Name:_____

AP PHYSICS 1 SUMMER ASSIGNMENT

Welcome

Welcome to AP Physics 1 at Hardin Valley academy. For many of you, this will be your first full physics course. Fortunately, we will cover many of the concepts that were covered your freshman year in Physical World Concepts. One difference, however, will be the pace and the mathematical rigor.

I know that it has been awhile since most of you have studied PWC, so this assignment is based on the review packet for the PWC final exam. I'm hoping that by doing this packet that you will review some of the concepts that you learned a few years ago, which will enable you to concentrate on the more advanced ideas in this class easier.

This packet will be due on the first day of class. It seems long, but there is plenty of time to do it all without having to spend much time a day if the work is spread out over time.

I look forward to seeing you in my physics class!

Dr. Sternberg

Name _____

Write your answer in a complete sentence, write the formula required, or give a complete solution to the problem.

Units and Vectors

1. If Mary has a mass of 125kg, how much would she weigh? _____
2. What are the units of mass, weight, force, velocity, and acceleration?

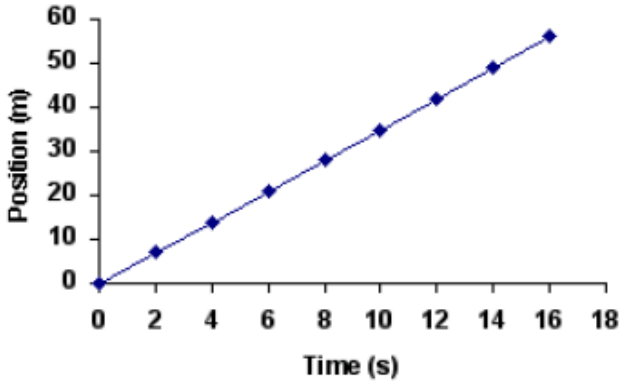
   _____

   _____

Velocity and Acceleration

3. How many seconds will it take you to walk a distance of 3,200 m north if your average velocity is 1.65 m/s?

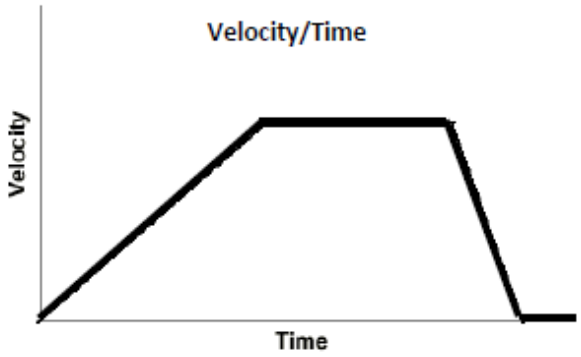
4. Use the graph to find the average velocity between 6 seconds and 10 seconds?

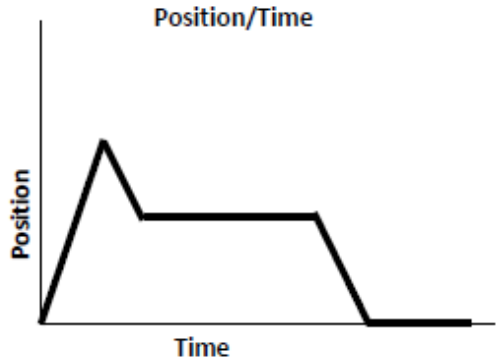


5. Mr. Jones was traveling 24 Km/s on Pellissippi Parkway. He needed to pass another car so he accelerated to 27.7 km/s. It took 60 seconds to increase his velocity. What was his average acceleration?

Name _____

6. Identify the part of the graph that shows constant velocity, acceleration and no velocity from each graph below. The graphs below are not of the same event.





Force and Gravity

7. What is a force? _____
8. What happens when forces are balanced? What happens when forces are unbalanced?

   _____

   _____
9. What are the steps you would take to figure out how far an object will land when it is thrown off a cliff? _____

   _____
10. If you launch a ball up in the air at 50 m/s, how many seconds will it go up in the air before it starts to fall down?
    - How high would the ball go before it starts to fall down?
    - How much time would it take for the ball to land back in your hand?
11. You are on the space shuttle orbiting the Earth.
    - Are you still affected by gravity?
    - Why do you float in the space shuttle?

Newton's Laws

12. What is Newton's first law? Is there another name for this? _____

    _____

    _____

Name _____

13. How is mass related to inertia? _____

    _____

14. What is Newton's second law? _____

    _____

15. If a person pushed on a car (mass = 2,400 kg) with a force of 10 Newtons; what is its acceleration?

16. What is the weight of a person with a mass of 125 kg?

17. What is Newton's third law? _____

    _____

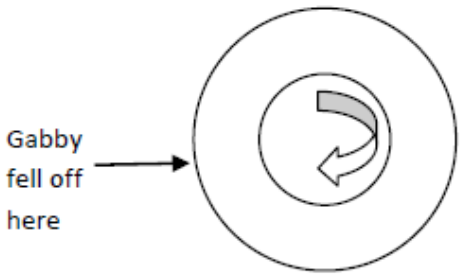
18. If Sam pushes on Jerry with a force of 20 N and Jerry does nothing but stand there, how much force does Jerry push back on Sam?_____

19. John pulled East on a box parallel to the ground with 45 Newtons. You calculated the friction force on the box of 15 Newtons. Sally pushed West on the box parallel to the ground. With how much force did Sally need to push in order to stop the box from moving?

Circular motion

20. We have a ball on a string and we are swinging it above our head in a horizontal circle; what direction is the acceleration? If the cut the string, what path would the ball take?

21. The diagram below is looking down on a merry-go-round that some UT students are riding. Gabby is on an outside horse and if she lets go, she will fall off of the merry-go-round. Draw the path that she will take after she falls off the merry-go-round.



Remember: Gabby's horizontal path is not affected by gravity.

Name _____

Work, Energy and Conservation of Energy

22. How do you calculate how much work is done on an object? _____
23. Josh pushes a box up a ramp. The box has a mass of 50 kg and the distance up the ramp is 5m. How much work is done on the box?

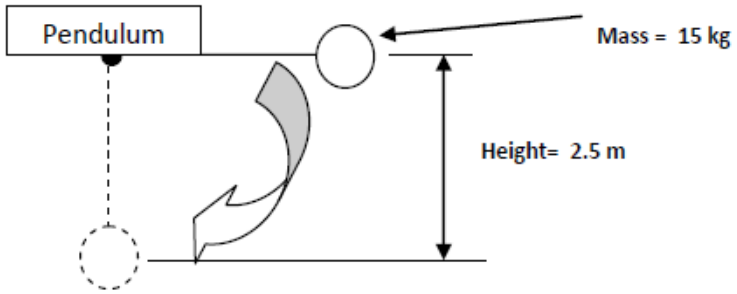
24. If Josh pushed on the box and it didn't move, would there be any work done? _____

    _____

25. What is the Law of "Conservation of Energy"? _____

    _____

26. How much potential energy is available if a 20 kg boulder is on a 10 m high cliff.
27. How much kinetic energy is in a train with a mass of 67,600 kg moving at 14 m/s.
28. Find the kinetic energy at the bottom of the swing of the pendulum below. Now, how fast is the pendulum going at the bottom of its swing?



29. You are on a roller coaster with a hill that is 25 meters high. This is the finest rollercoaster in the world and has no friction (loses no energy) as the rollercoaster moves down the track. The rollercoaster together with you have a combined mass of 1050 kg. You ride the rollercoaster down the first hill.
    - What is your velocity when the roller coaster is 15 meters off the ground?
    - What is your velocity when the roller coaster is 10 meters off the ground?
    - What is your velocity at ground level?

Momentum and Collisions

30. What does it mean when two objects have an elastic collision? _____

    _____

31. What does it mean when two objects have an inelastic collision? _____

    _____

32. A truck with a mass of 27,600 kg is moving 0.5 m/s; what momentum does it have?

Name _____

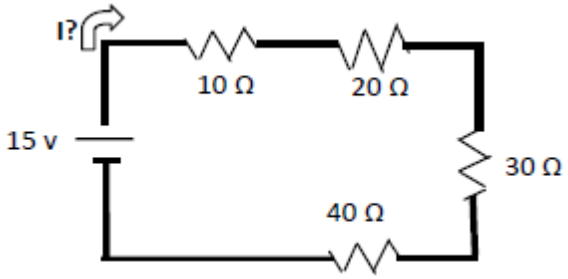
33. A Florida football player with a mass of 250 kg is moving 2 m/s running toward a UT football player that has a mass of 150 kg and is moving 4 m/s toward him. They collide.
    - What kind of collision would you expect? _____
    - Which football player will have the larger momentum?
    - Which football player will be pushed back?
34. A blue car with a mass of 2,400 kg is racing down the street (with a velocity of 55 m/s) is trying to outrun the police. The blue car, hits a red parked car with the brakes off. The red car has a mass of 2,250 kg. The cars stick together after the collision and move together in the same direction that the blue car was going.
    - What kind of collision is this?
    - How fast are the cars moving after the collision?
35. A hockey puck with a mass of 25 kg is sliding down the ice with a velocity of 15 m/s. It hits a second hockey puck with the same mass. The first hockey puck stops but the second hockey puck starts moving in the same direction that the first hockey puck was moving.
    - What kind of collision is this?
    - How fast is the second hockey puck going after the collision?

Electricity

36. What is the purpose and symbol for each component of an electric circuit?
    - Resistor _____
    - Battery _____
    - Wire _____
37. How do you make a series circuit? _____

    _____
38. What are the formulas for total resistance in a series circuit? _____ _____
    - Use Ohm's law to find the current in the circuit below

Name _____



39. What happens if you cut the wire of a series circuit or a light burns out? _____

_____

40. What units measure each of the parts of Ohm's law below?

- Resistors _____
- Current _____
- Voltage _____

Name _____

EQUATION SHEET

MECHANICS FORMULAS

$v = \Delta x / t$	v = velocity
$a = \Delta v / \Delta t$	d = distance
$W = Fd$	t = time
$p = mv$	F = force
$P = W/t$	W = work
$F = ma$	p = momentum
$KE = \frac{1}{2} mv^2$	KE= kinetic energy
$PE_g = mgh$	m = mass
$W = mg$	g = acceleration of gravity
	PE = potential energy
	h = height
	a = acceleration

Free Fall & Projectiles

$v = gt$ $\quad g = 10\ m/s^2$

$d = \frac{1}{2} gt^2$

Momentum:

$m_1v_1 + m_2v_2 = m_1v_1 + m_2v_2$

ELECTRICITY AND MAGNETISM

$V = IR$	V = voltage
	I = current
	R= resistance

Series Resistance

$R_T = R_1 + R_2 + R_3 \ldots\ldots$