Arfaz Hossain **p110-202201**
Assignment Assignment5-SecondLaw due 02/18/2022 at 11:59pm PST

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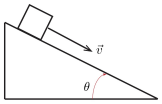
1. (1 point)
Student Name: Arfaz Hossain
Student ID: V00984826

A box of mass $m = 11.1$kg slides down a rough slope with an initial speed of $4.37\frac{\text{m}}{\text{s}}$ in the direction shown.
The slope makes an angle $\theta = 12.28°$ with the horizontal, and the coefficient of kinetic friction between the box and the slope is $\mu = 0.569$.



(The input below will accept answers with no more than 1
What is the rate of change of the speed of the box? A positive answer means the acceleration is down the slope and a negative answer means the acceleration is up the slope.
$\frac{d|\vec{v}|}{dt} =$ _____ $\frac{\text{m}}{\text{s}^2}$
UVic Problem ID: 29301611324924130
Student Name: Arfaz Hossain
Student ID: V00984826
Correct Answers:

- -3.364

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2. (1 point)
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A car of mass $m = 2620$kg drives on a horizontal, circular racetrack.
The racetrack has a radius of $r = 150.6$m.
The coefficient of static friction between the car's tires and the racetrack is $\mu = 0.604$.

(The input below will accept answers with no more than 1
The car travels at a constant speed $|\vec{v}| = 18.7\frac{\text{m}}{\text{s}}$. What is the magnitude of the friction force on the car?
$\left|\vec{F}_f\right| =$ _____ N
The car travels at $|\vec{v}| = 18.7\frac{\text{m}}{\text{s}}$. What is the maximum possible rate of change of the car's speed? Note that a component of the friction force along the direction of motion would produce a change in speed?
_____ $\frac{\text{m}}{\text{s}^2}$
UVic Problem ID: 29301611324924130
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Correct Answers:

- 6083.584
- 5.445

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3. (1 point)
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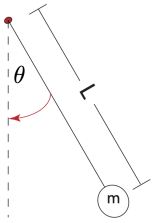
A ball of mass $m = 6.27$kg is suspended from a fixed point by a massless rope.
The rope is length $L = 4$m.
The ball moves in a horizontal circle at constant speed subject to the force from this rope and the downward force of gravity, so that the rope forms a conical shape with the surface at an angle of 20.8° from the vertical, as shown below.



(The input below will accept answers with no more than 1
What is the speed of the ball?
_____ $\frac{\text{m}}{\text{s}}$
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Correct Answers:

- 2.300

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4. (1 point)
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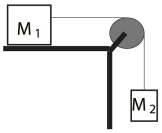
A box of mass $M_1 = 15.18$kg is on a rough horizontal surface with which it has a coefficient of kinetic friction μ.
This box is connected to a second box of mass $M_2 = 12.66$kg which is suspended against gravity by a massless rope which goes over a massless and frictionless pulley.



The acceleration of M_2 is $\vec{a}_2 = -2.84\frac{\text{m}}{\text{s}^2}\hat{k}$.
(The input below will accept answers with no more than 1
What is the coefficinet of kinetic friction μ?
_____
UVic Problem ID: 29301611324924130
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Correct Answers:

- 0.303

5. (1 point)

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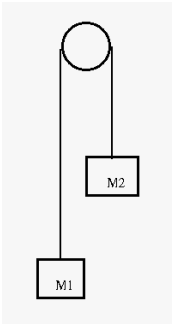
Two masses $M_1 = 5.48\text{kg}$ and $M_2 = 4.59\text{kg}$ are attached to each other via a massless rope which goes over a massless and frictinless pulley as shown.

These masses form a simple Atwood machine.



The masses are released from rest.

(The input below will accept answers with no more than 1

What is the acceleration of M_1?

$\vec{a}_1 =$ _____ $\frac{\text{m}}{\text{s}^2}\hat{k}$

What is the acceleration of M_2?

$\vec{a}_2 =$ _____ $\frac{\text{m}}{\text{s}^2}\hat{k}$

What is the tension in the rope?

$T =$ _____ N

UVic Problem ID: 30301611324924130

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Correct Answers:

- -0.866
- 0.866
- 48.958