Arts & Science 2D06

Quiz #2 2013 Oct 10 **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] One of the following statements is not one of Newton's three laws of motion. Which one?

(a) $F = ma$

(b) Forces come in action-reaction pairs.

(c) All things free-fall with the same acceleration.

(d) An object at rest stays at rest, unless acted on by a force.

2. [3] A student pushes a heavy box across a horizontal floor. The work done by the force of gravity on the box while it is pushed:

(Explain your answer in the space below.)

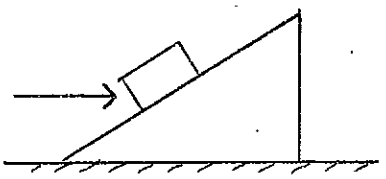
(a) depends on how hard the student is pushing.

(b) is equal to zero.

(c) cannot be determined without further information.

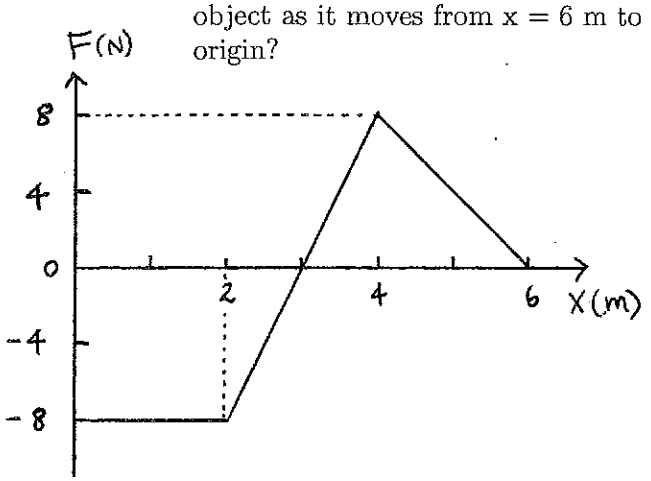
(d) depends on the coefficient of static friction.

3. [4] A brick of mass 2 kg is on a frictionless incline of 40 degrees, and is being pushed by a horizontal force of 6 N, as shown in the figure. Calculate the brick's acceleration.



4. [5] A 0.1-kg tennis ball moves in a vertical circle at the end of a string of length 35 cm. Find the tension in the string at the top of the circle, if the speed there is 2.5 m/s.

5. [5] A horizontal force experienced by a 0.3-kg object is shown in the figure below. Suppose that before the object begins to feel the force, it is approaching the origin from the right, with a speed of 12 m/s. (a) Determine the work done by this force on the object as it moves from x = 6 m to the origin. (b) What is its kinetic energy at the origin?



[20] total marks