

Physics

Fall 2026

Weeks 3 - 4

Monday (August 24)

- T: 5C - describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, velocity, frames of reference, and acceleration
- O: I will be able to demonstrate my understanding of velocity and speed
- D: by completing a lab and a worksheet over the concepts.

Wednesday, August 26

- T: **5B** - define scalar and vector quantities related to one- and two-dimensional motion and combine vectors using both graphical vector addition and the Pythagorean theorem
- **5C** - describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, velocity, frames of reference, and acceleration
- O: I will be able to demonstrate the difference between distance and displacement
- D: by creating a map and then analyzing it with vector addition.

Vector Addition

- It doesn't matter what order you combine vectors, so long as you do it head to tail, you will get the same result in the end.

Friday, August 28

- T: 5C - describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, velocity, frames of reference, and acceleration
- O: I will explore the affects of acceleration and on the motion of an object
- D: by participating in a class discussion and solving problems involving freefall.

Acceleration



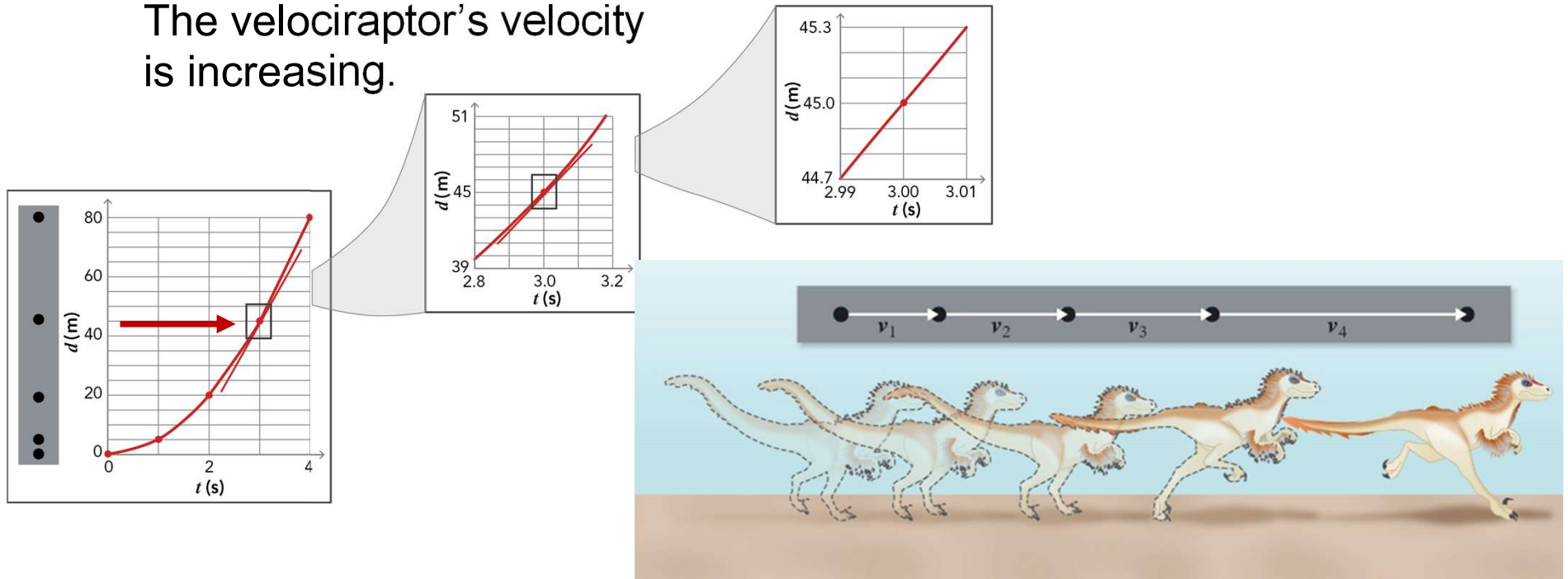
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Instantaneous Velocity

Instantaneous velocity is the average velocity over an infinitesimally small time interval; it is the slope of the tangent line on a position graph.

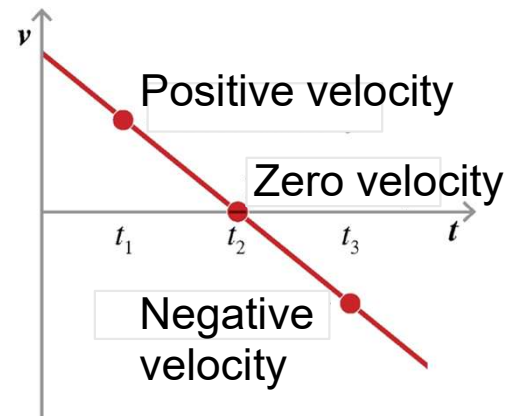
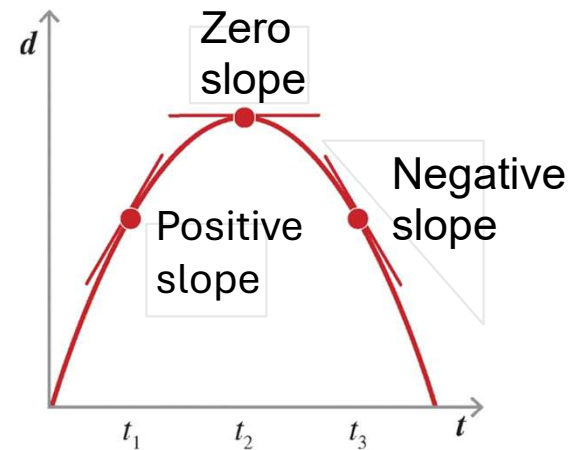
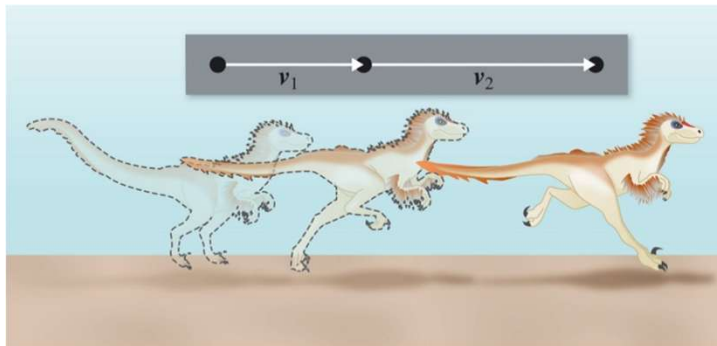
The velociraptor's velocity is increasing.



Graphs of Changing Velocity

The time derivative of a function is the rate at which the value of the function changes with time, which is the slope of the curve at that point.

Use the head-to-tail method to find Δv , the change in velocity of the velociraptor.



Acceleration

Acceleration is a vector that is the time derivative of velocity.

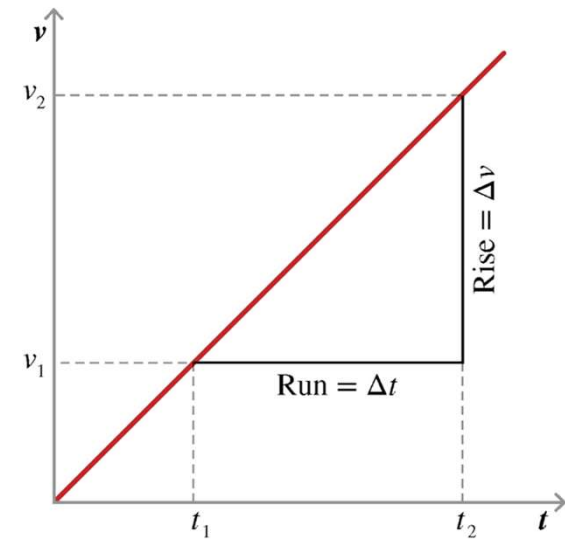
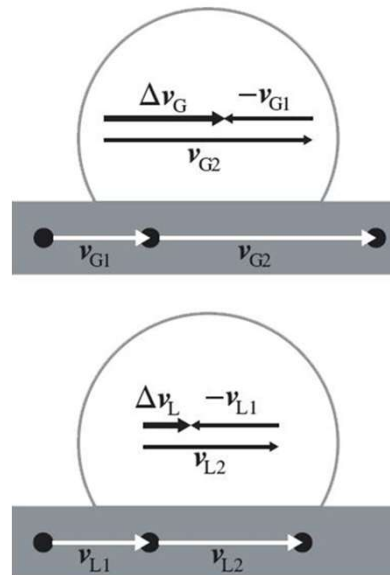
Use the head-to-tail method and the velocity vectors from a dot diagram to determine the direction of the acceleration.

$$a = \frac{v_2 - v_1}{t_2 - t_1} = \frac{\Delta v}{\Delta t}$$

a = acceleration

Δv = change in velocity

Δt = change in time

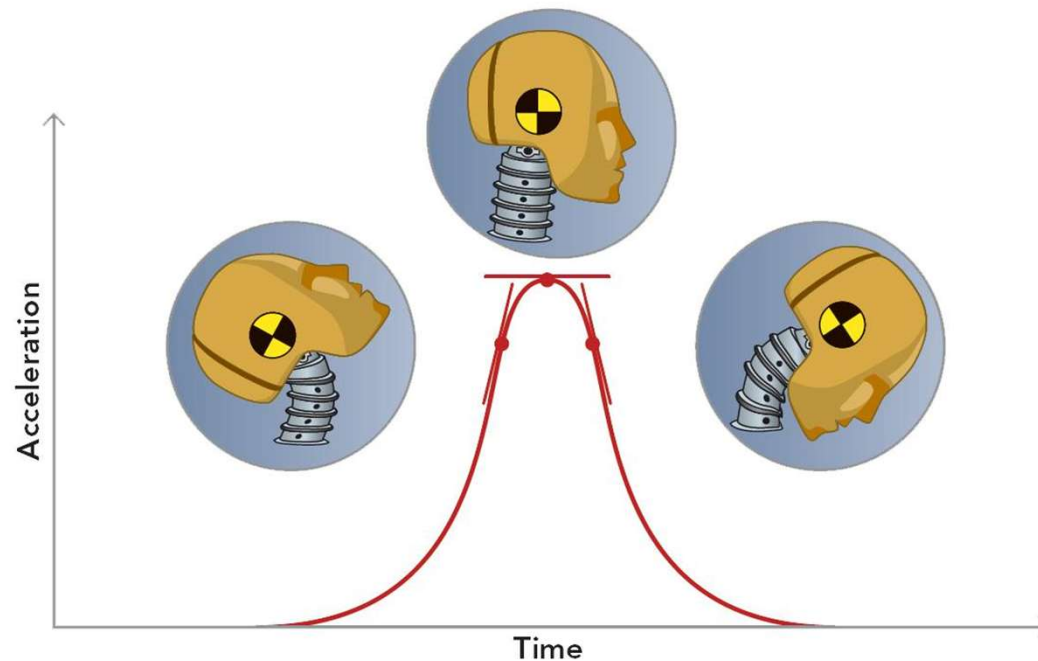


$$\text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta v}{\Delta t}$$

Instantaneous Acceleration

Instantaneous acceleration is the average acceleration over an infinitesimally small time interval. The slope of the tangent at an instant on a velocity vs. time graph is the instantaneous acceleration.

Whiplash
can occur in
a car crash.



Constant Acceleration

The two equations that describe an object's velocity and displacement are called **equations of motion**.

$$v = v_i + at$$

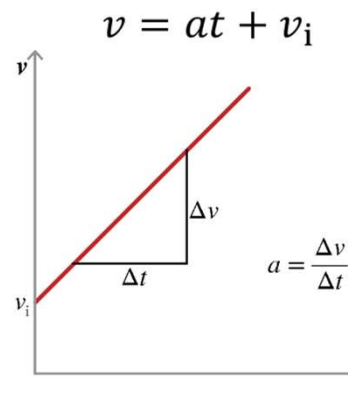
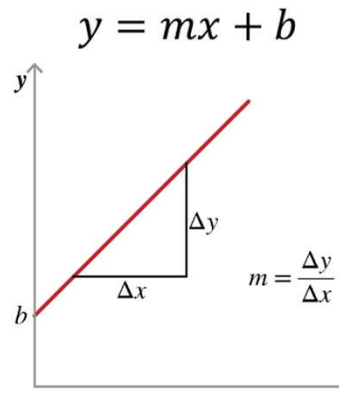
v = velocity

v_i = initial velocity

a =

acceleration

t = time



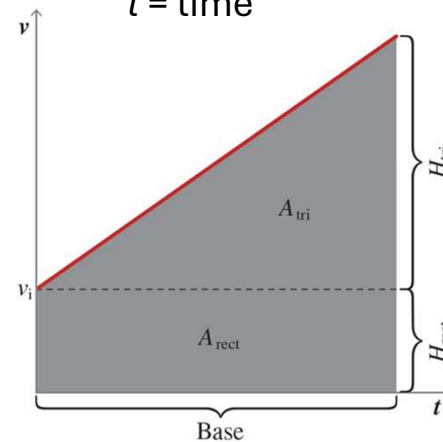
$$\Delta d = v_i t + \frac{1}{2} at^2$$

Δd = displacement

v_i = initial velocity

a = acceleration

t = time



Acceleration Due to Gravity

A body in free fall experiences a constant acceleration toward the center of Earth called acceleration due to gravity, g , which has a constant magnitude of 9.8 m/s^2 toward the ground.

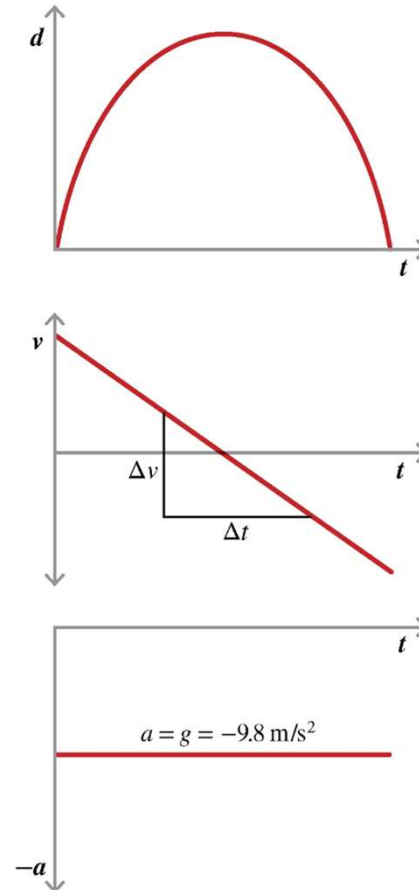
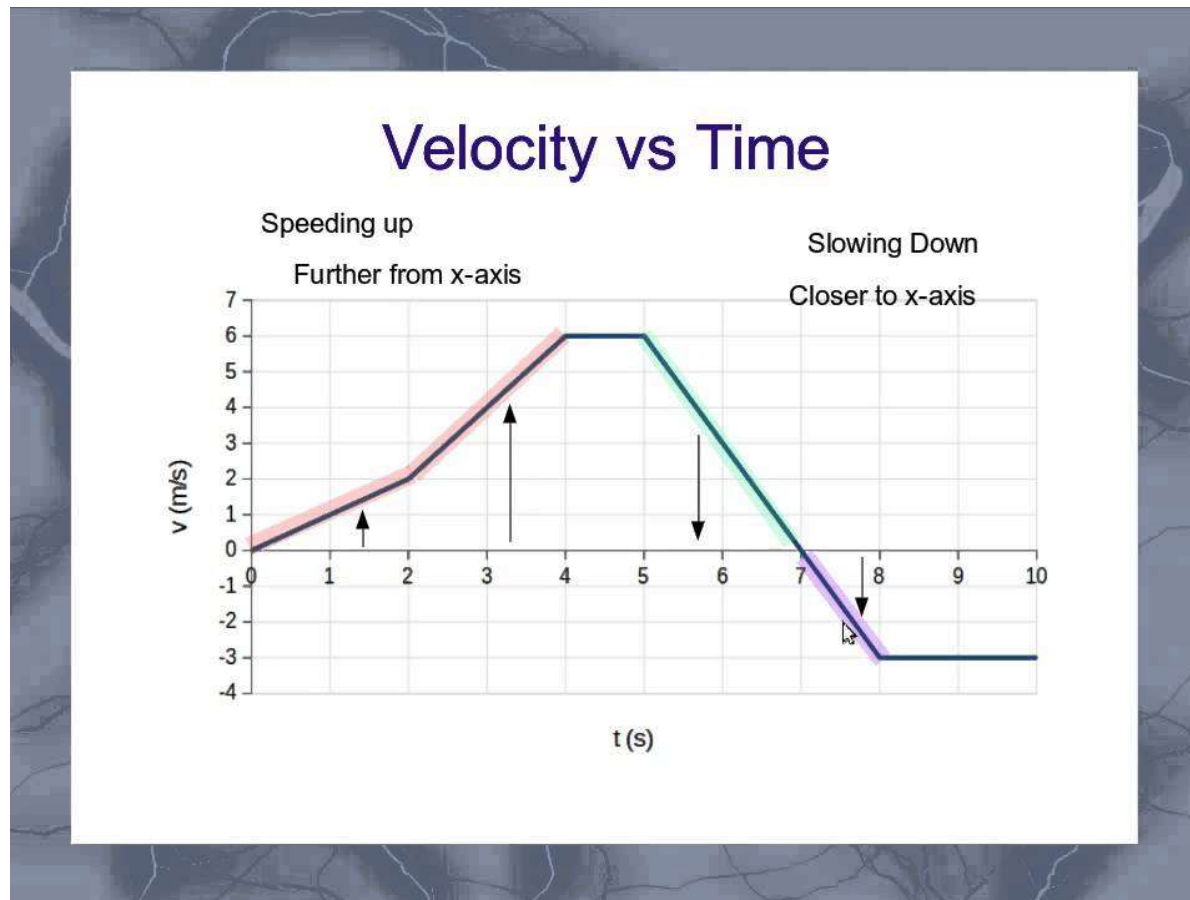


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Graphs for Acceleration (velocity vs time)



Monday – Thursday (Aug 31 – Sept 3)

- BOY Testing

Friday, Sept 4, C-day

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- **5C** - describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, velocity, frames of reference, and acceleration
- O: I will review and show my understanding of d vs t graphs, v vs t graphs, and free fall diagrams
- D: by completing a group discussion and comparing our findings.