

Laying Down A Bunt

What is this about?

The perfect bunt has been described as “catching the ball with the bat.” When you swing a bat, the usual goal is to hit the ball as hard as possible. That is, to have as much momentum as possible go into the motion of the ball. The art of laying down a bunt is about reducing the momentum that the bat gives the ball. This activity will help you understand the physics behind this feat.

What do I need?

You will only need a baseball, a bat, and a friend who can pitch underhand.

What will I be doing?

You will look at two ball-bat collisions. In one you will use the bat to hit the ball so it goes back toward the pitcher. In the second, you will use the bat in such a way as to just stop the ball so it falls at your feet.

What do I think will happen?

Take a minute and write down a description of what you think will happen and why you think it. Which direction will the bat move after the collision if the ball is hit back to the pitcher? What about if you use the bat to just stop the ball so it falls at your feet?



What really happened?

1. Have a friend pitch the ball.
2. Use the bat and hit the ball back to the pitcher at about the speed it came or a little faster. Note the direction the bat moves after the collision (toward or away from the pitcher).
3. Use the bat to stop the ball so that the ball drops straight down at your feet. Again, note the direction the bat is moving after the collision.

Write a description of your results. Compare the direction of motion of the bat after the collision in the two cases?

What did I learn?

You probably discovered that the bat moved in the same direction as the ball after the ball was hit back toward the pitcher, while the bat bounced away from the ball when you got the ball to fall at your feet. Physicists would describe this as an example of the “Law of Conservation of Momentum.” The incoming ball and the bat together have some initial momentum before the collision and according to the law, they must have the same total momentum after the collision.


Consider the collision where the ball goes back toward the pitcher. Before the collision, the bat must have more momentum toward the pitcher than the ball has away from the pitcher so that the total momentum is toward the pitcher. After the collision, the bat still has a bit of this forward momentum, so it follows the ball.


Now think about the collision where you stop the ball. The incoming ball has some momentum away from the pitcher and the bat has very little momentum toward the pitcher. The total momentum then is away from the pitcher. After the collision, if the ball stops, the bat must have all of this momentum so it moves away from the pitcher.

What else should I think about?

Have you ever noticed that when an outfielder makes a leaping catch above the outfield wall, their glove always snaps backward over the wall. Why would he do this? If the ball falls out and drops over the fence it is a homerun. Can you explain why using the idea of momentum?

Catch it in the Web!

 Empirical Analysis of Bunting By Dan Levitt at
(http://baseballanalysts.com/archives/2006/07/empirical_analy_1.php)
Discusses the issue of the possible over use of sacrifice bunts.

 Major League Physics – Dr. Baseball - Momentum
(<http://phys.csuchico.edu/baseball/DrBaseball/Momentum/>)
This humorous video illustrates the roll of momentum in ball-bat collisions including bunts.

