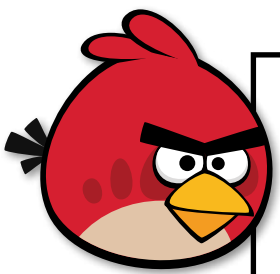
Name: _____

BOMBING BIRDS

In "The Science of Angry Birds" (p. 10), you learned about the *projectile motion* of vengeful birds in a popular video game. Players hurl birds from a slingshot so that the birds smash into mean, green pigs hiding in distant shelters. The key to winning is choosing the optimal launch angle so the bird's *range*, or horizontal distance traveled, is on target.

Use the projectile-motion equations below to learn how launch angle and initial velocity affect how far the angry bird flies. The equations calculate the range in meters (m) and use the initial velocity measured in meters per second (m/s) and the acceleration due to the force of gravity as 9.8 meters per second squared (m/s^2). Round your answers to the nearest one-hundredth.



EQUATIONS

30° LAUNCH ANGLE

Range = (Initial Velocity^2 ÷ Acceleration Due to Gravity) × 0.87

45° LAUNCH ANGLE

Range = (Initial Velocity^2 ÷ Acceleration Due to Gravity) × 1

70° LAUNCH ANGLE

Range = (Initial Velocity^2 ÷ Acceleration Due to Gravity) × 0.64

QUESTIONS

1. A bird is launched with an initial velocity of 10 m/s at an angle of 30° to the ground. What is the range of the bird?

2. A bird is launched with an initial velocity of 10 m/s at an angle of 45° to the ground. How far does this bird travel in the horizontal direction?

3. A bird is launched with an initial velocity of 10 m/s at an angle of 70° to the ground. What is this bird's range?

4. A bird is launched with an initial velocity of 5 m/s at an angle of 30° to the ground. What is the bird's range?

5. The last bird is launched at a 45° angle and travels 9 meters. What was this bird's initial velocity?

6. In the game *Angry Birds*, players can control only the launch angle of the bird—not its initial velocity. Suppose a player wants to maximize his or her bird's range. Which of the launch angles from your calculations should the player choose?