

1.0 Softballs vs Baseballs

GRADES 3rd-5th

Describe how each ball will function as a softball. Think about the distance and bounce-ability of each ball type.

Answers may vary among students. Example data below.

Tennis ball: Too light; won't go as far; bounces more than a softball.

Baseball: A little lighter and smaller than the softball; more stitching for control than the other sports balls.

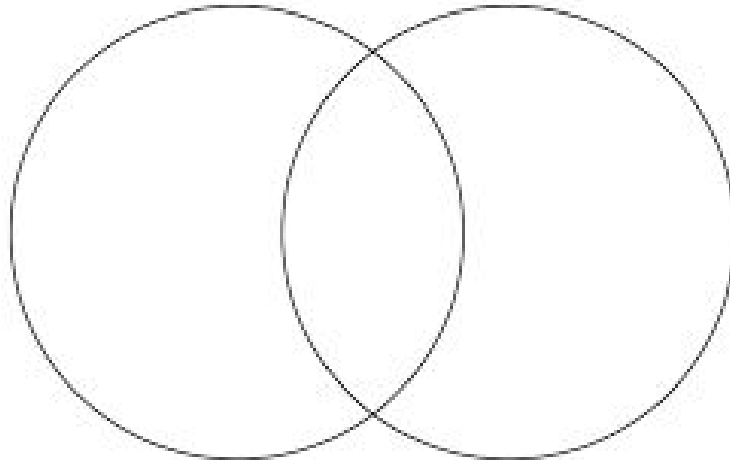
Golf ball: Much harder and smaller than all sport balls but the ping pong ball; plastic and dense inside and outside; will go very far when hit.

Ping Pong ball: Too small and light; bounces much more than a baseball.

	Size/Shape	Materials	Weight	Texture	Internal Structure
Tennis ball	Round; similar size as baseball	Felt Air Rubber	2.0 oz	Rough	Air and rubber
Golf ball	Round; smaller than a baseball	Rubber and Plastic	1.6 oz	Dimples, smooth	Hard, dense
Baseball	Round; similar size as tennis	Leather and stitches	5 oz	Smooth	Cork/Rubber
Softball	Round and larger than a tennis and baseball	Leather	6 oz	Smooth	Cork/Rubber

Ping Pong ball	Round and much smaller than a baseball	Plastic	.095 oz	Smooth	Air/Hallow
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Using the data collected, pick one other ball and fill in the venn diagram comparing and contrasting the ball's properties? **Results will vary based on ball choice and depiction.**



Using the data collected, what properties (traits) and materials support a softball's function (job)? **Answers will vary based on student trial results.**

Extend only:

Hit each ball five (5) times: tennis, golf, baseball, softball, and ping pong. How does each ball function differently when hit? Use descriptive words and details to compare and contrast.

Answers will vary based on student data.

Example response: The mass and volume relationship (density) differs for each ball and the softball weighs more than all the other sport balls. The softball is not hollow like the ping pong ball and tennis ball and it has a unique covering by way of the stitching compared to all the other balls, except the baseball. The stitching is pronounced, but not as much as the baseball, making it unique compared to the other sports balls.

2.0 Evolution of a Softball Glove

GRADES 3rd-5th

Energy Comparison: **Answers will vary. Example responses below.**

<u>Throws</u>	Observations	Energy (More, less)
Light/Slow - Ground Ball	Ball does not move very fast and bounces a bit when hit on the ground.	Less
Hard/Fast - Ground Ball	Ball was moving quite fast with few bounces along the ground.	More
Pop Fly	Ball was moving slowly in the air but very high, so it came down quite fast from the sky.	Less
Line Drive	Ball was moving very quickly through the air and not very far off the ground.	More

General Similarities and Differences Answers will vary. Example responses below.

Glove 1	Glove 2	Glove 3	Glove 4
<p>Very small with little to no pocket to catch the ball. Not much padding.</p>	<p>Looks a bit older and worn; the material looks broken in and natural, but with a much deeper pocket than glove 1.</p>	<p>Looks newer and stiffer than gloves 1 and 2 with a pocket not as deep as glove 2, but much deeper than glove 1.</p>	<p>Looks very new and shiny; the pocket looks as deep as glove 3, less than glove 2, but more than glove 1.</p>
<p>Performance of each glove based on the Energy Comparison Table:</p>			
Glove 1	Glove 2	Glove 3	Glove 4
<p>It could probably handle catching and retaining the slow ground ball and maybe the pop-up, yet that may even be a challenge. I don't think it could handle a lot of energy from the ball.</p>	<p>It could likely handle both low and high energy hits and throws. It is a big glove with a deep pocket.</p>	<p>It could probably handle both low and high energy hits and throws. It is a good size glove with a deep pocket, but I don't believe it could catch and retain the ball as well as glove 2.</p>	<p>It could probably handle low energy hits and throws and maybe some high energy hits and throws, but not as well as gloves 2 and 3 based on size and depth of the pocket. It also looks stiffer than the other gloves.</p>

Answers will vary among students. Examples below.

- 1) What are similarities and differences between softball gloves of the past and today's softball gloves?

Example: All gloves basically have the same structure, but overall the difference between glove 1 and the other gloves is substantial based on size and pocket depth to help catch and retain a pretty fast ground ball or line drive. However, the padding on glove one to protect a player's hand looks pretty good for being so long ago.

- 2) Based on your list of similarities and differences, what glove would you prefer to play with for protection?

Example: Glove 2. While it appears to not have as much padding where my palm would be, it has a deep pocket and webbing in the glove for more room to catch the ball without it hitting the palm of my hand very often.

- 3) Based on your list of similarities and differences, what glove would you prefer to play with for performance?

Example: Glove 2: Based on size, and appearing to be made of material that is broken-in, I think I could catch and retain the ball best with this glove. Yet I believe I would play well with glove 3, too; it is a decent size with good padding.

- 4) How has glove technology changed the game of softball?

Example: I think it has made the game more fun to play and watch, as players now feel more confident and comfortable catching and making difficult plays on the field, including both low and high energy ground balls and line drives. And of course, this is enjoyable to watch as a fan of the game.

3.0 Forces in Softball

GRADES 3rd-5th

Data Collection: Measure and Collect distance in feet.

Results will vary among students. Example data below.

<u>Swing</u>	Hit 1	Hit 2	Hit 3
Full Swing	48 feet	53 feet	58 feet
Bunt	5 feet	6 feet	4 feet

QUESTIONS: Answers will vary based on results. Examples below.

- 1) Why does the motion of the ball change with a full swing versus a bunt?
Because there is more energy in a full swing versus a bunt. In turn, the ball's motion is much different, resulting in the ball going much further.
- 2) How does gravity affect the motion of the ball with a full swing versus a bunt?
More energy generates more distance from a full swing versus a bunt. In turn, the ball has a longer period of time to overcome gravity.
- 3) Predict what would happen to the ball in the diagram below. Explain how gravity will play a role.
I think it would be hit pretty hard and far into the air, taking a longer time to come down. In turn, gravity would be less of a factor with the ball coming down from a higher/longer distance.
- 4) Hypothesis: What type of swing is the batter using in the image above?
A full swing. The higher/longer the ball is hit in the air, the more energy is needed. If it were a bunt swing, the (h)eight of the ball would be much lower/shorter.
- 5) Predict what would happen if you were to push the bat at the ball during a bunt (giving the ball more energy).
There would be more height and/or gravitational force, so the ball would go a bit higher and further.

4.0 Is it a Ball or Strike?

GRADES 3rd-5th

Explore: Place an “X” for a strike and a “O” for a ball.

Results will vary among students. Example data below.

	Pitch 1	Pitch 2	Pitch 3	Pitch 4	Pitch 5
Player 1	O	X	X	X	X
Player 2	X	X	X	X	O
Player 3	X	O	O	X	X

Elaborate: Place an “X” for a strike and a “O” for a ball.

	Pitch 1	Pitch 2	Pitch 3	Pitch 4	Pitch 5
Player 1 Accuracy	O	O	X	O	O
Player 1 Speed	22 MPH	24 MPH	18 MPH	25 MPH	23 MPH
Player 2 Accuracy	O	X	O	O	O
Player 2 Speed	25 MPH	20 MPH	22 MPH	23 MPH	21 MPH
Player 3 Accuracy	O	X	X	X	X
Player 3 Speed	29 MPH	24 MPH	25 MPH	25 MPH	24 MPH

- 1) Write a mathematical expression using greater than and less than symbols putting each pitch type in order from most accurate (X) and least accurate (O). Support your expression with a written justification.

Player 1: No speed: 4 strikes (X) > 1 strike (X) w/ speed

Player 2: No speed: 4 strikes (X) > 1 strike (X) w/ speed

Player 3: No speed: 3 strikes (X) < 4 strikes (X) w/ speed

Based on this data, Player 3 focused less on throwing the ball hard when speed (radar gun) was a factor. In turn, focusing more on accuracy and/or throwing strikes.

- 2) Make a claim and support it with evidence from your experiment: How does speed change accuracy?

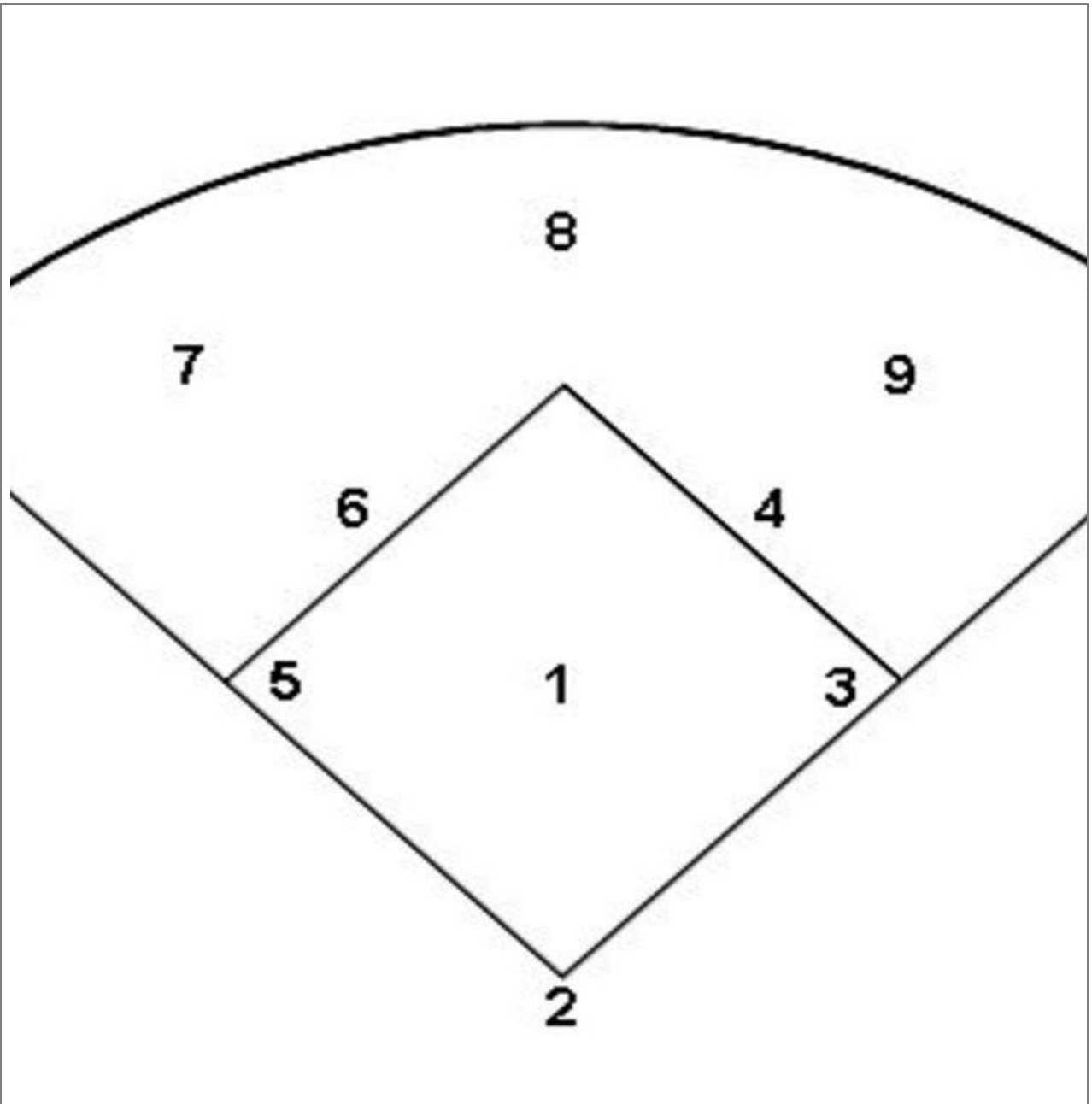
Throwing the ball harder requires more motion and force. In turn, producing fewer strikes/more balls and/or less accuracy. By focusing less on how hard the ball is thrown/pitched and/or more on the intended target, there was slightly less speed but better accuracy/strikes.

5.0 The Field of Play

GRADES 3rd-5th

Explore: Observe and discuss important lines (first and third base), shapes (batters boxes), and key points/markers (fair/foul poles) on the field.

Discussion points will vary based on student observations.



Elaborate: Draw a diagram of a softball field, labeling the angles, points (first base, second base), and any parallel or perpendicular lines.

Results will vary among students.



Write an explanation that describes the lines, shapes and angles that make up a softball field. **Answers will vary based on student results.**

6.0 Be a Hitter!

GRADES 3rd-5th

X = Hit

O = No Hit

Trial 1

Results will vary among students. Example data below.

<u>Hitter</u>	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	Fraction
Swings	O	O	X	X	O	X	X	O	O	X	5/10

Write a mathematical expression using the greater than or less than symbols.

Prediction $3/10 < 5/10$ Results

X = Hit

O = No Hit

Trial 2

<u>Hitter</u>	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	Fraction
Swings	X	O	X	X	O	X	X	O	X	X	7/10

Based on your data from each trial, put the fractions in order from greatest to smallest using the greater than/less than symbols (<>).

Prediction $3/10 < 5/10$ Trial 1 Results $< 7/10$ Trial 2 Results

Based on this information, were you more or less successful before or after watching the video on swinging mechanics? Please explain.

I was more successful after watching the video on hitting mechanics, as pre-video I hit only 5/10, whereas post video I hit 7/10.

	1	2	3	4	1	2	3	4
1								
2								
3								
4								
5								
6								
7								

Graph your Score: **Results will vary among students.**

Plot your Strikes: **Results will vary among students.**

Inning 1:



Inning 6:



Inning 2:



Inning 7:



Inning 3



Inning 4



Inning 5

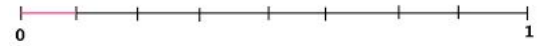


Plot your Balls: Results will vary among students.

Inning 1:



Inning 5:



Inning 2:



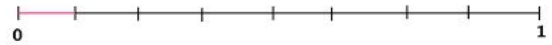
Inning 6:



Inning 3



Inning 7:



Inning 4



Use your graphs and number lines to answer the following questions:

Based on results, answers will vary among students.

1. Total your runs from all the innings you played. How many runs would you score if you play the same game 3 times?
2. Total your runs from all the innings you played. Divide your total by the total number of innings played. What is the average number of runs per inning?
3. Total your runs and your opponents runs. What is the difference between your totals? Who won the game?
4. Review the graph. Which inning had the greatest difference in runs? Which inning had the least difference in runs?
5. Review your line graphs of Strikes: How many times during the game did you strike out the opponent (3/3)?
6. Review your line graphs of Strikes: How many times was your strike fraction greater than $\frac{1}{2}$?
7. Review your line graphs of Strikes: How many times was your strike fraction less than $\frac{1}{2}$?
8. Review your line graphs of Balls: How many times during the game did you walk the opponent (4/4)?
9. Review your line graphs of Balls: How many times was your ball fraction greater than $\frac{1}{2}$?
10. Review your line graphs of Balls: How many times was your ball fraction less than $\frac{1}{2}$?

8.0 Advancements in Softball

GRADES 3rd-5th

Circle your Position: For or Against

Brainstorm: What problems does instant replay solve?

OR

What problems does instant replay cause?

Criteria for Improvements/Changes to Instant Replay	Constraints for Improvements/Changes to Instant Replay
<p>Examples: Ensure play does not slow down. Designate officials to view and operate instant replay.</p>	<p>Examples: Play is slowed down even more. Technological support is the same or ineffective as before.</p>

