

Print this template and write your solution in the spaces indicated. This is the paper you'll scan and upload.

A cannonball is fired from ground level toward a hill. The cannon is aimed at angle of 37.0° above the horizontal, and the ball leaves the barrel at a speed of 50.0 m/s. The top of the hill is 40.0 m higher than the top of the cannon.

- a. Determine the two possible values of the vertical component of the cannonball's velocity as it strikes the top of the hill.

Note: You may be confused at first that there are two possible values. Remember, objects that go up generally come down. Mathematically, you'll be taking a square root to get the two values.

Don't write in this column.	Do your work in this column.	
<p>Step 1. After reading the problem, draw a diagram in the cell to the right. On the diagram, indicate the origin and the directions you select for +x and +y. Label the directions of acceleration and initial velocity.</p>		
<p>Step 2. List the givens using standard symbols subscripted with x or y to distinguish between horizontal and vertical. List givens in two columns, one for horizontal and one for vertical. If values are known or defined to be 0, say so. You'll need to resolve the initial velocity into horizontal and vertical components. Given the directions you selected for +x and +y, make sure all the given information has the correct signs.</p>	Horizontal:	Vertical:
<p>Step 3. State the unknown that you're to find. Identify it with the proper symbol.</p>		

<p>Step 4. Look at the list of dvat equations in Table 4-1 and select one for which all quantities are known except for the unknown that you're solving for. Write the equation to the right using appropriate subscripts.</p>	
<p>Step 5. Algebraically solve the dvat equation you selected for the unknown. Substitute no numbers at this point. This is the step where you should see how the two values of velocity arise mathematically.</p>	
<p>Step 6. Substitute the given values with units. Do the arithmetic to arrive at the final answer.</p>	
<p>Step 7. Apply sign, units, and sensibility checks.</p>	

- b. Beginning with Step 3 of the method shown in the problem-solving template, write your solution to this problem: Determine the two possible values of the time interval between when the cannonball leaves the barrel and when it strikes the top of the hill.