

Honors Physics Semester 1 Final Study Guide

1. What is the definition of an independent variable?
2. What is the definition of a dependent variable?
3. What is a control variable?
4. What is the definition of distance?
5. What is the definition of displacement?
6. What is the definition of speed?
7. What is the definition of velocity?
8. What is the definition of acceleration?
9. What is the difference between instantaneous velocity and average velocity?
10. What is the rate of acceleration of an object in freefall?

- e. What will the speed of the ball be at the ground?
- f. What will the velocity of the ball be at the ground?
- g. What is the distance travelled?
- h. What is the displacement of the ball?

14. What is the definition of a force?

15. What is the definition of net force or ΣF ?

16. What is the definition of the resultant?

17. There are three forces (3 N, 5 N, 8 N).

- a. What is the largest possible resultant?
- b. What is the smallest possible resultant?
- c. How many different resultants can be formed from these forces?

18. What is the definition of equilibrium?

19. What are the two types of equilibrium?
20. A sign (mass = 40 kg) is hanging from two ropes that make 35° angles with the horizontal.
- Draw a complete force diagram. Label all forces including components.
 - Write a complete equation for the forces in the x-direction.
 - Write a complete equation for the forces in the y-direction.
 - Find the tension in each of the ropes.
21. What is Newton's First Law of Motion?
22. What is inertia?
23. What is the unit for inertia?
24. What is Newton's Second Law of Motion?
25. What is Newton's Third Law of Motion?
26. List the most common types of forces.

27. What is the weight of a 35 kg object on Earth?
28. What is the difference between mass and weight?
29. What does the phrase, terminal velocity mean?
30. You are standing at the top of the Leaning Tower of Pizza with a 10 kg bag of nails and a 5 kg bag of nails.
- Which bag of nails has the larger force of gravity on it?
 - Which bag of nails will accelerate faster as they fall?
 - Which bag of nails will hit the ground first?
31. A 4 kg block is on a frictionless incline.
- Draw a complete force diagram including components.
 - Find the force of gravity.
 - Find the normal force.
 - Find the acceleration of the block down the incline.

32. A 7 kg block is at rest on the ground. A 30 N force is applied horizontally. The coefficient of static friction between the block and the ground is 0.467. The coefficient of kinetic friction is 0.27.
- Draw and label a complete force diagram.
 - Will the block move from rest? If so, what will the acceleration of the block be?
 - Once the block is moving, find the acceleration of the block?
33. A 15 kg block is at rest on a ramp. The coefficient of static friction is 0.4 and the coefficient of kinetic friction is 0.25.
- Draw and label a complete force diagram.
 - Find the necessary angle for the block to begin moving.
 - Once the block begins moving at this angle, find the acceleration of the block.
34. A 850 kg sled accelerates at a rate of 7.2 m/s^2 by being pulled by a rope that is horizontal to the ground. The coefficient of kinetic friction is 0.15.
- Draw and label a complete force diagram.
 - What tension force is necessary to cause this acceleration?
 - Now the rope is raised to an angle of 20° . Find the new force of tension required to accelerate this sled at this acceleration.

38. A bowler is bowling on the edge of the Grand Canyon (height = 1800 m) and the ball "accidentally" rolls off the edge of the cliff. The ball's mass is 7 kg and was rolling at 11 m/s before leaving the cliff.

a. How long until the ball hits the ground?

b. How far from the base of the cliff does it hit the ground?

c. What is the velocity of the ball just before it strikes the ground (NOT SPEED)?