

Excel Project STEM Football Field Goal Challenge

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My Classroom

- 3rd Grade
- 20 students
- 2 SPED students
- Science/Math Lesson
 - STEM Activity

Goals and Objectives

- SWBAT: design, create, and engineer a goal post, paper football, and football field.
- SWBAT: test out their footballs and field goal post by flicking the paper football over the post using four different locations on the field.
- SWBAT: collect data and record them on their Excel worksheet.
- SWBAT: discuss their findings with others in the classroom.

NJCCCS

- **3-5-ETS1-1** - Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- **3-5-ETS1-3** - Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
- **3.MD.4** - Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Timeline and Activities

- Students will be given 4 days during their 30 minute science periods to complete the activity.
- Activities
 - Students will first be given a set of different materials in which they will design and construct a football field, field goal post, and a paper football.
 - Students will then test their footballs and field goal posts by kicking (flipping) their footballs to try and score field goals. Students will collect the data as there are experimenting.
 - Students will construct a bar diagram of their total points and discuss their findings with the other students.
 - They will finish up with discussion questions that discuss their roles and materials used during the engineering design process.




Field Goal



Directions: You are the field goal kicker. You are going to kick from three different locations on the field. You will kick (flip) ten times from each spot and collect your data.

Header

	Number of Field Goals	Fraction of field goals missed	Fraction of field goals made	Percentage of field goals made
Location # 1 5 inches from the goal				0.00%
Location # 2 10 inches from the goal				0.00%
Location # 3 15 inches from the goal				0.00%
Location # 4 20 inches from the goal				0.00%

Which location has the highest field goal percentage?
Which location has the lowest field goal percentage?

Fill Series -Locations

Your Score A field goal is worth 3 points. How many points did you score at each location? What was your total number of points?		Your Data	
Location #1		Minimum	0
Location #2		Maximum	0
Location #3		Average	
Location #4		Range	0
Total	0		

Footer

Which location has the highest field goal percentage?		Location 2	
Which location has the lowest field goal percentage?		Location 4	
Your Score A field goal is worth 3 points. How many points did you score at each location? What was your total number of points?		Your Data	
Location #1	12		
Location #2	21		
Location #3	18		
Location #4	6		
Total	57		
		Minimum	2
		Maximum	7
		Average	4.75
		Range	5

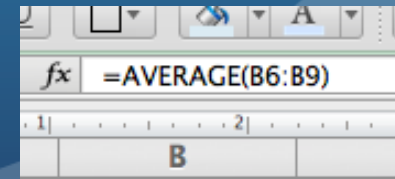
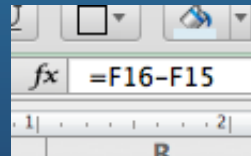
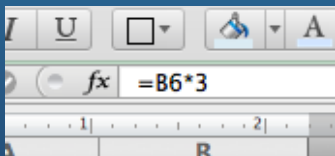
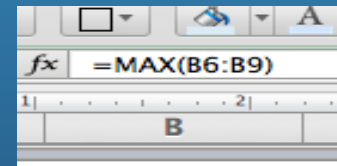
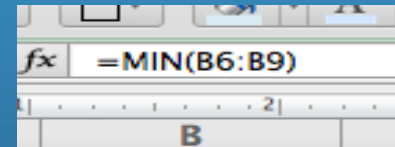
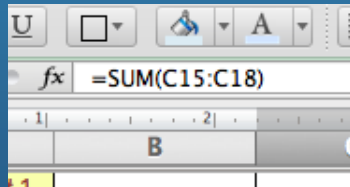
Created formulas

Sum

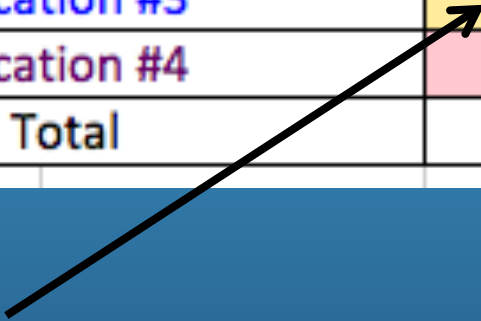
Product
Fill Series

Formulas

- Min
- Max
- Average
- Range




Your Score A field goal is worth 3 points. How many points did you score at each location? What was your total number of points?	
Location #1	12
Location #2	21
Location #3	18
Location #4	6
Total	57



Conditional Formatting

Student Examples

	Number of Field Goals	Fraction of field goals missed	Fraction of field goals made	Percentage of field goals made
Location # 1 5 inches from the goal	4	6/10	4/10	40.00%
Location # 2 10 inches from the goal	7	3/10	7/10	70.00%
Location # 3 15 inches from the goal	6	4/10	6/10	60.00%
Location # 4 20 inches from the goal	2	8/10	2/10	20.00%

Which location has the highest field goal percentage?

Location 2

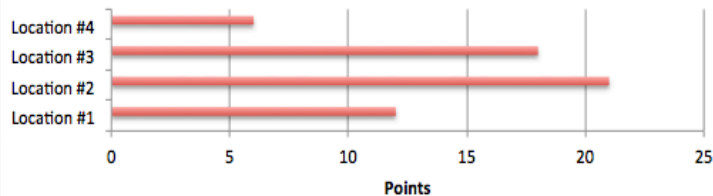
Which location has the lowest field goal percentage?


Location 4

Your Score A field goal is worth 3 points.
How many points did you score at each location?
What was your total number of points?

		Your Data	
Location #1	12	Minimum	2
Location #2	21	Maximum	7
Location #3	18	Average	4.75
Location #4	6	Range	5
Total	57		

Your Scores



	Number of Field Goals	Fraction of field goals missed	Fraction of field goals made	Percentage of field goals made
Location # 1 5 inches from the goal	3	7/10	3/10	30.00%
Location # 2 10 inches from the goal	8	2/10	8/10	80.00%
Location # 3 15 inches from the goal	5	5/10	5/10	50.00%
Location # 4 20 inches from the goal	4	6/10	4/10	40.00%

Which location has the highest field goal percentage?

Location 2

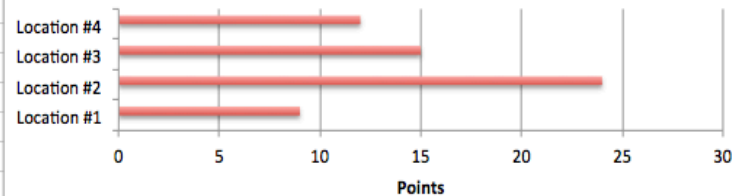
Which location has the lowest field goal percentage?

Location 1


Your Score A field goal is worth 3 points.
How many points did you score at each location?
What was your total number of points?

		Your Data	
Location #1	9	Minimum	3
Location #2	24	Maximum	8
Location #3	15	Average	5
Location #4	12	Range	5
Total	60		

Your Scores

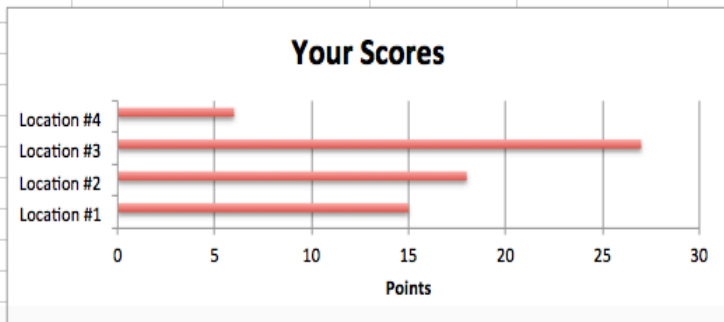



Student Examples cont.

	Number of Field Goals	Fraction of field goals missed	Fraction of field goals made	Percentage of field goals made
Location # 1 5 inches from the goal	5	5/10	5/10	50.00%
Location # 2 10 inches from the goal	6	4/10	6/10	60.00%
Location # 3 15 inches from the goal	9	1/10	9/10	90.00%
Location # 4 20 inches from the goal	2	8/10	2/10	20.00%

Which location has the highest field goal percentage?	Location 3
Which location has the lowest field goal percentage?	Location 4

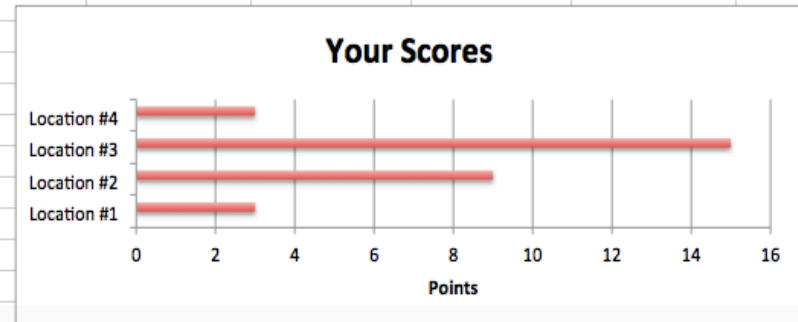
Your Score A field goal is worth 3 points. How many points did you score at each location? What was your total number of points?		Your Data	
Location #1	15	Minimum	2
Location #2	18	Maximum	9
Location #3	27	Average	5.5
Location #4	6	Range	7
Total	66		



	Number of Field Goals	Fraction of field goals missed	Fraction of field goals made	Percentage of field goals made
Location # 1 5 inches from the goal	1	9/10	1/10	10.00%
Location # 2 10 inches from the goal	3	7/10	3/10	30.00%
Location # 3 15 inches from the goal	5	5/10	5/10	50.00%
Location # 4 20 inches from the goal	1	9/10	1/10	10.00%

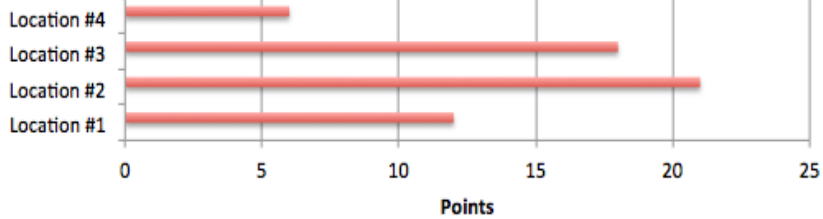
Which location has the highest field goal percentage?	Location 3
Which location has the lowest field goal percentage?	Location 1 and 4

Your Score A field goal is worth 3 points. How many points did you score at each location? What was your total number of points?		Your Data	
Location #1	3	Minimum	1
Location #2	9	Maximum	5
Location #3	15	Average	2.5
Location #4	3	Range	4
Total	30		

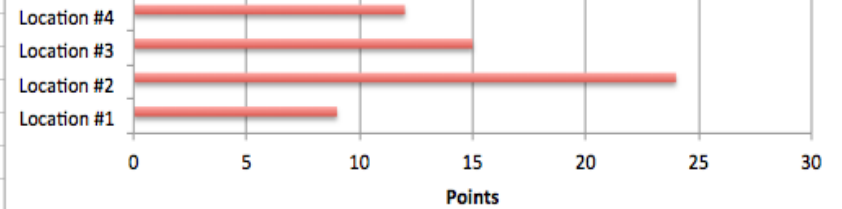


Student Bar Graphs

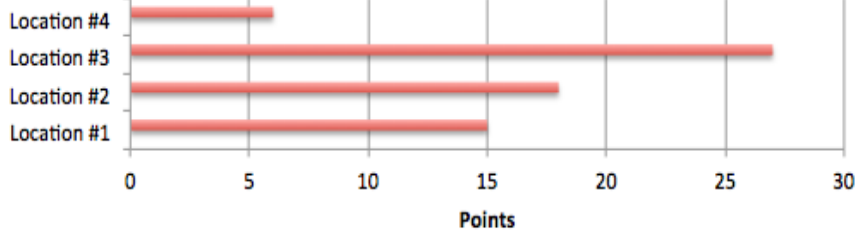
Your Scores



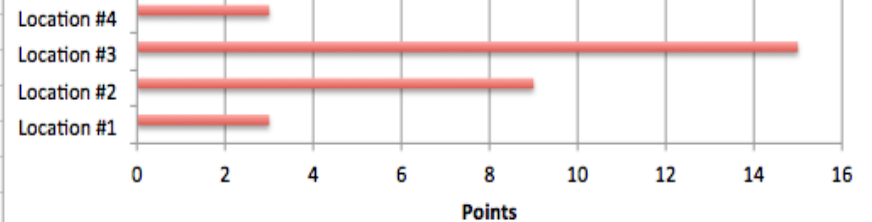
Your Scores



Your Scores



Your Scores



Evaluation

	1	2	3
Engineering Process	Students designed and constructed some parts of their project.	Students designed and constructed most of the parts of their project.	Students designed and constructed all of the parts of their project.
Data Collection	Students collected and recorded some data correctly into their worksheet.	Students collected and recorded most data correctly into their worksheet.	Students collected and recorded all data correctly into their worksheet.
Reflection	Students completed little to none of their reflection and discussion worksheet.	Students completed most of their reflection and discussion worksheet.	Student completed all of their reflection and discussion worksheet.

Brainy Bits – T-Pack

- Technological Knowledge
 - Is addressed through the use of computers and the Excel program to record the data from their activity. It is also used to create bar graphs to compare their data with one-another.
- Pedagogical Knowledge
 - Is addressed by knowing the abilities of your students. I used vocabulary and prior knowledge to help them understand the design process for engineers. I also would pair students together based on their learning abilities to make sure that everyone will learn from each other.
- Content Knowledge
 - Is addressed because of the research the teacher does prior to the lesson. Prior to this lesson, I now and understand the steps of the design process. I had to conduct the experiment myself to understand which materials and setups work the best.

Brainy Bits – Sense and Meaning

- In order for students to recall and retain the information they must first make sense of the material and make it meaningful to them.
- They can make sense of this activity because they have already learned the steps of the design process, they are now becoming the engineer and using those steps.
- This activity is meaningful to students because they take the front seat and get to design and construct everything. They decide what materials to use, how big their field goal post will be, and what kind of paper football design they will use. Students are the decision makers and they get to be hands-on the entire time.

Citations

- Anderson, Mark. “Technological, Pedagogical, And Content Knowledge.” ICT Evangelist, 28 May 2013. 27 February 2017.
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- Wormeli, Rick. “Making Sense: More Than Making Meaning.” Association for Middle Level Education. Middle Ground magazine, August 2010. 27 February, 2017.
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