

Exercise 4.5

①

$$1) \quad \frac{1}{2}x = \frac{3}{4} \quad \text{LCM } 4$$

$$\frac{4}{1} \cdot \frac{1}{2}x = \frac{4}{1} \cdot \frac{3}{4}$$

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

$$\boxed{x = 3/2}$$

$$4) \quad x + \frac{1}{2} = \frac{3}{4} \quad \text{LCM } 4$$

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

$$4x + 2 = 3$$

$$\frac{4x}{4} = \frac{1}{4} \rightarrow \boxed{x = \frac{1}{4}}$$

$$2) \quad \frac{3}{2}x = -\frac{9}{5} \quad \text{LCM } 10$$

$$\frac{10}{1} \cdot \frac{3}{2}x = -\frac{9}{5} \cdot \frac{10}{1}$$

$$5 \cdot 3x = -9 \cdot 2$$

$$\frac{15x}{15} = \frac{-18}{15}$$

$$x = -\frac{18}{15}$$

$$\boxed{x = -\frac{6}{5}}$$

$$5) \quad x - \frac{1}{3} = \frac{2}{3}$$

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

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

$$6) \quad x - \frac{1}{8} = \frac{1}{4} \quad \text{LCM } 8$$

$$\frac{8}{1} \cdot x - \frac{8}{1} \cdot \frac{1}{8} = \frac{8}{1} \cdot \frac{1}{4}$$

$$8x - 1 = 2$$

$$\frac{8x}{8} = \frac{3}{8} \rightarrow \boxed{x = \frac{3}{8}}$$

$$3) \quad \frac{5}{3}x = \frac{7}{10} \quad \text{LCM } 30$$

$$\frac{30}{1} \cdot \frac{5}{3}x = \frac{30}{1} \cdot \frac{7}{10}$$

$$10 \cdot 5x = 3 \cdot 7$$

$$\frac{50x}{50} = \frac{21}{50}$$

$$\boxed{x = \frac{21}{50}}$$

$$7) \quad \frac{1}{2}x - \frac{1}{6} = \frac{1}{3} \quad \text{LCM } 6$$

$$\frac{6}{1} \cdot \frac{1}{2}x - \frac{6}{1} \cdot \frac{1}{6} = \frac{6}{1} \cdot \frac{1}{3}$$

$$3x - 1 = 2$$

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

$$\boxed{x = 1}$$

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(2)

$$8) \quad \frac{3}{4}x - 1 = -\frac{2}{3} \quad \text{LCM } 12$$

$$\frac{12}{1} \cdot \frac{3}{4}x - \frac{12}{1} \cdot 1 = \frac{12}{1} \cdot \left(-\frac{2}{3}\right)$$

$$3 \cdot 3x - 12 = 4(-2)$$

$$\begin{array}{r} 9x - 12 = -8 \\ +12 \quad +12 \end{array}$$

$$\frac{9x}{9} = \frac{4}{9}$$

$$\boxed{x = 4/9}$$

$$12) \quad \frac{1}{4} - \frac{1}{12}(x+1) = \frac{1}{3} \quad \text{LCM } 12$$

$$\frac{12}{1} \cdot \frac{1}{4} - \frac{12}{1} \cdot \frac{1}{12}(x+1) = \frac{12}{1} \cdot \frac{1}{3}$$

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

$$3 - x - 1 = 4$$

$$\begin{array}{r} 2 - x = 4 \\ -2 \quad -2 \end{array}$$

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

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

$$9) \quad \frac{2}{3}x - \frac{1}{3} = \frac{1}{3} \quad \text{LCM } 3$$

$$\frac{3}{1} \cdot \frac{2}{3}x - \frac{3}{1} \cdot \frac{1}{3} = \frac{3}{1} \cdot \frac{1}{3}$$

$$\begin{array}{r} 2x - 1 = 1 \\ +1 \quad +1 \end{array}$$

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

$$13) \quad \frac{1}{3}x - 2 = \frac{2}{3}x + 1 \quad \text{LCM } 3$$

$$\frac{3}{1} \cdot \frac{1}{3}x - \frac{3}{1} \cdot 2 = \frac{3}{1} \cdot \frac{2}{3} + \frac{3}{1} \cdot 1$$

$$x - 6 = 2 + 3$$

$$\begin{array}{r} x - 6 = 5 \\ +6 \quad +6 \end{array}$$

$$\rightarrow \boxed{x = 11}$$

$$10) \quad \frac{1}{2}(x-1) + 2 = 1 \quad \text{LCM } 2$$

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

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

$$\begin{array}{r} x + 3 = 2 \\ -3 \quad -3 \end{array}$$

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

$$14) \quad \frac{1}{6}x - \frac{2}{3} = \frac{1}{3}x + \frac{1}{2} \quad \text{LCM } 6$$

$$\frac{6}{1} \cdot \frac{1}{6}x - \frac{6}{1} \cdot \frac{2}{3} = \frac{6}{1} \cdot \frac{1}{3}x + \frac{6}{1} \cdot \frac{1}{2}$$

$$x - 2 \cdot 2 = 2x + 3$$

$$\begin{array}{r} x - 4 = 2x + 3 \\ +4 \quad +4 \end{array}$$

$$\begin{array}{r} x = 2x + 7 \\ -2x \quad -2x \end{array}$$

$$\frac{-x}{-1} = \frac{7}{-1}$$

$$\rightarrow \boxed{x = -7}$$

$$11) \quad \frac{2}{3}(x+1) - 2x = \frac{1}{3} \quad \text{LCM } 3$$

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

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

$$2x + 2 - 6x = 1$$

$$\begin{array}{r} -4x + 2 = 1 \\ +2 \quad -2 \end{array}$$

$$-4x = -1$$

$$\begin{array}{r} -4x = -1 \\ -4 \quad -4 \end{array}$$

$$\boxed{x = \frac{1}{4}}$$

$$15) \quad \frac{5}{6}x - \frac{1}{3} = \frac{1}{2}x + 1 \quad \text{LCM } 6$$

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

$$\begin{array}{r} 5x - 2 = 3x + 6 \\ +2 \quad +2 \end{array}$$

$$\begin{array}{r} 5x = 3x + 8 \\ -3x \quad -3x \end{array}$$

$$\begin{array}{r} 2x = 8 \\ 2 \quad 2 \end{array}$$

$$\boxed{x = 4}$$