Name_____ Period_____

Study Guide AP Physics 1 Final Exam December 2017

Use separate paper as needed!

1. **Complete the following table:**

Quantity	**Scalar or Vector**	**Symbol for Quantity**	**Unit**	**Symbol for Unit**
distance	Scalar	x, s, d	meter	m
time				
Displacement				
speed				
velocity				
acceleration				
mass				
force				
acceleration due to gravity				
coefficient of friction				
impulse				
momentum				
weight				
Potential Energy				
Kinetic Energy				
Work				
Power				

2. On a position vs. time graph, describe how the instantaneous velocity can be determined if the motion is represented by
   a) a straight line with either a positive or a negative slope.
   b) a horizontal line.
   c) a parabolic shape.

3. On a velocity vs. time graph, describe how the instantaneous velocity can be determined?

4. On a velocity vs. time graph, describe how the instantaneous acceleration can be determined if the motion is represented by
   a) a straight line with either a positive or a negative slope.
   b) a horizontal line.
   c) a parabolic shape.

5. Determine the horizontal and vertical components of a glowing ember that escapes from a campfire with a speed of 12.5 m/s at an angle of 52.0° from the horizontal.

6. Consider a water balloon that has been dropped off a bridge over a deep canyon.
   a) What is the acceleration of a water balloon during the first second after it has been dropped?
   What is the acceleration of a water balloon during the third second after it has been dropped?
   Suppose the water balloon is still falling after 11 seconds, what would its acceleration be at that time?
   b) What is its velocity at each of these times?
   c) How far has it fallen at each of these times? (ignore drag force)

7. Give the name of Newton's First Law of Motion.
   Briefly describe Newton's First Law of Motion.
   Give three everyday examples of Newton's First Law of Motion "in action".

8. Give the name of Newton's Second Law of Motion.
   Briefly describe Newton's Second Law of Motion.
   Give three everyday examples of Newton's Second Law of Motion "in action".

9. Give the name of Newton's Third Law of Motion.
   Briefly describe Newton's Third Law of Motion.
   Give three everyday examples of Newton's Third Law of Motion "in action".

10. In the absence of air resistance, all objects what acceleration do all objects experience?

11. Distinguish between mass, Force due to Gravity, and weight.
    Which one of these depends upon the location of the object in the universe?
    Which one of these is the same regardless of where it is located in the universe?
    Which one is affected by motion, what type of motion?

12. When considering projectile motion, the horizontal and vertical components of a projectile's velocity are _____ of one another. In projectile motion, an object's horizontal velocity is _____. That same object's horizontal acceleration is _____.

13. If an object lands at the same height as when it was launched, what can you say about the time it takes the object to reach the top of its trajectory and the time it takes to return to the launch height (land)? What can you say about the total time of flight?

14. A projectile is launched **horizontally** from a shelf with a speed of 40.0 m/s. If the shelf is 2.5 meters above the ground, how **long** will it take the projectile to hit the ground? How **far** from the edge of the shelf will the projectile land?

15. a)As the angle of an inclined plane increases what happens to both the parallel and perpendicular components of the weight force (F_g)?
b) a)As the angle of an inclined plane increases what happens to normal force (F_n)?

16. As the angle of the applied force increases from 0° to 90°, what happens to the horizontal and vertical components of the applied force?

17. a) State the formula needed to calculate impulse.
b) State the formula needed to calculate momentum.
c) State the impulse momentum theorem.

18. a) What two things can increase linear momentum?
b) What two things can decrease linear momentum?

19. What happens to the total momentum of a closed system if there is an internal force applied on it?

20. If two objects collide and move apart at an angle, how is the momentum before the collision related to the momentum after collision?

21. You exercise by walking for 0.75 hours on a treadmill that has a level track that moves at a velocity of -3.5 m/s. What was your velocity relative to the treadmill track while you were exercising?
What was your velocity relative to the floor while you were exercising?

22. A car starts from rest and accelerates at a constant rate of 2.5 m/s^2 for 3.66 seconds. What is the car's displacement during this time?

23. A car rolling down a hill has an initial velocity of 2.6 m/s. If the car has a constant acceleration of 5.63m/s^2, what is it's velocity after 3.6s?

24. A racecar accelerates at a rate of 8.60 m/s^2 from rest to a velocity of 52.0 m/s. How long did this take?

25. What force is required to accelerate a 5.6 N crate at 2.6m/s^2?

26. A 5.66N force accelerates a bicycle at 2.3 m/s^2. What is the mass of the bicycle?

27. The coefficient of sliding friction between a 42.0 kg crate and a floor is 0.35.
How much force is needed to keep the crate moving at a constant velocity across the floor?

28. A 0.14 kg baseball is accelerated from rest to a velocity of 40.0 m/s as a pitcher 5.0 seconds delivers a pitch. What force is exerted on the ball during this time?

29. An applied force of 25 N accelerates an 11.2 kg wagon at a rate of 5.23 m/s^2 along a sidewalk. How large is the frictional force?

30. A 95 N object moving at constant speed is being pushed by a 26 N force. What is the coefficient of kinetic friction?

31. In bench pressing 95 kg, a weight lifter applies a force of 865 N. How large is the upward acceleration of the weights during the lift?

32. A batter hits a fly ball at an angle of 42.5° above the horizontal. The initial velocity of the ball is 45.0 m/s. How long is the ball in the air? What is the maximum height of the fly ball?

33. A tobaggan slides down a ski hill that makes an angle of 32.0° with the horizontal. The coefficient of kinetic friction between the tobaggan and the snow is 0.16. What is the acceleration of the tobaggan?

34. What is the momentum of a 852 kg car traveling at 25.5 m/s? What impulse is needed to stop the car?

35. A force of 5555 N is needed to stop an object with a mass of 350.0 kg moving at 35 m/s. How long does it take to stop the object?

36. A car rests on a hill that makes an angle of 22.5° above the horizontal. What is the magnitude of the component of the weight force that is parallel to the surface?

37. A dynamics cart with a mass of 12.0 kg rolls across a frictionless surface at 12.5 m/s and hits a stationary second cart having a mass of 15.2 kg. The first cart stops upon impact. With what speed does the second cart move off at?