Acceleration

Acceleration

$$a = \frac{v_{final} - v_{initial}}{time}$$

Acceleration Units

- Speed/time

Concept Test 1

1. A particular car can go from rest to 90 km/h in 10 s. What is its acceleration?

Concept Test 2

2. In 2.5 s a car increases its speed from 60 km/h to 65 km/h while a bicycle goes from rest to 5 km/h. Which undergoes the greater acceleration? What is the acceleration of each vehicle?

Galileo and the Ramp

- Ball rolls down ramp with constant acceleration
- What is the value when the ramp is vertical?
  - 9.8 m/s/s or 10 m/s/s among friends
  - 32 ft/s/s
  - 21 mi/h/s

Acceleration at the Top

- Velocity at top is zero
- What is the acceleration at the top?

- Ninja – 0 to 60 mi/h in 3.8 s
- 15.8 mi/h/s
- 23 ft/s/s or 7 m/s/s

Constant Acceleration Formulas

$$v_{final} = v_{initial} + a \cdot t$$

$$d_{final} = v_{initial} \cdot t + 0.5a \cdot t^2$$

Formulas That Always Work

Average velocity

$$\vec{v}_{ave} = \frac{change\,in\,position}{time}$$

Average speed

$$v_{ave} = \frac{dist\,traveled}{time}$$

Free Fall From Rest

- How Fast?

t (s)	v (m/s)
0	
1	
2	
3	
4	
5	
t	

How Far?

t (s)	d (m)
0	
1	
2	
3	
4	
5	
t	

Assignment

- Read Chapter 4 – pp. 55 – 65
- Homework 2