Physics 2048 Test 1
Dr. Jeff Saul
Fall 2001

Name:_____
Group:_____
Date:_____

READ THESE INSTRUCTIONS BEFORE YOU BEGIN

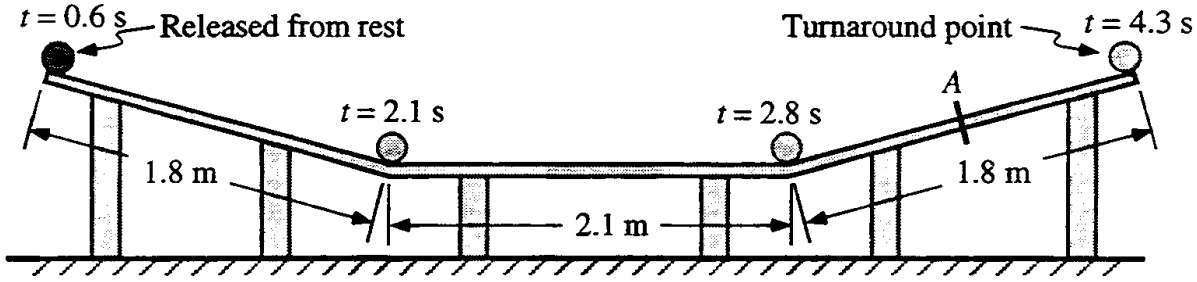
- Before you start the test, **WRITE YOUR NAME ON EVERY PAGE OF THE EXAM.**
- Calculators are permitted, but no notes or books are allowed
- If you have ANY questions while taking the test, please be sure to ask me. The purpose of the test is not to give you trick problems to catch you in an error. The purpose is to give you an opportunity to "show what you know!"
- On problems 2, 4, & 5 your answers will be evaluated on how you got them. Remember that to get full credit on a problem you will need to
  - Make a list of given information and indicate what you are trying to find
  - Start from general principles
  - Solve for the unknown quantity in symbols before plugging in numbers
  - Substitute numbers with units
  - Include units with all numeric quantities

  Partial credit will be given for correct steps shown, even if the final answer is wrong.
- Write clearly and logically so that I can understand what you are doing and can give you as much partial credit as you deserve. I cannot give credit for what you are thinking, only for what you show on your paper.
- If on a multistep problem you can't do a particular part, don't give up. Go on to the next part anyway. If necessary, define a variable name for the quantity you couldn't find and express your answer in terms of it.

Problem	Points Possible	Score
Group Problem	25	
1	20	
2	15	
3	10	
4	10	
5	20	
Total	100	

Problem 1 (Short Answer: 20 points) Make a motion diagram and a pictorial model for the following problem, but DO NOT SOLVE IT

Find the velocity and acceleration of the ball at point A. Assume friction is negligible.



Problem 2 (Estimation Problem: 15 points)

Estimate the weight of the air (in pounds) in our classroom. The density of air is 1.20 kg/m^3.

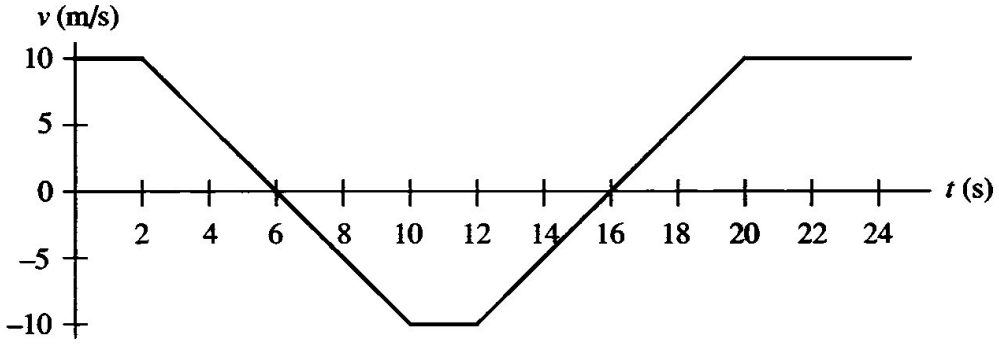
Problem 3 (Essay 10 points)

You may use diagrams and equations but no calculations in your response for this problem. USE WHAT YOU'VE LEARNED FROM CLASS SO FAR TO GIVE A CONVINCING EXPLANATION OF YOUR ANSWER.

Jay falls out of a tree and lands on a trampoline. The trampoline sags 3 feet before launching Jay back in the air. At the very bottom, where the sag is the greatest, is Jay's acceleration upward, downward, or zero.

Problem 4 (10 points)

The graph below is velocity verses time graph for a particle having an initial position $x_0 = x\ (t = 0) = 0$. At what time or times is the particle located at x = 35 m? Work directly from the graph, using the graphical relationship between velocity and position, and not from any kinematics formulas.



Problem 5 (20 points)

Several years ago, at 8 AM the eye of hurricane Floyd passed over Grand Bahama Island heading due west at a speed of 30.0 km/h. Four hours later, the course of hurricane Floyd shifted to Northwest towards the Florida coast and its speed increased to 40.0 km/h. Floyd continued on this course at this speed for two hours before turning due north again.

A. How far from Grand Bahama was hurricane Floyd 6 hours after it passes over the island?

B. What was Floyd's average speed during this time?

C. What was Floyd's average velocity during this time?

D. Sketch a vector representing hurricane Floyd's average acceleration during this time.

Group Test 1 (25 points) Physics 2048 Fall 2001

Because of your technical background, you have been given a job as a student assistant in a University research laboratory that has been investigating possible accident avoidance systems for oil tankers. Your group is concerned about oil spills in the North Atlantic caused by a super tanker running into an iceberg. The group has been developing a new type of radar that can detect large icebergs. They are concerned about its rather short range of 2 miles. Your research director has told you that the radar signal travels at the speed of light, 186,000 miles per second, but once the signal arrives back at the ship it takes the computer 5 minutes to process the signal. Unfortunately, the super tankers are such huge ships that it takes a long time to turn them. Your job is to determine how much time would be available to turn the tanker to avoid a collision once the tanker detects an iceberg. A typical sailing speed for super tankers during the winter on the North Atlantic is about 15 miles per hour.

Assume that the tanker is heading directly at an iceberg that is drifting at 5 miles per hour in the same direction that the tanker is going.

- USE THE GOAL PROTOCOL AND GROUP ROLES TO SOLVE THIS PROBLEM
- Make sure everyone's name and their group role is on the GOAL Answer sheets
- YOU MAY USE UP TO 2 WHITE BOARDS PER GROUP
- WORK ONLY WITH YOUR GROUP MEMBERS
- NO BOOKS, NOTES, OR SCRATCH PAPER ARE ALLOWED

YOU WILL BE GRADED ON YOUR REASONING AND HOW WELL YOU USED THE GOAL PROTOCOL IN ADDITION TO THE CORRECTNESS OF YOUR ANSWER