Student Name: _____

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Warning: ***Only nongraphing calculators are allowed.***

PHYS 151.001, GENERAL PHYSICS I, EXAM ONE

Instructor: Professor Tao Pang
Date: September 29, 2008
Time: 8:30–9:45 a.m.
Place: BPB 102

This is a closed-book test and no reference materials are allowed. The total score of this test is 15 points with each question worth 1 point.

Questions 1 through 4 pertain to the situation described bellow:

A 1270-kg car starts from rest in a constant acceleration motion and reaches 60.0 mph (26.8 m/s) in 4.30 s.

(1) What is the magnitude of the acceleration of the car?
(A) 6.23 m/s^2; (B) 5.34 m/s^2; (C) 4.45 m/s^2; (D) 3.56 m/s^2; (E) 2.67 m/s^2.

(2) How far does the car travel in the first 2.30 s?
(A) 13.8 m; (B) 14.7 m; (C) 15.6 m; (D) 16.5 m; (E) 17.4 m.

(3) How far does the car travel in the remaining 2.00 s?
(A) 50.0 m; (B) 41.1 m; (C) 32.2 m; (D) 23.3 m; (E) 59.9 m.

(4) What is the magnitude of the net (total) force on the car?
(A) 3.56 kN; (B) 4.65 kN; (C) 5.74 kN; (D) 6.83 kN; (E) 7.92 kN.

Questions 5 through 8 pertain to the situation described bellow:

A placekicker kicks a football at an angle of 42.0° above the horizontal axis with an initial speed of 23.0 m/s. Ignore air resistance.

(5) What is the maximum height that the ball attains?
(A) 10.3 m; (B) 11.2 m; (C) 12.1 m; (D) 13.0 m; (E) 14.9 m.

(6) What is the time of flight between kickoff and landing?
(A) 2.05 s; (B) 3.14 s; (C) 4.23 s; (D) 5.32 s; (E) 6.41 s.

(7) What is the range reached by the ball between kickoff and landing?
(A) 25.3 m; (B) 41.4 m; (C) 34.5 m; (D) 62.6 m; (E) 53.7 m.

(8) What is the direction of the velocity of the ball 2.00 s after kickoff (+ for an angle above and − for an angle below the horizontal)?
(A) −13.8°; (B) 14.7°; (C) 19.6°; (D) −18.5°; (E) 16.4°.

Questions 9 through 12 pertain to the situation described bellow:

A 24.0-kg box slides down an incline that is 17.0 m long and tilted with an angle of 35.0° relative to the horizontal. Assume that the box is released from rest at the highest point of the incline and the coefficient of kinetic friction between the box and the incline is 0.200. Use $g = 9.80$ m/s^2.

(9) What is the magnitude of the normal force on the box?
(A) 157 N; (B) 166 N; (C) 175 N; (D) 184 N; (E) 193 N.

(10) What is the magnitude of the kinetic friction on the box?
(A) 36.8 N; (B) 35.0 N; (C) 33.2 N; (D) 38.5 N; (E) 31.4 N.

(11) What is the magnitude of the acceleration of the box?
(A) 3.04 m/s^2; (B) 3.53 m/s^2; (C) 4.02 m/s^2; (D) 4.51 m/s^2; (E) 5.00 m/s^2.

(12) How long does it take for the box to slide through the incline?
(A) 2.91 s; (B) 3.22 s; (C) 3.53 s; (D) 3.84 s; (E) 4.15 s.

Questions 13 through 15 pertain to the situation described bellow:

A force is given as $\mathbf{F} = 3.0\ \text{N}\ \hat{\mathbf{x}} - 4.0\ \text{N}\ \hat{\mathbf{y}}$.

(13) What is the y component of the force?
(A) 3.0 N; (B) -3.0 N; (C) 4.0 N; (D) -4.0 N; (E) 5.0 N.

(14) What is the magnitude of the force?
(A) 6.0 N; (B) 5.0 N; (C) 4.0 N; (D) -4.0 N; (E) -5.0 N.

(15) What is the unit vector that describes the direction of the force?
(A) $0.60\ \hat{\mathbf{x}} - 0.80\ \hat{\mathbf{y}}$; (B) $-0.60\ \hat{\mathbf{x}} + 0.80\ \hat{\mathbf{y}}$; (C) $0.80\ \hat{\mathbf{x}} - 0.60\ \hat{\mathbf{y}}$;
(D) $\hat{\mathbf{x}}$; (E) $\hat{\mathbf{y}}$.