**Son of Conservation of Momentum**

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| a -3.55 m/s  b 2.78 m/s  c -15.1 m/s  d 3.55 m/s | 1. 109 Kg Thor and his 5.26 Kg hammer are at rest on top of the first of two uncoupled frictionless 89.7 Kg carts that are next to each other. (Ok - its a physics word problem) Thor runs and jumps from one cart to the other and lands on it. (Still holding the hammer) He, the hammer, and the cart are going +1.56 m/s in the end.  A) What must be the velocity of the other cart?  B) What was Thor's velocity after he left the first cart, but before he landed on the second?  C) With what velocity must he throw his hammer to give himself and the cart he lands on (Not the one he starts on) a velocity of 2.00 m/s?  D) If instead of throwing the hammer in C), he were to jump from the second cart in such a way that he was not moving horizontally with respect to the ground, what would be the velocity of the second cart? |
| a 1.82 m/s  b -1.02 m/s  c .807 m/s  d -45.7 N  e 1.45 m/s | 2. Priscilla (65**.**4 Kg) is at rest on the first of two 82**.**0 Kg carts which are also at rest on a frictionless level surface. She jumps from the first cart to the second, and then to the ground Following this maneuver, the first cart has a velocity of -1**.**45 m/s, and the second a velocity of 2**.**26 m/s.  A What was her **velocity** between the first and second cart?  B. What was her **velocity** between the second cart and the ground?  C. What would have been the **velocity** of her and the second cart if she had remained on the second cart instead of jumping off?  D. If her interaction with the first cart took 2**.**6 seconds, what **force** did she exert on it?  E. What would have been the **velocity** of the second cart if she was motionless after leaving it? |
| a 244 m/s  b 320. m/s  c 466 N  d 60. s  e 24.4 m/s | 3. Two 746 g blocks of wood are at rest on that by now familiar frictionless surface. A 123 g bullet is shot through the first and sticks in the second. Following this the first block is moving 12**.**5 m/s, and the second with the bullet stuck in it 34**.**6 m/s. Neither the bullet nor the blocks lose any pieces.  A. What was the bullet's **velocity** between the blocks?  B. What was the bullet's **velocity** before it hit the first block?  C. Suppose the bullet's interaction with the first block had taken **.**0200 seconds. What **force** would it have exerted on the block?  D. If in actuality there had been a frictional force of about **.**50 N on the second block with the bullet stuck in it, over what **time** would it have been brought to rest?  E. Suppose the bullet had stuck in the first block, causing it to slide into and stick to the second block. What would have been the **velocity** of the bullet and the two blocks? |
| a. 551.7 m/s  b. 1016.7 m/s  c. 846.0 m/s | 4. A 45.00 kg exploding shell traveling at 684.0 m/s strikes the first of three 16.00 kg blocks of wood lined up in a row, initially at rest, and spaced a meter apart on a frictionless surface. The shell explodes upon impact with the first block, sending a 15.00 kg fragment backwards at 72.00 m/s. The remaining 30.00 kg of the shell penetrates the first and second blocks of wood, and sticks in the third. Following the collision the first block is moving in the original direction of the shell at 85.00 m/s, and the second, 320.00 m/s. Assume that the wood blocks lose no pieces. (hee hee)  A. What is the final velocity of the third block of wood with the 30.00 kg shell fragment in it?  B. What was the velocity of the 30.00 kg shell fragment between the first and second block?  C. What is the velocity of the 30.00 kg shell fragment between the second and third block? |