



# The GED Mathematics Test

## *Fractions*



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# GED

## Video Partner



### Passing the GED Math Test

Music, in performance, is a type of sculpture.  
Frank Zappa (1940- 1994)

Video 31 Focus: how we use fractions in our daily lives and how to solve problems using fractions.

#### You Will Learn From Video 31:

- How to use fractions to solve problems.
- That fractions use division to express parts of a whole.
- The rules for performing four operations with fractions.
- Using the calculator to solve problems with fractions.
- About prime numbers and composite numbers.



#### Words You Need to Know:

While viewing the video, put the letter of the meaning by the correct vocabulary word. Answers are on page 21.

- |                       |   |
|-----------------------|---|
| _____ 1. fraction     | a. top number of a fraction representing the part         |
| _____ 2. numerator    | b. number that has only itself and one as factors         |
| _____ 3. denominator  | c. way to show division with the part over the whole      |
| _____ 4. prime number | d. a whole number and a fraction such as $3 \frac{1}{4}$  |
| _____ 5. mixed number | e. the bottom number of a fraction representing the whole |



#### Points to Remember:

- We already use fractions in our daily lives.
- There are special rules for performing operations with fractions.
- The calculator for the GED Math Test will do computations with fractions.
- Fractions can be very practical!

## Fractions in Daily Living

Fractions are things we use in our daily lives even if we do not think of activities with fractions as a mathematical exercise. Some of the most important mathematical skills are those that you learn and use in real life. Your own experience as an adult will help you to understand fractions and their use in solving problems for the GED Math Test.

Check the activities you have completed that involve fractions:

- |                                  |                        |                         |
|----------------------------------|------------------------|-------------------------|
| _____ followed a recipe          | _____ doubled a recipe | _____ diluted a mixture |
| _____ took music lessons         | _____ cut a pizza      | _____ sang songs        |
| _____ measured something at home | _____ cut brownies     | _____ made change       |
| _____ set up a fish tank         | _____ built something  | _____ sewed something   |

Now list some other activities that you have done which are not on the list above:



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## Introduction to Fractions

A fraction is a number that uses division to express a part of a whole. The part is placed over the whole to show a number equal to or smaller than the whole. For example, the fraction  $3/5$ , or  $\frac{3}{5}$ , means three parts out of five. This bar shows a picture of the fraction:



These three parts represent the  $3/5$ .  
Here you see shaded the part showing  $3/5$ .

The top number represents the parts, and the bottom number represents the whole. The top number is called the **numerator**, and the bottom number is called the **denominator**.

NUMERATOR  
DENOMINATOR

3  
5

PART  
WHOLE

## About Math and Life



Carmen wanted to bake cookies for her cousins' visit. She knew they really loved her punch bowl cookies with the jam in the center. Since it would be a large group, she decided to double the recipe. Answers are on page 21.

### Punch Bowl Cookies

$\frac{2}{3}$  cup real butter  
 $\frac{1}{3}$  cup sugar  
1 egg  
1 teaspoon vanilla  
 $\frac{1}{2}$  teaspoon salt  
 $1\frac{3}{4}$  cups flour

Cream butter, sugar, egg, and vanilla together. Add dry ingredients and mix thoroughly. The dough should be soft but not wet. Add flour if necessary. Roll into balls. Press thumb in the center and fill with jam. Substitutes for jam are chocolate kisses, candied cherries, or nuts. Bake at  $350^\circ$  for about 20 minutes or until lightly browned.

Write the new list of ingredients here:

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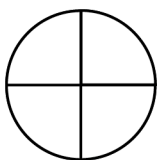
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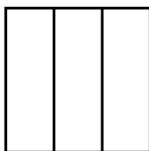
### Practice Showing Fractions

Shade the following pictures to show the correct fraction:

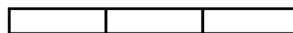
Answers are on page 21.



$\frac{3}{4}$



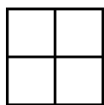
$\frac{2}{3}$



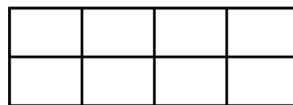
$\frac{1}{3}$



$\frac{5}{6}$



$\frac{1}{4}$



$\frac{5}{8}$

Use the space below to draw your own illustrations of the these fractions:

Answers are on page 21.

$\frac{1}{2}$

$\frac{3}{8}$

$\frac{5}{12}$

$\frac{1}{3}$

$\frac{4}{5}$

$\frac{5}{6}$

## Finding Equivalent Fractions

It is often necessary to express a fraction in a different way without changing its value. This exercise is called finding an equivalent fraction. For example,  $1/2$  is the same as  $2/4$  or  $3/6$ . In order to find a fraction equivalent to another fraction, it is necessary to multiply or divide the numerator and the denominator by the **same** number.

$$1/2 = 2/4$$

$$\frac{1 \times 2}{2 \times 2} = \frac{2}{4}$$

To find  $2/4$  we multiplied both the numerator and denominator by 2.

$$4/12 = 1/3$$

$$\frac{4 \div 4}{12 \div 4} = \frac{1}{3}$$

To find  $1/3$  we divided both the numerator and denominator by 4.

Sometimes we know all but one missing number when it is necessary to find an equivalent fraction. For example:

$$\frac{3}{24} = \frac{1}{\square}$$

Ask the question? How did 3 become 1? Did we multiply or divide? We divided by three; so now divide 24 by 3 to find the equivalent fraction. *Whatever is done to the numerator, must be done to the denominator so the value of the fraction stays the same (equivalent).*

$$\frac{3}{24} = \frac{1}{8}$$

Find equivalents for the fractions below. Answers are on page 22.

$$1/2 = \square / 4$$

$$1/2 = \square / 8$$

$$1/2 = 6 / \square$$

$$3/15 = \square / 5$$

$$3/4 = \square / 12$$

$$3/4 = \square / 16$$

$$12 / \square = 1/2$$

$$\square / 5 = 18/30$$

$$2/7 = 4 / \square$$

$$1/6 = \square / 18$$

$$\square / 24 = 2/3$$

$$1/3 = 4 / \square$$

Write five fractions that are equivalent to  $1/9$ . \_\_\_\_\_

Write 10 fractions that are equivalent to  $2/3$ .  
\_\_\_\_\_

What two operations are used when finding equivalent fractions? Answer is on page 22.

\_\_\_\_\_ and \_\_\_\_\_  
\_\_\_\_\_

## Operations with Fractions

There are rules for adding, subtracting, multiplying, and dividing fractions. It is important to know these rules and follow them in order to come up with the correct answer. Read the summary of the rules for each operation below. Detailed examples with guided practice will follow.

<b>Addition +</b>	<b>Subtraction -</b>	<b>Multiplication x</b>	<b>Division ÷</b>
Find a common denominator and change fractions to equivalents using the new denominator. Add the numerators. Reduce the answer to lowest terms.	Find a common denominator and change fractions to equivalents using the new denominator. Subtract the numerators. Reduce the answer to lowest terms.	Cross cancel (optional). Multiply the numerators. Multiply the denominators. Reduce the answer to lowest terms.	Invert the divisor. Cross cancel (optional). Multiply the numerators. Multiply the denominators. Reduce the answer to lowest terms.

### Addition



If you are adding fractions with the same denominator, just add the numerators. For example:  $1/3 + 1/3 = 2/3$

$$1/5 + 2/5 = 3/5$$

$$3/8 + 2/8 =$$

$$2/7 + 3/7 =$$

$$1/8 + 1/8 + 3/8 =$$

There are three rules to follow when adding fractions with unlike denominators:

1. Find a common denominator and change fractions to equivalents using the new denominator.
2. Add the numerators.
3. Reduce the answer to lowest terms.

$$3/4 + 1/8$$

The lowest common denominator is 8. Use the least common denominator (LCD) to be most efficient. However, any common denominator will work.

$$\begin{array}{r} \frac{3}{4} \quad \frac{6}{8} \\ \frac{1}{8} \quad \frac{1}{8} \\ \hline \frac{7}{8} \end{array}$$

Change the fractions to eighths. In this case only one fraction has to change.

Add the numerators.

Reducing the answer to lowest terms is customary when performing operations with fractions. Sometimes when you add fractions, the answer is not in lowest terms and needs reducing or is greater than a whole and needs to be changed to a mixed number.

$$\begin{array}{r} \frac{1}{3} \quad \frac{2}{6} \\ + \frac{1}{6} \quad \frac{1}{6} \\ \hline \frac{3}{6} \end{array} = 1/2$$

The answer, 3/6 is not in lowest terms. Divide the numerator and denominator by three to reduce.

$$\begin{array}{r} \frac{1}{3} \quad \frac{2}{6} \\ + \frac{5}{6} \quad \frac{5}{6} \\ \hline \frac{7}{6} \end{array} = 1 \frac{1}{6}$$

7/6 is greater than one whole (improper.) Divide the numerator by the denominator to find the mixed number. Put the remainder over the denominator.

Practice the rules for adding the following fraction problems. Reduce the answers to lowest terms as needed. Change improper fractions to mixed numbers.

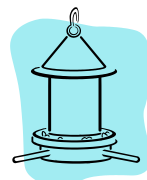
Answers are on page 22.

$2/5 + 1/3 =$	$1/4 + 3/5 =$	$5/6 + 2/3 =$	$2/7 + 5/14 =$	$1/2 + 1/3 =$

$1/8 + 3/4 =$	$2/9 + 5/6 =$	$1/12 + 1/6 =$	$2/3 + 1/4 =$	$3/4 + 7/8 =$

Ralph's father liked to set up bird feeders in his back yard. He had three seed feeders, a suet feeder, and six hummingbird feeders. He made his own seed mixtures. He combined 3/4 cup of black oil sunflower seeds, 1/2 cup of millet, and 2/3 cup of safflower seeds. Approximately how many cups of mix did he end up with in one batch?

\_\_\_\_\_





Exactly how many cups in a double batch? \_\_\_\_\_

The hummingbird feeders were filled with a solution mixed by Ralph's mother. She bought sugar concentrate in powdered form and mixed it with cold water. Each feeder held two cups of mixture. From one feeder the birds drank  $\frac{1}{4}$  cup on Monday,  $\frac{1}{3}$  cup on Tuesday, and  $\frac{1}{6}$  cup on Wednesday, how much mixture was left in the feeder?



\_\_\_\_\_

Answers are on page 22.

$\frac{5}{6} + \frac{7}{8} =$	$\frac{2}{3} + \frac{1}{2} =$	$\frac{5}{12} + \frac{3}{8} =$	$\frac{4}{5} + \frac{4}{7} =$	$\frac{1}{2} + \frac{1}{3} + \frac{1}{5} =$

### Subtraction



If you are subtracting fractions with the same denominator, just subtract the numerators. For example:  $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$

$$\frac{4}{5} - \frac{2}{5} = \frac{2}{5}$$

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

$$\frac{5}{7} - \frac{3}{7} =$$

$$\frac{7}{8} - \frac{1}{8} - \frac{3}{8} =$$

There are three rules to follow when subtracting fractions with unlike denominators:

1. Find a common denominator and change fractions to equivalents using the new denominator.
2. Subtract the numerators.
3. Reduce the answer to lowest terms.

$$\frac{3}{4} - \frac{3}{8}$$

The lowest common denominator is 8. Use the least common denominator (LCD) to be most efficient. However, any common denominator will work.

$$\begin{array}{r} \frac{3}{4} \quad \frac{6}{8} \\ \frac{3}{8} \quad \frac{3}{8} \\ \hline \frac{3}{8} \\ \frac{3}{8} \end{array}$$

Change the fractions to eighths. In this case, only one fraction has to change.

Subtract the numerators.



Practice the rules for subtracting the following fraction problems. Reduce the answers to lowest terms as needed. Change improper fractions to mixed numbers.

Answers are on page 22.

$2/5 - 1/3 =$	$3/4 - 3/5 =$	$5/6 - 2/3 =$	$6/7 - 5/14 =$	$1/2 - 1/3 =$

$7/8 - 3/4 =$	$8/9 - 5/6 =$	$5/12 - 1/6 =$	$2/3 - 1/4 =$	$3/4 - 3/8 =$

Chuck used  $1/4$  cup balsamic vinegar, one garlic clove, and  $2/3$  cup of virgin olive oil to make his special vinaigrette salad dressing. He used  $1/3$  cup of the mixture on the salad he made for dinner. How much mixture was left in the dressing bottle?



Rosita made minestrone soup for dinner for guests. The recipe yielded  $6 \frac{3}{4}$  cups of soup. She served dinner for four and gave each person a  $1/2$  cup serving. Then she froze  $1 \frac{1}{3}$  cups for a future meal for herself and her son. She put the rest in the refrigerator for the next day. How much soup was left to eat the next day?



### Subtracting Mixed Numbers

1. When you subtract mixed numbers, follow the same rules as when you subtract fractions. Find a common denominator and change fractions to equivalents using the new denominator.
2. Subtract the fractions. Then subtract the whole numbers.
3. Reduce the fraction to lowest terms.

$$\begin{array}{r}
 4 \frac{4}{6} \Rightarrow 4 \frac{8}{12} \\
 - 2 \frac{1}{2} \quad \quad \quad 2 \frac{6}{12} \\
 \hline
 \quad \quad \quad \quad \quad \quad 2 \frac{2}{12}
 \end{array}
 \Rightarrow
 \begin{array}{r}
 4 \frac{8}{12} \\
 - 2 \frac{6}{12} \\
 \hline
 2 \frac{2}{12} \Rightarrow 2 \frac{1}{6}
 \end{array}$$



## Multiplication

There are four rules to follow when multiplying fractions:

1. Cross cancel (optional).
2. Multiply the numerators.
3. Multiply the denominators.
4. Reduce the answer to lowest terms.



$$\frac{2}{3} \times \frac{1}{5}$$

Multiply the numerators.  $2 \times 1 = 2$   
 Multiply the denominators.  $3 \times 5 = 15$

$$2/3 \times 1/5 = 2/15$$

In this problem, cross cancellation and reducing are not needed.

$$\begin{array}{r} 3 \\ \cancel{6} \times \frac{14}{\cancel{7} \ 16} \\ 8 \end{array}$$

Cross cancel by looking at the numbers on each diagonal. Divide each by the same number, in this case 2.

$$\begin{array}{r} 3 \quad 2 \\ \cancel{6} \times \frac{14}{\cancel{7} \ 16} \\ 1 \quad 8 \end{array}$$

Now look at the other diagonal. We can divide by 7.

$$\begin{array}{r} 3 \quad 2 \\ \cancel{6} \times \frac{14}{\cancel{7} \ 16} \\ 1 \quad 8 \end{array}$$

Now multiply the numerators.  $3 \times 2 = 6$   
 Then multiply the denominators.  $1 \times 8 = 8$

$$\begin{array}{l} \underline{6} \div \underline{2} = \underline{3} \\ \underline{8} \div \underline{2} = 4 \end{array} \quad \begin{array}{l} \text{Reduce the answer to lowest terms.} \\ 6/8 = 3/4 \end{array}$$

Follow the rules for multiplication of fractions. Here are some easy ones to get started. Just multiply the numerators and then the denominators. Cross cancellation and reducing are not needed in these problems. Answers are on page 23.

$$1/6 \times 1/2 = \quad 2/5 \times 1/3 = \quad 1/8 \times 3/5 = \quad 1/9 \times 1/4 = \quad 1/2 \times 1/2 = \quad 1/2 \times 1/3 =$$

$$5/8 \times 1/3 = \quad 1/7 \times 1/5 = \quad 2/7 \times 1/3 = \quad 1/8 \times 1/9 = \quad 1/4 \times 1/3 \quad 1/4 \times 1/4 =$$

Now practice all of the steps for multiplying fractions. Follow the step-by-step explanation on page 10 while you work.

$3/5 \times 9/12 =$	$2/5 \times 3/4 =$	$2/7 \times 9/10 =$	$3/8 \times 4/9 =$	$2/9 \times 3/4 =$

$7/15 \times 3/14 =$	$5/6 \times 2/3 =$	$7/10 \times 8/9 =$	$7/8 \times 4/5 =$	$8/9 \times 2/3 =$



Stephanie used to run home each day after high school. The distance is  $3/4$  mile. After she injured her hamstring, she had to build up to that distance. For the first three days, she could only run  $1/2$  of the distance and had to walk the rest of the way. How far was she able to run in the *three* days? \_\_\_\_\_

Stephanie

### *Multiplying with Mixed Numbers*

There are five rules to follow when multiplying mixed numbers.

1. Change the mixed number(s) to improper fraction(s).
2. Cross cancel (optional).
3. Multiply the numerators.
4. Multiply the denominators.
5. Reduce the answer to lowest terms or change to a mixed number.



To change a mixed number to an improper (value equal to or greater than 1 whole) fraction, multiply the whole number by the fraction's denominator, add the numerator, and put the sum over the denominator. For example:

$$3 \frac{1}{2} = \frac{7}{2} \quad 2 \times 3 = 6 + 1 = 7 \quad \text{The improper fraction will always have the same denominator as the fraction.}$$

Change the mixed numbers below to improper fractions:

$2 \frac{1}{3} = \frac{7}{3} \quad 4 \frac{1}{2} = \frac{\square}{2} \quad 3 \frac{2}{3} = \quad 5 \frac{1}{8} = \quad 2 \frac{1}{5} = \quad 1 \frac{3}{4} =$

$1 \frac{7}{8} = \quad 2 \frac{5}{6} = \quad 4 \frac{2}{5} = \quad 3 \frac{2}{7} = \quad 1 \frac{9}{10} = \quad 6 \frac{1}{6} =$

Follow the guide on page 10 and practice multiplying the mixed numbers. The first one is done for you. Answers are on page 23.

$1 \frac{1}{3} \times 2 \frac{1}{4} =$	$4 \frac{1}{3} \times 2 \frac{2}{3} =$	$1 \frac{1}{6} \times 1 \frac{4}{7} =$	$3 \frac{1}{3} \times 1 \frac{1}{8} =$	$2 \frac{1}{5} \times 3 \frac{5}{9} =$
1. $\frac{4}{3} \times \frac{9}{4}$ $\begin{array}{r} 1 \quad 3 \\ \times \quad 3 \\ \hline 3 \end{array}$ 2. $\frac{4}{3} \times \frac{9}{4}$ $\begin{array}{r} 3 \quad 4 \\ \times \quad 1 \quad 1 \\ \hline 3 \end{array}$ 3. $\frac{3}{1}$ 4. $\frac{1}{1}$ 5. $\frac{3}{1} = 3$				

$1 \frac{1}{4} \times 1 \frac{1}{3} =$	$6 \times 2 \frac{3}{7} =$	$1 \frac{8}{9} \times 1 \frac{5}{6} =$	$1 \frac{1}{2} \times 1 \frac{1}{4} =$	$\frac{6}{7} \times 1 \frac{5}{6} =$

Alexis took  $\frac{1}{3}$  pound of sugar out of a new 5-pound bag. Then she gave the bag to her neighbor, Gary, who used twice the amount of the remainder in the bag to make boysenberry jam.



How much sugar did Gary use for his project?

\_\_\_\_\_

Sandra studies on an Internet tutorial for her math class. She works on her lessons for  $1 \frac{1}{2}$  hours daily, three days a week. How much time does she spend on the class in one month? \_\_\_\_\_

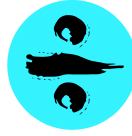
Luigi used  $2 \frac{3}{4}$  cups of tomato puree to make his special pasta sauce. When he was preparing for a family reunion, he decided to make  $1 \frac{1}{2}$  batches of sauce. How much tomato puree did he need? \_\_\_\_\_

Answers are on page 23.

## Division

There are five rules to follow dividing fractions:

1. Invert the divisor and change the sign to x.
2. Cross cancel (optional).
3. Multiply the numerators.
4. Multiply the denominators.
5. Reduce the answer to lowest terms or change an improper fraction to a mixed number.



### WHY INVERT

The reason for the first rule to invert the divisor is so that we can follow the rules for multiplication. **Multiplying any number by its reciprocal (upside down or inversion) is the same as dividing.** Here is an example with whole numbers:

$$12 \div 3 = 4$$

The divisor is 3, which is the same as  $3/1$  or one whole.

Invert  $3/1$  and see the fraction  $1/3$ . If we multiply  $12 \times 1/3$ , the answer is also 4.

$$\begin{array}{r} \underline{12} \times \underline{1} \\ 1 \quad 3 \\ 4 \end{array}$$

$$\begin{array}{r} \underline{12} \times \underline{1} \\ 1 \quad 3 \\ 1 \end{array}$$

$$\begin{array}{l} 4 \times 1 = 4 \\ 1 \times 1 = 1 \end{array}$$

The answer is 4.

So if we multiply by the reciprocal of the divisor, we can use the same method that we just practiced multiplying fractions and mixed numbers. The **reciprocal** is also called the multiplicative inverse. The word **invert** is used to remind us to turn the divisor **upside down** before we follow the rules for multiplication.

Write the reciprocals for the following numbers: Answers are on page 23.

$1/2 \quad \underline{\hspace{2cm}}$

$3/5 \quad \underline{\hspace{2cm}}$

$7/8 \quad \underline{\hspace{2cm}}$

$2/3 \quad \underline{\hspace{2cm}}$

$4 \quad \underline{\hspace{2cm}}$

$11/12 \quad \underline{\hspace{2cm}}$

$9/5 \quad \underline{\hspace{2cm}}$

$3/4 \quad \underline{\hspace{2cm}}$

Here is an example of a division problem following all five steps.  $3/4 \div 5/6$

$$\begin{array}{l} \underline{3} \div \underline{5} \\ 4 \quad 6 \end{array} \Rightarrow \begin{array}{l} \underline{3} \times \underline{6} \\ 4 \quad 5 \end{array} \begin{array}{l} \text{Invert the divisor; change the sign to x.} \\ \text{The reciprocal is } 6/5. \end{array} \quad \Downarrow$$



$$\begin{array}{l} 3 \times 6 = \underline{18} \\ 4 \times 5 = 20 \end{array}$$

$18/20 = 9/10$  Reduce the answer to lowest terms.

Now practice all of the steps for dividing fractions. Follow the step-by-step explanation on page 13 while you work. Answers are on page 23.

$3/5 \div 9/12 =$	$2/5 \div 3/4 =$	$2/7 \div 9/10 =$	$3/8 \div 4/9 =$	$2/9 \div 3/4 =$

$7/15 \div 3/14 =$	$5/6 \div 2/3 =$	$7/10 \div 14/15 =$	$7/8 \div 4/5 =$	$8/9 \div 2/3 =$

$16 \div 7/10 =$	$14 \div 2/5 =$	$2/9 \div 4/5 =$	$5 \div 3/7 =$	$7/8 \div 4 =$

Dana had a piece of fabric 18 inches wide. She wanted to cut it into thin strips  $3/4$  of an inch wide to use in her quilting project. How many strips could she get from the piece of fabric? \_\_\_\_\_

Miguel had a bottle of liquid medicine that held four ounces ( $1/2$  cup). How many  $1/8$  cup adult doses could he get out of the bottle? \_\_\_\_\_

Andrea bought  $7/8$  of a pound of chocolate at the Cake Cottage. She wants to divide it in half to use in two recipes. How much chocolate goes into each recipe? \_\_\_\_\_

## Dividing with Mixed Numbers

There are six rules to follow when multiplying mixed numbers:

1. Change the mixed number(s) to improper fraction(s).
2. Invert the divisor.
3. Cross cancel (optional).
4. Multiply the numerators.
5. Multiply the denominators.
6. Reduce the answer to lowest terms or change to a mixed number.



Follow the rules above and practice dividing the mixed numbers. The first one is done for you. Answers are on page 23.

$1 \frac{1}{3} \div 2 \frac{5}{6} =$	$4 \frac{1}{3} \div 2 \frac{2}{3} =$	$1 \frac{1}{6} \div 1 \frac{4}{7} =$	$3 \frac{1}{3} \div 1 \frac{1}{8} =$	$2 \frac{1}{5} \div 3 \frac{5}{9} =$
1. $\frac{4}{3} \div \frac{17}{6}$ 2. $\frac{4}{3} \times \frac{6}{17}$ 2 3. $\frac{4}{3} \times \frac{6}{17}$ 1 4. $4 \times 2 = 8$ 5. $1 \times 17 = 17$ 6. not needed				

$4 \frac{2}{3} \div 1 \frac{2}{3} =$	$12 \div 2 \frac{4}{5} =$	$2 \frac{4}{5} \div 12 =$	$7 \frac{1}{2} \div 1 \frac{1}{8} =$	$2 \frac{1}{5} \div 4 =$

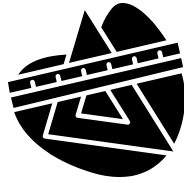
Sue Lin made  $10 \frac{1}{2}$  cups of holiday drink mix to use for gifts. She mixed cocoa, sugar, orange zest, lemon peel, cinnamon and other spices. She decorated jars that held  $1 \frac{1}{4}$  cups of the mixture. How many gifts could she make?



\_\_\_\_\_



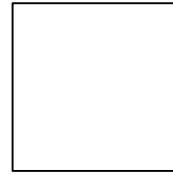




## Measure Up

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Estimate the distance around the box at the right.



Is it closest to:

1. 2 inches
2. 4 inches
3. 4 1/2 inches
4. 5 inches
5. 6 inches

Answer is on page 23.

## Prime Numbers and Prime Factors

Prime numbers are numbers greater than 1 that have only themselves and one as factors. Consequently, they are only divisible evenly by themselves and one. Five is a **prime** number because the only factors of five are five and one. The only numbers that will divide five evenly are 5 and 1. Answers are on pages 23 and 24.

$$5 \times 1 = 5$$

$$1 \times 5 = 5$$

$$5 \div 5 = 1$$

$$5 \div 1 = 5$$

List the prime numbers between 1 and 25.

---

What is the only **even** prime number? \_\_\_\_\_

Numbers that are not prime are **composite**. They have other factors besides themselves and 1. Four is a composite number.  $4 \times 1 = 4$  and  $2 \times 2 = 4$ . The three factors of four are 1, 2 and 4. Composite numbers may be even or odd.

List the composite numbers between 1 and 25.

---

Write P for prime or C for composite after each of the following numbers:

2 \_\_\_\_\_      6 \_\_\_\_\_      13 \_\_\_\_\_      23 \_\_\_\_\_      24 \_\_\_\_\_      29 \_\_\_\_\_

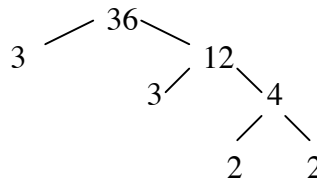
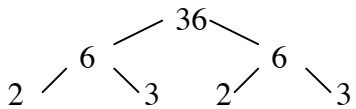
31 \_\_\_\_\_      39 \_\_\_\_\_      41 \_\_\_\_\_      51 \_\_\_\_\_      72 \_\_\_\_\_      99 \_\_\_\_\_

## Prime Factorization

It is often useful to break a composite number down into a product of prime numbers. For example,  $24 = 3 \times 8$ . Three is prime, but 8 is composite.  $8 = 2 \times 4$ . Two is prime, but 4 is composite.  $4 = 2 \times 2$ .

The prime factorization of  $24 = 2 \times 2 \times 2 \times 3$ . It is customary to list the prime factors from smallest to largest. **Fractions are *always* in lowest terms if the numerator AND the denominator are prime. If only one is prime, see if it divides the other evenly. If it does not, the fraction is in lowest terms.** That is how primes help with reducing.

Sometimes prime factors are shown as trees where the tree continues to branch until all of the branches end in prime numbers.



It doesn't matter where you start, the prime factorization of  $36 = 2 \times 2 \times 3 \times 3$ .

Draw prime factor trees for the following composite numbers: 24, 42, 57, 80, 81, and 100. Use the space below to draw the trees. Write the prime factorization on the lines below. Remember it is customary to list the prime factors from lowest to highest. Answers are on page 24.



$24 = \underline{\hspace{2cm}}$

$42 = \underline{\hspace{2cm}}$

$57 = \underline{\hspace{2cm}}$

$80 = \underline{\hspace{2cm}}$

$81 = \underline{\hspace{2cm}}$

$100 = \underline{\hspace{2cm}}$

## Fraction Operations - Mixed Practice



Find the answers to these problems with fractions and mixed numbers. Watch the signs. Show your work in the boxes. Refer to the chart on page 5 if you need help remembering the steps for each operation. Answers are on page 24.

$1/2 + 5/6 =$	$3/4 - 2/7 =$	$6/7 \times 5/12 =$	$1/4 + 1/5 + 1/6 =$	$7/8 \div 1/5 =$

\*

$1/3 + 3/4 - 1/2 =$	$8/9 \div 1/2 =$	$1/2 + 1/3 \times 4/5 =$	$6/7 - 5/7 =$	$5/6 \times 1\ 1/2 =$

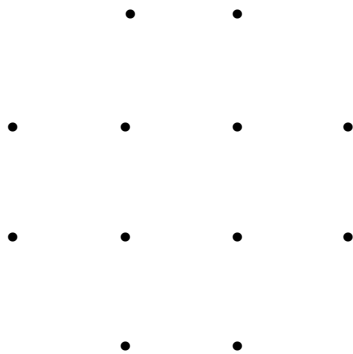
\*

\*

$4 \div 7/8 =$	$3\ 1/3 \times 1\ 1/8 =$	$(1/2 + 3/5) \div 1/2 =$	$1\ 1/2 + 1/2^2 =$	$3\ 1/2 - 1\ 7/8 =$

\* Don't forget the proper order of operations.

## Out into Space



Connect any four dots to make a square. Find as many squares as you can. How many squares are possible? \_\_\_\_\_

Show them here.

Hint: There are more than you think!

Answer is on page 25.

## STRATEGY SESSION



### Prepare for the Test Physically and Emotionally to Do Your Best Work

The most important thing to do to get ready to take the GED Math Test is to practice working with the material to be tested so you will be comfortable that you can answer the questions correctly. It is also important to practice using the official calculator, the Casio fx-260, so that you know how to solve problems using the calculator if you choose to use it.

It is also important to practice some techniques to help you stay calm and focused while you are studying and while you are taking the test. The *GED Video Partners* workbooks will give you information you need in test content, calculator use, and preparation to be calm and focused on the day of the test.

Information about physical and emotional test preparation will be presented throughout the workbooks. Remember the three R's of test preparation, and try to practice them as you study and prepare for the test. Reminders in more detail will be presented throughout the workbooks.

**R**eadiness

**R**est

**R**elaxation



### Prepare for the Test Physically and Emotionally to Do Your Best Work

## GED Exercise

1. There are 28 students in Mr. Green's first grade. Sixteen of the students are girls. What fraction shows the number of boys in the class?

- 1)  $1/2$
- 2)  $3/5$
- 3)  $3/7$
- 4)  $3/4$
- 5)  $4/5$



2. A biochemist created a mixture of some liquids.  $3/8$  of the mixture was water. One of the other liquids, vinegar, was  $2/3$  the amount of the water. What method would give the fraction of the mixture that was vinegar?

- 1)  $1 - 3/8$
- 2)  $3/8 + 2/3$
- 3)  $2/3 - 3/8$
- 4)  $2/3 \times 3/8$
- 5) not enough information given

3. Angela made her own powdered drink mix for summer coolers. She used  $2/3$  cup Tang,  $1/2$  cup sugar, and  $3/4$  cup Crystal Light lemonade. Approximately how much mixture did she end up with for each batch?

- 1) 1 cup
- 2)  $1 \frac{1}{2}$  cups
- 3)  $1 \frac{3}{4}$  cups
- 4) 2 cups
- 5)  $2 \frac{3}{4}$  cups

4. Mr. Anderson ground coffee beans for the booth at the fair **that** sold coffee and sandwiches. He ground  $5 \frac{1}{2}$  pounds of coffee to get started. The first day the workers used  $2 \frac{3}{4}$  pounds of coffee. How much was left for the next day?

- 1) 1 pound
- 2) 2 pounds
- 3)  $2 \frac{1}{4}$  pounds
- 4)  $2 \frac{1}{2}$  pounds
- 5)  $2 \frac{3}{4}$  pounds

5. Which expression shows the prime factorization of 30?

- 1)  $2 \times 3 \times 5$
- 2)  $5 \times 6$
- 3)  $2 \times 2 \times 3 \times 5$
- 4)  $2 \times 15$
- 5)  $2 \times 3 \times 3 \times 5$

6. The home economics department bought 6 yards of fabric for the first project. If each student was given  $2/3$  of a yard, how many students received fabric?

- 1) 5 students
- 2) 7 students
- 3) 9 students
- 4) 10 students
- 5) not enough information given



# Answers and Explanations

Matching

page 1

1. c
2. a
3. e
4. b
5. d

About Math and Life

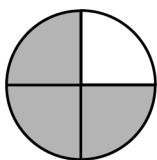
page 3

- 1  $\frac{1}{3}$  cups real butter
- $\frac{2}{3}$  cup sugar
- 2 eggs
- 2 teaspoons vanilla
- 1 teaspoon salt
- $3 \frac{1}{2}$  cups flour

Practice Showing Fractions

page 3

Shade the following pictures to show the correct fraction:



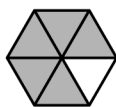
$\frac{3}{4}$



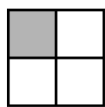
$\frac{2}{3}$



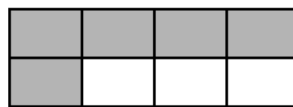
$\frac{1}{3}$



$\frac{5}{6}$



$\frac{1}{4}$



$\frac{5}{8}$

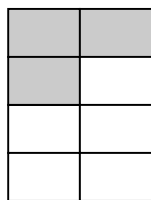
Use the space below to draw your own illustrations of these fractions.

Answers will vary. Below are examples:

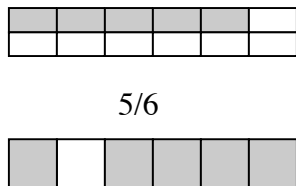
$\frac{1}{2}$



$\frac{3}{8}$

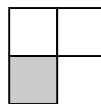


$\frac{5}{12}$

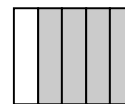


$\frac{5}{6}$

$\frac{1}{3}$



$\frac{4}{5}$



Finding Equivalent Fractions page 4

2	4	12	1
9	12	24	3
14	3	16	12

Answers will vary. Below are examples:

$\frac{2}{18}$   $\frac{3}{27}$   $\frac{4}{36}$   $\frac{5}{45}$   $\frac{6}{54}$

Answers will vary. Below are examples:

$\frac{4}{6}$   $\frac{6}{9}$   $\frac{8}{12}$   $\frac{10}{15}$   $\frac{12}{18}$   $\frac{14}{21}$   $\frac{16}{24}$   $\frac{18}{27}$   $\frac{20}{30}$   $\frac{40}{60}$

multiplication and division

Operations with Fractions page 5

*Addition*

$\frac{5}{8}$   $\frac{5}{7}$   $\frac{5}{8}$

*Addition* page 6

$\frac{11}{15}$	$\frac{17}{20}$	$1\frac{1}{2}$	$\frac{9}{14}$	$\frac{5}{6}$
$\frac{7}{8}$	$1\frac{1}{18}$	$\frac{1}{4}$	$\frac{11}{12}$	$1\frac{5}{8}$

approximately 2 cups

*Addition* page 7

$3\frac{5}{6}$  cups in a double batch

$1\frac{1}{4}$  cups

$1\frac{17}{24}$	$1\frac{1}{6}$	$\frac{19}{24}$	$1\frac{13}{35}$	$1\frac{1}{30}$
------------------	----------------	-----------------	------------------	-----------------

*Subtraction* page 7

0	$\frac{2}{7}$	$\frac{3}{8}$
---	---------------	---------------

*Subtraction* page 8

$\frac{1}{15}$	$\frac{3}{20}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{6}$
$\frac{1}{8}$	$\frac{1}{18}$	$\frac{1}{4}$	$\frac{5}{12}$	$\frac{3}{8}$

$\frac{7}{12}$  cup

$3\frac{5}{12}$  cups

*Subtracting Mixed Numbers* page 9

$2\frac{1}{15}$	$\frac{3}{20}$	$2\frac{1}{6}$	$7\frac{1}{2}$	$1\frac{1}{6}$
-----------------	----------------	----------------	----------------	----------------

*Borrowing to Subtract Mixed Fractions*

page 9

1 1/15          7 13/20          1 1/2          8 13/14          2 14/15          7 bags

*Multiplication*

page 10

1/12          2/15          3/40          1/36          1/4          1/6  
5/24          1/35          2/21          1/72          1/12          1/16

*Multiplication*

page 11

9/20          3/10          9/35          1/6          1/6  
1/10          5/9          28/45          7/10          16/27

1 1/8 miles

Change mixed numbers to improper fractions.

page 12

7/3          9/2          11/3          41/8          11/5          7/4  
15/8          17/6          22/5          23/7          19/10          37/6

*Multiplying with Mixed Numbers*

page 12

3          11 5/9          1 5/6          3 3/4          7 37/45  
5/12          14 4/7          3 25/54          1 7/8          1 4/7

9 1/3 pounds          18 hours          4 1/8 cups

*Division*

Reciprocals

page 13

2/1          5/3          8/7          3/2  
1/4          12/11          5/9          4/3

*Division*

page 14

4/5          8/15          20/63          27/32          8/27  
2 8/45          1 1/4          3/4          1 3/32          1 1/3  
22 6/7          35          5/18          11 2/3          7/32

24 strips          4 doses          7/16 pound

*Dividing with Mixed Numbers*

page 15

8/17          1 5/8          49/66          2 26/27          99/160  
2 4/5          4 2/7          7/30          6 2/3          11/20

8 gifts

Measure Up

page 16

2. 4 inches



Prime Numbers and Prime Factors

page 16

2 3 5 7 11 13 17 19 23

2 is the only even prime.

Prime Numbers and Prime Factors

page 16

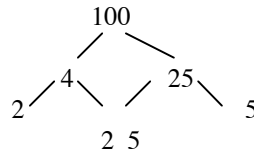
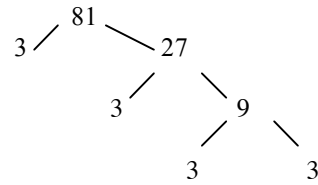
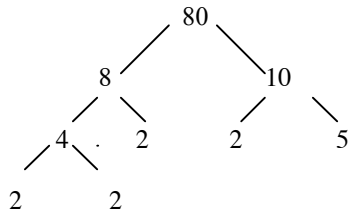
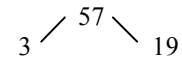
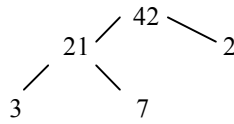
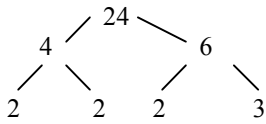
4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24

P C P P C P  
P C P C C C

Prime Factorization

page 17

Trees will vary. Below are examples:



$$24 = 2 \times 2 \times 2 \times 3$$

$$42 = 2 \times 3 \times 7$$

$$57 = 3 \times 19$$

$$80 = 2 \times 2 \times 2 \times 2 \times 5$$

$$81 = 3 \times 3 \times 3 \times 3$$

$$100 = 2 \times 2 \times 5 \times 5$$

Fraction Operations -- Mixed Practice

page 18

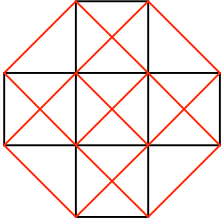
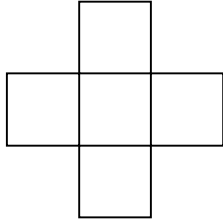
$1 \frac{1}{3}$        $\frac{13}{28}$        $\frac{5}{14}$        $\frac{37}{60}$        $4 \frac{3}{8}$   
 $\frac{7}{12}$        $1 \frac{7}{9}$        $\frac{23}{30}$        $\frac{1}{7}$        $1 \frac{1}{4}$   
 $4 \frac{4}{7}$        $3 \frac{3}{4}$        $2 \frac{1}{5}$        $1 \frac{3}{4}$        $1 \frac{5}{8}$

Out into Space

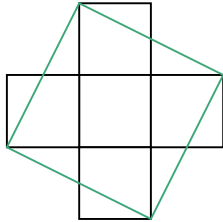
page 19

11 squares

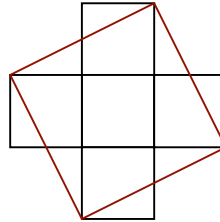
5 small ones



4 medium ones



2 large ones



GED Exercise

page 20

- 1. 3)
- 2. 4)
- 3. 4)
- 4. 5)
- 5. 1)
- 6. 3)