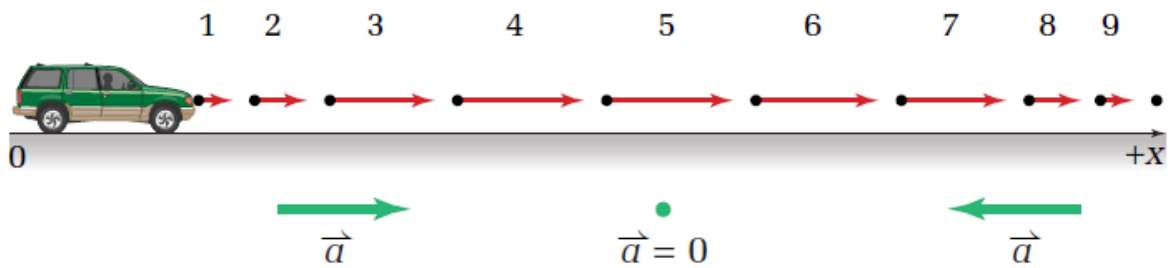
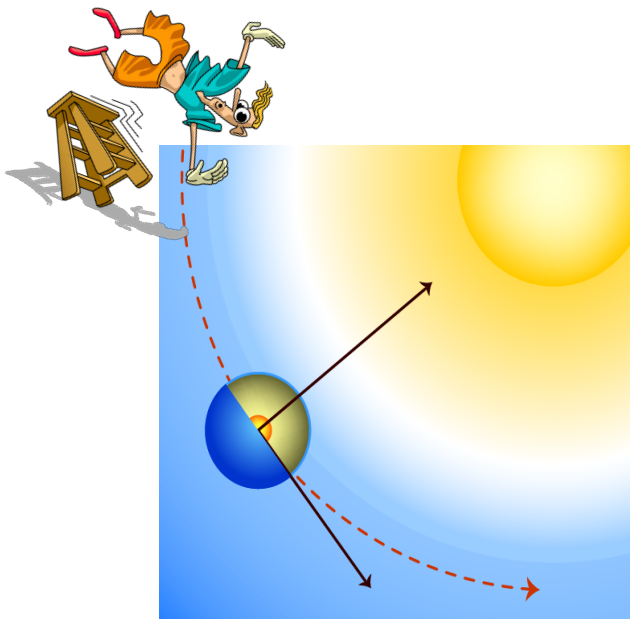


woosh

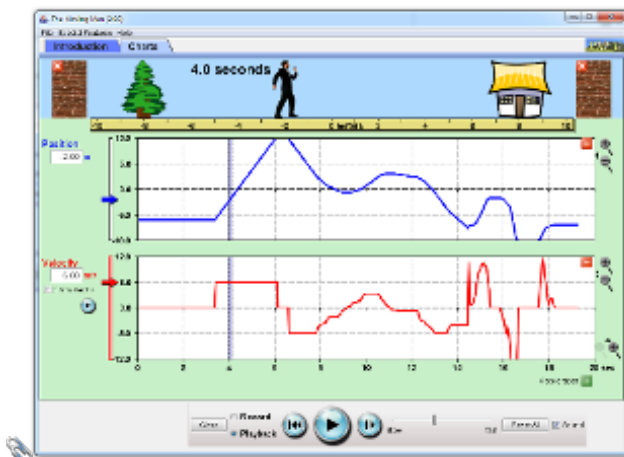
woosh

# ACCELERATION



# The Graphical Analysis of Position & Time

## The Moving Man



\*Use equation feature

## Objectives

- Review Frame of reference and coordinate system.
- Analyze how position can change with time for an accelerating object.
- Learn how to find key points on the graph.
- Develop knowledge about how the graph relates to speed, velocity, distance and position.

## Close Reading: Acceleration

MHR Pg. 61-63 (first paragraph), 64, conceptual problems on 66.

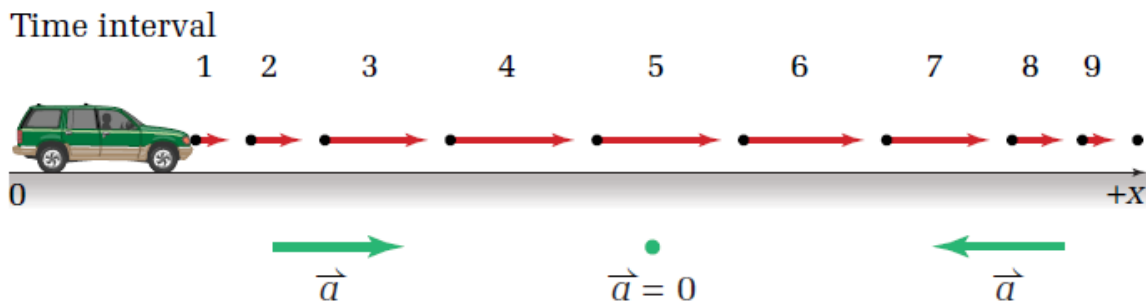
ACCELERATION		
Acceleration is the quotient of the change in velocity and the time interval over which the change takes place.		
$\vec{a} = \frac{\Delta\vec{v}}{\Delta t}$		
Quantity	Symbol	SI unit
acceleration	$\vec{a}$	$\frac{\text{m}}{\text{s}^2}$ (metres per second squared)
change in velocity	$\Delta\vec{v}$	$\frac{\text{m}}{\text{s}}$ (metres per second)
time interval	$\Delta t$	s (seconds)
Unit Analysis		
$\frac{\frac{\text{metres}}{\text{second}}}{\text{second}} = \frac{\frac{\text{m}}{\text{s}}}{\text{s}} = \frac{\text{m}}{\text{s}^2}$		

Velocity = change in position ÷ **time**

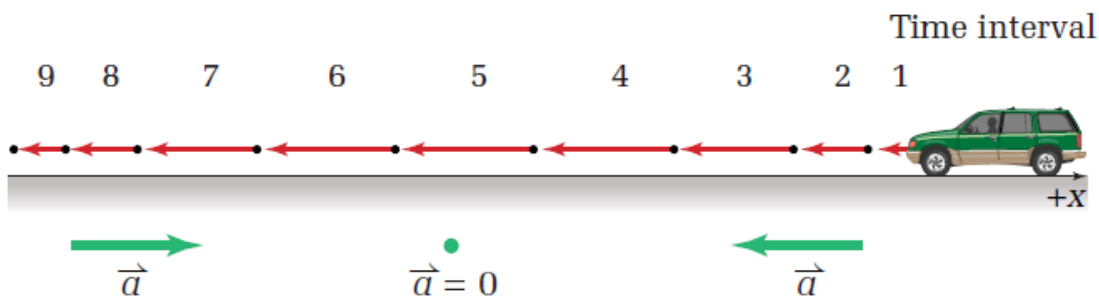
acceleration = change in velocity ÷ **time**

Notice we divided by time **twice**, that is why the unit for acceleration has a **time<sup>2</sup>** in it.

# Visualizing Acceleration



**Figure 2.19** When the van is moving in a positive direction but slowing down, the direction of the acceleration is negative.



**Figure 2.20** When the van is moving in a negative direction and slowing down, the direction of acceleration is positive.

## MISCONCEPTION

### They *Don't* Mean the Same Thing!

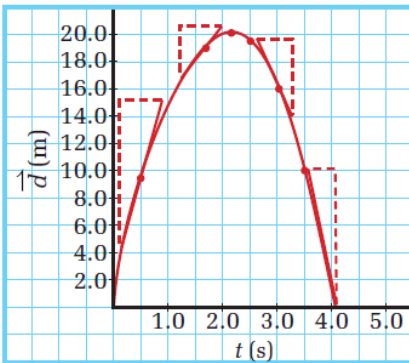
Many people think that *negative acceleration* and *deceleration* mean the same thing — that an object is slowing down.

“Deceleration” is not a scientific term but a common term that people use for slowing down.

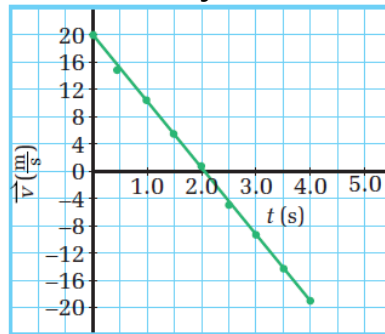
“Negative acceleration” is a scientific term meaning that the acceleration vector is pointing in the negative direction. However, an object with a negative acceleration might be speeding up.

# Graphical Relationships

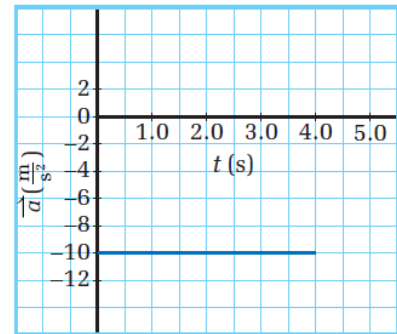
Position-Time



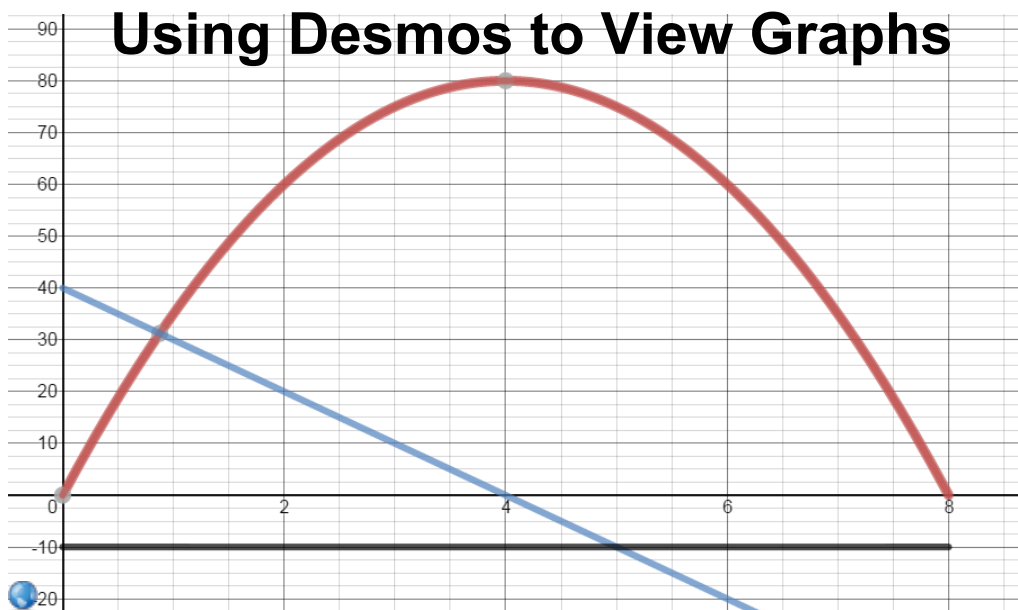
Velocity-Time



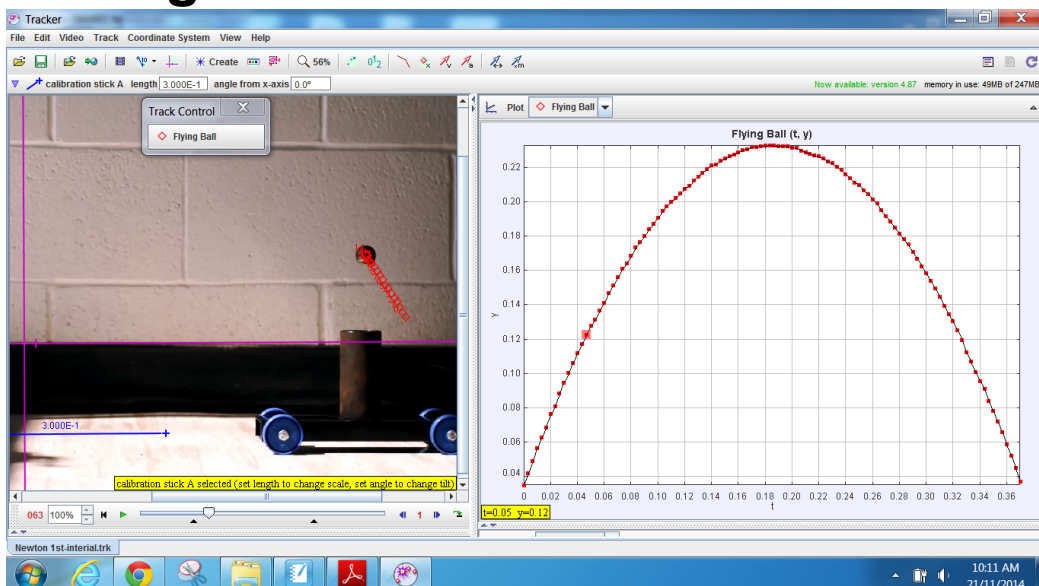
Acceleration-Time



## Using Desmos to View Graphs



## Using Tracker to View Motion Data



### • ***Conceptual Problems***

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- How do intervals of constant acceleration appear on an acceleration-time graph?
  - How do intervals of constant acceleration appear on a velocity-time graph?
  - What does a straight-line slope indicate on an acceleration-time graph?
  - What would a curved line indicate on an acceleration-time graph?
  - Explain circumstances in which an object would be accelerating but have an instantaneous velocity of zero?
  - How does uniform acceleration differ from uniform motion?
-

## Attachments

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moving-man\_all.jar