NAME .....

10-12 ACTIVITY

Firing the Cannons on *Constitution*, using parabolic equations & vectors to describe the path of projectile motion

A cannonball is fired from the spar deck of USS Constitution at an initial velocity of 1,500 m/s. The cannon was inclined 15° and positioned 32 ft from the water.

1. Draw a quick sketch of the situation.

2. Calculate the vertical and horizontal components of the velocity vector.

3. Substitute the values into the equations $y(t) = \frac{-1}{2} gt^2 + v_y t + h_o$, the equation for vertical distance and $x(t) = v_x t$, the equation for horizontal distance.

4. How high is a cannonball after 3 seconds? How far has it traveled?

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5. What is the maximum height of the cannonball? How long does it take to reach this height? How far has it traveled in this time?

6. Assume that the cannonball misses its target. When will the cannonball hit the water? How far has it traveled?

7. Could the cannons hit a target 2 miles away? (1 mile = 5,280 feet) How long would it take for the cannonball to reach its target?