DISCLAIMER: Please note that this material was created by your tutor, whom is a student. This material is in no way inclusive of all material or content that may see on your upcoming exam/quiz/assignment. This should not be used as your only tool and resource to study. This material may also NOT reflect the type or format of questions/objectives that your professor may use. This material was not checked or approved by the professor and was not checked for errors.

Primary resources:

1. Whatever the teacher gives you! Powerpoints, lectures, lecture recordings, practice problems, textbook, etc.

Other resources:

- **Khan Academy**
- **Organic Chemistry Tutor**
- **Professor Dave Explains**
- **Chad's Prep**
- **College Physics by OpenStax**

Basics

1. SI Units
2. Unit conversions
3. Precision Vs Accuracy
4. Significant Figures
5. Trigonometry

SI Units

1. Fill in the table with the correct SI Units

Base quantity	Symbol	Unit (Name and symbol)
(**EXAMPLE)** Electric Current	i	Ampere (A)
Length		

Time		
Mass		
Amount of substance		
Thermodynamic Temperature		

Unit Conversions

1. A car is going 75 mph on the highway, how fast is that in meters per second? (1 mile = 5280 feet)

2. The student is measuring her room for decorations. She finds it to be 3 meters by 3 meters. Convert this measurement to inches.

Precision vs Accuracy

1. Tiana is a student performing an experiment where she drops and ball and measures the height of each bounce. Her max height for 5 trials were, respectively, 4.2, 4.5, 4.3, 4, 4.2 in inches. On amazon, the description says the ball can go up to 6 inches high. Is her measurements accurate, precise, both, or neither?

2. If a scale reads your mass as 75 kg with a 2.5% uncertainty. What is the uncertainty of your mass?

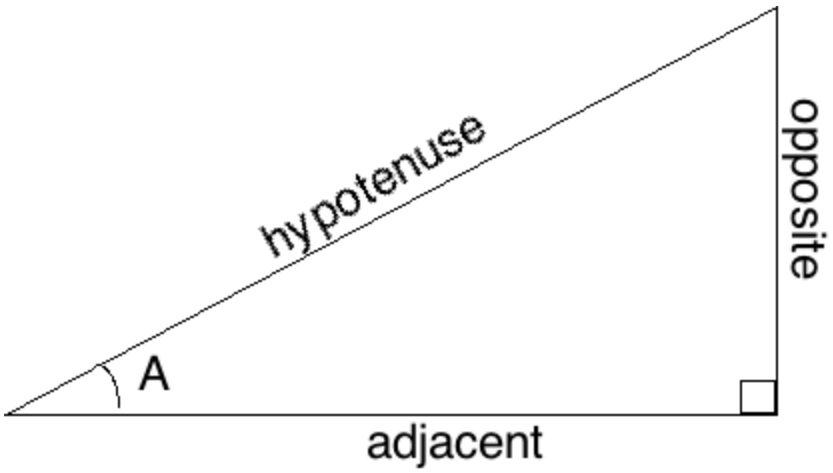
Significant Figures

1. List the significant figure rules

2. State how many significant figures are proper in the results of the following calculations:
    a. (106.7)(98.2)/(46.210)(1.01)
    b. (18.7)^2
    c. (1.6e-19)(3712)

Trigonometry

1. Let's say I have a right triangle where Adjacent = 10, and Opposite = 13. Fill out the table:



Adj	Opp	Hyp	Sin (A)	Cos (A)	Tan (A)	Angle A
10	13					

Kinematics

1. Scalars and Vectors
2. Simple Vector Addition
3. Motion Graphs
4. 1D Kinematics
    a. Free Fall
5. Connecting Kinematics and motion graphs
6. 2D Kinematics

Scalars and Vectors

1. Compare and contrast scalars and vectors. Include examples of both with explanations as to WHY they are a scalar or a vector.

2. Is weight a vector or a scalar? Explain your answer.

3. If I walked 14 meters east, and then 4 meters west.
    a. What is my total distance?
    b. What is my displacement?

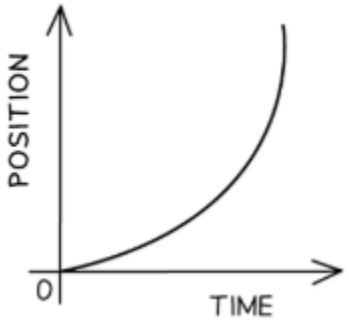
Vector Addition

1. Suppose you first walk 12.0 m in a direction 20º west of north and then 20.0 m in a direction 40.0º south of west. How far are you from your starting point, and what is the compass direction of a line connecting your starting point to your final position?

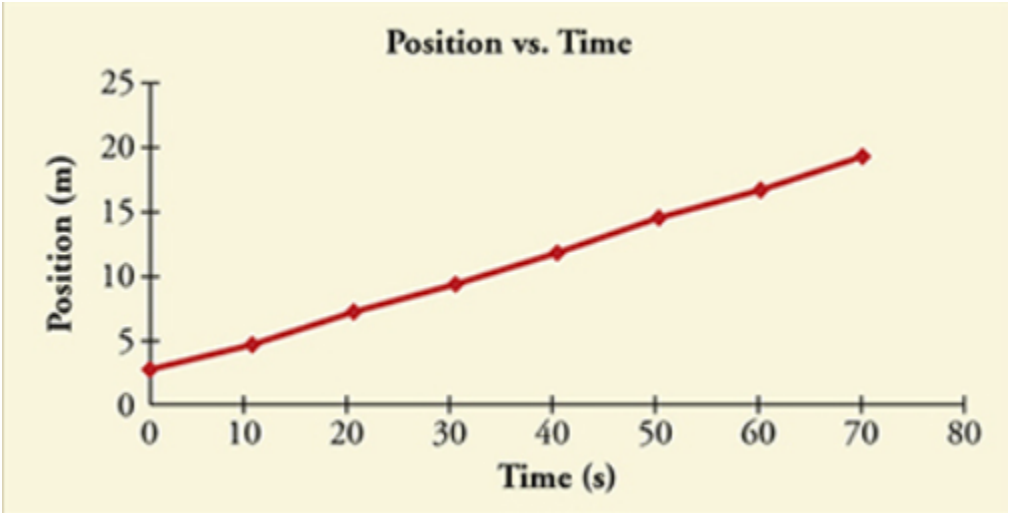
Motion graphs

1. If I had a velocity vs time graph, what component of the graph will tell me the total distance traveled? What about the acceleration?

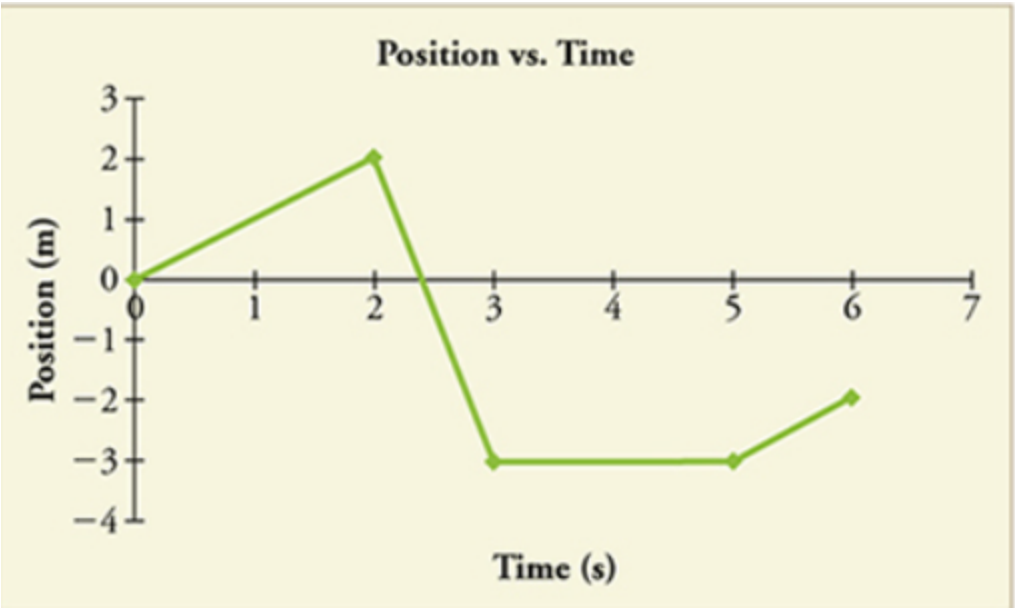
2. From this position vs time graph, draw…
    a. The velocity vs time graph.
    b. The Acceleration vs time graph



3. Based on the graph, approximate the velocity at t = 43 seconds.

a. 

4. The picture below shows the position graph for a particle for 6 s.
    a. Draw the corresponding Velocity vs. Time graph.
    b. What is the acceleration between 0 s and 2 s?
    c. What happens to the acceleration at exactly 2 s?



1D Kinematics

1. What are the three big kinematic equations? (You may only have two. You may also have a bunch of formulas, try to connect all the equations you are given and see if you can find similarities and see which ones might be the same thing. (Ex: D = 1/2at^2 is just a part of one of the big equations).)
    a.
    b.
    c.
2. List the kinematic variables:

3. A man drops a ball from a cliff, what is the velocity after 10 seconds. (Ignore air resistance)

4. An unwary football player collides with a padded goalpost while running at a velocity of 7.50 m/s and comes to a full stop after compressing the padding and his body 0.350 m.
    a. What is his deceleration?
    b. How long does the collision last?

5. Answer the following questions for projectile motion on level ground assuming negligible air resistance (the initial angle being neither 0º nor 90º):
    a. Is the velocity ever zero?
    b. When is the velocity a minimum? A maximum?
    c. Can the velocity ever be the same as the initial velocity at a time other than at t=0?

d. Can the speed ever be the same as the initial speed at a time other than at t=0?

6. You throw a ball straight up with an initial velocity of 15.0 m/s. It passes a tree branch on the way up at a height of 7.00 m. How much additional time will pass before the ball passes the tree branch on the way back down?

7. A coin is dropped from a hot-air balloon that is 300 m above the ground and rising at 10.0 m/s upward. For the coin, find
    a. the maximum height reached
    b. its position and velocity 4.00 s after being released
    c. the time before it hits the ground.

2D Kinematics

Disclaimer: Some of these problems may require the equation v(t)^2=v(0)^2=2a(x(t)-x(0))

1. A projectile is launched at ground level with an initial speed of 50.0 m/s at an angle of 30.0º above the horizontal. It strikes a target above the ground 3.00 seconds later. What are the x and y distances from where the projectile was launched to where it lands?

2. An arrow is shot from a height of 1.5 m toward a cliff of height H. It is shot with a velocity of 30 m/s at an angle of 60º above the horizontal. It lands on the top edge of the cliff 4.0 s later.
    a. What is the height of the cliff?
    b. What is the maximum height reached by the arrow along its trajectory?
    c. What is the arrow's impact speed just before hitting the cliff?

3. A football player punts the ball at a 45.0º angle. Without an effect from the wind, the ball would travel 60.0 m horizontally.
    a. What is the initial speed of the ball?
    b. When the ball is near its maximum height it experiences a brief gust of wind that reduces its horizontal velocity by 1.50 m/s.
    c. What distance does the ball travel horizontally?