$$x = 3 \text{ or } x = -3$$

Used to

$$\begin{array}{r} x^2 = 9 \\ -9 \quad -9 \\ \hline \end{array}$$

$$x^2 - 9 = 0$$

$$(x-3)(x+3) = 0$$

$$x = 3 \text{ or } x = -3$$

$$\text{If } a^2 = b$$

$$\text{then } a = \sqrt{b}$$

$$\text{or } a = -\sqrt{b}$$

$$a = \pm \sqrt{b}$$

$$\textcircled{\text{ex}} \quad \frac{2x^2}{2} = \frac{54}{2}$$

$$x^2 = 27$$

$$\sqrt{x^2} = \pm \sqrt{27}$$

$$x = \pm \sqrt{9 \cdot 3}$$

$$x = \pm 3\sqrt{3}$$

$$\textcircled{\text{ex}} \quad (x+3)^2 = 64$$

$$\sqrt{(x+3)^2} = \pm \sqrt{64}$$

$$x+3 = \pm 8$$

$$\begin{array}{r} -3 \quad -3 \\ \hline \end{array}$$

$$x = -3 \pm 8$$

$$x = -3 + 8$$

$$x = 5$$

$$x = -3 - 8$$

$$x = -11$$

$$\textcircled{ex} \quad (3x-2)^2 = 16$$

$$\sqrt{(3x-2)^2} = \pm \sqrt{16}$$

$$\begin{array}{ccc} 3x-2 & = & \pm 4 \\ +2 & & +2 \end{array}$$

$$\frac{3x}{3} = \frac{2 \pm 4}{3}$$

$$x = \frac{2 \pm 4}{3}$$

Now

$$x = \frac{2+4}{3} \quad x = \frac{2-4}{3}$$

$$x = \frac{6}{3} \quad \text{or} \quad x = \frac{-2}{3}$$

$$x = 2$$

$$\textcircled{ex} (8x-1)^2 = 20$$

$$\sqrt{(8x-1)^2} = \pm \sqrt{20}$$

$$8x-1 = \pm \sqrt{4.5}$$

$$8x-1 = \pm 2\sqrt{5}$$

$$\frac{8x}{8} = \frac{1 \pm 2\sqrt{5}}{8}$$

$$x = \frac{1 \pm 2\sqrt{5}}{8}$$

$$x = \frac{1+2\sqrt{5}}{8}$$

$$\text{or } x = \frac{1-2\sqrt{5}}{8}$$

$$\textcircled{\text{ex}} \quad x^2 - 2x + 1 = 9$$

$$\quad \quad \quad \underline{-9 \quad -9}$$

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

$$(x-4)(x+2) = 0$$

$$x = 4 \text{ or } x = -2$$

$$x^2 - 2x + 1 = 9$$

$$\begin{array}{ccc} \swarrow & \uparrow & \searrow \\ (x) & -1x(2) & (-1)^2 \end{array}$$

$$(x-1)^2 = 9$$

$$\sqrt{(x-1)^2} = \pm \sqrt{9}$$

$$x-1 = \pm 3$$

$$\begin{array}{cc} +1 & +1 \\ \hline \end{array}$$

$$x = 1 \pm 3$$

$$x = 4 \quad x = -2$$

$$ax^2 + bx + c$$

$$x^2 + 6x + 9$$

$$(x+3)^2$$

$b = \frac{6}{2} = 3$
 $x^2 + 6x + 9 = (x+3)^2$ Complete the Square
 $b^2 = (3)^2 = 9$
 $(x+b)^2 = x^2 + 2xb + b^2$

(ex) $x^2 - 10x + 25 = (x-5)^2$

$b = -\frac{10}{2} = -5$
 $b^2 = (-5)^2 = 25$

(ex)

$$a^2 - 3a + \frac{9}{4} = \left(a - \frac{3}{2}\right)^2$$

$$b = -\frac{3}{2}$$

$$b^2 = \left(-\frac{3}{2}\right)^2 = \frac{9}{4}$$

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

$$x^2 - 2x + \frac{1}{1} = 8 + \frac{1}{1}$$

$$\sqrt{(x-1)^2} = \pm\sqrt{9}$$

$$x-1 = \pm 3$$

$$\begin{array}{r} +1 \quad +1 \\ \hline \end{array}$$

$$x = 1 \pm 3$$

$$x = 4 \text{ or } x = -2$$

$$b = -\frac{2}{2} = -1$$
$$b^2 = (-1)^2 = 1$$

Solving an equation by completing the square

$$x^2 + 4x - 3 = 0$$

$$\begin{array}{cc} +3 & +3 \\ \hline \end{array}$$

$$x^2 + 4x + \frac{4}{1} = 3 + \frac{4}{1}$$

$$b = \frac{4}{2} = 2 \quad \sqrt{(x+2)^2} = \pm\sqrt{7}$$

$$b^2 = 2^2 = 4$$

$$\begin{array}{cc} x+2 = \pm\sqrt{7} \\ -2 & -2 \\ \hline \end{array}$$

$$x = -2 \pm \sqrt{7}$$

$$x = -2 + \sqrt{7} \quad \text{or} \quad x = -2 - \sqrt{7}$$

$$\textcircled{\text{ex}} \quad \underline{4x^2} + 4x - 3 = 0$$

$$\begin{array}{cc} +3 & +3 \\ \hline \end{array}$$

$$\frac{4x^2 + 4x}{4} = \frac{3}{4}$$

Completing
the square

$$x^2 + x + \frac{1}{4} = \frac{3}{4} + \frac{1}{4}$$

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

$$b = \frac{1}{2}$$

$$b^2 = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

$$x + \frac{1}{2} = \pm 1$$

$$\begin{array}{cc} -\frac{1}{2} & -\frac{1}{2} \\ \hline \end{array}$$

$$x = -\frac{1}{2} \pm 1$$

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

$$x = \frac{1}{2}$$

$$x = -\frac{1}{2} - 1$$

$$x = -\frac{3}{2}$$