V1

Name:
Student Number:

Lecture Section: **C04 (Rheinstadter)**
C05 (Hughes)
C06 (Nejat)

PHY 1B03
Midterm 1

Winter/12

There are a total of 16 multiple choice question.

Question 1 is the version number and is worth zero

All remaining questions are worth one mark. There is only one correct answer for each question.

Only answers bubbled on the scan card will be marked.

Only the McMaster standard calculator is allowed.

A formula sheet can be found attached to this test paper.

By writing this paper, you agree to be bound by the Senate policy on Academic Dishonesty.

All portable communications devices (pagers, cellular phones, etc) must be **off** during tests.

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1. This is ***Version 1*** of the midterm. Choose A as the answer to this question. Incorrectly answering this question will adversely affect the marking of your test.

   A. Version 1
   B. Version 2

2. A certain quantity, f, is defined by

$$\mathbf{f} = \frac{\mathbf{x}}{\mathbf{y}} - \mathbf{z}$$

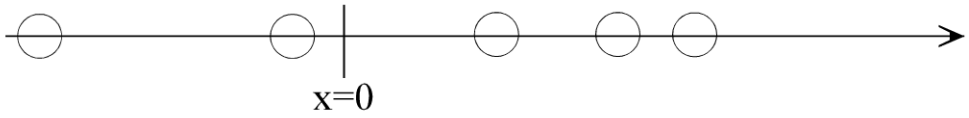
   If x = 11.3 ± .1 , y = 1.50 ± .04 , and z = 3.0 ± .1 , what is f with its uncertainty?

   A. 4.53 ± .07
   B. 4.53 ± .1
   C. 4.5 ± .2
   D. 4.5 ± .3
   E. 4.5 ± .4

3. A car travels from here to there. For half the distance, it travels at a speed of 80 km/hr, and for the other half, at 40 km/hour. The average speed of the car over the whole trip is

   A. 40 km/hr
   B. 47 km/hr
   C. 53 km/hr
   D. 60 km/hr
   E. Can not be determined without knowing the travel time.

4. The motion diagram of a moving disc is shown below.



Which of the following statements is correct? The disc's acceleration is

A. positive if it is moving to the right and negative if it is moving to the left.
B. negative if it is moving to the right and positive if it is moving to the left.
C. positive no matter which way it is moving.
D. negative no matter which way it is moving.
E. none of the above.

5. Starting at time t=0, an object moves along a straight line. Its position is given by

$$x(t) = 75\ t - 1.0\ t^3 \qquad (t \text{ in seconds, } x \text{ in meters})$$

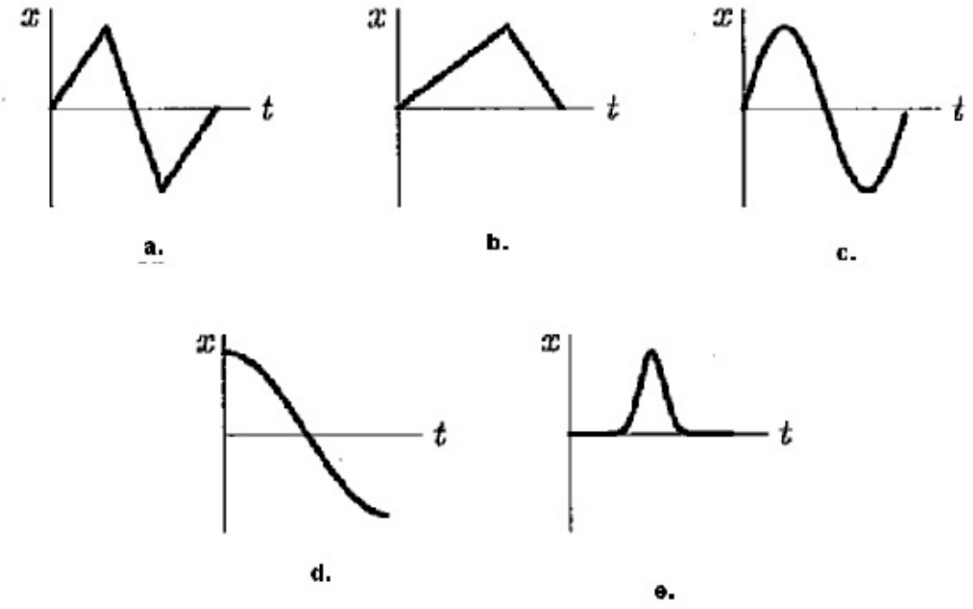
When it momentarily comes to rest, what is its acceleration?

A. 0 m/s^2
B. – 30 m/s^2
C. – 75 m/s^2
D. – 150 m/s^2
E. – 9200 m/s^2

6. An object is shot vertically upward so that it reaches a maximum height of 100 m. If the initial speed of the object is doubled, to what maximum height will the object now climb?

A. 141 m
B 200 m
C 241 m
D. 400 m
E. 482 m

7. You get into your car at one end of your driveway, and start to back out towards the road. Just as you reach the other end of your driveway, you realize that you've forgotten your physics textbook. (Oh no!) You stop, drive back up to the house and park in your original spot. Which of these sketches of position vs time best describes your motion?



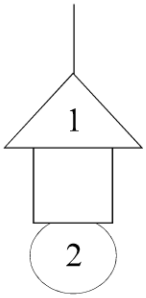
8. A woman was reported to have fallen 45.0 m from the balcony of an apartment building, onto a ventilator box, crushing it to a depth of 4.10 m (Fortunately, the woman walked away with only minor injuries.) What was the magnitude of the acceleration of the woman during the time she was in contact with the box?

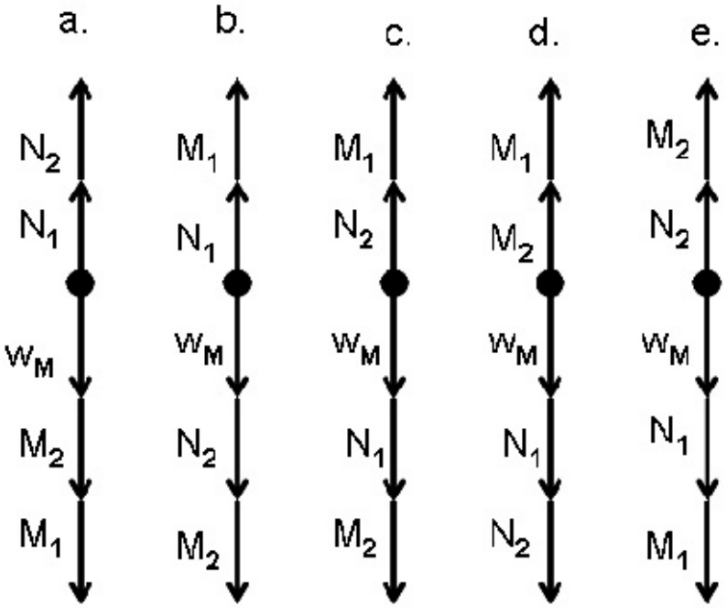
A. 9.80 m/s^2
B. 17.4 m/s^2
C. 34.6 m/s^2
D. 76.2 m/s^2
E. 110 m/s^2

9. A tiny spider is descending on a silk strand. If the strand supports it with a force of 4.4×10^{-4} N when it is ***accelerating downward*** at 1.9 m/s^2 , what force would the strand exert if the spider was moving downward at constant velocity?

A. 1.4×10^{-4} N
B. 3.7×10^{-4} N
C. 4.4×10^{-4} N
D. 5.5×10^{-4} N
E. 6.9×10^{-4} N

10. The figure shows a hanging mobile made from three magnetic blocks. Following the notation from the lab, let W, M, N, and T represent the weight, magnetic, normal, and tension forces respectively. Which of the following best represents the free-body diagram of the **square magnet**? (NB. The force vectors are not drawn to scale and are only meant to indicate the direction of each force, not the magnitude.)



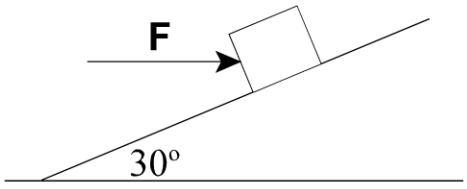


11. A child insists on going sledding on a barely snow-covered hill. The child starts from rest at the top of the 60 m long hill which is inclined at an angle of 30° to the horizontal, and arrives at the bottom 8.0 s later. What is the coefficient of kinetic friction between the hill and the sled?

A. .14
B. .36
C. .42
D. .56
E. .79

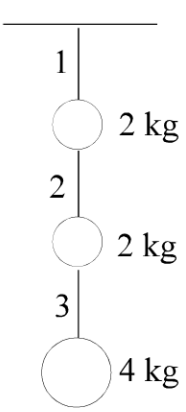
12. A 10 kg block is at rest on a surface inclined at an angle of 30°. An external horizontal force, F, acts on the block as shown. In addition, a static frictional force of 20 N is opposing motion up the plane. Calculate F.

A. 20 N
B. 49 N
C. 69 N
D. 80 N
E. 120 N



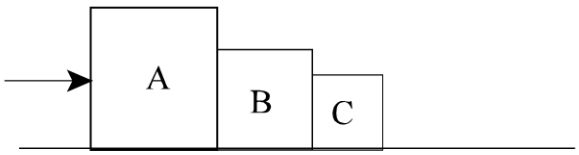
13. Three objects are hanging by threads from the ceiling of an elevator as shown in the diagram. The elevator begins to accelerate upward. Which of the strings (which are identical in mass, length and composition) is most likely to break?

A. String 1
B String 2
C. String 3
D. String 1 and string 2 are equally likely to break.
E. The strings are all equally likely to break.



14. Three blocks of different masses are in contact on a rough horizontal surface, as shown in the diagram. (m_A is 3.0 kg, m_B is 2.0 kg, and m_C is 1.0 kg.) The blocks are all made of different materials so that the coefficient of friction with the floor for block A is 0.10, for block B is 0.20, and for block C is 0.30. An external force of 30 N is applied to block 1. What force does block A exert on block B?

A. 10 N
B. 12 N
C. 15 N
D. 17 N
E. 30 N



15. A 30 kg crate rests on a horizontal surface. The coefficients of kinetic and static friction between the crate and the floor are .30 and .40 respectively. What is the magnitude of the **net** force on the crate when a 100 N horizontal force is applied to it?

A. 0 N
B. 8.0 N
C. 88. N
D. 100 N
E. 118 N

16. A ladder leans against a wall. Which of the following forces should NOT appear on the free-body diagram of the ladder?

A. The frictional force exerted by the ground on the ladder.
B. The normal force exerted by the ground on the ladder.
C. The normal force exerted on the wall by the ladder.
D. The gravitational force exerted by the earth on the ladder.
E. All of these forces should appear on the free-body diagram.

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