Module 1.1: MEASURING AND COMPARING THROWS

Measure Length of Throws (in feet)
Results may vary among students. Example data below.

	Throw 1	Throw 2	Throw 3	Throw 4	Range
Youth	15 ft	12 ft	11 ft	18 ft	7 ft
Foam	11ft	9 ft	12 ft	8ft	3 ft

Measure Length of Throw (Circle one: meters, centimeters, inches, millimeters or yards)
Results may vary among students. Example data below.

	Throw 1	Throw 2	Throw 3	Throw 4	Range
Youth	530 cm	410 cm	390 cm	670 cm	280 cm
Foam	420 cm	250 cm	470 cm	290 cm	220 cm

What is the best way to measure distance of a throw? Why?
Answers may vary based on student results.
Based on sample data, feet are a better way to measure distance then centimeters. Because centimeters are small and should be used to measure smaller distances. Meters or yards might be even better than feet to measure distance on a football field.

Write a statement using the greater than or less than symbols (< >) that explain which ball can be thrown the furthest. Answers will vary based on student results.
Example based on sample data: Youth ball > Foam ball

Module 2.1: TECHNOLOGICAL ADVANCEMENTS AND IMPROVED QUARTERBACK PLAY

Picking up the football: Put a check-mark if you were successful at picking up the ball with one hand. Results may vary among students. Example data below.
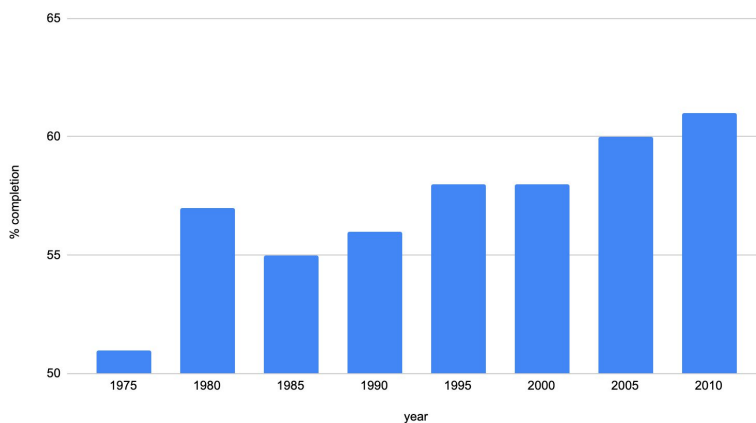
	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	P
No Gloves	x	x	x			x	x	x			60%
Gloves		x	x	x	x	x	x	x	x		80%

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

Results may vary among students. Example data below.

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	P
No Gloves	x		x				x	x			40%
Gloves	x	x			x	x	x			x	60%

% completion vs. year

Graph the following data

Year	Completion %
1975	51
1980	57
1985	55
1990	56
1995	58
2000	58
2005	60
2010	61

Based on your data and NFL data, do gloves help pass completion? Explain your answer.

Based on review and interpretation of the NFL data and subsequent graphing results, answers may vary among students.

Module 3.1: THE ADVANCEMENT OF IN-GAME COMMUNICATION

Communication Tests: Put a check mark next to the successful test.
Results may vary among students.

	Trial 1	Trial 2	Trial 3
No Technology		x	
Walkie Talkie	x	x	x

Design better communication technology
Answers may vary based on student results.

Criteria	Constraints
- Must work within 100 yards. - Must be contained within the helmet. - Must have a battery life for the duration of the game.	- Each offensive and defensive team is permitted no more than one player on the field with a speaker in his/her helmet. - Players who have speakers in their helmets must be identified in the Communication System section of the Game Day Administration Report that is submitted to the Referee, or a member of his crew, no later than one hour and 30 minutes prior to kickoff.

Brainstorm ways to increase the success rate of communication
Results may vary among students.

Select a single design (draw in detail, label materials and provide measurements)
Results may vary among students.

Module 4.1: THE EVOLUTION OF FOOTBALL HELMET

Interpretations and results may vary among students. Examples below.

Helmet	Observations	Rating
No helmet	N/A	0
	Leather, thin, worn out, two materials (inside and outside).	1
	Thicker than helmet number 1, leather, smooth, wool or fabric lining, more shape.	2
	Hardened leather, shaped, black, chin strap.	4
	Looks like soft plastic; includes chin strap, smooth ear holes, leather inside material.	5

	Made of hard plastic, little to no padding, smooth and no chin strap.	3
	Face guard, hard plastic with some inside padding.	6
	Full face guard, hard plastic, thick with foam padding on the inside.	7

Module 5.1: MEASURING FOOTBALL DISTANCES

	Equation	# of feet	# of inches	Extend: # of cm	Extend: # of mm
One yard	(1 x B) 12	3	36	91.44	914.4
Five yards	(5 x B) 12	15	180	457.2	4572
Ten yards	(10 x B) 12	30	360	914.4	9144
Sixty-three yards	(63 x B) 12	189	2268	5760.72	57607.2

1. The line of scrimmage of Team A is at their own 25-yard line. The team runs a play that gets six (6) yards. Use an equation to calculate the number of feet the ball was moved.
   1 yd = 3 ft
   yd x 3 = ft
   6 yd x 3 = 18 ft
   6 yd = 18 ft

2. Team A punts from their 47- yard line. The punt travels 46 yards. Then Team B fields the punt and returns the ball eight (8) yards. How many centimeters did the ball move in total?
   1 yd = 91.44 cm
   yd x 91.44 = cm
   46 yd (punt) + 8 yd (return) = 54 yd
   54 yd x 91.44 = 4937.76 cm

3. A football field is about 100 meters long. There are 100 centimeters in a meter, and 10 millimeters in a centimeter. How many millimeters are in a football field?

1 m = 1000 mm

m x 1000 = mm

100 m x 1000 = 100,000 mm

100,000 mm in a football field

Name: KEY

Module 6.1: EXTRA POINT VS TWO-POINT CONVERSION SUCCESS

Paper Football data collection: Put a checkmark when you make a shot.
Results may vary among students. Example data below.

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10
Field Goal	x	x			x	x	x	x		

Total number of Extra Point kicks made: 6/10
Results may vary among students.

	Trial 1	Trial 2	Trial 3	Trial 4
Field Goal		x	x	

Total number of Extra Point kicks made: 2/4
Results may vary among students.

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8
Field Goal	x		x	x	x		x	x

Total number of Extra Point kicks made: 6/8
Results may vary among students.

|	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10	Trial 11	Trial 12
Field Goal	x			x	x		x		x	x		

Total number of Extra Point kicks made: 6/12

Based on your data collection, write a mathematical expression using greater than or less than symbols. In 2016, the chances of making any kick attempted at the 15 yard line is 9/10. There is a second option for PATs, a two-point conversion. The NFL states that the chances of making a two-point conversion is 5/10. Write a mathematical expression using a greater than or less than symbol that states which is the better option.

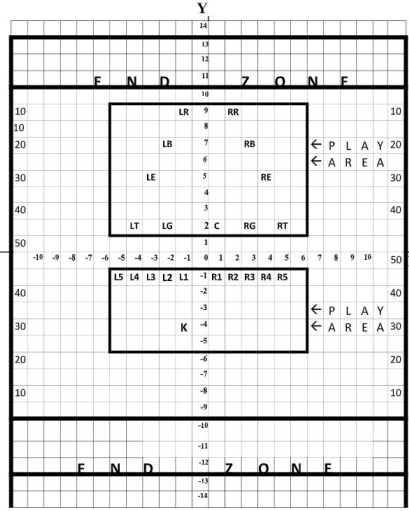**One-point attempt: 9 / 10 = .90 $\geq$ .50 = 5 / 10: Two-point conversion**

Module 7.1: INTRICACIES OF A FOOTBALL FIELD

Find the area for each of the following play areas:
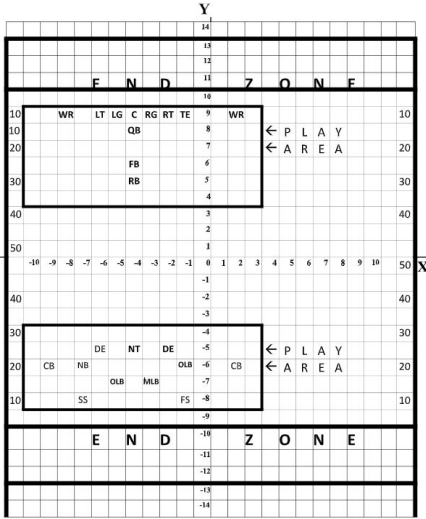
A=84

A=70

A= 96
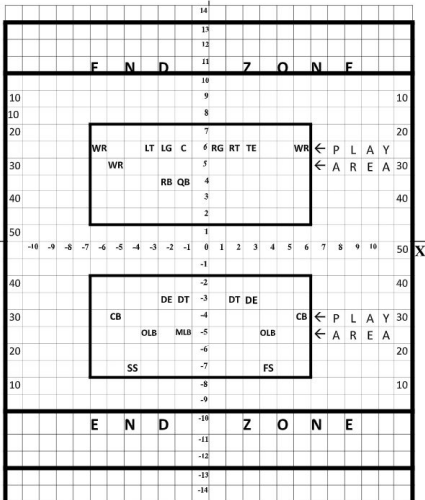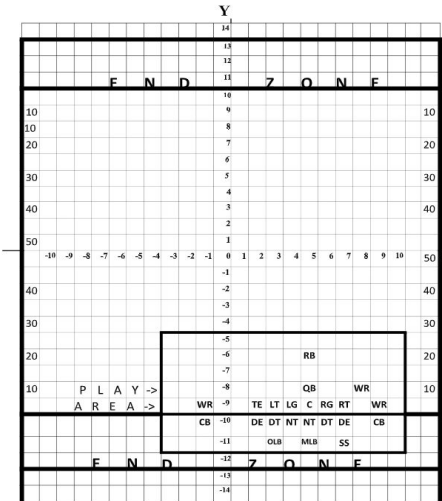
A=70

A=78

A=78

A=98

Name: KEY

Module 8.1: PROPERTIES OF A FOOTBALL AND FOAM FOOTBALL

Behaviors: Results may vary among students. Example data below.

|	How does it bounce?	How far can you throw it?	How far can you kick it?	Is it easy to catch?	Is it easy to squish?
Foam Football	Poorly; Low bounce	20 feet	22 feet	Very	Very
Youth Football	Randomly; depends what part of the ball hits the ground first.	30 feet	44 feet	Sometimes	When it's flat; a little

Properties: Results may vary among students. Example data below.

	Color	Shape	Texture	Length, height and Circumference	Mass	Materials
Foam Football	White Yellow	Triangle Oval Cylinder	Smooth Spongy	L- 9.5 inches H- 5.5 inches C- 17.5 inches	5.6 oz	Foam Air

Youth Football	Brown White	Triangle Oval Cylinder	Rough Firm	L- 11 inches H- 6.5 inches C- 19.25 inches	12.5 oz	Rubber Plastic Air

Draw dotted lines that divide the football into four equal parts. Bounce the ball 10 times. Put an 'X' on the diagram where the ball hits the ground for the regular football and an 'O' on the diagram where the ball hits the ground for the foam football.

Answers will vary based on student results. Example data below.
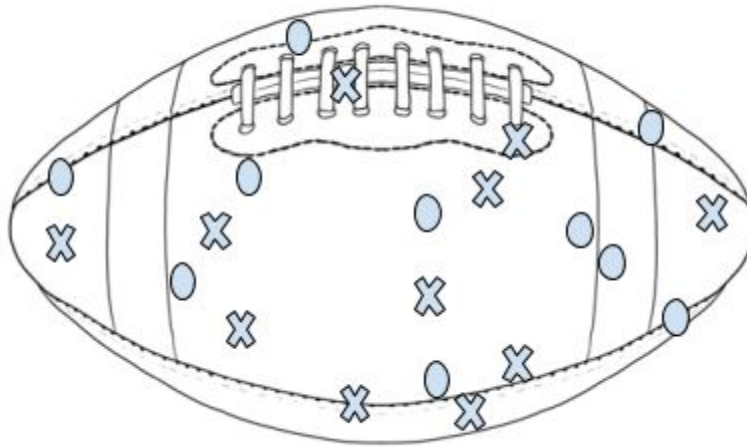
Drop	Height: Foam	Direction: Foam	Height: Youth	Direction: Youth
1	9 inches	Right	8 inches	Spin
2	1 foot 8 inches	Straight up	2 feet	Left
3	3 inches	Spin	2 feet 6 inches	Left

4	5 inches	Left	3 feet 2 inches	Straight up
5	1 foot 1 inch	Straight up	1 foot 7 inches	Away from me
6	2 feet 2 inches	Left	2 feet 10 inches	Spin
7	1 foot 4 inches	Toward me	2 feet 6 inches	Right
8	2 feet	Away from me	11 inches	Toward me
9	3 inches	Right	1 foot 3 inches	Away from me
10	1 foot 6 inches	Away from me	2 feet 8 inches	Left

Why do the balls behave differently? (Use your data tables to give examples)
Answers may vary based on student results.
Example: The balls are made of different materials. Because they are made of different materials, they have different properties.

Where does the ball bounce the most? Explain.
Answers may vary based on student data collection.
Example: Based on the data above, the ball bounces on the quadrant of the ball depending on how it's dropped, when dropped straight down it hit on the bottom but the location of the bounce did not influence the direction of the bounce.