

This exam is based on Ch 2-3 of Giambattista et al.

## exam1\_06

1. A sled weighs 10.0 kg. It is held in place on a frictionless 20.0 degree slope by a rope attached to a stake at the top of the slope. Find the tension in the rope if it is parallel to the slope.

- A. 47.9 N
- B. 37.4 N
- C. 94.1 N
- D. 33.5 N
- E. 23.8 N

2. A boy with a mass of 55 kg walks into a room and sees a girl 8.0 m in front of him who has a mass of 40 kg. What is his gravitational attraction to her? (Neglect any effect's from Earth's gravity)

- A.  $2.0 \times 10^8$  N
- B.  $2.3 \times 10^{-9}$  N
- C.  $2.2 \times 10^{-11}$  N
- D.  $2.4 \times 10^{-8}$  N
- E.  $2.1 \times 10^9$  N

3. A block is at rest on a wooden ramp. The coefficient of static friction between the block and ramp is 0.35. What is the angle between the ramp and the horizontal direction when the box first begins to slide?

- A. 17°
- B. 19°
- C. 29°
- D. 20°
- E. 22°

4. The diagram below represents an ideal pulley system (no mass or friction). What is the force required to lift the 45 kg mass?

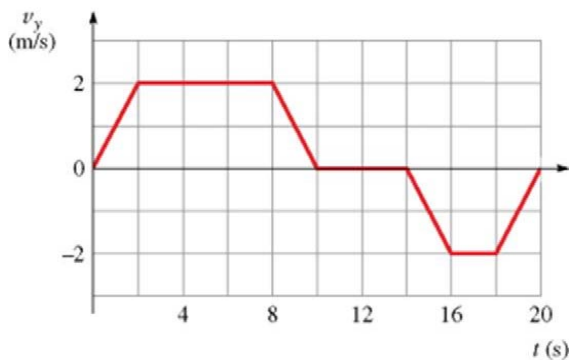


- A. 442 N
- B. 393 N
- C. 221 N
- D. 147 N

5. A displacement vector  $D$  is given as 40.0 m long at an angle of 60.0 degrees NORTH of EAST. The  $D_x$  component and the  $D_y$  component of the vector are:

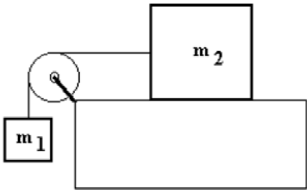
- A.  $D_x = + 34.6$  m,  $D_y = + 20.0$  m.
- B.  $D_x = + 20.0$  m,  $D_y = - 34.6$  m.
- C.  $D_x = + 20.0$  m,  $D_y = + 34.6$  m.
- D.  $D_x = - 34.6$  m,  $D_y = + 20.0$  m.
- E.  $D_x = + 34.6$  m,  $D_y = - 20.0$  m.

6. The figure is a graph of the vertical velocity versus time for an elevator. Solve graphically for the height of the elevator above the starting point at  $t = 20$ s?



- A. 4.0 m
- B. 16.0 m
- C. 0.0 m
- D. 8.0 m

7. Two masses are connected by a cord that passes over a pulley as shown in the figure. The pulley and cord have negligible mass and  $m_2$  (2.0 kg) moves on a horizontal surface without friction,  $m_1$  (2.0 kg) is suspended vertically. What is the acceleration of  $m_1$ ?



- A.  $9.0 \text{ m/s}^2$
- B.  $12.0 \text{ m/s}^2$
- C.  $6.0 \text{ m/s}^2$
- D.  $4.9 \text{ m/s}^2$

8. A 4.0 kg mass has a velocity of 10 m/s to the EAST. The 4.0 kg mass undergoes an acceleration of  $4.0 \text{ m/s}^2$  to the WEST for 3.0 sec. What is the velocity of the 4.0 kg mass at the end of the 3.0 sec interval?

- A. 22 m/s to the WEST
- B. 2.0 m/s to the WEST
- C. 0.0 m/s
- D. 2.0 m/s to the EAST
- E. 22 m/s to the EAST

9. The velocity of a boat with respect to the water is 4.0 m/s at an angle of 30.0 degrees NORTH of EAST. The velocity of the water with respect to the ground is 3.0 m/s at an angle of 90.0 degrees NORTH of EAST. What is the velocity of the boat with respect to the ground?

- A. 6.1 m/s at 36 degrees NORTH of EAST
- B. 5.8 m/s at 55 degrees NORTH of EAST
- C. 6.1 m/s at 61 degrees NORTH of EAST
- D. 5.8 m/s at 36 degrees NORTH of EAST
- E. 6.1 m/s at 55 degrees NORTH of EAST

10. A tractor (T) is pulling two trailers,  $M_1$  and  $M_2$ , with a constant acceleration. T has a mass of 200 kg,  $M_1$  has a mass of 100 kg, and  $M_2$  has a mass of 150 kg. If the forward acceleration is  $0.60 \text{ m/s}^2$ , then the horizontal force on  $M_2$  due to the attachment to  $M_1$  is:



- A. 270 N backward.
- B. 270 N forward.
- C. 150 N backward.
- D. 150 N forward.
- E. 90 N forward.

## exam1\_06 Key

1. D
2. B
3. B
4. C
5. C
6. D
7. D
8. B
9. E
10. E