Wednesday, August 28, 2019

Welcome to Investigative Science with Mr. Fireng

SKEPTIC VADER
FINDS YOUR LACK OF EMPIRICAL EVIDENCE DISTURBING
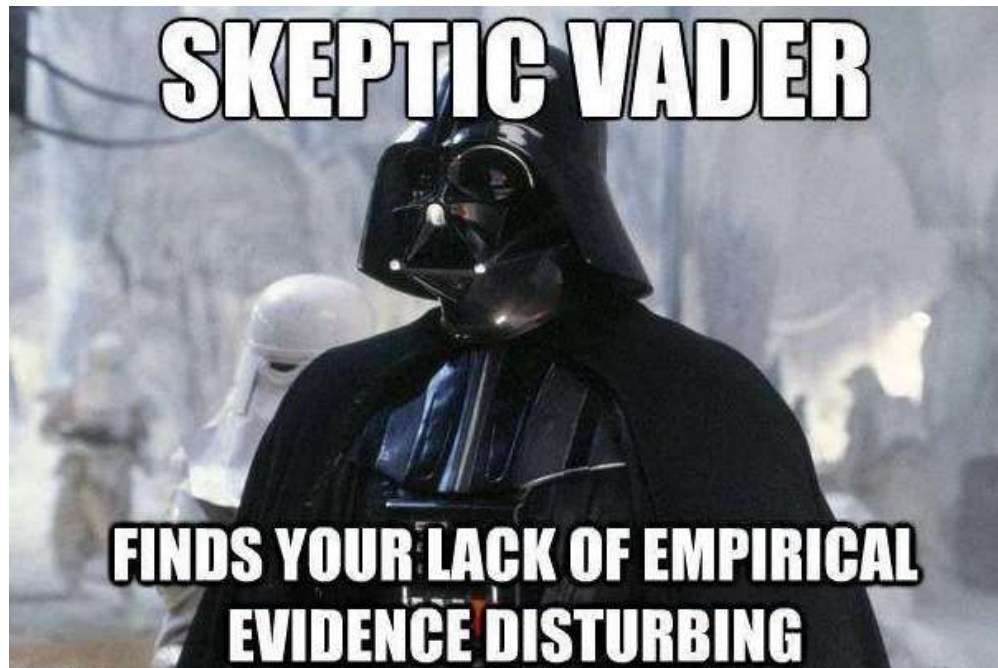
1. Get out your stampsheet
2. Get out your homework
3. Write tomorrow's homework in agenda
4. START WORKING QUIETLY

Investigative Science

Learning goal: Properly apply all steps in the scientific method when problem solving.

Learning goal: Properly apply all steps in the scientific method when problem solving.

Learning scale:

1	2	3	4
Name the steps	Name the steps and follow directions in an investigation	Can design and conduct an investigation leading to a conclusion	Design and carry out an investigation leading to a valid and rational conclusion

Student's self-evaluation: *Complete at home or at the end of class, use the 4-3-2-1 Learning scale (two to three sentences).*
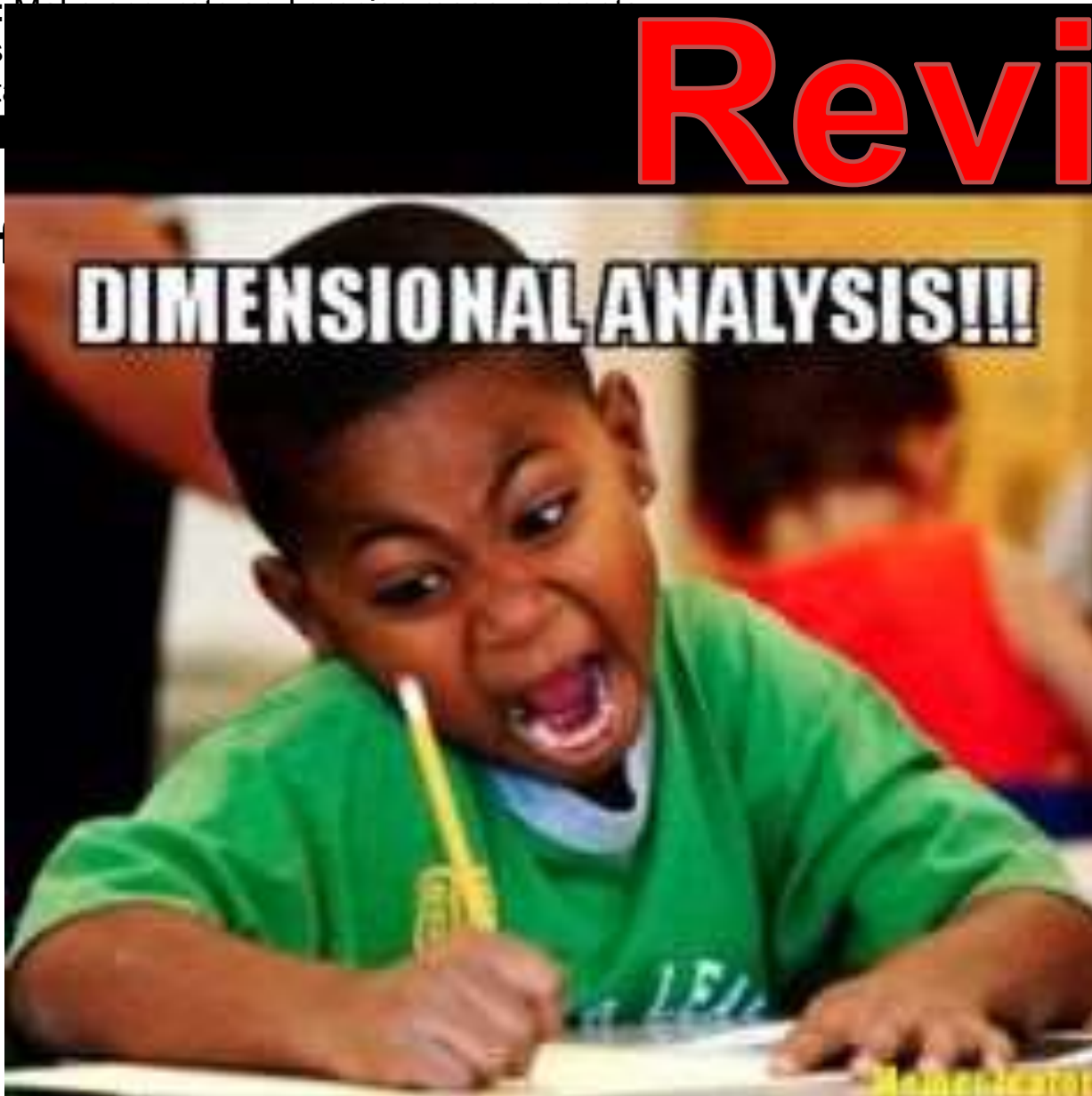
4
Design, complete, valid conclusion

3
Design & complete

2
Know steps, follow directions

1
Know the steps

Investigative Science

Learning goal: ~~Make~~ accurate ~~observations~~ ~~measurements~~
using proper s...
organizing dat...

Review

What it... ...t Units

DIMENSIONAL ANALYSIS!!!

4 Evaluate based on A&P
3 Distinguish A&P in data
2 Importance of A&P
1 Define A&P

Investigative Science

Learning goal: Make accurate and precise measurements using proper significant figures when collecting and organizing data.

6 steps of dimensional analysis problem solving

1.
2.
3.
4.
5.
6.

** Write an example:

Dimensional Analysis and problem solving

Write all Cues!!

Las Vegas is 320 miles away, you drive there 75 miles per hour how many minutes will to take to get there?

4
Design, complete, valid conclusion

3
Design & complete

2
Know steps, follow directions

1
Know the steps

Investigative Science

Dimensional Analysis and problem solving

Dimensional Analysis is often used in problem solving. This is something you do every day!

I get paid $10 per hour for baby sitting, how much will I get paid for 3 hours?

Or, I get paid $10 per hour for baby sitting, I made $50, how many hours did I baby sit?

Yes, you can figure these out in your head, but they are dimensional analysis problems..

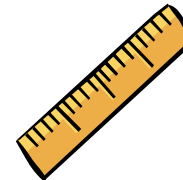| |
|---|
| **4** Evaluate based on A&P |
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Investigative Science

Dimensional Analysis and problem solving

A car used 25.00 gallons of fuel when driving a distance of 400.0 km. How many gallons will it use when driving 250 km?

Saffron costs $368.00 per ounce. Determine how many grams you can purchase for $15.00.

Or! You speed walk at 2.6 meters/seconds. The moon is 384,400 km away, how many days would it take to speed walk there?

These look harder, but they are NOT. Each has three parts. A conversion factor, a given and what you want. Find those and its easy!
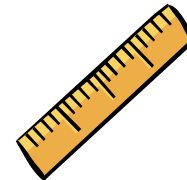
4
Evaluate based on A&P

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Define A&P

Investigative Science

Dimensional Analysis and problem solving

Oranges are 5 for a $2.50, how many oranges can you buy for $7.50?

Step 1: Find the conversion factor, circle it. Find what you are "given" label it "G". Find what you "want" label it "W".

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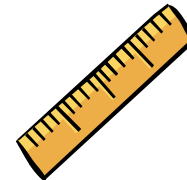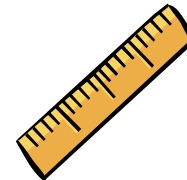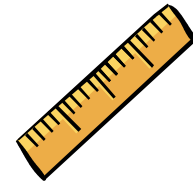| |
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Investigative Science

Learning goal: Make accurate and precise measurements using proper significant figures when collecting and organizing data.

Dimensional Analysis and problem solving

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Investigative Science

Dimensional Analysis and problem solving

Oranges are 5 for a $2.50, how many oranges can you buy for $7.50?

W

G

Step 2: Write the "given" on the left as fraction over 1 with a "X". Write the "want" on the right with an "=".

$$\frac{\$7.50}{1} \text{ X}$$

$$= \_\_\_\_ \text{Oranges}$$

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Dimensional Analysis and problem solving

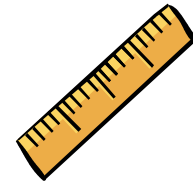Oranges are 5 for a $2.50, how many oranges can you buy for $7.50?

Step 3: find the conversion factor. Write next to the "X". Put the unit of the given at the bottom and cancel.

$$\frac{\$7.50}{1} \quad X \quad \frac{5 \text{ oranges}}{\$2.50} \qquad = \underline{\quad\quad} \text{Oranges}$$

Investigative Science

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Dimensional Analysis and problem solving

Oranges are 5 for a $2.50, how many oranges can you buy for $7.50?

Step 4: Make sure the unit in the conversion factor is the same as the unit you want. If not, convert.

Yup! They are the same!

$$\frac{\$7.50}{1} \times \frac{5 \text{ oranges}}{\$2.50} = \underline{\quad} \text{ Oranges}$$

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Dimensional Analysis and problem solving

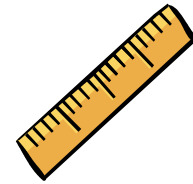Oranges are 5 for a $2.50, how many oranges can you buy for $7.50?

Step 5: Do the math!

7.5 x 5 ÷ 2.5 = 15 oranges!!

$$\frac{\$7.50}{1} \times \frac{5 \text{ oranges}}{\$2.50} = \underline{15} \text{ Oranges}$$

Investigative Science

Dimensional Analysis and problem solving

Oranges are 5 for a $2.50, how many oranges can you buy for $7.50?

Step 6: Does the answer make sense?

Hummmm, 5 for $2.50, we have $7.50 would be a lot more oranges.. So, 15 makes sense!

= $\underline{15}$ Oranges

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Dimensional Analysis and problem solving

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Dimensional Analysis and problem solving

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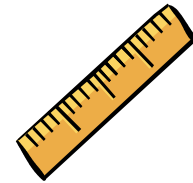
W

G

Conversion factor

Want $$

Given (starting point)

$$\frac{3 \text{ hours}}{1} \quad \times \quad \frac{\$10}{1 \text{ hour}} \quad = \quad \underline{\hspace{1cm}}\$$$

3 x 10 ÷ 1 = 30   Answer is $30!!

Investigative Science

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Dimensional Analysis and problem solving

Las Vegas is 320 miles away, you drive there 75 miles per hour how many minutes will to take to get there?

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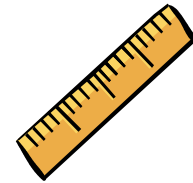| |
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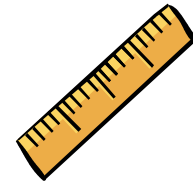
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Dimensional Analysis and problem solving

Las Vegas is 320 miles away, you drive there 75 miles per hour how many minutes will to take to get there?

Step 2: find what you are "given" put on the left. Write as fraction over 1 with a "X". Find what you "want" and put on the right with an "=".

$$\frac{320 \text{ miles}}{1} \text{ X}$$

$$= \underline{} \text{minutes}$$

Investigative Science

Dimensional Analysis and problem solving

Las Vegas is 320 miles away, you drive there 75 miles per hour how many minutes will to take to get there? 1 X =

Step 3: find the conversion factor. Write next to the "X". Put the unit of the given at the bottom and cancel.

$$\frac{320 \text{ miles}}{1} \quad X \quad \frac{1 \text{ hour}}{75 \text{ miles}} \qquad = \_\_\_ \text{minutes}$$

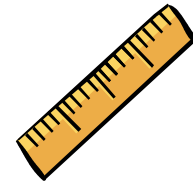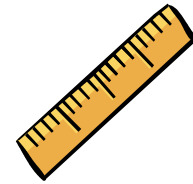| |
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Step 4: Make sure the unit in the conversion factor is the same as the unit you want. If not, convert.

$$\frac{320 \text{ miles}}{1} \quad X \quad \frac{1 \text{ hour}}{75 \text{ miles}} \quad = \quad \underline{\quad} \text{ minutes}$$

NOPE! They are NOT the same!

$$\frac{320 \text{ miles}}{1} \quad X \quad \frac{1 \text{ hour}}{75 \text{ miles}} \quad X \quad \frac{60 \text{ min}}{1 \text{ hour}} \quad = \quad \underline{\quad} \text{ minutes}$$

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Dimensional Analysis and problem solving

Las Vegas is 320 miles away, you drive there 75 miles per hour how many minutes will to take to get there? 1 X =

Step 5: Do the math!

320 ÷ 75 x 60 = 256.5 minutes!!

$$\frac{320\ miles}{1} \times \frac{1\ hour}{75\ miles} \times \frac{60\ min}{1\ hour} = 256.5\ minutes$$

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Learning goal: Make accurate and precise measurements using proper significant figures when collecting and organizing data.

Dimensional Analysis and problem solving

Las Vegas is 320 miles away, you drive there 75 miles per hour how many minutes will to take to get there? 1 X =

Step 6: Does the answer make sense?

Hummmm, 256 minutes is about 4 hours. Las Vegas is 320 miles away 75 miles per hour, so ya, it would take about four hours..

256.5 minutes

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