

Honors Physical - Earth Science 1<sup>st</sup> Quarter Objectives Review

Name:

Hr:

1. Sketch graphs to represent the motion of a car traveling at a constant speed on a straight road. Graphs must be:

### a. Position – Time

### b. Velocity – Time

and c. Acceleration

– Time

2. Sketch graphs to represent the motion of a ball rolling down a ramp, starting from rest.

Graphs must be:

### a. Position – Time – Time

### b. Velocity – Time

and c. Acceleration

3. A magnet causes a steel ball to accelerate to the right at  $4 \text{ m/s}^2$  for 3 seconds. If the ball initially was moving to the right at  $2 \text{ m/s}$ , what is its final velocity? (Use diagram to solve, using arrows to represent different velocities)

4. Two model rockets are built, both with the same size of rocket engine to propel them. One rocket is 1.5 times the mass of the other. Explain the relationship between their motions when they are fired.

5. Ned pushes on a box with 300N of force. Friction between the floor and the box acts with 200N of force. If the box has a mass of 40kg, how much will the box accelerate?

6a. Two cars, moving in opposite directions, run into one another and remain stuck together

after the collision. What property determines which direction (if any) the cars will move after the collision?

b. If car A had mass = 2000kg and was moving at 20 m/s East, while car B had mass = 1500 m/s and was moving at 20 m/s West, in what direction and how fast will the two-car system move after the crash?

7. A car traveling **Northward** slows to a stop before a red light. Describe the car's acceleration and the direction of the net force on the car.

8. Is the Earth pulled toward the Moon? Explain.

9. John weighs 500N on the Earth's surface. If he climbs to the top of a high mountain, so that his distance from the center of the Earth is 1.1 times what it was, will he weigh the same amount? (explain, with numbers)

(this example is exaggerated; no mountains exist that are anywhere near 10% of the Earth's radius.)

10. Liz drops a pencil off her desk. At the same time, a marble rolls off Francis's desk. Which (if any) will hit the floor first, and why?

11. A ball, while moving through the air at an upward angle, has two forces acting on it. Draw a diagram and use arrows to represent these forces.

12. Why is gravity important to the arrangement of our solar system, and what would happen if gravity suddenly disappeared?

13. An Olympic diver jumps off the high – dive board and splashes into the water. Contrast the forces acting on her at two times during her jump, and label arrows to represent the forces acting on her (2 forces in each scenario)

14. An airboat is a boat that is used in swampy areas with heavy wildlife, algae, mud, etc. where a water propeller would get stuck. It moves by spinning a huge fan that blows air backward. Explain how this moves the boat forward. You may use a diagram.

15. A 2.0kg ball is dropped from a tower. How fast will it be traveling after 3.0s? (you may use a diagram to solve, and you may have some unnecessary information)

16. If a 1000kg car is slowed from 20 m/s to a stop in 3.0s, what force acted on the car?

17. Ashley weighs 450N. What would she weigh on a planet whose size was the same as the Earth, but its mass was half as much?

18. Engineers are measuring the gravitational force between the Earth and the Moon. If the Moon were suddenly moved to twice its current distance from the Earth, how would the force between the Moon and Earth change?

19. Sumo wrestling is a sport where participants attempt to stay inside a ring and knock their opponent to the outside. Why is it advantageous for sumo wrestlers to be quite large?