



Name: _____

Projectile Practice HORIZONTALS

1. A stone is thrown horizontally at 15m/s from the top of a cliff 44 m high.
 - a. How long does the stone take to reach the bottom of the cliff?
 - b. How far from the base of the cliff does the stone strike the ground?
2. A physics book is thrown horizontally at a velocity of 5.0 m/s from the top of a cliff 78.4 m high.
 - a. How long does the stone take to reach the bottom of the cliff?
 - b. How far from the base of the cliff does the stone strike the ground?
3. A physics book is thrown horizontally at a velocity of 10.0 m/s from the top of a cliff 78.4 m high.
 - a. How long does the stone take to reach the bottom of the cliff?
 - b. How far from the base of the cliff does the stone strike the ground?
4. Wyle E. Coyote is now in the real world. He goes running off a cliff and becomes a human projectile. It takes him 12.5 seconds to hit the bottom of the canyon. He falls to his cartoon death and lands 82 m from the wall of the canyon.
 - a. How far did he fall? (Or how high is the cliff?)
 - b. What was his cartoon velocity as he ran horizontally off a cliff?
5. The longest shot on a golf tournament was made by Mike Austin in 1974. The ball went a distance of 471 m. Suppose the ball was shot horizontally off a cliff at 80.0 m/s. Calculate the height of the cliff.
6. The longest banana split ever made was 7.320 km long (needless to say, more than one banana was used). If an archer were to shoot an arrow horizontally from the top of Mount Everest, which is located 8848 m above sea level, would the arrow's horizontal displacement be larger than 7.32 km? Assume that the arrow cannot be shot faster than 100.0 m/s, that there is no air resistance, and that the arrow lands at sea level.
7. The longest stuffed toy ever manufactured is a 420 m snake made by Norwegian children. Suppose a projectile is thrown horizontally from a height half as long as the snake and the projectile's horizontal displacement is as long as the snake. What would be the projectile's initial speed?
8. Libyan basketball player Suleiman Nashnush was the tallest basketball player ever. His height was 2.45 m. Suppose Nashnush throws a basketball horizontally from a level equal to the top of his head. If the speed of the basketball is 12.0 m/s when it lands, what was the ball's initial speed? (Hint: Consider the components of final velocity.)
9. A movie director is shooting a scene that involves dropping a stunt dummy out of an airplane and into a swimming pool. The plane is 10.0 m above the ground, traveling at a velocity of 22.5 m/s in the positive x direction. The director wants to know where in the plane's path the dummy should be dropped so that it will land in the pool. What is the dummy's horizontal displacement?



ANGLES

1. A player kicks a football from ground level with a velocity of magnitude 27.0 m/s at an angle of 30.0° above the horizontal.
 - a. What is its "hang-time?"
 - b. How far does the ball travel before it hits the ground?
 - c. What is the maximum height the ball reaches?
2. A kicker now kicks the football with the same velocity, but at 60° from the horizontal.
 - a. What is its "hang-time?"
 - b. How far does the ball travel before it hits the ground?
 - c. What is the maximum height the ball reaches?
3. The narrowest strait on earth is Seil Sound in Scotland, which lies between the mainland and the island of Seil. The strait is only about 6.0 m wide. Suppose an athlete wanting to jump "over the sea" leaps at an angle of 35° with respect to the horizontal. What is the minimum initial speed that would allow the athlete to clear the gap? Neglect air resistance.
4. April Moon set a record in flight shooting (a variety of long-distance archery). In 1981 in Utah, she sent an arrow a horizontal distance of $9.50 \times 10^2 \text{ m}$. What was the speed of the arrow at the top of the flight if the arrow was launched at an angle of 45.0° with respect to the horizontal?
5. In 1989 during overtime in a high school basketball game in Erie, Pennsylvania, Chris Eddy threw a basketball a distance of 27.5 m to score and win the game. If the shot was made at a 50.0° angle above the horizontal, what was the initial speed of the ball?
6. In 1978, Geoff Capes of the United Kingdom won a competition for throwing 5 lb bricks; he threw one brick a distance of 44.0 m . Suppose the brick left Capes' hand at an angle of 45.0° with respect to the horizontal.
 - a. What was the initial speed of the brick?
 - b. What was the maximum height reached by the brick?
7. In 1991, Doug Danger rode a motorcycle to jump a horizontal distance of 76.5 m . Find the maximum height of the jump if his angle with respect to the ground at the beginning of the jump was 12.0° .
8. Michael Hout of Ohio can run 110.0 meter hurdles in 18.9 s at an average speed of 5.82 m/s . What makes this interesting is that he juggles three balls as he runs the distance. Suppose Hout throws a ball up and forward at twice his running speed and just catches it at the same level. At what angle, θ , must the ball be thrown? (Hint: Consider horizontal displacements for Hout and the ball.)
9. In 1993, Wayne Brian threw a spear a record distance of 201.24 m . (This is not an official sport record because a special device was used to "elongate" Brian's hand.) Suppose Brian threw the spear at a 35.0° angle with respect to the horizontal. What was the initial speed of the spear?