

## Angled Projectile Motion Worksheet

*(With some horizontal projectiles)*

- An arrow is shot at  $30.0^\circ$  angle with the horizontal. It has a velocity of 49 m/s.
  - How high will it go?
  - What horizontal distance will the arrow travel?
  - What is the arrow's impact speed? (magnitude of final velocity)
- A person kicks a rock off a cliff horizontally with a speed of 20 m/s. It takes 7.0 seconds to hit the ground, find:
  - height of the cliff
  - final vertical velocity
  - range
  - impact speed (magnitude of final velocity)
- A ship fires its guns with a speed of 400 m/s at an angle of  $35^\circ$  with the horizontal. Find:
  - range
  - maximum height
  - impact speed (magnitude of final velocity)
- A basketball is held over head at a height of 2.4 m. The ball is lobbed to a teammate at 8 m/s at an angle of  $40^\circ$ . If the ball is caught at the same height it was tossed at, how far away is the teammate?
- Suppose the ball in #4 was not caught, what would the range be?
- A hunter aims directly at a target (on the same level) 140 m away. If the bullet leaves the gun at a speed of 280 m/s, by how much will the bullet miss the target?
- A baseball was hit at 45 m/s at an angle of  $45^\circ$  above the horizontal.
  - How long did it remain in the air?
  - How far did it travel horizontally?
  - What was its maximum height?
  - What is its impact speed? (magnitude of final velocity)
- A camper dives from the edge of a swimming pool at water level with a speed of 8.0 m/s at an angle of  $30.0^\circ$  above the horizontal.
  - How long is the diver in the air?
  - How high does the diver go?
  - How far out in the pool does the diver land?

**Answers:**

1.
  - a. 32 m
  - b.  $2.2 \times 10^2$  m
  - c.
  
2.
  - a.  $2.4 \times 10^2$  m
  - b. 69 m/s
  - c.  $1.4 \times 10^2$  m
  - d.
  
3.
  - a.  $2.7 \times 10^3$  m
  - b.  $1.5 \times 10^4$  m
  - c.
  
4. 6.2 m
  
5. 8.4 m
  
7. 1.23 m
  
8.
  - a. 6.6 s
  - b.  $2.1 \times 10^2$  m
9.
  - a. 0.82 s
  - b. 0.82 m
  - c. 5.7 m
  - d.