Name: _____ Class: _____

Forces in Baseball

GRADES 6-8

	Throw 1 = 10 meters			Throw 2 = 10 meters		
Mass of ball: 0.145kg	Time(s)	Velocity (m/s)	Kinetic Energy (Joules)	Time(s)	Velocity (m/s)	Kinetic Energy (Joules)
Student 1						
Student 2						
Student 3						
Student 4						
	Throw 3 = 10 meters			Throw 4 = 10 meters		
Mass of ball: 0.145kg	Time(s)	Velocity (m/s)	Kinetic Energy (Joules)	Time(s)	Velocity (m/s)	Kinetic Energy (Joules)
Student 1						
Student 2						
Student 3						
Student 4						

1. What percent of the Aroldis Chapman throw (105.1 MPH) was your fastest pitch? Example: If you threw at 45 MPH/150 MPH = .3 or 30%, your fastest throw was only 30% as fast as Aroldis Chapman's throw.

_____

_____

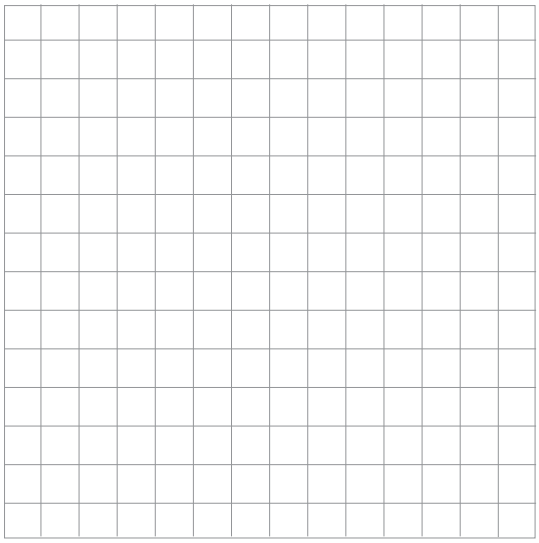
_____

Name: _____ Class: _____

Forces in Baseball

GRADES 6-8

Graph the kinetic energy vs. your velocity for each throw from slowest to fastest.



2. Based on your data/graph, explain the relationship between velocity and kinetic energy by making a claim about the relationship. Support your claim with evidence and reasoning.

Claim: What is the relationship between velocity and kinetic energy?

_____

Evidence: Record and reference in words any data that supports your claim.

_____

_____

_____

Reasoning: Explain why your claim is supported by evidence and scientific ideas. Use the kinetic energy equation to support you.

_____

_____

_____

Name: _____ Class: _____

Composition of a Baseball

GRADES 6-8

1. What were some of the constraints for the first baseball? Why do you think players felt they needed to make changes?

2. How has the anatomy of a baseball changed over time? What drove this change?

3. How have the materials of a baseball changed over time? How do you think the change from natural to synthetic cores impacted play?

4. Explain the importance of the governing bodies setting clear criteria for the baseball's design?

5. How did Major League Baseball ensure that all baseballs were the same size in 2011? In 1974? Why was this important to the game?

6. What is the purpose of this article? Provide evidence from the text to support your claim.

Name: _____ Class: _____

Composition of a Baseball

GRADES 6-8

Using the article and classroom discussion, fill in the following criteria and constraints table.

Criteria	Constraints

	Distance of Hit 1	Distance of Hit 2	Distance of Hit 3	Distance of Hit 4	Distance of Hit 5
Baseball					
Tennis Ball					
Softball					
Golf Ball					

Name: _____ Class: _____

Composition of a Baseball

GRADES 6-8

Based on evidence from the article and your experiment, write a claim and support it with evidence and reasoning, explaining how and why a baseball behaves differently than a tennis, softball, and golf ball.

Claim: How did the evolution of the baseball create a design that has a different function than a tennis ball, softball and golf ball?

_____

Evidence: Record and reference in words any data that supports your claim.

_____

_____

_____

Reasoning: Explain why your claim is supported by evidence and scientific ideas. Use the ideas in your test and your understanding of engineering an object for a specific function.

_____

_____

_____

Module 3.0

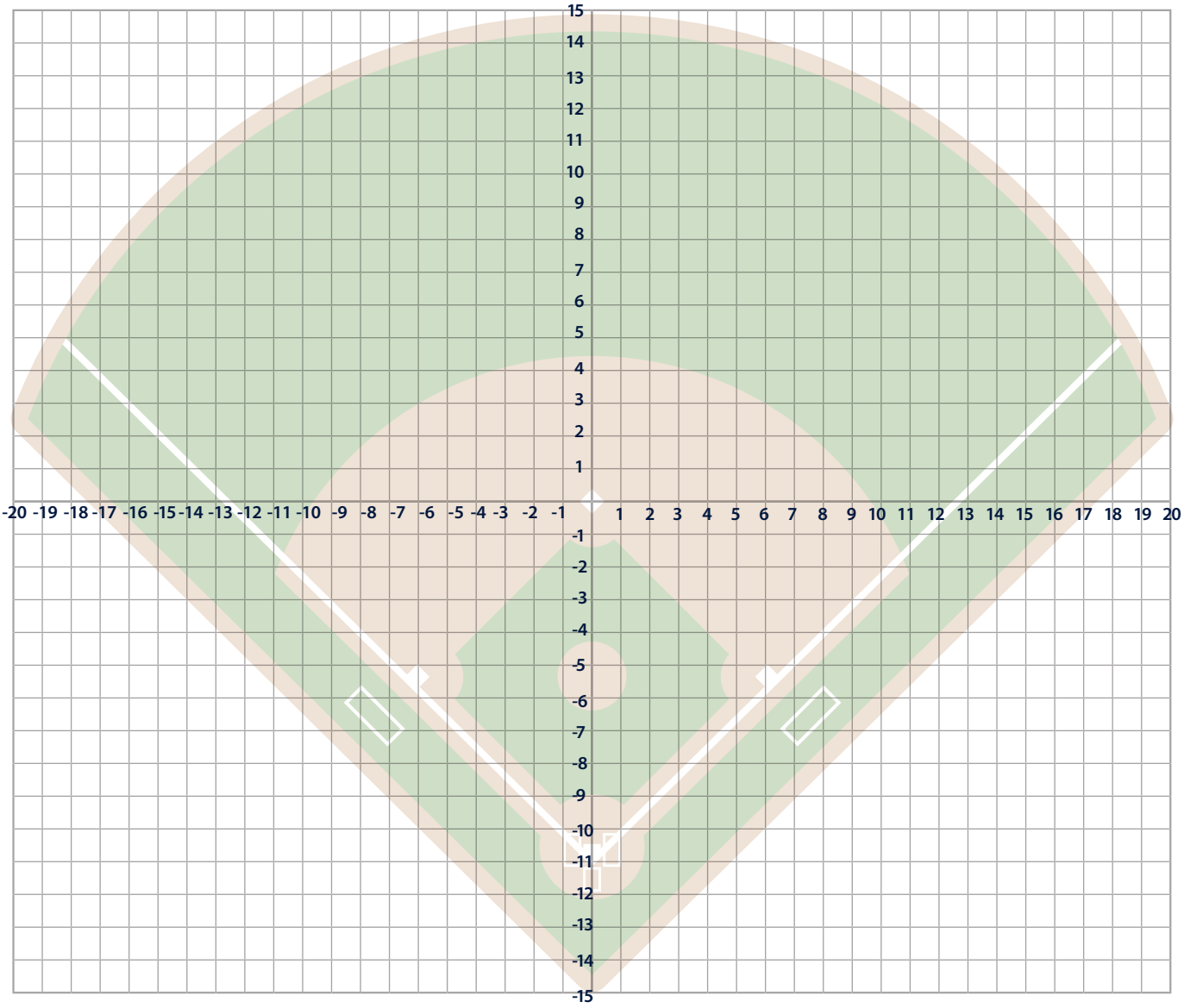
Name: _____ Class: _____

The Field of Play

GRADES 6-8

6th Grade Specific Standards

Plot each player on the coordinate plane. Label their x,y coordinates.



Center field: Pitcher: Shortstop:

Left Field: First Base: Third Base:

Right Field: Second Base: Catcher:

STEM sports science • technology engineering • math • sports

Name: _____ Class: _____

The Field of Play

GRADES 6-8

6th Grade Questions

Use the coordinate plane to determine the absolute value between players.

1. How far would the Second Base player need to throw to the Shortstop?

2. How far would the Third Base player need to throw to the First Base player?

3. How far would the Pitcher need to throw to the Catcher?

4. How far does the Center Fielder need to throw to the Pitcher?

5. If the First Baseman ran to (0, 6) to catch the ball and then needed to throw to Home to make the play, how far would he/she throw?

6. If the Catcher (-11) was trying to throw out a runner stealing Third, how far would he/she throw?

Module 3.0

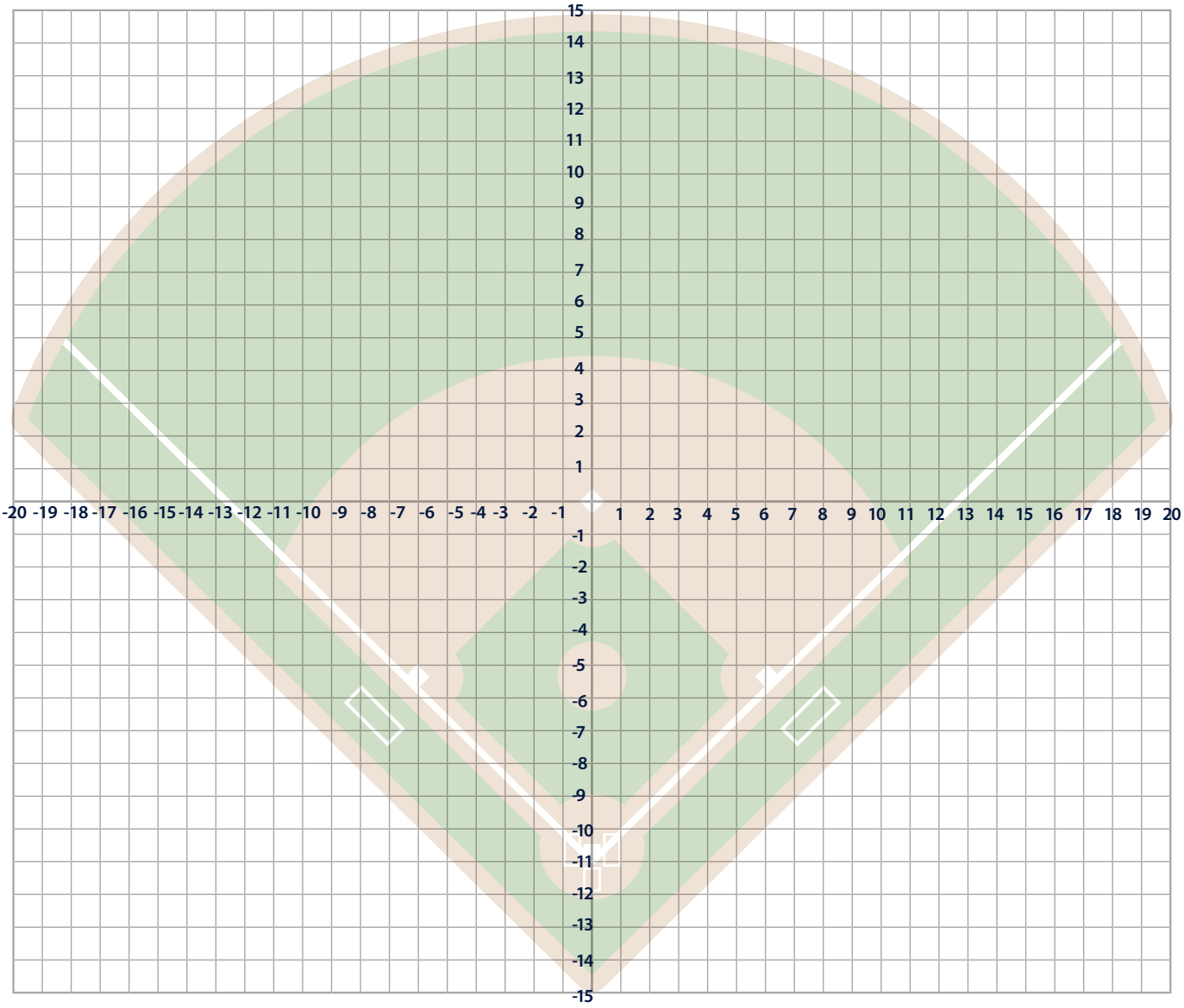
Name: _____ Class: _____

The Field of Play

GRADES 6-8

8th Grade Specific Standards

Plot each player on the coordinate plane. Label their x,y coordinates.



Center Field: Pitcher: Shortstop:

Left Field: First Base: Third Base:

Right Field: Second Base: Catcher:

STEM sports science • technology engineering • math • sports

Name: _____ Class: _____

The Field of Play

GRADES 6-8

8th Grade Questions

1. Use the distance between the Pitcher and First Base (A), and the Pitcher and Catcher (B). Use the Pythagorean Theorem to calculate the distance between First Base and Catcher. $A^2 + B^2 = C^2$

2. Use the distance between the Pitcher and Third Base (A), and the Pitcher and Catcher (B). Use the Pythagorean Theorem to calculate the distance between Third Base and Catcher. $A^2 + B^2 = C^2$

3. Use the distance between the Pitcher and Center Field (A), and the Pitcher and Third Base (B). Use the Pythagorean Theorem to calculate the distance between Third Base and Center Field. $A^2 + B^2 = C^2$

4. Use the distance between the Pitcher and Center Field (A), and the Pitcher and First Base (B). Use the Pythagorean Theorem to calculate the distance between First Base and Center Field. $A^2 + B^2 = C^2$

5. The Catcher moves to (6, -11). Use the distance between First Base and Catcher (A) and First Base and Pitcher (B). Use the Pythagorean Theorem to calculate the distance between the Pitcher and Catcher. $A^2 + B^2 = C^2$

6. The Right Fielder moves to (4, 7) in line with the Second Base player. Use the distance between the Second Base player and the Right Fielder (A) and the Second Base player and Shortstop (B). Use the Pythagorean Theorem to calculate the distance between Right Field and Shortstop. $A^2 + B^2 = C^2$

Name: _____ Class: _____

The Art of Pitching

GRADES 6-8

What variables do you need to control?

Pitching Motion	Speed (measured by radar) m/s	Time of travel (From video) s	Acceleration (Calculated (SI-SF)/time) m/s^2	Mass kg	Force F=MA N(newtons)
Windup					
Windup					
Stretch					
Stretch					

How does a change in force affect a change in motion? Support your answer with evidence from the experiment.

Name: _____ Class: _____

Engineering a Pitching Machine

GRADES 6-8

Identify the Problem: What is the problem you are trying to solve?

Brainstorm multiple designs

Select a single design (draw in detail, label materials and provide measurements)

Name: _____ Class: _____

Engineering a Pitching Machine

GRADES 6-8

Build, Design, and Test It: Your test should be a controlled experiment; the table is provided to support your data collection. Consider ensuring the target, energy input, pitcher, and ball are the same.

	Test 1	Test 2	Test 3
Over the plate but low			
Over the plate but high			
Directly over the plate			

Communicate: Did it work? What evidence supports that it works? Would you make any changes?

Name: _____ Class: _____

Success at the Plate

GRADES 6-8

X = Hit O = No Hit

Trial 1

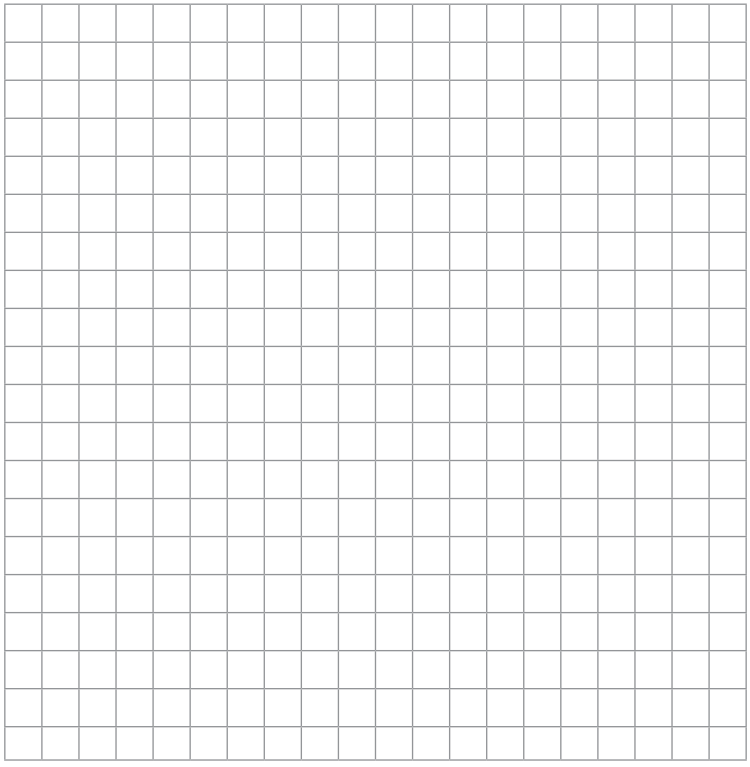
Swings	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	Probability
Hitter											

X = Hit O = No Hit

Trial 2

Swings	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	Probability
Hitter											

Graph the probability of each trial below:



Name: _____ Class: _____

Success at the Plate

GRADES 6-8

1. Based on Trial 1 probability, how many successful hits would you have out of 100 hits?

2. Based on Trial 1 probability, how many successful hits would you have out of 1,000 hits?

3. Based on Trial 1 probability, how many successful hits would you have out of 10,000 hits?

4. Based on Trial 2 probability, how many successful hits would you have out of 100 hits?

5. Based on Trial 2 probability, how many successful hits would you have out of 1,000 hits?

6. Based on Trial 2 probability, how many successful hits would you have out of 10,000 hits?

Based on this information, were you more or less successful before or after watching the video and implementing a change to your swing? Support your answer with data.

Name: _____ Class: _____

Keeping Score

GRADES 6-8

Option 1: Scoring the Game

1	2	3	4	5	6	7	8	9

Option 2: Scoring the game

Add a tally mark as needed.

Innings	Runs	
	Team 1	Team 2
1		
2		
3		
4		
5		
6		
7		
8		
9		

Name: _____ Class: _____

Keeping Score

GRADES 6-8

Team 1

Innings	Strikes (3)				Balls (4)			
	Hitter 1	Hitter 2	Hitter 3	Hitter 4	Hitter 1	Hitter 2	Hitter 3	Hitter 4
1								
2								
3								
4								
5								
6								
7								
8								
9								

Team 2

Innings	Strikes (3)				Balls (4)			
	Hitter 1	Hitter 2	Hitter 3	Hitter 4	Hitter 1	Hitter 2	Hitter 3	Hitter 4
1								
2								
3								
4								
5								
6								
7								
8								
9								

Name: _____ Class: _____

Keeping Score

GRADES 6-8

Put your data above in ratios and simplify to unit rate in the tables below.

Strike to Pitch

	Ratio	Unit Rate
1st Inning		
2nd Inning		
3rd Inning		
4th Inning		

Balls to Pitch

	Ratio	Unit Rate
1st Inning		
2nd Inning		
3rd Inning		
4th Inning		

Runs to Batters

	Ratio	Unit Rate
1st Inning		
2nd Inning		
3rd Inning		
4th Inning		

Name: _____ Class: _____

Keeping Score

GRADES 6-8

Inning score to total score

	Ratio	Unit Rate
1st Inning		
2nd Inning		
3rd Inning		
4th Inning		

Team 1 total score / Team 2 total score

	Ratio	Unit Rate
1st Inning		
2nd Inning		
3rd Inning		
4th Inning		

Team 1 inning score / Team 2 inning score

	Ratio	Unit Rate
1st Inning		
2nd Inning		
3rd Inning		
4th Inning		

Name: _____ Class: _____

Keeping Score

GRADES 6-8

Answer the questions:

1. Based on the Run to Hitter ratios, who is a more effective pitcher? How do the ratios support your claim?

2. Based on your inning Runs to Total Runs ratio, which inning was the best played inning? How do the ratios support your claim?

3. If your team out scores the other team at a ratio of 2:1, what will the score be for each inning and the end of the game?

Innings	Opponent Score	Your Score
1	1	
2	2	
3	4	
4	3	
5	0	
6	1	
7	2	
8	1	
9	3	
Total		

Name: _____ Class: _____

Keeping Score

GRADES 6-8

4. If a pitcher's ratio of pitches to strikes is 5:2, how many strikes will the pitcher throw during a game of 50 pitches?

5. If a relief pitcher strikes out a player 1/3 times, what is their ratio of strikes to pitches?

Name: _____ Class: _____

Advancements in Baseball

GRADES 6-8

After review of GamePlan:

Pitching

Rate your pitches: best to worst. Explain your reasoning.

Swinging

Rate your swings/hits: best to worst. Explain your reasoning.

Problem: In Baseball, comprehensive skills (swinging and pitching) happen more quickly than we can see and analyze. How can coaches and players better analyze their skills?

Brainstorm a list of criteria and constraints with students and display below:

Criteria	Constraints

Name: _____ Class: _____

Advancements in Baseball

GRADES 6-8

After review of Performance Technology:

Pitching

Rate your pitches: best to worst. Explain your reasoning. What evidence did you collect from the technology? _____

_____

_____

_____

Swinging

Rate your swings/hits: best to worst. Explain your reasoning. What evidence did you collect from the technology?

_____

_____

_____

_____

Which is the best solution to the problem that coaches and players need a better way to analyze their skills: GamePlan Technology, Performance Technology or a redesign? These questions will help support your writing: Which technology – GamePlan or Performance Technology – better supports a player improving their skills? What are the similarities and differences from each technology? How do both technologies meet or not meet the criteria/constraints brainstormed in the *Explain* section? What improvements would you make to both technologies?

_____

_____

_____

_____

_____

_____

Name: _____ Class: _____

Capstone

GRADES 6-8

Game Simulation

Probability generators:

- https://stattrek.com/statistics/random-number-generator.aspx
- Dice (ten sided)
- Numbers in a hat (0-9)
- https://www.omnicalculator.com/statistics/dice
- Random.org
- #numbers 1-999

Inning one:

Offense: Hitting
(Probability generator 1-999 needed)
Using the batting average probability, determine if you 'got a hit'. Mark a hit with a "O."
To determine if you "got a hit," use the probability generator. If you roll, select or draw a number within your probability: you "got a hit."
Example: Your player's batting average is 0.362. You roll a 272, you 'got a hit'. You roll a 585 or 891, no hit.

	Player 1	Player 2	Player 3	Player 4	Player 5	Player 6	Player 7	Player 8	Player 9
Team 1									
Team 2									

If you have a player with a Slugging Percentage probability greater than 0.450, **score one (1) run per inning.*

Defense: Outfield Play and Pitching
(Probability generator 1-9 needed)

1. Review your *put-out* probabilities. Roll the dice for every hit the opposing team made. If you roll a number within your probability, cross out a hit. For example, If your put out probability is 0.2 and you roll a 2, cross out a hit. If you roll a 3-9 all hits remain.
2. Review your error probabilities. Roll the dice for every hit the opposing team made. If you roll a number within your probability, put a '2' in the circle: the hitter got a double.
   For example: If you have an error probability of 0.6, anything you roll 1-6 the hitter scores a double.

Name: _____ **Class:** _____

Repeat for as many innings as your teacher assigned.

Score:

1. Review your opponent's pitcher's ERA (earned run average). For every single (O) hit you made within the average is a run. If the average is 2, and you have 10 hits, you score 2 runs.
2. Count your remaining hits for every four bases you score a run. (O) = 1 base; (O w/ two inside) = two bases. Unlike regular baseball players on base in one inning can be used for runs in a different inning. For example: If you had a double and three singles in the 1st inning. And three singles in 2nd inning. You would have a total of 2 runs.

	Player 1	Player 2	Player 3	Player 4	Player 5	Player 6	Player 7	Player 8	Player 9
Team 1									
Team 2									

Pitchers

	Defensive	
Player Name	**ERA (earned run average)**	**ERA (earned run average)**
Billy Smith	3.00	Good
Christie Clark	2.00	Very good
Christopher Marks	1.00	Excellent
Darren Willis	4.00	Fair
Hannah Wall	5.00	Poor
Jack Snell	5.00	Poor
James Knight	4.00	Fair
Jamie Welch	2.00	Very good
Kellie Wallace	7.00	Poor
Larry Smith	3.00	Good
Matt Davis	4.00	Fair
Matt Palmer	8.00	Poor
Megan Reagan	10.00	Poor
Mick Stein	2.00	Very good
Miles Corey	12.00	Poor
Nellie Ward	6.00	Poor
Phil Bradley	5.00	Poor
William Bradshaw	3.00	Good

Hitters + Fielders

	OFFENSE				DEFENSE			
Player Name	BA (Batting Average)	BA (Batting Average)	SLG (Slugging Percertage %)	SLG (Slugging Percertage %)	Put Outs	Put Outs	Errors	Errors
Addison Rush	0.274	Fair	0.472	Good	0.7	Very Good	0.6	Poor
Adrian Steele	0.236	Poor	0.409	Fair	0.2	Poor	0.2	Very good
Alejandro Philip	0.345	Excellent	0.667	Excellent	0.9	Excellent	0.4	Fair
Alex Donovan	0.277	Good	0.461	Fair	0.5	Fair	0.3	Good
Andre Whitaker	0.302	Very good	0.488	Good	0.9	Excellent	0.2	Very Good
Anna Kelly	0.264	Fair	0.403	Fair	0.4	Fair	0.9	Poor
Ari Goodman	0.203	Poor	0.273	Poor	0.7	Very good	0.4	Fair
Ariel Boyer	0.281	Good	0.387	Fair	0.5	Fair	0.3	Good
Armani Curtis	0.255	Fair	0.491	Good	0.3	Poor	0.8	Poor
Averi Norris	0.304	Very good	0.406	Fair	0.8	Very good	0.2	Very good
Bernard Greer	0.291	Good	0.388	Fair	0.5	Fair	0.5	Fair
Bo Friedman	0.214	Poor	0.353	Fair	0.2	Poor	0.4	Fair
Braelyn Rios	0.299	Good	0.566	Very good	0.3	Poor	0.8	Poor
Bruce Wallace	0.266	Fair	0.408	Fair	0.5	Fair	0.2	Very good
Carl Williams	0.231	Poor	0.391	Fair	0.2	Poor	0.6	Poor
Carmen Yang	0.265	Fair	0.441	Good	0.6	Good	0.9	Poor
Casey Finnegan	0.362	Excellent	0.714	Excellent	0.3	Poor	0.1	Excellent
Caylee Kennedy	0.268	Fair	0.399	Fair	0.8	Very good	0.2	Very good
Cecilia McGiffin	0.222	Poor	0.422	Fair	0.6	Good	0.4	Fair
Charles Corsini	0.275	Fair	0.494	Good	0.8	Very good	0.1	Excellent
Chris Kim	0.194	Poor	0.303	Fair	0.9	Excellent	0.1	Excellent
Chris Wilson	0.283	Good	0.443	Good	0.4	Fair	0.6	Poor
Claire Oswald	0.331	Excellent	0.584	Very good	0.3	Fair	0.6	Poor
Dale Michaels	0.297	Good	0.501	Very good	0.7	Very good	0.2	Very good
Damaris Gould	0.223	Poor	0.359	Fair	0.4	Fair	0.8	Poor
Dan Reynolds	0.242	Fair	0.366	Fair	0.7	Good	0.3	Fair
Daniel Weiss	0.279	Good	0.555	Very good	0.8	Very good	0.2	Very good
Darrren Monroe	0.236	Poor	0.324	Fair	0.2	Poor	0.5	Fair
Dave Lewis	0.363	Excellent	0.506	Very good	0.8	Very good	0.1	Excellent
Devin Walker	0.281	Good	0.401	Fair	0.6	Good	0.3	Fair
DJ Witmore	0.258	Fair	0.403	Fair	0.8	Very good	0.4	Fair
Donald Thorpe	0.248	Fair	0.355	Fair	0.2	Poor	0.7	Poor
Elaina Stewart	0.196	Poor	0.289	Poor	0.3	Fair	0.9	Poor
Emiliano Hull	0.366	Excellent	0.681	Excellent	0.8	Very good	0.3	Good
Emilio Gibson	0.286	Good	0.498	Good	0.6	Good	0.3	Good
Emily Carr	0.233	Poor	0.378	Fair	0.5	Fair	0.4	Fair
Esmeralda Good	0.264	Fair	0.506	Good	0.3	Poor	0.3	Good
Ethan Garvey	0.252	Fair	0.413	Fair	0.2	Poor	0.7	Poor
Fred Watkins	0.289	Good	0.492	Good	0.8	Very good	0.2	Very good
Genevieve Mathieu	0.262	Fair	0.371	Fair	0.6	Good	0.1	Excellent
Grant Rogers	0.295	Good	0.443	Fair	0.4	Fair	0.3	Good
Haley Park	0.259	Fair	0.401	Fair	0.6	Good	0.2	Very good
Isabel Bautista	0.321	Very good	0.629	Excellent	0.5	Fair	0.3	Good
Jaliyah Harris	0.302	Very good	0.473	Fair	0.7	Good	0.2	Very good
James Brooks	0.285	Good	0.431	Fair	0.5	Fair	0.8	Poor
Jamie Kemp	0.261	Fair	0.483	Good	0.6	Good	0.4	Fair
Jared Villegas	0.314	Very good	0.436	Fair	0.8	Very good	0.2	Very good
Javier Edwards	0.279	Good	0.552	Good	0.4	Fair	0.4	Fair
Jenna Klink	0.274	Fair	0.472	Fair	0.7	Good	0.6	Poor
Jerry White	0.236	Poor	0.409	Fair	0.2	Poor	0.2	Very good

Hitters + Fielders

	OFFENSE				DEFENSE			
Player Name	BA (Batting Average)	BA (Batting Average)	SLG (Slugging Percertage %)	SLG (Slugging Percertage %)	Put Outs	Put Outs	Errors	Errors
Jordan Johnson	0.345	Excellent	0.667	Fair	0.9	Excellent	0.4	Fair
Joshua Martin	0.277	Good	0.461	Fair	0.5	Fair	0.3	Good
Julio Daniels	0.302	Very good	0.488	Good	0.9	Excellent	0.2	Very good
Kalvin Henry	0.264	Fair	0.403	Fair	0.4	Fair	0.9	Poor
Kathleen Reilly	0.203	Poor	0.273	Poor	0.7	Good	0.4	Fair
Kathy Jackson	0.281	Good	0.387	Fair	0.5	Fair	0.3	Good
Katie Smith	0.255	Fair	0.491	Good	0.3	Poor	0.8	Poor
Kenneth Howell	0.304	Very good	0.406	Fair	0.8	Very good	0.2	Very good
Kevin Matlock	0.291	Good	0.388	Fair	0.5	Fair	0.5	Fair
Kevin Watts	0.214	Poor	0.353	Good	0.2	Poor	0.4	Fair
Kian Lutz	0.299	Very good	0.566	Very good	0.3	Poor	0.8	Poor
Koen Rodriguez	0.266	Fair	0.408	Good	0.5	Fair	0.2	Very good
Larry Frazier	0.231	Poor	0.391	Good	0.2	Poor	0.6	Poor
Laura Matson	0.265	Fair	0.441	Good	0.6	Fair	0.9	Poor
Lillian Paige	0.362	Excellent	0.714	Excellent	0.3	Fair	0.1	Excellent
Luca Dean	0.268	Fair	0.399	Fair	0.8	Very good	0.2	Very good
Lucy Conner	0.222	Poor	0.422	Good	0.6	Good	0.4	Fair
Luis Valez	0.275	Fair	0.494	Good	0.8	Very good	0.1	Excellent
Lyle Moore	0.194	Poor	0.303	Good	0.9	Excellent	0.1	Excellent
Madeline Grady	0.283	Good	0.443	Fair	0.4	Fair	0.6	Poor
Marian Hancock	0.331	Very good	0.584	Very good	0.3	Poor	0.6	Poor
Mary Oliver	0.297	Good	0.501	Good	0.7	Good	0.2	Very good
Mary Phillips	0.223	Poor	0.359	Good	0.4	Fair	0.8	Poor
Melanie McCarthy	0.242	Poor	0.366	Good	0.7	Good	0.3	Fair
Micheal Polese	0.279	Good	0.555	Good	0.8	Very good	0.2	Very good
Miguel Ortiz	0.236	Poor	0.324	Fair	0.2	Poor	0.5	Poor
Nathalie Herman	0.363	Excellent	0.506	Fair	0.8	Very good	0.1	Excellent
Nathan Avery	0.281	Good	0.401	Fair	0.6	Good	0.3	Good
Norman Levi	0.258	Fair	0.403	Good	0.8	Very good	0.4	Fair
Omari Arellano	0.248	Fair	0.355	Fair	0.2	Poor	0.7	Poor
Raphael Savage	0.196	Poor	0.289	Fair	0.3	Poor	0.9	Poor
Reggie Davis	0.366	Excellent	0.681	Very good	0.8	Very good	0.3	Good
Rob Lowenthal	0.286	Good	0.498	Good	0.6	Good	0.3	Good
Rolando Avery	0.233	Poor	0.378	Good	0.5	Fair	0.4	Fair
Rose Howe	0.264	Fair	0.506	Good	0.3	Poor	0.3	Fair
Ryleigh Kelly	0.252	Fair	0.413	Fair	0.2	Poor	0.7	Poor
Salma Beard	0.289	Good	0.492	Good	0.8	Very good	0.2	Very good
Sean Haggerty	0.262	Fair	0.371	Fair	0.6	Good	0.1	Excellent
Sharon Kelly	0.295	Good	0.443	Fair	0.4	Fair	0.3	Good
Sofia Mousseau	0.259	Fair	0.401	Good	0.6	Good	0.2	Very Good
Sue Thrive	0.321	Fair	0.629	Fair	0.5	Very good	0.3	Very good
Taylor Webb	0.302	Very good	0.473	Good	0.7	Good	0.2	Very good
Ted Dawson	0.285	Good	0.431	Good	0.5	Good	0.8	Poor
Timothy Ramirez	0.261	Fair	0.483	Good	0.6	Good	0.4	Fair
Todd Carlsen	0.314	Very good	0.436	Fair	0.8	Very good	0.2	Very good
Trevor Blankenship	0.279	Good	0.552	Very good	0.4	Fair	0.4	Fair
Turner McBribe	0.196	Poor	0.289	Fair	0.3	Poor	0.9	Poor
Valentina Stevens	0.366	Excellent	0.681	Very good	0.8	Very good	0.3	Good
William Elston	0.288	Good	0.561	Good	0.8	Very good	0.2	Very good
Zion Morrison	0.254	Fair	0.508	Good	0.6	Good	0.6	Poor