Practice Exam Chapters 3.3-5.6 (Ungraded) (6043257)

Due: Wed Feb 24 2016 06:00 PM EST

Question 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Description

This will not be graded, but it is in your interest to practice.

Instructions

The actual test will be all multiple choice, with only one correct answer per question.

1. Question Details SerCP8 5.P.005. [3499312]

Starting from rest, a 6.0-kg block slides 2.80 m down a rough 30.0° incline. The coefficient of kinetic friction between the block and the incline is $\mu_k = 0.436$.

(a) Determine the work done by the force of gravity.

82.3 J

(b) Determine the work done by the friction force between block and incline.

-62.2 J

(c) Determine the work done by the normal force.

0 J

(d) Qualitatively, how would the answers change if a shorter ramp at steeper angle were used to span the same vertical height?

Key: If a shorter ramp is used to increase the angle of inclination while maintaining the same vertical displacement, the work done by gravity will not change, the work done by the friction force will decrease (because the normal force, and hence the friction force, will decrease and also because the ramp length *L* decreases), and the work done by the normal force remains zero (because the normal force remains perpendicular to the displacement).

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2. Question Details SerCP8 5.P.016. [3499204]

A 0.54 kg particle has a speed of 5.0 m/s at point *A* and kinetic energy of 7.5 J at point *B*.

(a) What is its kinetic energy at *A*?

[ ] 6.75 J

(b) What is its speed at point *B*?

[ ] 5.27 m/s

(c) What is the total work done on the particle as it moves from *A* to *B*?

[ ] 0.75 J

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3. Question Details SerCP8 5.MC.006. [3499125]

Alex and John are loading identical cabinets onto a truck. Alex lifts his cabinet straight up from the ground to the bed of the truck, whereas John slides his cabinet up a rough ramp to the truck. Which statement is correct?

- None of these statements is necessary true because the force of friction is unknown.
- None of these statements is necessary true because the angle of the incline is unknown.
- Alex and John do the same amount of work.
- Alex does more work than John.
- John does more work than Alex.

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4. Question Details SerCP8 5.MC.007. [3499066]

Mark and David are loading identical cement blocks onto David's pickup truck. Mark lifts his block straight up from the ground to the truck, whereas David slides his block up a ramp on massless, frictionless rollers. Which statement is true?

- David does more work than Mark.
- None of these statements is necessary true because of the angle of the incline is unknown.
- Mark does more work than David.
- Mark and David do the same amount of work.
- None of these statements is necessary true because the mass of one block is not given.

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5. Question Details SerCP9 5.MC.001. [3503065]

A worker pushes a wheelbarrow 5.0 m along a level surface, exerting a constant horizontal force of 50.0 N. If a frictional force of 43 N acts on the wheelbarrow in a direction opposite to that of the worker, what net work is done on the wheelbarrow?

- 215 J
- 35 J
- 250 J
- 45 J
- 15 J

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6. Question Details SerCP9 5.MC.003. [3502942]

A 40.0-N crate starting at rest slides down a rough 6.00-m-long ramp, inclined at 30.0° with the horizontal. The magnitude of the force of friction between the crate and the ramp is 6.0 N. What is the speed of the crate at the bottom of the incline?

- 1.60 m/s
- 4.5 m/s
- 7.75 m/s
- 3.32 m/s
- 6.42 m/s

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7. Question Details SerCP9 5.MC.004. [3503093]

A skier leaves a ski jump at 15.0 m/s at some angle θ. At what speed is he traveling at his maximum height of 4.50 m above the level of the end of the ski jump? (Neglect air friction.)

- 11.7 m/s
- 12.2 m/s
- 17.4 m/s
- 8.55 m/s
- 16.3 m/s

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8. Question Details SerCP9 5.MC.010. [3503062]

An athlete jumping vertically on a trampoline leaves the surface with a velocity of 8.5 m/s upward. What maximum height does she reach?

- 3.7 m
- 0.27 m
- 2.3 m
- 13 m
- The answer can't be determined because the mass of the athlete is not given.

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9. Question Details SerCP9 4.MC.001. [3502828]

A horizontal force of 95.0 N is applied to a 60.0-kg crate on a rough, level surface. If the crate accelerates at 1.20 m/s^2, what is the magnitude of the force of kinetic friction acting on the crate?

- 23.0 N
- 45.0 N
- 16.0 N
- 8.80 N
- 33.0 N

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10. Question Details SerCP9 4.MC.006. [3503031]

A crate remains stationary after it has been placed on a ramp inclined at an angle with the horizontal. Which of the following statements must be true about the magnitude of the frictional force that acts on the crate?

- It is at least equal to the weight of the crate.
- It is greater than the component of the gravitational force acting down the ramp.
- It is larger than the weight of the crate.
- It is equal to $\mu_s n$.
- It is equal to the component of the gravitational force acting down the ramp.

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11. Question Details SerCP9 4.MC.007. [3502763]

In the photo, a locomotive has broken through the wall of a train station. During the collision, what can be said about the force exerted by the locomotive on the wall?

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- The force exerted by the locomotive on the wall was the same in magnitude as the force exerted by the wall on the locomotive.
- The force exerted by the locomotive on the wall was larger than the force the wall could exert on the locomotive.
- The force exerted by the locomotive on the wall was less than the force exerted by the wall on the locomotive.
- The wall cannot be said to "exert" a force; after all, it broke.

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12. Question Details SerCP9 4.MC.008. [3502937]

If an object of mass *m* moves with constant velocity *v*, the net force on the object is which the following?

- *mg*
- *mv*
- *mv/t*
- 0
- None of these answers is correct.

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13. Question Details SerCP9 4.MC.009. [3502908]

Four forces act on an object, given by $\vec{\mathbf{A}}$ = 40 N east, $\vec{\mathbf{B}}$ = 50 N north, $\vec{\mathbf{C}}$ = 70 N west, and $\vec{\mathbf{D}}$ = 90 N south. What is the magnitude of the net force on the object?

- 70 N
- 250 N
- 170 N
- 50 N
- 131 N

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14. Question Details SerCP9 4.MC.010. [3502794]

If an object is in equilibrium, which of the following statements is *not* true?

- The acceleration of the object is zero.
- The object must be at rest.
- The net force acting on the object is zero.
- The speed of the object remains constant.
- The velocity is constant.

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15. Question Details SerCP9 4.MC.011. [3502878]

A manager of a restaurant pushes horizontally with a force of magnitude 150 N on a box of melons. The box moves across the floor with a constant acceleration in the same direction as the applied force. Which statement is most accurate concerning the magnitude of the force of kinetic friction acting on the box?

- It is equal to 150 N.
- It is less than 150 N.
- The kinetic friction force is steadily decreasing.
- The kinetic friction force must be zero.
- It is greater than 150 N.

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16. Question Details SerCP9 4.MC.012. [3502804]

A truck loaded with sand accelerates along a highway. The driving force on the truck remains constant. What happens to the acceleration of the truck as its trailer leaks sand at a constant rate through a hole in its bottom?

- It increases at a steady rate.
- It remains constant.
- It increases and then decreases.
- It decreases at a steady rate.
- It decreases and then increases.

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17. Question Details SerCP9 3.P.022. [3502509]

One of the fastest recorded pitches in major-league baseball, thrown by Tim Lincecum in 2009, was clocked at 101.0 mi/h (see the figure). If a pitch were thrown horizontally with this velocity, how far would the ball fall vertically by the time it reached home plate, 60.5 ft away?

[ ] 2.68 ft

Michael Zagaris/Getty Images

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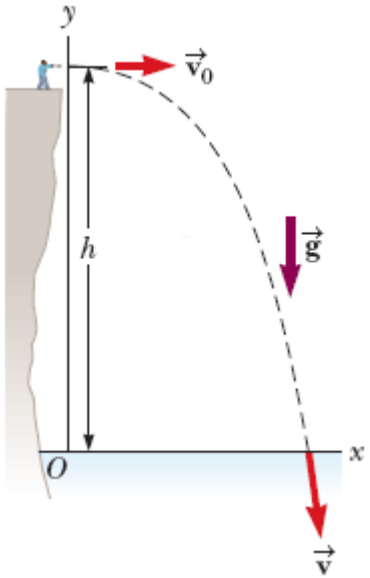
18. Question Details SerCP9 3.P.023. [3502595]

A student stands at the edge of a cliff and throws a stone horizontally over the edge with a speed of 20.0 m/s. The cliff is h = 57.0 m above a flat, horizontal beach as shown in the figure.



(a) What are the coordinates of the initial position of the stone?

x_0 = [ ] 0 m

y_0 = [ ] 57 m

(b) What are the components of the initial velocity?

v_{0x} = [ ] 20 m/s

v_{0y} = [ ] 0 m/s

(c) Write the equations for the x- and y-components of the velocity of the stone with time. (Use the following as necessary: t. Let the variable t be measured in seconds. Do not state units in your answer.)

v_x = [ ] 20.0

$v_y =$ $-9.80 \cdot t$

(d) Write the equations for the position of the stone with time, using the coordinates in the figure. (Use the following as necessary: t. Let the variable t be measured in seconds. Do not state units in your answer.)

$x =$ $20.0 \cdot t$

$y =$ $57.0 - 4.90 \cdot t^2$

(e) How long after being released does the stone strike the beach below the cliff?

3.41 s

(f) With what speed and angle of impact does the stone land?

$v_f =$ 39 m/s

$\theta =$ 59.1 ° below the horizontal

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19. Question Details SerCP9 3.P.025.WI. [3502734]

The best leaper in the animal kingdom is the puma, which can jump to a height of 3.7 m when leaving the ground at an angle of 45°. With what speed must the animal leave the ground to reach that height?

12 m/s

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20. Question Details SerCP9 3.P.027.MI.SA. [3502699]

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

A place-kicker must kick a football from a point 36.0 m (about 40 yards) from the goal. Half the crowd hopes the ball will clear the crossbar, which is 3.05 m high. When kicked, the ball leaves the ground with a speed of 20.5 m/s at an angle of 45.5° to the horizontal.

(a) By how much does the ball clear or fall short of clearing the crossbar? (Enter a negative answer if it falls short.)

(b) Does the ball approach the crossbar while still rising or while falling?

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21. Question Details SerCP9 3.P.029.soln. [3502584]

A brick is thrown upward from the top of a building at an angle of 40° to the horizontal and with an initial speed of 15 m/s. If the brick is in flight for 3.2 s, how tall is the building?

[ ] 19.3 m

Solution or Explanation

We choose our origin at the initial position of the projectile. After 3.2 s, it is at ground level, so the vertical displacement is $\Delta y = -H$.

To find H, we use the following equation.

$$\Delta y = v_{0y}t + \frac{1}{2}a_y t^2$$

We then plug in the information we have to find H.

$$-H = (15 \text{ m/s})(\sin 40°)(3.2 \text{ s}) + \frac{1}{2}(-9.80 \text{ m/s}^2)(3.2 \text{ s})^2 \text{ or } H = 19.3 \text{ m}$$

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22. Question Details SerCP9 3.MC.002. [3502739]

A skier leaves the end of a horizontal ski jump at 22.0 m/s and falls 3.20 m before landing. Neglecting friction, how far horizontally does the skier travel in the air before landing?

- 12.2 m
- 9.8 m
- 21.6 m
- 17.8 m
- 14.3 m

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23. Question Details SerCP9 3.MC.003. [3502518]

A catapult launches a large stone at a speed of 45.0 m/s at an angle of 55.0° with the horizontal. What maximum height does the stone reach? (Neglect air friction.)

- 45.7 m
- 32.7 m
- 83.2 m
- 102 m
- 69.3 m

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24. Question Details SerCP9 3.MC.005. [3502741]

A NASA astronaut hits a golf ball on the Moon. Which of the following quantities, if any, remain constant as the ball travels through the lunar vacuum? (Select all that apply.)

- ☐ velocity
- ☐ vertical component of velocity
- ☐ acceleration
- ☐ horizontal component of velocity
- ☐ speed

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25. Question Details SerCP9 3.CQ.006. [3502682]

A ball is projected horizontally from the top of a building. One second later, another ball is projected horizontally from the same point with the same velocity.

(a) At what point in the motion will the balls be closest to each other?

- the instant the second ball is projected
- the instant the first ball hits the ground
- one second after the second ball is projected
- They stay equidistant from each other throughout the motion.

(b) Will the first ball always be traveling faster than the second?

- Yes
- No

(c) What will be the time difference between them when the balls hit the ground?

- no time difference
- It depends on the height of the building.
- between one and ten seconds
- one second

(d) Can the horizontal projection velocity of the second ball be changed so that the balls arrive at the ground at the same time?

- Yes
- No

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26. Question Details SerCP9 3.CQ.008. [3502593]

Determine which of the following moving objects obey the equations of projectile motion developed in this chapter. (Select all that apply.)

- ☐ A ball is thrown in an arbitrary direction.
- ☐ A jet airplane crosses the sky with its engines thrusting the plane forward.
- ☐ A rocket leaves the launch pad.
- ☐ A rocket moves through the sky after its engines have failed.
- ☐ A stone is thrown under water.

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27. Question Details SerCP9 3.CQ.011. [3502499]

A projectile is launched at some angle to the horizontal with some initial speed v_i, and air resistance is negligible.

(a) Is the projectile a freely falling body?

- Yes
- No

(b) What is its acceleration in the vertical direction? (Let up be the positive direction.)

-9.8 m/s^2

(c) What is its acceleration in the horizontal direction?

0 m/s^2

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Assignment Details

Name (AID): **Practice Exam Chapters 3.3-5.6 (Ungraded) (6043257)**
Submissions Allowed: **10**
Category: **Homework**
Code:
Locked: **Yes**
Author: **Holcomb, Mikel (** miholcomb@mix.wvu.edu **)**
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