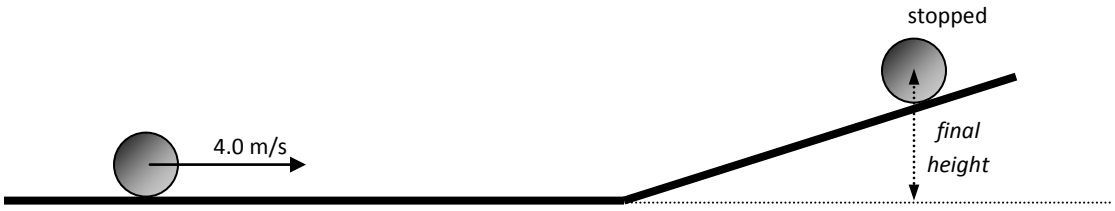
Physics Honors Name:
Quiz 1a – Chapters 1 & 2 – Math Review, Units & Energy Conservation Period:

1. A small marble is sliding horizontally along the ground with a speed of 4.0 m/s. It approaches a ramp, slides up it, and eventually comes to a stop before sliding back down the ramp. The friction between the marble and the ground is too small to make a difference to this problem.



a. It helps to have a "feel" for how fast this marble is going. Convert the speed to miles per hour (MPH). [Curricular items 1a & 1b / 2 points]

b. The marble is made from glass with a density of 2500 kg/m^3. As you know, objects with density greater than water density (1 g/cm^3) will sink in water. Would this marble sink in water? Answer by converting the marble's density to units appropriate for comparison with water. [Curricular items 1a & 1c / 2 points]

c. What final height does the marble reach? (Show your work – remember that the highest grades are given to students who write a solution that can be understood by *everyone* in the class.) [Curricular item 5d / 6 points]

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2. The Earth is moving through space due to its orbit around the Sun with an average speed of 29.7 km/s. Calculate the kinetic energy of the Earth. (You may need to refer to your equation sheet for this problem.) [Curricular items 1a, 1b & 5b / 2 points]

3. The radius of Mars is only <u>half</u> the radius of the Earth. So you might think there'd be less "real estate" available on Mars. However, 70% of the Earth's surface is covered with water. So: which planet has more *land area*? Justify your answer with a calculation or carefully written argument. (Note: surface area is calculated using the formula $SA = 4\pi R^2$ – this formula is available on your equation sheet.) [Curricular item 1c / 3 points]

4. The Olympic gold medal in women's diving this year went to Chen Ruolin. The diving board was 10.0 m above the surface of the water. Assume Chen Ruolin began by launching off the board with a speed of 3.0 m/s. At what speed did she hit the water? *Please include an energy bar graph in your solution.* [Curricular items 5a & 5d / 5 points]