Kinetic Energy

NAME:

Quick Concepts

- A. In words, what is kinetic energy?
- B. What is the equation (and therefore the definition) of kinetic energy?
- C. What are the units used for kinetic energy?
- D. Is kinetic energy a vector or a scalar? Why?
- E. Can *kinetic energy* ever be negative? Why?

Calculations

1. How much kinetic energy does a 65 kg person running at 2 m/s have?

- 2. How fast is a 1500 kg car moving if it has a kinetic energy of 200,000 J?
- 3. What is the mass of something moving at 12 m/s that has a kinetic energy of 1000 J?
- 4. What is the kinetic energy of a 0.0001 kg bee flying at 5 m/s?

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- 5. A 1200 kg car is driving down the road with a speed of 5 m/s.
 - a. What is the kinetic energy of the car?
 - b. If the car gains 50,000 J of kinetic energy, how much kinetic energy would it have?
 - c. And so how fast would it then be going?
- 6. A 3 kg box is sliding along the floor. It has an initial speed of 8 m/s.a. How much kinetic energy does it have?
 - b. If it loses 60 J of kinetic energy, how fast will it be going?
- 7. If you gain kinetic energy, what has to happen to you?
- 8. If you lose kinetic energy, what has to happen to you?
- 9. Both momentum and kinetic energy depend on *mass* and *velocity*.a. Is it possible to have a constant kinetic energy, but a changing momentum? Explain.
 - b. How about a constant momentum and a changing kinetic energy? Explain.

10. a. Which has more kinetic energy: a mass of 1 kg moving at 2 m/s or a mass of 2 kg moving at 1 m/s?

b. Which has more momentum: a 1 kg object moving at 2 m/s or a 2 kg object moving at 1 m/s?

- 11. Imagine there are two objects traveling in opposite directions. A mass of 5 kg moving at 4 m/s to the left and a mass of 5 kg moving at 4 m/s to the right.
 - a. What is the total kinetic energy of the two objects?
 - b. What is the total momentum of the two objects?
- 12. Imagine you are driving down the road with a certain speed.
 - a. If you double your speed, how much does your kinetic energy change? how about momentum?
 - b. If you triple your speed, how much does your kinetic energy change? how about momentum?
 - c. If you cut your speed in half, what happens to your kinetic energy? how about momentum?

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Answers:

1) 130 J	2) 16.3 m/s	3) 13.9 kg	4) 0.00125 J
5. a) 15,000 J	b) 65,000 J	c) 10.4 m/s	
6. a) 96 J	b) 4.9 m/s	7) speed up	8) slow down
9. a) Yes. Changing direction at constant speed.			
b) No. Constant momentum implies constant speed.			
10. a) the 1 kg mass (2	' J vs. 1 J)	b) they are the same	. both 2 kgm/s
11. a) 80 J	b) 0 kgm/s		
12. a) 4x K & 2x p	b) 9x К & 3х р	c) 1/4 K & 1/2 p	