Warm-Up 1/21/2021

1. Simplify $\sqrt{50x^7y^5}$

2. $-2\sqrt{3x}\cdot 4\sqrt{3x^2}$

3. $\sqrt{27}+5\sqrt{12}$

① $\sqrt{50x^7y^5}$

$\sqrt{2 \cdot 25 \cdot x^6 \cdot x^1 y^4 \cdot y^1}$

$\div 2$ $\div 2$

$5 \quad x^3 \quad y^2$

$5x^3y^2\sqrt{2xy}$

② $-2\sqrt{3x^1} \cdot 4\sqrt{3x^2}$

$-8\sqrt{9x^3}$

$-8\sqrt{9 \cdot x^2 \cdot x^1}$

$\div 2$

$3 \quad 1$

$-24x\sqrt{x}$

③ $\sqrt{27} + 5\sqrt{12}$

$\sqrt{9 \cdot 3} + 5\sqrt{4 \cdot 3}$

$3 \quad \times 5 \quad 2$

$3\sqrt{3} + 10\sqrt{3}$

$3x + 10x = 13x$

$= 13\sqrt{3}$

Polynomials Test Review

Find the difference.

$(3- 2x + 2x^2) - (4x -5 +3x^2)$

$3-2x+2x^2$

$+5 \quad -4x \quad -3x^2$

$8-6x-x^2$

$\boxed{-x^2-6x+8}$

Simplify the expression.

$(4n^4 - 8n + 4) - (8n^2 + 4n^4 + 1)$

Simplify $(x+4)^2$

$= (x+4)(x+4)$

	x	$+4$
x	x^2	$4x$
$+4$	$4x$	16

$= \boxed{x^2+8x+16}$

Find the product:

$(n - 5)(n - 1)$

	n	-1
n	n^2	$-n$
-5	$-5n$	5

$= \boxed{n^2-6n+5}$

Essential Questions 1/21/2021

- How can I convert units within the metric and customary system of measurement?
- How can I convert units betwe the metric and customary systems?

1/21/2021 Unit 1

Day 7 - One & Two Step Dimensional Analysis

Important Units of Measure

Standard: MGSE9–12. N.Q.1

Convert units and rates using dimensional analysis (English–to–English and Metric–to– Metric without conversion factor provided and between English and Metric with conversion factor);

There are many different units of measure specific to the U.S. Customary System that you will need to remember. The list below summarizes some of the most important.

Measurement	Time	Capacity	Weight
1 foot = _____ inches	1 minute = _____ seconds	1 cup = _____ fl. oz	1 ton = _____ lbs
1 yard = _____ feet	1 hour = _____ minutes	1 pint = _____ cups	1 lb = _____ oz
1 mile = _____ feet	1 day = _____ hours	1 quart = _____ pints	
1 mile = _____ yards	1 week = _____ days	1 gal = _____ quarts	
	1 year = _____ weeks		

In order to convert between units, you must use a conversion factor. A **conversion factor** is a fraction in which the numerator and denominator represent the same quantity, but in different units of measure.

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Examples

1. 3 feet = 1 yard: $\frac{3\text{ feet}}{1\text{ yard}}$ OR $\frac{1\text{ yard}}{3\text{ feet}}$

2. 100 centimeters = 1 meter: $\frac{100\text{ cm}}{1\text{ m}}$ OR $\frac{1\text{ m}}{100\text{ cm}}$

Dimensional Analysis

Multiplying a quantity by a unit conversion factor changes only its units, not its value.

It is the same thing as multiplying by 1!

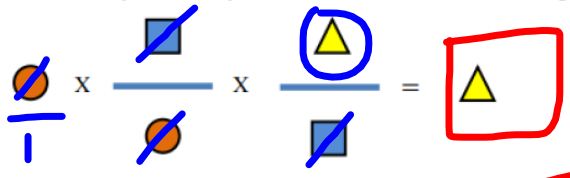
$$\frac{100\ cm}{1\ m} = \frac{100\ cm}{100c\ m} = 1$$

The process of choosing an appropriate conversion factor is called **dimensional analysis**.

Exploring Dimensional Analysis

1. Describe the patterns you notice with the following equations and how the final answer was determined:

a.

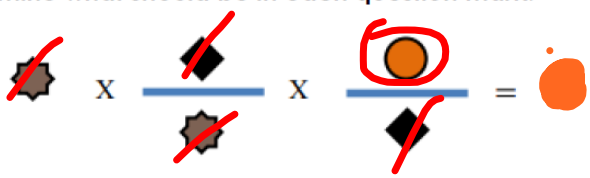


b.

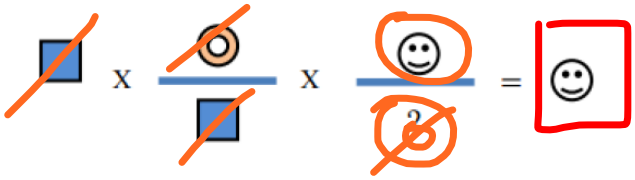
The patterns I noticed were…

2. Determine what should be in each question mark:

a.



b.



Practicing Dimensional Analysis

Scenario 1: How many feet are in 72 inches?

want given

Step 1: Write the given quantity with its unit of measure.	72 inches
Step 2: Set up a conversion factor. (Choose the conversion factor that cancels the units you have and replaced them with the units you want. $\frac{\text{what you want}}{\text{what you have}}$	$\frac{72 \text{ inches}}{1} \cdot \frac{1 \text{ ft}}{12 \text{ inches}}$
Step 3. Divide the units (only the desired unit should be left).	
Step 4: Solve the problem using multiplication and/or division.	$\frac{72}{12} = 6 \text{ ft}$

Scenario 2: How many cups are in 140 pints?

want given

Possible Conversion Factors:

1 pint = 2 cups

$$\frac{140 \text{ pints}}{1} \cdot \frac{2 \text{ cups}}{1 \text{ pint}} = 280 \text{ cups}$$

Scenario 3: How many pounds are in 544 ounces?

given want

Possible Conversion Factors: $\frac{1\text{ lb}}{16\text{ oz}}$ $\frac{16\text{ oz}}{1\text{ lb}}$

$$\frac{544\text{ oz}}{1} \cdot \frac{1\text{ lb}}{16\text{ oz}} = \frac{544}{16}$$

$$= 34\text{ lbs}$$

Multi-Step Dimensional Analysis

How many seconds are in a day?

Most of us do not know how many seconds are in a day or hours in a year. However, most of us know that there are 60 seconds in a minute, 60 minutes in an hour, and 24 hours in a day. Some problems with converting units require multiple steps. When solving a problem that requires multiple conversions, it is helpful to create a flowchart of conversions you already know, set up your conversion factors, and solve your problem.

Flowchart: Days → Hours → Minutes → Seconds

Conversion Factors: 60 sec = 1 min, 60 min = 1 hr 24 hours = 1 day

$$\frac{1\,day}{1} \cdot \frac{24\,hr}{1\,day} \cdot \frac{60\,min}{1\,hr} \cdot \frac{60\,sec}{1\,min}$$

$$= 86{,}400 \text{ seconds}$$

Scenario 4: How many inches are in 3 miles?

Possible Conversion Factors:

1 ft = 12 inches ; 1 mile = 5,280 ft

$$\frac{3 \text{ miles}}{1} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{12 \text{ inches}}{1 \text{ ft}}$$

$$= 190,080 \text{ inches}$$

Scenario 5: How many centimeters are in 900 feet? (2.54 cm = 1 in)

Possible Conversion Factors:

ft → inches → cm

1 ft = 12 inches

$$\frac{900\text{ ft}}{1} \cdot \frac{12\text{ inches}}{1\text{ ft}} \cdot \frac{2.54\text{ cm}}{1\text{ inch}}$$

$$= 27,432\text{ cm}$$

Scenario 6: How many gallons are in 250 mL? (1 gal = 3.8 Liters)

Possible Conversion Factors:

$$\frac{250\,mL}{1} \cdot \frac{1\,Lt}{1000\,mL} \cdot \frac{1\,gal}{3.8\,Lt}$$

$$= \frac{250}{3800}$$

$$= 0.066$$

$$\approx 0.1\,gal$$

Metric System

K H D U D C M

g

L

m

1 Liter = 1000 mL

oz

How many onces are in 451 mL?

(0.034 oz = 1 mL)

$$\frac{451\,\text{mL}}{1} \cdot \frac{0.034\,\text{oz}}{1\,\text{mL}}$$

$$= 15.33\,\text{oz}$$

Scenario 7: Mrs. Wheaton is approximately 280,320 hours old. How many years old is she?

flow chart: hrs → days → wks → yrs

Possible Conversion Factors:

$$\frac{280{,}320\text{ hrs}}{1} \cdot \frac{1\text{ day}}{24\text{ hrs}} \cdot \frac{1\text{ wk}}{7\text{ days}} \cdot \frac{1\text{ yr}}{52\text{ wks}}$$

$$= \frac{280{,}320}{8732} = 32.10\text{ yrs}$$

Exit Ticket:

want

How many minutes are in 180 days?

given

$$180\ \text{days} \cdot \frac{24\ \text{hrs}}{1\ \text{day}} \cdot \frac{60\ \text{min}}{1\ \text{hr}}$$

$$= 259{,}200\ \text{mins}$$