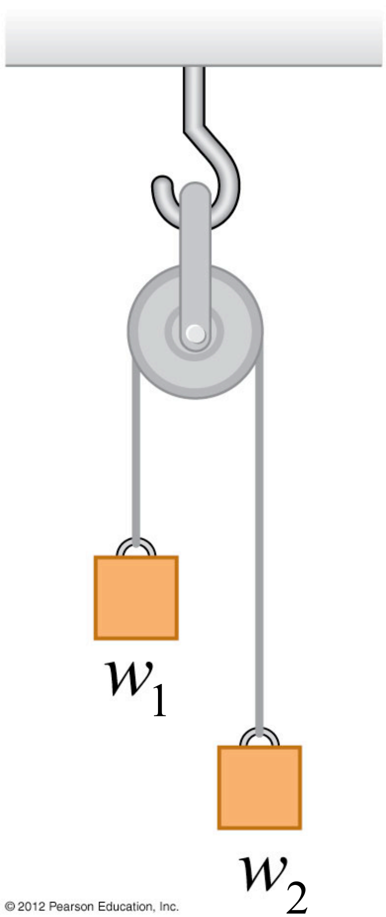
Atwood Machine



Suppose $w_1 = w_2$, arranged as shown with w_1 higher than w_2. The pulley is frictionless and the rope is massless, and the masses begin at rest.

How will the system behave?

A. w_2 will fall, w_1 will rise

B. w_1 will fall, w_2 will rise

C. It won't move at all

D. Need more information

Text 'PHYSJC' and your answer to 22333

Chapter 5.1-2
Applying Newton's Laws

PHYS1210 - Prof. Jang-Condell

Goals for Chapter 5

- To use Newton's first law for bodies in equilibrium
- To use Newton's second law for accelerating bodies
- To study the types of friction and fluid resistance
- To solve problems involving circular motion

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Problem Solving

- We will spend class working through a number of problems
- The precise solution to each problem is not the point
- Pay attention to the **set up** and **methods** used to solve each problem!

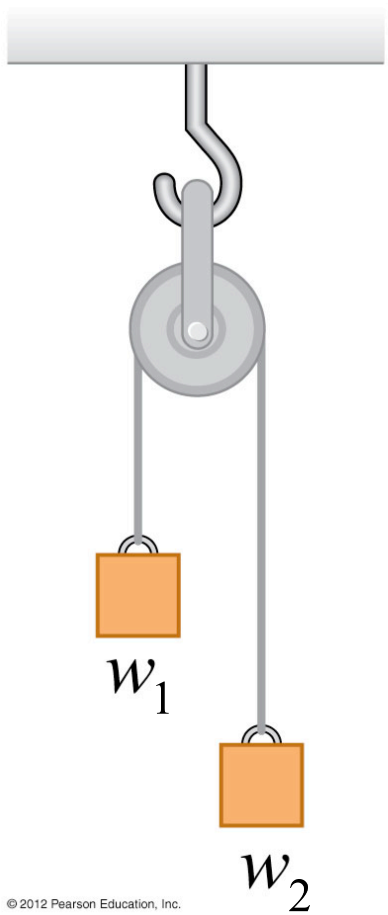
Statics:
Bodies in Equilibrium

- If bodies are at rest or constant velocity, Newton's First Law applies
- $\sum \vec{F} = \vec{0}$
- When net forces cancel, the forces are in **equilibrium**

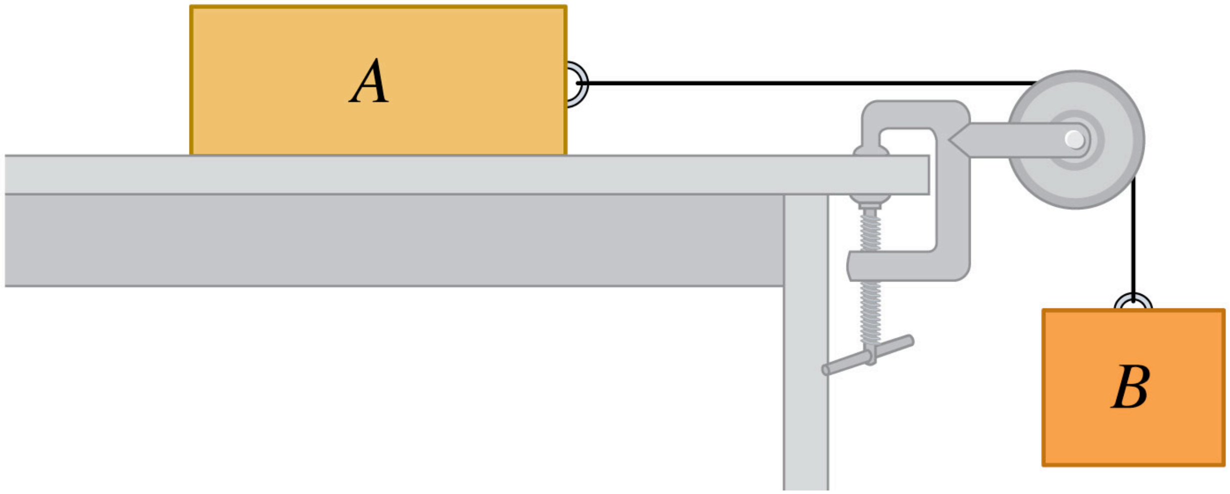
Dynamics:
Bodies in Motion

- If there is a non-zero net force, Newton's Second Law applies
- $\sum \vec{F} = m\,\vec{a}$

Atwood Machine



- What if $w_1 \neq w_2$?
- Find the acceleration of w_1.
- Solve for the tension on the rope.



Assume A is on a frictionless surface. Also assume a frictionless pulley and massless string. What mass of B will cause the system to be in equilibrium?

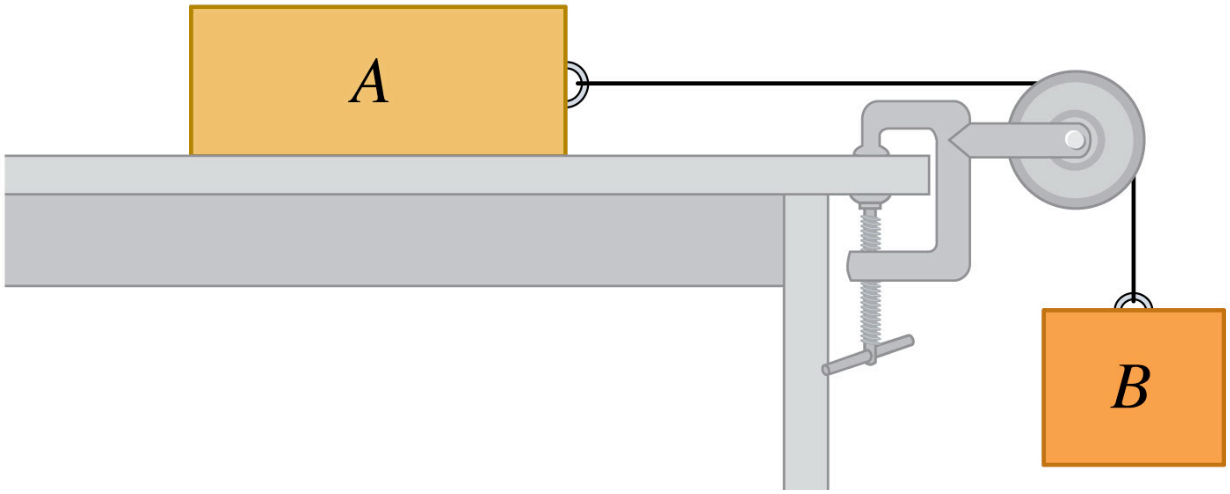
F. The mass of A

G. Half the mass of A

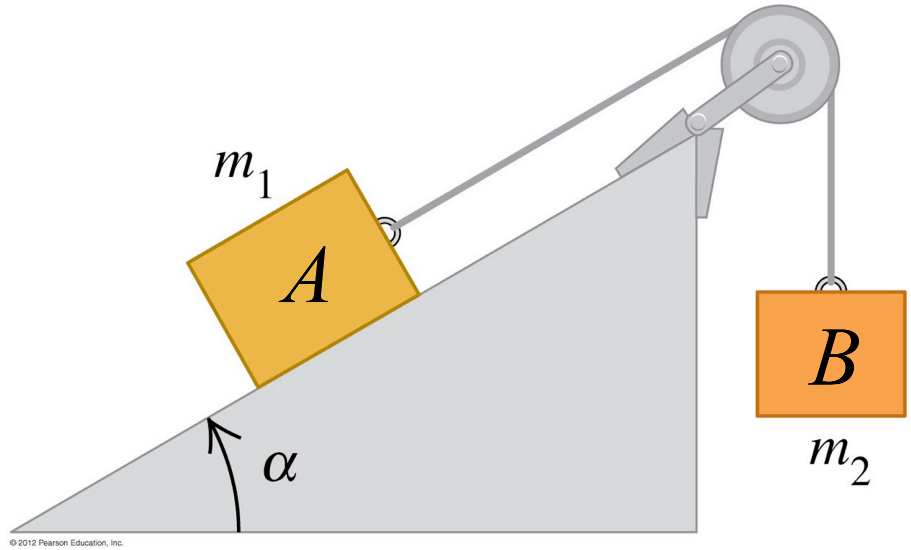
H. Something larger than the mass of A

I. None of the above

Text your answer to 22333



- Assume A is on a frictionless surface. Also assume a frictionless pulley and massless string.
- What is the tension in the string?
- What is the acceleration?



Assume A is on a frictionless surface. Also assume a frictionless pulley and massless string. What mass of B will cause the system to be in equilibrium?

K. m_1

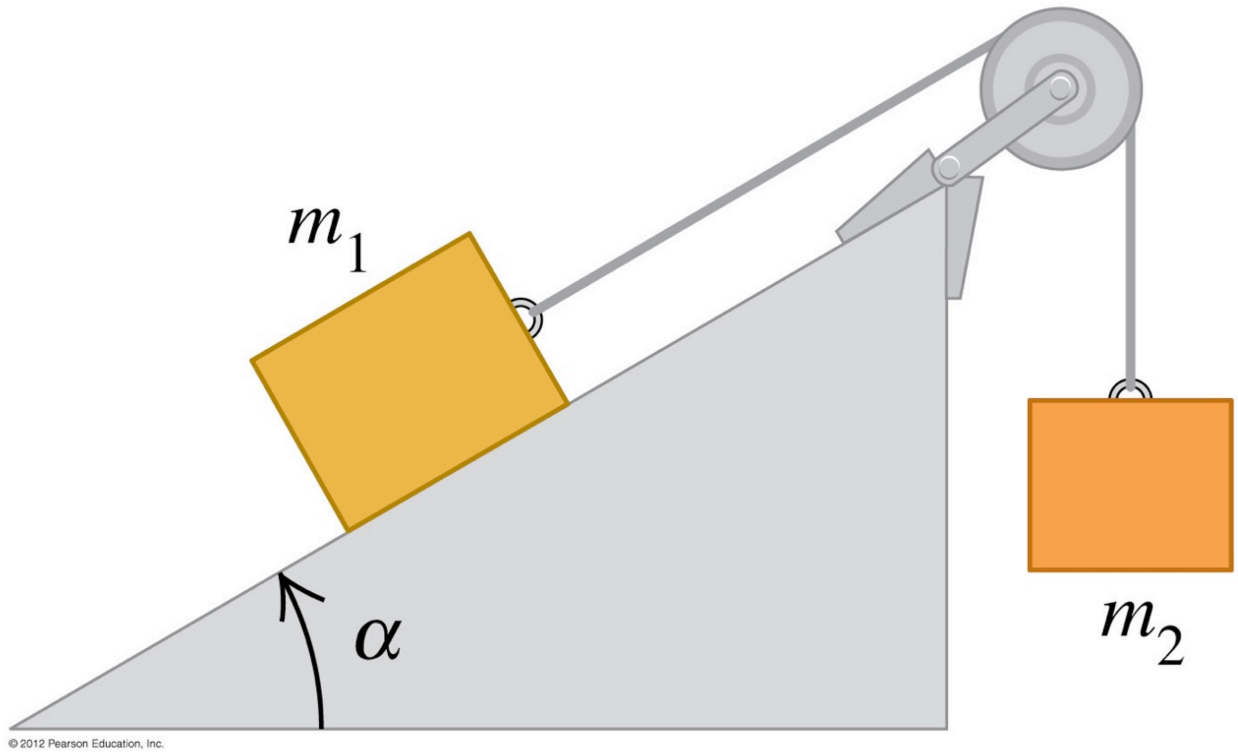
L. $m_1 \sin \alpha$

M. $m_1 \cos \alpha$

N. 0

P. None of the above

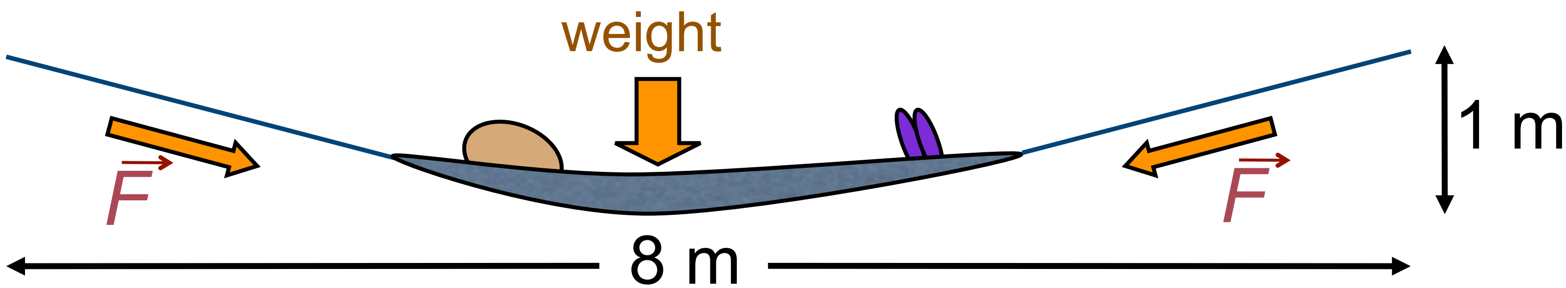
Text your answer to 22333



What is the acceleration of m_2?

What is the tension in the rope?

Concept Question



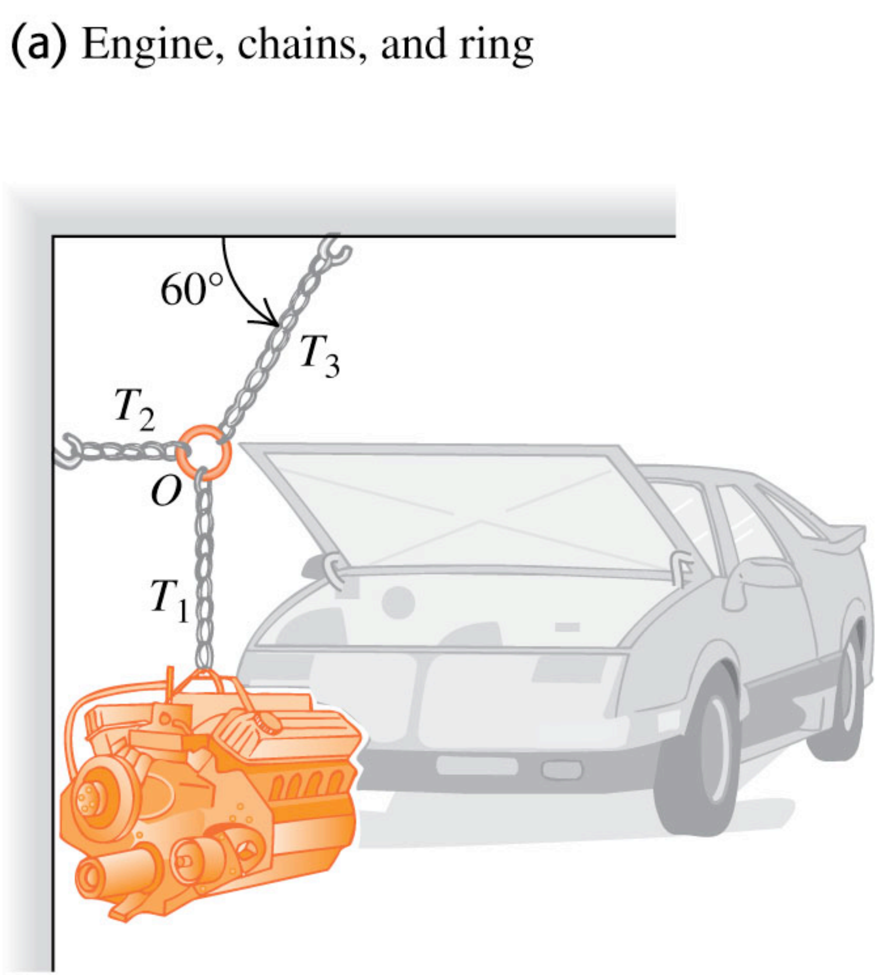
A hammock slung between trees 8 m apart sags 1 m when a person lies in it. The tension of each rope holding the hammock is

Q. Equal to the weight of the person.
R. Half the weight of the person.
S. More than the weight of the person.
T. Less than the weight of the person, but more than half.

Text your answer to 22333

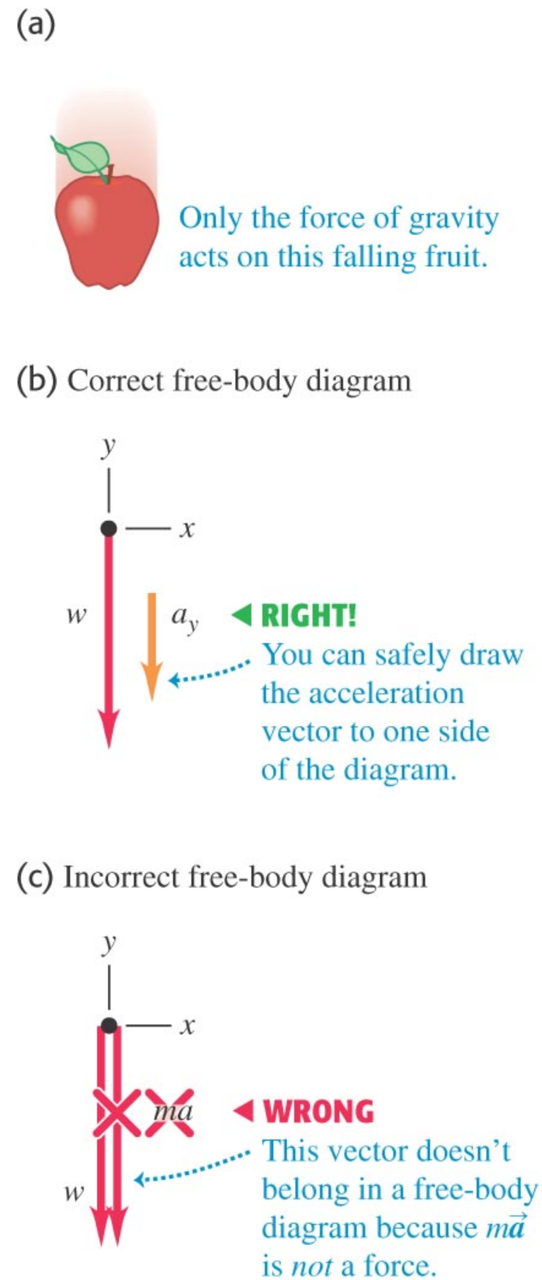
Two-dimensional equilibrium

- A car engine hangs from several chains.
- Follow Example 5.3.



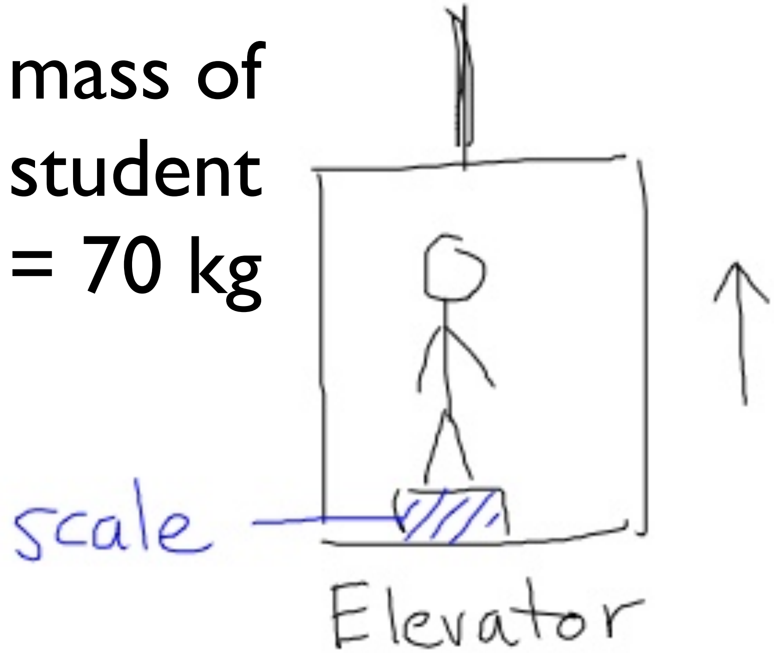
A note on free-body diagrams

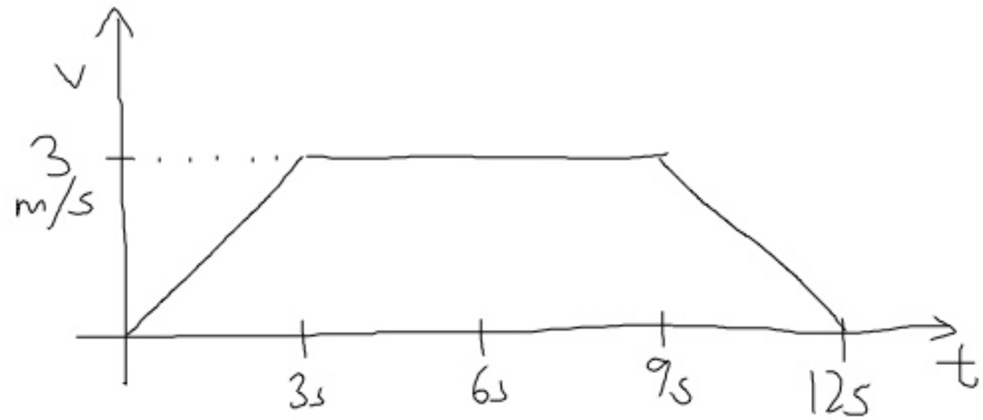
- Refer to Figure 5.6.
- Only the force of gravity acts on the falling apple.
- $m\vec{a}$ does *not* belong in a free-body diagram.



Grad student in an elevator

mass of
student
= 70 kg





Plot the reading of the scale (in Newtons) as the elevator moves upwards