Arts & Science 2D06

Quiz #2 (make up)   **2013 Oct 18**   **Name:**

NB: Mark values are given in brackets [ ] beside each problem. Write all your answers on the quiz paper. No books or notes allowed. Time to write quiz: 50 minutes.

Solution for quadratic equation: $x = (-b \pm \sqrt{b^2 - 4ac})/2a$

Equations of motion for uniform acceleration: $x = x_0 + v_0 t + \frac{1}{2}at^2$, $v^2 = v_0^2 + 2ax$

$g = 9.8$ m/s^2 centripetal $a_c = v^2/r$ linear K.E. $= (1/2)mv^2$

1. [3] If a person is standing in an elevator that is accelerating upward, how does the normal force exerted by the elevator floor on the person compare with the person's weight?

(a) The normal force is smaller than her weight.
(b) The normal force is equal to her weight.
(c) The normal force is greater than her weight.
(d) More information is required.

2. [3] A student holds a box in a fixed position. The work done by the student on the box while she is holding it:

(Explain your answer in the space below.)

(a) cannot be determined without further information.
(b) is equal to zero.
(c) depends on the height of the box's position.
(d) depends on the weight of the box.

3. [4] Suppose that an applied force given by $F(x) = 15x + 0.4x^3 N$ is required to extend a spring by a distance x (from equilibrium). Find the work needed to extend the spring from $x = 2$ m to $x = 3$ m with this force.

4. [4] A 15-g bullet traveling at 350 m/s is stopped in 3.5 cm in a block of wood. What was the average force exerted by the wood on the bullet?

5. [6] Two blocks with masses $m_A = 0.3$ kg and $m_B = 0.4$ kg hang together, as shown in the figure. Assume that the ropes are massless.

(a) What are the tensions in the ropes when the blocks are not moving?

(b) If the tension in either rope is not allowed to exceed 12 N, then find the maximum possible upward acceleration of the blocks.

[20] total marks