

AP Physics C - Mechanics **Background Questions**

Follow these instructions very carefully. Write each question and its answer BY HAND (legibly) on paper. Bring these with you on the first day of class. This will count as your first homework assignment.

Also on the first day of class, I will give you a quiz that will consist of 20 questions from this list. This should be a relatively easy quiz if you arrive prepared.

Enjoy your summer. I'll see you in the fall. It'll be fun!

1. According to the College Board, what primary topics will be covered in this course?
2. What are the primary steps in the scientific method?
3. What is one important condition of any scientific hypothesis?
4. What is the definition of a vector as they're used in physics?
5. What do we call quantities that don't qualify as vectors?
6. Provide two examples of each type of quantity that we'll use in physics.
7. Speed is the rate at which what happens?
8. What is the primary difference between speed and velocity?
9. Acceleration is the rate at which what happens?
10. Given an expression for position as a function of time, what do we call its first derivative with respect to time?
11. Given an expression for velocity as a function of time, what do we call its first derivative with respect to time?
12. What are the units for acceleration?
13. Why does the unit of time occur twice in the units for acceleration?
14. What is meant by free fall?
15. If you toss a ball upward, what is its change in speed each second?
16. What is a projectile?
17. In the absence of air resistance, why does the horizontal component of velocity for a projectile remain constant while the vertical component changes?
18. What effect, if any, does gravity have on the horizontal component of a projectile's velocity?
19. How far below its straightline (i.e., gravity-free) path will a projectile fall in one second?
20. Provide a basic definition of a force.
21. List the four fundamental forces in the universe in order of strongest to weakest.
22. What is the only force acting on a satellite that is above Earth's atmosphere?
23. Why does a bowling ball move without acceleration as it rolls along a bowling lane?
24. What is friction?
25. What are the two primary types of friction and what distinguishes them?
26. What is the effect of kinetic friction on an object sliding across the floor?
27. Does the law of inertia pertain to moving objects, objects at rest, or both? Give examples to support your answer.
28. If you were in a spaceship and launched a cannonball into frictionless space, how much force would have to be exerted on it to keep it going?

29. What is the weight (on Earth) of a 5 kg bag of sand?
30. What is the mass of a 5 kg bowling ball if you take it to the moon?
31. What is meant by the *net force* acting on an object?
32. If forces of 10 N and 15 N act in opposite directions on an object, what is the net force on the object?
33. State Newton's 2nd law in words and then express it as an equation.
34. If the friction force acting on an object is 100 N, how much force must be applied to keep it moving at a constant speed?
35. What is a free body diagram and why do we draw them?
36. If you push on the wall with a force of 25 N, does the wall exert a force on you?
37. When you jump up, the world really does recoil downward. Why can't the motion of the world be noticed?
38. Specifically, what force causes a car to accelerate and what object exerts the force?
39. What is the acceleration of a skydiver who has reached terminal velocity?
40. What is the normal force as used in physics?