Physics 12: More Projectiles Than You Can Shake a Stick At.

1. A novice driver on a cellular telephone drives their overly powerful car horizontally off of a 12m high cliff. The car lands in a twisted heap of metal and glass and burning rubber 62.2m from the base of the cliff (but not before the driver posted a sweet pre-crash selfie). How fast was the distracted youth travelling as they left the edge of the cliff?

2. A golfer hits a perfect chip shot onto a green that sits 5.00m above the point from which the ball is struck. The ball strikes the green at 19.6m/s at an angle of 20.0o below horizontal.

 a. What is the range of flight for the ball?

 b. What maximum height does the ball reach measures from the point at which it is hit?

 c. What is the velocity of the ball as it leaves the club-face?

3. A large (32kg) hunk of Gorgonzola Cheese, carved to resemble a 1982 Oldsmobile Cutlass Ciera is launched from a catapult, over level ground, at 23m/s @ 41o above +x. What is its velocity after 2.6s?

4. A novice driver, distracted by their iPod, drives their overly powerful car horizontally off of a cliff. The car lands 36.7m from the base of the cliff in a hideous scene on twisted metal, broken glass and bones and burning rubber. As the car strikes the ground it is travelling at 18.2o below horizontal. What is the height of the cliff?

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5. In the sport of skeet shooting a person with a gun tries to shoot flying discs of clay, called skeets, out of midair with a rifle. In one case the skeet is fired at 48.00m/s @ 50.0o above horizontal. The shooter then waits 6.57s and fires a bullet. The bullet strikes the skeet 7.00m above the point at which both the skeet and bullet are fired. Assuming the bullet and skeet are fired from the same point, determine the initial velocity of the bullet.

6. A projectile launched over level ground reaches a maximum height of 23m and has a range of 98m. Find the initial velocity of the projectile.

7. A paper bag filled with wasabi and human teeth is thrown at 14.4m/s [77o above horizontal] from the top of a 22.6m building. Find the range of the flight.

8. A rock is thrown from the top of a 19.0m tall cliff. The rock is in the air for 2.7s and has a range of 18m. Find the initial velocity (magnitude and direction) of the rock.

9. A soccer ball is kicked over level ground at 12.0m/s [36o above horizontal]. The ball strikes a wall 1.20m above the ground. What are the two possible horizontal distances from the point the ball was kicked to the wall?

10. A bus drives horizontally off of a cliff at 24.0m/s. The crash scene investigator forgot to bring a tape measure, but does have a long piece of rope. She determines that the bus landed at a distance from the base of the cliff that is 1.80 times the height of the cliff. Determine the height of the cliff.

1. 4.0x10m/s 2. a) 35.1m b) 7.29m c) 22.0m/s @ 33.0o above horizontal 3.20.2m/s @ 30.9o below +x 4. 6.04m

5. 306m/s @ 2.46o above horizontal 6. 31m/s @ 43o above horizontal. 7. R=13m 8. 9.1m/s [43o above horizontal] 9.1.9m, 12m

10. 36m

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