Name: _____ Date: _____ Period: _____

Impulse Worksheet

1. Why is it incorrect to say that impulse equals momentum?

_____

_____

2. To impart the greatest momentum to an object, what should you do in addition to exerting the largest force possible?

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3. For the same force, which cannon imparts the greater speed to a cannonball - a long cannon or a short cannon? Explain.

_____

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4. If you're in a car with faulty brakes and you have to hit something to stop, the momentum will change to zero whether you hit a brick wall or a haystack. So why is hitting a haystack a safer bet?

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5. Why is it a good idea to start with your hand forward and move back with the ball when catching a fast-moving baseball with your bare hand?

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6. In boxing, why is it advantageous to roll with the punch?

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_____

7. In karate, why is a short time of the applied force advantageous?

_____

_____

OVER

9. Suppose you are traveling in a bus at highway speed on a nice summer day and the momentum of an unlucky bug is suddenly changed as it splatters onto the front window.

a. Compared to the **force** that acts on the bug, how much **force** acts on the bus?

(more) (the same) (less)

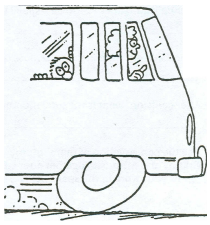
b. The time of impact is the same for both the bug and the bus. Compared to the **impulse** on the bug, this means the **impulse** on the bus is

(more) (the same) (less)

c. Although the momentum of the bus is very large compared to the momentum of the bug, the **change in momentum** of the bus, compared to the **change of momentum** of the bug is

(more) (the same) (less)

Think about the 2nd law of motion and the relationship between force mass and



acceleration before you answer the following questions.

d. Which undergoes the greater acceleration?(or deceleration)

(bus) (both the same) (bug)

e. Which therefore, suffers the greater damage?

(bus) (both the same) (the bug of course!)

10. Granny whizzes around the rink and is suddenly confronted with Ambrose at rest directly in her path. Rather than knock him over, she picks him up and continues in motion without "braking."
Consider both Granny and Ambrose as two parts of one system. Since no outside forces act on the system, **the momentum of the system before collision equals the momentum of the system after collision.**

a. If, before the collision, Granny's mass is **80 kg** and her speed is **3 m/s**, what is Granny's momentum? SHOW WORK

_____

b. If, before the collision, Ambrose's mass is **40 kg** and his speed is **0 m/s**, what is Ambrose's momentum? SHOW WORK

_____

c. After collision, does Granny's speed increase or decrease? _____

d. After collision, does Ambrose's speed increase or decrease? _____

e. After collision, what is the total mass of Granny + Ambrose? SHOW WORK _____

f. After collision, what is the total momentum of Granny + Ambrose? _____

g. Use the conservation of momentum law to find the speed of Granny and Ambrose together after collision. SHOW WORK

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