Essentials of Medication Administration

VNSG 1227

Basic Math Review

Mathematics Skills

- Fractions
- Decimal fractions
- Percents
- Ratios
- Proportions

You round up to the nearest whole number if the tenths digit is 5,6,7,8 or 9.

4.7 is rounded up to 5

5.58 is rounded up to 6

17.872 is rounded up to 18

125.92 is rounded up to 126

46.6 is rounded up to 47

Official VN Rounding Policy

Location: Blackboard VNSG 1327 shell > Course Content

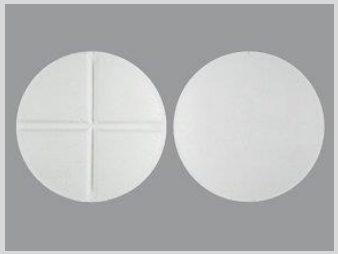
- **Round only at the end of the problem for the final answer**.
- **Follow the directions of each problem**
- (i.e.: Round to the tenths place, or Round to the nearest hundredths place)
- **Oral & Parenteral Medications**
- Perform calculations to the hundredths place and round to the tenths place as needed.
- **IV Medications**
- Perform calculations to the tenths place and round to a whole number
- **Pediatric dosages:**
- Perform calculations and round to the hundredths place as applicable & administer using a TB syringe

Rounding Rules:

- Round to the tenths place - If the number in hundredths place is 5 or greater, increase the number to the left (tenths place) by 1.
- i.e.: (7.4<u>6</u> = 7.<u>5</u>) or (1.96=2)
- Round to the hundredths place – If the number in the thousandths place is 5 or greater, increase the number to the left (hundredths place) by 1.
- i.e.: (3.23<u>8</u> = 3.2<u>4</u>)
- If directions say "round to the tenths place" then the answer should have a number in the tenths place.
  - i.e.: (5.73 = 5.<u>7</u>) or (3.38 = 3.<u>4</u>)
- If directions say ‘round to the hundreds place” then the answer must have a number in the tenths and hundreds place.
- i.e: (1.637 = 1.<u>64</u>) or (2.249 = 2.<u>25</u>)

Miscellaneous Rules:

- Unscored Tablets – answers must be written as whole numbers
- Scored Tablets - answers may be written as:
  - whole numbers - i.e.: (2)
  - a half - i.e.: (½) or (0.5)
  - or a mixture - i.e.: (3 ½) or (3.5)



- IV medications:
- Round to a whole number
- Gravity - answers are written in whole numbers [drops] i.e.: (30 gtt/minute)
- For Gravity problems, rounding may be either rounded up or down.
- (i.e.: 12.49 gtt/min = 12 or 13 gtt/min - both are acceptable answers)
  - Pump - answers are written in whole numbers i.e.: (200 ml/hr) or (50 ml/hr)

Reference:
Gray Morris, D. (2018). *Calculate with Confidence*, 7th Ed. Elsevier Mosby, St. Louis, Missouri.

Skills Check on Fractions

Watch the YouTube video listed on the next slide for a quick review of working with fractions.

If you feel comfortable with the material then you can skip ahead to the section on decimals beginning with Slide 45.

If you feel rusty and need a refresher then just continue on from here.

Quick Review of Fractions

- https://www.youtube.com/watch?v=dG2WSstQyUE
- There are two small errors in video:
  - Problem # 2
    - At 1:52 the answer should be 3 1/3 not 3 1/2
  - Problem # 7
    - At 13:23 the answer should be 7/3 not 7/2
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Working with Fractions

Types of Fractions

Proper Fractions

Numerator (top number) is smaller than Denominator (bottom number)

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

Improper Fractions

Numerator is larger than Denominator

$\frac{7}{3}$ $\frac{4}{3}$

Mixed Numbers

Whole number and a fraction

$3\frac{5}{7}$ $2\frac{4}{9}$

Changing Improper Fraction to Mixed or Whole Number

Converting Improper Fractions to Mixed Numbers

$$\frac{7}{3} = 2\frac{1}{3}$$

Step 1: Set-up a division problem and divide 7 by 3

$$3\overline{)\,7}\quad 2,\ -6,\ 1$$

Step 2: the result is 2 with a remainder of 1 which we write as $2\frac{1}{3}$

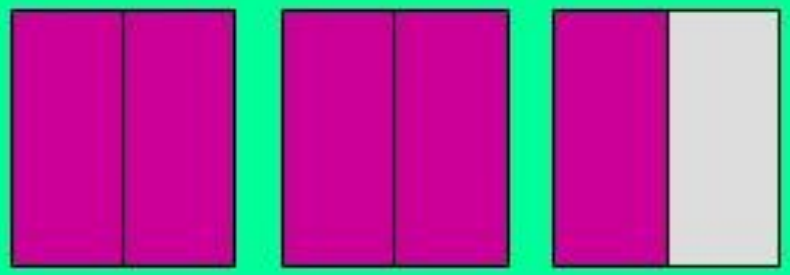
Improper Fraction → Mixed Number

1. *Divide the numerator by the denominator*
2. *Put the remainder over the denominator*

Divide the numerator by the denominator

$$2\overline{)5} \quad 2 \text{ R } 1$$
$$-\,4$$
$$1$$

Write the remainder over the denominator



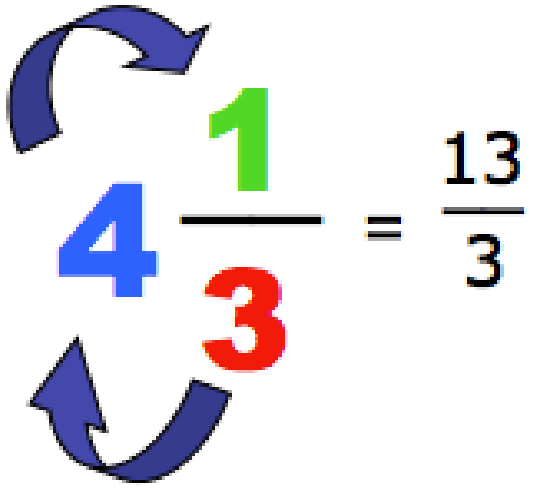
$$= \frac{5}{2} \rightarrow 2\frac{1}{2}$$

Changing Mixed Number to Improper Fraction

Multiply the whole number by the denominator and add the numerator.

Keep the same denominator.

Then add.



Multiply.

Reducing Fractions

Reducing Fractions

Method 1

1. Find a number that can divide the top and bottom.
2. Divide top and bottom by that number.
3. Repeat from step 1 until there is no number, greater than 1, that can divide the top and bottom.

$$\frac{28}{42} \overset{\div 2}{=} \frac{14}{21} \overset{\div 7}{=} \frac{2}{3}$$

Method 2

1. Find the Greatest Common Factor (GCF)
2. Divide top and bottom by GCF.

$$\frac{8}{12} \overset{\div 4}{=} \frac{2}{3}$$

Which Fraction is Larger

Comparing Fractions

- *Students need to be able to determine if two fractions are equal or if one fraction is greater or less than the other.*

Comparing Fractions with the Same Denominator:

- *If the denominators of two fractions are the same, the fraction with the largest numerator is the larger fraction.*
  - Example:- $\frac{1}{4} < \frac{3}{4}$

Both the denominators are same i.e., 4,

So think about numerator, Here 1 < 3

Examples

Which is larger : $\frac{3}{7}$ *or* $\frac{7}{2}$

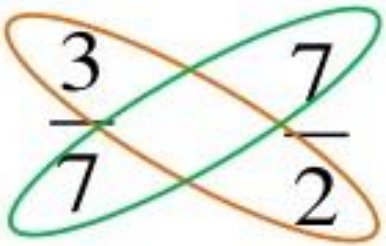
Solution :

The two fractions are: $\frac{3}{7}$ *or* $\frac{7}{2}$

Multiply the first numerator with the second denominator: **3** × **2** = **6**

Multiply the Second numerator with the first denominator: 7 × **7** = **49**

6



49

which product is greater:

We can see that 6 < 49

Means 49 is larger than 6

So, that $\frac{3}{7} < \frac{7}{2}$

Which Fraction is Larger

https://www.youtube.com/watch?v=KNdUJQ_qd4U
https://www.youtube.com/watch?v=lQHdX74XjGg

Adding Fractions

Adding Fractions

Adding Fractions with Like Denominators

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

Add the numerators.
Denominator is unchanged.

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

$$\frac{4}{7}$$

Adding Fractions with Unlike Denominators

$$\frac{1}{8}+\frac{2}{3}$$

Rewrite with common denominator

$$\begin{matrix} 3 \text{ x } \frac{1}{8}+\frac{2}{3} \text{ x } 8 \\ 3 \text{ x } \frac{1}{8}+\frac{2}{3} \text{ x } 8 \end{matrix}$$

Add the numerators

$$\frac{3}{24}+\frac{16}{24}$$

$$\frac{19}{24}$$

Adding and Subtracting Mixed Numbers

Add Mixed Numbers

$$9\frac{1}{2}+5\frac{3}{4}$$

$$=\frac{19}{2}+\frac{23}{4}$$ Change to improper fractions

$$=\frac{19\times 2}{2\times 2}+\frac{23}{4}$$ Change to common denominator

$$=\frac{38}{4}+\frac{23}{4}$$

$$=\frac{61}{4}$$ Add the numerators

$$=15\frac{1}{4}$$ Change to mixed numbers

Subtract Mixed Numbers

$$9\frac{1}{2} - 5\frac{1}{4}$$

$$= \frac{19}{2} - \frac{21}{4}$$ Change to improper fractions

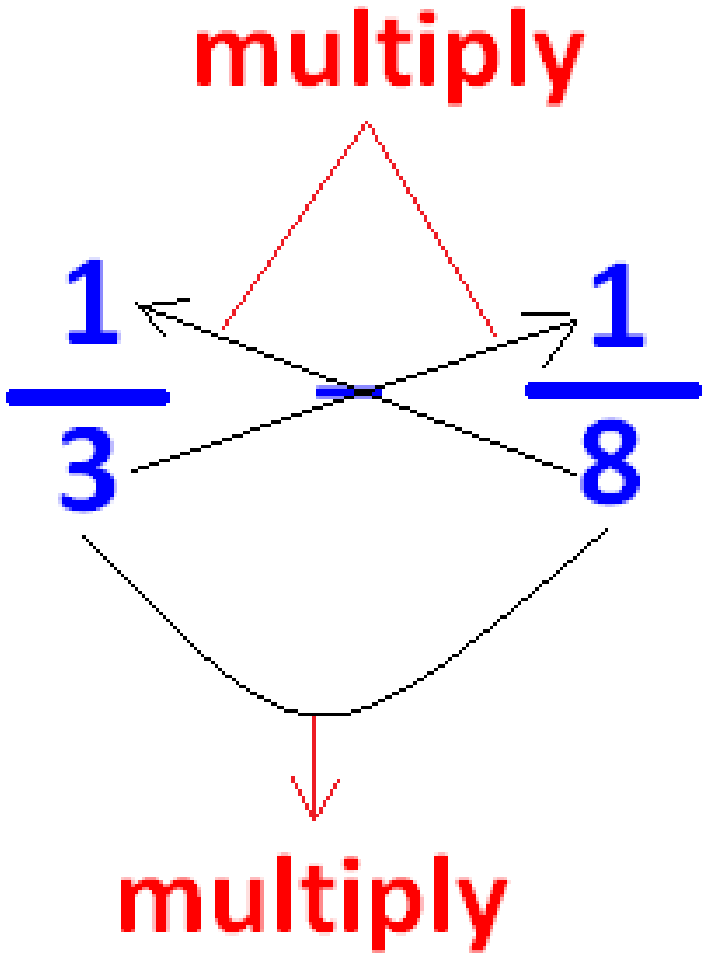
$$= \frac{19 \times 2}{2 \times 2} - \frac{21}{4}$$ Change to common denominator

$$= \frac{38}{4} - \frac{21}{4}$$ Subtract the numerators

$$= \frac{17}{4} = 4\frac{1}{4}$$ Change to mixed numbers

Subtracting Fractions

Subtract Fractions with Unlike Denominators



$$\frac{1}{3} - \frac{1}{8} = \frac{8-3}{24} = \frac{5}{24}$$

Subtraction Fractions with UNLIKE denominators

$$\frac{5}{6} - \frac{3}{9} =$$

1. Find the LCM of the denominators. This is your new denominator.

Multiples of 6 = 6, 12, 18
Multiples of 9 = 9, 18, 27

LCM = 18

2. Rewrite the problem using the LCM.

$$\frac{5}{6} \times \frac{3}{3} - \frac{3}{9} \times \frac{2}{2} = \frac{15}{18} - \frac{6}{18}$$

Whatever you do to the numerator you must do to the denominator.

3. Subtract the numerators. The denominator stays the same.

$$\frac{15}{18} - \frac{6}{18} = \frac{9}{18}$$

4. Simplify

$$\frac{9}{18} \div 9 = \frac{1}{2}$$

Divide by the Greatest Common Factor.

Multiplying Fractions

Multiplying Fractions

Remember! 1. Multiply 2. Multiply 3. Simplify	Fraction multiplied by a fraction	Whole number multiplied by a fraction	Fraction multiplied by a mixed number
Step 1: Write whole number as fraction; write mixed number as improper fraction.	$\frac{2}{3} \times \frac{3}{4}$	$9 \times \frac{2}{5}$ $\frac{9}{1} \times \frac{2}{5}$	$\frac{2}{3} \times 2\frac{1}{3}$ $\frac{2}{3} \times \frac{7}{3}$
Step 2: Multiply the numerators	$\frac{2}{3} \times \frac{3}{4} = \frac{6}{}$	$\frac{9}{1} \times \frac{2}{5} = \frac{18}{}$	$\frac{2}{3} \times \frac{7}{3} = \frac{14}{}$
Step 3: Multiply the denominators	$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$	$\frac{9}{1} \times \frac{2}{5} = \frac{18}{5}$	$\frac{2}{3} \times \frac{7}{3} = \frac{14}{9}$
Step 4: Write answer in simplest terms	$\frac{6}{12} = \frac{1}{2}$	$\frac{18}{5} = 3\frac{3}{5}$	$\frac{14}{9} = 1\frac{5}{9}$

Dividing Fractions

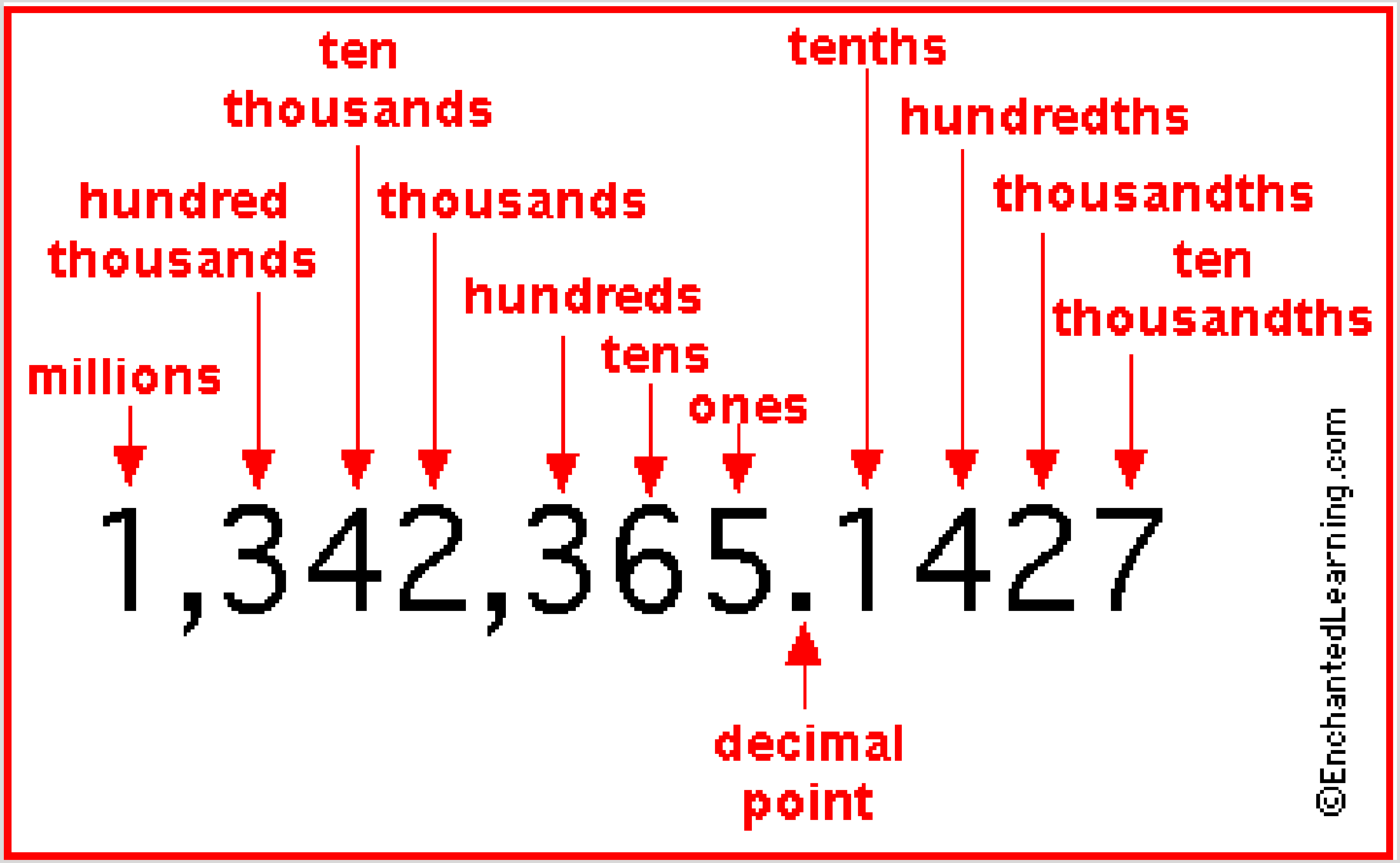
Dividing Fractions

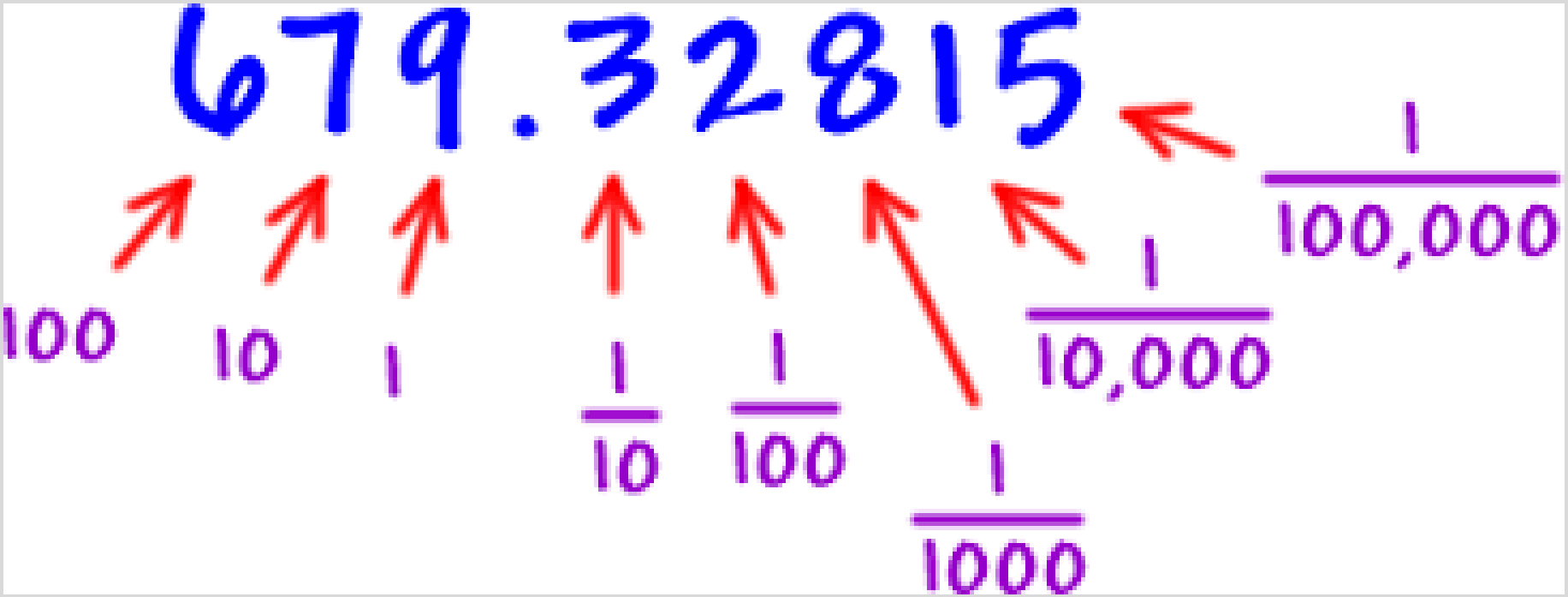
Remember!

Keep	Change	Flip
First fraction stays the same	Operation changes from ÷ to x	Flip 2nd fraction for reciprocal

	Fraction divided by a fraction	Whole number divided by a fraction	Fraction divided by a mixed number
Step 1: Write whole number as fraction; write mixed number as improper fraction.	$\frac{2}{3} \div \frac{1}{3}$	$9 \div \frac{1}{3}$ → $\frac{9}{1} \div \frac{1}{3}$	$\frac{2}{3} \div 2\frac{1}{3}$ → $\frac{2}{3} \div \frac{7}{3}$
Step 2: Find the reciprocal of the divisor (the number you are dividing by).	$\frac{2}{3} \div \frac{3}{1}$	$\frac{9}{1} \div \frac{3}{1}$	$\frac{2}{3} \div \frac{3}{7}$
Step 3: The reciprocal allows you to change the operation from division to multiplication.	$\frac{2}{3} \times \frac{3}{1}$	$\frac{9}{1} \times \frac{3}{1}$	$\frac{2}{3} \times \frac{3}{7}$
Step 4: Multiply the fractions.	$\frac{2}{3} \times \frac{3}{1} = \frac{6}{3}$	$\frac{9}{1} \times \frac{3}{1} = \frac{27}{1}$	$\frac{2}{3} \times \frac{3}{7} = \frac{6}{21}$
Step 5: Write the answer in simplest terms.	$\frac{6}{3} = 2$	$\frac{27}{1} = 27$	$\frac{6}{21} = \frac{2}{7}$

Decimal Fractions

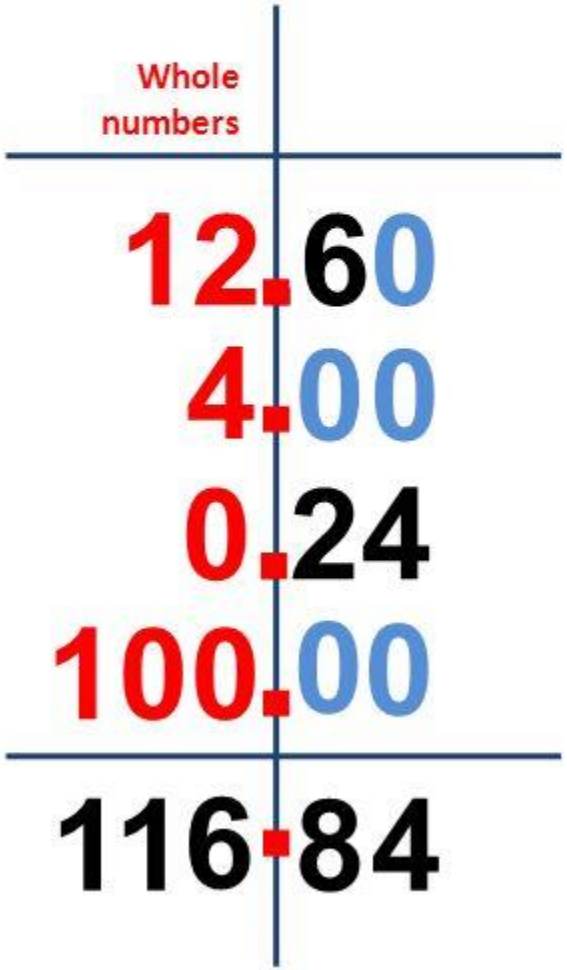

millions
hundred thousands
ten thousands
thousands
hundreds
tens
ones
tenths
hundredths
thousandths
ten thousandths
1,342,365.1427
decimal point
©EnchantedLearning.com


679.32815
100
10
1
1/10
1/100
1/1000
1/10,000
1/100,000

Adding Decimals

Adding Decimal Numbers

12.6 + 4 + 0.24 + 100



- Keep **decimal points** in line
- Line up **whole numbers** carefully
- Fill up spaces with **zeros**

Subtracting Decimals

To Add and Subtract

Decimals

#1 Line up the numbers. All decimal points should be written to form a straight line.

$$\begin{array}{r} 3.4 \\ +\ 5.95 \\ \hline . \end{array}$$

#2 Bring down the decimal point before adding or subtracting. Keep the decimal points in a straight line.

#3 Add zeroes to the right of the decimal point as needed to fill in the place value.

$$\begin{array}{r} 4.600 \\ +\ 7.841 \\ \hline . \end{array} \qquad \begin{array}{r} 13.533 \\ -\ 2.400 \\ \hline . \end{array}$$

#4 Add or subtract to solve the problem.

Multiplying Decimals

Multiplying Decimals

1. Multiply like whole numbers.
2. Count decimal places in the problem.
3. Put the same number of places behind the decimal in the product.

$$\begin{array}{r} 2.34 \\ \times\ 1.2 \\ \hline 2.808 \end{array}$$

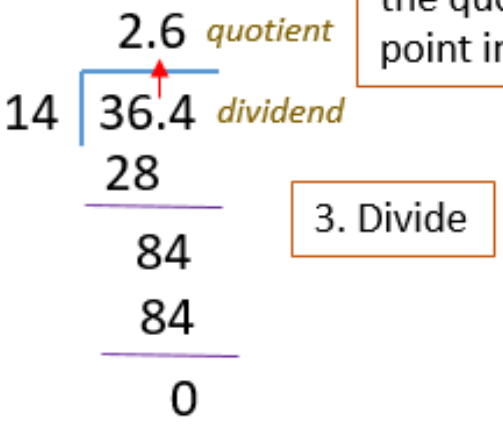
2 decimal places
+ 1 decimal place
3 decimal places

Dividing Decimals

Divide Decimals

1. Make the divisor a whole number by moving the decimal point.

2. Move the decimal point in the dividend the same number of places.



4. Line up decimal point in the quotient with decimal point in the dividend.

3. Divide

$3.64 \div 1.4 = 36.4 \div 14 = 2.6$

Changing Fractions to Decimals

Convert Fractions and Decimals

Fractions		Decimals
$\frac{3}{4}$	Divide numerator by denominator	0.75

Fractions		Decimals
$\frac{2}{5}$	Write as fraction and simplify	0.4

Fractions to Decimals

To change a fraction into a decimal, you divide the NUMERATOR by the DENOMINATOR.

Write each fraction or mixed number as a decimal.

Example 1: $\frac{7}{20}$

$$20\overline{)7.0} = 0.35$$

$$-60$$

$$100$$

$$-100$$

$$0$$

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

This is called a TERMINATING DECIMAL.
(it comes to an end, as in terminate a game!)

Convert Decimal to a Fraction

Example: Convert 3.125 to a fraction.

* *Don't worry about the whole number (the 3) until the very end!*

Step One

Rewrite the decimal as a fraction with a denominator of one.

$$\frac{0.125}{1}$$

Step Two

Multiply the numerator and denominator by 10^n, where n equals the number of digits after the decimal.

$$\frac{0.125}{1} \times \frac{1{,}000}{1{,}000} = \frac{125}{1{,}000}$$

Step Three

Simplify

$$\frac{125}{1{,}000} \div \frac{25}{25} = \frac{5}{40} \div \frac{5}{5} = \frac{1}{8}$$

➤ Then bring back the 3.

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

Percentages

What is a percentage?

A **percentage** is a **ratio of a number to 100**.

The symbol **%** is used to indicate a percent.

The word *percent* means "per cent" , "per hundred." So 6% means "6 out of 100."

What is a Percentage?

A percentage is a special fraction.

The % says, "per hundred."

For example, 47%, is simply another way of writing the fraction

47/100

Percent → Decimal

$$28\% = \frac{28}{100} = .28$$

Divide by 100.

(Move the decimal 2 places to the left.)

Converting fractions to percent

For converting fractions to percent follow the following steps:

- Divide the numerator of the fraction by its denominator
- Multiply the result by 100 (for that move the decimal point two places to the right)
- Put the % sign at the end of the result

Percent of a Number

What is 35% of 80?

$$\frac{35}{100} \times 80 = 28$$

$$0.35 \times 80 = 28$$

Ratios

A ***ratio*** is the comparison of two numbers written as a fraction.

For example: Your school's basketball team has won 7 games and lost 3 games. What is the ***ratio*** of wins to losses?

Because we are comparing wins to losses the first number in our ***ratio*** should be the number of wins and the second number is the number of losses.

The ***ratio*** is $\frac{\text{games won}}{\text{games lost}} = \frac{7 \text{ games}}{3 \text{ games}} = \frac{7}{3}$

Ratio - A comparison of two whole numbers in the same units.

5 girls to 7 boys

4 Possible Ways to Write a Ratio

$\frac{5}{7}$ 5 : 7 5 to 7

sometimes . . .

5 out of 12

as in 5 girls out of 12 students

RULES FOR SOLVING RATIO PROBLEMS.

1. **When writing ratios, the numbers should be written in the order in which the problem asks for them.**

For example: There were 4 girls and 7 boys at the birthday party.

What is the ratio of girls to boys?

Hint: The question asks for girls to boys; therefore, girls will be listed first in the ratio.

4 girls to 7 boys 4 girls : 7 boys $\frac{4 \text{ girls}}{7 \text{ boys}}$

Proportions

Ratio and Proportion

- A ratio is a comparison of two values expressed as a quotient
  - Example: A class has 12 girls and 18 boys. The ratio of girls to boys is $\frac{12}{18}$
  - This ratio can also be expressed as an equivalent fraction $\frac{2}{3}$
- A proportion is an equation stating that two ratios are equal.
  - Example: $\frac{12}{18} = \frac{2}{3}$

PROPORTIONS

comparison of ratios whether they are
the same, less than, or more than the other

NOT PROPORTIONAL

10 : 16 NOT EQUAL 6 : 16

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How to Add and Subtract Fractions

- https://www.youtube.com/watch?v=J8x0EkWHhUU

Fractions, Decimals, and Percentages

- https://www.youtube.com/watch?v=rqlPKSvQ-YU

How to Add and Subtract Mixed Numbers

- https://www.youtube.com/watch?v=_BPY1lMO5r0

Quick Review of Percentages

- https://www.youtube.com/watch?v=tfZKwMdTt2w

Additional Math Resources

- https://www.khanacademy.org/
- STC Centers for Learning Excellence
  - https://www.southtexascollege.edu/cle/