The foundation of math is your ability to function in the basic concepts, adding, subtracting, multiplying, dividing, fractions, decimals, ratios and proportions. This booklet covers Fractions to integers.

Fractions and beyond

GED preperation

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www.math-aids.com

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Introduction

This booklet covers most of the areas that students hate, fractions, decimals, rates/ratios, proportions, angles and integers.

Like the Basic booklet or the advanced math booklet, this one is no different. It is designed to be boiled down to the basics. Unfortunately, just like the other two, the burden of learning is on your shoulders.

If there is anything you can learn, learn this. ***You and you alone are responsible for your learning***. Does that sound tough, harsh? School systems, schools, teachers and tutors can provide you with all the tools you need to be successful, but in the end, it is up to you to pick up the tools and use them.

Both academic and life success is based upon you! Are you changing behaviors? What this means is, are you doing the same thing you did in high school that didn't serve you well? If so, then you need to change those behaviors to behaviors that serve you, such as

- ✓ Attending classes, tutoring sessions.
  - Have pencils, paper, binder, rested and ready to go.
- ✓ Coming to classes or tutoring ready to learn.
- ✓ Doing homework as assigned.
- ✓ Doing your own self learning, taking time to access websites or books that will help you.
- ✓ Staying away for mind altering substances.
- ✓ Staying positive.
- ✓ Adopting a can-do attitude/believing in yourself.
- ✓ Never giving up.

Finally, Keep Einstein's quote in the front of your mind, "**Insanity** is doing the same thing over and over and expecting different results."

Change those things that have not served you well, adopt new methods and strategies to win!

Recommended websites:

https://virtualnerd.com/ (all videos from basics, grades 6-8, to algebra 2 and geometry.)

http://www.wallace.ccfaculty.org/book/book.html (includes 400-page free textbook with a video index for every concept presented in textbook.

Fractions

What are fractions?

Simply put, fractions are parts of a whole. I like using pizza as an example.

Looking at this pizza, how many pieces did the cook cut the pizza into to?

8 pieces yes?

Vocabulary: Always memorize vocabulary!

$\frac{N}{D}$ Or $\frac{Numerator}{Denominator}$ $\frac{Tells\ you\ how\ many\ pieces\ you\ have}{Tells\ you\ how\ many\ pieces\ the\ pizza\ was\ cut\ into}$

Let's look at this pizza. It has been cut into 8 pieces. If we do not eat any of the pizza, we represent it two ways.

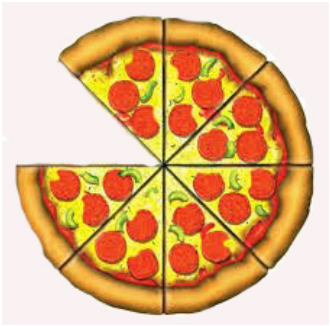
1st, it is a whole if no pizza is gone, we can simply write **1**

2nd we can write it as a fraction, we cut it into 8 pieces, we still have 8 pieces, so we represent it as a fraction as follows.

$\frac{8}{8}$

Let's eat a piece of Pizza!

Look at the picture, you will note that one piece is missing, it's been eaten. Considering our vocabulary, numerator/denominator, how many pieces do we have _____? How many pieces was the pizza cut into to begin with _____?



As a fraction $\frac{\text{Numerator}}{\text{Denominator}}$ $\frac{7}{8}$

What about the one piece?

How many pieces were eaten? _____ How many did we cut the pizza into _____? As a fraction?

Give it a try on the next page $\frac{1}{8}$

What is the Fraction of the Shaded Area ?

1)  _____

2)  _____

3)  _____

4)  _____

5)  _____

6)  _____

7)  _____

8)  _____

9)  _____

10)  _____

Shade the Figure with the Indicated Fraction.

11)  $\frac{2}{3}$

12)  $\frac{7}{10}$

13)  $\frac{5}{8}$

14)  $\frac{1}{6}$

15)  $\frac{6}{10}$

16)  $\frac{3}{9}$

17)  $\frac{2}{8}$

18)  $\frac{3}{4}$

19)  $\frac{3}{6}$

20)  $\frac{4}{9}$

Adding and Subtracting Like Fractions

Vocabulary:

Like Fractions simply means two or more fractions have the same denominator.

Example:

$\frac{1}{9}$ $\frac{4}{9}$ $\frac{7}{9}$ All these fractions are different in size but have the same denominator. The pizza in this case was cut into nine pieces, correct?

Adding and subtracting like fractions is the easiest part of fractions. In essence, all you have to do is add straight across. Numerator with numerator and keep the denominator.

Example: Addition

$\frac{5}{10} + \frac{2}{10} = \frac{7}{10}$ Another way to look at this is $\frac{5+7}{10} = \frac{7}{10}$

Example: subtraction

$\frac{13}{16} - \frac{8}{16} = \frac{5}{16}$ Simply subtract the two numerators, keeping the denominator the same.

The main point for like fractions, just add or subtract the two top numbers

Your Turn, do the following problems

$\frac{3}{4} - \frac{2}{4} =$ $\frac{2}{4} + \frac{1}{4} =$ $\frac{5}{9} - \frac{2}{9} =$ $\frac{10}{13} - \frac{4}{13} =$

$\frac{3}{8} + \frac{2}{8} =$ $\frac{5}{12} + \frac{4}{12} =$ $\frac{7}{15} - \frac{3}{15} =$ $\frac{23}{24} - \frac{15}{24} =$

Answers: $\frac{1}{4}$, $\frac{3}{4}$, $\frac{3}{9}$, $\frac{6}{13}$, $\frac{5}{8}$, $\frac{9}{12}$, $\frac{4}{15}$, $\frac{8}{24}$

Adding and Subtracting Unlike Fractions

Recall:

- At this point, fractions are made of two pieces, a numerator and a denominator.
- The numerator is the top number and tells us how many pieces we have.
- The Denominator is the bottom number and tells us how many pieces the pizza was cut into to.
- Like fractions, have the same denominator.
- To add or subtract, simply add or subtract the top number and keep the bottom number.

Vocabulary:

Unlike fractions:

Are fractions that have different bottom numbers, that is denominators as shown below.

Example:

$\frac{1}{4}, \frac{3}{8}, \frac{3}{9,}, \frac{6}{13}, \frac{5}{15}, \frac{9}{20}, \frac{4}{25}, \frac{8}{30}$ All these fractions have different bottom numbers/denominators.

As nice as it might be, we **cannot** add or subtract the top number and call it good. **SAD** but true. We must weave some magic and change unlike fractions into like fractions.

This is where it gets confusing so pay attention!

We can change the numbers in the fraction all day long by multiplying the numerator and denominator by the same number.

Example:

$\frac{1}{3}^{x\,2}_{x\,2}$ by multiplying the top and bottom number by 2, we get $\frac{2}{6}$

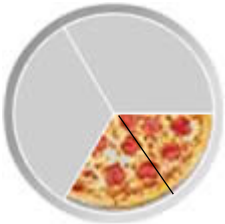
$\frac{1^{x\,3}}{3_{x\,3}}$ becomes $\frac{3}{9}$ The funny thing about this, the numbers are getting bigger, but the size of the pizza is not.

Note: The numbers have gotten bigger in the second fraction but look at the pizza, they are equal in size!

These is called **equivalent**

$\frac{1}{3}$

$\frac{2}{6}$



To add Fractions, we have to find what is called, "The lowest common denominator (LCD)."

Vocabulary

Lowest common denominator: (LCD)

The smallest number that both denominators can divide into.

Example:

$\frac{1}{3} + \frac{1}{7} =$

Being skilled multiplication will help here!!!

However, there are two ways to find the LCD

1st, we can factor, using the bottom numbers/denominators we count by 3 and 7.

3, 6, 9, 12, 15, 18, 21, 24…..

7, 14, 21, 28….

You will note that counting by 3, and 7, they both go into 21 evenly.

2nd, or, another way to find the LCD is simply multiply the denominators. When we do this, we also have to change the numerators.

Example:

$$\frac{1}{3} + \frac{1}{7} = \frac{7+3}{21}$$

Can you see what happened?

$\frac{1}{3} + \frac{1}{7}$

Multiply 7 x 3 = 21

$\frac{1}{3} + \frac{1}{7}$ becomes $\frac{7}{21} + \frac{3}{21}$

Multiply 7 x 1 = 7, and 3 x 1 = 3

Once you have done this, you now have like fractions again and you can simply add the numerators, top numbers. Your answer is;

$$\frac{1}{3} + \frac{1}{7} = \frac{7+3}{21} = \frac{10}{21}$$

Subtracting fractions is done exactly the same way!

Adding and Subtracting Fractions (A)

Find the value of each expression in lowest terms.

1. $\frac{7}{4} - \frac{8}{5}$

2. $\frac{23}{2} + \frac{9}{4}$

3. $\frac{8}{3} - \frac{3}{2}$

4. $\frac{5}{2} - \frac{13}{12}$

5. $\frac{3}{2} - \frac{9}{7}$

6. $\frac{7}{10} + \frac{2}{5}$

7. $\frac{14}{5} - \frac{4}{3}$

8. $\frac{17}{7} - \frac{5}{3}$

9. $\frac{4}{3} - \frac{2}{5}$

10. $\frac{5}{2} + \frac{2}{3}$

11. $\frac{9}{8} + \frac{5}{6}$

12. $\frac{9}{7} - \frac{5}{6}$

Reducing/Simplifying Fractions

When we say reducing or simplify fraction, we are talking about making the numbers in the numerator/denominator smaller if possible while the size of the fraction does not change.

Vocabulary:

Simplify/reduce means to make the numbers in the fraction as small as possible.

Greatest Common Factor: **(GFC)** The largest number that will divide equally into the numerator and denominator. ***Recall we talked about factoring earlier***.

When do you have to simplify? After you have added/subtracted/multiplied or divided fractions.

Example 1:

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

After you answer the question, you must ask yourself, "Can I simplify the answer?" Is there a number that will divide equally into the 2 and the 4?

If yes, what is the biggest number that will divide equally into the 2 and the 4? The answer is, 2!

Example 2:

$$\frac{2}{4} \overset{\div 2}{=} \frac{1}{2}$$

Example 3:

5 is the GCF, divide 35 and 40 by 5

$$\frac{35}{40} = \frac{7}{8}$$

2 is the GCF, divide 10 and 16 by 2

$$\frac{10}{16} = \frac{5}{8}$$

8 is the GFC, divide 8 and 32 by 8

$$\frac{8}{32} = \frac{1}{4}$$

4 is the GCF, divide 12 and 40 by 4

$$\frac{12}{40} = \frac{3}{10}$$

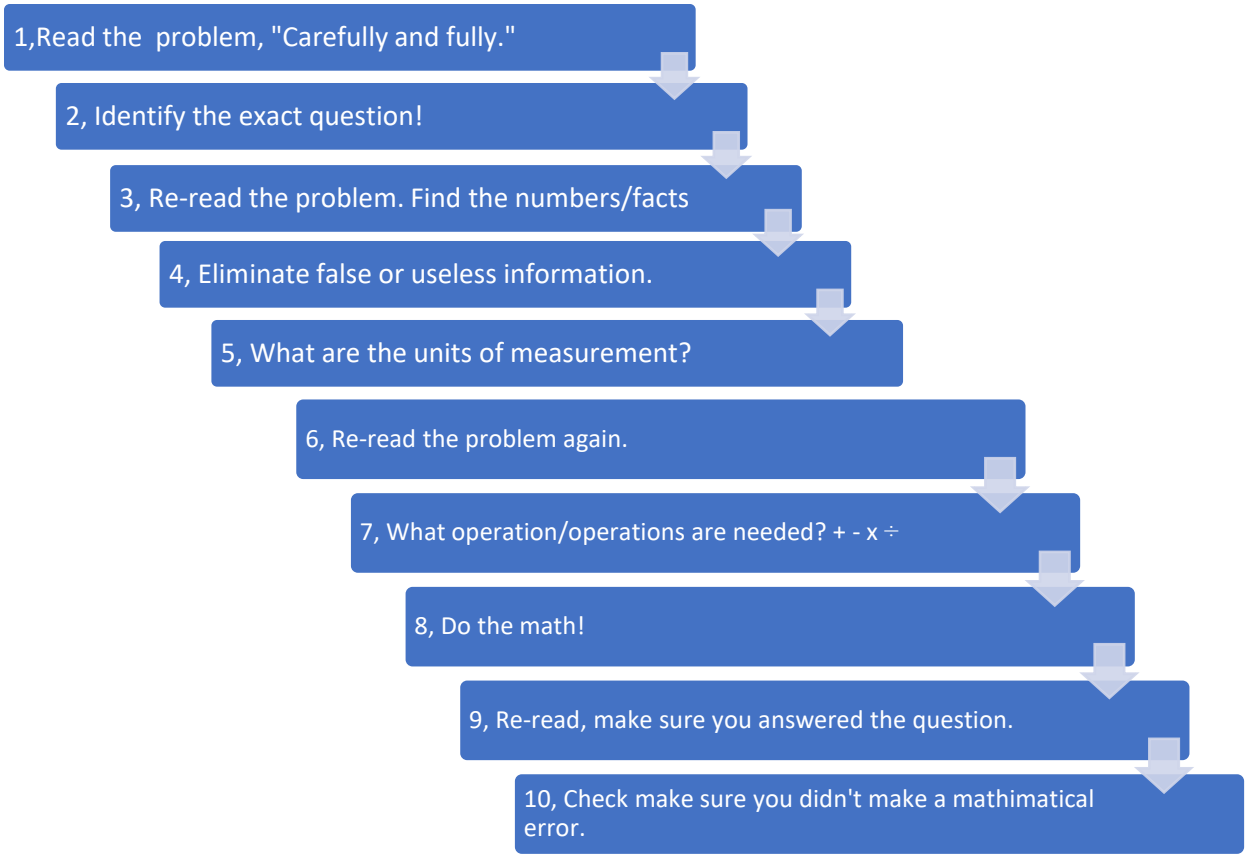
Simplify Fractions (A)

Simplify each fraction to its lowest terms.

$\frac{9}{18} =$	$\frac{4}{16} =$	$\frac{18}{36} =$	$\frac{20}{40} =$
$\frac{70}{80} =$	$\frac{18}{24} =$	$\frac{5}{40} =$	$\frac{21}{36} =$
$\frac{6}{9} =$	$\frac{21}{56} =$	$\frac{9}{36} =$	$\frac{9}{45} =$
$\frac{6}{42} =$	$\frac{14}{35} =$	$\frac{24}{36} =$	$\frac{10}{12} =$
$\frac{36}{45} =$	$\frac{4}{24} =$	$\frac{12}{21} =$	$\frac{63}{77} =$
$\frac{12}{15} =$	$\frac{30}{40} =$	$\frac{32}{48} =$	$\frac{42}{77} =$
$\frac{18}{36} =$	$\frac{28}{42} =$	$\frac{12}{24} =$	$\frac{12}{15} =$
$\frac{40}{60} =$	$\frac{12}{24} =$	$\frac{6}{18} =$	$\frac{36}{40} =$

Word Problems

The GED is almost entirely word problems. You must be able to take apart word problems. Many do not like word problems. Nonetheless, it is something you must learn how to do.



Math Operations	Symbols	Other Words	
Addition	+	**sum** Altogether all in all	together total total number add
Subtraction	−	**minus** greater than more than take away fewer than less than	How many more? How many left? How many less? subtract difference is left
Multiplication	× ●	**product** multiply multiplied by times	
Division	÷ /	**quotient** dividend divide divided by	each per average divide equally
Equal	=	the same equals the same as is equal to equivalent	

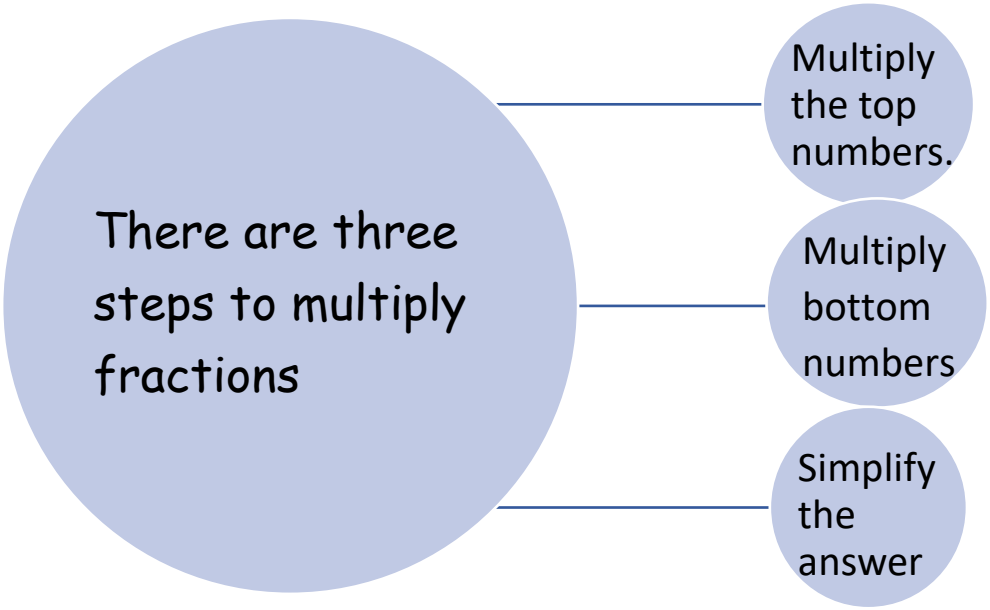
Use the steps, symbols and words to help solve the following questions. Simplify if you can.

Fraction Word Problems

#1 Jessica bought 8/9 of a pound of chocolates and ate 1/3 of a pound. How much was left?	#2 Tom bought a board that was 7/8 of a yard long. He cut off 1/2 of a yard. How much was left?
#3 Sam rode his bike 2/5 of a mile and walked another 3/4 of a mile. How far did he travel?	#4 Sally walked 3/4 of a mile before lunch and 1/2 of a mile after lunch. How far did she walk in all?
#5 Don bought 3/4 of a pound of jellybeans and 5/8 pound of gummy bears. How much candy did he buy?	#6 The track is 3/5 of a mile long. If Tyrone jogged around it twice, how far did he run?
#7 Which apple weighs more, one that weighs 2/3 of a pound or one that weighs 5/6 of a pound?	#8 Stanley ordered two pizzas cut into eighths. If he ate 5/8 of a pizza, how much was left?
#9 Sandra bought 2¾ yards of red fabric and 1¼ of blue. How much cloth did she buy in all?	#10 An equilateral triangle measures 3½ inches on one side. What is the perimeter of the triangle?

Developed by Laura Candler at Teaching Resources (http://home.att.net/~teaching)

Multiplying and Dividing Fractions



Example 1:

$$\frac{1}{2} \; x \; \frac{2}{5} \qquad Steps\ 1\ and\ 2\ \frac{1\ x\ 2}{2\ x\ 5} = \frac{2}{10} \qquad step\ 3\ \frac{2}{10} = \frac{1}{5}$$

Some people like to see the problem like this. Decide for yourself which you prefer.

Or just multiple straight across.

Example 2:

$\frac{1}{3} \; x \; \frac{9}{16} = \frac{9}{48}$ *Can it be reduced? Yes!* 3 *is the GCF, divide by* 3. $\frac{9 \div 3}{48 \div 3} = \frac{3}{16}$ ← Final answer

Sometimes when you add or multiply your answer may look like this $\frac{15}{3}$ This is different, it is called an **improper fraction**. We will deal with these later. For now, after you answer the question, the numerator is bigger than the denominator, do not reduce. Just leave the answer as it is, unless you know how to change an improper fraction to a **mixed fraction**.

Multiplying Fractions (A)

Find the value of each expression.

1. $\frac{5}{6} \times \frac{1}{2}$
2. $\frac{4}{9} \times \frac{2}{3}$
3. $\frac{3}{5} \times \frac{3}{4}$
4. $\frac{5}{6} \times \frac{1}{3}$
5. $\frac{7}{9} \times \frac{1}{2}$
6. $\frac{5}{11} \times \frac{1}{3}$
7. $\frac{1}{3} \times \frac{5}{6}$
8. $\frac{1}{2} \times \frac{1}{6}$
9. $\frac{1}{2} \times \frac{1}{3}$
10. $\frac{1}{8} \times \frac{1}{4}$
11. $\frac{1}{2} \times \frac{5}{6}$
12. $\frac{1}{3} \times \frac{4}{5}$

Dividing Fractions

This is just another one of those crazy things in math. When dividing fractions, you end up multiplying! A simple philosophy, don't ask how or way, just understand that the process works.

Process: always memorize the steps in each concept you learn.

$\frac{3}{2} \div \frac{4}{9}$ *Becomes* $\frac{3}{2} \times \frac{9}{4}$ = Multiply straight across. $\frac{3}{2} \times \frac{9}{4} = \frac{27}{8}$

Follow this rule, Keep, Change, Flip, then multiply straight across!

Example 1:

$\frac{7}{10} \div \frac{1}{3}$ apply the rule $\frac{7}{10} \div \frac{1}{3}$ becomes $\frac{7}{10} \times \frac{3}{1} = \frac{21}{10}$

1)Keep, don't change.

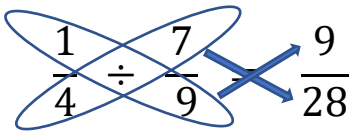
2)Change to multiplication

3)Flip second fraction upside down!

A different Process to consider.

Some people like to use the butterfly method.

Example 2:



Use which ever process works for you!

Multiplying or dividing with a whole number

Example

$$2 \div \frac{1}{3} = \textit{Put the whole number over a } 1$$

$$\textit{then divide or multiply which ever}$$

$$\textit{you have to do!} \ \frac{2}{1} \div \frac{1}{3} = \frac{6}{1}$$

Dividing Fractions (A)

Find the value of each expression in lowest terms.

1. $\frac{1}{5} \div \frac{2}{3}$
2. $\frac{1}{3} \div \frac{7}{10}$
3. $\frac{1}{2} \div \frac{2}{3}$
4. $\frac{1}{5} \div \frac{2}{7}$
5. $\frac{1}{3} \div \frac{3}{4}$
6. $\frac{2}{9} \div \frac{3}{4}$
7. $\frac{1}{3} \div \frac{3}{4}$
8. $\frac{1}{7} \div \frac{1}{5}$
9. $\frac{4}{9} \div \frac{1}{2}$
10. $\frac{1}{4} \div \frac{7}{9}$
11. $\frac{3}{7} \div \frac{5}{9}$
12. $\frac{1}{4} \div \frac{8}{9}$

Mixed and Improper Fractions

Vocabulary:

Mixed: A mixed fraction consists of a whole number and a fraction together.

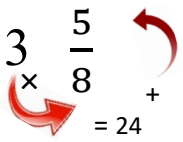
Example 1: $3\frac{5}{8}$

Improper: An improper fraction's numerator is bigger than its denominator. I like to think of it as a whole pizza stuffed in a box along with a few extra pieces left over from another pizza.

Example 2: $\frac{29}{8}$

You have to be able to convert between mixed and improper fractions. When answering some questions, you will convert from mixed to improper. Once you have answered a question, if the answer is improper, you always have to convert back to a mixed fraction.

Convert a Mixed Fraction into an Improper Fraction:

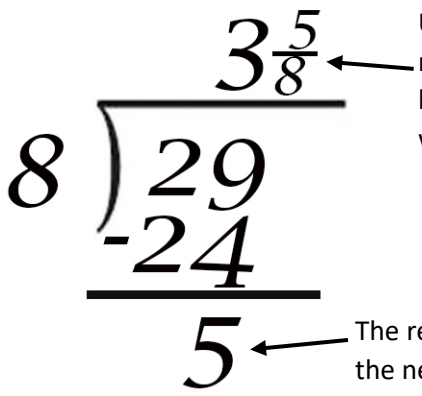


1) Multiple the whole number 3, by the denominator of 8. This = 24.
2) Add the numerator of 5 to 24 = 29. This becomes a new numerator.
3) Place the 29 over the denominator 8 and there you go.

$= \frac{29}{8}$

Convert from Improper to Mixed Fraction

Simple: Divide the top number/numerator, by the bottom number/denominator.



The 8 is the denominator

Using the 8 as the original denominator, take the remainder of 5 and place over the 8. Now you have the fraction. Notice we've been working with the same mixed fraction?

The remainder 5 becomes the new numerator

Converting Fractions (A)

Name: _____ Date: _____

Convert mixed to improper fractions and improper to mixed fractions.

$\frac{10}{3} =$ _	$\frac{19}{4} =$ _	$1\frac{5}{9} =$ —	$\frac{82}{15} =$ —
$4\frac{11}{12} =$ —	$1\frac{5}{12} =$ —	$4\frac{9}{10} =$ —	$6\frac{5}{7} =$ —
$9\frac{8}{15} =$ —	$1\frac{7}{9} =$ —	$\frac{43}{7} =$ _	$6\frac{1}{6} =$ —
$8\frac{2}{9} =$ —	$\frac{97}{10} =$ —	$1\frac{3}{10} =$ —	$\frac{49}{5} =$ _
$\frac{29}{8} =$ _	$\frac{94}{15} =$ —	$\frac{45}{7} =$ _	$5\frac{1}{4} =$ —
$5\frac{7}{8} =$ —	$\frac{21}{10} =$ —	$9\frac{2}{7} =$ —	$7\frac{7}{12} =$ —
$3\frac{6}{7} =$ —	$\frac{7}{5} =$ _	$\frac{31}{5} =$ _	$6\frac{11}{15} =$ —
$3\frac{1}{15} =$ —	$\frac{55}{9} =$ _	$2\frac{4}{7} =$ —	$7\frac{8}{9} =$ —
$\frac{75}{8} =$ _	$\frac{17}{2} =$ _	$7\frac{1}{8} =$ —	$\frac{85}{9} =$ _
$3\frac{5}{6} =$ —	$3\frac{3}{5} =$ —	$8\frac{2}{15} =$ —	$4\frac{1}{12} =$ —

Adding Mixed Fractions

There are two ways to attack adding mixed fractions.

1) You can convert both mixed fractions to improper fractions then find the LCD and change everything so you can add the numerators.
2) You can simply pull out the fractions from the whole numbers and work with them separately then add everything back together.

Example 1: Convert to improper fractions

$2\frac{3}{4} + 3\frac{3}{8} =$ Convert to improper fractions, $= \frac{11}{4} + \frac{27}{8} =$ Find the LCD.

LCD

We only need to change the first fraction by turning the 4 into an 8 by multiplying by 2 and multiplying the 11 by 2.

$$\frac{22}{8} + \frac{27}{8} = \frac{49}{8}$$

Example 2: Working with the fractions only.

$$\begin{array}{r} 3\frac{5}{8} \\ +\ 1\frac{3}{4} \\ \hline \end{array}$$

Pull out the fractions and work with them first!

$$\begin{array}{lll} 3 & & \frac{5}{8} \\ 1 & \frac{3}{4} = \frac{6}{8} & \\ \hline 4 & & \frac{11}{8} \end{array}$$

Only change one fraction. Add!

Note: We now have a whole number 4, and an improper fraction. This doesn't happen all the time, but you need to be prepared for it. We have two more steps to do.

We have, $4\ and\ \frac{11}{8}$. We have to convert the improper fraction of $\frac{11}{8}$ into a mixed fraction and add the whole number to the four.

Example 3:

$4\ and\ \frac{11}{8}, the\ fraction\ becomes\ 1\ \frac{3}{8}\ (the\ 1\ is\ \ added\ to\ the\ four!)$

Our final answer is $5\ \frac{3}{8}$

Subtracting Mix Fractions

The process for subtracting mixed fractions is almost exactly the same. I say almost the same because you may have to add an additional step or two.

Example 1:

Let's look at two whole number subtraction problems.

Go ahead and do these to problems

$$\begin{array}{r} 328 \\ -\ 124 \\ \hline \end{array} \qquad \begin{array}{r} 75 \\ -\ 29 \\ \hline \end{array}$$

What was the difference between the two? In the second problem did you have to borrow from the seven? Yes, you did. Fractions have the same type of processes. Sometimes it is simple subtraction, other times you have to borrow from the whole number and give it to the fraction.

Processes: there are two just like in adding. You can convert both sets of fractions from Mixed to improper, find the common denominator if needed, then subtract. Or you can use the second process as outlined in Adding mixed fractions.

Example 2:

This is where multiple skills and processes come into play. Adding, subtracting, multiplying and dividing at times. Recalling every process in order to complete the

$3\frac{8}{9} - 2\frac{1}{3}$ Turn into improper fractions, find LCD and subtract $\frac{34}{9} - \frac{7}{3} = \frac{34}{9} - \frac{21}{9} = \frac{13}{9}$

Example 3:

Using the second method, treating only the fractions. I like to stack fractions when I subtract

$$\begin{array}{r} 3\ \frac{8}{9} \\ -\ 2\ \frac{1}{3}\quad \frac{3}{9} \\ \hline 1\quad \frac{5}{9} \end{array}$$

We only need to change the second fraction to get the LCD.

Applying Borrowing When Subtracting Mixed Fractions

Think of borrowing like this. You have three pizzas in a box, and $\frac{3}{8}$ of a pizza left.

You are going to borrow one of the whole pizzas, take it out of the box and cut in up in to eights. You will add those pizza slices to the $\frac{3}{8}$. How many slices do you have now? 11, and because the pizza slices were eights, as a fraction it looks like this, $\frac{11}{8}$. You still have two whole pizzas, you now have a new mixed fraction that looks like this, $2\ \frac{11}{8}$.

Let's put this to use.

Example:

Here's the problem	Borrow 1 whole from the 7, cut it into 9 pieces. $\frac{9}{9}$	Add the pieces $\frac{9}{9}$ to the $\frac{1}{9}$ Now you have $\frac{10}{9}$, now subtract
$8\ \frac{1}{9}$	$\cancel{8}^{7}\ \frac{1}{9} + \frac{9}{9}$	$7\ \frac{10}{9}$
$-\ 6\ \frac{5}{9}$	$-\ 6\ \frac{5}{9}$	$-\ 6\ \frac{5}{9}$
		$1\ \frac{5}{9}$

Once more, math is about two things, vocabulary and Processes, both of which must be memorized.

Always ask for help if you cannot understand if you cannot understand the process.

Use tutors, teachers, or even videos if necessary.

The last thing you want to do is move on without understanding what you were supposed to just learn.

If you struggle with this concept, you can look up videos on YouTube.

However, here is a link to Virtual Nerd.

https://virtualnerd.com/middle-math/adding-subtracting-fractions/mixed-numbers/subtract-mixed-numbers-different-denominators-regrouping

Adding and Subtracting Mixed Fractions (A)

Find the value of each expression in lowest terms.

1. $2\frac{1}{5}+1\frac{3}{4}$

2. $3\frac{1}{2}-2\frac{2}{3}$

3. $3\frac{1}{2}-3\frac{1}{2}$

4. $5\frac{3}{4}-5\frac{1}{4}$

5. $1\frac{1}{2}+2\frac{3}{5}$

6. $3\frac{1}{2}-2\frac{5}{9}$

7. $2\frac{3}{4}+1\frac{1}{5}$

8. $3\frac{1}{4}-2\frac{3}{8}$

9. $3\frac{1}{2}-1\frac{1}{2}$

10. $5\frac{1}{2}+5\frac{1}{4}$

11. $1\frac{10}{11}-1\frac{1}{3}$

12. $1\frac{5}{12}+3\frac{1}{3}$

Mixed Fractions Word Problems

Fraction word problems

Read and answer each question:

It is harvest season at Joe's Farm.

1. He has two pumpkin fields and the total area of the two pumpkin fields is $3\frac{2}{5}$ acres. The big field yield $3\frac{2}{5}$ tons of pumpkins and the small $2\frac{1}{12}$ tons of pumpkins. What is the total yield of pumpkins?

2. The biggest zucchini from Joe's farm is $2\frac{5}{8}$ pounds, which is $1\frac{1}{12}$ pound more than the average weight of zucchinis from his farm. What is the average weight of zucchinis from his farm?

3. Farm Joe ordered 3 bags of soil last month. Each bag weighed $4\frac{2}{5}$ kilograms. He used the first bag in a week. At the end of this month, there were $2\frac{3}{4}$ kilograms of soil left in the second bag and $\frac{7}{8}$ kilograms of soil left in the third bag. How much soil was used in this month?

4. Last month, the price of one pound of carrots was \$ $2\frac{1}{5}$ and Joe sold $12\frac{1}{12}$ pounds of carrots. This month, the price has increased by \$ $1\frac{1}{10}$ and Farmer Joe only sold $5\frac{1}{8}$ pounds of carrots. What is the price of a pound of carrots this month?

5. There were $24\frac{1}{4}$ crates of tomatoes in the barn but $7\frac{3}{5}$ crates of tomatoes were rotten and had to be thrown out. Joe sold $8\frac{1}{3}$ crates and canned $7\frac{5}{6}$ crates of tomatoes. How many crates of tomatoes were left?

6. The farmer's market opens for $2\frac{1}{5}$ hours in the morning and $3\frac{2}{3}$ hours in the afternoon. How long is the farmer's market open in a day?

Multiplying and Dividing Mixed Fractions

Let us consider multiplying and dividing with fractions and a whole number first.

$\frac{3}{8}\ x\ 2,$ we can turn the 1 into a fraction by placing the 2 over a 1 and then multiply.

$$\frac{3}{8}\ x\ \frac{2}{1} = \frac{6}{8}$$

The same holds true for dividing. Always put the whole number over a one than multiply or divide.

Using mixed numbers is a bit of a different story. We must convert all mixed fractions into improper fractions.

Example:

$1\ \frac{1}{2}\ x\ 2\ \frac{1}{5} =$ Becomes $\longrightarrow$ $\frac{3}{2}\ x\ \frac{11}{5} = \frac{33}{10}$ convert back to mixed $\longrightarrow$ $3\ \frac{3}{10}$

Now look at dividing mixed fractions.

$3\ \frac{1}{2} \div 1\ \frac{2}{3} =$ Becomes $\frac{7}{2} \div \frac{5}{3} =$ flip the second fraction and multiply $\frac{7}{2}\ x \frac{3}{5} = \frac{21}{10}$

And of course, we must turn the improper back into a mixed fraction.

$$\frac{21}{10} = 2\frac{1}{10}$$

"Always change back to mixed fraction and recheck, make sure the fraction does not need to be reduced!"

Multiplying and Dividing Mixed Fractions (A)

Find the value of each expression in lowest terms.

1. $3\frac{2}{7} \div 1\frac{1}{4}$
2. $1\frac{2}{3} \div 3\frac{1}{3}$
3. $2\frac{1}{4} \div 1\frac{1}{2}$
4. $6\frac{1}{2} \div 2\frac{2}{3}$
5. $2\frac{1}{10} \div 2\frac{3}{5}$
6. $1\frac{1}{3} \times 1\frac{2}{3}$
7. $1\frac{1}{3} \times 2\frac{1}{5}$
8. $2\frac{1}{7} \div 2\frac{1}{2}$
9. $1\frac{3}{11} \div 2\frac{1}{3}$
10. $3\frac{1}{2} \div 2\frac{3}{4}$
11. $1\frac{3}{8} \div 1\frac{1}{12}$
12. $2\frac{7}{8} \div 5\frac{1}{2}$
13. $3\frac{2}{3} \div 1\frac{1}{6}$
14. $1\frac{3}{8} \times 3\frac{1}{3}$
15. $1\frac{4}{11} \div 1\frac{1}{4}$

Multiplying and Dividing Mixed Fractions Word Problems

Multiplication (with mixed numbers)

Solve the word problems. Please show all of your work. Use labels in your answers.

1) Gabe is barely 2 3/5 years old. He has spent 1/3 of his life sleeping or crying. How much of his short life has Gabe spent either sleeping or crying in years?

2) Emily needs enough fabric for 3 1/2 hats, since she has half a hat done already. If each hat requires 1 2/7 feet of fabric, how much fabric will she need to make the 3 1/2 hats?

3) Steven can run 1 2/9 miles in 10 minutes. How much can Steven run in half an hour, if he keeps a consistent pace?

   a) How much can Steven run in one hour if he keeps the consistent pace of 1 2/9 miles every ten minutes?

Division with Fractions (With mixed numbers)

Solve the word problems. Please show all of your work. Use labels in your answers.

1) Sheila is baking a few cakes for the bake sale for her school. Each cake requires 2 1/2 cups of sugar. How many cakes can she bake if she has 7 1/3 cups of sugar?

2) Sheldon is a long distance runner. He can run a mile at a consistent pace of 6 4/5 minutes. How many miles can he run in 30 minutes, if he keeps that pace?

3) Lourdes got a plant as a birthday gift. Her plant grows an average of 1 2/5 inches every month. How long will it take for the plant to grow a full 10 2/3 inches?

   a) How long will Lourdes have to wait for her plant to grow a total of 14 1/4 inches?

Converting Fractions to Decimals

Converting Fractions to decimals is pretty easy. Remember, they are basically the same thing, a number smaller than one.

Vocabulary

Terminating decimals: when you convert fractions to decimals by dividing in which answers will stop, one, two or three digits to the right of decimal. That's it, you're done.

Repeating Decimals: On the other hand, some answers will continue forever and so you have to pick a digit past the decimal to stop at.

Terminating Decimals

Convert the following fraction to a terminating decimal.

$\frac{16}{20}$ Turn this into a division problem, dividing the smaller number by the bigger number.

```
      0 .8
   ┌──────
20 │ 16
   │ -0
   ├──────
     160
    -160
   ──────
       0
```

1) How many times does 20 go into 16? ZERO TIMES.
2) Multiply by zero = zero
3) Subtract
4) Bring down the 16, except now, add a decimal point to the right of the zero in the answer.
5) Add a zero to 16 = 160.
6) Divide 160 by 20 = 8, place the 8 to the right of the decimal and your answer is 0.8. Keep going.
7) Multiply and then subtract, your left with zero on, you cannot divide anymore.

Let's trying one more.

$\frac{5}{8}$ divide, 5 ÷ 8

```
   0.625
8 )5.000
   0
   ‾
   5.0
   4.8
   ‾‾‾
    20
    16
    ‾‾
     40
     40
     ‾‾
      0
```

Repeating Decimals

As noted, they will go on and on and on…..so we have to have a system to recognize them and a place to stop dividing at.

Try turning $\frac{4}{9}$ into a decimal

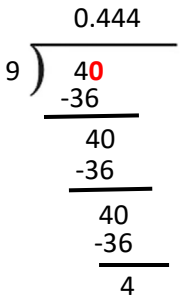
Nine goes into 4 zero times. Put a zero above the four.

Add a zero to the four, nine goes into 40 four times. Put a decimal after the 0 and then the 4 = 0.4

4 times 9 = 36, subtract.

Divide again, 9 into 4, add a zero, and repeat.

This will go on forever.



When do I stop?

Most say stop at the third digit past the decimal. For our answer above 0,444 is enough. Sometimes, instructions given by teachers or the test's instructions tell you to stop or round to the tenth,0.4, hundredth, 0.44 or thousandth, 0.444.

Others will instruct you to stop at a certain point and to place a line over all of the digits or one of the digits as exampled below.

$0.\overline{444}$, or $0.44\overline{4}$

Some people prefer to convert fractions to decimals and then do the work, turning the answer back into a fraction when done.

At the end of the decimal unit we will look at how to convert decimals back into fractions.

Video link

https://virtualnerd.com/pre-algebra/rational-numbers/definitions-basics/convert-decimals-fractions/fraction-to-repeating-decimal-conversion

Converting Fractions to Decimals (A)

Name: _____ Date: _____

Convert each fraction to a decimal.

$\frac{4}{20} =$

$\frac{4}{10} =$

$\frac{15}{20} =$

$\frac{10}{20} =$

$\frac{1}{2} =$

$\frac{19}{20} =$

$\frac{1}{10} =$

$\frac{3}{8} =$

$\frac{8}{20} =$

$\frac{2}{8} =$

$\frac{2}{20} =$

$\frac{17}{20} =$

$\frac{4}{5} =$

$\frac{5}{20} =$

$\frac{16}{20} =$

$\frac{13}{20} =$

$\frac{2}{10} =$

$\frac{11}{20} =$

$\frac{6}{20} =$

$\frac{3}{20} =$

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Decimals

What are these silly things? In short, they are just another way to express a number smaller than one. You use them all the time when you deal with money.

Example:

$5.75, when we say this, we are saying, "I have five dollars **and** seventy-five cents. In Math, the decimal point represents the word "**and**." This is a decimal number because the whole number of 5, has a decimal attached to it. It is the same as mixed fractions. Let's start by understanding decimal place values and names.

Vocabulary

Place value, on a chart, this is the value the number represents within the chart

Thousands	Hundreds	Tens	Ones	Decimal .	Tenths	Hundredths	Thousandths
1,	**3**	**2**	**4**	**.**	**7**	**5**	**3**
				.	**3**		
				.	**3**	**5**	

Example 1:

Looking at this chart, first row, the number is, 1,324.753. Our natural propensity is to say "one thousand, three hundred, twenty-four point seven five three. But nope sorry, not the way to say it.

Looking at the chart we see .753. we read it like a whole number, "and seven hundred, fifty-three" but we add thousandths to the end because that is where the last digit 3 is located.

"SEVEN HUNDERD FIFTY-THREE THOUSANDTHS"

We always call it by where the last digit is located.

Example 2:

0.3, the three sits in the "Tenths column, so we say three tenths.

0.35, the five sits in the hundredth's column, we say, thirty-five hundredths.

On the next page, not only identify the place value of the underlined word but also write out the decimal number as it was done above

Decimal Place Value (A)

What is the value of each underlined digit?

8,<u>5</u>19	6,3<u>4</u>6
<u>4</u>,727	7,53<u>0</u>
<u>2</u>,369	<u>8</u>,450
1,<u>0</u>96	<u>6</u>,748
3,<u>4</u>67	6,68<u>8</u>
2,<u>1</u>30	<u>7</u>,970
<u>3</u>,996	6,<u>7</u>91
9,7<u>3</u>8	6,94<u>7</u>
8,<u>9</u>68	9,8<u>7</u>4

Adding and Subtracting Decimals

Adding decimals are simple, just line up the decimals, add the numbers, and bring the decimal straight down. Let us have a look.

Example:

$1.452 + 1.3$ 1) Stack them up.

$$\begin{array}{r} 1.452 \\ +1.3 \\ \hline \end{array}$$

2) Add

$$\begin{array}{r} 1.452 \\ +1.3 \\ \hline 2.752 \end{array}$$

Bring decimal straight down!

Sometimes you may see something like this

$$\begin{array}{r} 1.4 \\ +1.352 \\ \hline \end{array} \qquad \begin{array}{r} 1.400 \\ +1.352 \\ \hline 2.752 \end{array}$$

← If you want, add zeros. Looks better too.

Subtracting is exactly the same as in both cases above, just subtract, borrow when necessary.

Example:

$$\begin{array}{r} 1.452 \\ -1.3 \\ \hline 0.152 \end{array}$$

Line up decimals and subtract.

You can add zeros to 1.3 making it 1.300 if it makes you feel better

$$\begin{array}{r} 1.4 \\ -1.352 \\ \hline \end{array}$$

This one is different, line up decimals

Add zeros to 1.4 making it 1.400

$$\begin{array}{r} {}^{3}\cancel{1}.{}^{9}\cancel{4}{}^{1}0 \\ -1.352 \\ \hline 0.048 \end{array}$$

After adding the zeros subtract.

Note borrowed from the 4, to make the 9, and 10

Give it a try, on the next two pages are addition and subtraction problems. Refer back to this page or use the links below to watch the videos.

Trailing zeros

https://virtualnerd.com/middle-math/decimals/adding-subtracting/trailing-zeros-definition

Adding

https://virtualnerd.com/middle-math/decimals/adding-subtracting/decimal-addition-method

Subtracting

https://virtualnerd.com/middle-math/decimals/adding-subtracting/decimal-subtraction-method

Adding Decimals (A)

Find each sum.

1.33 + 9.41	6.14 + 6.94	6.86 + 1.41	6.78 + 4.10	5.49 + 5.41
1.40 + 3.11	1.56 + 5.09	8.77 + 5.34	4.74 + 5.61	2.76 + 6.08
7.25 + 9.27	9.15 + 4.53	8.48 + 5.17	1.10 + 1.26	4.48 + 5.02
5.92 + 6.39	1.66 + 2.81	3.42 + 1.06	3.16 + 7.07	8.46 + 9.07
4.49 + 8.68	8.01 + 1.41	7.08 + 9.23	2.52 + 8.63	5.78 + 8.49
4.52 + 8.83	7.84 + 2.40	2.71 + 9.16	8.73 + 6.82	4.25 + 5.16

Subtracting Decimals (A)

Name: _____ Date: _____

Calculate each difference

9.66 − 0.8	8.97 − 0.4	0.8 − 0.6	7.7 − 3.71	9.46 − 0.31
0.7 − 0.27	2.5 − 0.9	6.43 − 2.16	0.7 − 0.17	9.28 − 8.3
0.7 − 0.2	8.93 − 7.73	0.6 − 0.1	9.4 − 6.9	5.82 − 1.94
0.86 − 0.20	4.4 − 0.6	7.5 − 2.19	9.50 − 4.9	4.1 − 0.69
0.9 − 0.7	0.46 − 0.31	1.93 − 0.2	0.9 − 0.3	2.74 − 1.8

Multiplying Decimals

Multiplying decimals is easy. First, treat them like a whole number, as if there were no decimals.

Example 1:

0.03 x 1.1 — Treat as whole number,

Stack them up and multiply!

$$\begin{array}{r} 11 \\ \times\ 3 \\ \hline 33 \end{array}$$

We have the whole number 33 and whole numbers have an unseen decimal to the right 33.

Easy right? The trick is figuring out the decimal!

Look back at the original problem, how many numbers/digits are to the right of every decimal

0.03 x 1.1

1 2 3 Three numbers to the right of all decimals!

0.033.

Pretending there is a decimal to the right of the whole number 33, move the decimal three places back to the left. Add zeros as necessary. (3 places because in the problem there are three numbers to the right of every decimal in the original problem

Example 2:

Problem	Treat as whole numbers	Equals	Finished product
0.25 x 0.2 =	25 x 2 =	50	Move decimal 3 places to left. 0.050
102 x 0.22 =	102 x 22 =	2244	Move decimal 2 places to left. 22.44

How many numbers were to the right of all decimals in each problem?

3 places in the first problem
2 places in the second problem

Video link

How do you multiply decimals?

https://virtualnerd.com/middle-math/decimals/multiplying/decimal-multiplication-method

Multiplying 3-Digit by 2-Digit Numbers with Various Decimal Places (A)

Name: _____ Date: _____

Calculate each product.

68.2 × 8.4	630 × 1.2	16.0 × 36	5.52 × 0.25	32.3 × 26
7.91 × 0.19	26.3 × 7.8	3.07 × 19	63.2 × 8.5	0.394 × 70
55.8 × 9.4	596 × 3.6	940 × 8.2	203 × 42	0.707 × 0.97
906 × 64	310 × 1.8	520 × 0.92	131 × 0.41	6.00 × 5.1
0.913 × 56	12.8 × 3.8	52.2 × 2.3	0.394 × 76	0.411 × 0.35

Dividing Decimals

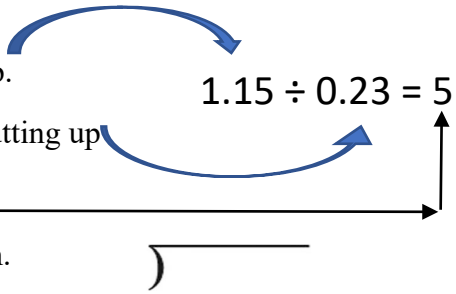
Reminder Vocabulary

Dividend: The number that is being divided or being cut up.

Divisor: The number that is doing the dividing, or doing cutting up

Quotient: The answer

Radical: The funny shaped thingamabob we use in division.



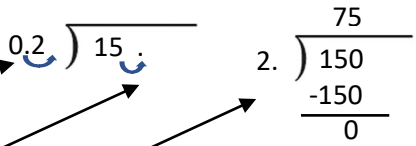
Example 1: Dividing a whole number by a decimal

The Problem: 15 ÷ 0.2 =

Step one: Move the decimal point in the 0.2, to the right one place. Making the 0.2 into a 2

Step Two: put a decimal to the right of the 15 and move it one place to the right. Fill in the opening with a zero.

Step three: divide.



Example 2: Dividing a decimal by a whole number

The Problem: 68.5 ÷ 5 =

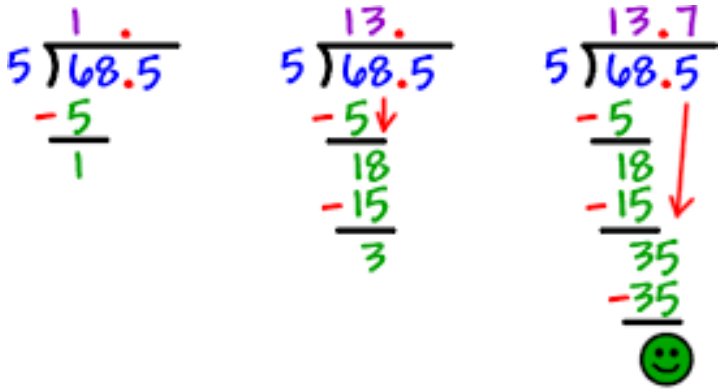
Step 1: Divide the five into six.

Step 2, after you have multiplied, subtracted and brought down, Divide five into eighteen.

Step 3: Put the decimal straight up behind the three. In this example, the decimal was already raised to the top.

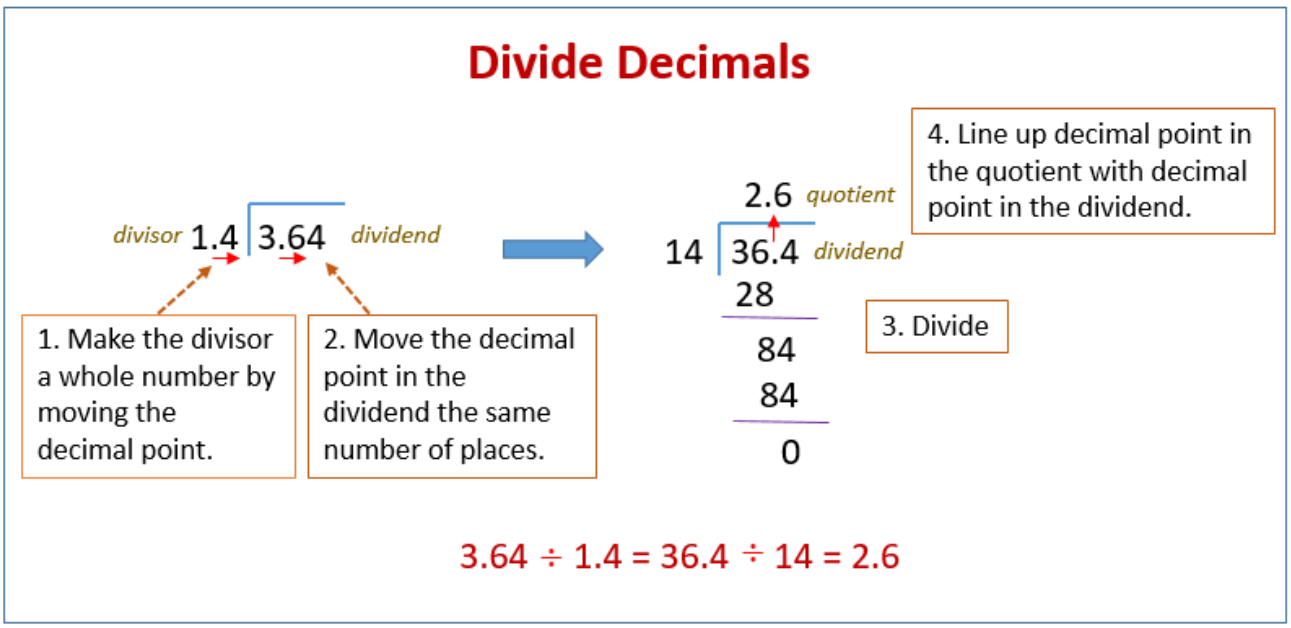
Step 4: Divide again, multiply, subtract, bring down.

Step 5: Divide the five into 35. Place the 7 to the right of the decimal. Multiple and subtract, Zero. Problem solved.

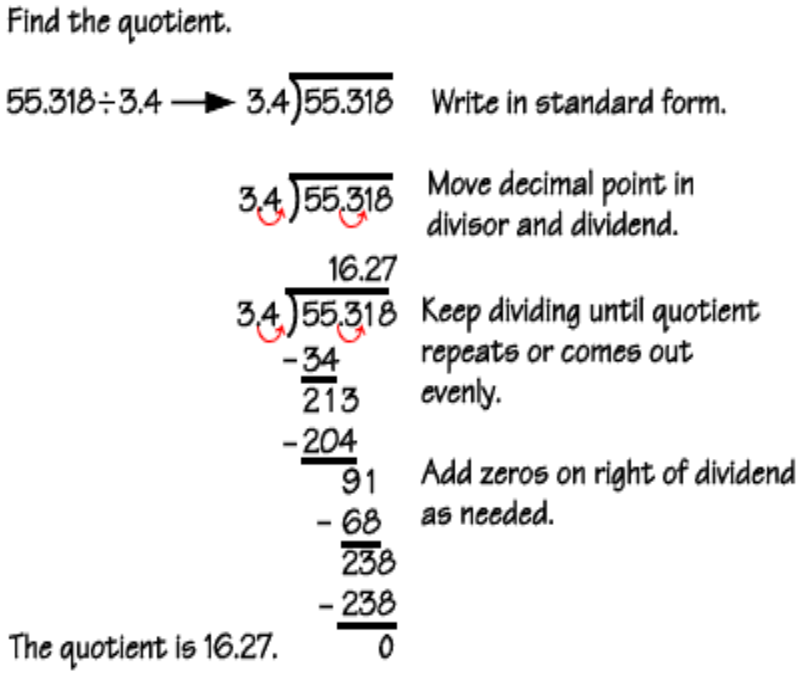


Example 3: Dividing a decimal by a decimal

The Problem: 3.64 ÷ 1.4 =



Let's look at another problem



Note: The goal is to make the divisor a whole number.

If you move the decimal one place in the divisor, you must move it one place in the dividend.

In this case, 3.4 becomes 34. And 55.318 become 553.18.

If the divisor was 3.45, then it would become 345, and we'd move the decimal two places in the dividend, 55.318 would become 5531.8

Dividing Decimals by Whole Numbers (A)

Find each quotient.

$6\overline{)1.29}$	$6\overline{)9.51}$	$5\overline{)1.26}$	$6\overline{)7.79}$
$2\overline{)9.70}$	$5\overline{)3.76}$	$4\overline{)7.77}$	$2\overline{)2.12}$
$9\overline{)7.66}$	$8\overline{)5.09}$	$8\overline{)1.81}$	$2\overline{)3.70}$

Dividing Decimals (A)

Find each quotient.

$0.58\overline{)0.5568}$	$0.2\overline{)0.12}$	$0.7\overline{)0.1995}$	$1.5\overline{)1.2}$
$0.1\overline{)0.0805}$	$0.6\overline{)1.452}$	$0.5\overline{)0.05}$	$3.64\overline{)28.5376}$
$1.92\overline{)1.152}$	$0.3\overline{)0.24}$	$0.9\overline{)0.801}$	$0.59\overline{)0.295}$

Converting Fractions to Decimals

We read decimals based upon the decimal chart we looked at in the beginning of this section. Recall the table.

Decimal .	Tenths	Hundredths	Thousandths	As a Decimal
.	7			0.7
.	7	5		0.75
.	2	7	5	0.275

Decimal	What is the place value of the last number?	We read it as
0.7	The 7 is in the tenths place	Seven tenths
0.75	The 5 is in the hundredths place	Seventy-five hundredths
0.275	The 5 is in the thousandths place	Two hundred seventy-five thousandths

Read this out loud, listen to what you are saying

Let's read these fractions

$\frac{3}{10}$ You might say three over ten but nope,

Three tenths.

$\frac{35}{100}$ Now read this.

Thirty-five hundredths

$\frac{145}{1000}$ Now try this one.

One hundred forty-five thousandths.

The denominator is read as tenths, hundredths thousandths. Considering this, look at those decimals above and consider how you might see them as a fraction.

Example:

Convert 0.175 to a fraction.

Step 1: Read it aloud. One hundred seventy-five thousandths.

Step 2: was it tenths, hundredths or thousandths? This number is the denominator

Thousandths

$\frac{}{1000}$

Step 3: write the 175 as the numerator. Simplify if needed

$\frac{175}{1000}$ $Simplified\ \frac{7}{4}$

A quick way, “what is the place value of the last number in the decimal, tenths, hundredths or thousandths? That’s the bottom number, the denominator. Simply put the decimal number over 10ths, 100ths, 1000ths and simplify if necessary. There you go! Simple right?

Converting Decimals to Fractions (A)

Name: _____ **Date:** _____

Convert each decimal to a fraction.

0.75 =	0.5 =
0.1 =	0.9 =
0.35 =	0.125 =
0.6 =	0.625 =
0.3 =	0.85 =
0.45 =	0.375 =
0.4 =	0.7 =
0.25 =	0.8 =
0.15 =	0.65 =
0.2 =	0.55 =

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Decimal Word Problems - 1

Show all work to the right in the space provided.

1) Billie runs daily as part of an exercise plan. On Sunday she ran 8.3 miles, on Monday 5.1 miles, on Tuesday 5.75 miles, on Wednesday 5.6 miles, on Thursday 4.25 miles, and 6 miles on Saturday. How many miles did she run this week?

2) Tom had $84.50 and then spent $12.25 for a music CD, $17.85 for a gift, and $15.45 for gasoline. How much did he have left?

3) The employees in a firm earn $8.50 an hour for the first 40 hours per week, and 1.5 times the hourly rate for any hours worked over 40. How much does an employee who works 52 hours in one week earn?

4) The monthly rental for an apartment is $412.50. How much would the rent be for one year?

5) If you have $325.58 in your checking account and then write a check for $166.73, what is your new balance?

6) John and Rosie own a home assessed at $98,000. If for every $1000 of assessed value they must pay $65.50 in taxes, how much is their tax bill?

Ratios and Rates

Vocabulary:

Ratios compare two similar things. It says how much of one thing there is when compared to another.

Rate is a ratio that compares different types of quantities. Is usually expressed in units.

Ratios:

Ratios compares two things.

Example: Looking at a classroom, there are a total of 30 students, a mix of women and men. Let us say there are 18 women and 12 men. We can express this as women vs men.

$\frac{Women}{Men} = \frac{18}{12}$ This can be expressed as 18:12 or 18 to 12.

If we compare men to women, we express exactly that way.

$\frac{Men}{Women} = \frac{12}{18}$ And can also be expressed as 12:18 or 12 to 18.

I hope you noticed that it is a fraction of sorts and as such can be simplified.

Women to men $\frac{18}{12} = \frac{3}{2}$

Men to women $\frac{12}{18} = \frac{2}{3}$

We can also ask, how many women out of all the students?

$$\frac{Women}{Students} = \frac{18}{30}\ Simplify = \frac{3}{5}$$

Cooking Rice: The ratio of water to rice is 2:1, that is two cups of water for every one cup of rice. If this ratio makes four servings and you are hosting a dinner for eight people you need to do what to determine how much water and rice.

Ratios like fractions can be changed by picking number and multiplying the numerator and denominator by that number. Equivalent fractions, equivalent ratios.

Example:

$\frac{Water}{Rice} = \frac{2}{1}$ This is for four servings, but we need 8. $\frac{2\ x\ 2}{1\ x\ 2} = \frac{4\ cups\ of\ water}{2\ cups\ of\ rice}$

Autumn Ratios (A)

Find each ratio and simplify, if necessary.

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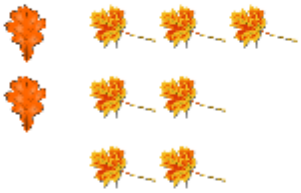

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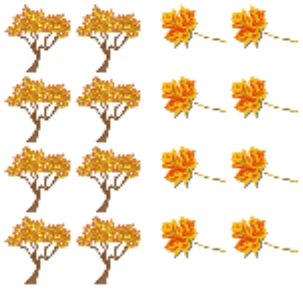

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Express each as a ratio and simplify if necessary

1) 12 cups to 20 cups

2) 24 pennies to 66 pennies

3) 50 beetles out of 55 insects

4) 4 quarts to 40 quarts

5) 49 miles out of 84 miles

6) 36 dimes to 54 dimes

7) 21 gallons to 63 gallons

42 blue cars out of 49 cars

Rates

Rates compare quantities of two different things. You use them all the time. Rent, price of gasoline, how much money you are paid each hour, or how much mileage you get.

Example 1:

Rent, $1700 per month Gasoline, $2.58 per gallon Pay, $15.00 per hour.

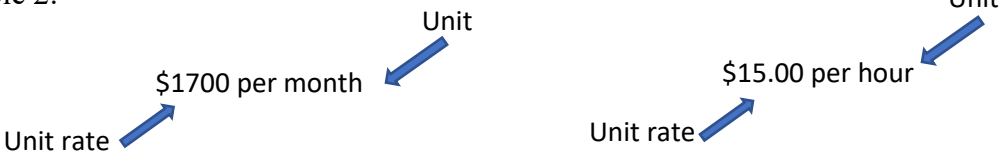
Mileage, 25 miles per gallon.

Vocabulary

Unit is the measurement, month, gallon, hour, or miles.

Unit rate is the cost, the time it takes, the amount it takes,

Example 2:



You can use rates to help you make decisions.

At the store you see two different bands of milk. Brand A and Brand B.

Brand A, 2 liters of milk costs $3.80 vs Brand B, 1.5 liters of milk costing $2.70. Which is cheaper?

Lets write these as fractions

Brand A

$$\frac{Cost}{liters} = \frac{3.80}{2}$$

Cost per liter?

Unit rate is $1.90 per liter.

Just like improper fractions you can divide the numerator by the denominator.

Brand

$$\frac{Cost}{liters} = \frac{2.70}{1.5}$$

Cost per liter?

Unit rate is $1.80 per liter.

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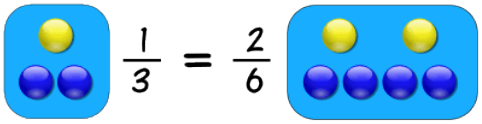
Ratios and Rates

Express each phrase as a rate and unit rate. (Round your answer to the nearest hundredth.)	Rate	Unit Rate
1) 4 calculators cost $125.00	_____	_____
2) 105 miles on 5 gallons of gas	_____	_____
3) mowed 6 yards for $25.00	_____	_____
4) 5 pencils for 11 dollars	_____	_____
5) 5 dollars for 2 cans of tuna	_____	_____
6) 9 chocolate bars cost 18 dollars	_____	_____
7) 13 inches of snow in 6 hours	_____	_____
8) 10 batteries cost 15 dollars	_____	_____
9) 6 movie tickets cost $45.00	_____	_____
10) 23 dollars for 6 books	_____	_____

Proportions

Definition: A proportion is a mathematical comparison between two numbers. They are written the same as ratios. A proportion tells you that two ratios are equal, even when the numbers are different. Much in the same as equivalent fractions.

Example 1:



As a ratio, 1:3 is equal to 2:6

Recall: In fractions you can change $\frac{1}{3}$ to $\frac{2}{6}$ by multiplying $\frac{1\ x\ 2}{3\ x\ 2} = \frac{2}{6}$

Example 2: Comparing two numbers

Rope A

Length is 20 feet.

Weight is 2 lbs.

Rope B

Length is 60 feet.

Weight is 6 lbs.

These ropes are proportional because we can use multiplication to determine the weight of the rope regardless of length.

How much would the same rope weight if it was 120 feet long? I can multiple Rope A by 6 which equals 120. I can also multiple Rope A's weight by 6. How much does Rope B weight? Answer, 12 lbs

$$\frac{Length\ 20}{Weight\ 2} = \frac{20\ x\ 6}{2\ x\ 6} = \frac{120}{12}$$

Example 3:

Let us look at

If you have a picture of your favorite dog and you want to make it bigger.

5

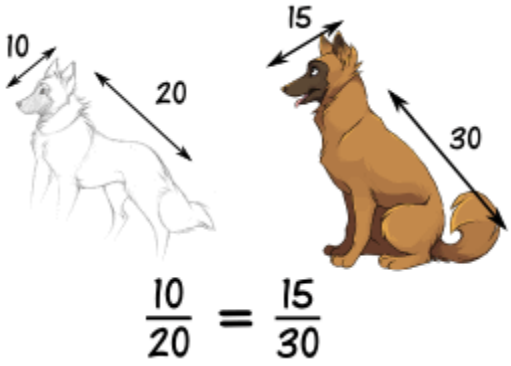
10

This picture is 5 x 10

There is something wrong with this picture. It is still 10 inches wide, but the height is no longer proportional. It is 22 inches high.

This picture is proportional. It is twice the length and twice the width of the original. In other words, it is 10 x 20

How to determine if something is proportional?



Are these proportional?

Simply cross multiply across

$$\frac{10}{20} \times \frac{15}{30} = \frac{300}{300}$$

As long as the answer is the same top and bottom, it is proportional. So, yes, the pictures are proportional

Is the pictures proportional?

$\frac{5}{10} \times \frac{10}{22} = \frac{100}{110}$ No, this is not proportional

$\frac{5}{10} \times \frac{10}{20} = \frac{100}{100}$ Yes, this is proportional

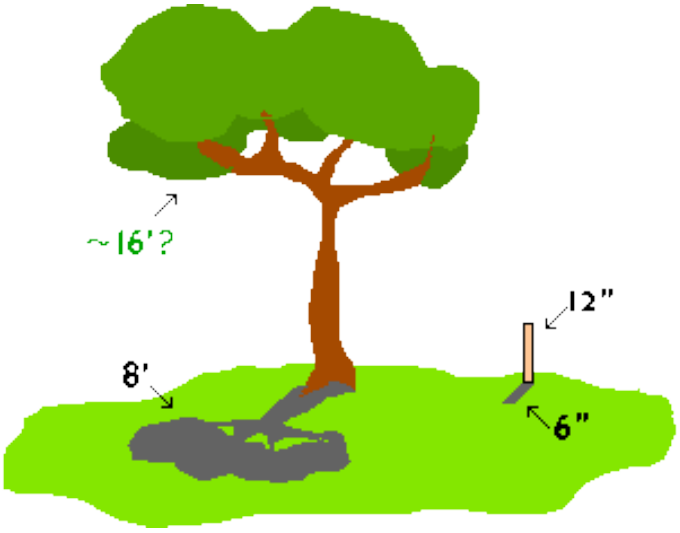
Okay, so how can I use these things?

Let's say you want to find the height of a tree. You cannot climb it and use a tape measure.

You can measure the tree's shadow. It is 8 feet long.

There's a post nearby and you can measure both the post's height 12 feet tall, and the posts shadow, 6 feet long.

Set it up as a proportion.



Set up the problem

	Tree	Post
Height	x unknown	12
Shadow length	8	6

As a proportion

$$\frac{x}{8} = \frac{12}{6}$$

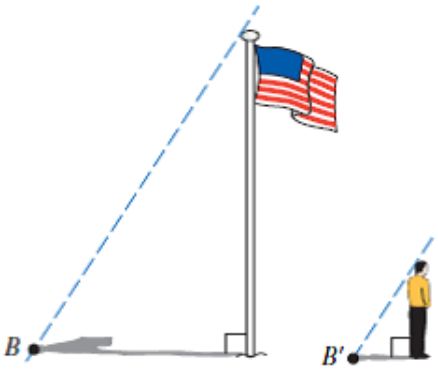
Slight of hand time, lets work some magic on this problem.

Use cross multiplication: x is unknow, so pretend it is a 1.

$$\frac{x}{8} = \frac{12}{6} = \frac{1}{8} \times \frac{12}{6} = \frac{96}{6}$$

More magic, divide the bigger number by the smaller number $96 \div 6 = 16$

To answer the question, the tree is 16 feet tall.



You try it. The trick is setting up the problem. I like using boxes

	Flagpole	Man
Height		
Shadow		

The flagpole's shadow is 35 feet long.

The man is 6 feet tall and casts a shadow 5 feet long

How tall is the flagpole?

Basic Pre-algebra Skill

Solving Proportion Word Problems

Answer each question and round your answer to the nearest whole number.

1) Totsakan enlarged the size of a photo to a height of 18 in. What is the new width if it was originally 2 in tall and 1 in wide?

2) A frame is 9 in wide and 6 in tall. If it is reduced to a width of 3 in then how tall will it be?

3) The money used in Saudi Arabia is called the Riyal. The exchange rate is 4 Riyals to $1. Find how many Riyals you would receive if you exchanged $5.

4) Jacob bought one bulb of elephant garlic for $2. How many bulbs can Stephanie buy if she has $12?

5) Natalie bought one bunch of fennel for $2. How many bunches can Stephanie buy if she has $6?

6) A triangle is 20 in tall and 5 in wide. If it is reduced to a width of 1 in then how tall will it be?

7) One bulb of elephant garlic costs $2. How many bulbs of elephant garlic can you buy for $14?

8) If you can buy one bunch of seedlees green grapes for $2 then how many can you buy with $18?

9) The currency in Sweden is the Kronor. The exchange rate is approximately $1 for every 7 Kronor. At this rate, how many dollars would you get if you exchanged 14 Kronor?

10) Totsakan bought one can of pineapple chunks for $2. How many cans can Stefan buy if he has $16?

11) The currency in Bolivia is the Boliviano. The exchange rate is approximately $1 = 8 Bolivianos. At this rate, how many Bolivianos would you get if you exchanged $3?

12) A painting is 2 in tall and 3 in wide. If it is enlarged to a width of 15 in then how tall will it be?

Percentages

What is percentages?

A percent is a part of a whole. The whole is measured as 100. A percent can also be expressed as a ratio, a decimal or a fraction.

You use them now but don't necessarily think about it.

25 cents

25 cents is 25% of a dollar

50 cents

50 cents is 50% of a dollar

75 cents

75 cents is 75% of a dollar.

How many pennies are in a dollar? (100)

From the beginning: The average way we use percentages is when we are buying things. So, you walk into a store and see four different discounts on four different products you want to buy.

Shoes, $89, 15% off

Jacket, $70, 20% off

Shirt, $55, 25% off

Hat, $29, 30% off.

The easiest way to figure out what that discount is, turn the percent into a decimal and then multiply the price by that decimal. Oh My Goodness, "WHAT?"

Shoes, $89, 15% off.

Step 1

Pretend that the % sign is a decimal. What we have then is 15**.** Instead of 15%.

Now, move the decimal two places to the left!

15**.** becomes **.**15,

Always move the decimal two places no matter what the percent is. Add a zero if necessary.

Example: 6% becomes 6**.** Becomes **.**06

Or 125% becomes 125**.** Becomes 1**.**25

Step 2

Multiple the price of $89 with the new decimal number of .15

89 x .15 = 13.35

The discount is $13.35.

But how much will you pay? Subtract the discount of $13.35 from the price of $89.

You will pay, $ 75.36

Now, you try and figure out the discount and final price of the remaining products.

Finding Percents of a Number (A)

Find the value of each percent.

35% of 31	36% of 74	64% of 41	33% of 40
91% of 5	96% of 19	31% of 97	18% of 43
39% of 1	17% of 67	59% of 3	10% of 34
13% of 14	68% of 69	98% of 88	13% of 25
81% of 29	8% of 35	28% of 75	67% of 10
91% of 61	40% of 4	71% of 68	14% of 1
6% of 33	57% of 15	57% of 28	41% of 28
40% of 73	49% of 75	34% of 19	29% of 9
60% of 22	82% of 29	43% of 80	57% of 30
41% of 52	35% of 46	68% of 98	71% of 38

Solving various percentage problems.

As noted, in life, most of the time you are just looking to find out what the discount is and how much you are going to pay. However, in the GED test you may be asked to find different parts.

When we look at percentages, we are looking at three parts.

1) **The whole**. For the example we used shoes that cost $89. This is the whole.
2) **The Actual percent** %, in the case of the shoes, 15%
3) **The part**. The part is, in this case, the discount of $13.35

Nifty way to find any one of the three pieces, Part/whole/percentage

$$\frac{Part}{Whole} = \frac{\%}{100}$$

Insert the pieces you have into the right spot, use an x for the missing piece, cross multiple and then divide the bigger number by the smaller number.

Example 1: If asked to find the **part/discount**, we have the whole 89 and the percentage 15%

$$\frac{x}{89} = \frac{15}{100} = \frac{1335}{100} = 13.35$$

Example 2: If asked to find the **whole**, we have the part, 13.35, and the percentage, 15%.

$$\frac{13.35}{x} = \frac{15}{100} = \frac{15}{1335} = 89$$

Example 3: If asked to find the **percentage**, we have the part, 13.35 and the whole 89.

$$\frac{13.35}{89} = \frac{x}{100} = \frac{89}{1335} = 15$$

The only difference with Example 3 we must turn the 15 into a percentage 15%.

Turn number into a percentage

1) Pretend there is a decimal to the left of the number. In this case, **.**15
2) Regardless of how big the number is, always move the decimal two places to the right, .15 becomes 15% (Add the % sign)
3) What if you have different numbers like,
    a. 6, becomes .6, move the decimal two places to the right and add a zero. 60%
    b. 125 becomes .125, move decimal over two places to the right = 12.5%

Reading a problem

What percent **of** 89 **is** 13.35, means we are looking for the percent %. (Example 3)

13.35 is 15% **of what amount**, means we are looking for the whole. (Example 2)

What is 15% of 89, means we are looking for the part. (Example 1)

Percent Calculations (A)

Calculate the percent or value requested.

1. **What percent of $805.00 is $402.50?**
2. **$212.75 is 25% of what amount?**
3. **$142.00 is 50% of what amount?**
4. **$49.25 is 25% of what amount?**
5. **What is 25% of $249.00?**
6. **What percent of $975.00 is $243.75?**
7. **What is 25% of $256.00?**
8. **What percent of $567.00 is $425.25?**
9. **What is 75% of $11.00?**
10. **What is 25% of $159.00?**

Percent Word Problems

- **PROBLEM 1:** A store owner paid $120 wholesale price for a suit. He needs to make a 35% profit on the sale of the suit. By how much should he markup the price of the suit to make his desired profit?

  Rephrase: What is 35% of $120?

- **PROBLEM 2:** Mrs. Smith earns $3500 a month. She saves $280 a month. Savings is what percent of her income?

  Rephrase: $280 is what percent of $3500?

- **PROBLEM 3:** Sales tax in a certain community is 7%. If the sales tax on a new car was $1400, what was the selling price of the car?

  Rephrase: $1400 is 7% of what number?

- **PROBLEM 4:** Mr. Jones receives 10% commission on each sale that he makes. He earned $450 last week in commissions. How much were his sales?

  Rephrase: $450 is 10% of what number?

- **PROBLEM 5:** An organization has raised $4800 for a remodeling project. This is 60% of their goal. What is their fundraising goal?

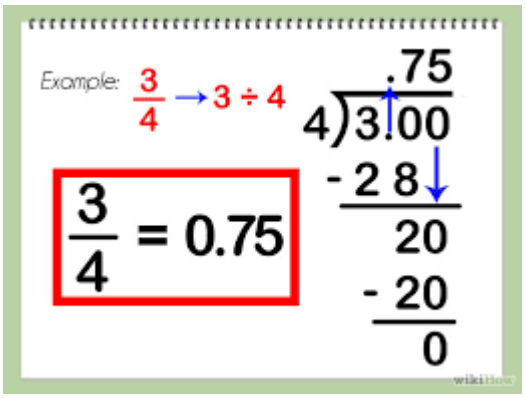
  Rephrase: $4800 is 60% of what number?

Converting Percentages to Decimals and Fractions

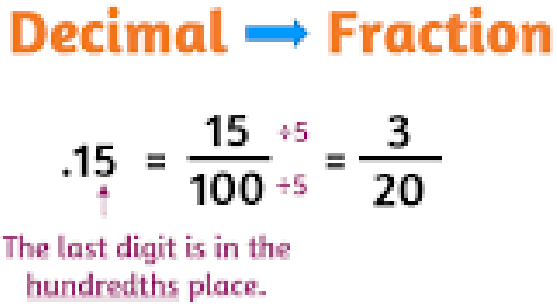
In order to work with percentages, we have to be comfortable changing from fractions to decimals, to percentages. We previously learned how to convert fractions to decimals and decimals back to fractions. We just went over how to convert a percentage to a decimal and a decimal to a percentage.

Recall,

To turn a fraction to a decimal, divide the numerator by the denominator.



To turn a decimal to a fraction, use the place value of the last digit to write as a fraction. .15, the five is in the hundredth place



You can work this backwards, Change the fraction $\frac{3}{20}$ into a decimal 3 ÷ 20 = 0.15. Now you can move the decimal over two places and change it to a % sign. 0.15 becomes 15%

One the next page is a chart for you to fill out. Here is an example. The bolded items need to be changed into a decimal, fraction or percentage, represented by normal type.

Decimal	Fraction	Percentage
0.35	$\frac{35}{100}$ *simplified* $\frac{7}{20}$	35%
0.125	$\mathbf{\frac{1}{8}}$	12.5%
.25	$\frac{1}{4}$	**25%**

Fill in the missing parts. Remember to simplify fractions to lowest terms.

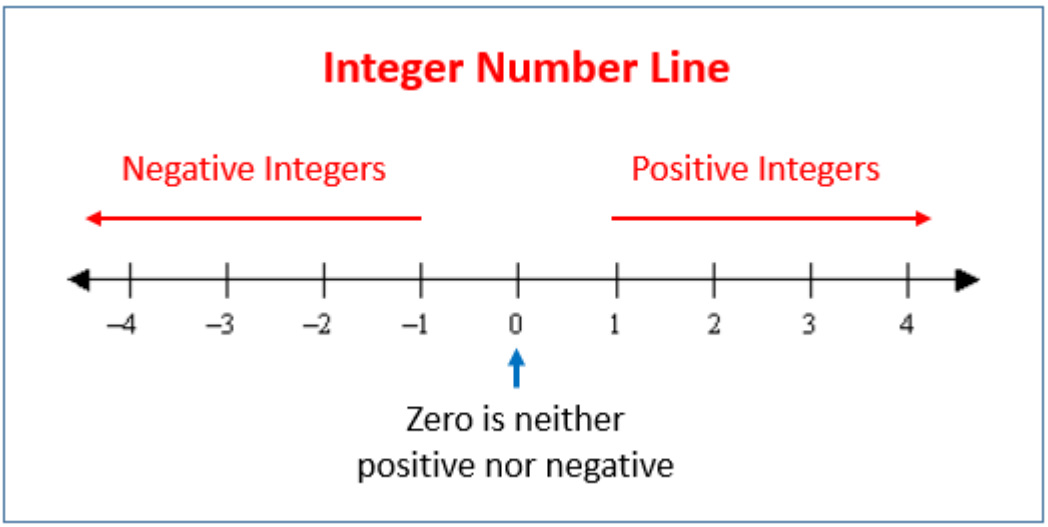
Decimal	Fraction	Percentage
.75		
	$\frac{9}{10}$	
		40%
0.8		
	$\frac{5}{8}$	
0.625		
		30%

Pre-Algebra: Integers

Definition:

Any real number both positive and negative, including zero.

They are often taught using a number line to illustrate what they are.



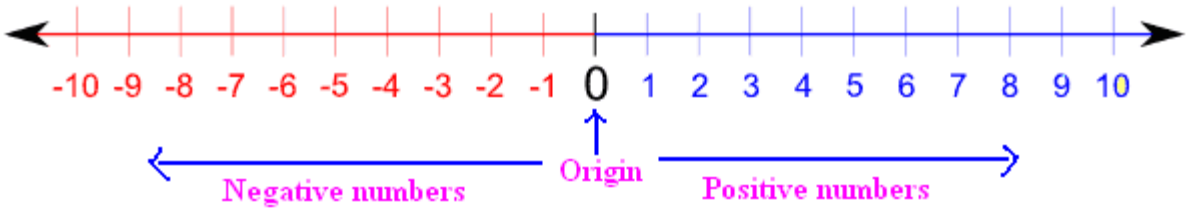
- We use them when we read a thermometer, temperature goes up, positive increase. If the temperature goes down, that's a negative decrease.
- When we use our bank accounts. When we put money in, that is an increase/positive. When we withdrawal money, that's a decrease and is represented by a minus sign.

One of my favorite things to say is, don't try and understand the how, just understand it works. The next few pages we will learn how to add, subtract, multiply and divide integers.

Vocabulary:

Absolute value: simply means, the actual value of a number. If you have $5, that can be seen as +5. However, if you spend $5, that can be seen as -5. Either way, five is five, positive or negative.

So, + 5 is the opposite of – 5. Absolute values are written | -5 | when asked the absolute value of a – 5, it is " 5"



Adding Integers:

Rule 1) if the signs are the same, add the two values together and keep the sign.

Example.

3 + 4 = 7. Because there are no signs in front of the numbers, we assume both are positive.

-3 + (-4) Both the 3 and the 4 have – signs in front. Add, 3 + 4 = 7, but add the **–** to the answer, - 7.

Note: Because we are using both an addition plus sign and negative sign, parentheses are used on the second number to separate the addition and negative sign.

Rule 2) If the signs are different, subtract the smaller number from the larger number and keep the sign of the bigger number.

Examples

3 + (-7) =

Subtract 3 from 7 our solution is 4. Is it a negative or positive?

It is a **–** 4 because the 7 is the bigger of the two numbers.

-4 + 6 =

Subtract, 6 - 4 = 2, Is the answer negative or positive?

Which number is the larger of the two? The 6 is larger the answer

Is 2, positive 2.

Two more examples

3 + **(-**11) =

Subtract, 11 – 3 = 8. Is it a negative or positive 8? It is **-**8 because

the 11 is bigger than the 3, we keep the negative sign.

-2 + 8 =

Subtract, 8 – 2 = 6, negative or positive? The answer is 6.

You must memorize these rules. Subtraction will require you to use these rules.

1) -3 + (-3) =

2) 38 + (-70) =

3) -1+ (-10) =

4) 55 + (-88) =

5) 56 + 63 =

6) -96 + (-10) =

7) -98 + (-94) =

8) -59 + (-28) =

9) 28 + 74 =

10) -4 + 38 =

11) 61 + (-3) =

12) 66 + (-41) =

13) -4 + 45 =

14) -39 + 95 =

15) 99 + 88 =

16) -88 + 11 =

17) 8 + 19 =

18) 9 + (-29) =

19) -76 + 55 =

20) 86 + (-14) =

Subtracting Integers

Oh the evil someone weaved when they figured out how to subtract integers!

As you saw with addition, when we use rule 2, we really are not adding but subtracting. Well, guess what? Yes, change subtraction to an addition problem!

Rule 1) Keep, Change, Change.

Example 1:

Keep Change Change

Here's the problem $3 - 8 =$ apply rule 1, $3 - 8 =$

A) The 3 doesn't' change, it is a positive 3, stays that way.
B) Change the subtraction to an addition sign.
C) The 8 is a positive 8, we use the opposite, a negative 8.

Becomes $3 + (-8) =$

Rule 2) Default to the addition rules. Recall, "**You must memorize these rules. Subtraction will require you to use these rules."**

Ask yourself, are the signs the same? NO! What **addition rule** do we use? **Rule 2**, if signs are different, subtract the smaller number from the larger number and keep the sign of the bigger number.

$$3 + (-8) = -5.$$

Example 2:

Keep Change Change

$$-4 - (-6) =$$

Becomes $-4 + 6 = 2$

Example 3:

Ah oh! This one is different? Why? When we keep, change, change, the signs become the same!

$$-6 - 9 =$$

$$-6 + (-9) - 15$$

Addition Rule 1. If the signs are the same, add both numbers and keep the sign.

1) 70 - +1 =

2) 32 - 7 =

3) 87 - 37 =

4) -66 - 62 =

5) -73 - (-96) =

6) 43 - (-75) =

7) 37 - (-93) =

8) -22 - 94 =

9) -51 - 92 =

10) 28 - (-14) =

11) -76 - (-2) =

12) -43 - (-62) =

13) 55 - (-14) =

14) -93 - 99 =

15) -22 - 48 =

16) -31 - (-16) =

17) 83 - 95 =

18) -62 - (-8) =

19) 76 - (-27) =

20) 58 - 48 =

Multiplying and Dividing Integers

Multiplication and division work in the same way. In other words, they have the same pattern. Let's start with a simple concept.

When multiplying and dividing integers, simply multiply or divide as normal.

After you have done the multiplication or division then you can decide if the answer is negative or positive.

Multiplication rules	**Division rules**
Positive x a positive = a positive	Positive ÷ a positive = a positive
Negative x a negative = a positive	Negative ÷ a negative = a positive
A positive x a negative = a negative	A positive ÷ a negative = a negative
A negative x a positive = a negative	A negative ÷ a positive = a negative

The pattern is the same between multiplication and division.

Example 1:

(4) (-6) The signs are different + times a –

-24 is the solution.

Example 2:

(8) (5) Signs are the same

40 is the solution

Example 3:

(-3) (-7) Signs are the same

21 is our solution

Example 4:

$\frac{-45}{5}$ Division, signs are different

-9 is the solution

Example 5:

-18 ÷ (-3) = 6

Consider, 6 × (-3) = -18

Memorize the pattern!

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1) 8 x 97 =

2) -58)x (-75) =

3) -83) x 37 =

4) 41 x 79 =

5) 61 x (-45) =

6) 46 x 51 =

7) 50 x 7 =

8) 47 x (-47) =

9) 76 x (-49) =

10) -94 x 52 =

11) 15 x 13 =

12) 84 x 83 =

13) 92 x (-8) =

14) -75 x 8 =

15) -25 x 12) =

16) -95 x (-1) =

17) 7 x 10) =

18) -56 x 7) =

19) 85 x 41 =

20) 70 x 8 =

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1) 492 ÷ 82 =

2) -8835 ÷ (-93) =

3) 924 ÷ 21 =

4) 1760 ÷ 55 =

5) -1170 ÷ (-18) =

6) 405 ÷ 27 =

7) -272 ÷ (-4) =

8) -2808 ÷ (-72) =

9) 7569 ÷ 87 =

10) -84 ÷ (-21) =

11) 2280 ÷ 24 =

12) -2550 ÷ (-51) =

13) 1855 ÷ 35 =

14) 660 ÷ 66 =

15) -4000 ÷ 50 =

16) 1900 ÷ 76 =

17) 2176 ÷ 64 =

18) -3816 ÷ (-72) =

19) 4800 ÷ (-80) =

20) 2664 ÷ 72 =

Congratulations!

If you have done everything in this textbook/workbook, and have done every problem presented, and you have watched the videos offered, then you are on your way to the next step.

Answer sheets are provided for most every worksheet and problem in this book.

Answer sheets

Adding and Subtracting Fractions (A) Answers

Find the value of each expression in lowest terms.

1. $\frac{7}{4} - \frac{8}{5} = \frac{3}{20}$

2. $\frac{23}{2} + \frac{9}{4} = \frac{55}{4} = 13\frac{3}{4}$

3. $\frac{8}{3} - \frac{3}{2} = \frac{7}{6} = 1\frac{1}{6}$

4. $\frac{5}{2} - \frac{13}{12} = \frac{17}{12} = 1\frac{5}{12}$

5. $\frac{3}{2} - \frac{9}{7} = \frac{3}{14}$

6. $\frac{7}{10} + \frac{2}{5} = \frac{11}{10} = 1\frac{1}{10}$

7. $\frac{14}{5} - \frac{4}{3} = \frac{22}{15} = 1\frac{7}{15}$

8. $\frac{17}{7} - \frac{5}{3} = \frac{16}{21}$

9. $\frac{4}{3} - \frac{2}{5} = \frac{14}{15}$

10. $\frac{5}{2} + \frac{2}{3} = \frac{19}{6} = 3\frac{1}{6}$

11. $\frac{9}{8} + \frac{5}{6} = \frac{47}{24} = 1\frac{23}{24}$

12. $\frac{9}{7} - \frac{5}{6} = \frac{19}{42}$

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Simplify Fractions (A) Answers

Simplify each fraction to its lowest terms.

$\frac{9}{18} = \frac{1}{2}$	$\frac{4}{16} = \frac{1}{4}$	$\frac{18}{36} = \frac{1}{2}$	$\frac{20}{40} = \frac{1}{2}$
$\frac{70}{80} = \frac{7}{8}$	$\frac{18}{24} = \frac{3}{4}$	$\frac{5}{40} = \frac{1}{8}$	$\frac{21}{36} = \frac{7}{12}$
$\frac{6}{9} = \frac{2}{3}$	$\frac{21}{56} = \frac{3}{8}$	$\frac{9}{36} = \frac{1}{4}$	$\frac{9}{45} = \frac{1}{5}$
$\frac{6}{42} = \frac{1}{7}$	$\frac{14}{35} = \frac{2}{5}$	$\frac{24}{36} = \frac{2}{3}$	$\frac{10}{12} = \frac{5}{6}$
$\frac{36}{45} = \frac{4}{5}$	$\frac{4}{24} = \frac{1}{6}$	$\frac{12}{21} = \frac{4}{7}$	$\frac{63}{77} = \frac{9}{11}$
$\frac{12}{15} = \frac{4}{5}$	$\frac{30}{40} = \frac{3}{4}$	$\frac{32}{48} = \frac{2}{3}$	$\frac{42}{77} = \frac{6}{11}$
$\frac{18}{36} = \frac{1}{2}$	$\frac{28}{42} = \frac{2}{3}$	$\frac{12}{24} = \frac{1}{2}$	$\frac{12}{15} = \frac{4}{5}$
$\frac{40}{60} = \frac{2}{3}$	$\frac{12}{24} = \frac{1}{2}$	$\frac{6}{18} = \frac{1}{3}$	$\frac{36}{40} = \frac{9}{10}$

Multiplication (with mixed numbers)

Solve the word problems. Please show all of your work. Use labels in your answers.

1) Gabe is barely 2 3/5 years old. He has spent 1/3 of his life sleeping or crying. How much of his short life has Gabe spent either sleeping or crying in years?

$\frac{13}{15}$

2) Emily needs enough fabric for 3 1/2 hats, since she has half a hat done already. If each hat requires 1 2/7 feet of fabric, how much fabric will she need to make the 3 1/2 hats?

$4\frac{1}{2}$

3) Steven can run 1 2/9 miles in 10 minutes. How much can Steven run in half an hour, if he keeps a consistent pace?

$3\frac{2}{3}$

a) How much can Steven run in one hour if he keeps the consistent pace of 1 2/9 miles every ten minutes?

$7\frac{1}{3}$

Division with Fractions (With mixed numbers)

Solve the word problems. Please show all of your work. Use labels in your answers.

1) Sheila is baking a few cakes for the bake sale for her school. Each cake requires 2 1/2 cups of sugar. How many cakes can she bake if she has 7 1/3 cups of sugar?

$7\frac{14}{15}$

2) Sheldon is a long distance runner. He can run a mile at a consistent pace of 6 4/5 minutes. How many miles can he run in 30 minutes, if he keeps that pace?

$4\frac{7}{17}$

3) Lourdes got a plant as a birthday gift. Her plant grows an average of 1 2/5 inches every month. How long will it take for the plant to grow a full 10 2/3 inches?

$7\frac{13}{21}$

a) How long will Lourdes have to wait for her plant to grow a total of 14 1/4 inches?

$10\frac{5}{8}$

Multiplying Fractions (A) Answers

Find the value of each expression.

1. $\frac{5}{6} \times \frac{1}{2} = \frac{5}{12}$

2. $\frac{4}{9} \times \frac{2}{3} = \frac{8}{27}$

3. $\frac{3}{5} \times \frac{3}{4} = \frac{9}{20}$

4. $\frac{5}{6} \times \frac{1}{3} = \frac{5}{18}$

5. $\frac{7}{9} \times \frac{1}{2} = \frac{7}{18}$

6. $\frac{5}{11} \times \frac{1}{3} = \frac{5}{33}$

7. $\frac{1}{3} \times \frac{5}{6} = \frac{5}{18}$

8. $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$

9. $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$

10. $\frac{1}{8} \times \frac{1}{4} = \frac{1}{32}$

11. $\frac{1}{2} \times \frac{5}{6} = \frac{5}{12}$

12. $\frac{1}{3} \times \frac{4}{5} = \frac{4}{15}$

Dividing Fractions (A) Answers

Find the value of each expression in lowest terms.

1. $\frac{1}{5} \div \frac{2}{3} = \frac{3}{10}$

2. $\frac{1}{3} \div \frac{7}{10} = \frac{10}{21}$

3. $\frac{1}{2} \div \frac{2}{3} = \frac{3}{4}$

4. $\frac{1}{5} \div \frac{2}{7} = \frac{7}{10}$

5. $\frac{1}{3} \div \frac{3}{4} = \frac{4}{9}$

6. $\frac{2}{9} \div \frac{3}{4} = \frac{8}{27}$

7. $\frac{1}{3} \div \frac{3}{4} = \frac{4}{9}$

8. $\frac{1}{7} \div \frac{1}{5} = \frac{5}{7}$

9. $\frac{4}{9} \div \frac{1}{2} = \frac{8}{9}$

10. $\frac{1}{4} \div \frac{7}{9} = \frac{9}{28}$

11. $\frac{3}{7} \div \frac{5}{9} = \frac{27}{35}$

12. $\frac{1}{4} \div \frac{8}{9} = \frac{9}{32}$

Converting Fractions (A) Answers

Name: _____ Date: _____

Convert mixed to improper fractions and improper to mixed fractions.

$\frac{10}{3} = 3\frac{1}{3}$	$\frac{19}{4} = 4\frac{3}{4}$	$1\frac{5}{9} = \frac{14}{9}$	$\frac{82}{15} = 5\frac{7}{15}$
$4\frac{11}{12} = \frac{59}{12}$	$1\frac{5}{12} = \frac{17}{12}$	$4\frac{9}{10} = \frac{49}{10}$	$6\frac{5}{7} = \frac{47}{7}$
$9\frac{8}{15} = \frac{143}{15}$	$1\frac{7}{9} = \frac{16}{9}$	$\frac{43}{7} = 6\frac{1}{7}$	$6\frac{1}{6} = \frac{37}{6}$
$8\frac{2}{9} = \frac{74}{9}$	$\frac{97}{10} = 9\frac{7}{10}$	$1\frac{3}{10} = \frac{13}{10}$	$\frac{49}{5} = 9\frac{4}{5}$
$\frac{29}{8} = 3\frac{5}{8}$	$\frac{94}{15} = 6\frac{4}{15}$	$\frac{45}{7} = 6\frac{3}{7}$	$5\frac{1}{4} = \frac{21}{4}$
$5\frac{7}{8} = \frac{47}{8}$	$\frac{21}{10} = 2\frac{1}{10}$	$9\frac{2}{7} = \frac{65}{7}$	$7\frac{7}{12} = \frac{91}{12}$
$3\frac{6}{7} = \frac{27}{7}$	$\frac{7}{5} = 1\frac{2}{5}$	$\frac{31}{5} = 6\frac{1}{5}$	$6\frac{11}{15} = \frac{101}{15}$
$3\frac{1}{15} = \frac{46}{15}$	$\frac{55}{9} = 6\frac{1}{9}$	$2\frac{4}{7} = \frac{18}{7}$	$7\frac{8}{9} = \frac{71}{9}$
$\frac{75}{8} = 9\frac{3}{8}$	$\frac{17}{2} = 8\frac{1}{2}$	$7\frac{1}{8} = \frac{57}{8}$	$\frac{85}{9} = 9\frac{4}{9}$
$3\frac{5}{6} = \frac{23}{6}$	$3\frac{3}{5} = \frac{18}{5}$	$8\frac{2}{15} = \frac{122}{15}$	$4\frac{1}{12} = \frac{49}{12}$

Adding and Subtracting Mixed Fractions (A) Answers

Find the value of each expression in lowest terms.

1. $2\frac{1}{5} + 1\frac{3}{4}$
$= \frac{79}{20} = 3\frac{19}{20}$

2. $3\frac{1}{2} - 2\frac{2}{3}$
$= \frac{5}{6}$

3. $3\frac{1}{2} - 3\frac{1}{2}$
$= 0$

4. $5\frac{3}{4} - 5\frac{1}{4}$
$= \frac{1}{2}$

5. $1\frac{1}{2} + 2\frac{3}{5}$
$= \frac{41}{10} = 4\frac{1}{10}$

6. $3\frac{1}{2} - 2\frac{5}{9}$
$= \frac{17}{18}$

7. $2\frac{3}{4} + 1\frac{1}{5}$
$= \frac{79}{20} = 3\frac{19}{20}$

8. $3\frac{1}{4} - 2\frac{3}{8}$
$= \frac{7}{8}$

9. $3\frac{1}{2} - 1\frac{1}{2}$
$= 2$

10. $5\frac{1}{2} + 5\frac{1}{4}$
$= \frac{43}{4} = 10\frac{3}{4}$

11. $1\frac{10}{11} - 1\frac{1}{3}$
$= \frac{19}{33}$

12. $1\frac{5}{12} + 3\frac{1}{3}$
$= \frac{19}{4} = 4\frac{3}{4}$

Multiplying and Dividing Mixed Fractions (A) Answers

Find the value of each expression in lowest terms.

1. $3\frac{2}{7} \div 1\frac{1}{4}$
$= \frac{92}{35} = 2\frac{22}{35}$

2. $1\frac{2}{3} \div 3\frac{1}{3}$
$= \frac{1}{2}$

3. $2\frac{1}{4} \div 1\frac{1}{2}$
$= \frac{3}{2} = 1\frac{1}{2}$

4. $6\frac{1}{2} \div 2\frac{2}{3}$
$= \frac{39}{16} = 2\frac{7}{16}$

5. $2\frac{1}{10} \div 2\frac{3}{5}$
$= \frac{21}{26}$

6. $1\frac{1}{3} \times 1\frac{2}{3}$
$= \frac{20}{9} = 2\frac{2}{9}$

7. $1\frac{1}{3} \times 2\frac{1}{5}$
$= \frac{44}{15} = 2\frac{14}{15}$

8. $2\frac{1}{7} \div 2\frac{1}{2}$
$= \frac{6}{7}$

9. $1\frac{3}{11} \div 2\frac{1}{3}$
$= \frac{6}{11}$

10. $3\frac{1}{2} \div 2\frac{3}{4}$
$= \frac{14}{11} = 1\frac{3}{11}$

11. $1\frac{3}{8} \div 1\frac{1}{12}$
$= \frac{33}{26} = 1\frac{7}{26}$

12. $2\frac{7}{8} \div 5\frac{1}{2}$
$= \frac{23}{44}$

13. $3\frac{2}{3} \div 1\frac{1}{6}$
$= \frac{22}{7} = 3\frac{1}{7}$

14. $1\frac{3}{8} \times 3\frac{1}{3}$
$= \frac{55}{12} = 4\frac{7}{12}$

15. $1\frac{4}{11} \div 1\frac{1}{4}$
$= \frac{12}{11} = 1\frac{1}{11}$

Converting Fractions to Decimals (A) Answers

Name: _____ Date: _____

Convert each fraction to a decimal.

$\frac{4}{20} = 0.2$

$\frac{2}{20} = 0.1$

$\frac{4}{10} = 0.4$

$\frac{17}{20} = 0.85$

$\frac{15}{20} = 0.75$

$\frac{4}{5} = 0.8$

$\frac{10}{20} = 0.5$

$\frac{5}{20} = 0.25$

$\frac{1}{2} = 0.5$

$\frac{16}{20} = 0.8$

$\frac{19}{20} = 0.95$

$\frac{13}{20} = 0.65$

$\frac{1}{10} = 0.1$

$\frac{2}{10} = 0.2$

$\frac{3}{8} = 0.375$

$\frac{11}{20} = 0.55$

$\frac{8}{20} = 0.4$

$\frac{6}{20} = 0.3$

$\frac{2}{8} = 0.25$

$\frac{3}{20} = 0.15$

Word Problems Answers

Page 11	Page 22	Page 56
1) $\frac{5}{9}$ 2) $\frac{3}{8}$ 3) $1\frac{3}{20}$ 4) $1\frac{1}{4}$ 5) $1\frac{3}{8}$ 6) $1\frac{1}{5}$ 7) $\frac{5}{6}$ 8) $\frac{3}{8}$ 9) 4 10) $10\frac{1}{2}$	$1\frac{13}{24}$ $9\frac{23}{40}$ $3\frac{3}{10}$ $\frac{29}{60}$ $5\frac{13}{15}$	1) \$42 2) 8% 3) \$20,000 4) \$4500 5) \$8000

Adding Decimals (A) Answers

Find each sum.

1.33 + 9.41 10.74	6.14 + 6.94 13.08	6.86 + 1.41 8.27	6.78 + 4.10 10.88	5.49 + 5.41 10.90
1.40 + 3.11 4.51	1.56 + 5.09 6.65	8.77 + 5.34 14.11	4.74 + 5.61 10.35	2.76 + 6.08 8.84
7.25 + 9.27 16.52	9.15 + 4.53 13.68	8.48 + 5.17 13.65	1.10 + 1.26 2.36	4.48 + 5.02 9.50
5.92 + 6.39 12.31	1.66 + 2.81 4.47	3.42 + 1.06 4.48	3.16 + 7.07 10.23	8.46 + 9.07 17.53
4.49 + 8.68 13.17	8.01 + 1.41 9.42	7.08 + 9.23 16.31	2.52 + 8.63 11.15	5.78 + 8.49 14.27
4.52 + 8.83 13.35	7.84 + 2.40 10.24	2.71 + 9.16 11.87	8.73 + 6.82 15.55	4.25 + 5.16 9.41

Subtracting Decimals (A) Answers

Name: _____ Date: _____

Calculate each difference

9.66 − 0.8 = 8.86	8.97 − 0.4 = 8.57	0.8 − 0.6 = 0.2	7.7 − 3.71 = 3.99	9.46 − 0.31 = 9.15
0.7 − 0.27 = 0.43	2.5 − 0.9 = 1.6	6.43 − 2.16 = 4.27	0.7 − 0.17 = 0.53	9.28 − 8.3 = 0.98
0.7 − 0.2 = 0.5	8.93 − 7.73 = 1.20	0.6 − 0.1 = 0.5	9.4 − 6.9 = 2.5	5.82 − 1.94 = 3.88
0.86 − 0.20 = 0.66	4.4 − 0.6 = 3.8	7.5 − 2.19 = 5.31	9.50 − 4.9 = 4.60	4.1 − 0.69 = 3.41
0.9 − 0.7 = 0.2	0.46 − 0.31 = 0.15	1.93 − 0.2 = 1.73	0.9 − 0.3 = 0.6	2.74 − 1.8 = 0.94

Multiplying 3-Digit by 2-Digit Numbers with Various Decimal Places (A) Answers

Name: _____ Date: _____

Calculate each product.

68.2 × 8.4 = 572.88	630 × 1.2 = 756.0	16.0 × 36 = 576.0	5.52 × 0.25 = 1.3800	32.3 × 26 = 839.8
7.91 × 0.19 = 1.5029	26.3 × 7.8 = 205.14	3.07 × 19 = 58.33	63.2 × 8.5 = 537.20	0.394 × 70 = 27.580
55.8 × 9.4 = 524.52	596 × 3.6 = 2145.6	940 × 8.2 = 7708.0	203 × 42 = 8526	0.707 × 0.97 = 0.68579
906 × 64 = 57984	310 × 1.8 = 558.0	520 × 0.92 = 478.40	131 × 0.41 = 53.71	6.00 × 5.1 = 30.600
0.913 × 56 = 51.128	12.8 × 3.8 = 48.64	52.2 × 2.3 = 120.06	0.394 × 76 = 29.944	0.411 × 0.35 = 0.14385

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Dividing Decimals by Whole Numbers (A) Answers

Quotients may be rounded and/or truncated.

0.215 6) 1.29	1.585 6) 9.51	0.252 5) 1.26	1.29833 6) 7.79
4.85 2) 9.70	0.752 5) 3.76	1.9425 4) 7.77	1.06 2) 2.12
0.8511 9) 7.66	0.63625 8) 5.09	0.22625 8) 1.81	1.85 2) 3.70

Dividing Decimals (A) Answers

Find each quotient.

$0.58\overline{)0.5568}$ $0.2\overline{)0.12}$ $0.7\overline{)0.1995}$ $1.5\overline{)1.2}$

Whole number divisors and quotients:

$58\overline{)55.68}$ $2\overline{)1.2}$ $7\overline{)1.995}$ $15\overline{)12}$

$0.1\overline{)0.0805}$ $0.6\overline{)1.452}$ $0.5\overline{)0.05}$ $3.64\overline{)28.5376}$

Whole number divisors and quotients:

$1\overline{)0.805}$ $6\overline{)14.52}$ $5\overline{)0.5}$ $364\overline{)2853.76}$

$1.92\overline{)1.152}$ $0.3\overline{)0.24}$ $0.9\overline{)0.801}$ $0.59\overline{)0.295}$

Whole number divisors and quotients:

$192\overline{)115.2}$ $3\overline{)2.4}$ $9\overline{)8.01}$ $59\overline{)29.5}$

Converting Decimals to Fractions (A) Answers

Name: _____ Date: _____

Convert each decimal to a fraction.

$0.75 = \frac{3}{4}$

$0.5 = \frac{1}{2}$

$0.1 = \frac{1}{10}$

$0.9 = \frac{9}{10}$

$0.35 = \frac{7}{20}$

$0.125 = \frac{1}{8}$

$0.6 = \frac{3}{5}$

$0.625 = \frac{5}{8}$

$0.3 = \frac{3}{10}$

$0.85 = \frac{17}{20}$

$0.45 = \frac{9}{20}$

$0.375 = \frac{3}{8}$

$0.4 = \frac{2}{5}$

$0.7 = \frac{7}{10}$

$0.25 = \frac{1}{4}$

$0.8 = \frac{4}{5}$

$0.15 = \frac{3}{20}$

$0.65 = \frac{13}{20}$

$0.2 = \frac{1}{5}$

$0.55 = \frac{11}{20}$

Decimal Word Problems - 1

Show all work to the right in the space provided.

1) Billie runs daily as part of an exercise plan. On Sunday she ran 8.3 miles, on Monday 5.1 miles, on Tuesday 5.75 miles, on Wednesday 5.6 miles, on Thursday 4.25 miles, and 6 miles on Saturday. How many miles did she run this week?

35 miles

2) Tom had $84.50 and then spent $12.25 for a music CD, $17.85 for a gift, and $15.45 for gasoline. How much did he have left?

38.95

3) The employees in a firm earn $8.50 an hour for the first 40 hours per week, and 1.5 times the hourly rate for any hours worked over 40. How much does an employee who works 52 hours in one week earn?

$493.00

4) The monthly rental for an apartment is $412.50. How much would the rent be for one year?

$4950.00

5) If you have $325.58 in your checking account and then write a check for $166.73, what is your new balance?

158.85

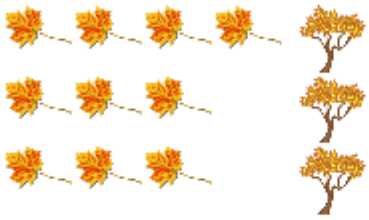
6) John and Rosie own a home assessed at $98,000. If for every $1000 of assessed value they must pay $65.50 in taxes, how much is their tax bill?

$6419.00

1) 35 miles 2) $38.95 3) $493.00 4) $4950.00 5) $158.85 6) $6419.00 W '04

Autumn Ratios (A) Answers

Find each ratio and simplify, if necessary.



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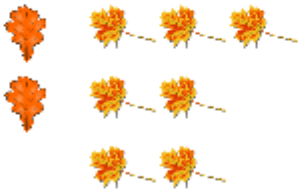
: =3 :10=3 :10

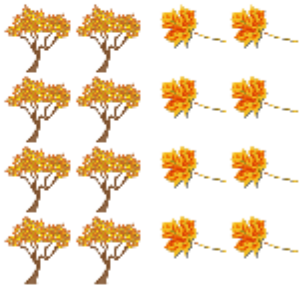
: =1 :4 =1 :4

: =4 :1 =4 :1



: =2 :7 =2 :7

: =7 :2 =7 :2



: =8 :8 =1 :1

: =8 :8 =1 :1

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Express each as a ratio and simplify if necessary

1) 12 cups to 20 cups

3:5

2) 24 pennies to 66 pennies

4:11

3) 50 beetles out of 55 insects

10:11

4) 4 quarts to 40 quarts

1:10

5) 49 miles out of 84 miles

7:12

6) 36 dimes to 54 dimes

2:3

7) 21 gallons to 63 gallons

1:3

42 blue cars out of 49 cars

6:7

Name : _____ Score : _____

Teacher : _____ Date : _____

Ratios and Rates

Express each phrase as a rate and unit rate. (Round your answer to the nearest hundredth.)	Rate	Unit Rate
1) 4 calculators cost $125.00	$\frac{125 \text{ dollars}}{4 \text{ calculators}}$	31.25 dollars per calculator
2) 105 miles on 5 gallons of gas	$\frac{105 \text{ miles}}{5 \text{ gallons}}$	21.00 miles per gallon
3) mowed 6 yards for $25.00	$\frac{25 \text{ dollars}}{6 \text{ yards}}$	4.17 dollars per yards
4) 5 pencils for 11 dollars	$\frac{11 \text{ dollars}}{5 \text{ pencils}}$	2.20 dollars per pencil
5) 5 dollars for 2 cans of tuna	$\frac{5 \text{ dollars}}{2 \text{ cans}}$	2.50 dollars per can
6) 9 chocolate bars cost 18 dollars	$\frac{18 \text{ dollars}}{9 \text{ chocolate bars}}$	2.00 dollars per chocolate bar
7) 13 inches of snow in 6 hours	$\frac{13\text{" of snow}}{6 \text{ hours}}$	2.17" of snow per hour
8) 10 batteries cost 15 dollars	$\frac{15 \text{ dollars}}{10 \text{ batteries}}$	1.50 dollars per battery
9) 6 movie tickets cost $45.00	$\frac{45 \text{ dollars}}{6 \text{ movie tickets}}$	7.50 dollars per movie ticket
10) 23 dollars for 6 books	$\frac{23 \text{ dollars}}{6 \text{ books}}$	3.83 dollars per book

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Answers to Solving Proportion Word Problems

1) 9 in	2) 2 in	3) 20 Riyals	4) 6
5) 3	6) 4 in	7) 7	8) 9
9) $2	10) 8	11) 24 Bolivianos	12) 10 in
13) 3 in	14) 2	15) 2	16) 2 in
17) 3	18) 5	19) $3	20) $2
21) 15 Somoni	22) 10	23) $3	24) 9 Zlotych

Finding Percents of a Number (A) Answers

Find the value of each percent.

35% of 31 = 10.85	36% of 74 = 26.64	64% of 41 = 26.24	33% of 40 = 13.2
91% of 5 = 4.55	96% of 19 = 18.24	31% of 97 = 30.07	18% of 43 = 7.74
39% of 1 = 0.39	17% of 67 = 11.39	59% of 3 = 1.77	10% of 34 = 3.4
13% of 14 = 1.82	68% of 69 = 46.92	98% of 88 = 86.24	13% of 25 = 3.25
81% of 29 = 23.49	8% of 35 = 2.8	28% of 75 = 21	67% of 10 = 6.7
91% of 61 = 55.51	40% of 4 = 1.6	71% of 68 = 48.28	14% of 1 = 0.14
6% of 33 = 1.98	57% of 15 = 8.55	57% of 28 = 15.96	41% of 28 = 11.48
40% of 73 = 29.2	49% of 75 = 36.75	34% of 19 = 6.46	29% of 9 = 2.61
60% of 22 = 13.2	82% of 29 = 23.78	43% of 80 = 34.4	57% of 30 = 17.1
41% of 52 = 21.32	35% of 46 = 16.1	68% of 98 = 66.64	71% of 38 = 26.98

Percent Calculations (A) Answers

Calculate the percent or value requested.

1. **What percent of $805.00 is $402.50?**

   50%

2. **$212.75 is 25% of what amount?**

   $851.00

3. **$142.00 is 50% of what amount?**

   $284.00

4. **$49.25 is 25% of what amount?**

   $197.00

5. **What is 25% of $249.00?**

   $62.25

6. **What percent of $975.00 is $243.75?**

   25%

7. **What is 25% of $256.00?**

   $64.00

8. **What percent of $567.00 is $425.25?**

   75%

9. **What is 75% of $11.00?**

   $8.25

10. **What is 25% of $159.00?**

    $39.75

Answers to Percent Word Problems

1. $\frac{x}{120} = \frac{35}{100}$ **$42 markup**

2. $\frac{280}{3500} = \frac{x}{100}$ **8% of her income**

3. $\frac{1400}{x} = \frac{7}{100}$ **$20,000 is the selling price of the car**

4. $\frac{450}{x} = \frac{10}{100}$ **$4500 was the amount of his sales**

5. $\frac{4800}{x} = \frac{60}{100}$ **$8000 fundraising goal**

6. difference in price $3.71 - $3.50 = $.21 $\frac{.21}{3.50} = \frac{x}{100}$ **6% rise in price**

7. difference in price $50 – 35 = $15 $\frac{15}{50} = \frac{x}{100}$ **30% discount**

8. difference in price $5.00 - $2.50 = $2.50 $\frac{2.50}{2.50} = \frac{x}{100}$ **100% price increase**

9. difference in population 30,000 – 25,000 = 5,000 $\frac{5,000}{25,000} = \frac{x}{100}$ **20% increase**

10. difference in price $150,000 - $135,000 = $15,000 $\frac{15,000}{150,000} = \frac{x}{100}$ **10% depreciation**

Conversion chart

Fill in the missing parts. Remember to simplify fractions to lowest terms.

Decimal	Fraction	Percentage
.75	$\frac{1}{4}$	75%
0.9	$\frac{9}{10}$	90%
0.4	$\frac{2}{5}$	40%
0.8	$\frac{4}{5}$	80%
0.624	$\frac{5}{8}$	62.4%
0.625	$\frac{5}{8}$	62.4%
0.3	$\frac{3}{10}$	30%

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1) (-3) + (-3) = -6

2) (+38) + (-70) = -32

3) (-1) + (-10) = -11

4) (+55) + (-88) = -33

5) (+56) + (+63) = 119

6) (-96) + (-10) = -106

7) (-98) + (-94) = -192

8) (-59) + (-28) = -87

9) (+28) + (+74) = 102

10) (-4) + (+38) = 34

11) (+61) + (-3) = 58

12) (+66) + (-41) = 25

13) (-4) + (+45) = 41

14) (-39) + (+95) = 56

15) (+99) + (+88) = 187

16) (-88) + (+11) = -77

17) (+8) + (+19) = 27

18) (+9) + (-29) = -20

19) (-76) + (+55) = -21

20) (+86) + (-14) = 72

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1) (+70) - (+1) = 69

2) (+32) - (+7) = 25

3) (+87) - (+37) = 50

4) (-66) - (+92) = -158

5) (-73) - (-96) = 23

6) (+43) - (-75) = 118

7) (+37) - (-93) = 130

8) (-22) - (+94) = -116

9) (-51) - (+92) = -143

10) (+28) - (-14) = 42

11) (-76) - (-2) = -74

12) (-43) - (-62) = 19

13) (+55) - (-14) = 69

14) (-93) - (+99) = -192

15) (-22) - (+48) = -70

16) (-31) - (-16) = -15

17) (+83) - (+95) = -12

18) (-62) - (-8) = -54

19) (+76) - (-27) = 103

20) (+58) - (+48) = 10

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1) (+8) x (+97) = 776

2) (-58) x (-75) = 4350

3) (-83) x (+37) = -3071

4) (+41) x (+79) = 3239

5) (+61) x (-45) = -2745

6) (+46) x (+51) = 2346

7) (+50) x (+7) = 350

8) (+47) x (-47) = -2209

9) (+76) x (-49) = -3724

10) (-94) x (+52) = -4888

11) (+15) x (+13) = 195

12) (+84) x (+83) = 6972

13) (+92) x (-8) = -736

14) (-75) x (+8) = -600

15) (-25) x (+12) = -300

16) (-95) x (-1) = 95

17) (+7) x (+10) = 70

18) (-56) x (+7) = -392

19) (+85) x (+41) = 3485

20) (+70) x (+8) = 560

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Teacher : _____ Date : _____

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1) (+492) ÷ (+82) = 6

2) (-8835) ÷ (-93) = 95

3) (+924) ÷ (+21) = 44

4) (+1760) ÷ (+55) = 32

5) (-1170) ÷ (-18) = 65

6) (+405) ÷ (+27) = 15

7) (-272) ÷ (-4) = 68

8) (-2808) ÷ (-72) = 39

9) (+7569) ÷ (+87) = 87

10) (-84) ÷ (-21) = 4

11) (+2280) ÷ (+24) = 95

12) (-2550) ÷ (-51) = 50

13) (+1855) ÷ (+35) = 53

14) (+660) ÷ (+66) = 10

15) (-4000) ÷ (+50) = -80

16) (+1900) ÷ (+76) = 25

17) (+2176) ÷ (+64) = 34

18) (-3816) ÷ (-72) = 53

19) (+4800) ÷ (-80) = -60

20) (+2664) ÷ (+72) = 37