

# Reasoning and Problem Solving

## Step 14: Four Rules with Fractions

### National Curriculum Objectives:

Mathematics Year 6: (6F2) [Use common factors to simplify fractions; use common multiples to express fractions in the same denomination](#)

Mathematics Year 6: (6F4) [Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions](#)

Mathematics Year 6: (6F5a) [Multiply simple pairs of proper fractions, writing the answer in its simplest form \[for example,  \$1/4 \times 1/2 = 1/8\$ \]](#)

Mathematics Year 6: (6F5b) [Divide proper fractions by whole numbers \[for example,  \$1/3 \div 2 = 1/6\$ \]](#)

### Differentiation:

Questions 1, 4 and 7 (Problem Solving)

**Developing** Change one number in a multi-step calculation to make the answer correct, using knowledge of the four rules with fractions. Fractions have the same denominators and pictorial support is provided.

**Expected** Change one operation in a multi-step calculation to make the answer correct, using knowledge of the four rules with fractions. Fractions and mixed numbers are used and have denominators that are direct multiples.

**Greater Depth** Change one operation in a multi-step calculation to make the answer correct, using knowledge of the four rules with fractions. Improper fractions and mixed numbers are used and have denominators that are not always direct multiples.

Questions 2, 5 and 8 (Problem Solving)

**Developing** Select the correct operation to complete the calculations, using knowledge of the four rules with fractions. Fractions have the same denominators and pictorial support is provided.

**Expected** Select the correct operation to complete the calculations, using knowledge of the four rules with fractions. Fractions and mixed numbers have denominators that are direct multiples.

**Greater Depth** Select the correct operation to complete the calculations, using knowledge of the four rules with fractions. Proper fractions, improper fractions and mixed numbers are used and have denominators that are not always direct multiples.

Questions 3, 6 and 9 (Reasoning)

**Developing** Explain who is correct, using knowledge of the four rules with fractions. Fractions have the same denominators.

**Expected** Explain who is correct, using knowledge of the four rules with fractions. Fractions have denominators that are direct multiples.

**Greater Depth** Explain who is correct, using knowledge of the four rules with fractions. Proper fractions, improper fractions and mixed numbers are used and have denominators that are not always direct multiples.

More [Year 6 Fractions](#) resources.

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## Four Rules with Fractions

1a. The following calculation is incorrect.

$$\frac{2}{10} + \frac{3}{10} + \frac{4}{10} = \frac{8}{10}$$

Change one number in the calculation to make the answer correct.



PS

## Four Rules with Fractions

1b. The following calculation is incorrect.

$$\frac{7}{8} - \frac{2}{8} - \frac{1}{8} = \frac{1}{8}$$

Change one number in the calculation to make the answer correct.



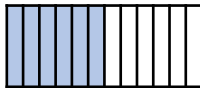
PS

2a. Select the correct operation to make the calculation correct.

A.  $(\frac{2}{5} + \frac{2}{5})$    $\frac{3}{5} = \frac{1}{5}$



B.  $(\frac{8}{12} + \frac{4}{12})$    $2 = \frac{6}{12}$



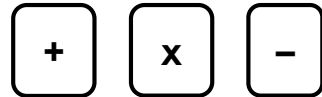
PS

2b. Select the correct operation to make the calculation correct.

A.  $(\frac{9}{10} - \frac{7}{10})$    $\frac{4}{10} = \frac{6}{10}$



B.  $(\frac{4}{5} \text{  } \frac{3}{5}) \times 3 = \frac{3}{5}$



PS

3a. Lottie and Suzie have completed the same calculation.



Lottie

$$(\frac{5}{8} - \frac{2}{8}) \div 3 = \frac{1}{8}$$



Suzie

$$(\frac{5}{8} - \frac{2}{8}) \div 3 = \frac{3}{8}$$

Who is correct? Explain how you know.



R

3b. Jacob and Bradley have completed the same calculation.



Jacob

$$(\frac{7}{9} - \frac{5}{9}) \times 4 = \frac{6}{9}$$



Bradley

$$(\frac{7}{9} - \frac{5}{9}) \times 4 = \frac{8}{9}$$

Who is correct? Explain how you know.



R

## Four Rules with Fractions

## Four Rules with Fractions

4a. The following calculation is incorrect.

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

Change one operation in the calculation to make the answer correct.



PS

4b. The following calculation is incorrect.

$$\left(\frac{2}{4} - \frac{1}{4}\right) \times \frac{4}{8} = \frac{3}{8}$$

Change one operation in the calculation to make the answer correct.



PS

5a. Select the correct operation to make the calculation correct.

A.  $\left(1\frac{3}{4} \square \frac{6}{24}\right) - \frac{4}{12} = 1\frac{8}{12}$

B.  $\left(1\frac{1}{8} \square \frac{1}{4}\right) + 1 = 1\frac{7}{8}$

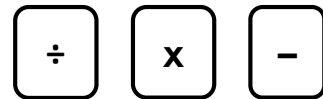


PS

5b. Select the correct operation to make the calculation correct.

A.  $\left(4\frac{2}{4} \square 3\right) + \frac{10}{16} = 2\frac{1}{8}$

B.  $\left(\frac{5}{8} + \frac{4}{16}\right) \square 3 = 2\frac{10}{16}$



PS

6a. John and Rhoda have completed the same calculation.



John

$$\left(\frac{7}{4} - \frac{2}{8}\right) \div 2 = \frac{3}{8}$$



Rhoda

$$\left(\frac{7}{4} - \frac{2}{8}\right) \div 2 = \frac{3}{4}$$

Who is correct? Explain how you know.



R

6b. Harry and Mina have completed the same calculation.



Harry

$$\left(\frac{3}{4} + \frac{2}{8}\right) \times 2 = 2$$



Mina

$$\left(\frac{3}{4} + \frac{2}{8}\right) \times 2 = 1$$

Who is correct? Explain how you know.



R

## Four Rules with Fractions

## Four Rules with Fractions

7a. The following calculation is incorrect.

$$\left(\frac{8}{5} + \frac{16}{12}\right) \times 2 = 1\frac{7}{15}$$

Change one operation in the calculation to make the answer correct.



PS

7b. The following calculation is incorrect.

$$\left(\frac{8}{6} + \frac{9}{5}\right) \div 2 = \frac{12}{10} = 1\frac{1}{5}$$

Change one operation in the calculation to make the answer correct.



PS

8a. Select the correct operation to make the calculations correct.

A.  $\left(\frac{4}{3} \square \frac{5}{7}\right) \times 3 = \frac{39}{21}$

B.  $\left(\frac{3}{6} + \frac{6}{14}\right) \square 2 = 1\frac{6}{7}$



PS

8b. Select the correct operation to make the calculations correct.

A.  $\left(\frac{5}{8} \square \frac{4}{5}\right) + \frac{10}{16} = 1\frac{1}{8}$

B.  $\left(\frac{7}{3} - \frac{1}{4}\right) \square \frac{8}{10} = \frac{50}{30}$



PS

9a. Micha and Peter have completed the same calculation.



Micha

$$\left(\frac{9}{12} \div 3\right) \times \frac{8}{7} = 1\frac{7}{12}$$



Peter

$$\left(\frac{9}{12} \div 3\right) \times \frac{8}{7} = \frac{24}{84} = \frac{2}{7}$$

Who is correct? Explain how you know.



R

9b. Bobby and Brooke have completed the same calculation.



Bobby

$$\left(\frac{9}{8} + \frac{2}{9}\right) \times 2 = 2\frac{25}{72}$$



Brooke

$$\left(\frac{9}{8} + \frac{2}{9}\right) \times 2 = 2\frac{25}{36}$$

Who is correct? Explain how you know.



R

## Reasoning and Problem Solving Four Rules with Fractions

### Developing

1a. Various answers, for example:

$$\frac{1}{10} + \frac{3}{10} + \frac{4}{10} = \frac{8}{10}$$

2a. A. - ; B. ÷

3a. Lottie is correct:  $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$  and  
 $\frac{3}{8} \div 3 = \frac{1}{8}$ .

### Expected

4a. The calculation should read:

$$\left(\frac{2}{8} + \frac{4}{8}\right) \times 3 = 2\frac{1}{4}$$

5a. A. + ; B. -

6a. Rhoda is correct:

$$\frac{7}{4} - \frac{2}{8} = \frac{14}{8} - \frac{2}{8} = \frac{12}{8} \text{ and}$$
$$\frac{12}{8} \div 2 = \frac{6}{8} = \frac{3}{4}$$

### Greater Depth

7a. The calculation should read:

$$\left(\frac{8}{5} + \frac{16}{12}\right) \div 2 = 1\frac{7}{15}$$

8a. A. - ; B. x

9a. Peter is correct:  $\frac{9}{12} \div 3 = \frac{3}{12}$  and

$$\frac{3}{12} \times \frac{8}{7} = \frac{24}{84} = \frac{2}{7}$$

## Reasoning and Problem Solving Four Rules with Fractions

### Developing

1b. Various answers, for example:

$$\frac{7}{8} - \frac{5}{8} - \frac{1}{8} = \frac{1}{8}$$

2b. A. + ; B. -

3b. Bradley is correct:  $\frac{7}{9} - \frac{5}{9} = \frac{2}{9}$  and  
 $\frac{2}{9} \times 4 = \frac{8}{9}$ .

### Expected

4b. The calculation should read:

$$\left(\frac{2}{4} + \frac{1}{4}\right) \times \frac{4}{8} = \frac{3}{8}$$

5b. A. ÷ ; B. x

6b. Harry is correct:

$$\frac{3}{4} + \frac{2}{8} = \frac{6}{8} + \frac{2}{8} = 1 \text{ and } 1 \times 2 = 2$$

### Greater Depth

7b. The calculation should read:

$$\left(\frac{8}{6} \times \frac{9}{5}\right) \div 2 = \frac{12}{10} = 1\frac{1}{5}$$

8b. A. x ; B. x

9b. Brooke is correct:

$$\frac{9}{8} + \frac{2}{9} = \frac{81}{72} + \frac{16}{72} = \frac{97}{72} \text{ and}$$

$$\frac{97}{72} \times 2 = \frac{194}{72} = 2\frac{50}{72} = 2\frac{25}{36}$$