Physics 6A MWF Section
Winter 2012 Midterm

- The test consists of 13 multiple choice questions.
- Enter the answer to the multiple choice questions on the pink scantron sheet. Use a pencil, not a pen.
- There is no penalty for the wrong answer
- Write your name and perm number on the scantron sheet
- The scantron sheet has an entry box labeled "TEST FORM". There are 4 slightly different sets of multiple choice questions, different students get questions in different orders. Make sure to enter the appropriate "TEST FORM" (A, B, C, or D) on your scantron sheet.
- Take your test home with you. You may want to mark your answers so that you can check your score once the solutions are posted.

YOUR "TEST FORM" IS A

DO NOT TURN THIS SHEET OVER UNTIL YOU ARE INSTRUCTED TO DO SO

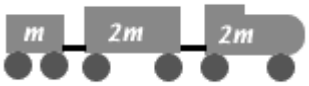
Question 1

A ball strikes a wall with a speed of 30 m/s and bounces straight back with a speed of 26 m/s. The collision takes 20 milliseconds. What is the magnitude of the average acceleration of the ball during the collision?

(a) 2800 m/s^2 (b) 1300 m/s^2 (c) 200 m/s^2 (d) 1500 m/s^2 (e) zero

Question 2

A train consists of an engine car (mass = 2000 Kg), a middle car (mass = 2000 Kg) and a caboose (mass=1000 Kg). The train is accelerating at 5 m/s^2. What is the tension force in the coupling between the middle car and the engine car.



(a) 25,000 N (b) 20,000 N (c) 15,000 N (d) 10,000 N

Question 3

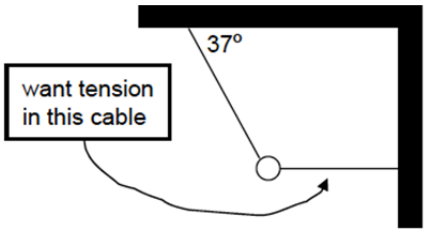
You shoot a bullet at an apple high up in a tree some distance in front of you, hoping to knock it loose so you can catch it and eat it. Ignoring air resistance, in order to hit this apple you must aim

(a) directly at it (b) above it (c) below it

Question 4

A 5000 N weight is held suspended in equilibrium by two cables attached to the ceiling and the wall as shown in the figure. What is the tension in the cable attached to the wall (rounded to the nearest 10 N)

(a) 3340 N (b) 4000 N (c) 8310 N (d) 6640 N



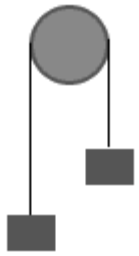
Question 5

If a vector **A** has components $A_x > 0$, and $A_y > 0$, then the angle that this vector makes with the positive *x*-axis must be in the range

(a) 0° to 90° (b) 90° to 180° (c) 180° to 270° (d) 270° to 360°.
(e) cannot be determined without additional information

Question 6
Two identical masses are attached by a massless cord passing over a massless, frictionless pulley. They are held at different heights (see Figure) and then released. After they are released

(a) The lower mass will move downwards
(b) The higher mass will move downwards
(c) The masses will not move



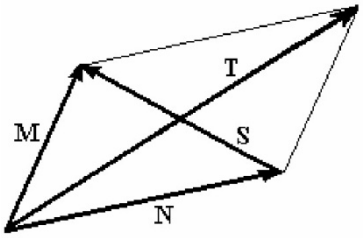
Question 7
Two athletes jump straight up. John has twice the initial speed of Harry. Compared to Harry, John stays in the air

(a) 0.50 times as long.
(b) 1.41 times as long.
(c) twice as long.
(d) three times as long.
(e) four times as long.

Question 8
Al is standing in an elevator that is accelerating upward. How does the upward normal force N exerted on Al by the floor of the elevator compare to his weight W?

(a) N=W (b)N>W (c)N<W

Question 9



Refer to the Figure. Vector **S** as expressed in terms of vectors **M** and **N** is given by

(a) **M** + **N** (b) **M** – **N** (c) **M** (d) **N** (e) None of the above

Question 10
Which of the following situations is impossible?

(a) An object has velocity directed east and acceleration directed east.
(b) An object has zero velocity but nonzero acceleration.
(c) An object has constant nonzero acceleration and changing velocity.
(d) An object has velocity directed east and acceleration directed west.
(e) An object has constant velocity and changing acceleration.

Question 11
A jogger runs halfway around a circular path with a radius of 30 m. What is her displacement?

(a) 60 m (b) 30 m (c) 94 m (d) 188 m (e) zero

Question 12
A 2.0-kg projectile is launched at an angle to the horizontal. Initially, its horizontal velocity is 30 m/s and its vertical velocity is 20 m/s. For how long will the projectile be in the air?

(a) 1.5 sec (b) 2.0 sec (c) 3.0 sec (d) 3.3 sec (e) 4.1 sec

Question 13
You drive 6.00 km at 50.0 km/h and then another 6.00 km at 90.0 km/h. Your average speed over the 12.0 km drive will be

(a) greater than 70.0 km/h. (b) equal to 70.0 km/h. (c) less than 70.0 km/h.
(d) exactly 38.0 km/h.
(e) cannot be determined from the information given, must also know directions traveled