Physics 6A TR Section
Winter 2012 Midterm

- The test consists of 19 multiple choice questions.
- Enter the answer to the multiple choice questions in 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

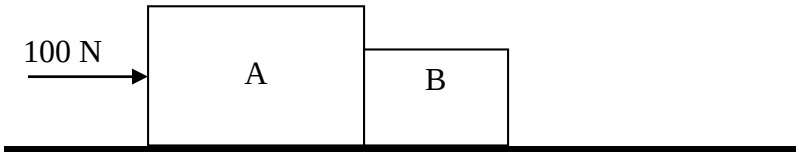
A 2-newton force acts on a 3-kilogram mass for 6 seconds. The change of velocity of the mass is
(a) 18 m/s (b) 2 m/s (c) 36 m/s (d) 4 m/s (e) 36 m/s

Question 2

A man weighing 800 Newtons is standing in an elevator. If the elevator rises with an acceleration of 9.8 meters per second^2, the force exerted by the elevator on the man will be
(a) 400 N (b) 800 N (c) 1200 N (d) 1600 N (e) 2000 N

Question 3

A person pushes two boxes with a horizontal force of 100 N on a frictionless floor:

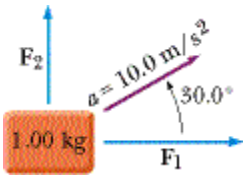


Box A is heavier than box B. Which of the following statements is correct?

(a) Box A pushes on box B with a force of 100 N, and box B pushes on box A with a force of 100 N
(b) Box A pushes on box B harder than box B pushes on box A
(c) Boxes A and B push on each other with equal forces less than 100 N
(d) The two boxes will not begin to move unless the total weight of the two boxes is less than 100 N
(e) None of the above

Question 4

A 1.00-kg mass is observed to accelerate at 10.0 m/s^2 in a direction 30.0° north of east. The force F_2 acting on the mass has a magnitude of 5.00 N and is directed north. Determine the magnitude of the force F_1 (directed east) acting on the mass.



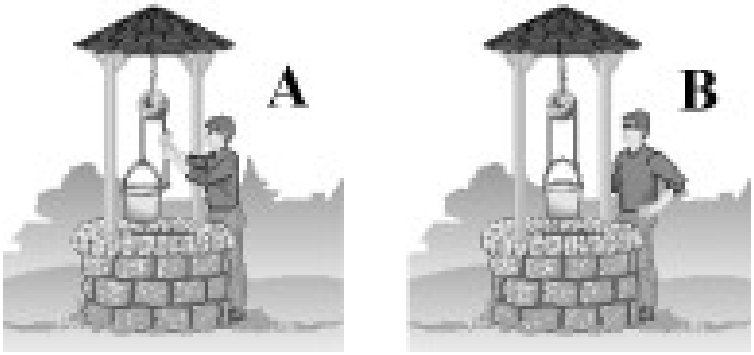
(a) 5.77 N (b) 5.00 N (c) 8.66 N (d) 10.00 N (e) 15.00 N

Question 5

A drag racer starts from rest and accelerates at 10 m/s^2 for the entire distance of 400 m. What is the velocity of the race car at the end of the run?

(a) 45 m/sec (b) 89 m/sec (c) 135 m/sec (d) 180 m/sec (e) 215 m/sec

Question 6



Compare the two situations shown in the Figure. On the left (A), James is holding the rope and keeping the bucket at rest. On the right (B), James ties the rope to the bucket so that it keeps the bucket at rest. In both cases the bucket contains the same quantity of water. In what case is the tension in the rope higher?

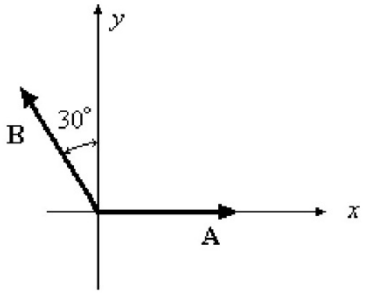
(a) left (b) right (c) It is the same in both cases. (d) We need more data to answer.

Question 7

The slope of a line connecting two points on a position versus time graph gives

(a) displacement.
(b) instantaneous velocity.
(c) average velocity.
(d) instantaneous acceleration.
(e) average acceleration

Question 8



Refer to the Figure. The components of vectors **A** and **B** are

(a) $A_x = 0$	$B_x = B \sin 30°$	$A_y = 0$	$B_y = B \cos 30°$.
(b) $A_x = A \sin 90°$	$B_x = B \cos 60°$	$A_y = A \cos 90°$	$B_y = B \sin 60°$.
(c) $A_x = A \cos 0°$	$B_x = -B \cos 60°$	$A_y = A \cos 90°$	$B_y = B \cos 30°$.
(d) $A_x = A \cos 90°$	$B_x = B \sin 60°$	$A_y = A \sin 90°$	$B_y = B \cos 60°$.
(e) $A_x = A \cos 90°$	$B_x = 0$	$A_y = A \sin 90°$	$B_y = 0$

Question 9

A packing crate slides down an inclined ramp at constant velocity. Thus we can deduce that
(a) a frictional force is acting on it.
(b) a net downward force is acting on it.
(c) a net upward force is acting on it.
(d) it is not acted on by appreciable normal force.
(e) it is not acted on by appreciable gravitational force.

Question 10

A furniture truck is moving along a level road at constant velocity. An object drops from the mid-point of the ceiling inside the truck. Where on the floor will the object land?

(a) Depends on the velocity of the truck
(b) Exactly on the point below the midpoint of the ceiling
(c) Ahead of the point below the midpoint of the ceiling
(d) Behind the point below the midpoint of the ceiling

Question 11

A ball is thrown with an initial angle of 60^o with respect to the horizontal and speed 23.0 m/s from the top of a 49.0 m high building. What is the horizontal component of the velocity when it hits the ground?

(a) 49 m/s (b) 23 m/s (c) 11.5 m/s (d) 19.9 m/s (e) 38.6 m/s

Question 12

Which of the following is an accurate statement?

(a) The magnitude of a vector can be zero even though one of its components is not zero.
(b) The magnitude of a vector is independent of the orientation of the coordinate system.
(c) Even though two vectors have unequal magnitudes, it is possible that their sum is zero.
(d) Rotating a vector about an axis passing through the tip of the vector does not change the vector.
(e) It is possible to add a scalar quantity to a vector.

Question 13

A large gun is aimed horizontally and fired. The bullet's initial speed is 75.4 m/s. What is the speed of the bullet 4.00 s after it is fired?

(a) 115 m/s (b) 42.5 m/s (c) 39.2 m/s (d) 85.0 m/s (e) 75.4 m/s

Question 14

Two objects have masses m and $5m$, respectively. They both are placed side by side on a frictionless inclined plane and allowed to slide down from rest.
(a) It takes the lighter object 5 times longer to reach the bottom of the incline than the heavier.
(b) It takes the lighter object 10 times longer to reach the bottom of the incline than the heavier.
(c) It takes the heavier object 5 times longer to reach the bottom of the incline than the lighter.
(d) It takes the heavier object 10 times longer to reach the bottom of the incline than the lighter.
(e) The two objects reach the bottom of the incline at the same time.

Question 15
A cheetah can run at approximately 100 km/hr and a gazelle at approximately 80 km/hr. If both animals are running at full speed, with the gazelle 70 m ahead, how long before the cheetah catches its prey?

(a) 10.7 sec (b) 25.2 sec (c) 12.6 sec (d) 6.3 sec (e) 9.8 sec

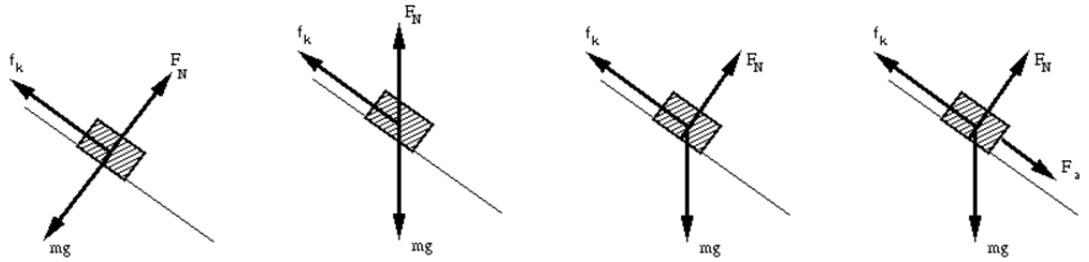
Question 16
A railroad train travels forward along a straight track at 80 m/s for 1000 m and then travels at 50 m/s for the next 1000 m. What is its average velocity?

(a) 70.0 m/sec (b) 61.5 m/sec (c) 63.7 m/sec (d) 65.0 m/sec

Question 17
A 4.0-kg object is moving across a frictionless surface with a constant velocity of 2 m/s. Which one of the following horizontal forces is necessary to maintain this state of motion?

(a) 0 N (b) 0.5 N (c) 2.0 N (d) 8.0 N (e) depends on the speed

Question 18
A box is sliding down a ramp. What is the Free Body Diagram for the forces on the box



(a) (b) (c) (d)

Question 19
A mass m is pushed with a horizontal force F on a horizontal floor. The coefficient of static friction is μ_S and the coefficient of kinetic friction is μ_K. The mass does not move. The magnitude of the frictional force on the mass is

(a) μ_S mg (b) μ_K mg (c) F (d) mg (e) μ_S F