

2.2 STUDY GUIDE

DIMENSIONAL ANALYSIS

Name: Key
 Block: _____

1. I CAN CONVERT WITHIN THE METRIC SYSTEM.

king	Henry	Dad	Unexpectedly	Drinking	Chocolate	mk
k	h	d	U	d	c	m
kilo	hecto	deka	UNIT GRAM METER LITER	deci	centi	milli

When moving the decimal to the left, you are dividing by a power of 10.

When moving the decimal to the right, you are multiplying by a power of 10.

When comparing two quantities, make sure they are in the same unit before comparing (you might have to convert one of them to the other unit first).

A. Convert the following:

1. 12.54 km = 1,254,000 cm Kthbuocm
~~12,540,000~~

2. 457 mL = .457 L
~~457~~

3. 0.55 g = 550 mg
~~550~~

B. Compare the following:

4. 7,225 cm = 7225 m
~~72,25 m = 7225 cm~~

5. 34 mg < ~~0.34 g~~
~~340 mg~~
~~34 g = 340 mg~~

C. A recipe for shortbread cookies calls for 5 grams of butter to make 12 cookies. How many centi-grams will there be in 60 cookies?

$\frac{5 \text{ grams}}{12 \text{ cookies}} \times 5 = \frac{25 \text{ grams}}{60 \text{ cookies}}$ $25 \text{ g} = \boxed{2500 \text{ cg}}$

D. A dollar bill is 15.6 cm long. If 200 dollar bills were laid end to end, how many meters long would the line be?

$\begin{array}{r} 15.6 \text{ cm} \\ \times 200 \\ \hline 31,200 \text{ cm} \end{array}$ $31,200 \text{ cm} = \boxed{312 \text{ meters}}$

2. I CAN DEFINE APPROPRIATE UNITS OF MEASURE.

Know your chart of Customary & Metric examples

A. For the following, give a Metric & Customary unit of measure that would best measure the following

1. height of a lamp: feet / centimeters or meters

2. Distance from NYC to ATL: miles / Kilometers

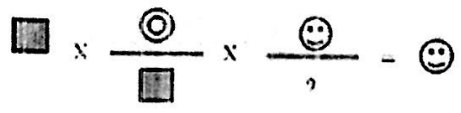
3. Weight of a cat: pounds / Kilograms or grams

4. Capacity of a water cooler: gallons / liters

3. I CAN CONVERT UNITS OF MEASURE (1 & 2 STEP).

Conversion Factor: $\frac{\text{what you want}}{\text{what you have}}$

Remember this activity:



Make you practice and memorize your Customary System flash cards.

If you are going from Metric to Customary or vice versa, the conversion factor will be given to you.

A. Convert 5 miles to feet. (5,280 feet = 1 mile)

$$\frac{5 \text{ miles}}{1} \times \frac{5,280 \text{ feet}}{1 \text{ mile}} = 26,400 \text{ feet}$$

B. Convert 4 years into days. (365 days = 1 year)

$$\frac{4 \text{ years}}{1} \times \frac{365 \text{ days}}{1 \text{ year}} = 1460 \text{ days}$$

C. How many miles will a person run during a 10 kilometer race? (1.6 kilometers = 1 mile)

$$\frac{10 \text{ kilometers}}{1} \times \frac{1 \text{ mile}}{1.6 \text{ kilometers}} = \frac{10 \text{ miles}}{1.6} = 6.25 \text{ miles}$$

4. I CAN CONVERT UNITS OF MEASURE (MULTI-STEP & WORD PROBLEMS).

Make sure you write every single conversion factor!

Think about where you are starting and where you want to go. Create a plan that includes the necessary conversion factors.

Example: A bucket has 4.65 L of water. How many gallons of water is that (1.06 qt = 1 L).

Given: 4.65 L **Needed:** gallons

Plan: L → qt → gallon

Equalities: 1.06 qt = 1 L; 1 gal = 4 qt

Set Up Problem:

$$4.65 \cancel{\text{L}} \times \frac{1.06 \cancel{\text{qt}}}{1 \cancel{\text{L}}} \times \frac{1 \text{ gal}}{4 \cancel{\text{qt}}} = 1.23 \text{ gal}$$

A. Convert 12 pints to gallons. (1 gallon = 4 quarts, 2 pints = 1 quart)

$$\frac{12 \text{ pints}}{1} \times \frac{1 \text{ quart}}{2 \text{ pints}} \times \frac{1 \text{ gallon}}{4 \text{ quarts}} = \frac{12 \text{ gallons}}{8} = 1.5 \text{ gallons}$$

B. Sarah ran a 10 meter race. How many feet is that? (1 in = 2.54 cm, 12 inches = 1 foot) (1 meter = 100cm)

$$\frac{10 \text{ meters}}{1} \times \frac{100 \text{ cm}}{1 \text{ meter}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} \times \frac{1 \text{ ft}}{12 \text{ in}} = \frac{1000 \text{ ft}}{30.48} = 32.8 \text{ ft}$$

C. A bowl of cereal weighs 60 oz. How heavy is it in kg? (1 oz = 28.3 g, 1000 grams = 1 kilogram)

$$\frac{60 \text{ oz}}{1} \times \frac{28.3 \text{ g}}{1 \text{ oz}} \times \frac{1 \text{ kg}}{1000 \text{ g}} = \frac{1698 \text{ kg}}{1000} = 1.698 \text{ kilograms}$$

5. I CAN PERFORM A RATE CONVERSION.

Sometimes it is helpful to convert either the numerator or denominator first and then convert the other. If you do too much at once, your problem gets messy.

Example: Convert 66 feet per second to miles per hour.

$$\frac{66 \text{ feet}}{1 \text{ sec}} \times \frac{60 \text{ sec}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hour}} \times \frac{1 \text{ mile}}{5280 \text{ feet}} = 45 \text{ miles/hour}$$

A. Convert 65 mph to feet per minute. (5,280 feet = 1 mile, 60 minutes = 1 hour)

$$\frac{65 \text{ miles}}{1 \text{ hour}} \times \frac{5,280 \text{ ft}}{1 \text{ mile}} \times \frac{1 \text{ hour}}{60 \text{ min}} = \frac{343,200 \text{ ft}}{60 \text{ min}}$$
$$= 5720 \text{ ft per min}$$

B. Convert 32 feet/seconds to meters/min (1 inch = 2.54 cm, 100 centimeters = 1 meter, 60 seconds = 1 min, 12 in = 1 foot)

$$\frac{32 \text{ feet}}{1 \text{ sec}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{60 \text{ sec}}{1 \text{ min}}$$
$$= \frac{58521.6 \text{ m}}{100 \text{ sec}} = 585.2 \text{ meters per second}$$

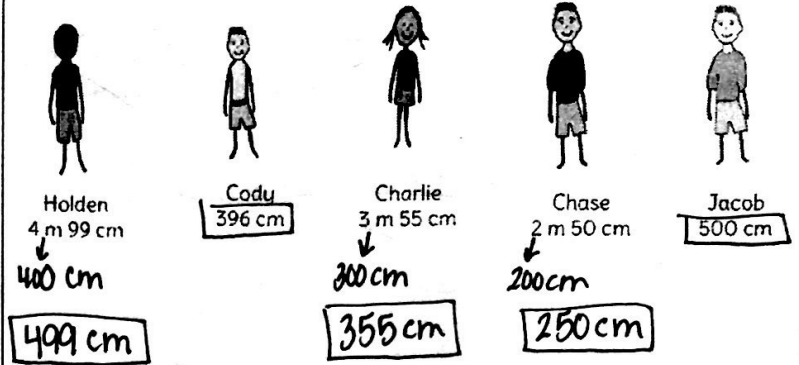
C. The average American student is in class 330 minutes/day. How many hours per school week is this (use 1 school week = 5 days, 60 minutes = 1 hour)?

$$\frac{330 \text{ minutes}}{1 \text{ day}} \times \frac{1 \text{ hr}}{60 \text{ min}} \times \frac{5 \text{ days}}{1 \text{ week}} = \frac{1650 \text{ hr}}{60 \text{ week}}$$
$$= 27.5 \text{ hours per week}$$

6. I CAN COMPARE VARIOUS QUANTITIES REPRESENTED IN DIFFERENT MEASUREMENTS.

In order to compare, you must convert all your quantities to the SAME unit of measure.

1. Which jumper jumped the highest? Then put them in order from least to greatest. $1 \text{ meter} = 100 \text{ centimeters}$



Chase, Charlie, Cody, Holden, Jacob

2. Marlow wants to order something from Uber Eats. He is trying to get free delivery as a promotion. If he orders something within **5 miles** of his house the delivery is free. There is a glitch in the software and he is getting different results from different restaurants. Ray's Pizza is 26,000 feet from his house. Tito's Pizza is 8.4 km from his house. Mario's Pizza is 8200 meters from his house. Lastly, Luigi's Pizza is 7,800,000 mm from his house. Which places will deliver for free?

(1.6 kilometers = 1 mile, 1000 meters = 1 kilometer, 1000 millimeters = 1 meter, 5,280 feet = 1 mile)

$$\text{Ray's: } \frac{26,000 \text{ ft}}{1} \times \frac{1 \text{ mile}}{5,280 \text{ ft}} = 4.9 \text{ miles yes!}$$

$$\text{Tito's: } \frac{8.4 \text{ km}}{1} \times \frac{1 \text{ mile}}{1.6 \text{ km}} = 5.25 \text{ miles No!}$$

$$\text{Mario's: } \frac{8200 \text{ m}}{1} \times \frac{1 \text{ km}}{1000 \text{ m}} \times \frac{1 \text{ mile}}{1.6 \text{ km}} = 5.125 \text{ miles No!}$$

$$\text{Luigi's: } \frac{7,800,000 \text{ mm}}{1} \times \frac{1 \text{ m}}{1000 \text{ mm}} \times \frac{1 \text{ km}}{1000 \text{ m}} \times \frac{1 \text{ mile}}{1.6 \text{ km}}$$

$$= 4.875 \text{ miles yes!}$$

You also could have used KHDUCM to go from meters to kilometers & millimeters to kilometers.