Quiz/Question of the Day

Define:
Position

Speed

Acceleration

Physics Chapter 1

Question/Quiz of the Day

A _____ is a possible explanation for why things are the way they are.

What are the SI (metric) units for:

Length

Mass

Time

Express 6,000,000 in scientific notation.

Numbers and Measurement

- Scientists have a convention for writing numbers that show the uncertainty of the measurement.
- Only *significant digits* are reported for measured and calculated numbers.
- 0.011
- 1.002
- 1.00
- 0.0025
- 0.00250

Arithmetic with Sig Figs

- Addition and subtraction:

- Multiplication and division:

- Other operations:

SI Units

- SI, system international
- Quantity, unit name, symbol
- Length,
- Mass,
- Time,
- Electrical charge,
- Combinations are called
- Examples:

SI (metric) prefixes

Prefix	Symbol	Factor
	M	
	k	
	h	
	da	
Base unit	---	1
	d	
	c	
	m	
	μ	
	n	

Converting units

- If 12 in = 1.0 ft then
- How many inches are in 6.2 ft?

- How many in^3 are in 6.2 ft^3?

- How many μs are in 6.2ms?

- If I weigh three nails and their weights are 6.68g, 6.72g, and 6.67g, what is the

Question of the day.

If 3.0 ft = 1 yd, the how many yd^3 are $4000ft^3$?

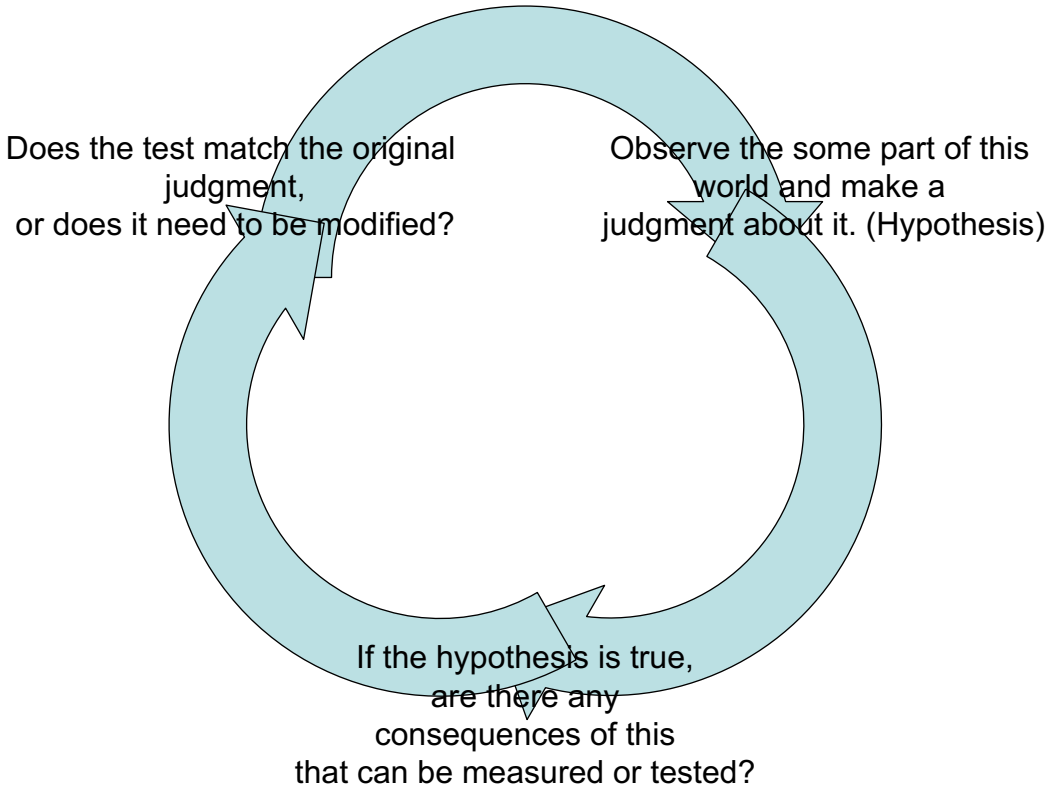
Sig fig and conversion problem

If I weigh three nails and their weights are 6.68g, 6.72g, and 6.67g, what is the average weight of a nail in lbs (1.0000lb = 453.59g)?

Strategies to increase certainty

- Take multiple measurements and use the average.
- Use a sample that is large compared to your measurement scale.
- Round only after all calculations are done.
- Precision vs. Accuracy?

Classical Realism, and the Scientific method



Chapter 1 Review problems

- Page 27…
- #’s 2, 5, 10, 11, 13, 16, 20, 27, 45

Chapter 2. One dimensional motion.

- Position and displacement.
- x and Δx, both in meters, feet, etc
- Distance vs. displacement.
- Defined wrt coordinate system.

- $\Delta x = x_f - x_i$

Velocity and Speed

- V, velocity
- $V_{average}$ = _____, measured in _____
- Because displacement has a direction….
- Speed has size but not specified direction.
- (vector vs scalar quantities)
- In a graph of position vs. time speed is_____ of the graph.

Question of The Day

- What does Δ mean?
- What does Δx mean?

Constant velocity problems.

- A bacteria swim at 3.5mm/s across a 84mm petri dish. How much time will it take?

- At 35mi/hr, how far can you travel in 6.5hrs?

- If you are at mile marker 60 at 3:00 am and at mile marker 390 at 12 noon, what is your average speed?

Acceleration

- Acceleration, a
- $a_{average}$ =
- Units:
- Since Δv is vector, so is a vector.
- A bus slows from 9m/s to 0m/s over the course of 5s. What is its acceleration?

- Acceleration can be positive or negative

Questions of the Day.

- “Negative acceleration” can have two possible meanings. What are they?

- What is the significance of the slope of a position vs. time graph (an x(t) graph)?

Acceleration problems

- A bus moving at 12m/s accelerates at $-3 m/s^{2}$. How long until it stops?

- If you wish for a bus to stop in 9 s from a speed of 14m/s, how fast should it accelerate?

Chapter 2 Review Problems

- Page 69…1-6, 9, 10, 16, 19, 22, 25, 28, 29, 32, 50, 55, 60, 65

Constant acceleration eqns

- Start with $V_{average} = \Delta x/\Delta t$
- At constant acceleration, $v_{average} = (v_f+v_i)/2$
- Substituting gives:

- Multiply by Δt gives:

$\Delta x = 1/2(v_f+v_i)\ \Delta t$

- A car moving at 20 m/s brakes to zero over 6 seconds, how far does it travel?

- If the car has only 20m to stop, how much time does it have?

Constant acceleration equations

- $a = (v_f - v_i)/\Delta t$
- $(v_f - v_i) = a\ \Delta t$
- $v_f = v_i + a\ \Delta t$
- If a car going 4m/s accelerates over the next 6 seconds at $2m/s^2$. What is its final speed?

Constant acceleration eqns

- $v_f = v_i + a\,\Delta t$
- $\Delta x = 1/2(v_f+v_i)\,\Delta t$ substitute the above for v_f

- $\Delta x = v_i\,\Delta t + \frac{1}{2}\,a\,(\Delta t)^2$
- If an object moving at 0.0 m/s begins to fall toward the earth at $9.8 m/s^2$, how far will it fall in 3.0 seconds?

(constant acceleration)

- $\Delta x = 1/2(v_f+v_i)\ \Delta t$ solve for Δt:

- Subst. into $v_f - v_i = a\ \Delta t$

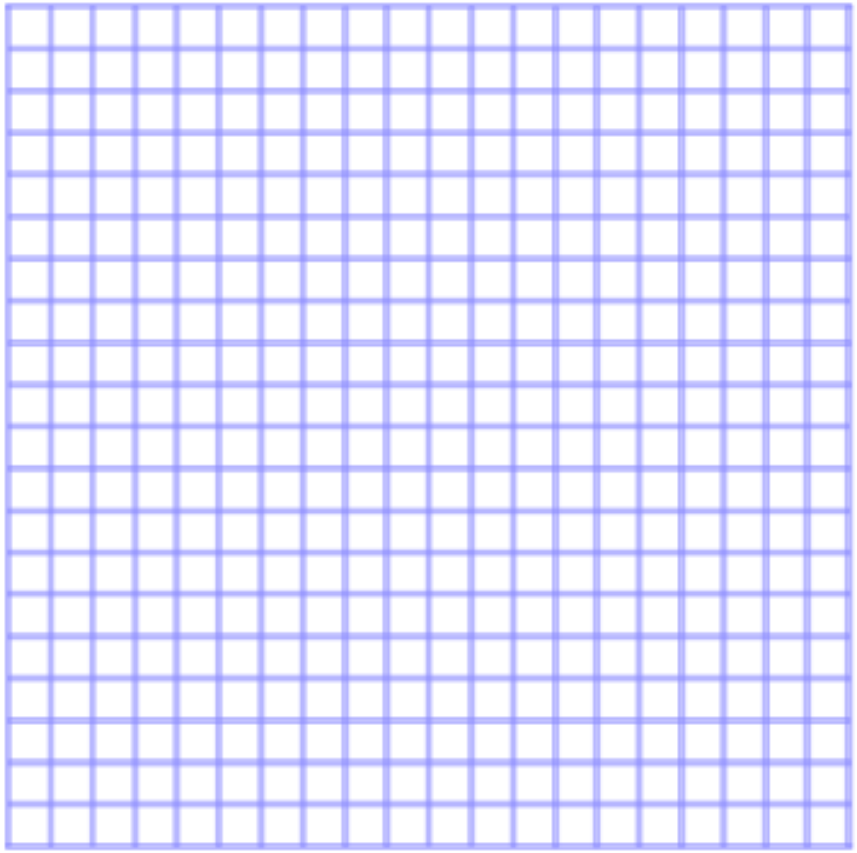
- $v_f^2 = v_i^2 + 2a\Delta x$

$v_f^2 = v_i^2 + 2a\Delta x$

- An object falls from rest from the height of a table, 0.75 meters. Acceleration due to gravity is $9.8 m/s^2$. How fast is the object falling when it hits the ground?

Question(s) of the day

What is the significance of the slope of a “velocity as a function of time” or v(t) plot?



Free Falling objects

- $a = 9.8 m/s^2$ (with no friction, no air resistance)
- Our class average with friction and air resistance was $9.4 m/s^2$.
- A ball is thrown upward at 7m/s. How high will it go? And when will it hit the ground again? How fast will it be going when it hits the ground?

Free Fall

- A ball is thrown upward at 7m/s from a 20m building. How high will it go? When will it hit the ground? How fast will it be moving when it hits the ground?