

A Swing and a Miss: The Mathematics of Baseball

Grades 4-9

What you need:

- Ruler (one for each team of 2 students)
- Table to record student information



What to do:

1. Divide the students into pairs. One student holds the ruler by its end between the other student's separated thumb and index finger. (Make sure the ruler is facing the same way for each attempt.)
2. The student releases the ruler and both carefully measure at what increment the second student is able to catch the ruler.
3. Do this ten times and calculate an average "time" (the inch or centimeter mark where the students caught the ruler).
4. All teams then share their data to find an average value for the entire class, for boys only, for girls only, or other parameters. Graph results in a scatter plot.

Investigate:

1. How is the measurement of centimeters or inches related to seconds? (Have students write their average "time" as centimeters per second)
 2. Would the experiment be fair if a student was allowed to drop the ruler by herself or himself? Why or why not?
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Conclusion:

Have the students compare their findings to a chart like the one below.

First Glance Reaction Time

Distances in Feet		Radar Gun Speed in mph					
Distance to Mound	Distance Used	50 mph	60 mph	70 mph	80 mph	90 mph	100 mph
60.5 feet High School, College, and Pro	60.5 feet	0.825 sec	0.688 sec	0.589 sec	0.516 sec	0.458 sec	0.413 sec
54 feet Ages: 13-14 Pony	54 feet	0.736 sec	0.614 sec	0.526 sec	0.460 sec	n/a	n/a
46 feet Ages: 11-12 Major	46 feet	0.627 sec	0.523 sec	0.448 sec	n/a	n/a	n/a
40 feet Ages: 7-10 PeeWee Minor	40 feet	0.545 sec	0.455 sec	n/a	n/a	n/a	n/a

Investigate Further:

1. Would your reaction time be enough for you to hit a ball traveling the speed for your age group?

Learn:

The speeds listed in the chart don't give the batter much time to think of what to do. If it takes about 0.3 seconds to physically swing a bat, then the batter may only have 0.1 to 0.2 seconds to decide where exactly to swing. The ball will only be over the plate for about 0.01 second, and the bat not only has to be there on time but at the right position in order to hit the ball. The reaction needed to make the best play is nearly impossible but is accomplished in virtually every baseball game.

Try this at home:

Here are some websites where you can test your reaction time.

- <http://www.exploratorium.edu/baseball/reactiontime.html>
- <http://www.topendsports.com/testing/reaction-timer.htm>
- <http://www.mathsisfun.com/games/reaction-time.html>

Catch a local baseball game and watch math in action!



Visit the Toledo Mudhens at:
<http://web.minorleaguebaseball.com/index.jsp?sid=t512>