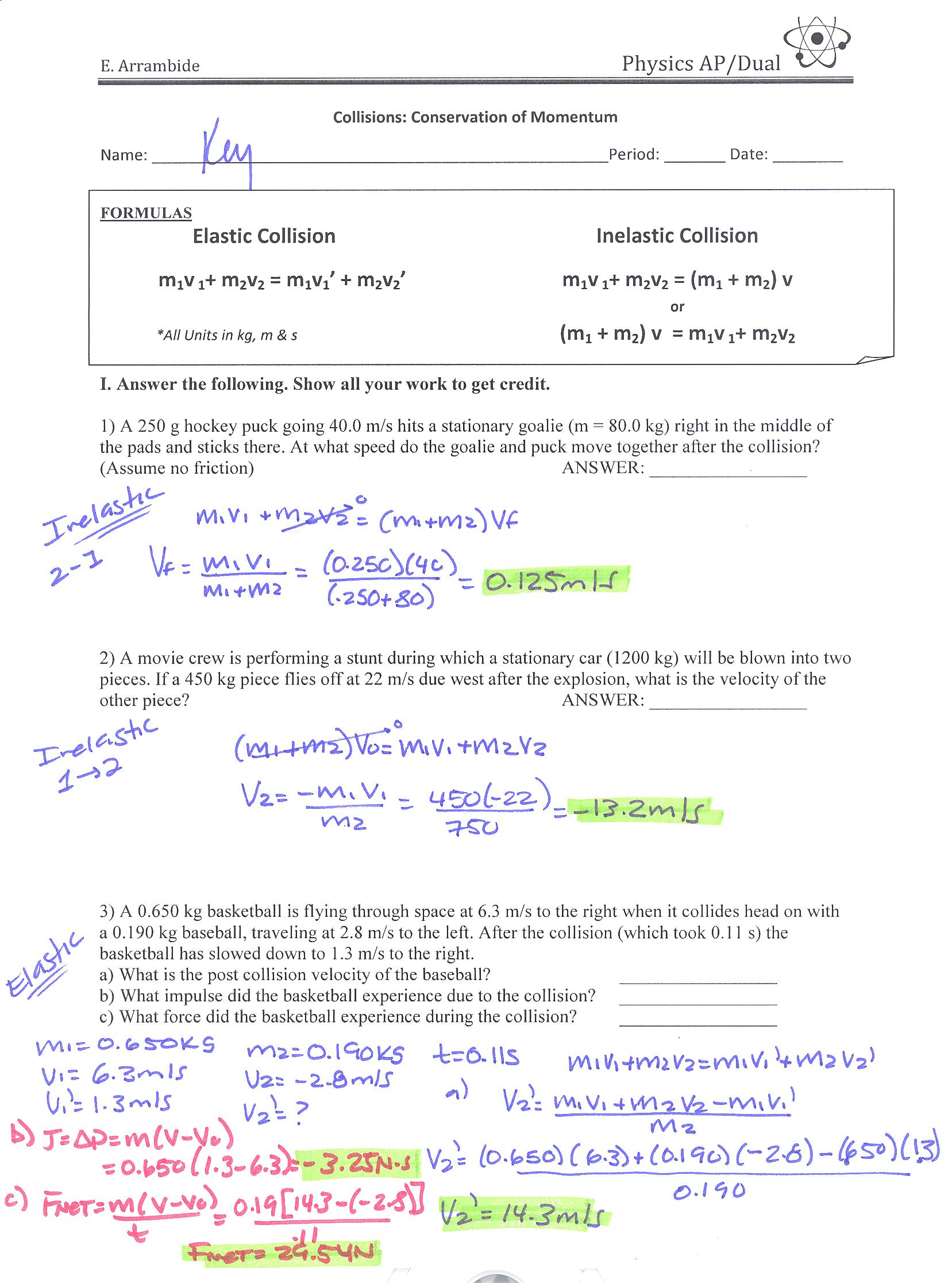
**Collision: Conservation of Momentum Problems**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date: \_\_\_\_\_\_\_\_\_\_\_\_Period: \_\_\_\_\_\_\_\_\_



I. Answer the following. Show all your work to get full credit.

1.) A 250 g hockey puck going 40.0 m/s hits a stationary goalie (m= 80.0 kg) right in the middle of the pads and sticks there. At what speed do the goalie and puck move together after the collision? (assume no friction)

ANSWER:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.) A movie crew is performing a stunt during which a stationary car (1200 kg) will be blown into two pieces. If a 450 kg piece flies off at 22 m/s due west after the explosion, what is the velocity of the other piece?

ANSWER:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.) A .650 kg basketball is flying through space at 6.3 m/s to the right when it collides head on a 0.190 kg baseball , traveling at 2.8 m/s left. After the collision (which took 0.11s) the basketball has slow down to 1.3m/s to the right.

a.) what is the post collision velocity of the baseball? ANSWER\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b.) what impulse did the basketball experience due to the collision? ANSWER\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c.) what force did the basketball experience during the collision? ANSWER\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4.) While two 2.5 kg physics carts are rolling along at 2.0 m/s, an explosive device placed between them is detonated by remote control. If the front cart continues along at 4.0 m/s, what is the post “explosion” velocity of the other cart? ANSWER:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5.) A proton (mass = 1.67 x 10-27 kg) traveling in a particle accelerator at 1.00 x 107 m/s collides with a helium nucleus, which is at rest. The proton rebounds back at 6.00 x 106 m/s and the helium nucleus jumps forward at 4.00 x 106 m/s.   
a) Determine the mess of the helium nucleus. ANSWER \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b)What impulse does the proton experience due to the collision? ANSWER \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6) An exploding plastic egg is sitting at rest on a lab table when it explodes into two pieces. One piece goes left at 6.0 m/s, call it m1 , and the other piece goes right at 8.0 m/s, call it m2.   
If m1 has a mass of 120 g, what is the mass of m2 ? ANSWER \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7) Two asteroid miners, Thelma (60.0 kg) and Louise (42.0 kg), are attached by a tether somewhere in space. Thelma sees something of great interest so she pulls on the tether to get the attention of her partner. Due to the small tug Thelma moves towards Louise at 0.40 m/s.

What is Louise’s velocity? ANSWER \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8) A 75 g marble flying along at 70.0 m/s runs into a 3.1 kg watermelon lying on a large table upon which µ=0.25. The marble sticks in the watermelon and the pair go sliding across the table.

a) Determine the velocity of the pair immediately after the collision. ANSWER \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) Calculate how far they travel before coming to a stop. ANSWER \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

