## Table of Contents

## NUMBERS & OPERATIONS

### Order of Operations (TEAS V Study Manual p. 50)

The purpose of having an order of operations in mathematics is to determine a correct answer to an arithmetic expression. For example, is 6 + 2 x 3 equal to 24 or 12? One way to remember the order of operations is to memorize GEMS:

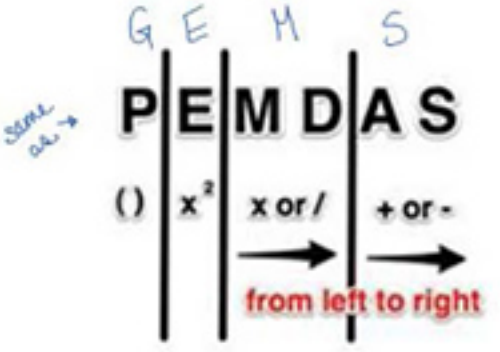
Group (parentheses), $\frac{(numerator)}{(denominator)}$, $\sqrt{(\text{radicand})}$, etc.

Exponents (powers$^2$)

Multiplication/Division (→left to right)

Subtraction/Addition (→left to right)

You may also recall this as PEMDAS:




Example 1:

Multiply first

$$6 + 2 \times 3$$

$$6 + 6$$

$$12$$

*Order of Operations- Exercises (TEAS V Study Manual p. 50)*

1) $508 \cdot 10^5$

2) $-9 \times 1 \div 3 + 6(2 - 78 \times 10)$

3) $68 \times 5{,}715 + 1$

508 (100000)
= 50800000

4) $98\overline{)9{,}702}$

5) $36 \div 6 \div (24 \div 8)$

6) $41 - 4 \times (8-6)^2$

7) $8 \cdot 3^2 + 6$

8) $60 \div 15 \cdot 4 - 2$

9) $10 \div 5 \cdot 2$

10) $4 + (3-4)^2 + 6 \times 2$

11) $(3)^2 + 2 - 1$

12) $8 \div 4 \cdot 5 \div (3-4+6) + 2^3$

## One- and Two-step Word Problems with Whole Numbers (TEAS V Study Manual p. 53-54)

Word problems can be solved using a method as outlined below:

**Summarize** – Take notes; underline; What is given? What is unknown?

**Question** - Are there any unclear parts? Can I make connections to concepts learned? Do I know a related formula?

**Predict** – What would be a reasonable answer? Use analogies, round.

**Clarify** - What is the unknown? Ask yourself, what am I being asked to accomplish? Draw a picture, make a table, and attempt to answer the question posed. Is your solution close to your prediction?

## *One- and Two-step Word Problems with Whole Numbers-Exercises (TEAS V Study Manual p. 53-54)*

1) For every 10 people who work in a city, 3 of them do not commute by public transportation. If 34,600 people work in the city, how many of them do not take public transportation?

2) Sam currently pays $1200 rent for her apartment every month. How much would he save in one year if he moved into an apartment where the rent is $675 per month?

3) A bullet train travels 240 kilometers per hour. How far can it travel in 45 minutes?

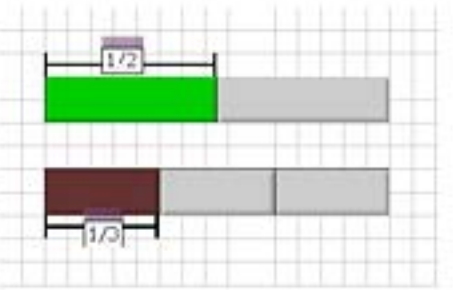
4) At a certain community college, three out of every five students are female. If the college has 12,200 students, how many are female?

5) Melissa had $845 in her checking account. She wrote a check for $390, deposited her $457 paycheck, and wrote another check for $493. What is the balance in her account?

6) The recommended daily intake of iron for an adult is 1 mg more than twice the recommended amount for a newborn infant. The amount for an adult male is 18 mg. How much should the infant receive?

## Addition and Subtraction of Fractions... (TEAS V Study Manual p. 55-56)

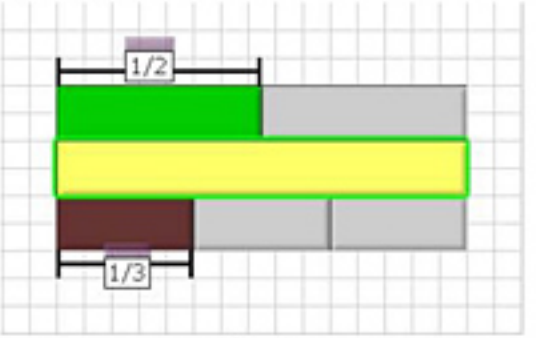
We were taught to add and subtract fractions many times, long ago, and yet this is always the stumper. When do you find the common denominator and why was that darned thing important in the first place? As with the word problems, it is important to visualize the given problem. Here is a visual of $\frac{1}{2}$ and $\frac{1}{3}$ (these fractions both represent part of a whole rectangle).




Suppose we want to add $\frac{1}{2}$ and $\frac{1}{3}$. Let's add a middle block (the yellow block also representing

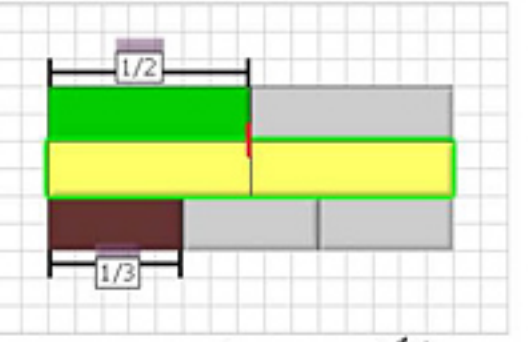
one whole) which we will divide into sections so that the fraction lines all line up:

One Section:



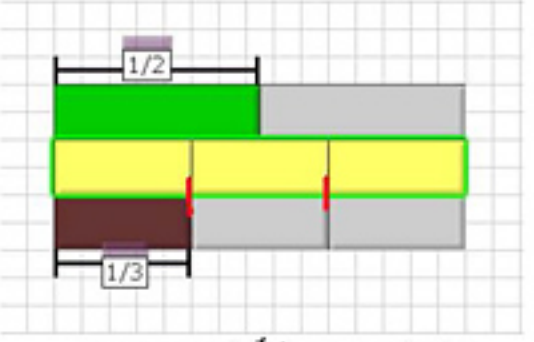

No lines

Two Sections:



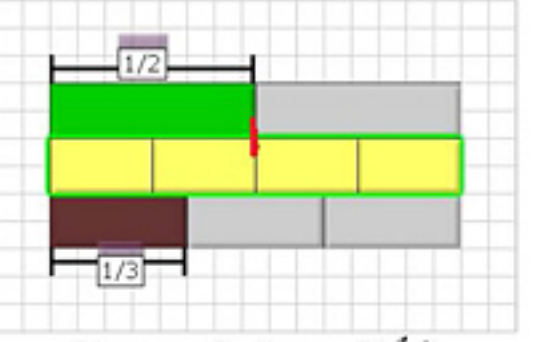

Lines up with ½ not with $^1/_3$.

Three:



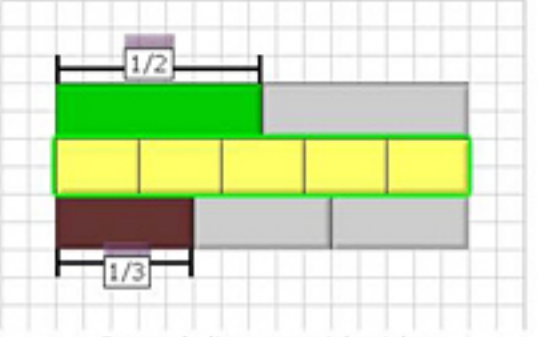

Lines up with $^1/_3$ not with 1/2.

Four:



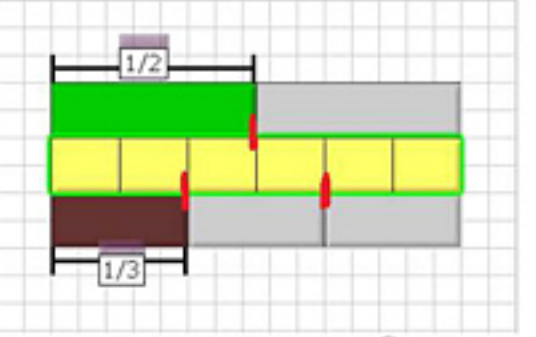

Lines up with ½ not with $^1/_3$.

Five:




Doesn't line up with either.

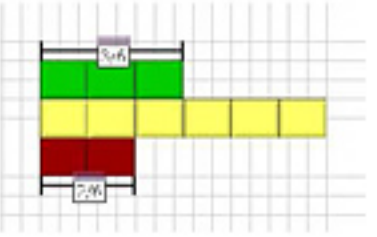
Six:

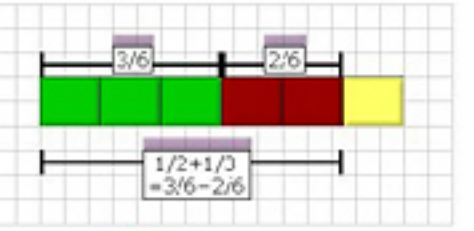



Lines up with both ☺

Six is the first value that works for both $\frac{1}{2}$ and $\frac{1}{3}$. **Six is the common denominator.** Six is the least common multiple (LCM) of two and three.

We can easily add $\frac{1}{2}$ and $\frac{1}{3}$ now dividing the whole into six parts instead of two and three:




So $\frac{1}{2}+\frac{1}{3}=\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$

## *Addition and Subtraction of Fractions...- Exercises (TEAS V Study Manual p. 55-56)*

1) $\frac{3}{8}+\frac{2}{8}=\frac{5}{8}$

2) $\frac{3}{4}-\frac{1}{6}$

3) $\frac{19}{35}-\frac{5}{14}$

4) $2-1\frac{1}{4}$

5) $94\frac{2}{5}-7\frac{3}{4}$

6) $45\frac{5}{64}+3\frac{3}{4}$

7) $\frac{1}{4}+\frac{2}{3}$

8) $1\frac{3}{8}+\frac{1}{4}$

9) $\frac{7}{15}-\frac{1}{3}$

10) $\frac{4}{15}+\frac{2}{5}$

11) $4\frac{1}{9}+\frac{9}{10}$

12) $\frac{5}{8}-\frac{2}{5}$

## Division and Multiplication of Fractions... (TEAS V Study Manual p. 57-58)

Multiply Across: $\frac{\boxed{A}}{\boxed{B}}\cdot\frac{\boxed{C}}{\boxed{D}}=\frac{AC}{BD}$

Example 1:

$4\frac{1}{3}\cdot\frac{4}{5}$

$\frac{13}{3}\cdot\frac{4}{5}$

Note: $4\frac{1}{3}=\frac{4\cdot3+1}{3}=\frac{13}{3}$

$\frac{52}{15}$

$3\frac{7}{15}$

$15\overline{)52}$ 3 R 7

$-95$

$7$

Divide (Multiply by the reciprocal)

$$\frac{\frac{S}{T}}{\frac{U}{Q}} = \frac{S}{T} \cdot \frac{Q}{U} = \frac{SQ}{TU}$$

Example 2:

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

Note that: $2\frac{1}{3} = \frac{2 \cdot 3 + 1}{3} = \frac{7}{3}$

$\frac{7}{3} \div \frac{1}{4}$

$\frac{7}{3} \cdot \frac{4}{1} = \frac{28}{3} = 9\frac{1}{3}$

$3\overline{)28}$ 9 R 1

$-27$

$1$

*Division and Multiplication of Fractions…-Exercises (TEAS V Study Manual p. 57-58)*

1) $\frac{3}{8} \cdot \frac{2}{8} = \frac{3}{32}$

2) $\frac{3}{4} \div \frac{1}{6}$

3) $\frac{19}{35} \div \frac{5}{14}$

4) $2\left(1\frac{1}{4}\right)$

5) $\frac{5}{7} \cdot \frac{1}{2}$

6) $45\frac{5}{64} \div 3\frac{3}{4}$

7) $\frac{1}{4} \cdot \frac{2}{3}$

8) $1\frac{3}{8} \div \frac{1}{4}$

9) $\frac{7}{12} \cdot \frac{4}{21}$

10) $\frac{3}{16} \cdot \frac{5}{9}$

11) $\frac{3}{4} \div \frac{13}{16}$

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

13) $\frac{1}{4} \cdot \frac{7}{8}$

14) $\frac{5}{8} \div 20$

15) $\frac{10}{81} \div 1\frac{1}{8}$

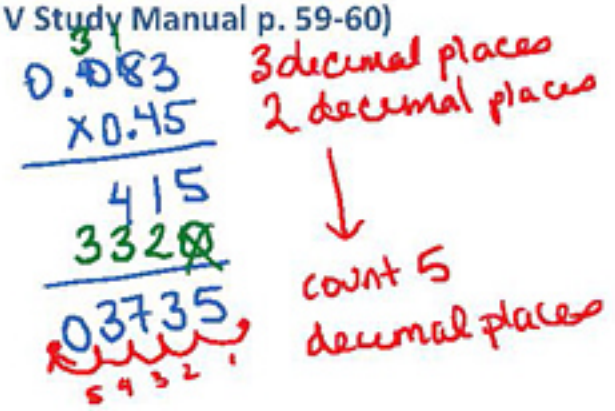
16) $\frac{4}{11} \cdot \frac{2}{8}$

## Decimal Placement in a Product or Quotient (TEAS V Study Manual p. 59-60)

Multiply, then count and add decimal places

Example 1: 0.083 × 0.45

= 0.03735

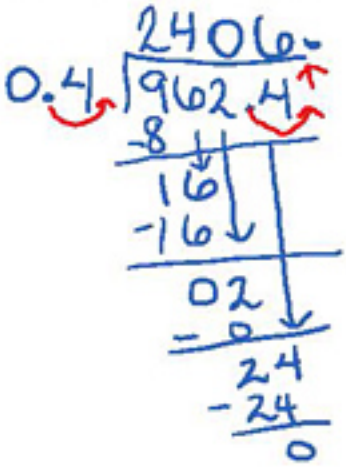



Divide, count over same number of decimal places as in divisor:

Example 2:

962.4 ÷ 0.4

= 2,406



## *Decimal Placement in a Product or Quotient- Exercises (TEAS V Study Manual p. 59-60)*

Solve the following problems without a calculator.

1) 0.2 x 0.003

2) 2.56 x 0.0004

3) 3.14 x 7.4

4) $7{,}055.1 \div 67$

5) $785.33 \div 9.1$

6) $\frac{0.09338}{4.6}$

7) Find the area of a rectangle that is 3.8 ft wide by 4.5 ft long.

8) Divide 1.42 by 17

9) Divide 5 by 8

10) Geraldine bought a new flat screen TV. The sales tax was $210.35, the delivery charge was $35, and the interest amounted to $880.32. If she paid $159 down and makes twenty-four monthly payments of $162.53, what is she paying altogether?

11) Jonathon needs to but a 10 lb wheel of cheese into 16 equal portions. How much will each portion weigh?

## Conversion between Irrational Numbers and Approximate Decimal Form (TEAS V Study Manual p. 62)

Memorize the first 13 perfect squares

| | |
|---|---|
| $1^2$ | 1 |
| $2^2$ | 4 |
| $3^2$ | 9 |
| $4^2$ | 16 |
| $5^2$ | 25 |
| $6^2$ | 36 |
| $7^2$ | 49 |
| $8^2$ | 64 |
| $9^2$ | 81 |
| $10^2$ | 100 |
| $11^2$ | 121 |
| $12^2$ | 144 |
| $13^2$ | 169 |

Since $\sqrt{a^2} = a$ for any positive number, $a$, the square roots of all thirteen perfect squares are the reverse of the squares table:

| | |
|---|---|
| $\sqrt{1}$ | 1 |
| $\sqrt{4}$ | 2 |
| $\sqrt{9}$ | 3 |
| $\sqrt{16}$ | 4 |
| $\sqrt{25}$ | 5 |
| $\sqrt{36}$ | 6 |
| $\sqrt{49}$ | 7 |
| $\sqrt{64}$ | 8 |
| $\sqrt{81}$ | 9 |
| $\sqrt{100}$ | 10 |
| $\sqrt{121}$ | 11 |
| $\sqrt{144}$ | 12 |
| $\sqrt{169}$ | 13 |

### Example 1:

Estimate the value of $\sqrt{110}$ to the nearest tenth. One hundred ten is not a perfect square; however, since we know that $\sqrt{100} = 10$ and $\sqrt{121} = 11$, we conclude $\sqrt{110}$ must be somewhere between 10 and 11. Since 110 is just about half-way between 100 and 121, my best estimate would be 10.5.

I could test out my guess by squaring 10.5 ($10.5^2 = 110.25$). Our best estimate for $\sqrt{110}$ is 10.5.

## *Conversion between Irrational Numbers and Approximate Decimal Form –Exercises (TEAS V Study Manual p. 62)*

Approximate the following square roots without using a calculator:

1) $\sqrt{30}$ 2) $\sqrt{10}$ 3) $\sqrt{47}$

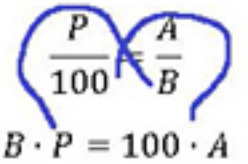
4) $\sqrt{105}$ 5) $\sqrt{8}$ 6) $\sqrt{5}$

7) $\sqrt{24}$ 8) $\sqrt{56}$ 9) $\sqrt{35}$

## Calculations of Percents (TEAS V Study Manual p. 63-64)

Percent can be thought of as "per 100."

$$\frac{percent}{100} = \frac{part}{of\ whole}$$




$$B \cdot P = 100 \cdot A$$

### Example 1:

What is 6% of 220?

We know to use the percentage formula

$$\frac{P}{100} = \frac{part\ (A)}{of\ whole\ (B)}$$

Percentage is easy to distinguish; P = 6

The key word "of" before 220 tells us 220 is the whole, or B.

$$\frac{6}{100} = \frac{A}{220}$$

$$6(220) = 100 \cdot A$$

$$\frac{1320}{100} = \frac{100 \cdot A}{100}$$

$$13.2 = A$$

## Example 2:

What percent of 300 is 12?

We are solving for percentage; P =?

The key word "of" tells us 300 is the whole, or B. Thus 12 must be A.

$$\frac{P}{100} = \frac{12}{300}$$

$$300 \cdot P = 100 \cdot 12$$

$$\frac{300 \cdot P}{300} = \frac{1200}{300}$$

$$P = 4$$

$$4\%$$

## Conversion between Percents, Fractions, and Decimals (TEAS V Study Manual p. 65-68)

### Ex: Percents-> Fractions

Percent = per 100

Convert 78% to a fraction:

$$\frac{78}{100}\frac{\div 2}{\div 2}=\frac{39}{50}$$

Convert 62.5% to a fraction

$$\frac{62.5}{100}=\frac{62.5(10)}{100(10)}=\frac{625}{1000}\frac{\div 125}{\div 125}=\frac{5}{8}$$

## Ex: Percents-> Decimals

Convert 34% to a decimal

$$34\%=\frac{34}{100}=0.34$$

Convert 256.6% to a decimal

$$256.6\%=\frac{256.6}{100}=2.566$$

## Ex: Fractions->Percents

Recall:

$$\frac{P}{100}=\frac{part\ (A)}{of\ whole\ (B)}=\frac{A}{B}$$

Convert $\frac{3}{5}$ into a percent.

$$\frac{P}{100}=\frac{3}{5}$$

$$5\cdot P=3\cdot 100$$

$$\frac{5 \cdot P}{5} = \frac{300}{5}$$

$$P = 60$$

3/5 is 60%

## Ex: Fractions-> Decimals

Fractions can be thought of as division problems. For example: ½ can be thought of as $1 \div 2$ which is 0.5

Convert $\frac{7}{80}$ into a decimal:

$7 \div 80 =$ 0.0875

.0875
80 ⟌ 7.0000
−640↓
600
−560↓
400
400
0

## Ex: Decimals->Fractions

In order to convert decimals to fractions, you must be able to say their values out loud.

For example: 0.3 is "three-tenths", thus written as $\frac{3}{10}$

Below is a table to remind you of place values:

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | . | 6 | 5 | 4 | 3 | 8 | 9 | 7 | 2 | 1 | | | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| | | tenths | hundredths | thousandths | ten-thousandths | hundred-thousandths | millionths | ten-millionths | hundred-millionths | billionths | | | |
| | | | | | | | | | | | | | |
| 1 | . | 6 | | | | | | | | | | | |
| | 1 | 0 | | | | $= 1\frac{6}{10}$ | | | | | | | |
| one and six tenths | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 0 | . | 6 | 5 | 4 | 3 | | | | | | | | |
| | 1 | 0 | 0 | 0 | 0 | | $= \frac{6{,}543}{10{,}000}$ | | | | | | |
| | | | | | | | | | | | | | |
| six thousand five hundred forty-three ten-thousandths | | | | | | | | | | | | | |

## *Conversion between Percents, Fractions, and Decimals- Exercises (TEAS V Study Manual p. 65-68)*

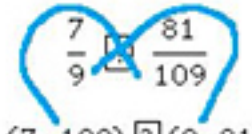
Fill in the blanks in each row of the following chart by converting the given form into the two missing forms. Reduce all fractions to lowest terms

| | Fraction | Decimal | Percent |
|---|---|---|---|
| 1 | | 0.55 | |
| 2 | | | 45% |
| 3 | $\frac{9}{16}$ | | |
| 4 | | 0.375 | |
| 5 | | | 48% |
| 6 | | | $12\frac{1}{4}\%$ |
| 7 | $\frac{4}{5}$ | | |
| 8 | | 0.15 | |
| 9 | | | 14% |
| 10 | | | $87\frac{1}{2}\%$ |
| 11 | | 0.65 | |
| 12 | $5\frac{1}{32}$ | | |
| 13 | | | 225% |
| 14 | $1\frac{5}{8}$ | | |
| 15 | | 3.8 | |
| 16 | $\frac{1}{5}$ | | |
| 17 | | | $6\frac{3}{4}\%$ |
| 18 | | 7 | |
| 19 | $1\frac{3}{50}$ | | |
| 20 | | 1.75 | |
| 21 | | | $20\frac{1}{2}\%$ |
| 22 | $2\frac{1}{2}$ | | |

## Comparison of Rational Numbers (TEAS V Study Manual p. 69-70)

Example 1: Which fraction is greater $\frac{7}{9}$ or $\frac{81}{109}$?

$$\frac{7}{9} \; >, <, or = ? \; \frac{81}{109}$$




$$(7 \cdot 109) \; ? \; (9 \cdot 81)$$

$$763 > 729 \text{ so..}$$

$$\frac{7}{9} > \frac{81}{109}$$

Example 2: Order the following numbers from least to greatest: $\frac{4}{9}, 0.444, \frac{11}{25}$.

Change all to decimal form:

$\frac{4}{9}$

$$\begin{array}{r} 0.44 \\ 9\overline{)4.000} \\ -36\downarrow \\ \hline 40 \\ -36\downarrow \\ \hline 40.. \end{array}$$

$0.444.. = 0.\overline{4}$

$\frac{11}{25}$

$$\begin{array}{r} 0.44 \\ 25\overline{)11.00} \\ -100\downarrow \\ \hline 100 \\ -100 \\ \hline 0 \end{array}$$

$\frac{4}{9}, 0.444, \frac{11}{25}$

$0.\overline{44}, 0.444, 0.44$

Change to 4 decimal places

$0.4444.., 0.4440, 0.4400$

largest Smallest

So $\frac{11}{25} < 0.444 < \frac{4}{9}$

## Estimation of the Solution to a Problem (TEAS V Study Manual p. 71)

1. Without using exact calculations, *estimate* the answer to this problem. The weights of four linemen in a football team are: 198, 218, 285, and 227 pounds. What is the total weight of those linemen?

2. Estimate the product of 89,005 x 564

3. Estimate the solution to 435,093-87,942

## One- and Two-Step Word Problems with Fractions or Decimals (TEAS V Study Manual p. 80)

1. Hal has pieces of fabric with lengths $\frac{5}{8}$ yd, $\frac{3}{4}$ yd, and $\frac{1}{3}$ yd. How many yards does he have altogether? If he gives away $\frac{1}{3}$ of the fabric, how much will he have left?

2. If fencing costs $5.38 per ft, what will 350 feet of fencing cost?

3. Bill had $2,200 in his checking account. He wrote a check for $1,215, deposited his $5,357 paycheck, and wrote another check for $6,300. What is the balance in his account?

4. The physician ordered digoxin 0.125 mg orally. You have available digoxin 0.25 mg per tablet. How many tablets will you give?

5. Joan bought 10.8 meters of fabric. She paid $43.09. What was the cost per meter, to the nearest cent?

6. The physician ordered Coumadin 3.75 mg orally. You have available Coumadin 7.5 mg per tablet. How many tablets will you give?

## Word Problems Involving Percents (TEAS V Study Manual p. 82)

1. In December a sweater sold for $50. In January, it was on sale for $40. What was the percentage decrease?

2. Steve told his wife that he should always give at least 15% of his earnings to charity. If Steve earned $120,000 last year, how much should he have given to charity?

3. A jewelry store is having a 15% off regular price sale. Find the sale price of a ring that is normally priced at $1,100.

4. Lee bought a new car for $30,000 three years ago, and now it is worth $13,800. Find the percent decrease in the value of this car.

5. A department store bought a shipment of MP3 players for $42 wholesale. If the store marks up the MP3 players by 45%, what is the selling price of an MP3 player?

## Word Problems Involving Ratios, Proportions, and Rates of Change (TEAS V Study Manual p. 83)

1. There are 24 marbles total: 6 are red, 8 are blue, and 10 are green.
    a. Write the ratio of red marbles to green marbles.
    b. Write the ratio of blue marbles to green marbles.
    c. Write the ratio of green marbles to total marbles.
2. An ant walks 20 cm in 5 seconds. Write this as a rate reduced to lowest terms
3. A cyclist travels 24 miles in $\frac{3}{4}$ of an hour. How fast is she traveling?
4. Suppose a 6-oz package of sliced bologna costs $1.49.
    a. To the nearest tenth of a cent, what is the unit cost?
    b. To the nearest tenth of a cent, what is the cost per slice if there are 8 slices in the package?
5. Sonya earned $640 in a 40 hour work week. What was her hourly rate of pay?
6. How many tablets are needed to make $19\frac{1}{2}$ grams dosage of medication if each tablet has 3 grams of medication?
7. One shelf is $4\frac{1}{3}$ feet long. How many shelves can be cut from 15 feet of lumber? How much will be left over?

8. A turkey needs to be cooked 30 minutes per pound. How many hours will it take to cook a $15\frac{1}{2}$ pound turkey?

9. If you think about your spouse every 3 minutes, how many times per day is this?

10. A tree can grow 40 feet in 46 months. How many feet per year is this?

## MEASUREMENT

## Estimation of Metric Quantities (TEAS V Study Manual p. 87-88)

The metric system, or International System of Units, is utilized by most of the world. In fact there are only three nations that have not officially adopted the metric system: Myanmar (Burma), Liberia, and the United States. The United States currently uses a system we informally call the English System (technically we use US Customary Units). Scientists and those working in healthcare are often required to mentally translate between metric and English units. Can you picture someone who is 1.9 meters tall and 136 kilograms? How about someone who is 6'3" and 300 lb.? We will only look at three types of measurements: length, volume, and weight.

### Types of Measurement

1) Length

Examples of units for measurement of length:

| Metric | English |
|---|---|
| Millimeters (mm) | Inch (in) |
| Centimeters (cm) | Feet (ft) |
| Meter (m) | Yard (yd) |
| Kilometer (km) | Mile (mi) |

2) Volume

Examples of units for measurement of volume:

| Metric | English |
|---|---|
| Cubic Centimeters (cc) | Teaspoon (t or tsp) |
| Milliliter (mL) | Tablespoon (T or Tbsp) |
| Liter (L) | Liquid Ounce (oz) |

| | |
|---|---|
| | Pint (pt) |
| | Quart (qt) |
| | Gallon (gal) |

3) Weight

Examples of units for measurement of weight:

| Metric | English |
|---|---|
| Milligram (mg) | Ounce (oz) |
| Gram (g) | Pound (lb) |
| Kilogram (kg) | |

## *Estimation of Metric Quantities- Exercises (p. 87-88)*

Circle the most appropriate unit of measurement for each item listed below. Try to estimate the item's measurement. Follow the first example below.

1) Pencil
   a. Length _____ yd m cm lb
   b. Weight_____ lb oz kg mg

2) Couch
   a. Length_____ cm in km mi
   b. Weight_____ g oz lb mg

3) Aspirin Tablet
   a. Length_____ cm in km mm
   b. Weight_____ mg oz lb g

4) Graduated Cylinder
   a. Volume_____ gal tsp mL g
   b. Weight_____ mcg kg lb mg

5) Argentina's Coast
   a. Length_____ cm in km mm

6) Pool

| | | | | | |
|---|---|---|---|---|---|
| a. | Length_____ | cm | in | km | ft |
| b. | Volume_____ | gal | tsp | mL | Tbsp |

7) Credit Card

| | | | | | |
|---|---|---|---|---|---|
| a. | Length_____ | cm | mm | km | m |
| b. | Weight_____ | g | oz | lb | mg |

8) Person

| | | | | | |
|---|---|---|---|---|---|
| a. | Length_____ | cm | yd | km | mm |
| b. | Weight_____ | g | kg | oz | mg |
| c. | Volume_____ | cup | L | mL | Tbsp |

9) Passenger Train

| | | | | | |
|---|---|---|---|---|---|
| a. | Length_____ | cm | m | km | mm |
| b. | Weight_____ | g | kg | mcg | mg |

10) Ice Cream

| | | | | | |
|---|---|---|---|---|---|
| a. | Volume_____ | mL | tsp | qt | Tbsp |
| b. | Weight_____ | kg | oz | lb | mg |

## Conversions between English & Metric (TEAS p. 87-88)

Approximate Conversions Between English & Metric:

| Length | Weight | Volume |
|---|---|---|
| $1\ in \approx 2.54\ cm$ | $1\ kg \approx 2.2\ lb$ | $1\ L \approx 1.06\ qt$ |
| $1\ m \approx 39.37\ in$ | $1\ oz \approx 28\ g$ | $1\ oz \approx 30\ mL$ |
| $1\ mi \approx 1{,}609\ m = 1.6\ km$ | | $1\ tsp \approx 5\ mL$ |
| $1\ m \approx 1.09 yd$ | | $1\ gal \approx 3.785\ L$ |

## Technique: Use Unit Fractions

$\frac{4}{4}$ is an example of a unit fraction. A unit fraction is equivalent to one. We can multiply

anything by one and get an equivalent amount. For example, if we multiply $\frac{1}{2}$ by a unit fraction, say $\frac{4}{4}$, we get $\frac{4}{8}$ which is equivalent to one-half.

$$\frac{1}{2} \cdot \frac{4}{4} = \frac{4}{8}$$

| ½ | | | | ½ | | | |
|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/8 | 1/8 | 1/8 | 1/8 | 1/8 | 1/8 |

We use the same technique for measurement conversions and dimensional analysis (DA).

For example, according to the Metric/English Conversion table above, 1 teaspoon is approximately 5 milliliters. We could create the following unit fractions using that fact.

**UNIT FRACTIONS:** Since $1\ tsp \approx 5\ mL$, $\frac{1\ tsp}{5\ mL} \approx 1$ or $\frac{5\ mL}{1\ tsp} \approx 1$

How do we use unit fractions?

Example 1: 4 tsp = ? mL

Multiply your given value by the appropriate unit fraction.

$$\frac{\boxed{given}}{\boxed{1}} \cdot \underbrace{\frac{\boxed{units\ needed}}{\boxed{given\ units}}}_{UNIT\ FRACTION} = units\ needed$$

$$\frac{\boxed{4\ \cancel{tsp}}}{\boxed{1}} \cdot \underbrace{\frac{\boxed{5\ mL}}{\boxed{1\ \cancel{tsp}}}}_{} = 20\ mL$$

So 4 teaspoons is equivalent to approximately 20 mL.

Example 2: 31 mL = ? tsp

Using unit fractions to solve:

$$\frac{31\ \cancel{ml}}{1} \cdot \frac{1\ tsp}{5\ \cancel{ml}} = \frac{31}{5} tsp = 6\frac{1}{5} tsp$$

Or we can convert $\frac{31}{5}$ into a decimal by dividing: $31 \div 5 = 6.2$

So 31 mL is equivalent to approximately $6\frac{1}{5} tsp$ or 6.2 mL.

## *Conversions between English & Metric-Exercises (TEAS p. 87-88)*

1) 15 mL = ? tsp
2) 1 ½ tsp = ? mL
3) 3.4 in = ? cm
4) 524 cm = ? in
5) 235.5 lb = ? kg
6) 2.4 kg = ? lb
7) ½ oz = ? g
8) 1.82 g = ? oz
9) 0.9 oz = ? mL
10) 650 qt = ? L
11) 4.5 gal = ? L
12) 1.87 m = ? ft, ? in
13) 1 kg = ? lb
14) 45.5 kg = ? lb
15) 2.16 oz = ? mL
16) 23 m = ? ft

## Conversion from One Measurement Scale to Another (TEAS V Study Manual p. 89-90)

English System

| Length | Volume | Weight |
|---|---|---|
| 1 ft = 12 in | 1 cup = 8 oz | 1 lb = 16 oz |
| 1 yd = 3 ft | 1 pint = 2 cups | 1 ton = 2,000 lb |
| 1 mi = 5,280 ft | 1 quart = 2 pints | |
| | 1 gallon = 4 quarts | |

## English Conversion Practice

1) 10 ft = ? in
2) 2.5 pints = ? cups
3) 367 oz = ? lb
4) 522 ft = ? yd
5) 2.7 mi = ? ft
6) 800 oz = ? pints
7) 4.5 tons = ? lb
8) 182 in = ? ft
9) 132 oz = ? qt
10) 6500 lb = ? ton
11) 45 pt = ? qt
12) 4500 cups = ? gal

## Metric Measurement System

| Length | Volume | Weight |
|---|---|---|
| | | 1 g = 1,000,000 microgram (μg or mcg) |
| 1 m = 1,000 millimeter (mm) | 1 L = 1,000 milliliter (mL) | 1 g = 1,000 milligram (mg) |
| 1 m = 100 centimeter (cm) | 1 L = 100 centiliter (cL) | 1 g = 100 centigram (cg) |
| 1 m = 10 decimeter (dm) | 1 L = 10 deciliter (dL) | 1 g = 10 decigram (dg) |
| 1 m = 1 meter | 1 L = 1 liter | 1 g = 1 gram |
| 1 dekameter (dam) = 10 m | 1 dekaliter (daL) = 10 L | 1 dekagram (dag) = 10 g |
| 1 hectometer () = 100 m | 1 hectoliter ()= 100 L | 1 hectogram ()= 100 g |
| 1 kilometer (km)= 1,000 m | 1 kiloliter (kL) = 1,000 L | 1 kilogram (kg) = 1,000 g |

## Metric Conversion Practice

1) 10 mL = ? L
2) 2.5 L = ? mL
3) 3.004 g = ? mg
4) 524 cc = ? L
5) 2.7 mg = ? g
6) 800 mL= ? L
7) 4.5 L = ? cc
8) 1.82 dag = ? mg
9) 0.9 L= ? mL
10) 650 mg = ?dg
11) 4500 mcg = ? mg
12) 4500 mcg = ? g

13) 1 kg = ? g  14) 45.5 kg = ? g  15) 2.16 mcg = ? g  16) 6000 m = ? km

17) The order is of 1 g of Chloromyedin. On hand are 250 mg capsules. Give _____ capsules.

18) A scored tablet can be broken in half. The whole tablet contained 30 mg. Each half contains ___ _____ mg.

## Recall Metric-English Conversions

| Length | Volume | Weight |
|---|---|---|
| $1\ in \approx 2.54\ cm$ | $.1\ qt \approx 1\ L$ | $2.2\ lb \approx 1\ kg$ |
| $1.09\ yd \approx 1\ m$ | | $1\ oz \approx 28\ g$ |

### More English Metric Conversion Practice

1) 10 cm = ? in  2) 2.5 L = ? qt  3) 3.004 kg = ? lb  4) 524 yd = ? m

5) 2.7 cm = ? in  6) 800 m= ? yd  7) 4.5 L = ? qt  8) 1.82 kg = ? lb

9) 0.9 g = ? oz  10) 650 in = ? m  11) 4500 cups = ? L  12) 4500 mcg = ? oz

# DATA INTERPRETATION

## Dependent and Independent Variables (TEAS V Study Manual p. 93)

An important concept in both algebra and statistics is the concept of the independent versus dependent variable. You can also think of an input variable versus an output variable. The

definition of dependent is as follows: conditioned or determined by something else; contingent.

For example: *Our trip is dependent on the weather.*

**(Dependent Variable) is dependent on (Independent Variable).**

Our trip may change due to changes in the weather; however, it doesn't work the other way around. The weather doesn't change because of changes in our trip.

The easiest way to determine which is dependent and which is independent is to insert the description of each variable into the above bolded sentence.

Our trip = Dependent Variable

Weather = Independent Variable

Example 1: A worker gets paid by the number of packages delivered. Which variable is the dependent variable, the amount of money earned or the number of packages delivered?

The amount of money earned is dependent on the number of packages delivered. Thus, the amount of money earned is the dependent variable and the number of packages delivered is the independent variable.