

Study Guide PHYSICS FOR test One Quarter One.....*SOME ANSWERS!!!! (NOT COMPLETE!!)*

See if you can answer: (use graph paper if needed)

What's the difference between an observation and a measurement of a physical property?

*Observation: an adjective, factual, objective....*

*Measurement: a comparison to standard or scale that uses a number and unit.*

What's a standard for a unit of measure?

*THE one thing that all is compared to.... Preferably a non changeable object or measurement.*

What are the three fundamental properties of physics and their English & metric units?

*Mass: Kg      TIME: sec      DIS(placement): Meters*

Convert a car that accelerates 10 inches/sec<sup>2</sup> to miles/hour per second.

$$\frac{10 \text{ in}}{\text{sec} \cdot \text{sec}} \mid \frac{1 \text{ ft}}{12 \text{ in}} \mid \frac{1 \text{ mile}}{5280 \text{ ft}} \mid \frac{3600 \text{ sec}}{1 \text{ hr}} = \frac{0.568 \text{ miles}}{\text{hour} \cdot \text{sec}}$$

Describe the difference between accuracy and precision in an experiment.

*Accuracy: close to right answer, precision: repeatable, # digits*

Estimate to within a power of ten the number of pencils that would fit in my teacher's desk.

$$\frac{3 \text{ ft} * 2 \text{ ft} * 8 \text{ ft}}{1 \text{ desk}} \mid \frac{12 \text{ in} * 12 \text{ in} * 12 \text{ in}}{1 \text{ ft} * 1 \text{ ft} * 1 \text{ ft}} \mid \frac{1 \text{ pencil}}{6 \text{ in} * .2 \text{ in} * .2 \text{ in}} = \frac{345,600 \text{ pencils}}{\text{desk}}$$

Identify the control group, experimental group, independent and dependent variables in an experiment to test the effects of gravity on plant growth.

*CG: Plant in zero g, EG: Plant in Gravity, IV: Gravity, DV: Height*

Describe the difference between distance and displacement.

*Distance: always positive, displacement: distance with direction from start*

Describe how to calculate average speed, velocity.

*Average speed = Abs Value of Velocity. Average velocity = Change in Dis/Change in time*

Describe the meaning and units for speed, velocity and acceleration.

*Speed = Abs Value of Velocity Units are m/s, Acceleration is Change in Vel/Change in Time units are m/s<sup>2</sup>, Jerk is Change in Acceleration/Time units are m/s<sup>3</sup>*

Describe how to get velocity from a displacement time graph.

*Slope!*

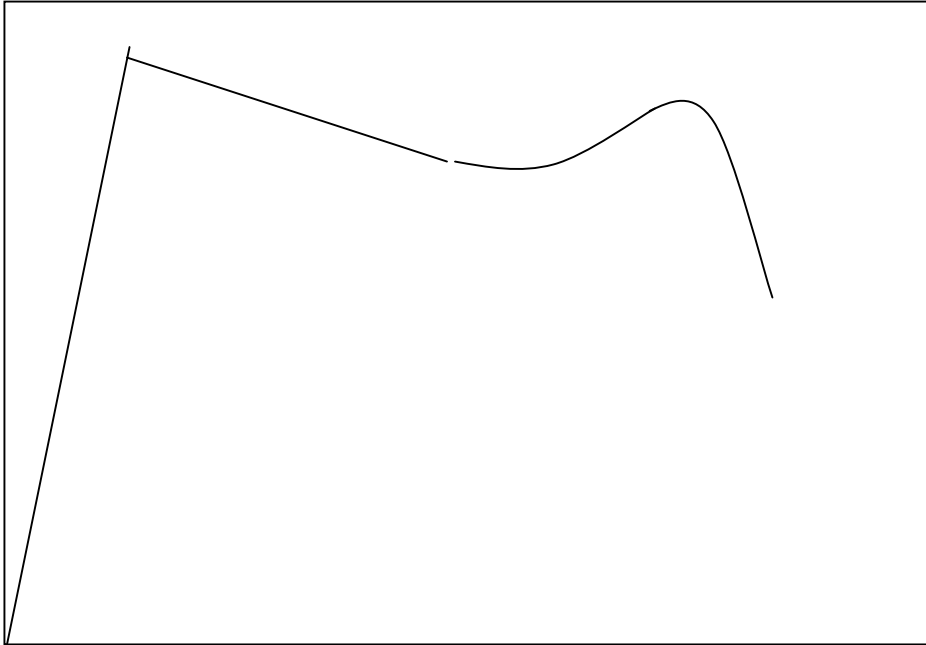
Describe how to get displacement and acceleration from a velocity time graph.

*Displacement = Average Vel \* time or area of V-T graph*

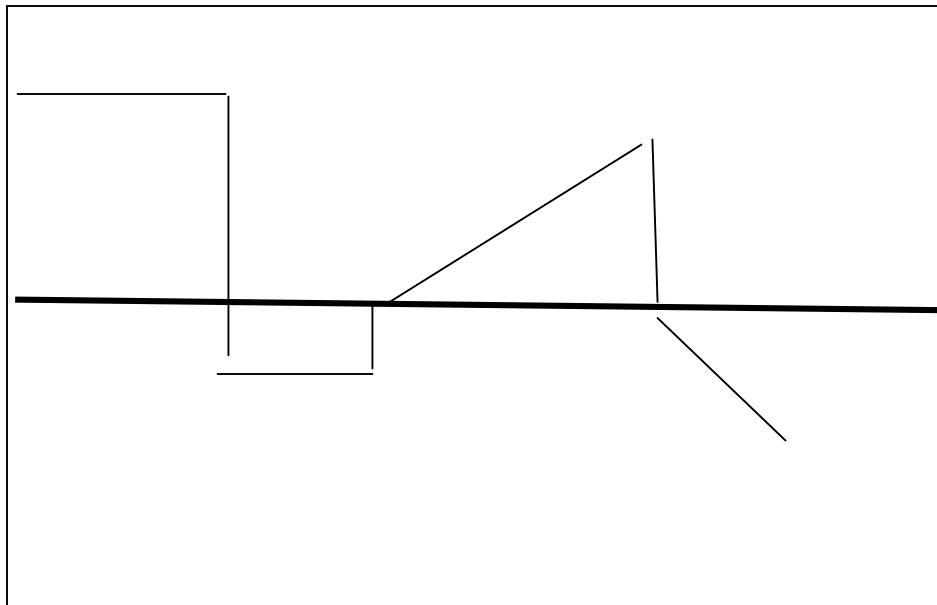
*Acceleration = Slope of V-T graph.*

Be able to use the definitions of velocity and acceleration to solve for dis and time.

Describe the shape of a displacement time and velocity time graph for an object: at rest, going fast forwards, going slow backwards, speeding up going forwards and backwards, speeding up going backwards.



D-T



V-T

Use an accurate D-T graph to answer this question.

While jogging, Maria sees Jason 10 m ahead of her, walking in the same direction. If Maria is jogging at 5.0 m/s and Jason is walking at 2.0 m/s, how long will Maria have to jog before catching up to Jason?

*Time: 3.33 sec, Dis: 16.67 m*

When velocity is negative and acceleration is positive, what happens to the object's motion?

*The object decreases speed going backwards, then increases speed going forwards. (changes direction)*

When velocity is positive and acceleration is negative, what happens to the object's motion? *The object decreases speed going forwards, then increases speed going backwards. (changes direction)*

Make a V-T table then draw an accurate V-T graph for this: A police car at a stoplight accelerates at  $0.5 \text{ m/s}^2$ . A truck goes a constant 2 m/s.

When will their velocities be equal? How far has each one gone?

*At time = 4 sec, their velocities are both 2 m/s. The truck has gone  $D = V_{avg}T = 2 * 4 \text{ sec} = 8 \text{ m}$ .*

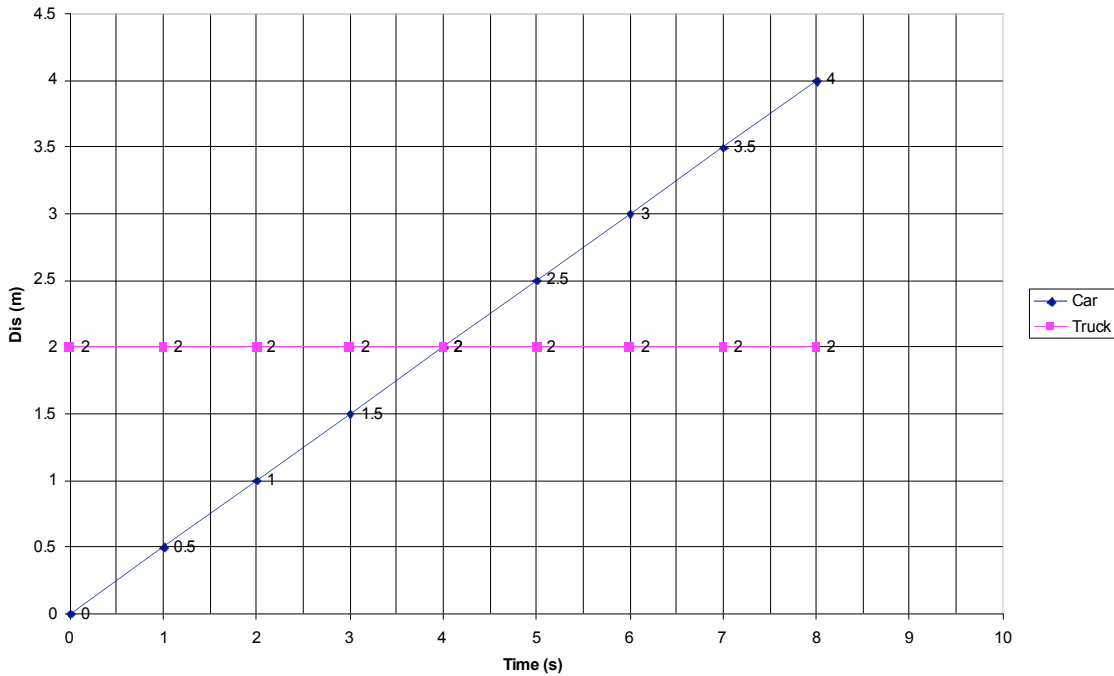
*The car has gone  $D = V_{avg}T = (2+0)/2 * 4 \text{ sec}$  or  $1/2 b * h = 4 \text{ m}$ .*

When will their displacements be equal? (use area on the V-T graph)

*At time = 8 sec, both have gone 16 m. The car has gone  $D = V_{avg}T = (4+2)/2 * 4 = 3 \text{ m/s} * 4 \text{ s} = 12 \text{ m}$  MORE for a total of  $12 + 4 = 16 \text{ m}$ .*

*Or, it is one big triangle  $(1/2 (8) * 4) = 16 \text{ m area}$*

Stoplight



Find the velocity for each section of the D-T graph. Find the average velocity of the whole trip. (Dis points: (0,0), (4,2.6), (7,8.8), (11.2,8.8), (15.5,2.9) )

*Slope of each section change in dis/change in time. = Velocity*

*$V_{avg}$  for whole trip =  $Dis/Time = (2.9-0)/(15.5-0) = 0.187 \text{ m/s}$*

Find the displacement and acceleration for each section of the V-T graph. Find the average velocity of the whole trip. (Vel points: (0,+1.9), (3,+1.9), (4.8, +2.4), (7,0), (8.2, -1.2), (10.5, 0) )  
 Slope of each section , change in velocity /change in time is acceleration.  
 Average Acceleration for whole trip =  $(0-1.9)/(10.5-0) = -0.18 \text{ m/s}^2$

Displacement = Area of each section..... Flat section has area of  $1.9 \times 3 = 5.7 \text{ m}$ , next positive section area of about  $5.3 \text{ m}$  for a total positive displacement of  $11 \text{ m}$ , then the negative section area is about  $-3.5 \text{ m}$ .  
 So the whole trip has a displacement of about  $+7.5 \text{ m}$  total. The average velocity for the whole trip is Change in Dis/Time so  $7.5 \text{ m}/10.5 = 0.71 \text{ m/s}$

