PHYS-114 Test #3 Chapters 9,10,11

(*Conservation of Momentum and Energy*)

Name (please print): _____

Raw Score: _____ Test Grade: _____

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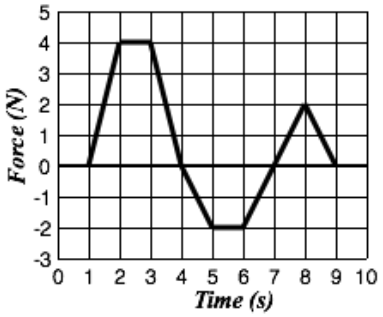
[1] (10 pts) A 3.7kg box is sliding across an icy pond with a velocity of 8.0 m/s. A gust of wind exerts a force as shown in the graph at right. What is the final velocity of the box?



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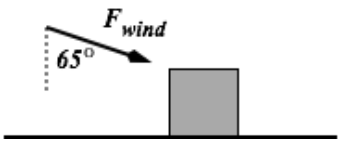
[2] (10 pts) A 3.7 kg box is sliding across an icy pond with a velocity of 8.0 m/s to the right. A constant wind gust of strength $F_{\text{wind}} = 4.5N$ blows on the box in the direction shown in the figure. When the wind stops blowing the box's speed has increased to 9.2 m/s. How far did the box travel while the wind was blowing?



[3] (10 pts) A 3.7 kg box is sliding across an icy pond with a velocity of 8.0 m/s in the positive *x*-direction. The box explodes into two pieces, m1 = 2.5 kg and m2 = 1.2 kg. After the explosion, the larger piece is moving in the positive *x*-direction with a speed of 13.5 m/s. What is the velocity (magnitude and direction) of the smaller piece?

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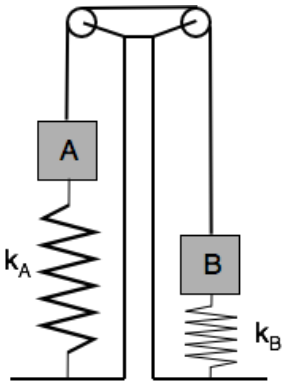
[4] (10 pts) Two blocks (m_A = 0.6 kg and m_B = 0.25 kg) are connected by a string which passes over a couple of massless, frictionless pulleys. Both blocks are attached to springs (k_A = 33 N/m and k_B = 15 N/m). Block A has been pulled upwards to a height of 0.75 m above the equilibrium point of the spring (spring A is initially stretched), while block B is at its equilibrium point. The system is released from rest, and block A begins to move downwards. Find the speed of block B when block A is passing through its equilibrium point.



[5] (30 pts) A block (m_1 = 5 kg) is attached to a spring (k = 18 N/m) that is initially compressed 0.84m. When released from rest at point A, block m_1 slides down a hill (h = 1.6 m), and over a 1.3 m long rough patch (μ_k = 0.27). After passing point B, block m_1 collides and sticks with a second block (m_2 = 3 kg) which is moving to the left with a speed of 1.4 m/s. After colliding and sticking together, the two blocks pass point C and encounter a force directed to the left and which varies with position as $F(x) = -3x - 2$. How far past point C do the two blocks travel before coming to a stop?