Physics 121.
Thursday, January 24, 2008.

Thor's Emerald Helmet. Credit & Copyright: Robert Gendler

Physics 121.
Thursday, January 24, 2008.

- Topics:
  - Updated Course Information
  - Review of motion in one dimension
  - Motion in two dimensions:
    - Vectors
    - Position, velocity, and acceleration in two and three dimensions
    - Projectile motion

Physics 121
Updated course information

- The Physics 121 workshops will start on Monday January 28.
- The physics 121 laboratories will start also on Monday January 28.
- There will be no lecture on Thursday 1/31. I will be in Europe from Wednesday 1/30 until Monday 2/4.
- Anyone who did not take the Diagnostic Test on Tuesday 1/22 needs to make up this test on Thursday morning 1/31 at 9.40 am in Hoyt (it will take 45 minutes to complete this Diagnostic Test).

Physics 121 homework set # 1. Due 2/2/08.

Weighted mean of $v(t)$. Use spread sheets!

Error propagation.

Relative velocity.

Integrate v to find d.

Relative velocity.

Relative velocity.

Obtaining a from $x(t)$.

Complicated projectile motion.

Review of motion in one dimension.

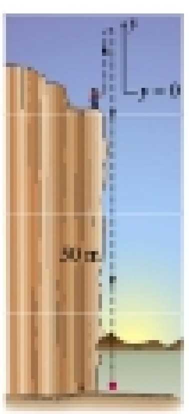
- Translational motion on one dimension can be described in terms of three parameters:
  - The position $x(t)$: units m.
  - The velocity $v(t)$: units m/s.
  - The acceleration $a(t)$: units m/s^2.
- An important special case is the case of constant acceleration (acceleration independent of time)

$$a = \frac{dv}{dt} = \text{constant}$$

$$v(t) = v_0 + a t$$

$$x(t) = x_0 + v_0 t + \frac{1}{2} a t^2$$

Review of motion in one dimension.



$$a = \frac{dv}{dt} = -g$$

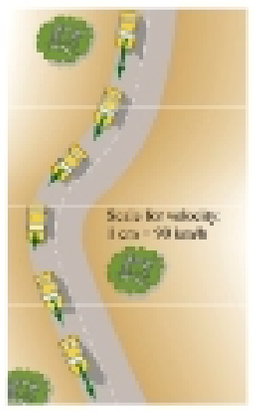
$$v(t) = v_0 - g t$$

$$y(t) = y_0 + v_0 t - \frac{1}{2} g t^2$$

Note: in this format, g is assumed to be the magnitude of the gravitational acceleration.

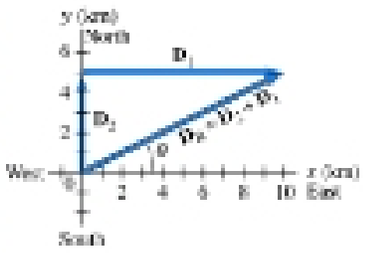
Motion in two or three dimensions. Vectors.

- In order to study motion in two dimensions, we need to introduce the concepts of vectors.
- Position, velocity, and acceleration in two- or three-dimensions are determined by not only specifying their magnitude, but also their direction.



Two-dimensional motion.

- The same displacement can be achieved in many different ways.
- Instead of specifying a heading and distance that takes you from the origin of your coordinate system to your destination, you could also indicate how many km North you need to travel and how many km East.
- In either case you need to specify two numbers and this type of motion is called two dimensional motion.



Vector manipulations.

- Any complicated type of motion can be broken down into a series of small steps, each of which can be specified by a vector.
- I will make the assumption that you have read the details about vector manipulations:
  - Vector addition
  - Vector subtraction