

Name: _____

Class: _____

Arm Strength: Youth vs Foam Football

GRADES 6-8

Distance of Throws

	Mass	Throw 1	Throw 2	Throw 3	Throw 4	Average
Youth						
Foam						

Speed of Throw

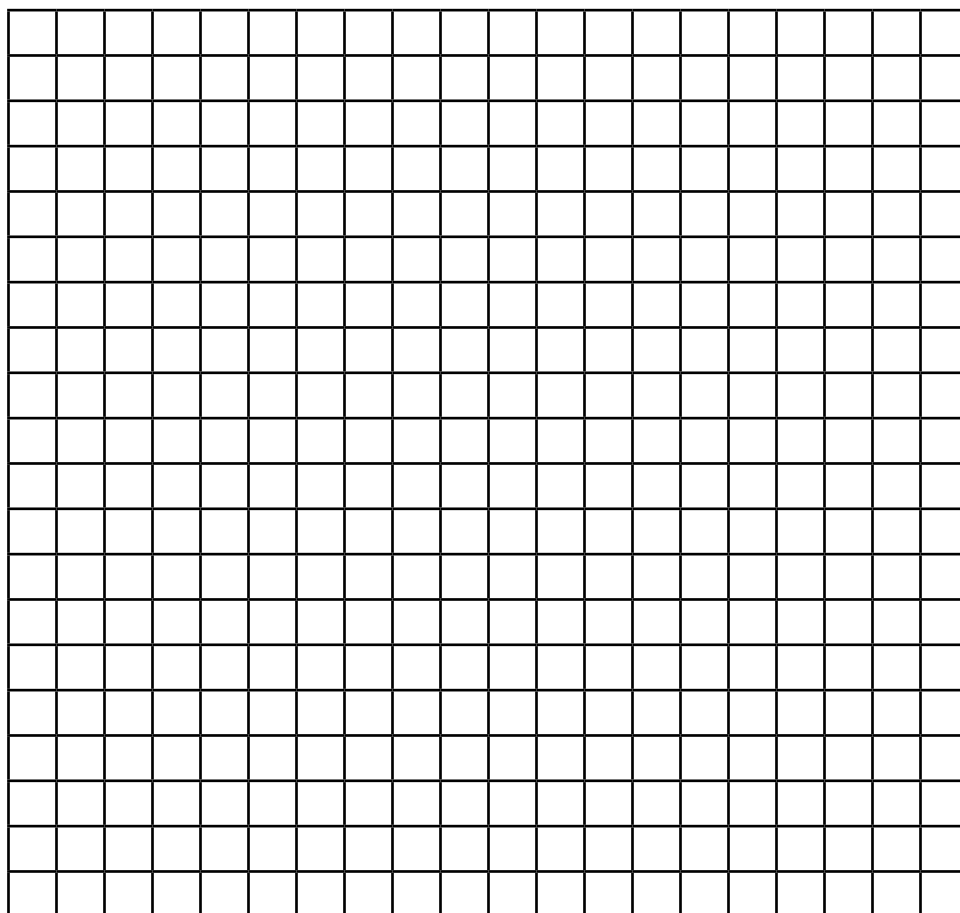
	Throw 1	Throw 2	Throw 3	Throw 4	Average
Youth Distance:					
Youth Time:					
Youth Speed:					
Foam Distance:					
Foam Time:					
Foam Speed:					

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Arm Strength: Youth vs Foam Football

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Make a claim about the relationship between speed, mass and kinetic energy. Support your claim with evidence and reasoning.

Technological Advancements and Improved Quarterback Play

GRADES 6-8

Picking up the football: Put a check-mark if you were successful at picking up the ball with one hand.

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	P
No Gloves											
Gloves											

Pass completion: Put a check-mark if you and your partner completed a successful pass.

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	P
No Gloves											
Gloves											

QUESTIONS:

1. What is your completion rate (percentage) for passes without gloves? With gloves?
2. Do you feel like players have an advantage when they wear gloves while playing?
3. Using your probability, how many passes would you and your partner complete, if you were using gloves, in a season? (The average number of passes in the 2018 NFL season was 552 or 34.5 attempts per game).
4. What are some arguments you could make against players wearing gloves?
5. Sometimes, in cold weather, quarterbacks wear gloves on their throwing hand. What advantages/disadvantages does the quarterback have?
6. What other on-field football equipment improvements have had major impacts on the game?

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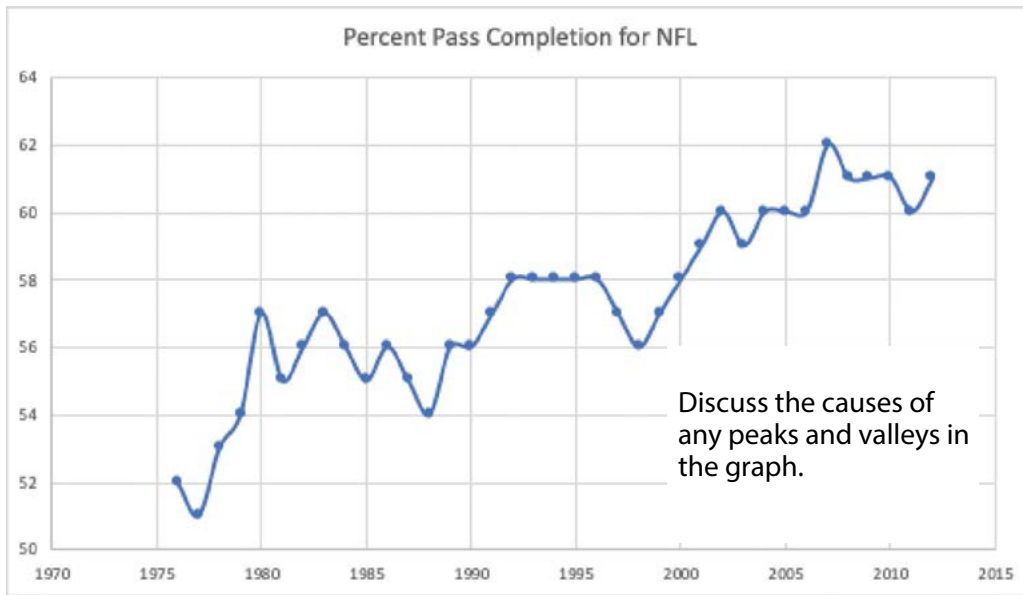
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Technological Advancements and Improved Quarterback Play

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1. Review and graph the data: www.stemsports.com/nfl-data-set or visit www.STEMSports.com "Resources", then "STEM Football". Based on your graph, discuss and answer the following:
2. Discuss the causes of any peaks and valleys in the graph.
3. What trends do you notice?
4. Using the graph and data, when do you think glove technology was mainstream? Support your answer using evidence.

Review the graph and answer the below questions:



What trends do you notice?

Using the graph and data, when did you think glove technology was mainstream? Support your answer using evidence.

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Engineering Better Gameplay Communication

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Communication Tests: Put a check-mark if the test was successful.

	Trial 1	Trial 2	Trial 3
No Technology			
Walkie Talkie			

Design better communication technology

Criteria	Constraints

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Engineering Better Gameplay Communication

GRADES 6-8

Brainstorm ways to increase the success rate of communication:

--	--	--

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

Write a procedure to test your new design. Think back to the walkie-talkie and non-technology tests for support.

The Evolution of the Football Helmet

GRADES 6-8

<p>No Helmet</p>	<p>HELMET 1</p> 
<p>HELMET 2</p> 	<p>HELMET 3</p> 
<p>HELMET 4</p> 	<p>HELMET 5</p> 
<p>HELMET 6</p> 	<p>HELMET 7</p> 

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The Evolution of the Football Helmet

GRADES 6-8

Helmet	Observations	Advantages	Limitations	Prediction: Percent of concussions
NO HELMET				
H1				
H2				
H3				
H4				
H5				
H6				
H7				

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Intricacies of a Football Field

GRADES 6-8

Try calculating the following to determine the length of a scaled-down field.

1.
$$\frac{0.25 \text{ inch (1/4)}}{1 \text{ yard}} = \frac{x \text{ inches}}{120 \text{ yards}}$$

2.
$$\frac{0.5 \text{ inch (1/2)}}{1 \text{ yard}} = \frac{x \text{ inches}}{120 \text{ yards}}$$

3.
$$\frac{0.125 \text{ inch (1/8)}}{1 \text{ yard}} = \frac{x \text{ inches}}{120 \text{ yards}}$$

Which of the three scales would have a reasonable end length?

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Intricacies of a Football Field

GRADES 6-8

Try calculating the following to determine the width of a scaled-down field.

$$4. \quad \frac{0.25 \text{ inch (1/4)}}{1 \text{ yard}} = \frac{x \text{ inches}}{57.3 \text{ yards}}$$

$$5. \quad \frac{0.5 \text{ inch (1/2)}}{1 \text{ yard}} = \frac{x \text{ inches}}{57.3 \text{ yards}}$$

$$6. \quad \frac{0.125 \text{ inch (1/8)}}{1 \text{ yard}} = \frac{x \text{ inches}}{57.3 \text{ yards}}$$

Which of the three scales would have a reasonable end width?

Coaches have clipboards that are 8.5 x 11 inches. What scale would you need to ensure the field fits on a single sheet of paper? *Don't forget that a football field has an additional 10 yards in each end zone.*

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Extra Point vs Two-Point Conversion

GRADES 6-8

Paper Football data collection: Put a check-mark when you make a "finger" kick

Total number of Extra Point kicks made: _____ /100 =

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Extra Point vs Two-Point Conversion

GRADES 6-8

Using the probability calculated on the previous page, answer the following questions:

1. How many extra points will be scored if a team attempts 24 extra points in a season?

2. How many extra points will be scored if a kicker attempts 348 kicks in a career?

3. In 2016, the accuracy of any kick made at the 15 yard line is 93%. What is the probability of making a kick at the 15 yard line? How does it compare to your data?

4. There is a second option for PATs, a two-point conversion. The NFL states that the probability of making a two-point conversion is .50 or 50%. How many extra points will be scored if a team attempts 24 two-point conversions?

5. In 2016, the NFL used data to calculate a 94.2% chance of making any (extra point kick or two-point conversion) points after a touchdown, the lowest in almost 4 decades. Based on this data, can you make a claim about what option you would exercise?

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Integers of Play

GRADES 6-8

Kick Practice:

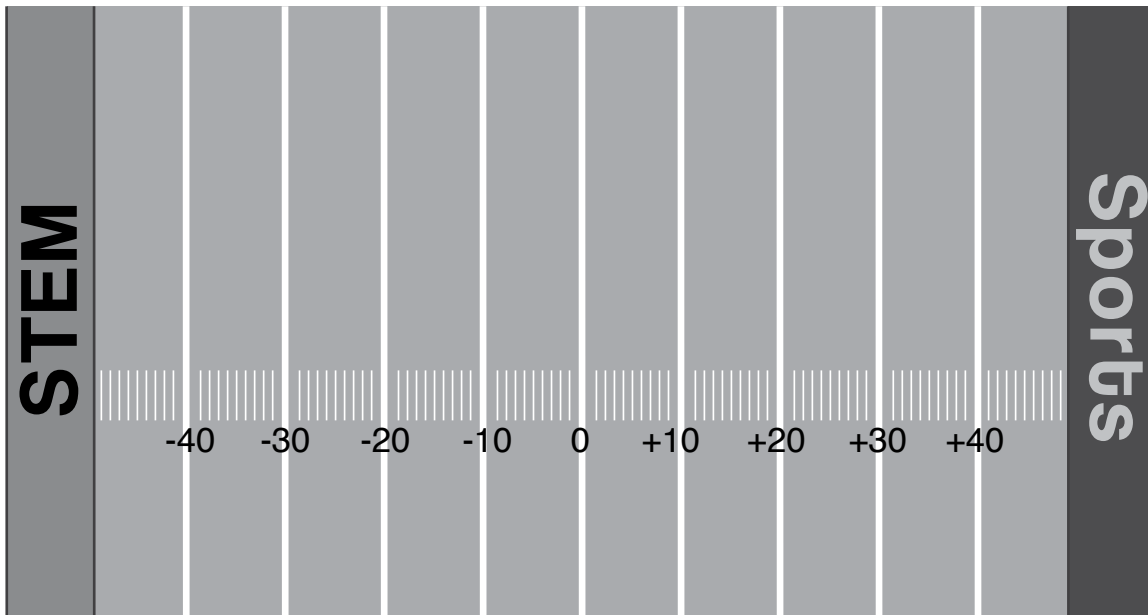
	Actual (measured kick)	To Goal Post
5 feet (representing 5 yards)		
10 feet (representing 10 yards)		
12 feet (representing 12 yards)		
17 feet (representing 17 yards)		

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Integers of Play

GRADES 6-8



Model the following problems using a football; write each problem as an equation:

1. Team A is moving to the left; they are on the 42 yard line to start. Once the play is finished, they are at the -23 yard line. How far did they travel?
2. Team B is moving to the right; they are on the -14 yard line to start. Once the play is finished, they are at the 16 yard line. How far did they travel?
3. Team A's kicker kicks at the 8 yard line. If they make the field goal, will they beat the NFL record of 64 yards?
4. Team B kicks-off at the -40 yard line and the ball bounces at the 15 yard line. How far did the ball travel?
5. Team A ended on the -48 yard line. They traveled 11 yards in their last play. Where did they start?

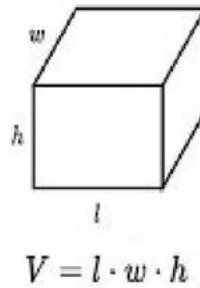
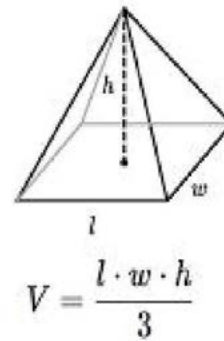
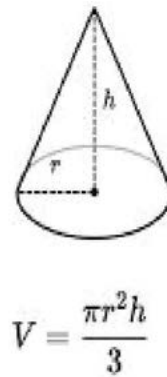
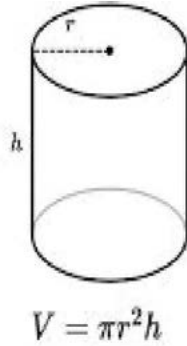
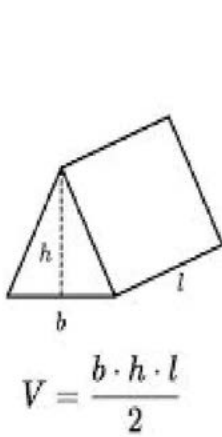
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Properties and Behavior of Footballs

GRADES 6-8

Formulas:



<p>Volume of object 1:</p>	<p>Volume of object 2:</p>
<p>Volume of object 3:</p>	<p>Volume of object 4:</p>

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Properties and Behavior of Footballs

GRADES 6-8

	Volume of the center cylinder	Volume of the end cone	Approximate volume of the football	Mass of the football	Density of the football D=M/V
Youth Football	_____ +	(_____) x2	=		
Foam Football	_____ +	(_____) x2	=		

Claim: How does the density of a football affect its behavior? Use evidence to support your answer.



Scene Title: _____

Time Estimate: _____

Location: _____

Transition: _____

Script: _____

Scene Title: _____

Time Estimate: _____

Location: _____

Transition: _____

Script: _____

Scene Title: _____

Time Estimate: _____

Location: _____

Transition: _____

Script: _____

Scene Title: _____

Time Estimate: _____

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Script: _____

Scene Title: _____

Time Estimate: _____

Location: _____

Transition: _____

Script: _____

Scene Title: _____

Time Estimate: _____

Location: _____

Transition: _____

Script: _____

Name: _____

Class: _____

Capstone

GRADES 6-8

Peer Review

Commercial #: _____ Title: _____

Producers: _____

What STEM topic was demonstrated?

Describe the concept they demonstrated.

Was the topic demonstrated correctly? Why or why not?

How were ethos used in the commercial? Be specific and provide an example and dialogue to support your answer.

How were pathos used in the commercial? Be specific and provide an example and dialogue to support your answer.

How were logos used in the commercial? Be specific and provide an example and dialogue to support your answer.
