Warmup

① 5km, 5000, 0.45, 0.45, 5000, 45cm

Find Perimeter in meters

5km → 5000m

45cm → 0.45m

Peri → 10000.90 m

② Simplify

$4x(10x^2-3x)-3(x^2+3x)$

$40x^3-12x^2-3x^2-9x$

$40x^3-15x^2-9x$

③ Convert $\frac{45\text{miles}}{1\text{hr}}$ to $\frac{\text{meters}}{\text{sec}}$

(1m = 3.3ft)

$\frac{45\text{miles}}{1\text{hr}} \cdot \frac{1\text{hr}}{60\text{min}} \cdot \frac{1\text{min}}{60\text{sec}} \cdot \frac{5280\text{ft}}{1\text{mile}} \cdot \frac{1\text{m}}{3.3\text{ft}}$

20m/sec

Module 0.10B

Dimensional Analysis/Units in Context

Name:

1.) d = vt
If the units for v are "cm/s"
and the units for t are "s"
What are the units for distance?

$d = vt$

$= \frac{cm}{s} \cdot \frac{s}{1} = cm$

2.) $a = \frac{v}{t}$
If the units for v are "m/s"
and the units for t are "s"
What are the units for a?

$a = \frac{\frac{v}{t}}{\frac{s}{1}} = \frac{\frac{m}{s}}{\frac{s}{1}} = \frac{m}{s} \cdot \frac{1}{s} = \frac{m}{s^2}$

3.) $C = kmt$
the units for C are "cal"
the units for m are "pounds"
the units for t are "minutes"
What are the units for k?

$Cal = K \cdot lbs \cdot min$

$\frac{Cal}{lbs \cdot min} = \frac{K \cdot lbs \cdot min}{lbs \cdot min}$

$K = \frac{Cal}{lbs \cdot mins}$

4.) The formula for density *d* is $d = m/V$, where *m* is mass and *v* is volume. If mass is measured in kilograms and volume is measured in cubic meters, what is the unit rate for density?

$d = \frac{m}{V} = \frac{kg}{m^3}$

5.) The tension caused by a wave moving along a string is found using the formula $T = \frac{mv^2}{L}$
If *m* is the mass of the string in grams, *L* is the length of the string in centimeters (cm), and *v* is the velocity of the wave in cm per second, what is the unit of the tension of the string, *T*?

A. gram-cm per second squared
B. cm per second squared
C. grams per cm-second squared
D. cm squared per second

$T = \frac{g\left(\frac{cm}{sec}\right)^2}{cm} = \frac{gcm^2}{sec^2}$

6.) Convert 60 miles per hour to feet per minute.

$\frac{60 miles}{1 hr} \cdot \frac{1 hr}{60 min}$

5280 ft/min

7.) One gallon every five miles is how many dollars per day?

~~1 hour to travel 55 miles~~
~~1 gallon is $3.10~~
1 driving day is 10 hours

$\frac{1 gal}{5 miles} \cdot \frac{55 miles}{1 hr}$

$341/day

8.) A rectangular prism has a volume of 2 m^3, a length of 40 cm, and a width of 50 cm. What is the height of the prism?

$V = l \cdot w \cdot h$

$40 = 0.4 m$
$50 = 0.5$

$2 = 0.4 \cdot 0.5 \cdot h$

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

$h = 10m$
$1000 cm$

9.) For every 12 kibs, there are 5 dats.
For every 7 dinks, there are 2 dats.
For every cham, there are 10 dinks.
How many kibs are there per cham?

$\frac{12 kibs}{5 dats} \cdot \frac{2 dats}{7 dinks} \cdot \frac{10 dinks}{1 cham}$

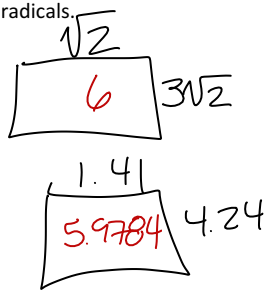
6.86 OR 6.9 kibs/cham

10.) When Bryce goes to work, he drives at an average speed of ~~65 miles per hour.~~ It takes about ~~1 hour and 30 minutes for Bryce to arrive at work~~. His car travels about ~~25 miles per gallon of gas.~~ If gas costs $3.65 per gallon, how much money does Bryce spend going to work?

$\frac{65 miles}{1 hr} \cdot \frac{1.5 hr}{work} \cdot \frac{1 gal}{25 miles} \cdot \frac{\$3.65}{1 gal}$

$14.24

11.) The width of the rectangle is $\sqrt{2}$ cm but Katie has crazy fear of crazy numbers, so she estimates it to 1.41 cm. The length of the rectangle is $3\sqrt{2}$ cm but Katie estimates to 4.24 cm. What is the area of the rectangle? Calculate both decimals and radicals.



Which area of the rectangle is more precise? Why?

The bottom Rectangle has been Rounded Top more precise

If you were pouring concrete for the base of a house, which answer would you want to use? Why?

6 → the measure is more precise

12.) The distance from Commerce to Athens is 18 miles. How long would that be in centimeters? (1 inch = 2.54 cm)

$\frac{18 \text{ miles}}{1} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{2.54 \text{ cm}}{1 \text{ in}}$

2896819.2 cm

If you ride your bike to Athens from Commerce at a rate of 120 centimeters per hour, how long would it take you to get there?

$\frac{2896819.2 \text{ cm}}{1} \cdot \frac{1 \text{ hr}}{120 \text{ cm}}$

24,140.16 hrs

13.) Jane noticed that her faucet was dripping. She later figured out that the rate of dripping was 50 drops every minute. If 20 drops equals 1 milliliter, how many liters per year is the faucet leaking?

$\frac{50 \text{ drops}}{1 \text{ min}} \cdot \frac{1 \text{ mL}}{20 \text{ drops}} \cdot \frac{1 \text{ L}}{1000 \text{ mL}}$

$= \frac{0.0025 \text{ L}}{1 \text{ min}}$

$\frac{0.0025 \text{ L}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{24 \text{ hrs}}{1 \text{ day}} \cdot \frac{365 \text{ days}}{1 \text{ yr}}$

1314 L/yr

How many gallons a year is the faucet leaking? (1 gal = 3.79 liters)

$\frac{1314 \text{ L}}{1 \text{ yr}} \cdot \frac{1 \text{ gal}}{3.79 \text{ L}}$

346.701847 gal/yr