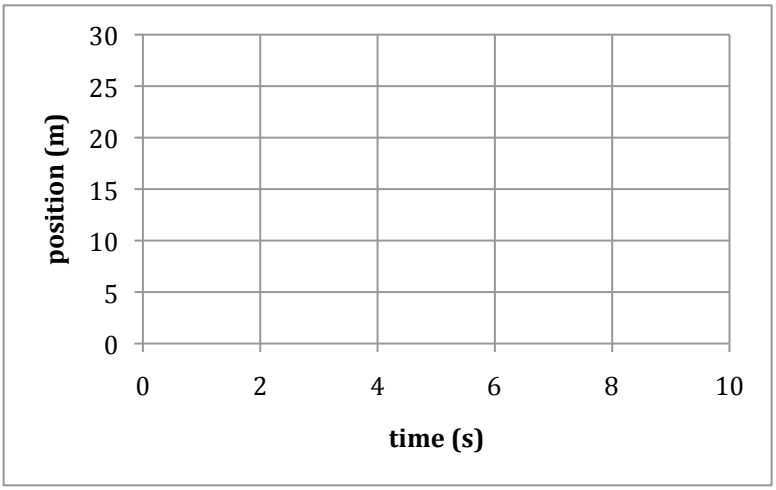
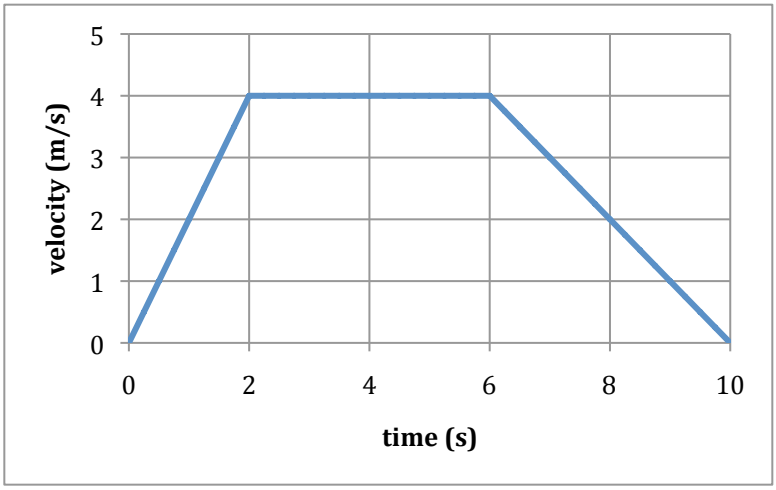
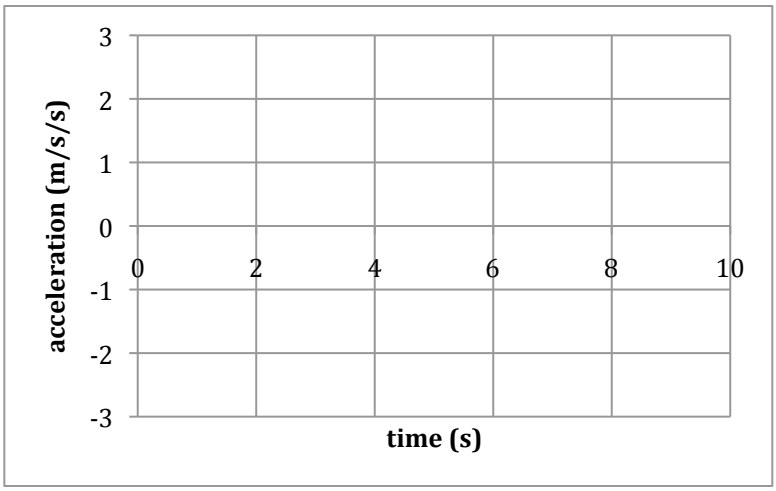
Name:_____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

1. At the right is a graph of the velocity of a toy car as a function of time. Draw the graphs of position versus time and acceleration versus time. For full credit you need to explain your reasoning.







2. Six balls with different masses are thrown straight upward with different speeds. The masses and speeds are indicated for each ball. They are all released from the same height and you can assume the air resistance is negligible. Rank them from greatest to least based upon. (a)the maximum height they reach, (b)their speed when they reach maximum height, (c)their acceleration on the way up, (d)their acceleration on the way down, and (e)their acceleration when they are at maximum height. Explain your reasoning for full credit.

A
0.046kg
5m/s

B
0.13kg
8m/s

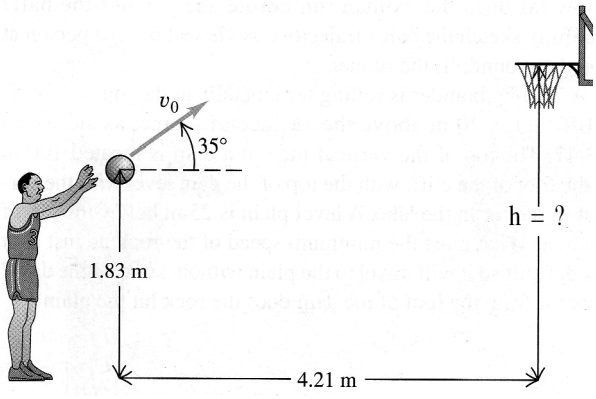
C
7.2kg
10m/s

D
0.40kg
8m/s

E
0.25kg
5m/s

F
0.60kg
12m/s

3. A free throw is made by shooting the ball at 8.65m/s at 35.0° above horizontal from 1.83m above the ground. The basket is 4.21m away. Find (a)the time the ball is in the air and (b)the height of the basket.



4. A plane flies 788miles at 48.0˚ north of east to go from Dallas to Chicago. The plane then travels 560miles at 69.0˚ south of east to get to Atlanta. (a)Draw the two displacement vectors on the map at the right. (b)Find the distance and direction that a plane would have to travel to go directly from Dallas to Atlanta.

5. We are now beginning to find many planets that orbit other stars. One such planet is found to have an orbital period of 3.00×10^7s and an orbital speed of 2.40×10^4m/s. Find (a)the radius of the planet's orbit and (a)the acceleration of the planet in its orbit.