Physics 2048 Test 1 Fall 2000
Dr. Jeff Saul

Name:

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.

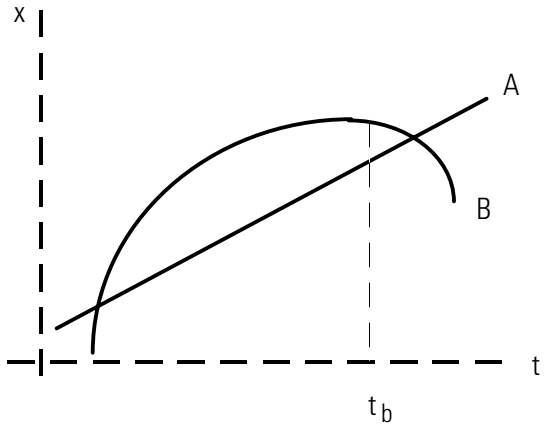
- Write clearly and logically so that I can understand what you are doing and can give you as much partial credit as you deserve. I cannot give credit for what you are thinking, only for what you show on your paper.

- 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
1	25	
2	15	
3	10	
4	25	
5	25	
Total	100	

Problem 1 (25 points)

The figure below represents the position vs. clock reading of the motion of two balls, A and B, moving on parallel tracks.



Answer the following questions:

(a) Mark with the symbol t_a along the t-axis any instant or instants at which one ball is passing the other.

(b) Which ball is moving faster at clock reading t_b?

(c) Mark with the symbol t_c along the t-axis any instant or instants at which the balls have the same velocity.

(d) Over the period of time shown in the diagram, which of the following is true of ball B? Explain your answer.

(1) It is speeding up all the time.
(2) It is slowing down all the time.
(3) It is speeding up part of the time and slowing down part of the time.

(e) Sketch the velocity-time graph (no numbers, one graph) for balls A and B below. Be sure to mark the times t_a, t_b, and t_c on the time axis at the appropriate instants.

Problem 2 (15 points)

In the Race across America, bicycle racers start riding in Los Angeles and the first one to reach the finish line in New York wins. How long would it take you to ride from LA to New York from start to finish? What would your average speed be?

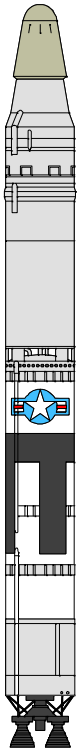
Problem 3 (10 points)

You may use diagrams and equations but no calculations for this problem.

In 1996, The eye of hurricane Fran traveled North directly between two cities in North Carolina, Raleigh and Durham. A hurricane consists of high winds and moisture traveling counterclockwise in a circle around the eye. Since Durham is west of Raleigh, which city do you think had the most wind damage and why?

Problem 4 (25 points)

A test rocket containing a probe to determine the composition of the upper atmosphere is fired vertically upward from an initial position at ground level. During the time T while its fuel supply lasts, it ascends with a constant upward acceleration of magnitude $2g$. Assume that air resistance is negligible and that the rocket rises a small enough height that the earth's gravity can be assumed to be constant.



(a) What is the speed of the rocket when the fuel runs out?

(b) How high up is the rocket when the fuel runs out?

(c) If the rocket reached a height of 20 km, for how long did its fuel last?

(d) Describe the motion of the rocket after its engine shuts down.

Problem 5 (25 points)

Last year, the eye of hurricane Floyd passed over Grand Bahama Island heading due west at a speed of 50 km/h. Four hours later, the course of hurricane Floyd shifted to North-West towards the Florida coast and its speed increased to 75.0 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?