

BASEBALL SIMULATION

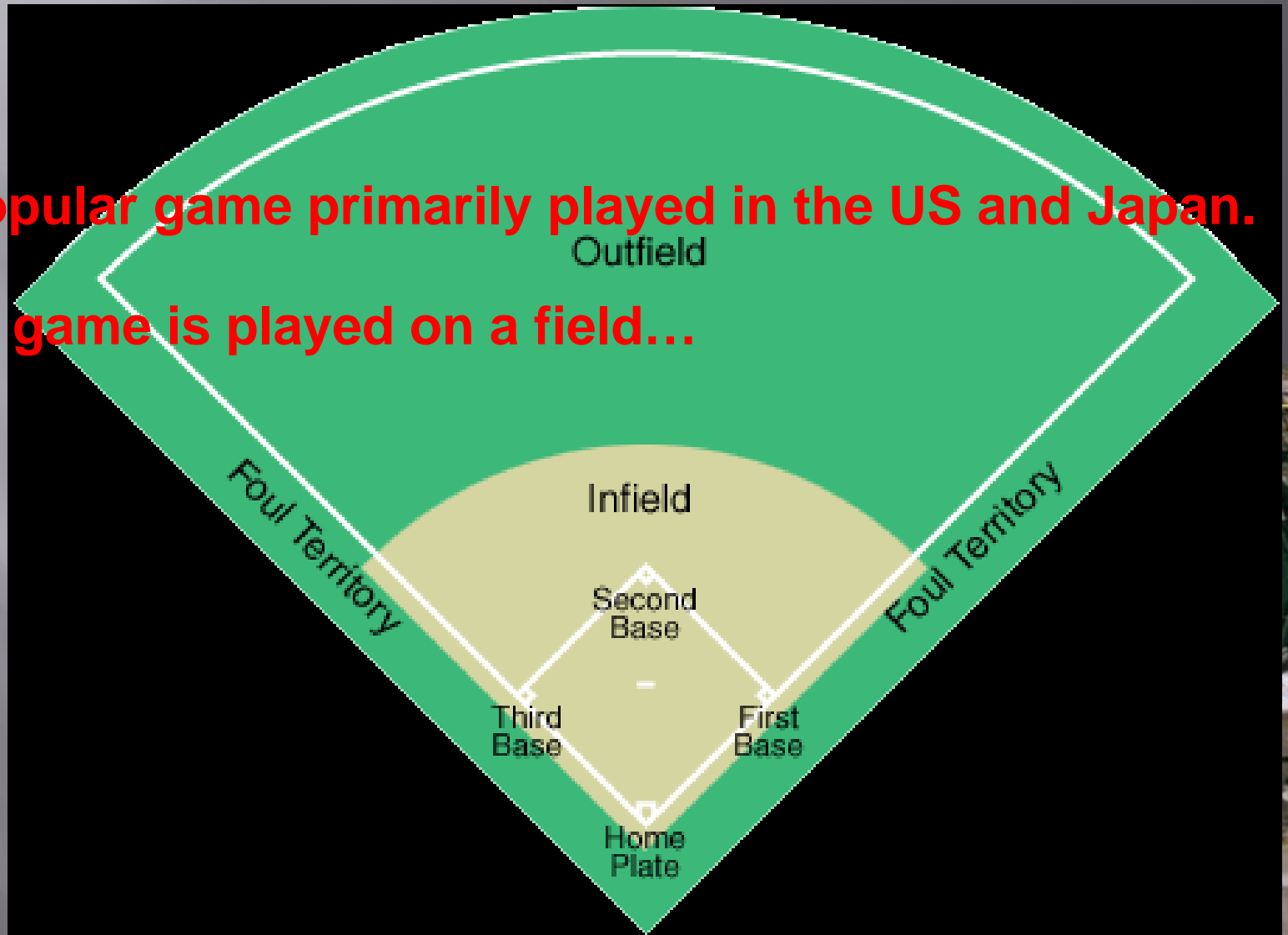
Joe Lossett

Liu Tang

What is Baseball?

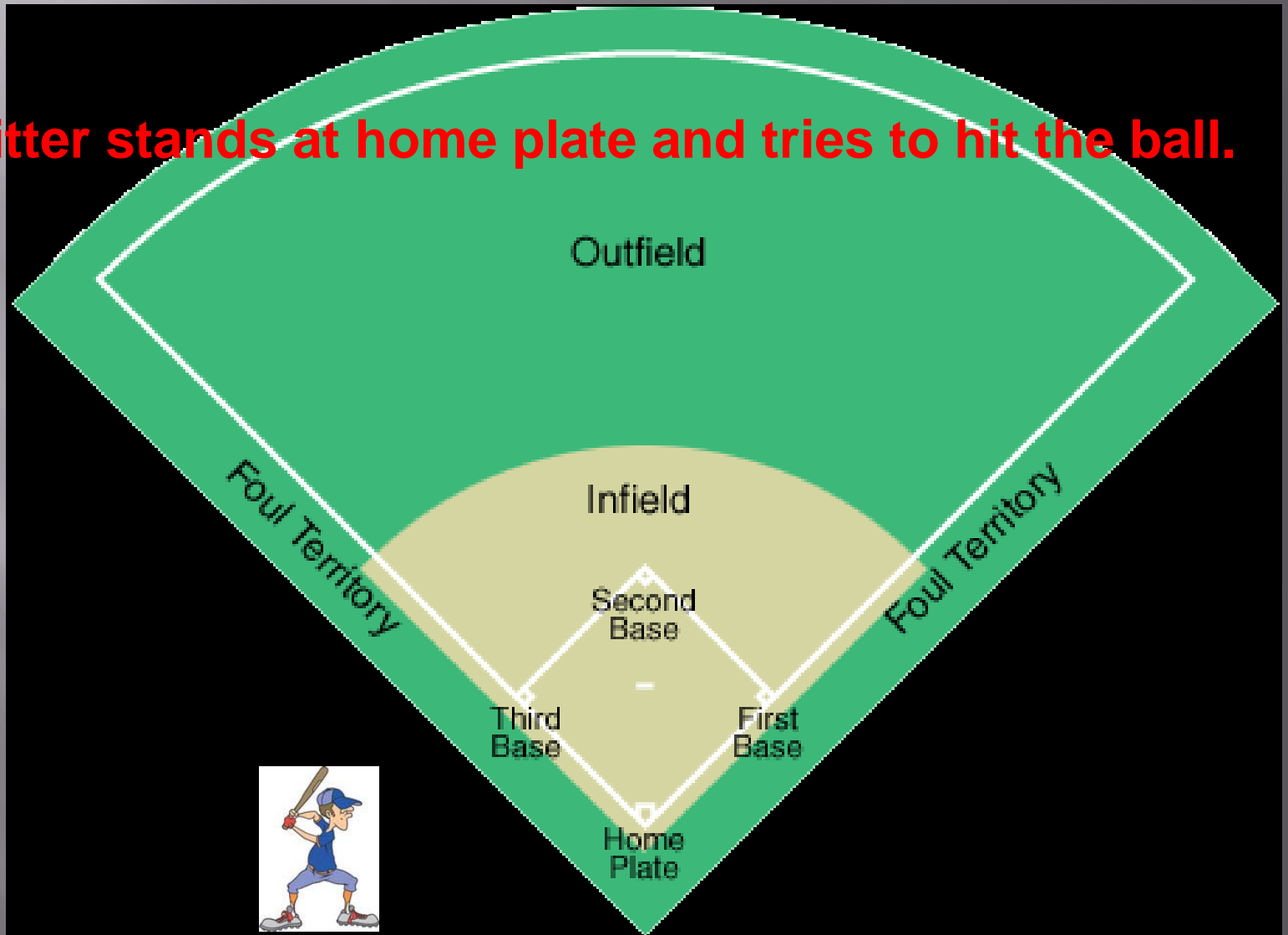
A popular game primarily played in the US and Japan.

The game is played on a field...



What is Baseball?

The hitter stands at home plate and tries to hit the ball.



What is Baseball?

If he does, he runs to First Base.

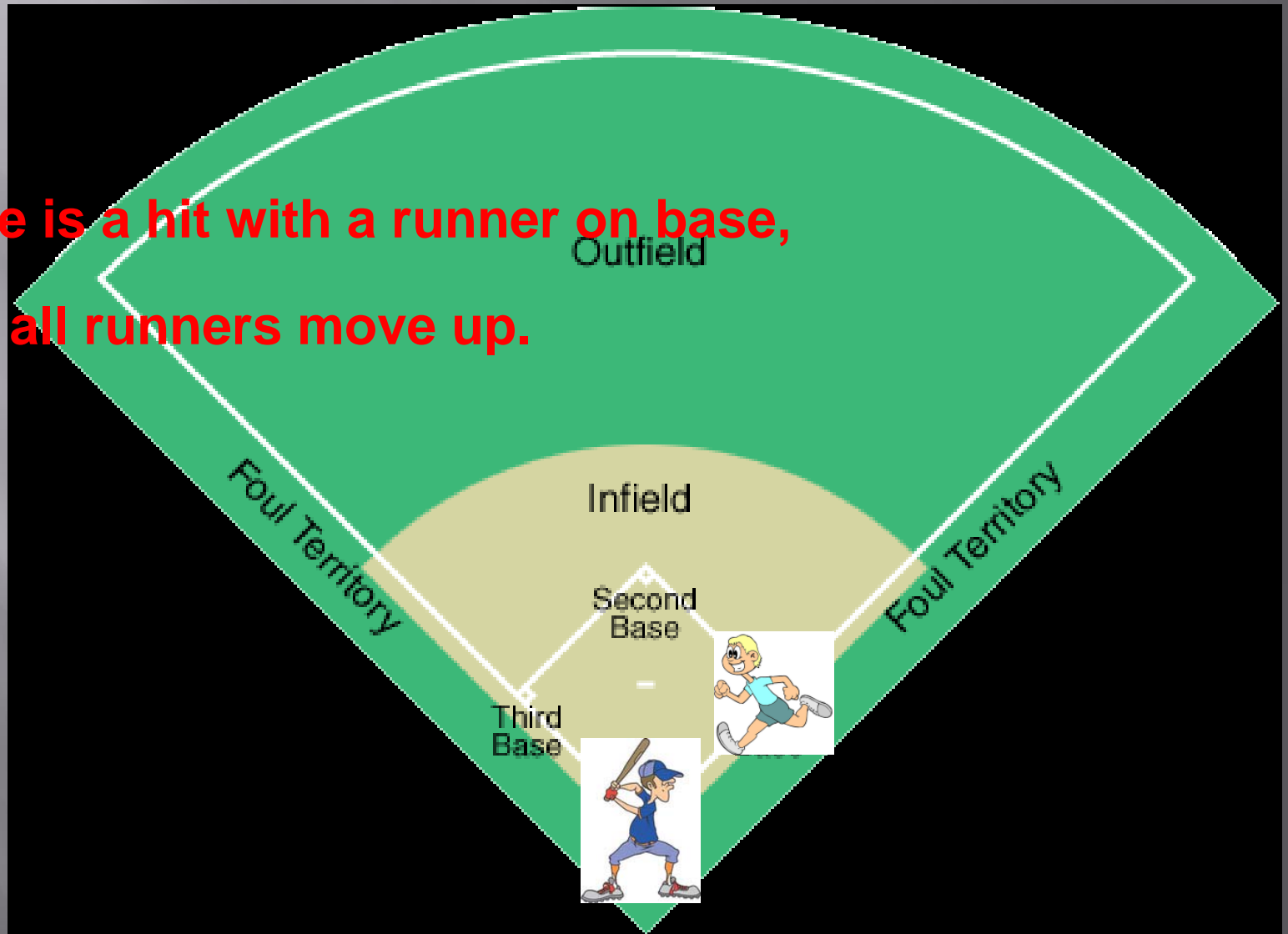
Another possibility is a walk, which also advances him to First.

If he fails, then he is out.



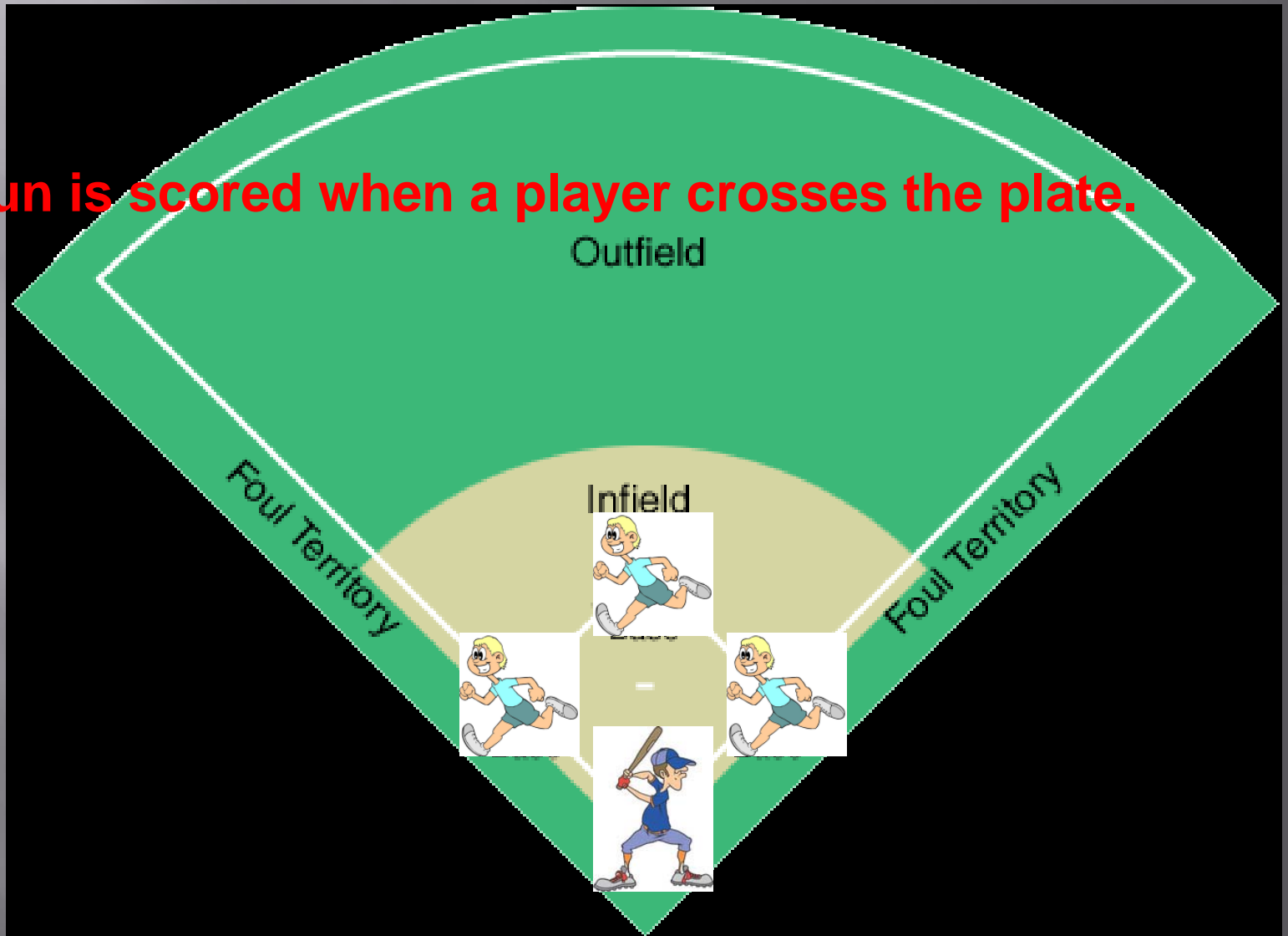
What is Baseball?

If there is a hit with a runner on base,
all runners move up.



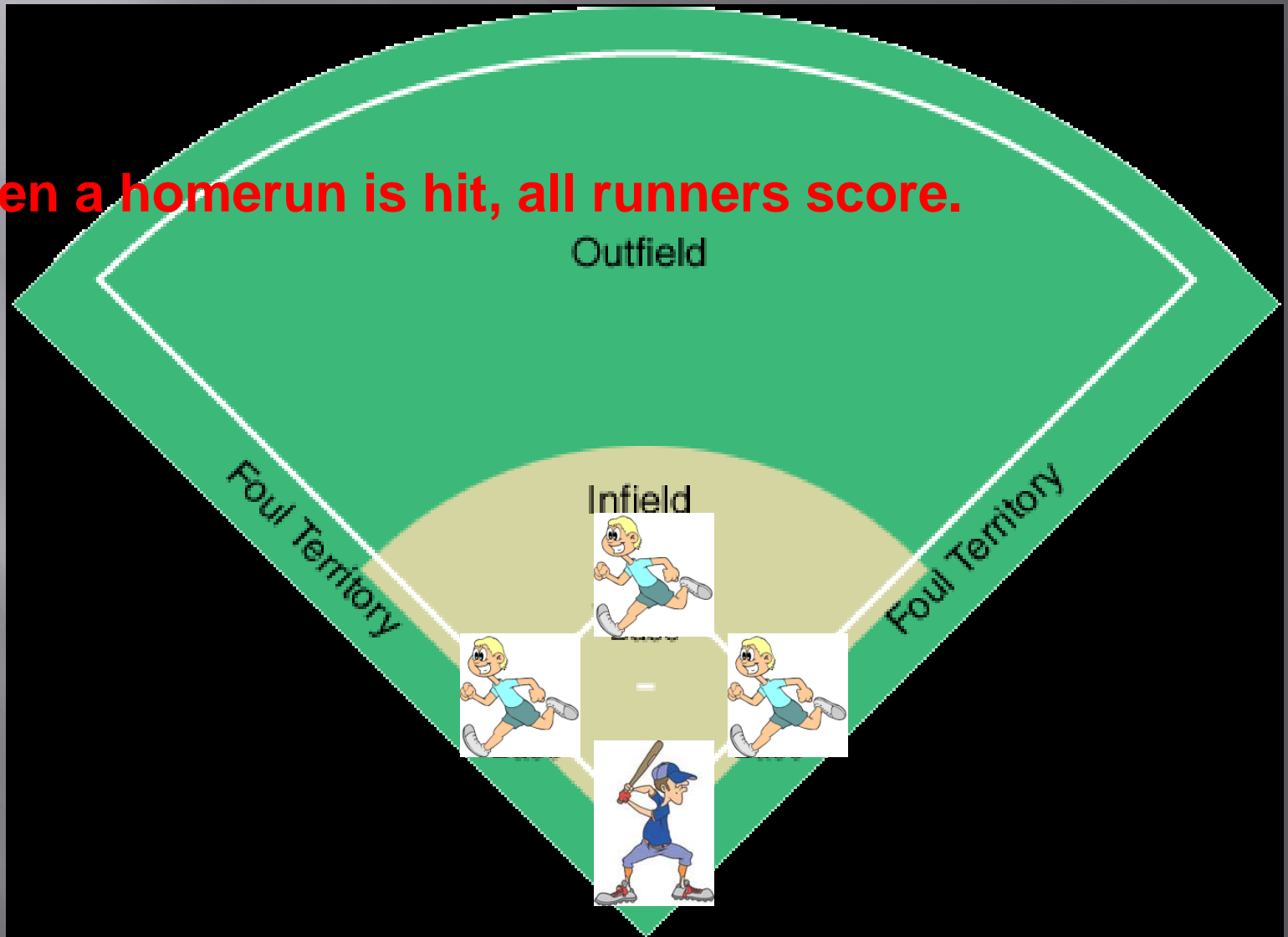
What is Baseball?

A run is scored when a player crosses the plate.



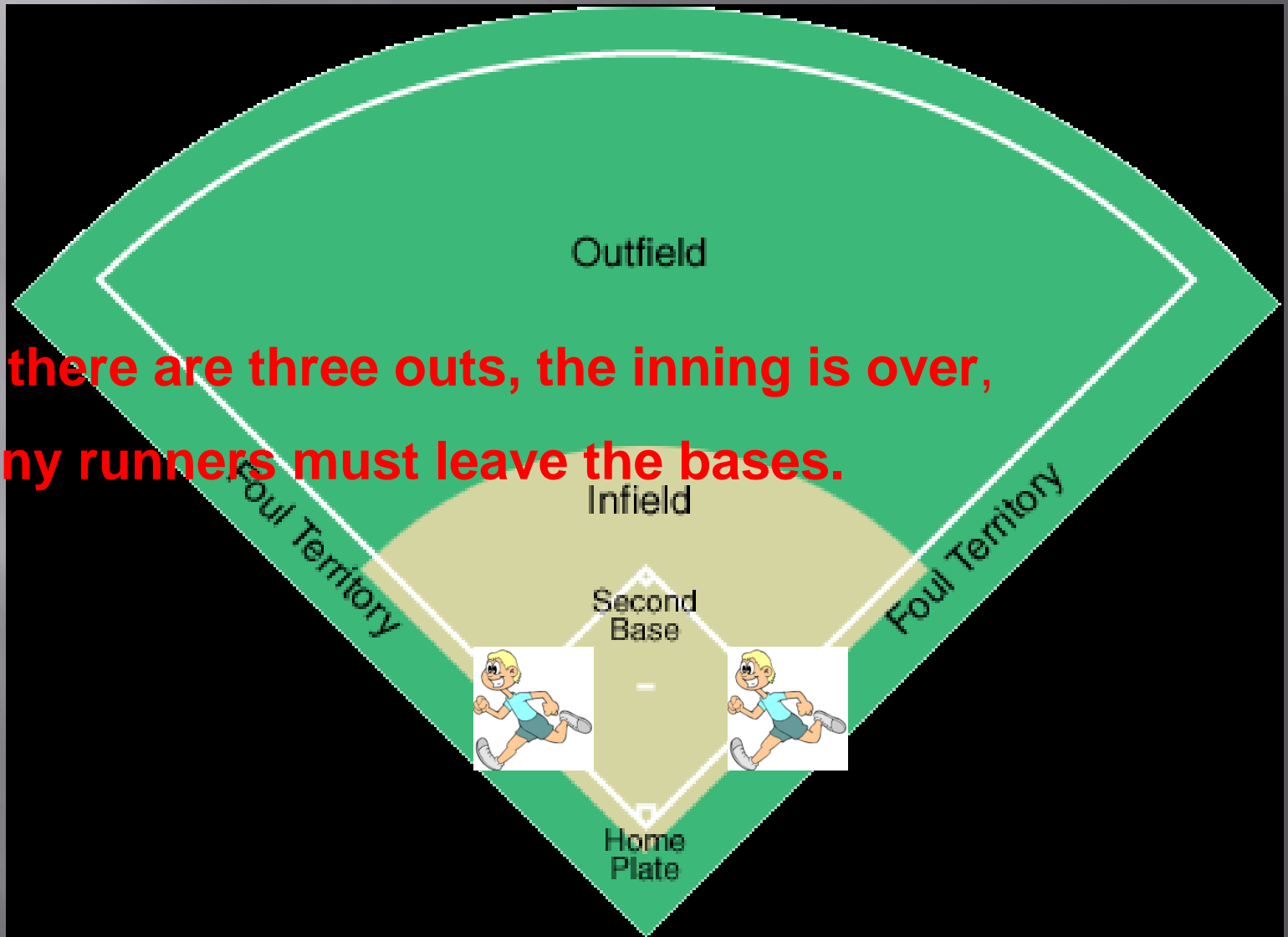
What is Baseball?

When a homerun is hit, all runners score.



What is Baseball?

**When there are three outs, the inning is over,
and any runners must leave the bases.**



What is Baseball?

The object is to score more runs than the other team during a nine inning game.

Project Goal

Provide baseball managers and executives with a tool that helps optimize offensive performance, and that can evaluate the value of a player.

Objectives

Simulate the offensive performance of a baseball team over the course of a season (162 games).

Compare the output of different lineups.

Find out how much one player can affect the output of a team made of average players.

Simplifications

The model only takes into account offensive performance.

Batter success will be limited to hitting a single or homerun.

Does not consider factors like speed.

- No stolen bases.

- Players cannot hit a double or triple.

Steps/Implementation

Develop a simple model for simulating what a batter does.

Design a system to keep track of the game state.

Add home runs and walks to the model.

Calibrate the model by output to MLB in 2008.

Make Excel automatically generate different lineups.

Find the Value over Regular Guy (VORG).

Develop a “simple” model for simulating what a batter does.

=IF(E6=1,0,IF(OR(D6=1,F6=1),1,IF(AND(I5=1,H5<>2),1,0)))

Batting Result			
U	Hit	Home Run	Walk
0.129353	1	0	0
0.34387	0	0	0
0.324729	0	0	0
0.127239	1	0	0
0.800841	0	0	0
0.831937	0	0	0

Game State

=IF(C6<CHOOSE(A6,Lineup!\$C\$7,Lineup!\$C\$8,Lineup!\$C\$9,Lineup!\$C\$10,Lineup!\$C\$11,Lineup!\$C\$12,Lineup!\$C\$13,Lineup!\$C\$14,Lineup!\$C\$15),1,0)

Outs	Inning	1st Base	2nd Base	3rd Base
0	1	0	0	0
0	1	1	0	0
1	1	1	0	0
2	1	1	0	0
2	1	1	1	0

Design a system to keep track of the game state.

Add home runs and walks to the model.

Hit Rate Power Rate Walk Rate
0.264 0.063 0.069

Calibrate the model to output of MLB in 2008.

LEAGUE AVERAGES	<u>GP</u>	<u>AB</u>	<u>R</u>	<u>H</u>	<u>2B</u>	<u>3B</u>	<u>HR</u>	<u>TB</u>	<u>RBI</u>	<u>BA</u>	<u>OBP</u>	<u>SLG</u>	<u>OPS</u>
American League	51	1756	250	469	96	9	56	751	238	.267	.338	.427	.765
National League	51	1710	231	442	93	10	48	699	221	.259	.335	.409	.744
Major League Baseball	51	1731	240	455	94	10	52	723	229	.263	.336	.418	.754

Make Excel automatically generate different lineups.

`=INDEX(B7:E15,MATCH($C33,$C$7:$C$15,0),3)`

Best Hitters First

Player	Hit Rate	Power Rate	Walk Rate
1Liu Tang	0.4	0.03	0.063
2Joe Lossett	0.35	0.02	0.085
3Long Gao	0.314	0.055	0.072

Find the Value over Regular Guy (VORG).

Value over Regular Guy

Player	Hit Rate	Power Rate	Walk Rate
Regular 1	0.264	0.063	0.069
Regular 2	0.264	0.063	0.069
Test Case	0	0	0
Regular 3	0.264	0.063	0.069
Regular 4	0.264	0.063	0.069
Regular 5	0.264	0.063	0.069
Regular 6	0.264	0.063	0.069
Regular 7	0.264	0.063	0.069
Regular 8	0.264	0.063	0.069

Runs/Game 3.86

VORG -0.74

Demonstration