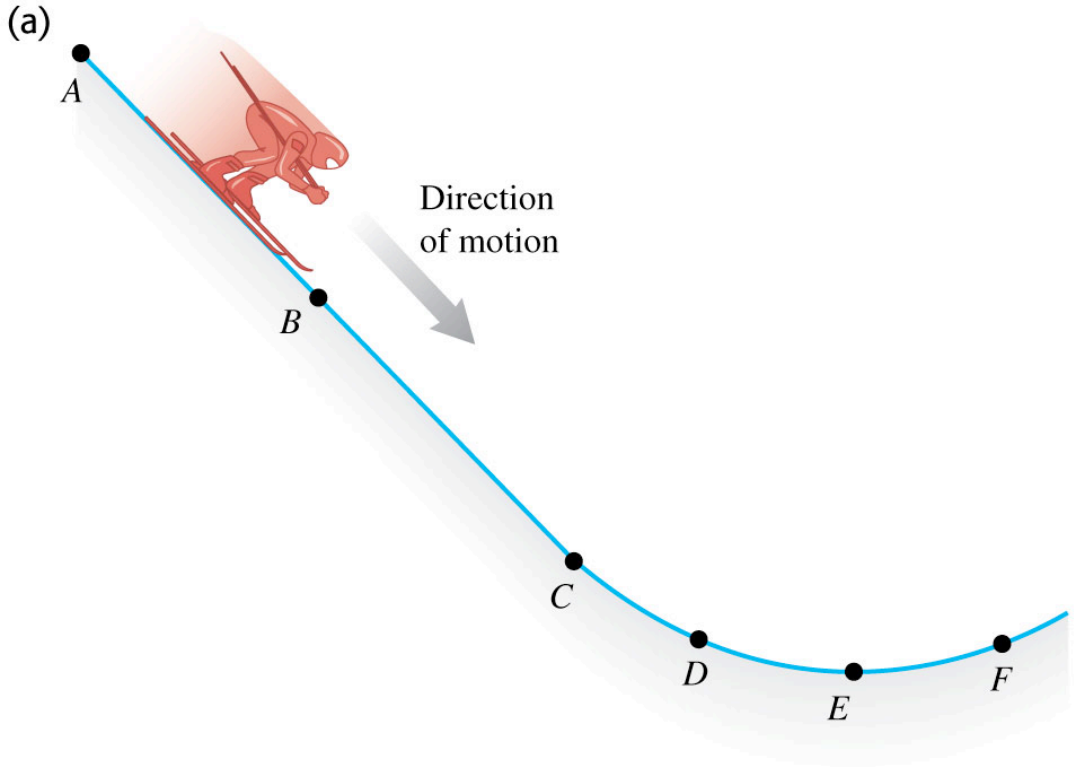
A ski jumper slides down a frictionless ramp as shown below. Draw the acceleration vector at points A-F.



Announcements

- Written Homework #1 due NOW!
- Online homework #1 due 10pm
- Do pre-lab for Lab #1 for next week

Ch 3.3-4: Projectile & Circular Motion

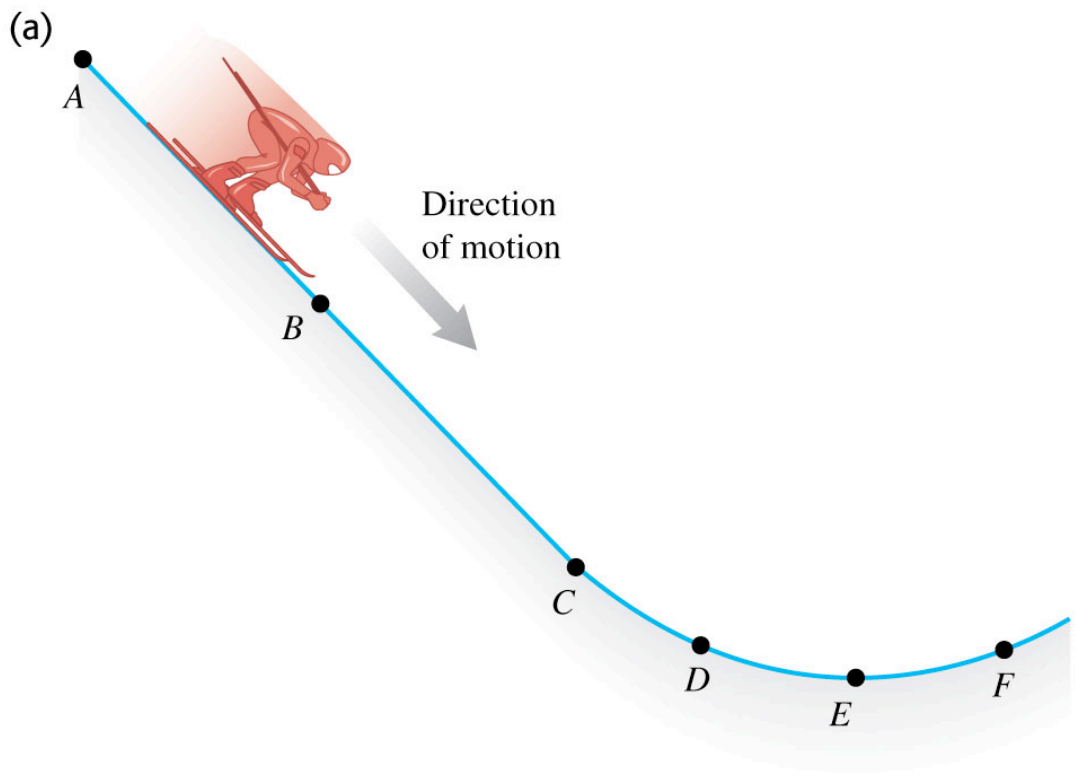
PHYS 1210 - Prof. Jang-Condell

Goals for Chapter 3

- To use vectors to represent the position of a body
- To determine the velocity vector using the path of a body
- To investigate the acceleration vector of a body
- To describe the curved path of projectile
- To investigate circular motion
- To describe the velocity of a body as seen from different frames of reference

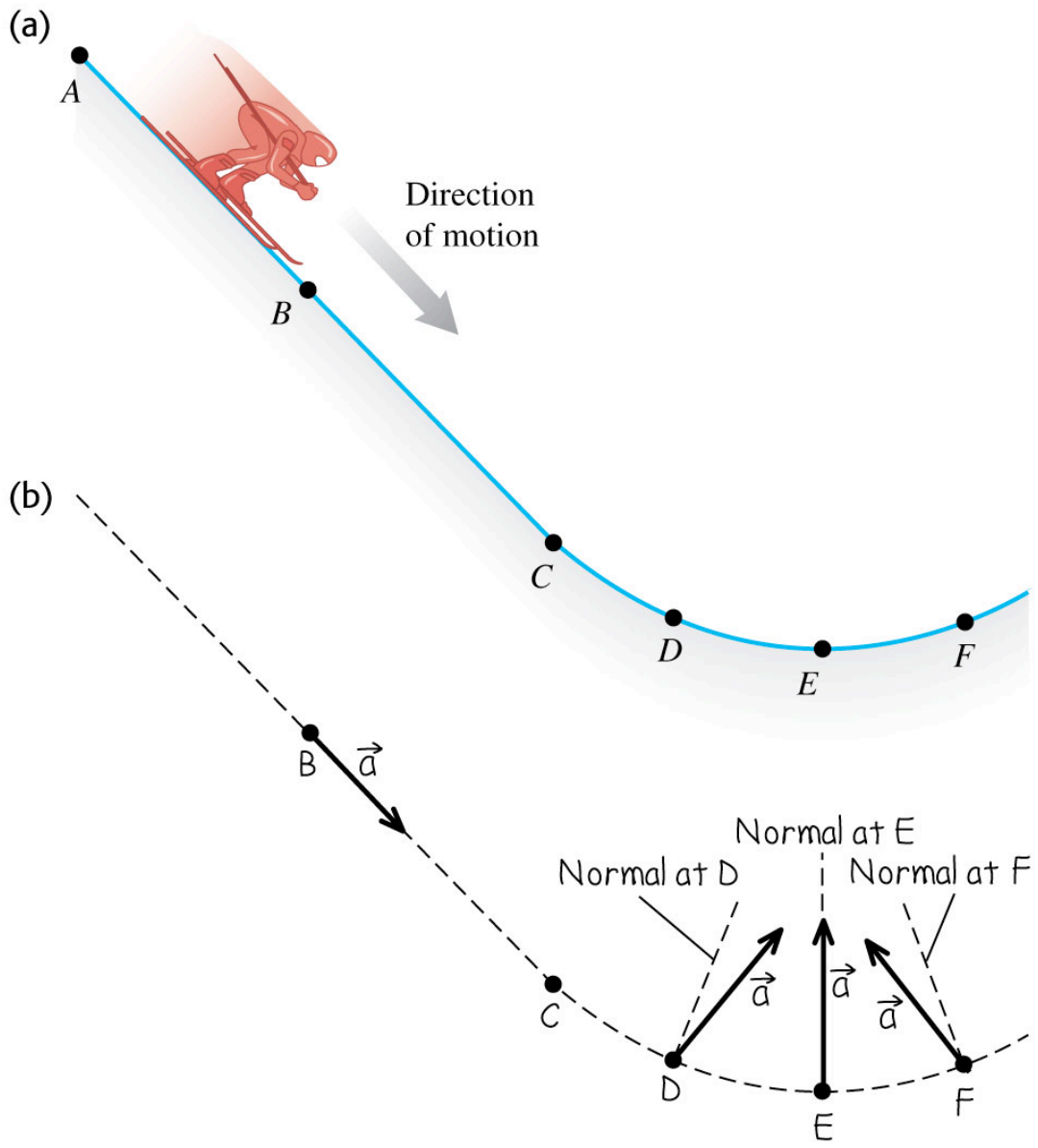
Acceleration of a skier

- Conceptual Example 3.4 follows a skier moving on a ski-jump ramp.



Acceleration of a skier

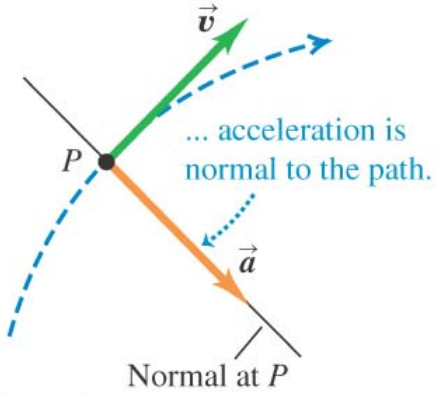
- Conceptual Example 3.4 follows a skier moving on a ski-jump ramp.
- Figure 3.14(b) shows the direction of the skier's acceleration at various points.



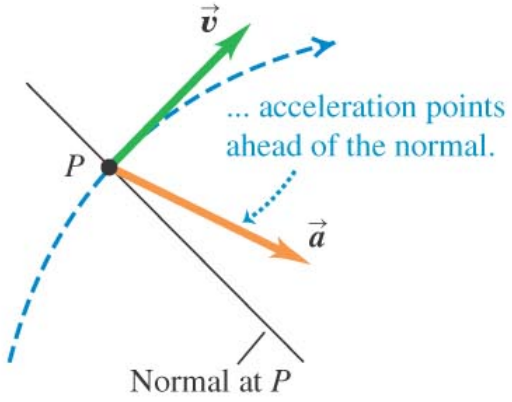
Direction of the acceleration vector

- The direction of the acceleration vector depends on whether the speed is constant, increasing, or decreasing, as shown in Figure 3.12.

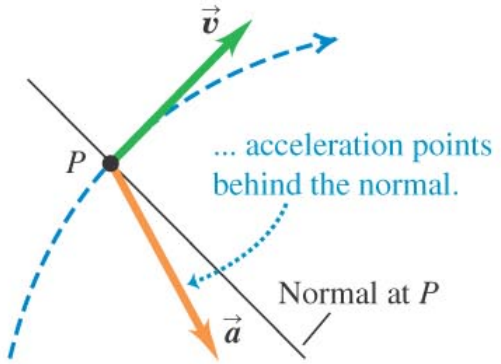
(a) When speed is constant along a curved path ...



(b) When speed is increasing along a curved path ...



(c) When speed is decreasing along a curved path ...



Acceleration of a skier

- Conceptual Example 3.4 follows a skier moving on a ski-jump ramp.
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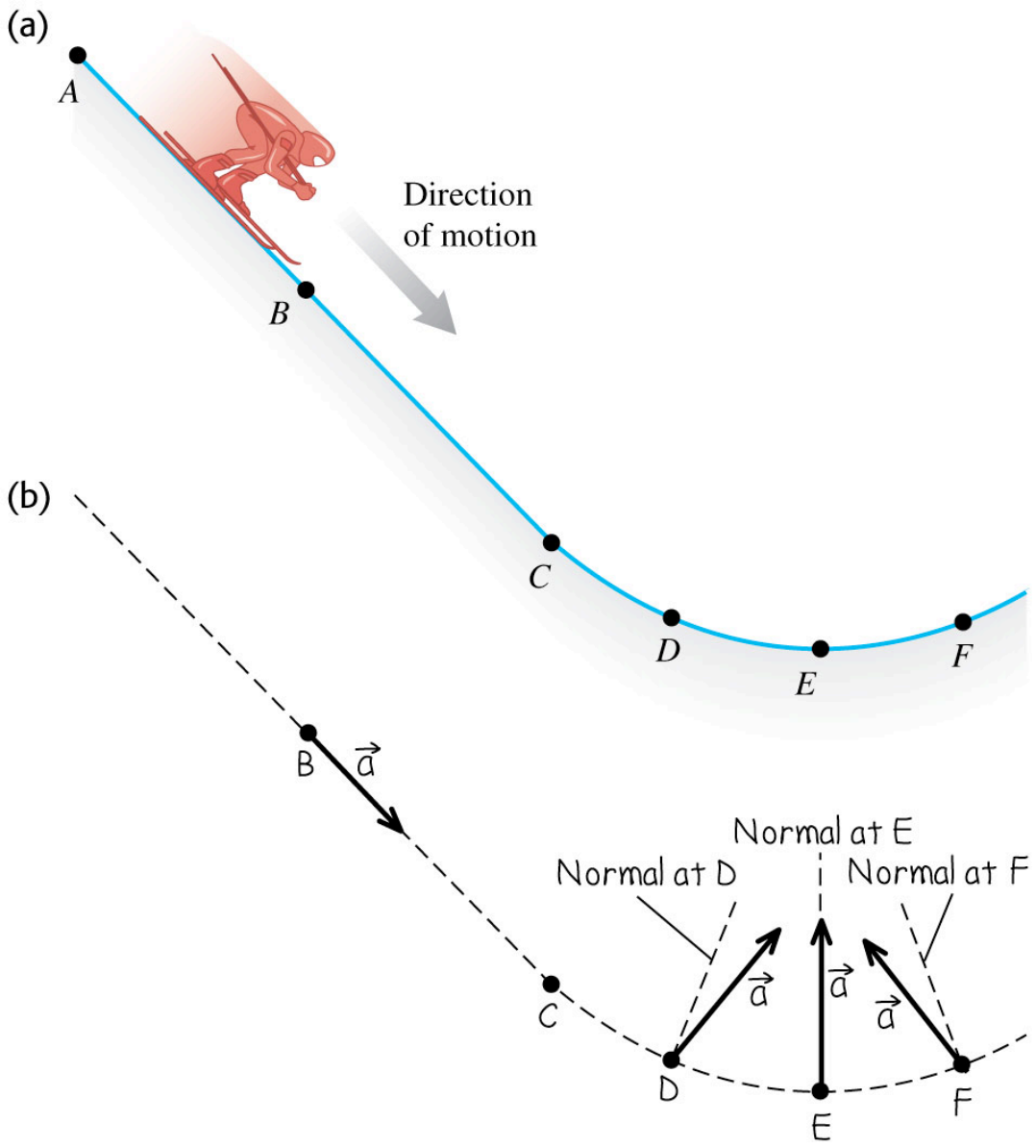
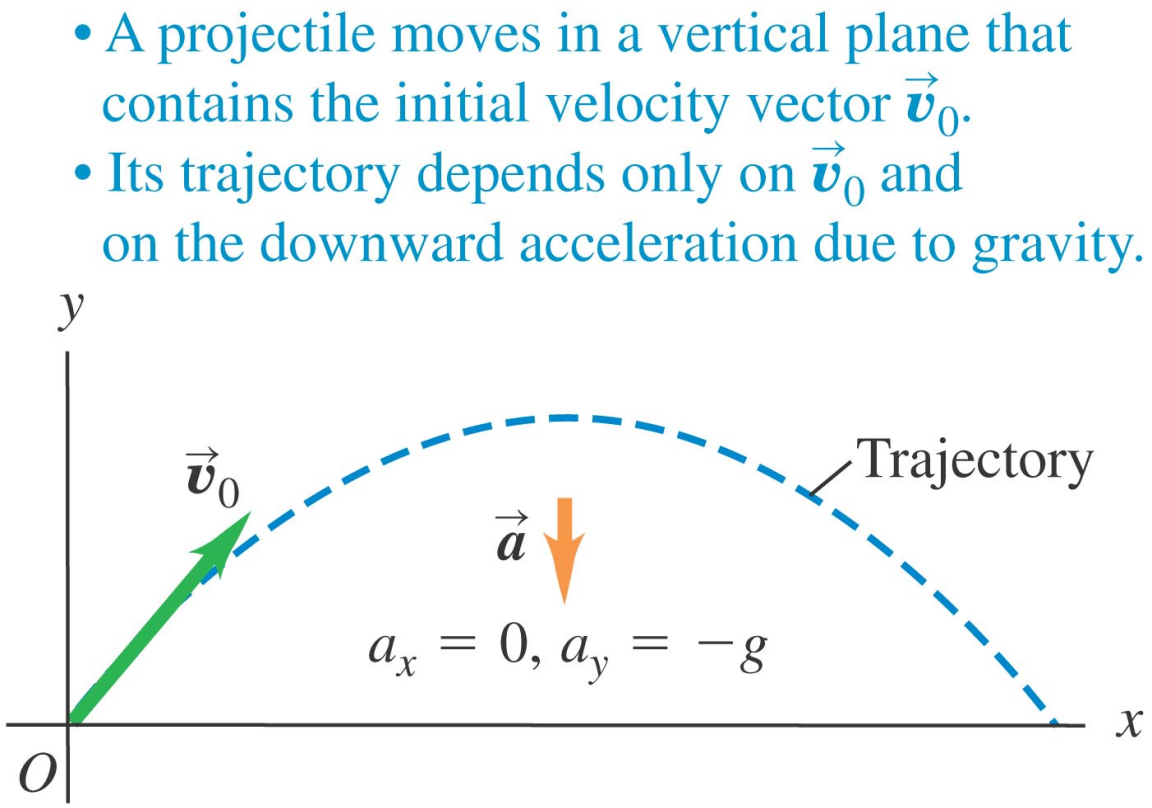


Projectile motion—Figure 3.15

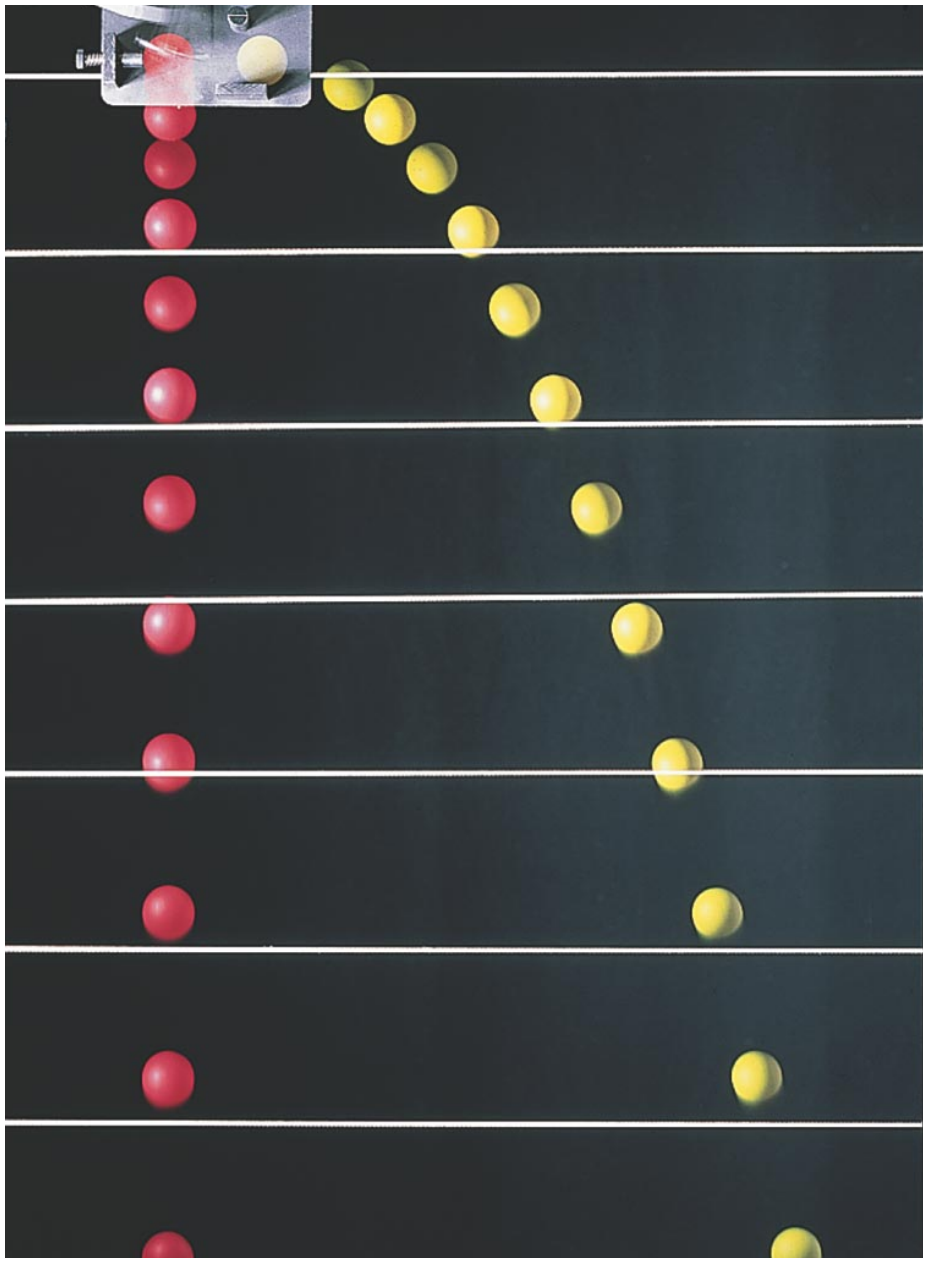
- A projectile is any body given an initial velocity that then follows a path determined by the effects of gravity and air resistance.
- Begin by neglecting resistance and the curvature and rotation of the earth.



Equations of Motion

The *x* and *y* motion are separable—Figure 3.16

- The red ball is dropped at the same time that the yellow ball is fired horizontally.
- The strobe marks equal time intervals.
- We can analyze projectile motion as horizontal motion with constant velocity and vertical motion with constant acceleration: $a_x = 0$ and $a_y = -g$.



The equations for projectile motion

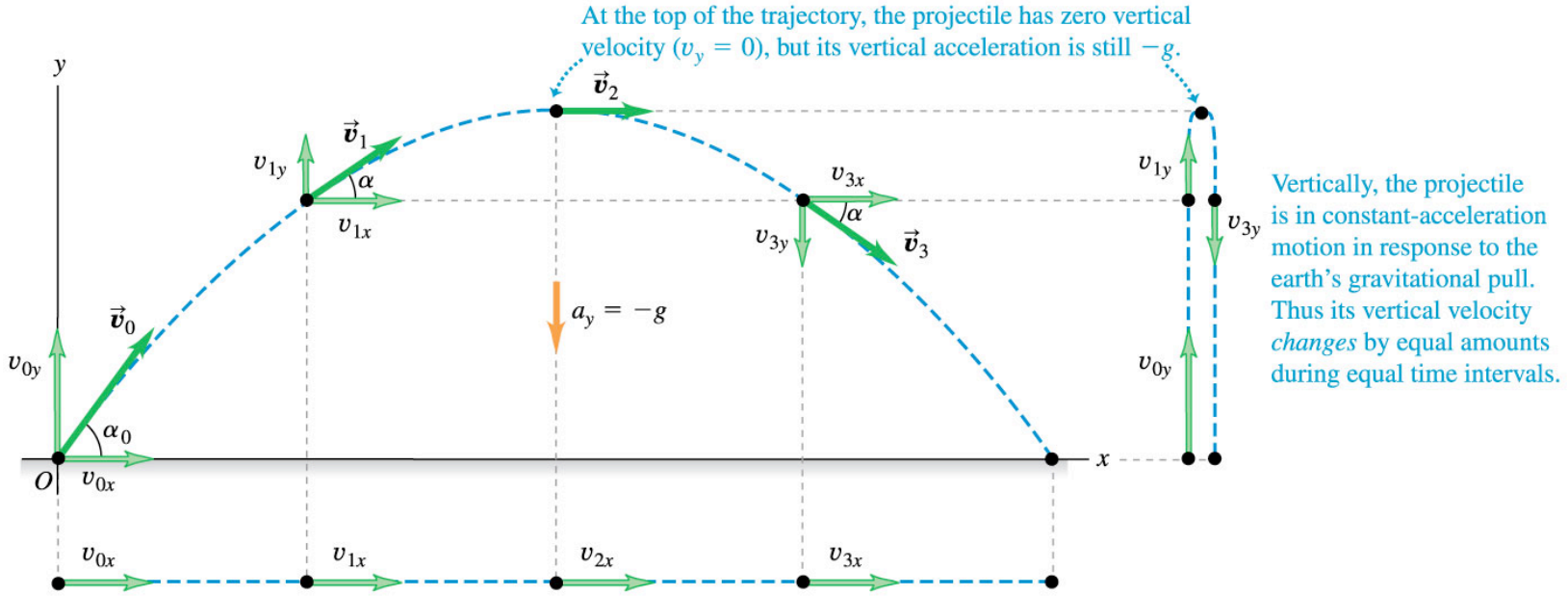
- If we set $x_0 = y_0 = 0$, the equations describing projectile motion are shown at the right.
- The trajectory is a parabola.

$$x = \left(v_0 \cos\alpha_0\right) t$$

$$y = \left(v_0 \sin\alpha_0\right) t - \frac{1}{2} g t^2$$

$$v_x = v_0 \cos\alpha_0$$

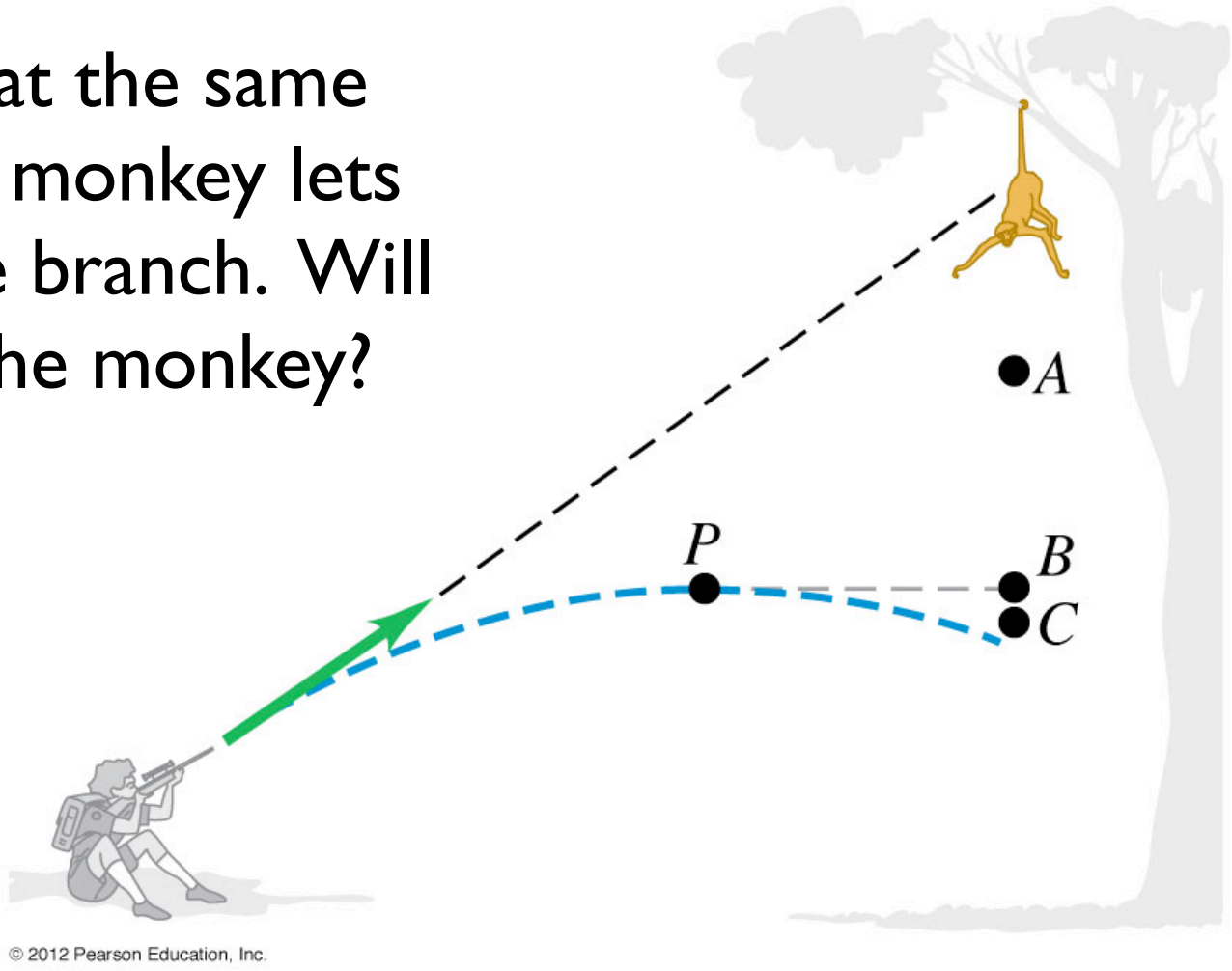
$$v_y = v_0 \sin\alpha_0 - gt$$



Tranquilizing a Falling Monkey

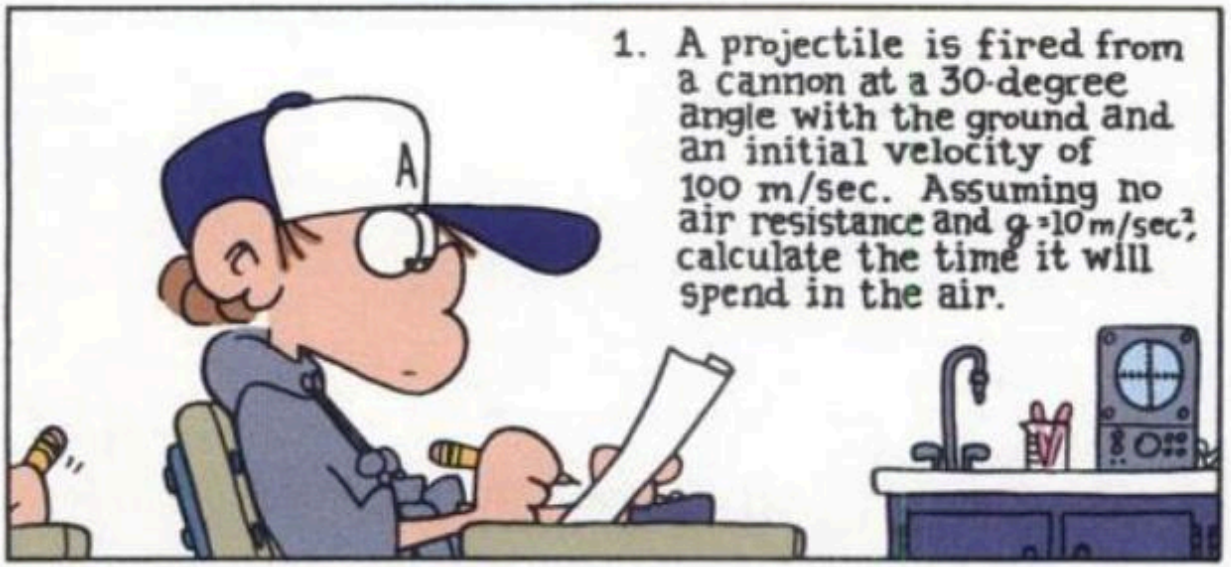
You fire at the same time the monkey lets go of the branch. Will you hit the monkey?

A. Yes
B. No

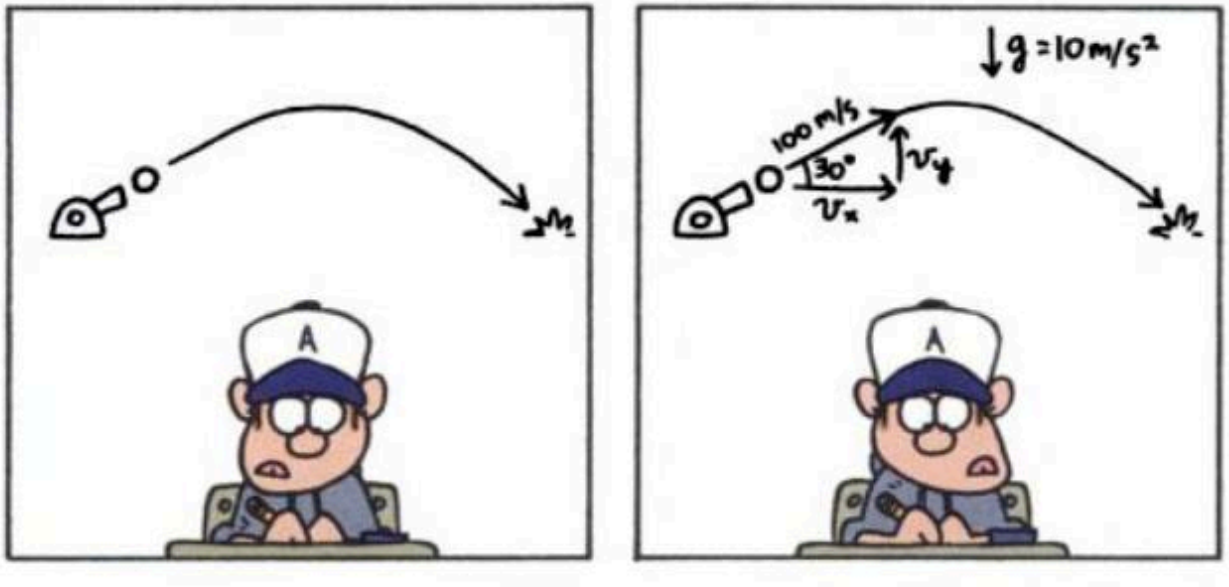


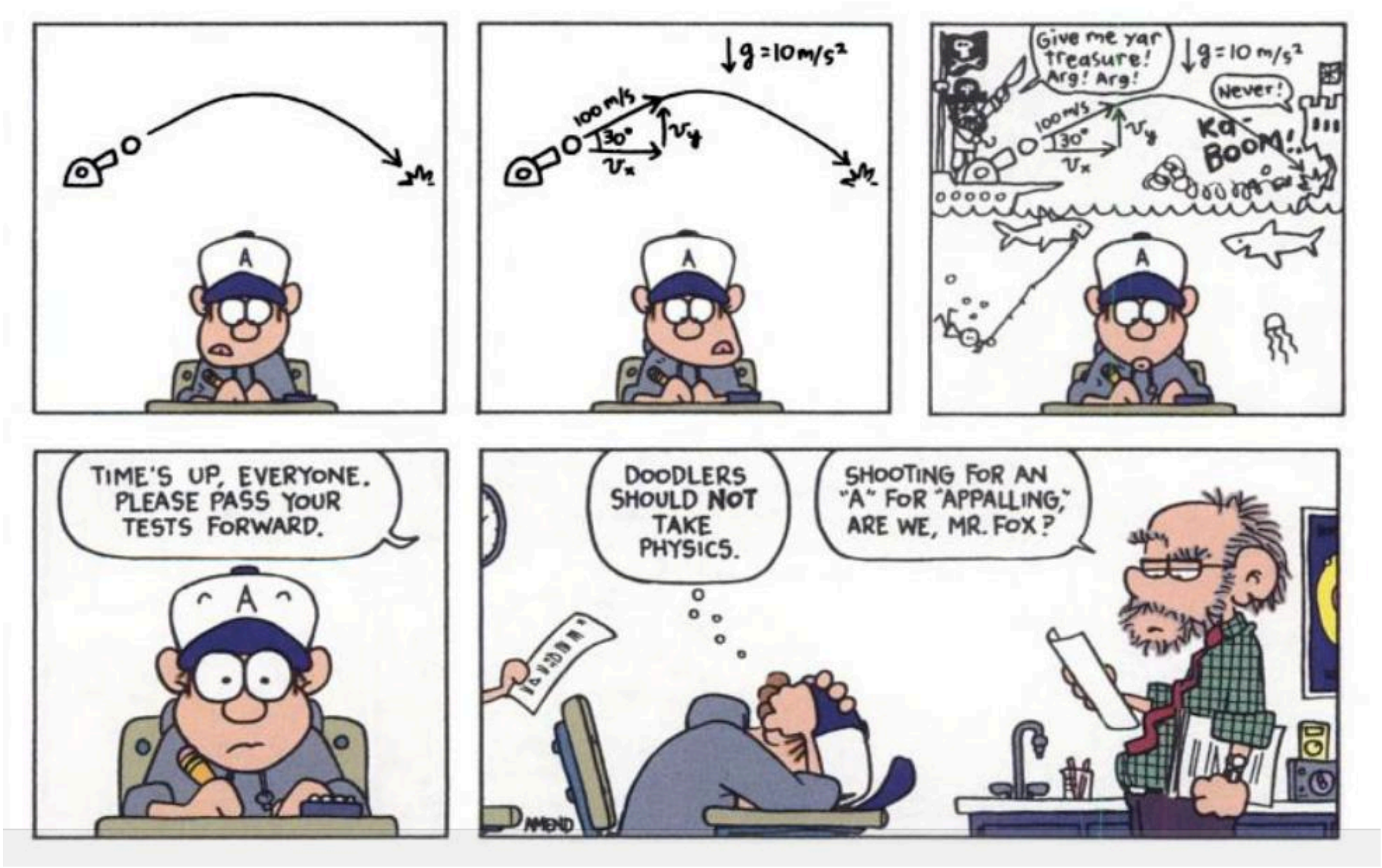
FoxTrot

BILL AMEND



A projectile is fired from a cannon at a 30-degree angle with the ground and an initial velocity of 100 m/sec. Assuming no air resistance and $g=10 m/sec^2$, calculate the time it will spend in the air.


A
↓g = 10 m/s²
100 m/s
30°
v_y
v_x
A


↓g = 10 m/s²
100 m/s
30°
Vy
Vx
Give me yar treasure! Arg! Arg!
Never!
Ka-Boom!
TIME'S UP, EVERYONE. PLEASE PASS YOUR TESTS FORWARD.
DOODLERS SHOULD NOT TAKE PHYSICS.
SHOOTING FOR AN "A" FOR "APPALLING," ARE WE, MR. FOX?

Text ‘PHYSJC’ and your answer to 22333

The direction of the acceleration of an object moving at constant speed in a circular path is:

F. in the direction of its motion.

G. opposite the direction of its motion.

H. toward the center of its circular path.

I. away from the center of its circular path.

Uniform Circular Motion vs. Projectile Motion