MATC9 Get Ready for Grade 9 Fractions Worked Examples and Practice

Example 1: **a)** Reduce $\frac{24}{36}$ to lowest terms.

b) Reduce $\frac{105}{120}$ to lowest terms.

Solution: **a)** Look for numbers that divide evenly into the numerator and denominator. In this question, both are divisible by 12.

$$\frac{24}{36} = \frac{24 \div 12}{36 \div 12}$$
$$= \frac{2}{3}$$

b) Sometimes it is difficult to determine the largest common factor for the numerator and denominator. You can do the reduction in several steps.

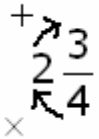
$$\frac{105}{120} = \frac{105 \div 5}{120 \div 5}$$
$$= \frac{21}{24}$$
$$= \frac{21 \div 3}{24 \div 3}$$
$$= \frac{7}{8}$$

Example 2: **a)** Express $2\frac{3}{4}$ as an improper fraction.

b) Express $\frac{14}{5}$ as a mixed number.

Solution: **a)** You have 2 wholes of 4 quarters each, making 8 quarters. Add the remaining 3 quarters to arrive at an answer of $\frac{11}{4}$.

You can achieve the same result using the algorithm "denominator times whole plus numerator." The answer is again $\frac{11}{4}$.



$$4 \times 2 + 3 = 11$$

b) Divide 14 by 5. The quotient of 2 gives you the whole number, and the remainder of 4 gives you the numerator. The answer is $2\frac{4}{5}$.

$$5\overline{)14}\ 2$$
$$\underline{10}$$
$$4$$

Example 3: Express the fraction $\frac{5}{8}$ with a denominator of 24.

Solution: Divide the desired denominator by the given denominator: $\frac{24}{8} = 3$. Then, multiply the numerator and denominator of the fraction by the result.

$$\frac{5 \times 3}{8 \times 3} = \frac{15}{24}$$

Example 4: **a)** Add $\frac{3}{4} + \frac{2}{3}$. **b)** Subtract $3\frac{2}{5} - 2\frac{1}{4}$.

Solution: a) To add or subtract fractions, they must have the same denominator. Find the smallest number that both given denominators will divide into evenly. This is called the "lowest common denominator." In this question, the lowest common denominator is 12. Express each fraction with the denominator of 12, and add the numerators.

$$\begin{aligned}\frac{3}{4} + \frac{2}{3} &= \frac{3 \times 3}{4 \times 3} + \frac{2 \times 4}{3 \times 4} \\ &= \frac{9}{12} + \frac{8}{12} \\ &= \frac{17}{12} \\ &= 1\frac{5}{12}\end{aligned}$$

b) Change each mixed number into an improper fraction. Then, use the lowest common denominator of 20, and subtract.

$$\begin{aligned}3\frac{2}{5} - 2\frac{1}{4} &= \frac{17}{5} - \frac{9}{4} \\ &= \frac{17 \times 4}{5 \times 4} - \frac{9 \times 5}{4 \times 5} \\ &= \frac{68}{20} - \frac{45}{20} \\ &= \frac{23}{20} \\ &= 1\frac{3}{20}\end{aligned}$$

Example 5: a) Multiply $\frac{3}{5} \times \frac{6}{7}$. **b)** Multiply $4\frac{1}{5} \times 2\frac{2}{3}$.

Solution: a) When multiplying fractions, multiply the numerators and the denominators.

$$\frac{3}{5} \times \frac{6}{7} = \frac{3 \times 6}{5 \times 7}$$
$$= \frac{18}{35}$$

b) Change each mixed number to an improper fraction. Then, multiply the numerators and denominators. **Hint:** cancel any common factors before multiplying.

$$4\frac{1}{5} \times 2\frac{2}{3} = \frac{21}{5} \times \frac{8}{3}$$
$$= \frac{7}{5} \times \frac{8}{1}$$
$$= \frac{56}{5}$$
$$= 11\frac{1}{5}$$

Example 6: a) Divide $\frac{2}{5} \div \frac{4}{9}$. **b)** Divide $3\frac{1}{5} \div 2\frac{2}{3}$.

Solution: a) When dividing fractions, multiply the first fraction by the reciprocal of the second fraction. This is known as the "invert and multiply" rule. **Hint:** cancel any common factors before multiplying.

$$\begin{aligned}\frac{2}{5} \div \frac{4}{9} &= \frac{2}{5} \times \frac{9}{4} \\ &= \frac{1}{5} \times \frac{9}{2} \\ &= \frac{9}{10}\end{aligned}$$

b) Change each mixed number to an improper fraction. Then, multiply the first fraction by the reciprocal of the second fraction.

$$\begin{aligned}3\frac{1}{5} \div 2\frac{2}{3} &= \frac{16}{5} \div \frac{8}{3} \\ &= \frac{16}{5} \times \frac{3}{8} \\ &= \frac{2}{5} \times \frac{3}{1} \\ &= \frac{6}{5} \\ &= 1\frac{1}{5}\end{aligned}$$

Example 7: **a)** Multiply $5 \times \frac{4}{7}$. **b)** Multiply $3 \times 2\frac{4}{9}$.

Solution: **a)** The whole number 5 is understood to be over a denominator of 1.

$$\begin{aligned} 5 \times \frac{4}{7} &= \frac{5}{1} \times \frac{4}{7} \\ &= \frac{20}{7} \\ &= 2\frac{6}{7} \end{aligned}$$

b) Change the mixed number to an improper fraction before multiplying. **Hint:** cancel any common factors before multiplying.

$$\begin{aligned} 3 \times 2\frac{4}{9} &= 3 \times \frac{22}{9} \\ &= 1 \times \frac{22}{3} \\ &= \frac{22}{3} \\ &= 7\frac{1}{3} \end{aligned}$$

Example 8: Simplify $\left(\frac{2}{5} + \frac{3}{4}\right) \div \left(2\frac{1}{3} - 1\frac{1}{4}\right)$.

Solution: Use BEDMAS rules.

$$\begin{aligned} \left(\frac{2}{5} + \frac{3}{4}\right) \div \left(2\frac{1}{3} - 1\frac{1}{4}\right) &= \left(\frac{8}{20} + \frac{15}{20}\right) \div \left(\frac{7}{3} - \frac{5}{4}\right) \\ &= \left(\frac{23}{20}\right) \div \left(\frac{28}{12} - \frac{15}{12}\right) \\ &= \left(\frac{23}{20}\right) \div \left(\frac{13}{12}\right) \\ &= \left(\frac{23}{20}\right) \times \left(\frac{12}{13}\right) \\ &= \left(\frac{23}{5}\right) \times \left(\frac{3}{13}\right) \\ &= \frac{69}{65} \\ &= 1\frac{4}{65} \end{aligned}$$

Practice:

1. a) Reduce $\frac{42}{48}$ to lowest terms.

b) Reduce $\frac{264}{384}$ to lowest terms.

2. a) Express $5\frac{3}{7}$ as an improper fraction.

b) Express $\frac{32}{9}$ as a mixed number.

3. Express $\frac{3}{11}$ with a denominator of 44.

4. a) Add $\frac{2}{3}+\frac{3}{5}$.

b) Subtract $3\frac{2}{7}-2\frac{1}{2}$.

5. a) Multiply $\left(\frac{5}{8}\right)\left(\frac{4}{11}\right)$.

b) Multiply $\left(1\frac{3}{4}\right)\left(2\frac{3}{14}\right)$.

6. a) Divide $\left(\frac{4}{9}\right)\div\left(\frac{2}{3}\right)$.

b) Divide $\left(1\frac{2}{9}\right)\div\left(7\frac{1}{3}\right)$.

7. a) Multiply $7 \times \frac{4}{5}$.

b) Multiply $3 \times 4\frac{3}{4}$.

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

Answers:

1. a) $\frac{7}{8}$ b) $\frac{11}{16}$ 2. a) $\frac{38}{7}$ b) $3\frac{5}{9}$ 3. $\frac{12}{44}$ 4. a) $1\frac{4}{15}$ b) $\frac{11}{14}$
5. a) $\frac{5}{22}$ b) $3\frac{7}{8}$ 6. a) $\frac{2}{3}$ b) $\frac{1}{6}$ 7. a) $5\frac{3}{5}$ b) $14\frac{1}{4}$ 8. $\frac{1}{43}$