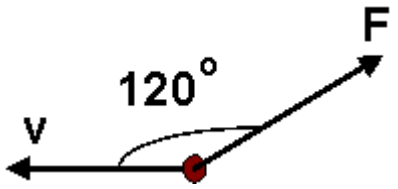
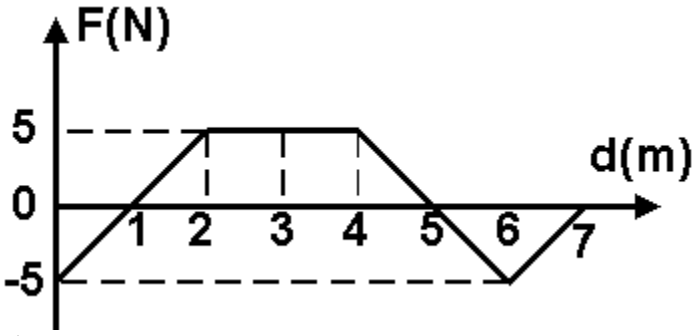
Work, Energy, Power, Momentum, Conservation Laws

1. An object moves 25m with a constant speed v, as shown in the figure below while a force F = 20N is exerted on the object. What is the work done by the force F?



a) -500J
b) -250J
c) 0J
d) 250J
e) 500J

2. The graph above plots the force exerted on a block of mass m against the displacement of the block. What is the work done by the force in moving the box from d = 0 to d = 6?



a) 2J
b) 5J
c) 8J
d) 10J
e) 15J

3. Two forces push simultaneously a stationary 2kg box in opposite directions: F_1 acts from left to right and does 150J of work on the box while F_2 acts from right to left and does 50J of work on the box. What is the velocity of the box after the work has been done on it?
a) 5m/s
b) 7m/s
c) 10m/s
d) 12m/s
e) 15m/s

4. A soccer ball is kicked vertically from the ground level with a speed of 20m/s. At what height is the gravitational potential energy of the ball maximum?
a) 5m
b) 10m
c) 15m
d) 20m
e) 25m

5. Two billiard balls move on a frictionless surface with speeds v and v/2, as shown in the figure below. Both of these balls have the same mass, and the collision is perfectly elastic. What is the sum of the velocities of the two balls after the collision?

a) v/2
b) v
c) 3v/2
d) 2v
e) 5v/2

6. A shopping cart weighing 12kg moves with a speed of 5m/s. A 3kg food container falls in the shopping cart. What is the speed of the shopping cart after the container fall?
a) 1m/s
b) 2m/s
c) 3m/s
d) 4m/s
e) 5m/s

Solutions:

Question #1: b
Question #2: d
Question #3: c
Question #4: d
Question #5: c
Question #6: d