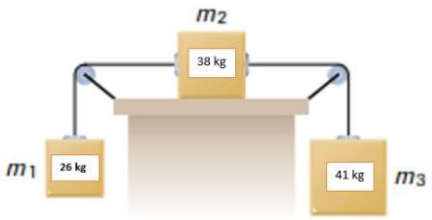
Consider the diagram below and solve the problem. * 1 point

Two strings are connecting the system of masses depicted below. The masses of each block are shown on the diagram. Friction is considered negligible in this situation. What is the magnitude of the **acceleration of the system**, and the magnitude of the **tension** in both the **left and right strings**?



$a = 1.6$ m/s/s
$F_{TL} = 3.1 \times 10^2\ N$
$F_{TR} = 3.6 \times 10^2\ N$

Option 4

$a = 1.0$ m/s/s
$F_{TL} = 2.5 \times 10^2\ N$
$F_{TR} = 3.0 \times 10^2\ N$

Option 1

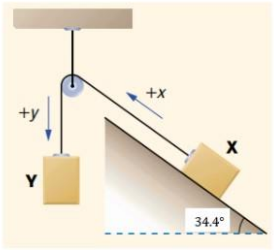
$a = 1.2$ m/s/s
$F_{TL} = 2.7 \times 10^2\ N$
$F_{TR} = 3.2 \times 10^2\ N$

Option 2

$a = 1.4$ m/s/s
$F_{TL} = 2.9 \times 10^2\ N$
$F_{TR} = 3.4 \times 10^2\ N$

Option 3

The diagram below contains two blocks, X & Y, connected by a single rope. Assume that the pulley is frictionless. What is the **magnitude of the acceleration** of the system, if Block X is 5.07 kg and Block Y is 3.14 kg? *Note: the direction of the system's acceleration has been provided on the diagram (i.e., +x and +y).*



0.326 m/s/s

Option 3

0.329 m/s/s

Option 4

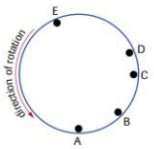
0.323 m/s/s

Option 2

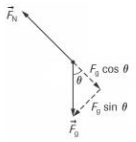
0.320 m/s/s

Option 1

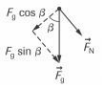
Below is a diagram representing a rotating cement mixer. The direction of rotation is indicated on the diagram. Each of the points below (A through E) represent a chunk of cement undergoing **centripetal acceleration** in the vertical plane. Which of the free body diagram options best describes point D?



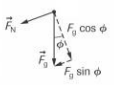
Option 4



Option 1

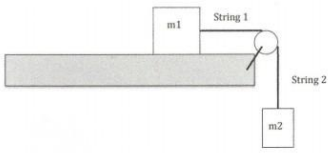


Option 2



Option 3

See the diagram below. Mass 1 is 27kg and Mass 2 is 19kg. What is the coefficient of friction between Mass 1 and the surface such that the system does not move? Hint: Assume the pulley itself is frictionless. * 1 point



$\mu_s = 0.76$

Option 4

$\mu_s = 0.70$

Option 2

$\mu_s = 0.73$

Option 3

$\mu_s = 0.67$

Option 1

See the question below: * 1 point

Rick, an avid skydiver, is falling through the air with his parachute deployed. He recently ate a lot during Thanksgiving and gained 3.0kg from his original 62.0kg. The air resistance on Rick is 505 N [up]. If g = 9.8 m/s/s [down] on Earth, what is the vertical net force on Rick?

141 N [down]

Option 2

138 N [down]

Option 1

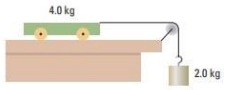
135 N [down]

Option 4

132 N [down]

Option 3

What is the acceleration of the cart shown in the graphic below? Assume that there is a 2.0 N force of friction acting on the cart. * 1 point



3.5 m/s/s [fwd]

Option 4

2.9 m/s/s [fwd]

Option 1

3.1 m/s/s [fwd]

Option 2

3.3 m/s/s [fwd]

Option 3

Solve the problem below. *

1 point

Snowboarding champ, Shaun White, has a mass m and is sliding down a powdery slope that is inclined at an angle ϕ above the horizontal. Which of the following choices best describes the **magnitude of the normal force** on Shaun?

zero

Option 1

$mg \sin \phi$

Option 3

$mg \cos \phi$

Option 4

$mg \tan \phi$

Option 2

See the problem below: * 1 point

A girl of mass 24 kg pushes her 75 kg father forward on frictionless ice.

The father accelerates forward at 0.16 m/s/s.

What is the horizontal force acting on the girl?

4 N [Backward]

Option 3

12 N [Backward]

Option 1

4 N [Forward]

Option 4

12 N [Forward]

Option 2

Below is a near-completed free body diagram of a muskie on a fishing line. 1 point
What force should be labelled beside the top arrow? *

$\vec{F}_T$

Option 4

$\vec{F}_N$

Option 2

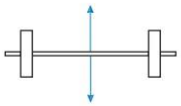
$\vec{F}_g$

Option 3

$\vec{F}_A$

Option 1

Below is a near-completed free body diagram of a barbell being held overhead by a weightlifter. At the peak, the weightlifter was perfectly still. What is the sum of the forces on the barbell during this period of stillness? * 1 point



Inconclusive

Option 1

0 N

Option 3

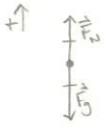
1 N

Option 4

2 N

Option 2

A person is standing in an elevator that is moving upward at constant speed. Is the following free body diagram of the person accurate? * 1 point



Yes

Option 3

No

Option 4

Possibly

Option 1

Not enough information

Option 2

Former professional bodybuilder, Dorian Yates, with a mass of 120 kg, is on an escalator rising at a constant velocity to visit his favourite supplement store. The escalator's velocity is 1.7 m/s at an angle of 18 degrees above the horizontal. What is the magnitude of the net force acting on Dorian?

7.5×10^2 N

Option 3

7.8×10^2 N

Option 4

0 N

Option 1

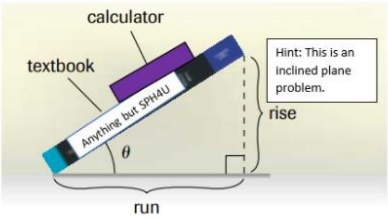
7.2×10^2 N

Option 2

Solve the problem below: *

1 point

In a feat of skill, you managed to balance your calculator on one of your textbooks without having it slide. If the calculator just began to slide when the rise was α cm and the run was β cm, what is the coefficient of static friction?



$\alpha+\beta$

Option 1

$\frac{\alpha}{\beta}$

Option 3

$\alpha\beta$

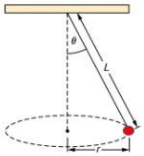
Option 2

$\frac{\beta}{\alpha}$

Option 4

Below is a diagram of a conical pendulum. This pendulum has a mass (the red ball) that moves in a circular fashion on the end of a string, tracing the shape of a cone. If **m = 1.58 kilograms**, **L = 1.21 meters** and $\theta = 29.7°$, what is the **speed** of the ball?

Hint: Consider the force that causes the centripetal acceleration, draw a free body diagram of the red ball, and utilize the component method. The challenge question given in Lesson 2.8 may provide some procedural insight.



1.83 m/s

Option 1

1.92 m/s

Option 4

1.86 m/s

Option 2

1.89 m/s

Option 3

Solve the problem below. Note: the "g" beside 0.53 denotes the Earth's gravitational constant. * 1 point

NASA enlisted you to take care of some calculations. Just after their recent Florida launch, it was determined that the acceleration of the shuttle was approximately 0.53g [up]. The shuttle's total mass, fuel included, was recorded to be 2.2×10^6 kg. Based on these values, what is the **magnitude of the upward force** on the shuttle?

3.5×10^7 N

Option 3

3.1×10^7 N

Option 1

3.3×10^7 N

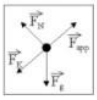
Option 2

3.7×10^7 N

Option 4

The free body diagram of a block being pushed up a rough ramp is best represented by which option below? * 1 point

Option 1



Option 2

Option 4

Option 3

Paolo "The Soundwave" is an amateur street luger. His mass is 85 kg, and his second-hand luge racer is 11 kg. He crossed the finish line travelling at 15 m/s and locked his rubber wheels to a create an ominous skid to the disinterest of all. He stopped in exactly 7.2 seconds.

Calculate the force of friction present in this situation.

$1.6\ x\ 10^2\ N\ [backward]$

Option 2

$1.4\ x\ 10^2\ N\ [backward]$

Option 1

$1.8\ x\ 10^2\ N\ [backward]$

Option 3

$2.0\ x\ 10^2\ N\ [backward]$

Option 4

A healthy raven's heart accelerates 15 g of blood from 7 cm/s to 17 cm/s in the span of 0.06 s. What is the magnitude of the force exerted on the blood by the heart muscle? * 1 point

0.08 N

Option 4

0.06 N

Option 3

0.02 N

Option 1

0.04 N

Option 2

Consider the image and solve the problem below. *

1 point

What is the **centripetal acceleration** of the hour hand on the clock below?

$a_c = 1.1 \times 10^{-7}\ cm/s^2$

Option 1

$a_c = 5.5 \times 10^{-3}\ cm/s^2$

Option 4

$a_c = 1.3 \times 10^{-7}\ cm/s^2$

Option 2

$a_c = 1.5 \times 10^{-7}\ cm/s^2$

Option 3

Solve the problem below. * 1 point

Planet Y travels in an approximate circular orbit, with a **diameter of 9.2 x 10^{12} m** around its local star. The **mass** of *Planet Y* is **1.4 x 10^{26} kilograms**. Analysis has shown that the **gravitational force** of attraction between *Planet Y* and its local star is **6.7 x 10^{20} N**.

What is the **speed** of Planet Y?

4.5 x 10^3 m/s

Option 1

5.1 x 10^3 m/s

Option 4

4.7 x 10^3 m/s

Option 2

4.9 x 10^3 m/s

Option 3