

## Cliff Problems

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1. A ball rolls off the edge of a table. It has an initial horizontal velocity of 3 m/s and is in the air for 0.75 seconds before hitting the floor.
  - a. How high is the table?
  
  
  
  
  
  
  
  
  
  
  - b. How far away (horizontally) from the edge of the table does the ball land?
  
  
  
  
  
  
  
  
  
  
  - c. What are the horizontal and vertical components of the ball's velocity when it lands?
  
  
  
  
  
  
  
  
  
  
  - d. How fast is the ball going when it lands?
  
2. The Coyote is chasing the Road Runner when the Road Runner suddenly stops at the edge of a convenient cliff. The Coyote, traveling with a speed of 15 m/s, does not stop and goes flying off the edge of the cliff, which is 100 meters high.
  - a. How long is the Coyote in the air?
  
  
  
  
  
  
  
  
  
  
  - b. Where does the Coyote land?
  
  
  
  
  
  
  
  
  
  
  - c. What are the horizontal and vertical components of the Coyote's velocity when he lands?

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- d. How fast is the Coyote going when he lands?
3. A car full of bad guys goes off the edge of a cliff. If the cliff was 75 meters high, and the car landed 60 meters away from the edge of the cliff, calculate the following:
- The total time the car was in the air.
  - The initial velocity of the car. (Give the components.)
  - The final velocity of the car just as it hits the ground. (Give the components.)
  - The final speed of the car just as it hits the ground.

*Answers:*

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|--------------|---|---|-------------|
| 1. a) 2.81 m | b) 2.25 m   | c) $v_x = 3 \text{ m/s}$ & $v_y = -7.5 \text{ m/s}$     | d) 8.1 m/s  |
| 2. a) 4.47 s | b) 67.1 m   | c) $v_x = 15 \text{ m/s}$ & $v_y = -44.7 \text{ m/s}$   | d) 47.2 m/s |
| 3. a) 3.87 s | b) $v_x = 15.5 \text{ m/s}$ & $v_y = 0 \text{ m/s}$ | c) $v_x = 15.5 \text{ m/s}$ & $v_y = -38.7 \text{ m/s}$ | d) 41.7 m/s |