PHYS 101: General Physics 1 **KOÇ UNIVERSITY** **Fall Semester 2011**

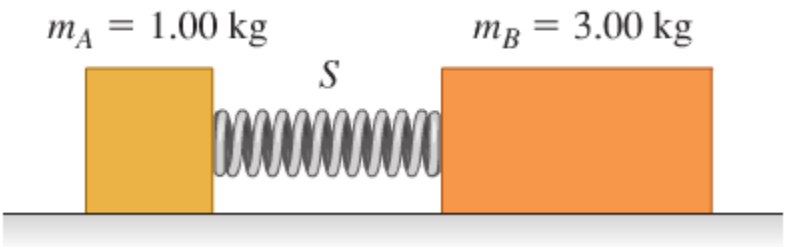
College of Arts and Sciences

Section 1 **Quiz 7** **17 November 2011**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 15 minutes

Name: **Student ID:** **Signature:**

In figure below, block *A* has mass 1 kg, and block *B* has mass 3 kg. The blocks are forced together, compressing a spring *S* between them; then the system is released from rest on a level, frictionless surface. The spring, which has negligible mass, is not fastened to either block and drops to the surface after it has expanded. Block *B* acquires a speed of 1 m/s. (a) What is the final speed of block *A*? (b) How much potential energy was stored in the compressed spring?



a) Conservation of momentum:

b) Sum of final kinetic energy=initial potential energy stored in the compressed spring

$$= 92 + 32 = 122 = 6 \text{ J}$$

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Section 2 Quiz 7 17 November 2011

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Quiz duration: 15 minutes

Name: Student ID: Signature:

Consider a one dimensional elastic collision of two bodies *A* and *B*. Masses of A and B are m_A and m_B. Before the collision, *B* is at rest while *A* is moving with velocity v_{A1x}. Velocities of *A* and *B* after the collision are v_{A2x} and v_{B2x}. Using conservation of energy and momentum show that .

Conservation of momentum:

(1)

Conservation of energy:

(2)

Divide (2) with (1)

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Section 3 Quiz 7 17 November 2011

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Quiz duration: 15 minutes

Name: **Student ID:** **Signature:**

Ahmet (mass 90 kg) and Mehmet (mass 60 kg) are 20 m apart on a frozen lake. Midway between them is a glass of their favorite beverage. They pull on the ends of a light rope stretched between them. When Ahmet has moved 6 m, how far has Mehmet moved?

Conservation of momentum:

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Section 4 **Quiz 7** **17 November 2011**

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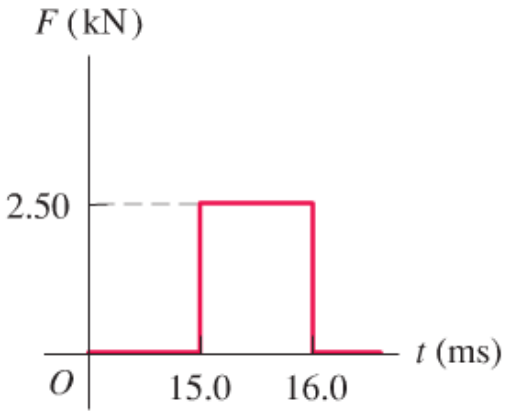
Quiz duration: 15 minutes

Name: **Student ID:** **Signature:**

A 2 kg stone is sliding to the right on a frictionless horizontal surface at 5 m/s when it is suddenly struck by an object that exerts a large horizontal force on it for a short period of time. The graph below shows the magnitude of this force as a function of time.
(a) What impulse does this force exert on the stone?
(b) Just after the force stops acting, find the magnitude and direction of the stone's velocity if the force acts (i) to the right or (ii) to the left.



a)

b)

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Section 5 Quiz 7 17 November 2011

Closed book. No calculators are to be used for this quiz.
Quiz duration: 15 minutes

Name: **Student ID:** **Signature:**

A bullet of mass m is fired into a wooden block of mass M, resting on a horizontal surface. The coefficient of kinetic friction between block and surface is μ_k. The bullet remains embedded in the block, which is observed to slide a distance d along the surface before stopping. What is the initial speed of the bullet expressed as a function of m, M, μ_k, and d ?

Conservation of momentum for inelastic collision:

(1)

Initial kinetic energy of bullet (m_B) and the wooden block (m_M) right after the collision is spent by the friction:

(2)

Combine (1) and (2):