

1.8: Order of Operations and Substitution

Warm-Up

$$1) \quad \frac{4}{5} \times \left[\frac{3}{8} + \left(\frac{-7}{4} \right) \right]$$

$$2) \quad \left(\frac{-6}{7} \right) + \left[\frac{3}{4} \times \left(\frac{-16}{7} \right) \right]$$

Practice Problems

Examples

$$\left[1\frac{2}{7} + \left(1\frac{1}{-3} \right) \right] \div \left(\frac{-1}{7} \right)$$

$$3a + 2b - c \quad a = \frac{1}{3}, b = \frac{1}{4}, c = \frac{2}{5}$$

$$1\frac{3}{4} \times \left(\frac{1}{4}\right) + (2) \div \left(\frac{-4}{3}\right)$$

$$2 - \left(-\frac{3}{4}\right) \times (-2) \div \left(\frac{4}{5}\right)$$

$$6ab - 2ac \quad a = \frac{1}{3}, \quad b = \frac{1}{4}, \quad c = \frac{2}{5}$$

$$\frac{a}{b} - \frac{c}{a} \quad a = \frac{1}{3}, \quad b = \frac{1}{4}, \quad c = \frac{2}{5}$$

Example 1:

$$\begin{aligned} & \left[1\frac{2}{7} + \left(1\frac{1}{-3} \right) \right] \div \left(\frac{-1}{7} \right) \\ &= \left[\frac{9}{7} + \left(\frac{-4}{3} \right) \right] \div \left(\frac{-1}{7} \right) \\ &= \left[\frac{27 + (-28)}{21} \right] \div \left(\frac{-1}{7} \right) \\ &= \frac{-1}{21} \div \left(\frac{-1}{7} \right) \\ &= \frac{-1}{21} \times \left(\frac{7}{-1} \right) = \frac{1}{3} \end{aligned}$$

Example 2:

$$\begin{aligned} a &= \frac{1}{3}, b = \frac{1}{4}, c = \frac{2}{5} \\ 3a + 2b - c \\ &= 3\left(\frac{1}{3}\right) + 2\left(\frac{1}{4}\right) - \frac{2}{5} \\ &= 1 + \frac{1}{2} - \frac{2}{5} \\ &= \frac{10}{10} + \frac{5}{10} - \frac{4}{10} \\ &= \frac{11}{10} = 1\frac{1}{10} \end{aligned}$$

Question 1:

$$\begin{aligned} & 1\frac{3}{4} \times \left(\frac{1}{4} \right) + (2) \div \left(\frac{-4}{3} \right) \\ &= \left(\frac{7}{4} \right) \times \left(\frac{1}{4} \right) + \left(\frac{2}{1} \right) \div \left(\frac{-4}{3} \right) \\ &= \left(\frac{7}{16} \right) + \left(\frac{2}{1} \right) \div \left(\frac{-4}{3} \right) \\ &= \left(\frac{7}{16} \right) + \left(\frac{2}{1} \right) \times \left(\frac{3}{-4} \right) \\ &= \left(\frac{7}{16} \right) + \left(\frac{-6}{4} \right) \\ &= \frac{7 + (-24)}{16} = \frac{-17}{16} = -1\frac{1}{16} \end{aligned}$$

Question 2:

$$\begin{aligned} & 2 - \left(-\frac{3}{4} \right) \times (-2) \div \left(\frac{4}{5} \right) \\ &= \frac{2}{1} - \left(\frac{-3}{4} \right) \times \left(\frac{-2}{1} \right) \div \left(\frac{4}{5} \right) \\ &= \frac{2}{1} - \left(\frac{6}{4} \right) \div \left(\frac{4}{5} \right) \\ &= \frac{2}{1} - \left(\frac{6}{4} \right) \times \left(\frac{5}{4} \right) \\ &= \frac{2}{1} - \left(\frac{30}{16} \right) \\ &= \frac{32}{16} - \left(\frac{30}{16} \right) \\ &= \frac{2}{16} = \frac{1}{8} \end{aligned}$$

Question 3:

$$\begin{aligned} a &= \frac{1}{3}, b = \frac{1}{4}, c = \frac{2}{5} \\ 6ab - 2ac \\ &= 6\left(\frac{1}{3}\right)\left(\frac{1}{4}\right) - 2\left(\frac{1}{3}\right)\left(\frac{2}{5}\right) \\ &= \frac{6}{12} - \frac{4}{15} \\ &= \frac{30 - 16}{60} = \frac{14}{60} = \frac{7}{30} \end{aligned}$$

Question 4:

$$\begin{aligned} a &= \frac{1}{3}, b = \frac{1}{4}, c = \frac{2}{5} \\ \frac{a}{b} - \frac{c}{a} \\ &= \frac{1/3}{1/4} - \frac{2/5}{1/3} \\ &= \frac{1}{3} \times \frac{4}{1} - \frac{2}{5} \times \frac{3}{1} \\ &= \frac{4}{3} - \frac{6}{5} \\ &= \frac{20}{15} - \frac{18}{15} = \frac{2}{15} \end{aligned}$$