

Test I: Name: \_\_\_\_\_

In the next 15 minutes you must solve and answer all the below questions below. Each question is designed to test your knowledge of the real world and see if you know your PHYisc stuff. Reach each question and all responses very thoroughly. Think about each answer very carefully. Put all your answers in the space(s) provided to you; anything outside of the answer space will not be accepted. If you have a question, all you have to do is raise your hand. (I can't tell you the answer though!) Work hard and have fun! Remember, "Physics is Pfun!!!" -- each problem is worth 5 points!!!!

Problems: (show all work to receive some credit)

1. A rock is released in a drop tower, essentially a chamber that has had most of the air evacuated from it, which is quite high. The rock hits the bottom and the sound of impact is heard 3.23 seconds later. How high is the drop tower?
2. An echo is heard reflecting off a distant hillside 1.4 seconds after the initial cry. If the speed of sound is 330 m/s, how far away is the hillside?
  - a) 120 m
  - b) 230 m
  - c) 460 m
  - d) Insufficient data to produce an answer.
  - e) None of the above responses is anywhere near to the correct one.
3. Explain why heavy things fall just as fast as light things (identically sized balls of steel and rubber), all things being equal: \_\_\_\_\_
4. The \_\_\_\_\_ is 0.61 times the size of the \_\_\_\_\_.
5. Circle the correct answer: A rock is released from rest 10 m above the ground. How fast does it hit the ground assuming negligible air resistance? Hint: see the formulas.
  - a) 9.3 m/s
  - b) 11.2 m/s
  - c) 15.5 m/s
  - d) 16.8 m/s
  - e) Impossible to say given only this information.

True/False: All things fall at the same rate near the surface of the earth. T/F

6. A ball is tossed up into the air. At the top of its arch it has a velocity of  $9.81 \text{ m/s}^2$ . If the rock is 5 m up at this time, how fast will it impact the ground? (Show all work to get any credit.) Hint:  $v = at$

- a) 3.4 m/s
- b) 3.4 m/s
- c)  $3.4 \text{ m/s}^2$
- d) 0
- e) none of the above

6. When I say that  $g = -9.8 \text{ m/s}^2$ , what do I mean? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. What are the colors on "Big Ben's" clock face on page 32 of the text?

- a) red and black
- b) red and white
- c) black and white
- d) black and yellow
- e) none of the above

8. In the table at the end of these here exam questions, what is the speed of the mouse at a time when  $t = 3.0$  seconds? \_\_\_\_\_ cm/sec

9. Use trigonometry to solve this problem: A tree is observed at a 30-degree almucantar. If you are 35 m from the tree, how high is the tree? Show all work to get any credit.

10. A tug-of-war has one team pulling to the left with 1800 N of force. The other team pulls to the right with a force of 1900 N. The rope can withstand 2200 N of force. What is the result?

- a) The rope moves to the left.
- b) The rope moves to the right.
- c) The rope breaks.
- d) Misleading - Such a situation is impossible.

11. A car uniformly accelerates to a speed of 30 m/s in 15 seconds. What is the average speed of the vehicle over this interval?

- a) 2 m/s

- b) 15 m/s
- c) 30 m/s
- d) 450 m/s
- e) None of the above responses is anywhere near correct.

12. Write a brief essay about the meaning of velocity.

13. What is the mass of a 100 lb. person standing on the moon?

- a) 3.1 slugs
- b) 45.5 kg
- c) none of the above are correct answers
- d) both of the above are correct answers

14. If a car takes 10 seconds to go 100 m, what is its velocity?

- a) 10 m/s
- b) 20 m/s
- c) 100 m/s
- d) None of the above is a correct response.
- e) Impossible to say given only this information.

15. Give the above velocity, how long would it take the car to go 90 meters?

- a) 9 seconds
- b) 4.5 seconds
- c) 0.9 seconds
- d) 10 seconds
- e) Misleading -- None of the above responses is correct.

16. (Context-Rich Problem) A police officer is watching motorists, timing their oncoming speed in a hospital traffic zone where the posted speed is 20 m/s. The officer sees a car moving toward him at a constant speed of 30 m/s and he wants to pull over the motorist without turning on his lights and siren. His procedure is to pull alongside any speeding motorist and then yells at them to pull over. He immediately pulls out of his hiding spot as the speeding car passes by. The police officer accelerates at a rate of 5 m/s/s from the instant the speeding motorist flies by, and takes 15 seconds to catch the speeder. How far down the road from the police officer's hiding place does he catch up with the speeding motorist?

formulas:

$$d = v(\text{bar})t \quad v_f^2 - v_o^2 = 2ax \quad d = 0.5 at^2$$

$$\tan(\theta) = \text{opp/adj} \quad G = 9.81 \text{ m/s}^2 \quad x^2 + y^2 = z^2$$