

## Section

**3-3**

## HOLT PHYSICS

**Math Skills***Projectile Motion*

After a snowstorm, a boy and a girl decide to have a snowball fight. The girl uses a large slingshot to shoot snowballs at the boy. Assume that the girl fires each snowball at an angle  $\theta$  from the ground and that the snowballs travel with an initial velocity of  $v_0$ .

- In terms of the initial velocity,  $v_0$ , and the launch angle,  $\theta$ , for what amount of time,  $\Delta t$ , will a snowball travel before it reaches its maximum height above the ground? (Hint: Recall that  $v_f = 0$  when an object reaches its maximum height.)  
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- What is the maximum height,  $h$ , above the ground that a snowball reaches after it has been launched?  
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- What is the horizontal distance,  $x$ , the snowball has traveled when it reaches its maximum height?  
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- The range,  $R$ , is the horizontal distance traveled in *twice* the time it takes for an object to reach its maximum height. Using your answers from items 1 and 3, write an expression for the range in terms of  $v_0$ ,  $\theta$ , and  $g$ .  
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- If the initial velocity,  $v_0$ , equals 50.00 m/s, find the maximum height and range for each of the launch angles listed in the table below.

Launch angle	Maximum height (m)	Range (m)
15°		
30°		
45°		
60°		
75°		