

Acceleration

Physics 3050, Lecture 4: Slide 1

Acceleration

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

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Acceleration Units

- Speed/time

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Concept Test 1

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

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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?

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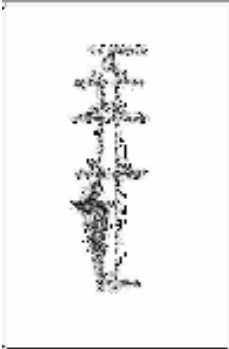
Galileo and the Ramp

- 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



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Acceleration at the Top



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- 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



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Constant Acceleration Formulas

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

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

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Formulas That Always Work

Average velocity $\bar{v}_{ave} = \frac{\text{change in position}}{\text{time}}$

Average speed $v_{ave} = \frac{\text{dist traveled}}{\text{time}}$

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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	

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Assignment

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

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