

**Motion in One
Dimension**
HOLT PHYSICS
Math Skills
Falling Objects

A juggler throws a ball straight up into the air. The ball remains in the air for a time Δt before it lands back in the juggler's hand.

$$\Delta y = v_i(\Delta t) + \frac{1}{2}a(\Delta t)^2$$

$$v_f = v_i + a(\Delta t)$$

$$v_f^2 = v_i^2 + 2a\Delta y$$

1. Answer the following questions in terms of Δt and g .
 - a. What is the acceleration of the ball during the entire time the ball is in the air?

 - b. With what speed did the juggler throw the ball into the air? (Hint: What is the total displacement of the ball during the time it is in the air?)

 - c. How much time elapsed before the ball reached its maximum height?

 - d. How high above the point of release did the ball rise?

2. Assume that the ball was in the air for 2.4 s. Answer the following questions:
 - a. What is the acceleration of the ball during the entire time the ball is in the air?

 - b. With what speed did the juggler throw the ball into the air?

 - c. How much time elapsed before the ball reached its maximum height?
