121 MT2 PM

Started: May 21 at 4:56pm

Quiz Instructions

Question 1 0 pts

By typing my name below, I pledge on my honor that I have not given or received, and will not give or receive, any unauthorized assistance on this examination. If I discuss the contents of this exam with others, I recognize that that breach will be reported to the Student Conduct Office. Such a report could lead to a failing grade in this course - for me and for the person, or people, with whom I conversed.

HTML Editor

Question 2

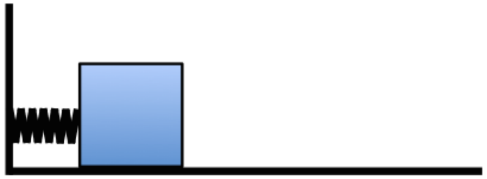
0 pts

Have you saved the exam as a pdf (by printing it as a pdf), and do you have a piece of paper and a pencil to write down your answers?

- ◯ Yes
- ◯ No

Question 3

6 pts

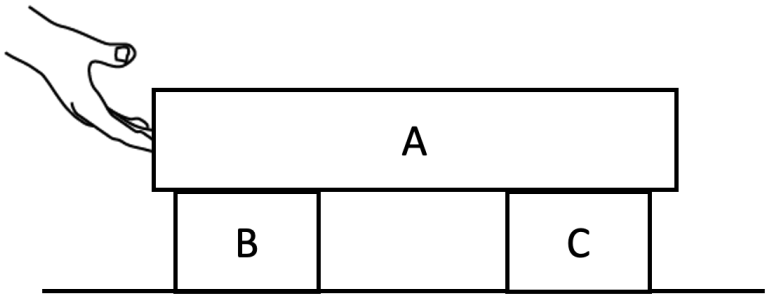


A 2.0 kg object is pushed against a spring until the spring is compressed by 0.50 m from its equilibrium position. The object is then released and it slides on a rugged surface for 5.0 m from its start position against the compressed spring until it comes to rest. The spring constant is k = 100 N/m. What is the magnitude of the kinetic friction between the object and the surface?

- ○ 0.50 N
- ○ 2.5 N
- ○ 25 N
- ○ 5.0 N
- ○ 0.10 N

Question 4

6 pts



Three blocks A, B, and C are stacked as shown. The inertias of the blocks satisfy $m_A > m_B = m_C$. A hand gently pushes block A and the stack begins to accelerate horizontally to the right. Friction between B and C and the floor can be neglected but the friction between the blocks keeps them from sliding against each other. Which of the following statements is (are) true?

I. The static friction force of A on B points to the right.

II. The static friction force of B on A points to the left.

III. The static friction force of C on A points to the right.

IV. The forces mentioned in (I) and (II) form an interaction pair.

- ◯ I and III only
- ◯ II only
- ◯ IV only
- ◯ I, II and IV
- ◯ All of these are true

Question 5

6 pts

Consider the old-fashioned bicycle shown in the figure. The back wheel (*b*) has a much smaller radius than the front wheel (*f*). Which of the following statement(s) is (are) correct regarding the tangential velocities v_f, v_b and the angular displacements θ_f, θ_b of the front and the rear wheels, when the bicycle is moving without slipping?

- ◯ $\theta_f > \theta_b$ and $v_f = v_b$
- ◯ $\theta_f < \theta_b$ and $v_f < v_b$
- ◯ $\theta_f < \theta_b$ and $v_f = v_b$
- ◯ $\theta_f > \theta_b$ and $v_f > v_b$
- ◯ $\theta_f = \theta_b$ and $v_f < v_b$

Question 6

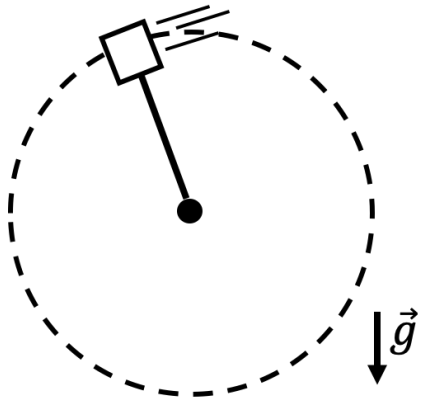
6 pts

A vinyl record with radius 0.1 m is rotating on a turntable at 78 revolutions per second. At t = 0 s we stop the record player causing the vinyl record to slow down with a constant angular acceleration of 95 s^{-2}. How long does it take for the record to come to rest? (Note: we have used Mazur's convention to drop "rad." in the units for angular acceleration and speed).

- ◯ 0.4 s
- ◯ 0.5 s
- ◯ 5.2 s
- ◯ 0.8 s
- ◯ 2.6 s

Question 7

6 pts

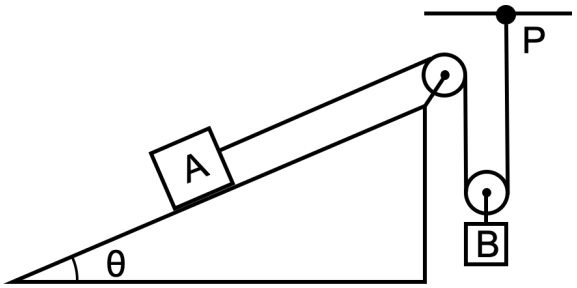


A pendulum consisting of a block at the end of a string traces a circular path in a vertical plane as shown in the figure. Starting from rest, the pendulum is given a kick so that it rotates counterclockwise (as shown), and at the top of its trajectory the tension in the string is nearly zero. Which of the following unlabeled free body diagrams best represents the forces acting on the block at the moment shown? Neglect air resistance.

- ◯

None of these

Question 8 6 pts

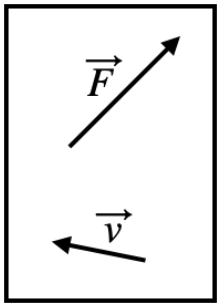


Two blocks are attached by a pulley system as shown. Block A rests on a frictionless incline. The rope is fixed to the ceiling at point P. The blocks are motionless. If the inertia of block B is half the inertia of block A, what is the angle θ that the incline makes with the horizontal?

- ○ 0.25º
- ○ 14º
- ○ 76 º
- ○ 30 º
- ○ None of these

Question 9

6 pts



An object moving at velocity $\vec{v}$ experiences a single external force $\vec{F}$. The vectors for $\vec{v}$ and $\vec{F}$ at a particular instant in time are shown. Select the statements that best represent the motion of the object at that instant.

I. Speeding up

II. Slowing down

III. Turning clockwise

IV. Turning counter clockwise.

- ◯ IV only
- ◯ II and IV
- ◯ I and III
- ◯ III only
- ◯ II and III

Question 10 6 pts

A monkey in a tree throws a banana at a person on the ground. The monkey throws the banana horizontally at speed 9.0 m/s, and it hits the ground 9.0 m from the tree. What is height from which the banana was thrown?

- ◯ 3.9 m
- ◯ None of these
- ◯ 1.0 m
- ◯ 2.0 m
- ◯ 4.9 m

Question 11

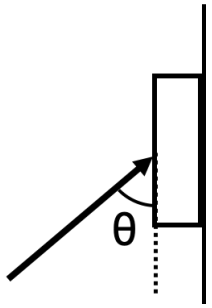
6 pts

A moving object is temporarily experiencing two forces given by $\vec{F}_1 = (2.0\hat{i} + 1.5\hat{j})$ N and $\vec{F}_2 = (-1.0\hat{i} - 2.5\hat{j})$ N. The object is constrained to move in the $\hat{j}$ direction. What is total amount of work done on the object by the two forces over a displacement of 3.0 m in the positive $\hat{j}$ direction?

- ◯ 3.0 J
- ◯ 12 J
- ◯ 16 J
- ◯ -3.0 J
- ◯ -12 J

Question 12

6 pts

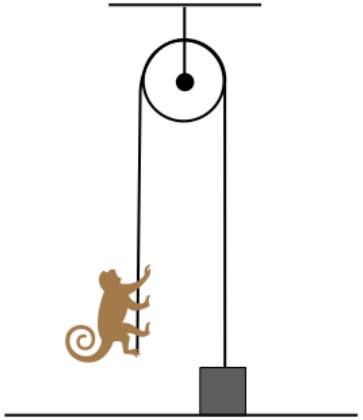


A person washes a vertical window with a sponge. For each swipe they apply a constant force of 5.0 N to the sponge that makes an angle of 30^o with respect to the window. If the sponge moves at a constant speed of 1.0 m/s under this force, how much work is done by the person on the system of the sponge and window in 0.50 seconds?

- ◯ 1.3 J
- ◯ None of these
- ◯ 8.7 J
- ◯ 2.2 J
- ◯ 0.39 J

Question 13

6 pts



A 10 kg monkey holds on to one end of a rope that runs over a frictionless pulley and is attached to a package, which is at rest on the ground. The monkey starts to climb up the rope with a constant upward acceleration of 10 m/s^2. What is the maximum inertia of a package that can be lifted off the ground?

- ◯ 1.0 kg
- ◯ 190 kg
- ◯ 8.0 kg
- ◯ 20 kg
- ◯ 10 kg

Question 14

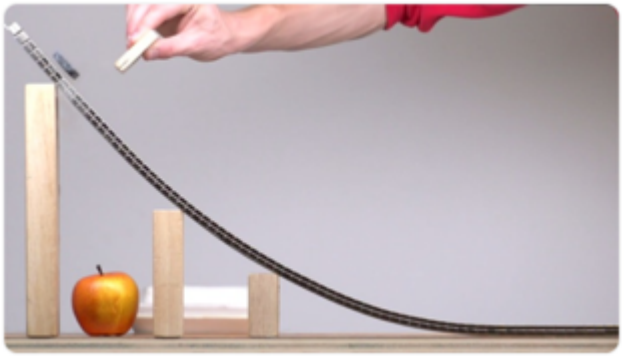
5 pts

In the Pivot Interactives “Boy on the Surfboard” video, a student determines the mass of the board given that the boy’s mass is 20 kg and uses measurements from the video to calculate the board’s mass. The boy moves 0.50 m to the right and the board moves 0.30 m to the left with respect to the water. Which of the following is closest to the percent error of the measurement calculated using the data from the video of the board mass if the mass of the board is 37 kg?

- ◯ 10%
- ◯ 12%
- ◯ 6%
- ◯ 8%

Question 15

5 pts



In the Pivot Interactives video “Math Modeling: Height vs Velocity”, the speed at the bottom of the ramp is measured for several different launch heights. A student plotted v^2 vs h, but didn’t get a linear relationship. Assuming that the student didn't make a mistake with the measurements, which of the following could explain their results:

I. The model doesn’t take the curvature of the ramp into consideration.

II. The model assumes that friction is negligible and it is possibly non-negligible.

III. The model assumes that the ramp is completely horizontal at the end, and it may be slightly sloped.

- ◯ II and III
- ◯ II only
- ◯ I and II
- ◯ I, II, and III
- ◯ I only
- ◯ III only

Question 16

3 pts

A student is analyzing the motion of an object on a Pivot Interactives video using the ruler and timer tools. The student's data are shown in the table.

Time (s)	*Position (cm)*
0.00	-30.0
2.00	-21.9
4.00	-15.3
6.00	-10.2
8.00	-6.7
10.00	-4.7
12.00	-4.3

Which of the following models for the object's motion is the best description of the data above?

- ◯ Constant velocity motion
- ◯ Constant acceleration motion in which the object is speeding up
- ◯ Constant acceleration motion in which the object is slowing down
- ◯ Some other kind of accelerated motion in which the object is slowing down
- ◯ Some other kind of accelerated motion in which the object is speeding up

Question 17

3 pts

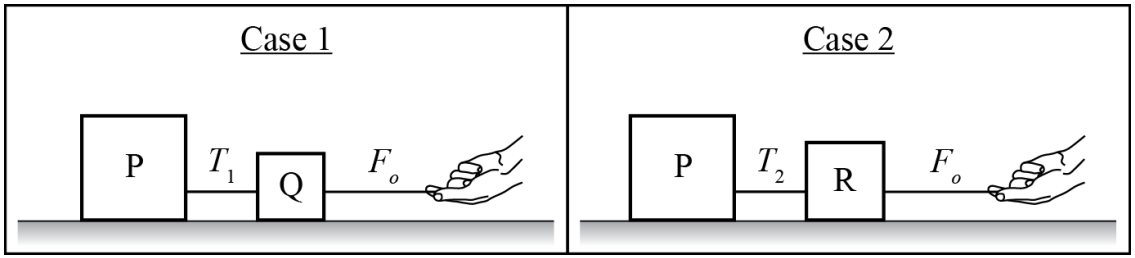
Restate your choice from the previous question and explain your reasoning.

HTML Editor

Question 18

6 pts

Two blocks are pulled by a force, F_o, on a level, frictionless surface as shown. The inertia of block R in case 2 is greater than the inertia of block Q in case 1.



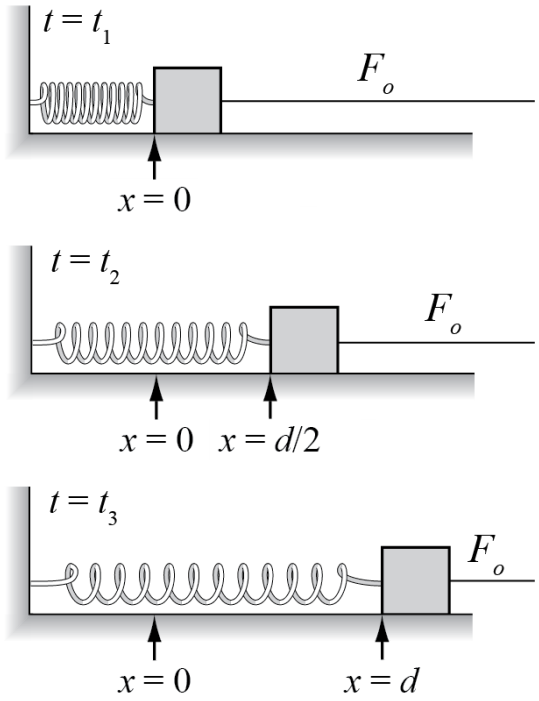
Is the tension in the string pulling block P in case 1, T_1, *greater than*, *less than*, or *equal to* the tension in the string pulling block P in case 2, T_2?

- ◯ Greater than
- ◯ Less than
- ◯ Equal to
- ◯ Not enough information

Question 19

6 pts

A block is attached to a wall by a massless spring, as shown. The spring is initially at its equilibrium length, and there is no friction between the block and the surface.



At time t_1, a string begins pulling the block to the right with a constant force F_o. At time t_2, the block is at distance $d/2$ from its initial position. The block moves another distance $d/2$ before turning around and returning to the left; the block reaches the turnaround point at time t_3.

Consider the system B, which consists of the block. Is the work done by the string on system B from t_2 to t_3 *greater than*, *less than*, or *equal to* the work done by the spring on system B from t_2 to t_3?

- ◯ Not enough information
- ◯ Equal to
- ◯ Greater than
- ◯ Less than

Question 20

6 pts

Explain your reasoning for your answer to the previous question.

HTML Editor

Not saved

Submit Quiz