

Skills for Success Curriculum Resource Cover Page

Organization

College Sector Committee for Adult Upgrading (CSC)

Curriculum Resource

Refresher: Operations with Fractions

In this activity learners will complete a quick review of operations with fractions, including examples and practice questions. Then they will complete a short activity answering questions applied to construction trades. Solutions are included at the end.

OALCF Alignment

Competency	Task Group	Level
Competency A -Find and Use Information	A1. Read continuous text	2
Competency A -Find and Use Information	A2. Interpret documents	2
Competency C - Understand and Use Numbers	C3. Use measures	3

Goal Paths (check all that apply)

- Employment
 Postsecondary
 Apprenticeship
 Independence
 Secondary School Credit

Embedded Skills for Success (check all that apply)

- Adaptability
 Numeracy
 Collaboration
 Problem Solving
 Communication
 Reading
 Creativity and innovation
 Writing
 Digital

Notes:

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Operations with Fractions

Learning in this Activity

At the end of this activity, you should be able to:

- Reduce fractions to lowest terms
- Add, subtract, multiply and divide fractions
- Convert between improper fractions and mixed fractions
- Solve applied problems using fraction operations

Part 1: Fractions – The Basics

1. What is a Fraction?

A fraction is used to express a part of a whole.

In this picture of a tape measure, each tick mark represents a part of the whole inch or centimeter.



(Kratochvil, n.d.) CC0 1.0

2. Parts of a Fraction

$$\frac{3}{4} = \frac{\text{Numerator}}{\text{Denominator}}$$

3. Equivalent Fractions

When working, attending school, or in everyday life, you may be required to convert fractions to an equivalent form to compare measurements. Equivalent fractions look different from each other, but they represent the **same** quantity.

To create an equivalent fraction multiply (or divide) both the top and bottom numbers by the **same** number.

Example 3.1

List 2 equivalent fractions for each.

a) $\frac{6}{12}$

Multiply numerator and denominator by 2

$$\frac{6}{12} = \frac{(6)(2)}{(12)(2)} = \frac{12}{24}$$

Multiply numerator and denominator by 10

$$\frac{6}{12} = \frac{(6)(10)}{(12)(10)} = \frac{60}{120}$$

b) $\frac{12}{144}$

Divide numerator and denominator by 2

$$\frac{12}{144} = \frac{(12)\div(2)}{(144)\div(2)} = \frac{6}{72}$$

Multiply numerator and denominator by 3

$$\frac{12}{144} = \frac{(12)(3)}{(144)(3)} = \frac{36}{432}$$

4. Reducing Fractions to Lowest Terms

Reducing fractions to lowest terms is important when you need to compare measurements.

To reduce a fraction to lowest terms, we divide the top and bottom numbers of the fraction by the **same** number. We know a fraction is in lowest terms if both the top and bottom number cannot both be divided by anything other than one.

Tip: You might have to divide the top and bottom more than once to get to the lowest terms.

Example 4.1

Reduce the following to lowest terms.

a) $\frac{24}{42}$

$$\frac{24}{42} = \frac{(24) \div (6)}{(42) \div (6)} = \frac{4}{7}$$

b) $\frac{12}{144}$

$$\frac{12}{144} = \frac{(12) \div (2)}{(144) \div (2)} = \frac{(6) \div (2)}{(72) \div (2)} = \frac{(3) \div (3)}{(36) \div (3)} = \frac{1}{12}$$

5. Types of Fractions

There are three types of fractions you may encounter while taking measurements and completing calculations.

$\frac{3}{4}$ is a **proper fraction** because the top is less than the bottom.

$\frac{8}{3}$ is an **improper fraction** because the top is greater than the bottom.

$2\frac{2}{3}$ is a **mixed fraction** because it contains both a whole number and a fraction.

Example 5.1

Identify if the fraction is proper, improper, or mixed.

- a) $3\frac{1}{4}$ Mixed
- b) $\frac{32}{6}$ Improper
- c) $\frac{5}{9}$ Proper
- d) $\frac{15}{2}$ Improper
- e) $12\frac{27}{28}$ Mixed
- f) $\frac{9}{67}$ Proper

6. Converting Between Improper and Mixed Fractions

Step 1: Divide the top by the bottom.

Step 2: The number to the left of the decimal becomes the whole number.

Step 3: Write this number as the whole number (not part of the fraction).

Step 4: Write the original bottom as the bottom of the new fraction.

Step 5: Multiply the whole number with the bottom (denominator).

Step 6: Subtract this from the original top (numerator).

Step 7: The leftovers become the top of the new fraction.

Example 6.1

Express the following as mixed fractions.

a) $\frac{15}{3}$

$$\frac{15}{3}$$

$$15 \div 3$$

$$= 5.0$$

$$= 5 \frac{15 - (5)(3)}{3}$$

$$= 5 \frac{0}{3}$$

$\frac{0}{3}$ is equal to 0 so we do not write it in our final result

$$= 5$$

b) $\frac{25}{6}$

$$\frac{25}{6}$$

$$25 \div 6$$

$$= 4.16667$$

$$= 4 \frac{25 - (4)(6)}{6}$$

$$= 4 \frac{25 - 24}{6}$$

$$= 4 \frac{1}{6}$$

7. Converting Between Mixed and Improper Fractions

Step 1: Multiply the bottom number of the fraction by the whole number.

Step 2: Add this answer to the top number in the fraction.

Step 3: This answer is your new top number and keep the **original** bottom number.

NOTE: When using mixed numbers in calculations, it is easiest to convert the mixed number to an improper fraction before beginning any calculations.

Example 7.1

Express the following as improper fractions.

a) $7\frac{1}{4}$

$$7\frac{1}{4} = \frac{((4)(7)+1)}{4} = \frac{(28+1)}{4} = \frac{29}{4}$$

b) $5\frac{3}{8}$

$$5\frac{3}{8} = \frac{((8)(5)+3)}{8} = \frac{(40+3)}{8} = \frac{43}{8}$$

Part 2: Performing Operations with Fractions

8. Adding and Subtracting Fractions

To add and subtract fractions, we need to ensure they have the **same** denominator.

Step 1: Convert from mixed to improper fractions if necessary.

Step 2: Find a common denominator by multiplying the bottom numbers together.

Step 3: Rewrite your first fraction as an equivalent fraction with the common denominator by multiplying both the top and bottom numbers with the bottom number of your second fraction.

Step 4: Rewrite your second fraction as an equivalent fraction with the common denominator by multiplying both the top and bottom numbers with the original bottom number of your first fraction.

Step 5: Add or subtract the top number.

Step 6: Keep the bottom number.

Step 7: Reduce answer to lowest terms.

Example 8.1

$$a) \frac{5}{8} - \frac{3}{5}$$

The fractions are not mixed so no need to convert.

First, find a common denominator (Multiply bottom numbers together).

$(8)(5) = 40$ this is the common denominator

Rewrite your fractions as equivalent fractions with the common denominator.

Multiply both the top and bottom numbers of the fraction with the bottom number of the other fraction.

$$\frac{5}{8} = \frac{(5)(5)}{(8)(5)} = \frac{25}{40}$$

$$\frac{3}{5} = \frac{(3)(8)}{(5)(8)} = \frac{24}{40}$$

We are ready to subtract.

$$\frac{5}{8} - \frac{3}{5}$$

Rewrite the subtraction using the equivalent fractions from above.

$$= \frac{25}{40} - \frac{24}{40}$$

Subtract the top numbers.

$$= \frac{25 - 24}{40}$$

This fraction is in lowest terms, so we are done.

$$= \frac{1}{40}$$

b) $\frac{8}{12} + \frac{7}{20}$

The fractions are not mixed so no need to convert.

Find a common denominator (Multiply bottom numbers together).

$$(12)(20) = 240 \text{ this is the common denominator}$$

Rewrite your fractions as equivalent fractions with the common denominator. Multiply both the top and bottom numbers of the fraction with the bottom number of the other fraction.

$$\frac{8}{12} = \frac{(8)(20)}{(12)(20)} = \frac{160}{240}$$

$$\frac{7}{20} = \frac{(7)(12)}{(20)(12)} = \frac{84}{240}$$

We are ready to add.

$$\frac{8}{12} + \frac{7}{20}$$

Rewrite the addition using the equivalent fractions from above.

$$= \frac{160}{240} + \frac{84}{240}$$

Add the top numbers.

$$= \frac{160 + 84}{240}$$

$$= \frac{244}{240}$$

This is an improper fraction, so we must convert to a mixed number.

$$\frac{244}{240} = 244 \div 240 = 1 \text{ with a remainder of } 4 = 1\frac{4}{240}$$

We need to reduce $\frac{4}{240}$

$$\frac{4}{240} = \frac{(4) \div (4)}{(240) \div (4)} = \frac{1}{60}$$

Now rewrite the answer by writing the whole number (1) and the fraction together.

The answer is $1\frac{1}{60}$

9. Multiplying Fractions

Step 1: Convert from mixed to improper fractions if necessary.

Step 2: Multiply the tops.

Step 3: Multiply the bottoms.

Step 4: Reduce to lowest terms.

Example 9.1

Multiply the following:

a) $\frac{1}{2} \times \frac{2}{5}$

$$\frac{1}{2} \times \frac{2}{5} = \frac{(1)(2)}{(2)(5)} = \frac{2}{10}$$

We need to reduce $\frac{2}{10}$

$$\frac{2}{10} = \frac{(2) \div (2)}{(10) \div (2)} = \frac{1}{5}$$

The answer is $\frac{1}{5}$

b) $5\frac{2}{3} \times \frac{3}{5}$

Convert first fraction to an improper fraction.

$$5\frac{2}{3} = \frac{((5)(3) + 2)}{3} = \frac{(15+2)}{3} = \frac{17}{3}$$

$$\frac{17}{3} \times \frac{3}{5} = \frac{(17)(3)}{(3)(5)} = \frac{51}{15}$$

We need to reduce $\frac{51}{15}$

$$\frac{51}{15} = \frac{(51) \div (3)}{(15) \div (3)} = \frac{17}{5}$$

Now convert to a mixed number.

$$\frac{17}{5} = 17 \div 5 = 3 \text{ with a remainder of } 2 = 3\frac{2}{5}$$

The answer is $3\frac{2}{5}$

10. Dividing Fractions

Step 1: Convert from mixed to improper fractions if necessary.

Step 2: Flip the second fraction.

Step 3: Change the operation from division to multiplication.

Step 4: Multiply the fractions.

Step 5: Reduce to lowest terms.

Example 10.1

Divide the following:

a) $\frac{7}{8} \div \frac{2}{3}$

$$\frac{7}{8} \div \frac{2}{3} = \frac{7}{8} \times \frac{3}{2} = \frac{7 \times 3}{8 \times 2} = \frac{21}{16}$$

Convert to a mixed number.

$$\frac{21}{16} = 21 \div 16 = 1 \text{ with a remainder of } 5 = 1 \frac{5}{16}$$

The answer is $1 \frac{5}{16}$

b) $5 \div \frac{7}{9}$

$$5 \div \frac{7}{9} = \frac{5}{1} \div \frac{7}{9} = \frac{5}{1} \times \frac{9}{7} = \frac{5 \times 9}{1 \times 7} = \frac{45}{7}$$

Convert to a mixed number.

$$\frac{45}{7} = 45 \div 7 = 6 \text{ with a remainder of } 3 = 6 \frac{3}{7}$$

The answer is $6 \frac{3}{7}$

Practice Questions

Use the following questions to practice your skills. The answers are on the next page.

1. Convert the following to an improper fraction:

a) $1\frac{1}{5}$

b) $2\frac{3}{7}$

c) $4\frac{4}{5}$

2. Convert the following to a mixed number:

a) $\frac{12}{5}$

b) $\frac{36}{5}$

c) $\frac{49}{8}$

3. Evaluate and reduce to lowest terms:

a) $\frac{5}{8} - \frac{3}{8}$

b) $\frac{2}{3} + \frac{5}{9} + \frac{1}{6}$ Express answer as a mixed fraction

c) $18 - 4\frac{1}{5}$ Express answer as an improper fraction

d) $\frac{3}{8} - \frac{4}{5} + \frac{7}{10}$

e) $\frac{4}{7} \times \frac{21}{8} \times \frac{1}{3}$

f) $\frac{42}{48} \div \frac{7}{16}$

g) $\frac{4}{5} \div 2\frac{1}{3}$

Practice Questions Answers

1. a) $\frac{6}{5}$

b) $\frac{17}{7}$

c) $\frac{24}{5}$

2. a) $2\frac{2}{5}$

b) $7\frac{1}{5}$

c) $6\frac{1}{8}$

3. (a) $\frac{1}{4}$

(b) $1\frac{7}{18}$

(c) $\frac{69}{5}$

(d) $\frac{11}{40}$

(e) $\frac{1}{2}$

(f) 2

(g) $\frac{12}{35}$

Ask your instructor to check your answers for the following questions.

- ✓ Show your work where applicable.
- ✓ You may use your calculator.
- ✓ Express answers in lowest terms when possible.

1. You need 4 pieces of trim that are $5\frac{1}{5}$ inches long to trim a bathroom. What is the total length of trim that you need for the bathroom?

a) Answer as an improper fraction (4 marks)

b) Answer as a mixed fraction (2 marks)

2. You have a piece of drywall of length $4\frac{7}{8}$ feet and another piece measuring of length $3\frac{5}{32}$ feet.

a) How much bigger is the first piece of drywall than the second? (11 marks)

b) What is the total length of drywall that you have? Answer as a mixed fraction. (9 marks)

Bibliography

Kratochvil, P. (n.d.). *A measuring tape isolated on a white background*. freestockphotos.biz. Freestockphotos.biz. Retrieved January 11, 2023, from <http://www.freestockphotos.biz/stockphoto/9176>.

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SOLUTIONS**Applying your Skills****/28 marks**

1. You need 4 pieces of trim that are $5\frac{1}{5}$ inches long to trim a bathroom. What is the total length of trim that you need for the bathroom?

a) Answer as an improper fraction

(2 marks)

$$5\frac{1}{5} = \frac{((5 \times 5) + 1)}{5} = \frac{(25 + 1)}{5} = \frac{26}{5}$$

(2 marks)

$$4 \times \frac{26}{5} = \frac{4}{1} \times \frac{26}{5} = \frac{4 \times 26}{1 \times 5} = \frac{104}{5} \text{ inches}$$

b) Answer as a mixed fraction

(2 marks)

$$\frac{104}{5} = 104 \div 5 = 20 \text{ with a remainder of } 4 = 20\frac{4}{5} \text{ inches}$$

2. You have a piece of drywall of length $4\frac{7}{8}$ feet and another piece measuring of length $3\frac{5}{32}$ feet.

a) How much bigger is the first piece of drywall than the second? Answer as a mixed fraction.

(2 marks)

$$4\frac{7}{8} = \frac{((4 \times 8) + 7)}{8} = \frac{(32 + 7)}{8} = \frac{39}{8}$$

(2 marks)

$$3\frac{5}{32} = \frac{((3 \times 32) + 5)}{32} = \frac{(96 + 5)}{32} = \frac{101}{32}$$

(4 marks)

$$\frac{39}{8} - \frac{101}{32} = \frac{39 \times 32}{8 \times 32} - \frac{101 \times 8}{32 \times 8} = \frac{1248}{256} - \frac{808}{256} = \frac{440}{256}$$

(2 marks)

$$\frac{440}{256} = 440 \div 256 = 1 \text{ with a remainder of } 184 = 1\frac{184}{256} \text{ feet}$$

(2 marks)

$$\frac{184}{256} = \frac{(184) \div (8)}{(256) \div (8)} = \frac{23}{32} \text{ feet}$$

(1 mark)

$$1\frac{23}{32} \text{ feet}$$

b) What is the total length of drywall that you have? Answer as a mixed fraction.

(4 marks)

$$\frac{39}{8} + \frac{101}{32} = \frac{39 \times 32}{8 \times 32} + \frac{101 \times 8}{32 \times 8} = \frac{1248}{256} + \frac{808}{256} = \frac{2056}{256}$$

(2 marks)

$$\frac{2056}{256} = 2056 \div 256 = 8 \text{ with a remainder of } 8 = 8\frac{8}{256} \text{ feet}$$

(2 marks)

$$\frac{8}{256} = \frac{(8 \div 8)}{(256 \div 8)} = \frac{1}{32}$$

(1 mark)

$$8\frac{1}{32} \text{ feet}$$