

welcome to physics!



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1.1 Mathematics and Physics

What is Physics?

- study of energy, matter and how they are related
- motion, energy of sound waves, electric circuits, etc

Mathematics in Physics

- use math to find quantitative solutions
- does the answer make sense?

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Practice Problems p 5 (1-4)

1) A light bulb with resistance of 50.0 Ohms is used in a circuit with a 9.0 Volt battery. What is the current through the bulb?

Knowns

Unknown

Formula

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Practice Problems p 5 (1-4)

2) An object with uniform acceleration a , starting from rest will reach a speed of v in time t according to the formula $v = at$. What is the acceleration of a bicyclist who accelerates from rest to 7 m/s in 4 s?

Knowns

Unknown

Formula

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Practice Problems p 5 (1-4)

3) How long will it take a scooter accelerating at 0.400 m/s^2 to go from rest to a speed of 4.00 m/s ?

Knowns

Unknown

Formula

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Practice Problems p 5 (1-4)

4) The pressure on a surface is equal to the force divided by the area: $P = F/A$. A 53-kg woman exerts a force (weight) of 520 Newtons. If the pressure exerted on the floor is $32,500 \text{ N/m}^2$, what is the area of the soles of her shoes?

Knowns

Unknown

Formula

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SI Units

- common units that everyone can understand

	BASE UNIT
length	- meter
mass	- kilogram
time	- second
temp	- Kelvin
amount	- mole
current	- ampere
intensity	- candela

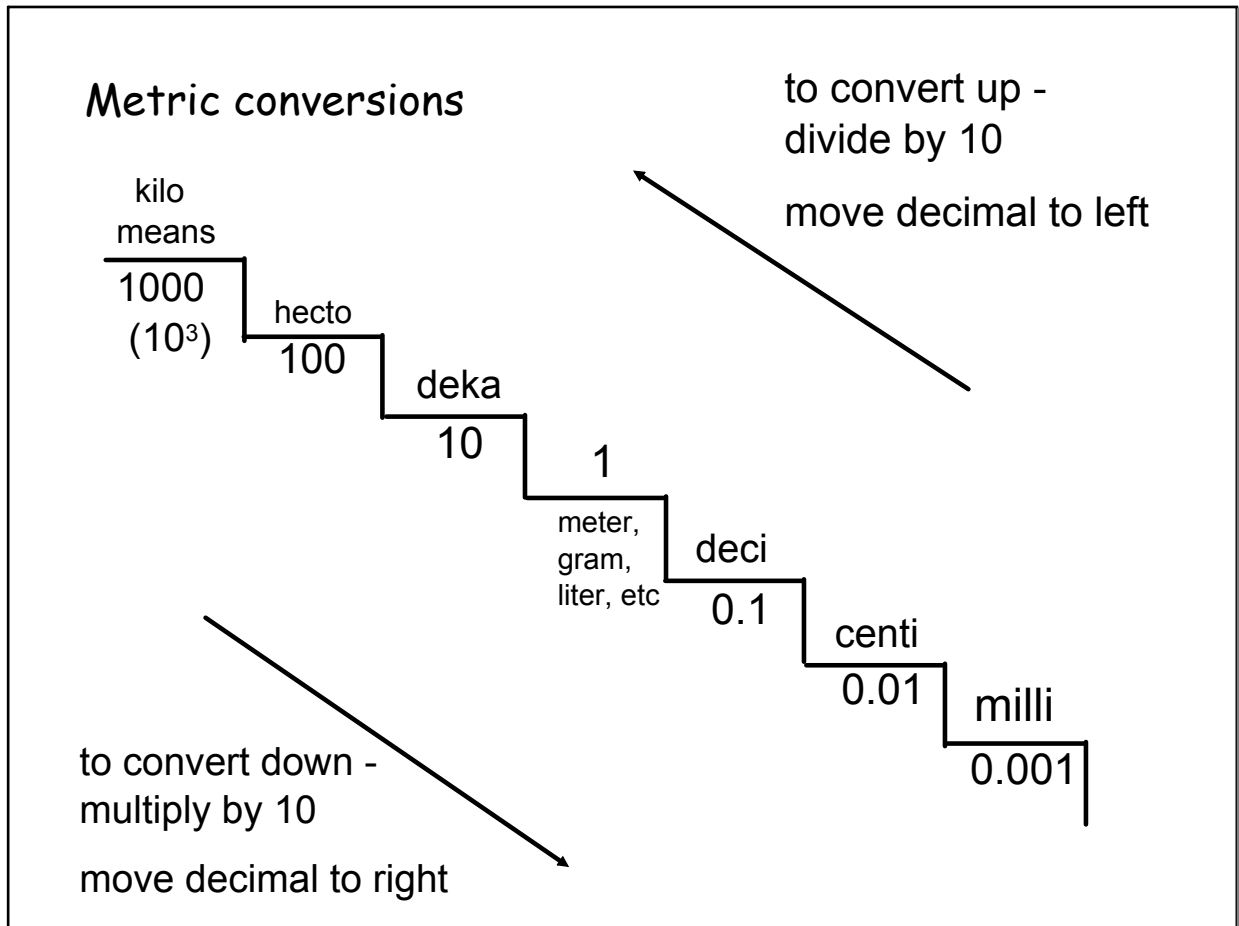
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Scientific notation

$$1000000 = 1 \times 10^6$$

$$0.000755 = 7.55 \times 10^{-4}$$

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connecting metric system and scientific notation

$$1 \text{ kilogram} = 1000 \text{ g}$$

How many grams are in 7,235 kg?

bookmark table on p 6

convert 646 nm to meters

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Dimensional analysis

- 1) start with your known (include labels)
- 2) use conversion factors - each consecutive factor has the previous numerator label in its denominator

$$\text{ex: } \frac{3 \cancel{\text{ft}}}{1} \times \frac{12 \text{ in}}{1 \cancel{\text{ft}}} = 36 \text{ in}$$

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Practice Problems: p 7 (5-8)

5. How many megahertz is 750 kilohertz?
same: How many MHz is 750 MHz?
can use DA or decimal movement

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Practice Problems: p 7 (5-8)

6. Convert 5021 centimeters to kilometers.

same: Convert 5021 cm to km.

can use DA or decimal movement

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Practice Problems: p 7 (5-8)

7. How many seconds are in a leap year?

Not metric, so need DA

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Practice Problems: p 7 (5-8)

8. Convert the speed 5.30 m/s to km/h.

not all metric, need DA

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Significant Digits

- 1) All non zero digits ARE significant
- 2) Zeros between sig figs ARE significant
- 3) Zeros to the left of non zero digits are NOT significant
- 4) Zeros to the right of a non zero digit are NOT significant unless a decimal point is present.

ex: 500 has 3 sig figs

ex: 500.0 has 5 sig figs

ex: 0.00700 has 3 sig figs

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Calculations with sig figs

* adding and subtracting

1) perform the math, then 2) round to least- detailed value

ex:

$$1) 13.86 \text{ m} + 2.4 \text{ m} = 6.26 \text{ m}$$

2) least precise is 2.4 (only to the tenths place) so answer needs to be rounded to the tenths place.

$$6.26 \text{ m rounds to } \boxed{6.3 \text{ m}}$$

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*multiplying and dividing

1) perform the math

2) count the number of sig figs in each of the measurements. Use the lowest count for your answer.

$$\text{ex: } 1) 409.2 \text{ km} / 11.4 \text{ L} = 35.894737 \text{ km/L}$$

2) $\begin{array}{l} \diagdown \\ 4 \text{ sig figs} \end{array}$ $\begin{array}{l} \diagdown \\ 3 \text{ sig figs} \end{array}$

$$\text{so answer needs 3.} = \boxed{35.9 \text{ km/L}}$$

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Practice Problems p 8 (9-12)

9a. $6.201 \text{ cm} + 7.4 \text{ cm} + 0.68 \text{ cm} + 12.0 \text{ cm}$

b. $1.6 \text{ km} + 1.62 \text{ m} + 1200 \text{ cm}$

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Practice Problems p 8 (9-12)

10a. $10.8 \text{ g} - 8.264 \text{ g}$

b. $4.75 \text{ m} - 0.4168 \text{ m}$

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Practice Problems p 8 (9-12)

11a. $139 \text{ cm} \times 2.3 \text{ cm}$

b. $3.2145 \text{ km} \times 4.23 \text{ km}$

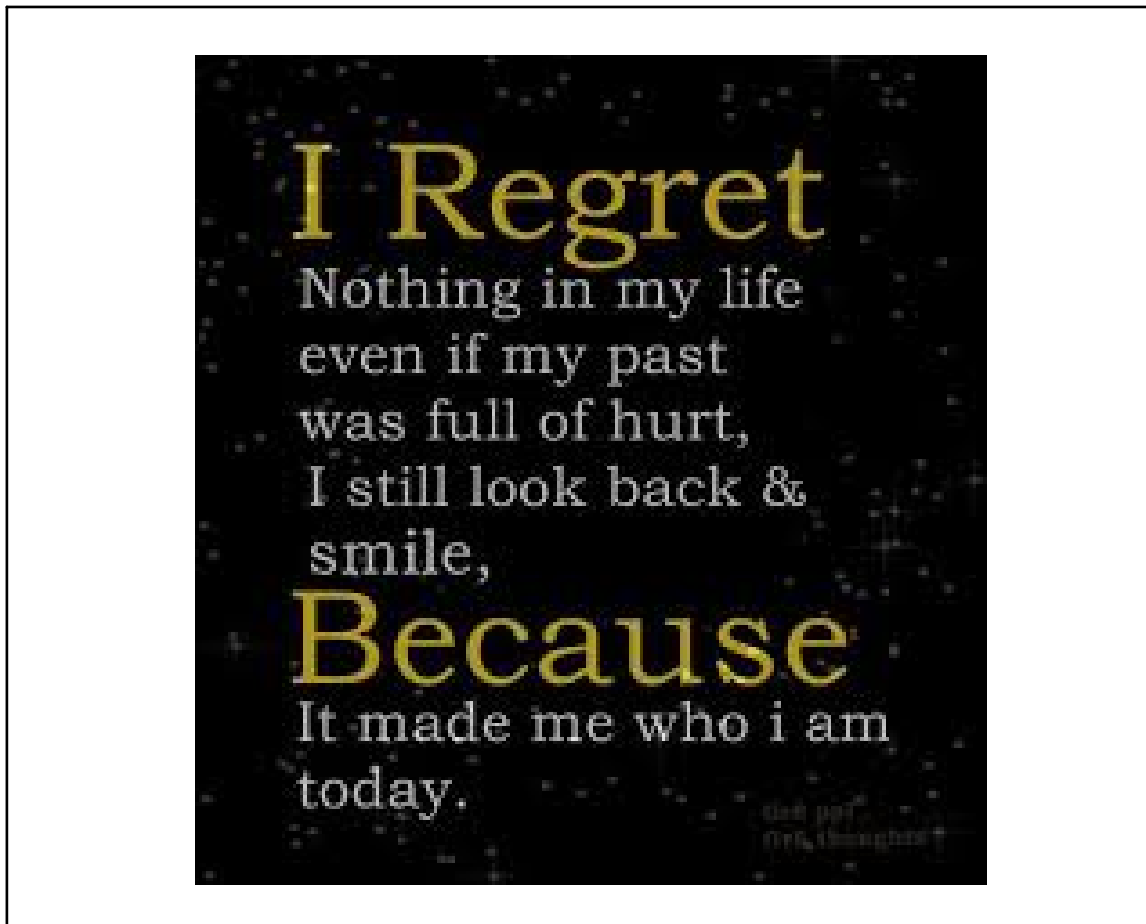
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Practice Problems p 8 (9-12)

12a) $13.78 \text{ g} / 11.3 \text{ mL}$

b) $18.21 \text{ g} / 4.4 \text{ cm}^3$

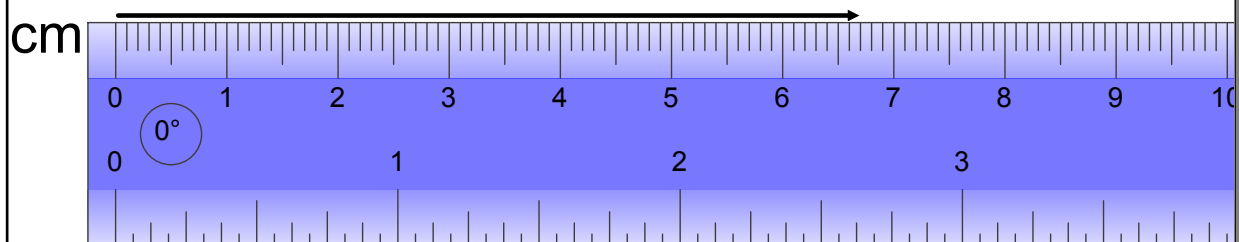
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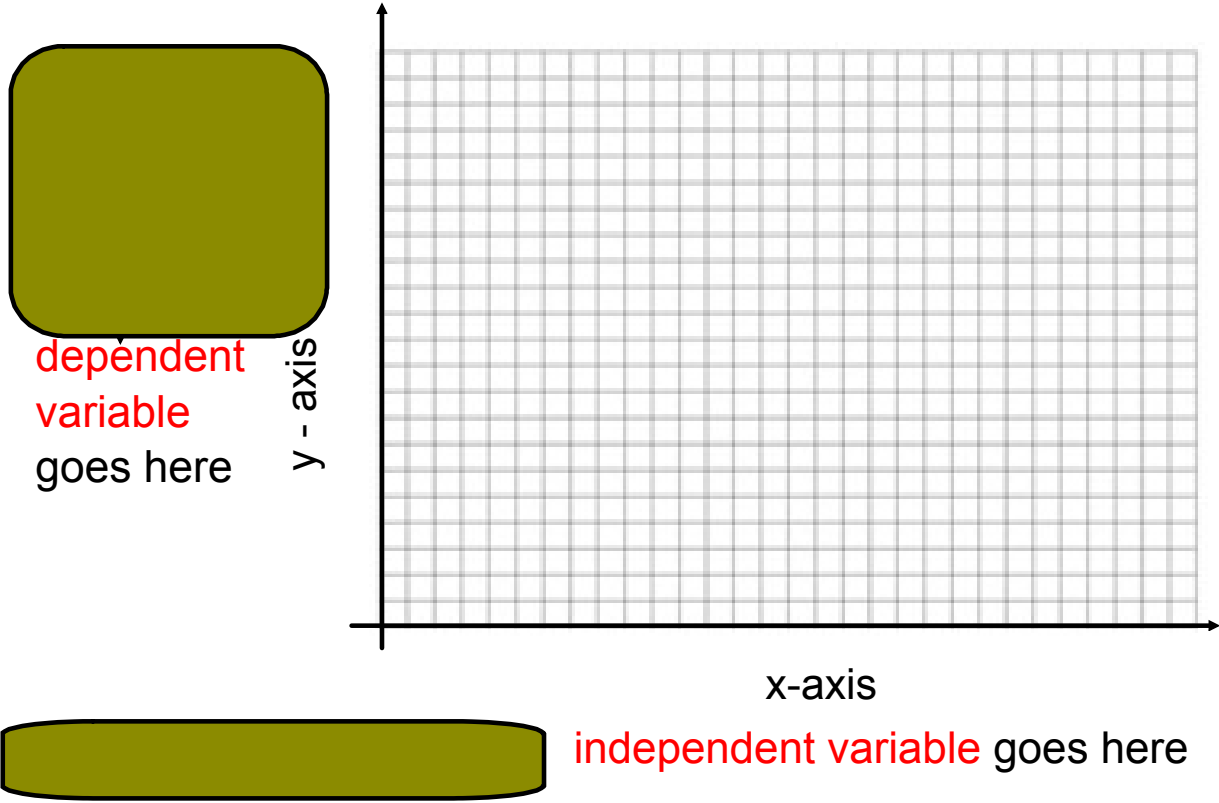
1.2 - Measurement

Briefly: You ALWAYS have one uncertain value in a measurement. This is the one you estimate - it is always the farthest right digit in a measurement.



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1.3 Graphing Basics open to page 15



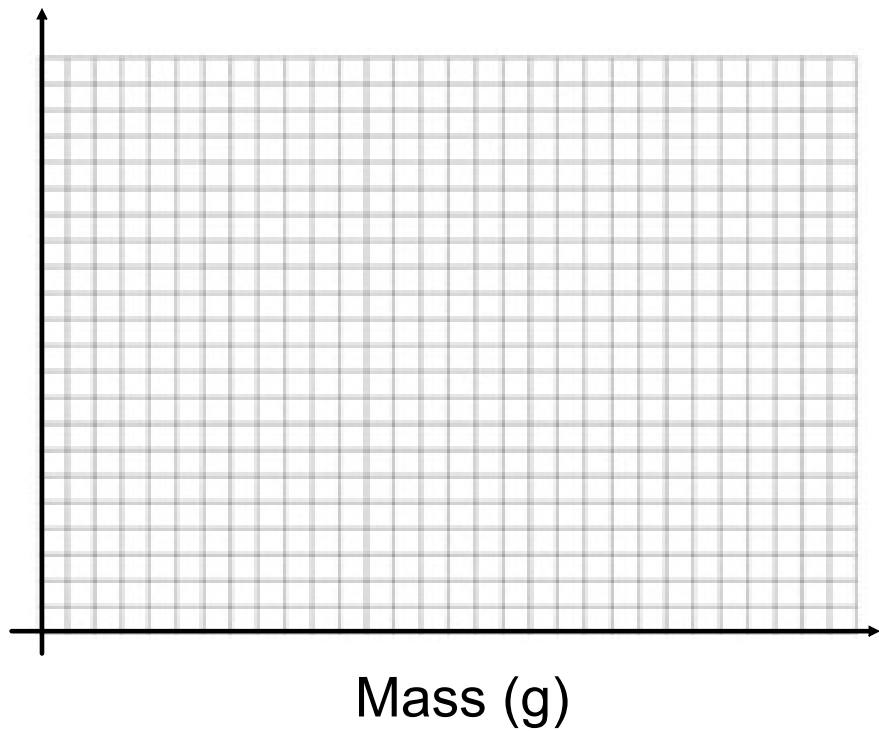
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1.3 Graphing Basics

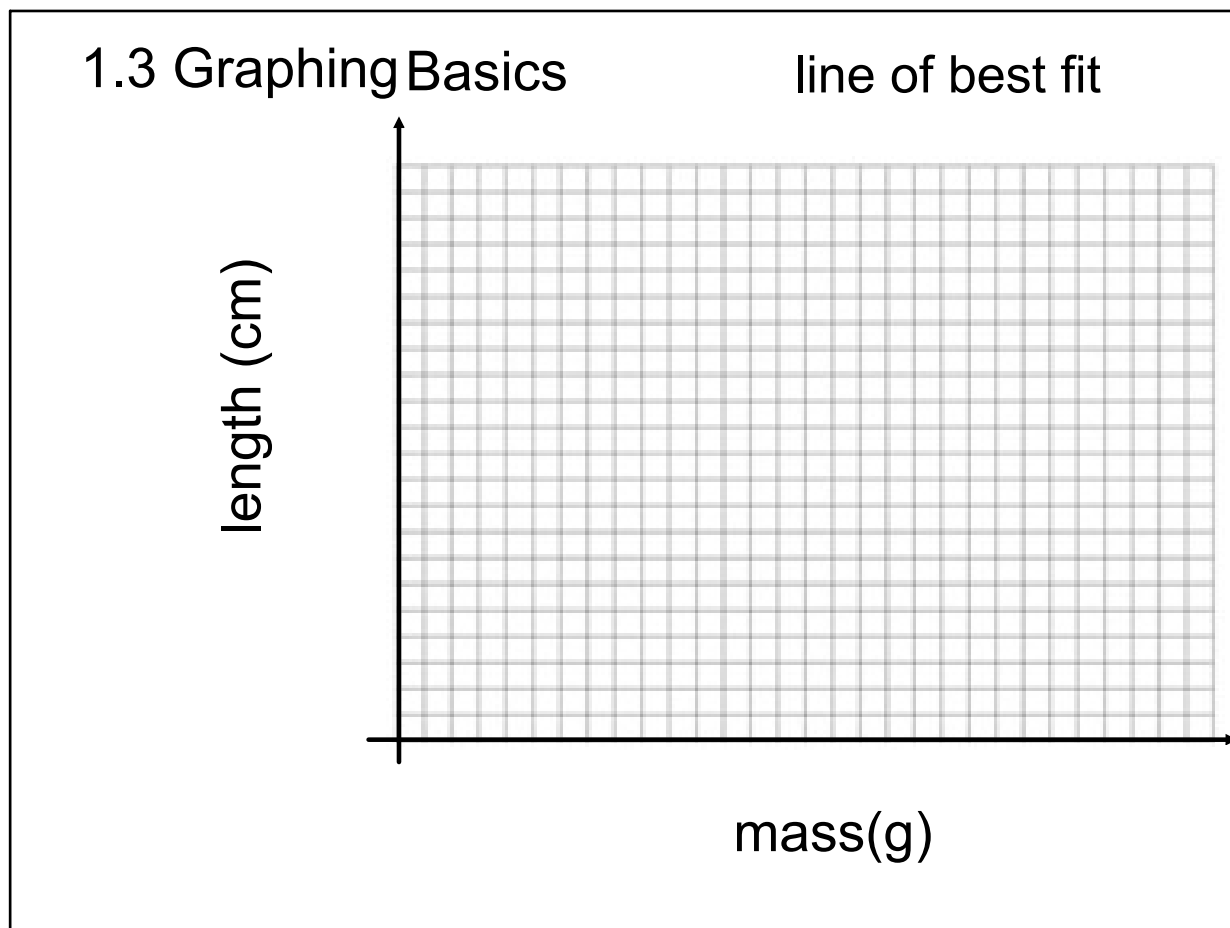
Be SURE to label the axes with labels and units

Also, write in the numerical intervals on each axis

(look at data to find the range)



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Be sure to utilize "Problem Solving Strategies" boxes that are included in the text. They are VERY helpful.

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