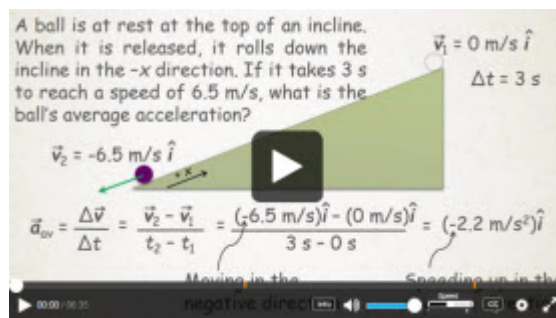


Description: Click Play to watch the video below. Answer the ungraded questions in the video and the graded follow-up questions at right. (a) A driver parked his car on a steep hill and forgot to set the emergency brake. As a result, the car rolled down the hill...

[Constants](#) | [Periodic Table](#)

Click [Play](#) to watch the video below. Answer the ungraded questions in the video and the graded follow-up questions at right.



Part A

A driver parked his car on a steep hill and forgot to set the emergency brake. As a result, the car rolled down the hill and crashed into a parked truck. If the car was moving at 10 mph (4.5 m/s) when it hit the truck 7.0 seconds after it began to move, what was the car's average acceleration while it rolled down the hill? Define the positive x direction to be down the hill.

ANSWER:

- ☐ $1.6 \text{ m/s}^2 \hat{i}$
- ☐ $-1.6 \text{ m/s}^2 \hat{i}$
- ☐ $1.4 \text{ m/s}^2 \hat{i}$
- ☐ $-1.4 \text{ m/s}^2 \hat{i}$
- ☐ $-0.6 \text{ m/s}^2 \hat{i}$
- ☒ $0.6 \text{ m/s}^2 \hat{i}$

The average acceleration is defined as the change in velocity divided by the time interval of that change. Here, the change in velocity is $4.5 \text{ m/s} - 0 \text{ m/s} = 4.5 \text{ m/s}$ in the positive x direction and the time interval is 7 s.

Part B

In a carnival game you roll a ball up a ramp and into a basket. During one attempt, you roll the ball so that it has a velocity of $6.0 \text{ m/s } \hat{i}$ at the bottom of the ramp and $2.0 \text{ m/s } \hat{i}$ at the top (where $\hat{i}$ points up the ramp). If it takes 1.5 s for the ball to roll from the bottom to the top of the ramp, the ball's average acceleration is _____ $\text{m/s}^2 \hat{i}$.

Give the answer with two significant figures.

ANSWER:

-2.7

Also accepted: -2.6, -2.66, -2.67

The ball's average acceleration is $-2.7 \text{ m/s}^2 \hat{i}$. The average acceleration is defined as the change in velocity divided by the time interval of that change. Here, the change in velocity is $2 \text{ m/s } \hat{i} - 6 \text{ m/s } \hat{i} = -4.0 \text{ m/s } \hat{i}$ and the time interval is 1.5 s. The acceleration is a negative value which signifies that the ball is slowing down as it rolls up the ramp.

Part C

You toss a ball straight up by giving it an initial upward velocity of 18 m/s. What is the velocity of the ball 0.50 s after you released it? Define the positive y direction to be upward, the direction that you toss the ball.

ANSWER:

- ☐ -13 m/s $\hat{j}$
- ☐ 23 m/s $\hat{j}$
- ☐ 9.0 m/s $\hat{j}$
- ☐ -9.0 m/s $\hat{j}$
- ☐ -23 m/s $\hat{j}$
- ☒ 13 m/s $\hat{j}$

The velocity is determined using the kinematic equation $\vec{v} = \vec{v}_0 + \vec{a}t$ where $\vec{v}_0$ is the initial velocity of 18 m/s $\hat{j}$ and $\vec{a}$ is the acceleration due to gravity, which is equal to -9.8 m/s² $\hat{j}$. The acceleration due to gravity is negative because its vector always points downward.