

Exercise 2.4

$$1) \left(\frac{2}{3}\right)^2 = \left(\frac{2}{3}\right)\left(\frac{2}{3}\right) = \boxed{\frac{4}{9}}$$

$$2) \left(\frac{1}{5}\right)^3 = \left(\frac{1}{5}\right)\left(\frac{1}{5}\right)\left(\frac{1}{5}\right) = \boxed{\frac{1}{125}}$$

$$3) \left(-\frac{4}{7}\right)^2 = \left(-\frac{4}{7}\right)\left(-\frac{4}{7}\right) = \boxed{\frac{16}{49}}$$

$$4) -\frac{5}{6}^2 = \boxed{-\frac{25}{6}}$$

$$5) -\left(\frac{2}{7}\right)^2 = -\left(\frac{2}{7}\right)\left(\frac{2}{7}\right) = \boxed{-\frac{4}{49}}$$

$$6) -\frac{4^3}{12} = -\frac{4 \cdot 4 \cdot 4}{4 \cdot 3} = -\frac{4 \cdot 4}{3} = \boxed{-\frac{16}{3}}$$

$$7) \left(\frac{3}{5}\right)^2 \left(\frac{1}{2}\right)^3 = \left(\frac{3}{5}\right)\left(\frac{3}{5}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{9}{25 \cdot 8} = \boxed{\frac{9}{200}}$$

$$8) \left(-\frac{2}{3}\right)\left(\frac{5}{3}\right)^2 = \left(-\frac{4}{3}\right)\left(\frac{5}{3}\right)\left(\frac{5}{3}\right) = \boxed{-\frac{100}{27}}$$

$$9) -\left(\frac{7}{8}\right)^2 \left(\frac{1}{2}\right) = -\left(\frac{7}{8}\right)\left(\frac{7}{8}\right)\left(\frac{1}{2}\right) = \boxed{-\frac{49}{128}}$$

$$10) \frac{2}{3} \div \frac{1}{4} \cdot \frac{5}{6} = \frac{2}{3} \cdot \frac{4}{1} \cdot \frac{5}{6} = \frac{2 \cdot 4 \cdot 5}{2 \cdot 3 \cdot 3} = \frac{4 \cdot 5}{3 \cdot 3} = \boxed{\frac{20}{9}}$$

$$11) \frac{1}{4} + \frac{2}{5} \cdot \frac{10}{3} = \frac{1}{4} + \frac{2 \cdot 2 \cdot 5}{3 \cdot 5} = \frac{1}{4} + \frac{2 \cdot 2}{3} = \frac{1}{4} + \frac{4}{3} = \frac{1}{4} \cdot \frac{3}{3} + \frac{4}{3} \cdot \frac{4}{4} = \frac{3}{12} + \frac{16}{12} = \boxed{\frac{19}{12} \text{ or } 1\frac{7}{12}}$$

$$12) \frac{1}{3} - \frac{2}{5} \div \frac{3}{5} = \frac{1}{3} - \frac{2}{5} \cdot \frac{5}{3} = \frac{1}{3} - \frac{10}{15} = \frac{1 \cdot 5}{3 \cdot 5} - \frac{10}{15} = \frac{5}{15} - \frac{10}{15} = \frac{-5}{15} = \boxed{-\frac{1}{3}}$$

$$13) \frac{4}{5} \cdot \left(\frac{1}{5} + \frac{2}{3}\right) - \frac{3}{5} = \frac{4}{5} \left(\frac{1}{5} \cdot \frac{3}{3} + \frac{2 \cdot 5}{3 \cdot 5}\right) - \frac{3}{5} = \frac{4}{5} \left(\frac{3}{15} + \frac{10}{15}\right) - \frac{3}{5} = \frac{4}{5} \left(\frac{13}{15}\right) - \frac{3}{5} = \frac{52}{75} - \frac{3}{5} = \frac{52}{75} - \frac{3}{5} \cdot \frac{15}{15} = \frac{52}{75} - \frac{45}{75} = \boxed{\frac{7}{75}}$$

Exercise 2.4 Continued

$$\begin{aligned}
 14) \quad & -\frac{1}{2} + \frac{1}{3} \left(\frac{1}{4} + \frac{1}{2} \right) \\
 & = -\frac{1}{2} + \frac{1}{3} \left(\frac{1}{4} + \frac{1}{2} \cdot \frac{2}{2} \right) \\
 & = -\frac{1}{2} + \frac{1}{3} \left(\frac{1}{4} + \frac{2}{4} \right) \\
 & = -\frac{1}{2} + \frac{1}{3} \left(\frac{3}{4} \right) \\
 & = -\frac{1}{2} + \frac{1}{4} \\
 & = -\frac{2}{4} + \frac{1}{4} = \boxed{-\frac{1}{4}}
 \end{aligned}$$

$$\begin{aligned}
 15) \quad & \left(\frac{1}{8} - \frac{1}{3} \right) \div \frac{19}{24} \\
 & = \left(\frac{1}{8} \cdot \frac{3}{3} - \frac{1}{3} \cdot \frac{8}{8} \right) \div \frac{19}{24} \\
 & = \left(\frac{3}{24} - \frac{8}{24} \right) \div \frac{19}{24} \\
 & = \left(-\frac{5}{24} \right) \div \frac{19}{24} \\
 & = \left(-\frac{5}{24} \right) \cdot \frac{24}{19} = \boxed{-\frac{5}{19}}
 \end{aligned}$$

$$\begin{aligned}
 16) \quad & \left(\frac{2}{3} - \frac{1}{6} \right)^2 + \frac{1}{18} \\
 & = \left(\frac{2}{3} \cdot \frac{2}{2} - \frac{1}{6} \right)^2 + \frac{1}{18} \\
 & = \left(\frac{4}{6} - \frac{1}{6} \right)^2 + \frac{1}{18} \\
 & = \left(\frac{3}{6} \right)^2 + \frac{1}{18} \\
 & = \left(\frac{1}{2} \right)^2 + \frac{1}{18} \\
 & = \frac{1}{4} + \frac{1}{18} \\
 & = \frac{1}{4} \cdot \frac{9}{9} + \frac{1}{18} \cdot \frac{2}{2} \\
 & = \frac{9}{36} + \frac{2}{36} \\
 & = \boxed{\frac{11}{36}}
 \end{aligned}$$

$$\begin{aligned}
 17) \quad & -\frac{2}{3} + \left(\frac{1}{2} - \frac{3}{4} \right)^3 = -\frac{2}{3} \left(\frac{2}{4} - \frac{3}{4} \right)^3 \\
 & = -\frac{2}{3} \left(-\frac{1}{4} \right)^3 \\
 & = -\frac{2}{3} \left(-\frac{1}{4} \right) \left(-\frac{1}{4} \right) \left(-\frac{1}{4} \right) \\
 & = \frac{2}{192} = \boxed{\frac{1}{96}}
 \end{aligned}$$

$$\begin{aligned}
 18) \quad & \frac{4}{5} \left(\frac{1}{3} + \frac{1}{2} \right)^2 - \frac{3}{5} \\
 & = \frac{4}{5} \left(\frac{2}{6} + \frac{3}{6} \right)^2 - \frac{3}{5} \\
 & = \frac{4}{5} \left(\frac{5}{6} \right)^2 - \frac{3}{5} = \frac{4 \cdot 25}{5 \cdot 36} - \frac{3}{5} \\
 & = \frac{25 \cdot 4}{5 \cdot 9} - \frac{3}{5} \\
 & = \frac{25}{5 \cdot 9} - \frac{3}{5} \cdot \frac{9}{9} \\
 & = \frac{25}{45} - \frac{27}{45} = \boxed{-\frac{2}{45}}
 \end{aligned}$$

$$\begin{aligned}
 19) \quad & \frac{\frac{3}{5}}{\frac{2}{7}} = \frac{3}{5} \div \frac{2}{7} \\
 & = \frac{3}{5} \cdot \frac{7}{2} = \boxed{\frac{21}{10}}
 \end{aligned}$$

$$\begin{aligned}
 20) \quad & \frac{\frac{6}{5}}{\frac{2}{15}} = \frac{6}{5} \div \frac{2}{15} = \frac{6}{5} \cdot \frac{15}{2} \\
 & = \frac{2 \cdot 3 \cdot 3 \cdot 5}{2 \cdot 5} \\
 & = \boxed{9}
 \end{aligned}$$

$$\begin{aligned}
 21) \quad & \frac{\frac{4}{9}}{\frac{2}{22}} = \frac{4}{9} \div \frac{2}{22} = \frac{4}{9} \cdot \frac{22}{2} \\
 & = \frac{4 \cdot 2}{9} = \boxed{\frac{8}{9}}
 \end{aligned}$$

Exercise 2.4 continued

$$22) \quad \frac{\frac{1}{2} + \frac{3}{5}}{\frac{2}{7}} = \frac{\frac{5}{10} + \frac{6}{10}}{\frac{2}{7}} = \frac{\frac{11}{10}}{\frac{2}{7}} = \frac{11}{10} \div \frac{2}{7} = \frac{11}{10} \cdot \frac{7}{2} = \boxed{\frac{77}{20}}$$

$$23) \quad \frac{\frac{2}{5}}{1 - \frac{2}{3}} = \frac{\frac{2}{5}}{\frac{3}{3} - \frac{2}{3}} = \frac{\frac{2}{5}}{\frac{1}{3}} = \frac{2}{5} \div \frac{1}{3} = \frac{2}{5} \cdot \frac{3}{1} = \boxed{\frac{6}{5}}$$

$$24) \quad \frac{\frac{1}{8} - \frac{3}{2}}{\frac{1}{3}} = \frac{\frac{1}{8} - \frac{3}{2} \cdot \frac{4}{4}}{\frac{1}{3}} = \frac{\frac{1}{8} - \frac{12}{8}}{\frac{1}{3}} = \frac{-\frac{11}{8}}{\frac{1}{3}} = -\frac{11}{8} \div \frac{1}{3} = -\frac{11}{8} \cdot \frac{3}{1} = \boxed{-\frac{33}{8}}$$