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FOR EXCELLENCE IN MIAMI-DADE PUBLIC SCHOOLS

2018-2019

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idea packet

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Out of the Park

December 2018

out of the park

MATH IN THE REAL WORLD

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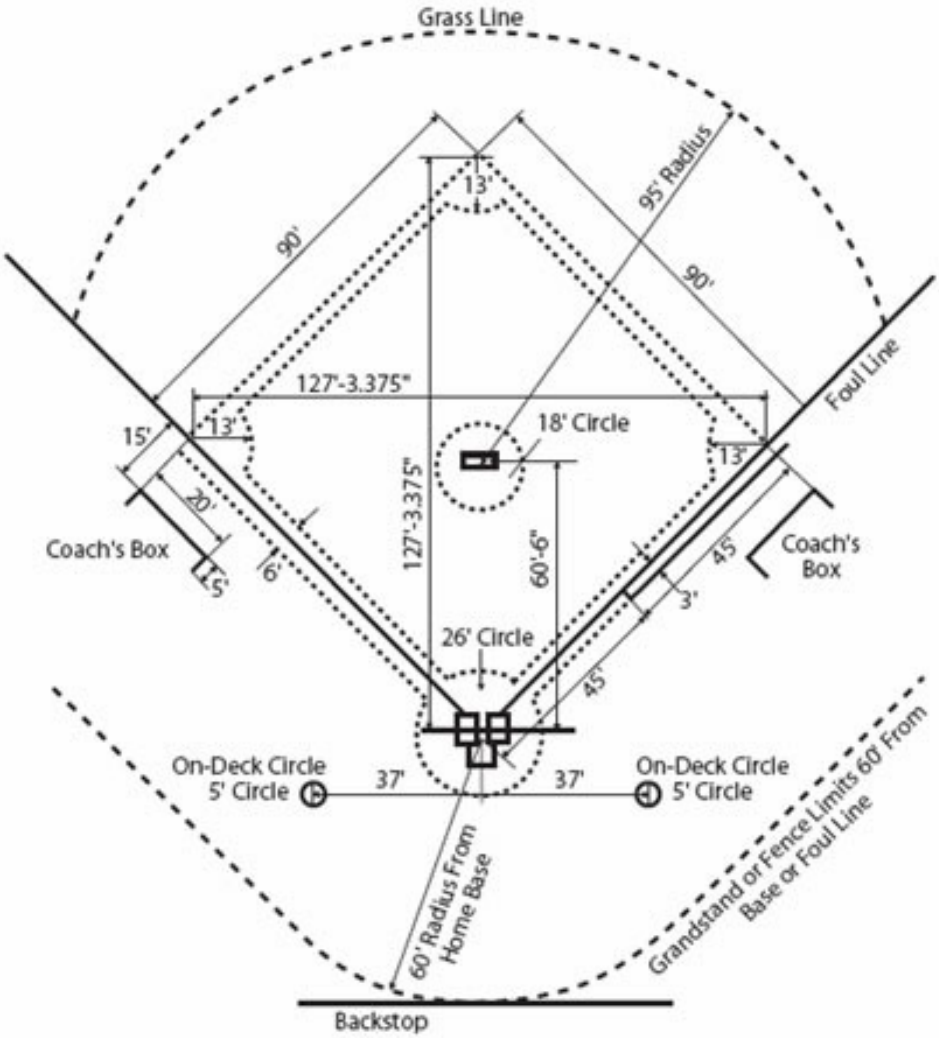
Goals and Objectives

The objectives of this lesson are:

- to have students practice converting measurements
- to have students understand that they must use appropriate terms when using measurements
- for students to work collaboratively to make sense of problems
- for students to practice using mathematical language
- for students to realize that math is all around us!



Florida State Standards & Mathematical Practices

MAFS.5.MD.1.1 - Convert among different-sized standard measurement units (i.e., km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec) within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

MAFS.5.NBT.2.6 - Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

MAFS.4.MD.1.2 - Use the four operations to solve word problems involving distances, *intervals of time*, and money, including problems involving simple fractions or decimals. Represent fractional quantities of distance and intervals of time using linear models.

MAFS.K12.MP.6.1 - Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

Lesson Overview & Inspiration

Play ball! Everyone loves sports or some variation of it - why not bring it into the classroom for our students to look at in a different aspect: the math side!

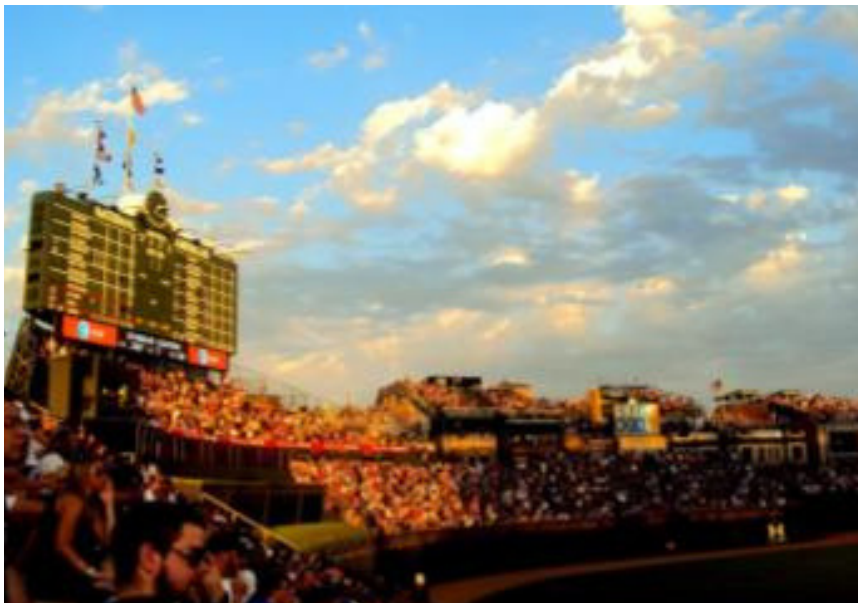
The purpose of this project is to have students understand how different types of math is all around them including when they go somewhere for fun. I love all types of sports, both watching and participating and it's something that I love to share with my students. Earlier this year over spring break, I was able to go to the Miami Marlins opening day game. As my husband and I made calculations about cost of snacks and drinks, discussed stats for our fantasy baseball teams and analyzed individual player performances, I thought - wow! So much math! I can bet that my students are out there somewhere over spring break immersed in math and they don't even know it! Let me make a lesson out of this!

Lesson Overview & Inspiration

Since we were in the middle of a unit on measurements and conversions, as soon as we came back from break, I used this lesson as a review. It was a great way to have students engage in math after a week off. The great thing about this lesson is that it can be adapted in any way - as a review, as an introduction, even applied to a different sport. Even if a student doesn't play or watch a sport, there is a way of connecting with all students through this universal lesson.

The best feature of this project is that most students can relate because everyone has a favorite sport whether they play or like to watch. It can also relate because it can be about a park that they have visited before or in a city they have visited or will visit. There is an entry point into the lesson for all students! This can be set-up through a quick discussion as a way to reel students in. In my case, I shared my experience as a baseball fan from Chicago, which my students love to hear about. I have some baseball players in my class and I have students interested in other sports (tennis, basketball, volleyball, softball, soccer.) All you have to do is take your own students' interests and apply the rest of the components of the lesson!

Lesson/Activity: Out of the Park!



Materials:
Field dimensions - virtual or copies
Copies of conversion problems
Conversion chart (if needed)

Introduction: To begin the lesson, have students think about sports in general and have them make connections to math in any form. (I showed the students photographs.) This will allow students to think about their own sport preferences and serves as an individual entry point to the lesson. Have the students participate in a pair-share and then discuss as a class. Make a list of math used in sports (ratios, percentages, measurements of lengths, adding and subtracting money, elapsed time, how games are split [quarters, innings, etc]. Through this discussion, guide the students to making the connection between baseball, measurements and conversions to lead into the objectives of the lesson.

Out of the Park!

Depending on the point of your unit when doing this lesson, you might need to do some practice problems, to model what students are required/expected to complete.

Directions for students: students are seated in groups of 6. Each student receives 2 problems to complete, each different types of converting for each student though each group receives the same problems as another group.

Students can work together to remember steps for converting (dividing, multiplying, etc) but have to work on their individual problems. Of course, depending on the point this is used in your lesson, there can be more problems. Since I used this lesson as a review, I wanted them to do a couple of problems to quickly get their brain juices flowing. I made sure all of the problems were numbered. Some of the problems will have students using the field map dimensions in order to find the measurements, others will already have problems just ready to convert. This where differentiation can come into place. Some students can use this to learn the dimensions and how it relates to the field other can simply have the problems ready to go.

Out of the Park!

Most of the problems are in customary units of measure, but there are a few that are metric and other have to be converted form customary to metric. Although it's not part of the standard for students to do this, some of my students had asked in the past if this was possible, so an opportunity to complete this was given to them. This can be another form of differentiation for students who look to be challenged.

Students are to work through the problems, making sure to double check their work is correct as you walk around to monitor progress and check when everyone is completed. After everyone has completed the problems, students will meet up with other students who had their same number to discuss their steps to solving and comparing their work and answers. This was a great opportunity for students to work collaboratively and for them to use mathematical language when comparing their work and final answers.

After they had a chance to discuss, we came back as a class, went over the answers and I chose just a few problems to specifically go over, with students explaining their work. This gave students a sense of ownership and confidence since they had already had a chance to discuss with other students.

Out of the Park!

As a second, shorter part to the lesson, we then discussed how long a baseball game lasts and compared to other sports. As baseball is one of the sports that doesn't have a fixed time, we looked at different start and end times of games - 2 groups had the longest game in MLB (1 had start and end times the other group had elapsed time), 2 other groups had the shortest game in MLB (1 had start and end times the other group had elapsed time), and the last 2 groups had a recent game played by the Marlins (1 had start and end times the other group had elapsed time). Again, students discussed with each other and then we discussed as a class and saw if times and elapsed time matched up.

As mentioned before, there are many conversations that can arise and directions one can take with this lesson. After discussing measurements, money and time within a game, this topic can lead to conversations of the business side of sports - management and higher office positions and the math that is involved in those decisions. It's all about giving students the entry point into math and how it can be applied in our lives and how it can come into play in their future as a career and empowering them into a level of comfortability in math.

Resources

Necessary for lesson

- Self-created conversion problems (attached)
- Baseball field dimensions - printed from andrewclem.com/baseball/stadium_lists.html (samples attached)

Convert the following problems.

1. Home Plate to 1st Base = _____ ft = _____ in

2. 1st Base to 2nd Base = _____ ft = _____ yd

3. Home Plate to Center Field Fence = _____ ft = _____ in

4. Home Plate to the Pitcher's Mound = 1829 cm = _____ m

5. Width of Pitching Rubber = 48 cm = _____ dm

6. Width of 3rd Base = 305 mm = _____ km

7. Home to Right Field Corner = _____ft= _____ m = _____ cm

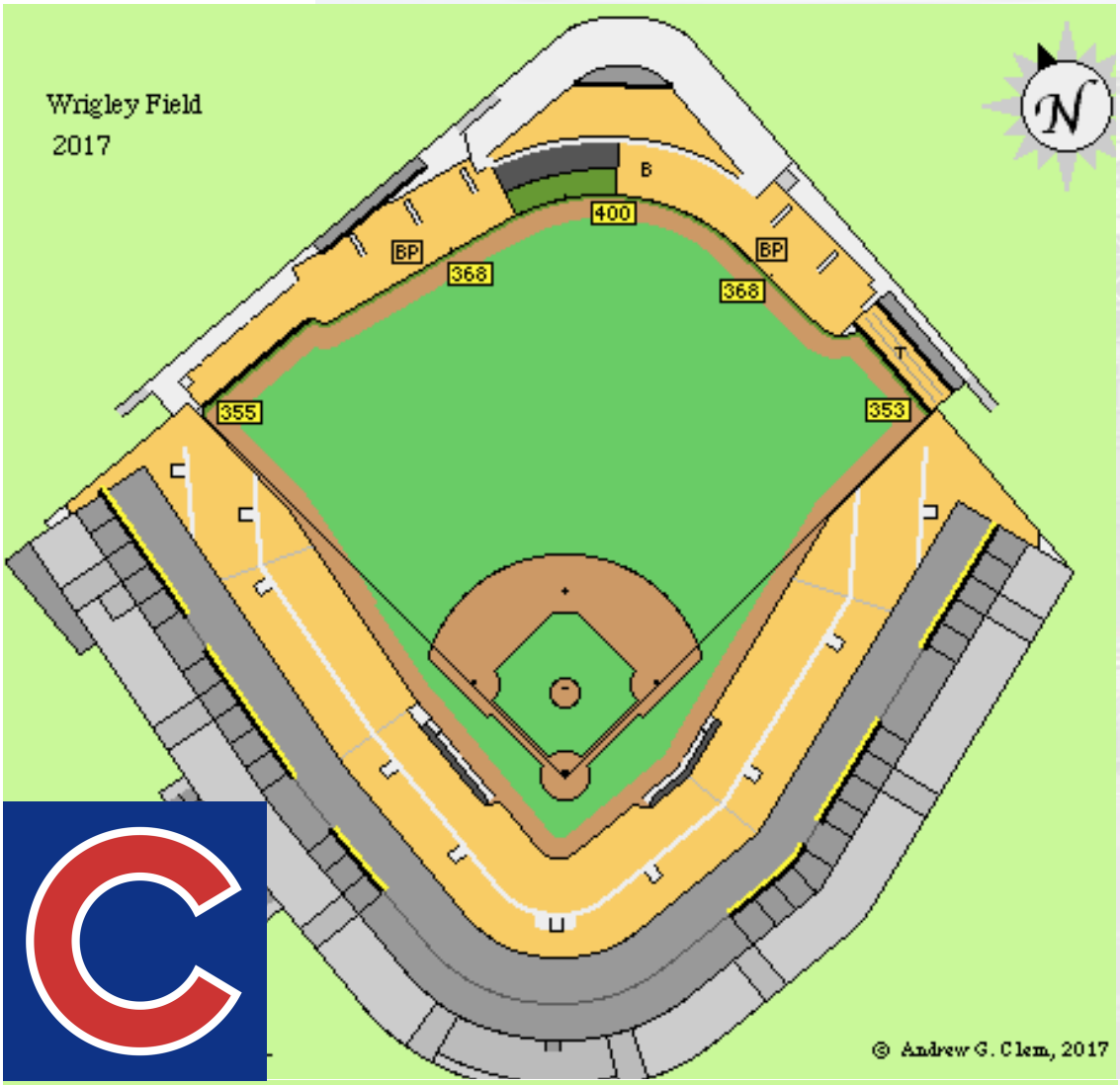
8. Home to Left Field Corner = _____ ft = _____ m = _____ hm

9. Large Pop at Wrigley Field = 2 pt. = _____ qt

10. Medium Pop at Wrigley Field = 1 L = _____ dL

11. Weight of a piece of pizza = 250 g = _____ mg

12. Weight of nachos = 4.5 hg = _____kg


Wrigley Field
2017
N
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400
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368
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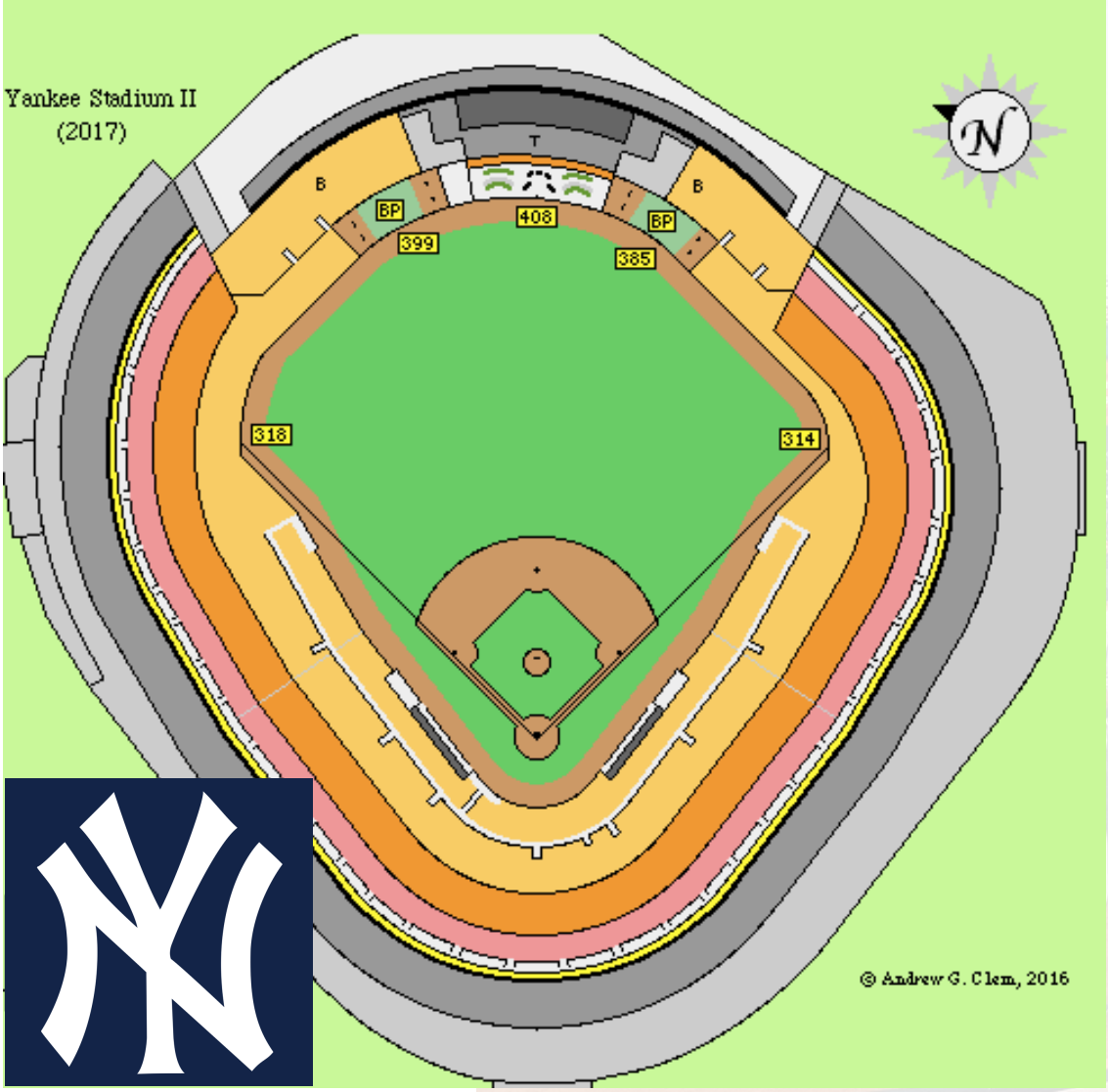
355
353
© Andrew G. Clem, 2017


Yankee Stadium II
(2017)
N
T
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B
BP
408
BP
399
385
318
314
© Andrew G. Clem, 2016


Dodger Stadium
(2014)
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395
375
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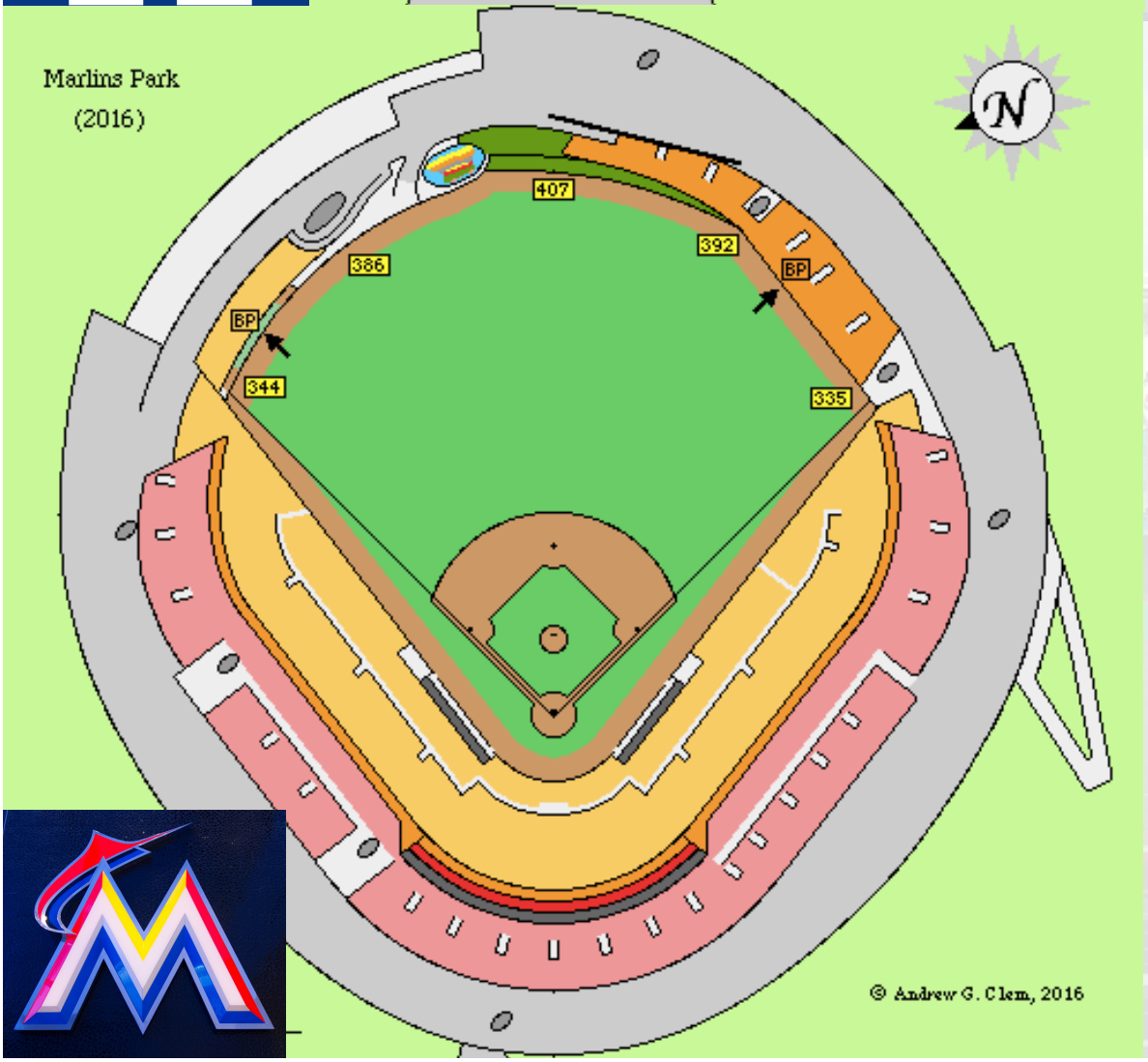
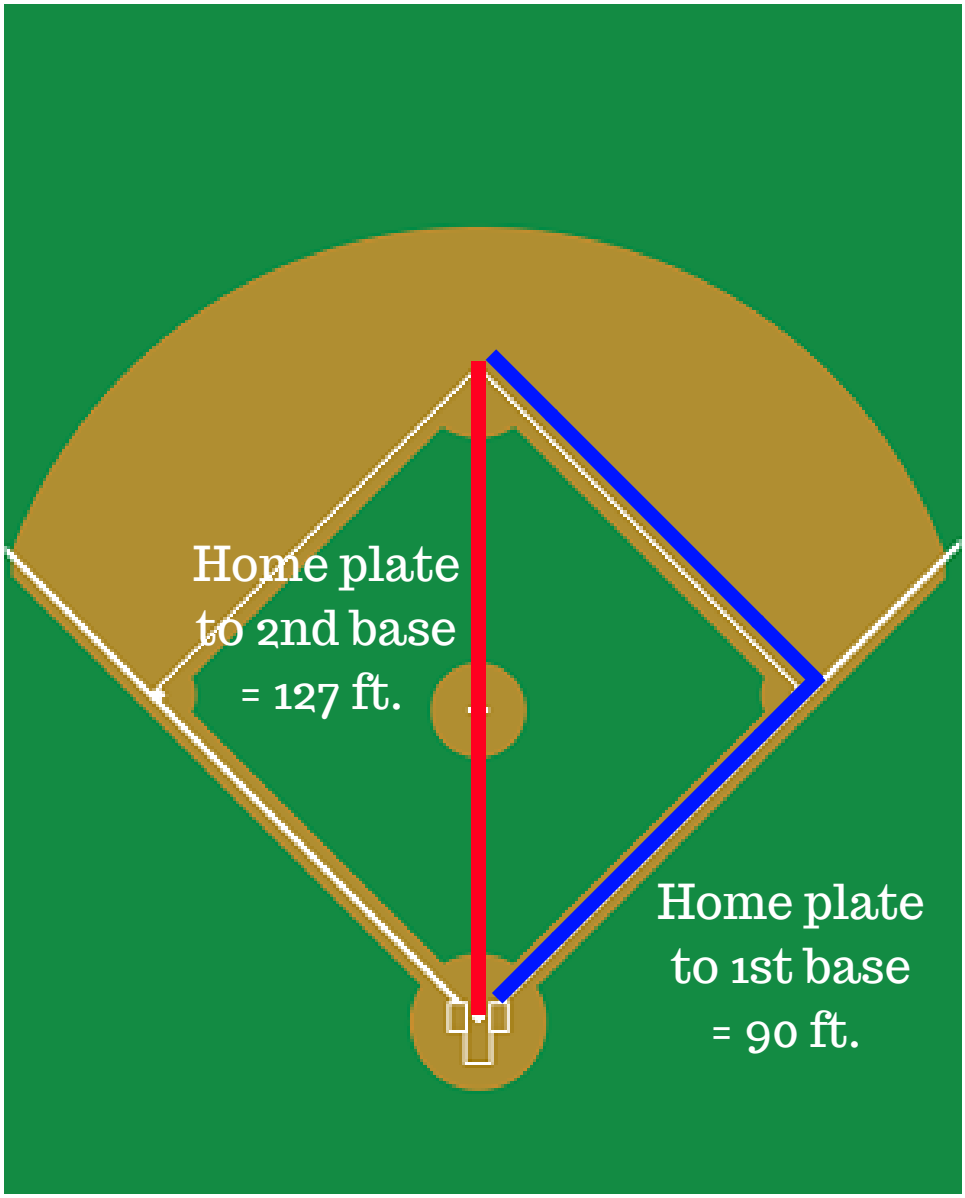
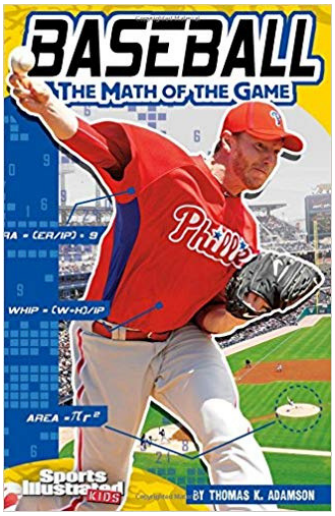
360
360
330
330
BP
BP
B
B
© Andrew G. Clem, 2014


Marlins Park
(2016)
N
407
392
386
344
335
BP
BP
© Andrew G. Clem, 2016

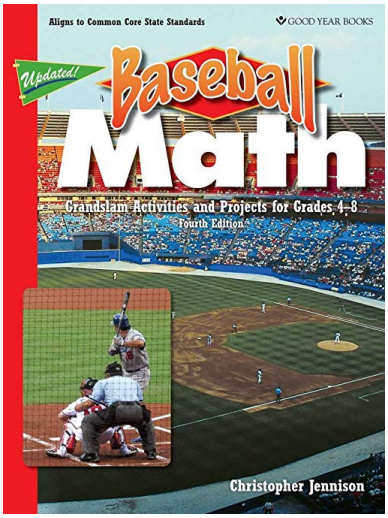

Home plate
to 2nd base
= 127 ft.
Home plate
to 1st base
= 90 ft.

Additional Resources

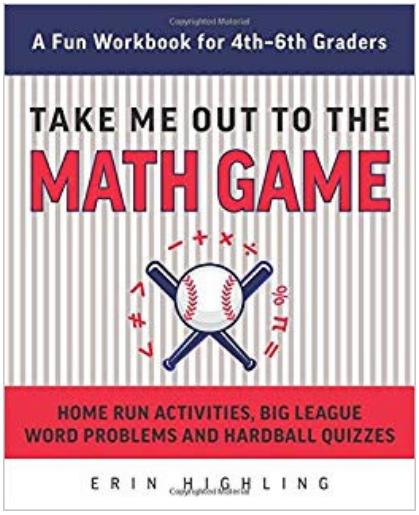
If you would like to incorporate other aspects of baseball into your math lessons, the following are books that can be used to come up with fun ideas. Also included are books for general baseball understanding that can be used in your classroom as well as other books related to sports to add to this lesson, extend or use in a completely different manner. They are all at various academic levels, complexity and for those who are familiar or totally new to the sport.



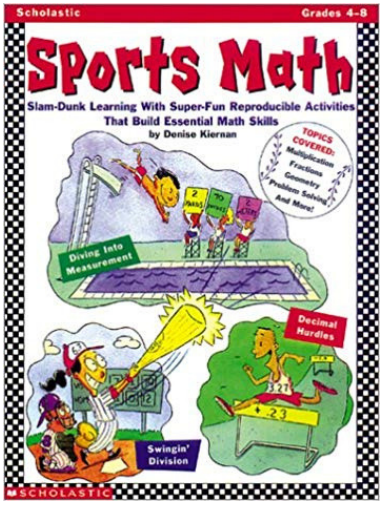
Baseball Math: The Math of the Game
Thomas K. Adamson
2011

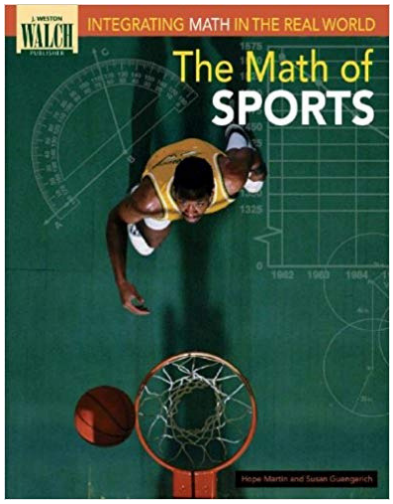


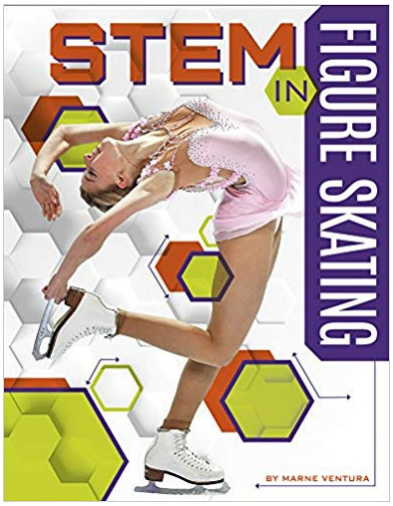
Baseball Math: Grandslam Activities and Projects for Grades 4-8, Fourth Edition
Christopher Jennison
2011



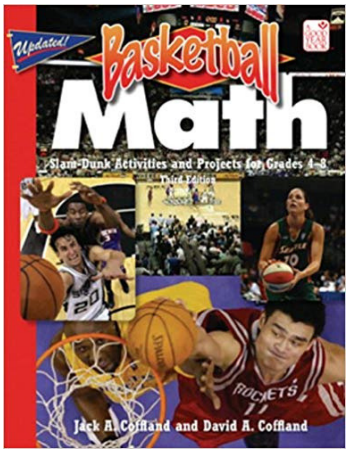
Take Me Out to the Math Game: Home Run Activities, Big League Word Problems and Hardball Quizzes
Erin Highling
2018

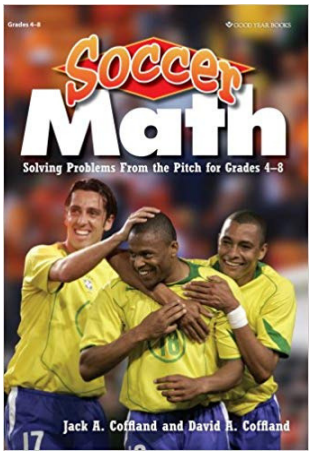


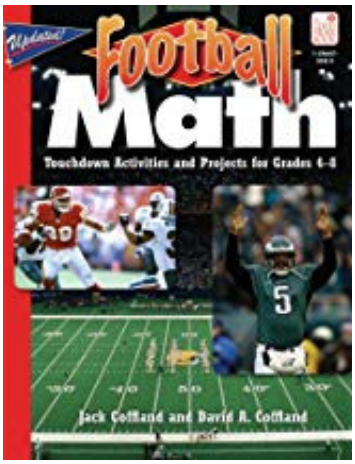


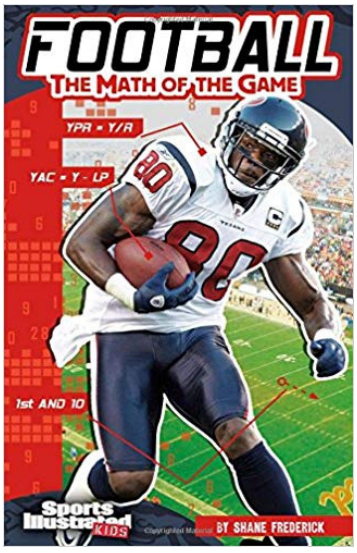


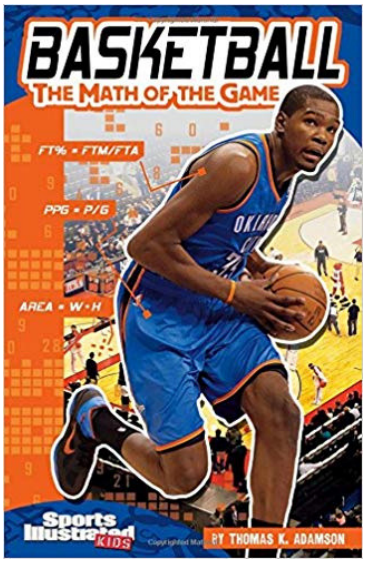
Additional Resources

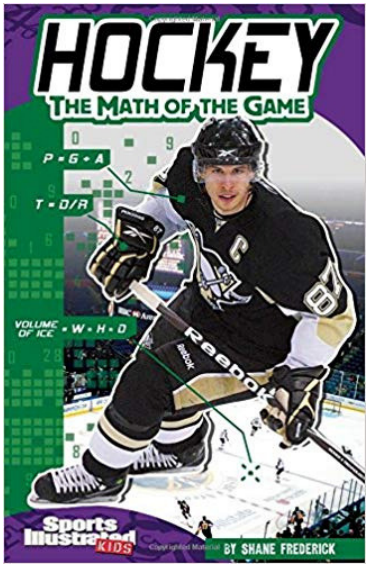


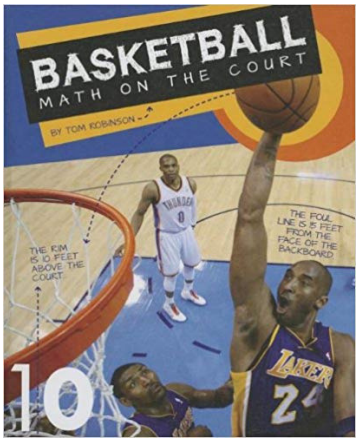


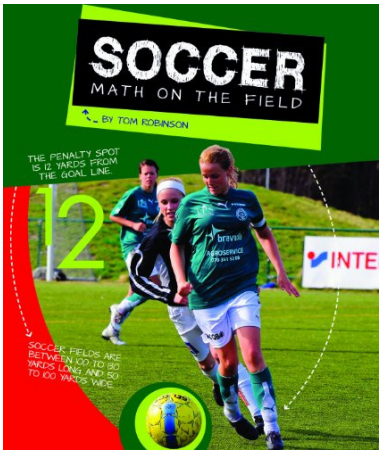


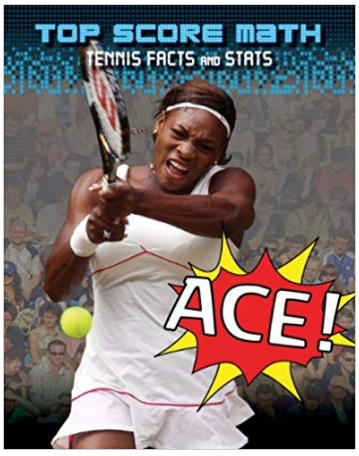












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Apply for an Ideas with IMPACT Adapter Grant!

All Miami-Dade County public school teachers, media specialists, counselors, or assistant principals may request funds to implement any project idea, teaching strategy, or project from the 2018 Idea EXPO workshops and/or curriculum ideas profiled annually in the ***Ideas with IMPACT*** catalogs from 1990 to the current year, 2018-19. Most catalogs can be viewed on The Education Fund's website at educationfund.org under "Ideas with IMPACT Catalog Publications."

- Open to all K-12 M-DCPS teachers, counselors, media specialists
- Quick and easy reporting requirements
- Grants range from $150 - $400
- Grant recipients recognized at an Awards Reception

To apply, you must contact the teacher who developed the idea before submitting your application. Contact can be made by attending a workshop given by the Disseminator, communicating via email or telephone, by visiting the Disseminator in their classroom, or by having the Disseminator visit your classroom.

Project funds are to be spent within the current school year or an extension may be requested. An expense report with receipts is required by Monday, June 3, 2019.

APPLICATION DEADLINE:
December 13, 2018

Apply online at educationfund.org

For more information, contact:
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