

### Exam 1 (October 9, 2003)

*Please read the problems carefully and answer them in the space provided. Write on the back of the page, if necessary. Show all your work. Partial credit will be given unless specified otherwise.*

**Problem 1 (10 pts, no partial credit):**

An 80 kg man on ice skates pushes a 40 kg boy, also on skates, with a force of 100 N. The magnitude of the force exerted by the boy on the man is

- a) 200 N
- b) 100 N
- c) 784 N
- d) 392 N
- e) zero unless the boy pushes back.

**Problem 2 (10 pts, no partial credit):**

My friend Chaz drives around a city looking for a specific restaurant where he is supposed to meet a friend. Being new to the town, he gets lost. In strict accordance with the rules and bylaws of the International Organization of Males, Chaz refuses to stop and ask someone for directions. Instead, he drives around randomly looking for the restaurant.

Suppose Chaz drives 4 blocks north, then 5 blocks east, then 4 blocks south, and finally, 3 blocks west, what is the magnitude of Chaz's displacement from his starting point?

- a) 5 blocks
- b) 8.12 blocks
- c) 6.4 blocks
- d) 2 blocks
- e) 16 blocks

**Problem 3 (10 pts):**

Two objects are sliding at the same speed across a wooden surface. The coefficient of kinetic friction between the first object and the surface is twice that between the second object and the surface. The distance traveled by the first object before it stops is  $S$ . The distance traveled by the second object is

- a) Impossible to determine without knowing the masses involved.
- b)  $2S$
- c)  $S/2$
- d)  $S$
- e)  $4S$

*Show your work/reasoning*

1)	/10
2)	/10
3)	/10
4)	/10
5)	/10
6)	/10
7)	/12
8)	/13
9)	/15

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tot	/100
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**Problem 4 (10 pts):**

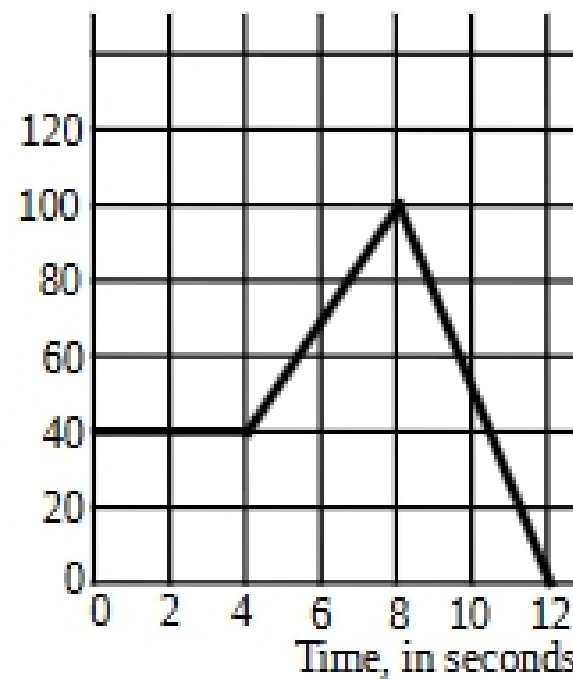
If you jump from the top of a table to the floor, why is it best to flex your knees when you land (as opposed to landing with locked knees)? *(Briefly discuss referring to physics concepts we have studied recently. Feel free to make and refer to sketches as needed.)*

**Problem 5 (10 pts):**

A particle travels in one dimension. The graph below shows the velocity of a particle as a function of time. In the 12 seconds shown, the particle travels a distance of

- a) 0 m
- b) 1200 m
- c) 640 m
- d) 440 m
- e) 200 m

Velocity, in m/s



Show your work/reasoning

**Problem 6 (10 pts):**

Consider the vector  $A = 5\hat{i} + 12\hat{j}$ .

- a) What is  $|A|$ ?
  
- b) What is the angle of  $A$  with the positive x axis?

Now, let  $B = 2\hat{i} - 7\hat{j}$ .

- c) What is  $C = A + B$ ?