Phys12   Momentum/2-D : Quiz - 20

1) Which of the following is (are) the same before and after a perfectly elastic collision ?

1) momentum   2) kinetic energy

a) 1 only   b) 2 only   c) 1 and 2

2) A curling rock of mass 20.0 kg moving with a constant speed of 0.50 m/s collides obliquely with a stationary rock of the same mass. Immediately after the collision the second rock moves off at 0.30 m/s. If the collision is perfectly elastic, what is the speed of the incident rock immediately afterwards. (use conservation of energy)

a) 0.00 m/s   b) 0.20 m/s   c) 0.30 m/s   d) 0.40 m/s

3) An object at rest explodes into three pieces : X, Y, and Z. X (mass of 6.0 kg) moves off at 3.0 m/s while Y (mass 1.5 kg) moves off at 8.0 m/s perpendicular to the direction of X. At what speed does Z (mass 4.0 kg) move off ?

a) 5.4 m/s   b) 7.5 m/s   c) 8.5 m/s   d) 11 m/s

4) A ball at rest is struck obliquely by another ball. Which of the following statements is always correct ?

a) The changes in the velocities of the two balls as a result of the collision are equal in magnitude and opposite in direction
b) The sum of the momenta of the two balls does not change as a result of the collision.
c) The balls have equal momenta after the collision.
d) The balls travel in directions at right angles to each other after the collision.

5) A 0.15 kg golf ball was hit with enough force for it to leave the tee with a velocity of 30.0 m/s. What impulse was given to the ball if the time of contact was 0.025 s ?

a) 4.5 N s in the direction of the ball's motion.
b) 4.5 N s in the direction opposite to the ball's motion.

c) 0.11 N s in the direction of the ball's motion.
d) 0.11 N s in the direction opposite the ball's motion.

6) A hockey puck of mass 0.51 kg is moving north across the ice with a speed of 32 m/s. If it is hit with a hockey stick so as to make it travel due west at the same speed, what is the magnitude of the impulse delivered to the puck ?

a) 0.0 N s   b) 16 N s   c) 23 N s   d) 45 N s

7) A toy car of mass 1.2 kg moving due east with a speed of 6.8 m/s collides with a toy truck of mass 3.6 kg moving due north with a speed of 4.2 m/s. If they lock together, how many degrees **East of North** do they head after the collision ?

a) 28°   b) 32°   c) 58°   d) 62°

8) What is the change in momentum of an object of mass 3.5 kg if a constant unbalanced force of 2.9 N acts on it for 4.7 s ?

a) 0.62 kg m/s   b) 3.9 kg m/s   c) 14 kg m/s   d) 16 kg m/s

9) A car of mass 2.0×10^3 kg moving east at 14 m/s collides with a truck of mass 4.4×10^3 kg moving south at 12 m/s. As a result of the collision, the two vehicles lock together. In what direction do they move after the collision ?

a) 49° E of S   b) 49° E of N   c) 28° E of S   d) 28° E of N

10) A space vehicle has a momentum of 8250 kg m/s. If its direction is changed by 1.20° without changing its speed, what is the change in its momentum? (Give magnitude only)

11)a) If the initial momentum of a system = [4 , -7] kg m/s, what is the final momentum ?

b) If a 2.3 kg ball has a momentum [-7.8 , -4.9] kg m/s, find the velocity.

c) A ball with a momentum [10. , 0.0], collides with another ball which moves off with a momentum of [7.0 , -2.8]. Find the momentum of the first ball. (units are kg m/s)

d) If a puck with momentum [3 , 7] collides and sticks to a puck with a momentum of [-8 , 4]. Find the final momentum of the system.

12) A 0.50 kg puck moving with a velocity of 3.8 m/s [East] collides with a stationary 0.30 kg puck which moves off with at an angle of 35° to the initial direction with a speed of 4.0 m/s. Find the velocity of the 0.50 kg puck.

Answers : 1) c, 2) d, 3) a, 4) b, 5) a, 6) c, 7) a, 8) c, 9) c, 10) 173 kg m/s,11) a) [4,-7], b) [-3.4,-2.1], c) [3.0,2.8], d) [-5,11], 12) P_f = [0.9,-0.69] kg m/s, V_f = [1.8,-1.4] m/s or 2.3 m/s [37° S of E].