

Title: Fun with Football (Data Collecting Activities)

Brief Overview:

These lessons will encompass collecting and displaying data with line plots and stem and leaf plots. Students will also understand basic probability concepts including quantifying the likelihood of an event. In addition, students will analyze data by identifying the mean, median, mode, and range.

NCTM Content Standard/National Science Education Standard:

NCTM Data Analysis and Probability Standards for grades 3-5:

- Collect, organize, and display relevant data
- Select and use appropriate statistical methods to analyze data
- Develop and evaluate inferences and predictions that are based on data
- Understand and apply basic concepts of probability
- Use measures of center and understand what each does not indicate about the data set

Grade/Level:

Grades 4-6

Duration/Length:

Three Days (60 minutes per lesson)

Student Outcomes:

Students will:

- Collect, organize, and represent data using stem and leaf plots and line plots
- Compare different representations of the data and choose the one that shows the most important aspect of the data
- Use words and numbers to justify their choice of graphical representation
- Compare different measures of central tendencies
- Apply knowledge of range, mean, median, and mode in order to analyze the data present in the line or stem and leaf plot

Materials and Resources:

- 3-4 Foam Footballs/group
- 1 plastic hula hoop/group
- Stopwatches
- 8 ½" x 11" Paper, 1 sheet for each student

- Plastic tape (for probability line)
- Metric tape measures or meter sticks, one per group
- Masking tape
- Pocket chart or magnetic tape
- Student math journals
- Calculators
 - Student Resource Sheet # 1: Hula Hoop Throws
 - Student Resource Sheet # 2: Sparrows Quarterback Training Results
 - Student Resource Sheet # 3: Hula Hoop Throws Line Plot
 - Student Resource Sheet # 4: Perform a Task Paper Footballs
 - Student Resource Sheet # 5: Group Field Goal Stem and Leaf Plots
 - Student Resource Sheet # 6: BCR Football Line Plot
 - Student Resource Sheet # 7: BCR Football Range, Cluster, Gap
 - Student Resource Sheet # 8: BCR Football Stem and Leaf Plot
 - Student Resource Sheet # 9: BCR Football Mean, Median, Mode
 - Student Resource Sheet # 10: BCR Football Outliers (Optional)
- Teacher Resource Sheets
 - Teacher Resource Sheet # 1: Data Analysis, Statistics and Probability Vocabulary
 - Teacher Resource Sheet # 2: Steps to Create a Line Plot
 - Teacher Resource Sheet # 3: Playing Paper Football
 - Teacher Resource Sheet # 4: Steps to Create a Stem and Leaf Plot
 - Teacher Resource Sheet # 5: Football Leaves
 - Teacher Resource Sheet # 6: Helmet Stems
 - Teacher Resource Sheet # 7: BCR Answer Keys
- Resource Sheets

Development/Procedures:

Lesson 1

Materials:

- 3-4 Foam footballs/group
- 1 plastic hula hoop/group
- Stopwatches
- Masking tape
- Meter stick or metric tape measure
- Resource Sheets
 - Student Resource Sheet # 1: Hula Hoop Throws
 - Student Resource Sheet # 2: Sparrows Quarterback Training Results
 - Student Resource Sheet # 3: Hula Hoop Throws Line Plot
 - Teacher Resource Sheet # 1: Data Analysis, Statistics and Probability Vocabulary

- Teacher Resource Sheet # 2: Steps to Create a Line Plot (Teacher Resource Sheet # 2 should be cut in half one – one set goes to half the room while the other set goes to the other side of the room)
- Teacher Resource Sheet # 3: Playing Paper Football

Set Up

Measure out a 5-foot space for each group. Mark one end with masking tape (long line) and place the foam footballs in a container at the line. Mark the other end and place the hula-hoop at the mark.

Preassessment –

- Identify possible outcomes of a real-life situation by making an organized list.
- Describe the probability of an event by using numbers to represent the chances

Launch

Ask the students if they have ever attended a carnival or county fair. Ask, have you ever played a target game where you have to throw a ball through a hoop?" Show them a foam football and hula-hoop. "If we placed the hoop five feet away from the thrower, can we predict whether or not the ball will go through the hoop? Hold a brief discussion and then say, "Do you think if I throw the foot ball 10 times, it will go through the hoop 10 times? [No] Why do you think it might not go through the hoop? [Throw may be off center/off target, unable to throw 5 feet] What words can we use to describe the likelihood that the ball will go through the hoop?" [Impossible, certain, likely, more than likely, less likely, 50/50] If students do not recall the appropriate math vocabulary words from prior knowledge, then pause for review (Teacher Resource Sheet # 01: Data Analysis, Statistics and Probability Vocabulary). Have students predict the number of times the teacher can throw the football through the hula hoop in 30 seconds and record it on their worksheet (Student Resource Sheet # 01: Hula Hoop Throws). Demonstrate throwing the football through the hoop from 5 feet away. Have one student be the post (holder of the hula hoop), one student time the teacher for 30 seconds, and one listener who makes sure the quarterback stops throwing. The remainder of the class records the teacher's pass completions as tallies on their worksheets.

Teacher Facilitation –

Introduce the concept of a line plot. A line plot indicates the location of data along a portion of a real number line. Example: At spring training camp of the Sparrows Football Team, 15 quarterbacks tried out for the starting position. They measured how many pass completions each quarterback made in the first week. Distribute (Student Resource Sheet # 2: Sparrows Quarterback Training Results)

to the students face down. Give one-half of the students the top half of the sheet and one-half of the class will get the bottom half. Tell the students they may not look at their sheet until you have directed them to do so. Direct students to turn over their sheets. Immediately begin asking the following questions giving very little wait time for feedback: How many quarterbacks completed 18 passes? [3], 9 passes [2], more than 15 passes [5]. (Students with the top of (Student Resource Sheet # 2: Sparrows Quarterback Training Results) will be able to answer immediately while those with the bottom of Student Resource Sheet # 2 won't). Discuss with students why some were able to answer quickly while others could not. Create a line plot together (Teacher Resource Sheet # 2: Steps to Create a Line Plot) on the chalkboard/overhead. Reinforce for students the ease of reading the information on the line plot as opposed to interpreting the information in paragraph form.

Student Application

Have students work in groups of 6 to complete the activity (quarterback, recorder, post, and listener). Have students make predictions on the number of times they can throw the foam football through the hula hoop in 30 seconds from five feet away and record it on their worksheets (Student Resource Sheet # 01: Hula Hoop Throws). Review directions with students: Stand behind the line, do not lean over the line, make as many throws as possible in thirty seconds, stop once time has been called, record each completed pass with a tally, total tallies, and write a number to represent each person's completed passes. As students complete activity observe each group to make sure they are following directions. Check to make sure students are standing behind the line, not leaning, using tally marks appropriately, and working in allotted time (30 seconds).

Intermediate Students: Once students have completed the activity create a data set of the information from the class [Sarah: 9 passes complete, Jeffrey: 4 passes complete]. Ask students if there is a better way to display the information [yes, line plot]. Construct a class line plot on the chalkboard [chart paper/overhead]. What shape does the data appear to have? Are there clusters, outliers, or gaps? What is the advantage to displaying the data on a line plot rather than a data set/list?

Advanced Students: Distribute student worksheet (Student Resource Sheet # 3: Hula Hoop Throws Line Plot) for this activity. Once students have completed the activity have the students use their group data to construct a line plot on Student Resource Sheet # 3: Hula Hoop Throws Line Plot. Direct students to predict in their math journals what the class line plot will look like based on their groups' results. Students should be able to support their opinion with data from their own line plots. Students should be prepared to plot their information on a class line plot in _____ minutes. Construct a class line plot on the chalkboard (chart paper/overhead). What is the lowest value? Highest value? What can we

determine from this information? What shape does the data appear to have? Review the concepts clusters and gaps (Teacher Resource Sheet # 1: Data Analysis, Statistics and Probability). Are any clusters or gaps located on the class line plot? What is the advantage of displaying data on a line plot rather than a data set/list? Introduce outliers - any point/data located at a distance from most of the points/data. There may be more than one outlier in a set of data (Teacher Resource Sheet # 1: Data Analysis, Statistics and Probability). Can you identify an outlier on the class line plot? Have students record the class line plot in their math journals.

Embedded Assessment

The students will write in their math journals to compare their predictions to the actual outcome. The students will:

- compare the group's results to the class results and record what they notice
- identify reasons for the differences or similarities
- give an assessment of today's lesson using math vocabulary words.

Reteaching/Extension –

- Review vocabulary words from today's lesson as well as the Steps to Create a Line Plot with students (Teacher Resource Sheet # 2: Steps to Create a Line Plot).
- For primary students you may extend learning by introducing the concepts clusters and gaps? (Teacher Resource Sheet # 1: Data Analysis, Statistics and Probability)
- For Intermediate students you may extend learning by having students write in their math journals to explain how they could use today's activities in the future? What professions would find today's activities useful? Why?
- Predict how many throws you could make in one minute. Predict how many throws you could make if the target was ten feet away. If time permits, have students complete the activity with the target located ten feet away or give students one minute at five feet away.
- Find the mean, median, mode, and range of the data. How did you do compared with the class mean?

Lesson 2

Preassessment –

- Students should be able to describe the probability of an event by using the terms impossible, less likely, equally likely, more likely, or certain.
- Students should be familiar with the ideas that fractional quantities can be used to quantify the likelihood of an event
- Students should be able to complete a frequency table and make tallies

Materials:

- Plastic tape (for probability line)
- Metric tape measures or meter sticks, one for every three students
- Masking tape
- Student math journals
- 8 ½" x 11" Paper, 1 sheet for each student
- Stopwatches
- Resource Sheets
 - Student Resource Sheet # 4: Perform a Task Paper Footballs
 - Student Resource Sheet # 5: Group Field Goal Stem and Leaf Plots
 - Teacher Resource Sheet # 3: Playing Paper Football
 - Teacher Resource Sheet # 4: Steps to Create a Stem and Leaf Plot

Launch

Ask the students if they have ever played paper football. Show them a paper football and briefly explain how it is played (Teacher Resource Sheet # 3: Playing Paper Football). Today, you are going to see how many field goals you can make by flicking the paper football in 60 seconds. Distribute the direction on how to make a paper football (Student Resource Sheet # 4: Perform a Task Paper Footballs) and an 8 ½" by 11" piece of paper to each student. (It may be helpful to have an example for each step.) Have each student make their own paper football by following the directions on the sheet.

Teacher Facilitation – Students will collect and organize data from a simple experiment and then use the information that they collect to determine how likely a field goal will occur in paper football. On the floor, lay down the plastic strip to represent the probability line – mark 0 at one end and 1 at the other end. We use this to quantify the likelihood that an event will occur. In this instance, we are going to use this to discuss the likelihood that a certain number of field goals will occur within 60 seconds. Review certain, likely, equally likely to occur and to not occur, unlikely, and impossible with the students. Using 5 student volunteers, have them make predictions on how likely they will be able to make field goals. For example, flicking a paper football from 50 cm away might be a likely event. In 30 seconds though, making 100 field goals might be considered a near impossible event. Have them stand where they think the likelihood of the following events might be: Making 1 field goal in 60 seconds, making 5 field goals in 60 seconds, making 15 field goals in 60 seconds, making 30 field goals in 60 seconds, making over 50 field goals in 60 seconds. Discuss these events in terms of certain, likely, equally likely to occur and to not occur, unlikely, and impossible. Have each student make a numerical prediction on how many field goals he or she will make. Record their predictions on the board and then create a line plot with this data. Discuss with the students how the data seems to be a bit crowded on a real number line. Introduce the stem and leaf plot. Explain that a stem and leaf plot

helps us to list the data in a meaningful way by grouping the data in stems and leaves. Model how to create a stem and leaf plot using their student predictions (Teacher Resource Sheet # 4: Steps to Create a Stem and Leaf Plot). Discuss how the data set shows the predictions of everyone. What conclusions can we draw from this data? [Answers will vary] Have students record the class prediction stem and leaf plot in their math journal.

Student Application

Divide the students into groups of three and distribute a measuring tape or meter stick, timer (or teacher can call out the start and stop times) and masking tape. Each student will also have their math journal as well as their student-created football. The students will use a meter stick or measuring tape to mark off a distance of 50 cm, marking off the kicking line and a line to form the location of the goal post (A student will need to keep their arms on the goal line). As each group is set up, have one-person setup to time the kicker and record the information in a frequency table, one person to be the kicker, and one person to be the goal post. Model for the students how to create the goal post with your hands. To do this, take your hands and extend your index fingers towards the ceiling. Have your thumbs extended (horizontally) and touching each other so your hands look like a U with your thumbs forming the bottom part of the U and your extended index fingers forming the sides (or make 2 "L's" and have them touch their thumbs together). Make sure the students place their arms on the table (on the masking tape) and their face away from the field goal. Using all 3 of the student-created footballs, have the student attempt to make as many field goals as possible in 60 seconds. The student that is timing and recording the kicks can also pass back the flicked footballs. To flick the football, have the student hold the football with one point on the kicking line and their finger on the opposite point. Have the student flick it with the opposite hand. Have each student flick the footballs for 60 seconds and then rotate so everyone has a chance to do all three parts. When all students have completed their experiment, call on each group to share their data and write on the board. Have each group complete the Group Field Goal Worksheet (Student Resource Sheet # 5: Group Field Goal Stem and Leaf Plots).

Embedded Assessment

Students can be evaluated by their generated stem and leaf plot from the classroom data collected on the Group Field Goal Worksheet (Student Resource Sheet # 5: Group Field Goal Stem and Leaf Plots). The assessment tool will ask students to identify any gaps or clusters. They will then interpret the gaps and clusters or lack of gaps and clusters in their math journal.

Reteaching/Extension –

- Review the vocabulary with the students. Take them step by step through using the example data on the Steps to Create a Stem and Leaf Plot (Teacher Resource Sheet # 4: Steps to Create a Stem and Leaf Plot)
- For advanced students, you might want to discuss outliers as well. Students can then estimate/calculate the number of field goals that they could make in one hour. [They will need to multiply the number of goals they made in 60 seconds by 60 minutes]. They can also calculate what their group could do in an hour [Add up the individual scores and multiply by 60].

Lesson 3

Preassessment -

- Collect, organize, and represent data using stem and leaf plots and line plots
- Be able to use a calculator

Materials:

- Student/Group work from Lesson 1
- Student/Group work from Lesson 2
- Magnetic tape/magnetic chalkboard/whiteboard or pocket chart
- Calculators
- Resource Sheets
 - Teacher Resource Sheet # 5: Football Leaves
 - Teacher Resource Sheet # 6: Helmet Stems

Launch

Say: Today we're going to use the information that we collected over the past two days and analyze our data and see what our averages are for our information. First off, we're going to display our data from our field goal activity from yesterday. Distribute 3 'football leaves' (Teacher Resource Sheet # 5: Football Leaves) with a magnetic strip attached (or you can use a pocket chart) to each student. These will need to be cut out ahead of time and there should be one per student. The teacher will also need to have a helmet (Teacher Resource Sheet # 6: Helmet Stems) for each tens place in the stem. Have the student write only the number from the ones place from their score from yesterday. For example, Joey scored 13 field goals. He would write a three on his football. Having reviewed the group work from yesterday, you should have the helmets (Teacher Resource Sheet # 6: Helmet Stems) with the appropriate number written on the helmet stems. Have them on the board already with a picture of a field goal for the vertical line.

Teacher Facilitation

The student's work of finding the three types of averages and range in the activities can be assessed. Completion of the final summative assessment can be utilized as an assessment.

Reteaching/Extension –

- For reteaching, review with students the terms mean, median, mode and range one skill at a time.
- For advanced students, extend the activity to include the projected information for the Group Field Goal Worksheet (Student Resource Sheet # 5: Group Field Goal Stem and Leaf Plots) and find the mean, median, mode and range for this information.

Summative Assessment:

Students will complete BCR questions that assess understanding of the following objectives:

- Describe the probability of an event by using the terms impossible, less likely, equally likely, more likely, or certain
- Collect and organize data into appropriate graphs
- Evaluation of line plots, range, median, mode and mean (Student Resource Sheets # 6-10).
- Answers can be found on Teacher Resource Sheet (Teacher Resource Sheet # 7: BCR Answer Keys)

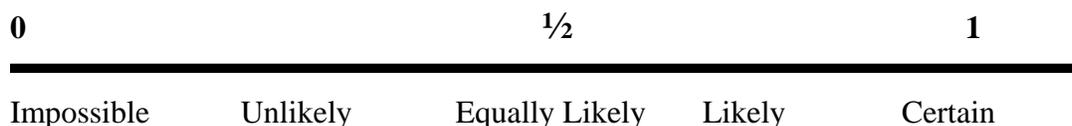
Authors:

Harry Hanna
Twin Ridge Elementary School
Frederick County Public Schools

Yolande Melbourne
Sligo Adventist School
Takoma Park, Maryland

Reteaching Basic Probability Concepts

The teacher will review with students that using 0 and certain by 1 can represent “impossible”. Equally likely is represented as $\frac{1}{2}$ or 50%. Draw the probability scale on the overhead or board.



The teacher will guide students to “discover” the concept of equally likely and write this in on the scale. Extend student thinking by asking, “How can we be certain to...?”

Organizing the Data

Data Set: information that is used to complete a line or stem and leaf plot; information provided or collected by the student

Line Plot: a graph used to show one kind of information or data that indicates the location of data along a segment of a real number line

Stem and Leaf Plot: a graph used to display information or data by listing the exact values in a meaningful array by listing the tens place on the left (stem) and the ones place on the right (leaf). Useful for data covering a range of 25 or more numbers.

Back-to-Back Stem and Leaf Plot: a graph used to compare two stem and leaf plots by sharing the same scale (stem) and is easier to view and compare the distributions of data.

Title: a name given to the graph that briefly describes the data set

Number line (x-axis): shows the frequency of an event or occurrence and data is ordered from least to greatest

Label: describes the data counts and is found below the x-axis

Cluster: isolated groups of points

Gap: large spaces between points

Outlier: data that is substantially larger or smaller than the other values

Mean: arithmetic average of a set of data, calculated by adding all the data then dividing the sum by the number of data in the set.

Median: the number in the center (middle) once data in a set is ordered from smallest to largest; if you have two numbers in the center the median is halfway between the two numbers.

Mode: the number in the data set that occurs most frequently.

Range: the number computed when the lowest number is subtracted from the highest number in a data set (Example: range of 3 if 16 is subtracted from 19).

Hula-Hoop Throws Tally Sheet

Predict how many pass completions the teacher will make in 30 seconds from 5 feet away and record it below. Watch the teacher perform the activity and record the completed passes using tally marks in the appropriate space below. Write a number to represent the total number of completed passes in the last column.

Predict how many pass completions you will make in 30 seconds from 5 feet away. Work with your partner (group) to record completed passes using tally marks in the appropriate space below. Write numbers to represent the total number of completed passes for each person in the last column.

Stand behind the line. Do not lean into your shot.
Keep throwing until your time is up. Stop once time is called.

Make sure your work is accurate; we will need your data for another activity.

Completed Passes in 30 seconds from 5 feet away

Name	Prediction	Tallies	Actual
Teacher			

Group range _____ Class range _____

My performance compared to most frequent class number _____
(less than, greater than, equal to)

Sparrows Quarterback Training Results

Data Set: 18, 16, 18, 13, 18, 12, 16, 9, 12, 8, 10, 14, 15, 9, 8

Quarterback Pass Completions

	Jeff Bob	Sally Larry	Tom		Pete David	Jerry	Amos	Peter	Ralph Deon		Sam Wayne Joe
7	8	9	10	11	12	13	14	15	16	17	18 19
	Passes										

Sparrows Quarterback Training Results

At the Sparrows Football Team's spring training camp 15 players tried out for the quarterback position. Joe had 18 completed passes while Jeff had 8 and Deon had 16. David and Pete each had 12 completed passes. After a slow start Sam made 18 completed passes while Larry was able to squeak out a mere 9 completions. Wayne had 18 completed passes, Sally had 9, Ralph had 16, and Amos had 14 completed passes. Peter had 15 completed passes and Bob had 8 completed passes. Jerry finished with 13 completed passes. Tom finished with 10 completed passes.

Steps to Create a Line Plot

(With example data; actual student data will vary)

A line plot indicates the location of data along a portion of a real number line.

Sample data set: 16, 17, 18, 17, 18, 17, 17

- A. Always identify the smallest and largest numbers in the data set first.

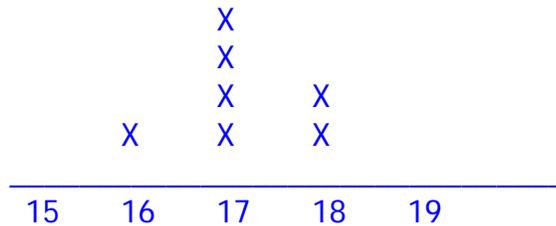
Smallest number 16

Largest number 18

- B. Draw a number line that extends beyond the smallest and largest numbers.



- C. Label the scale for your number line. Mark on the number line a point that represents your data. You may use an X or dot to mark your point.



- D. Create a title for your line plot: **Sample Pass Completions**

- E. Look for patterns/information that can be interpreted about your data. Make statements about them. Use words such as **clusters** (areas of high data), **gaps** (spaces between points/clusters), **outliers** (unusually large or small data far from the clusters), and **range** (difference between the largest and smallest value) (see Teacher Resource Sheet # 1).

There were more than 15 but less than 20 pass completions. The number occurring the most in this data set was 17. The range for this data set was 2 (18-16). There were only three different numbers in this data set. There were no outliers or gaps. The data set is clustered from 16-18.

Group Example:

Ten teachers at Ligos Elementary had a contest to see who could throw the most foam footballs through a hula-hoop located five feet away. The results are listed in the data set below. What information can you gain from the scores listed? Use a line plot to help you assess your information.

2, 9, 6, 10, 10, 13, 9, 9, 16, and 8

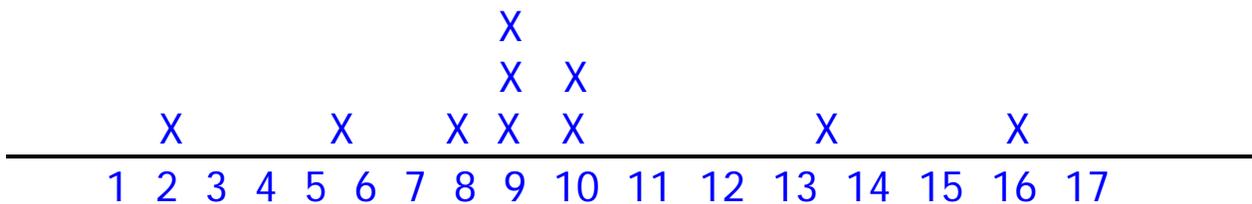
A. Always identify the smallest and largest numbers in the data set first.

Smallest number 2
 Largest number 16

B. Draw a number line that extends beyond the smallest and largest numbers.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

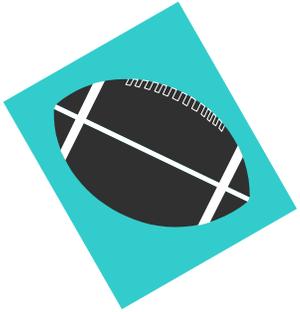
C. Label the scale for your number line (remember to extend it beyond your actual data). It can start at the lowest & highest value. Mark on the number line a point that represents your data. You may use an X or dot to mark your point.



D. Create a title for your line plot.

Ligos Teachers Pass Completions

E. Look for patterns/information that can be interpreted about your data. Make statements about them.



Hula-Hoop Quarterback Completion Passes Line Plot

Construct a line plot of your group's results. Remember to locate the smallest and largest values.



What is the range of your data? _____

What number occurs the most in your data? _____

Names of students in your group:

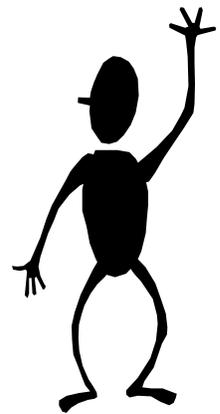
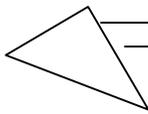
Teachers,

For official paper football rules please visit the following websites:

http://en.wikipedia.org/wiki/Paper_football (best)

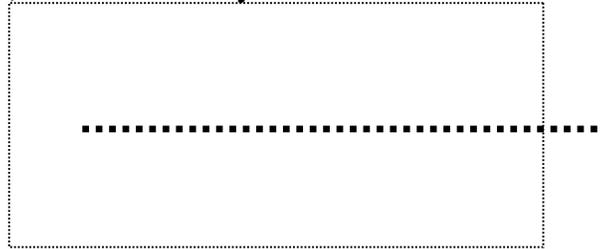
<http://www.mouck.com/blog/eet%20and%20ern%20football.pdf> (cute)

You may also choose to use any online search engine and search under 'Rules for Playing Paper Football'.

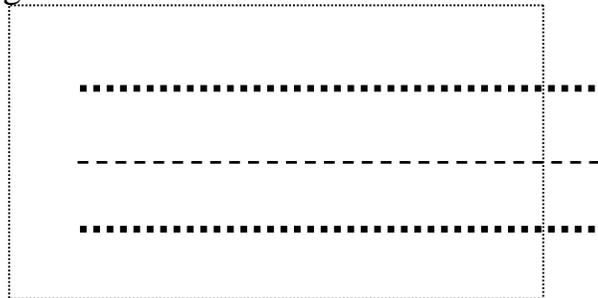


Perform a Task: Paper Football Assembly Instructions

1. Use a standard 8 ½” x 11” piece of paper. Fold in half lengthwise (hotdog style), unfold and lay flat.



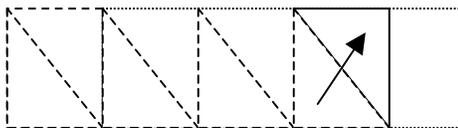
2. Fold both edges inward toward the middle fold.



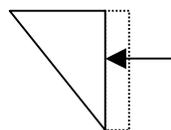
3. Refold paper in half, making sure to keep edges tucked inside.
4. At the short edge, begin to fold diagonally so it meets the outside edge (The fold should look like a triangle).



5. Continue folding in triangular fashion until you can't fold it again (You should have some paper left over).



6. Cut the leftover piece in half and then tuck the attached half into the pocket formed by folding the paper. Throw away the leftover piece.



Steps to Create a Stem and Leaf Plot

(With example data; actual student data will vary)

- A. Find the smallest and largest values in the student's predicted data (3 is the smallest and 55 is the largest).
10, 23, 15, 17, 55, 48, 45, 20, 3, 7, 27, 17, 42, 22, 28, 31, 37, 41, 29, 54, 12, 19
- B. If the smallest value does not have a number in the tens place, then a 0 will be the first number in the stems. Since 55 is the largest number and it has a 5 in the tens place, then the last number in the stem column will be 5. Write the numbers 0-5 vertically and make a vertical line to the right of the numbers.

0	
1	
2	
3	
4	
5	

- C. Place each value into the stem and leaf with the value in the tens place listed on the left of the line and the one place digits are listed horizontally on the right side of the vertical line. It is recommended that you start by finding the lowest number in the data and cross out the numbers as you add to the graph. Go in order from smallest to largest. Another option is to add the data not in order and then create an additional graph and place the digits in order. The lowest number is 3, then 7.

0	3 7
1	
2	
3	
4	
5	

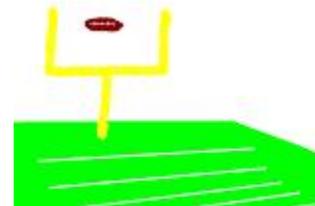
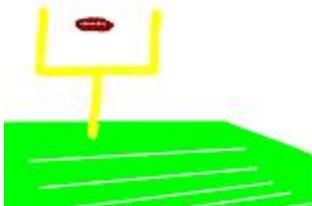
- D. Keep adding the numbers to the plot, keeping the spaces even between each one until all numbers from the data set have been added.

0	3	7					
1	0	2	5	7	7	9	
2	0	2	3	7	8	9	
3	1	7					
4	1	2	5	8			
5	4	5					

$$0|3 = \underline{\hspace{2cm}}$$

- E. Add a key and title.
- F. Finally, discuss the data and interpret the results. Describe the shape of the data using these terms: cluster, gap, range, and distribution (advanced: optional - outlier).

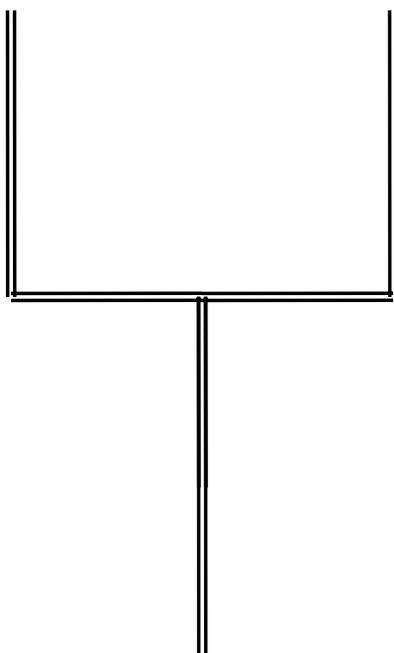
Field Goal Stem and Leaf Plots



Names: _____

Use the field goal post to create a stem and leaf plot using our class data from the board. Make sure you have _____ pieces of data. You may list the data on this page and then add it to your stem and leaf plot.

Title: _____

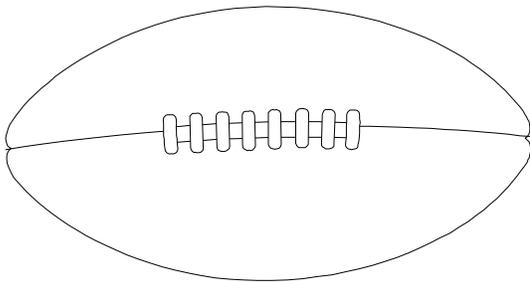
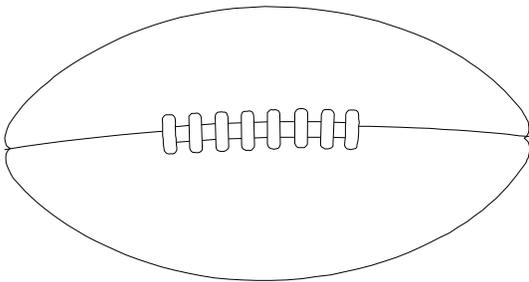
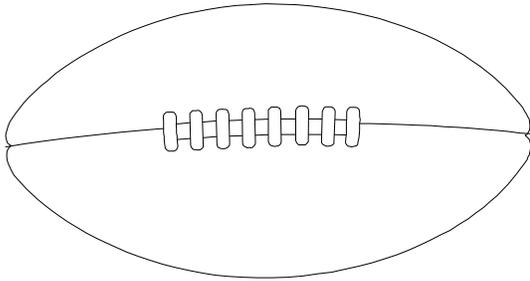
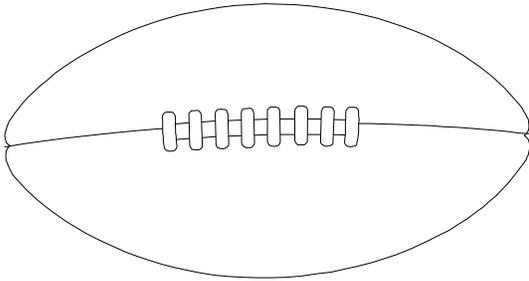
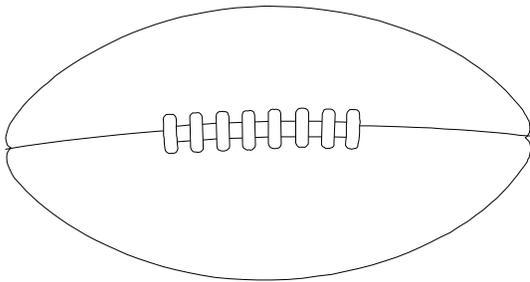
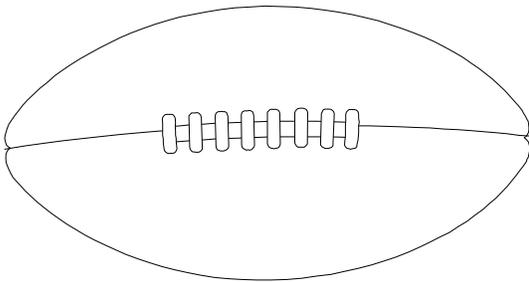
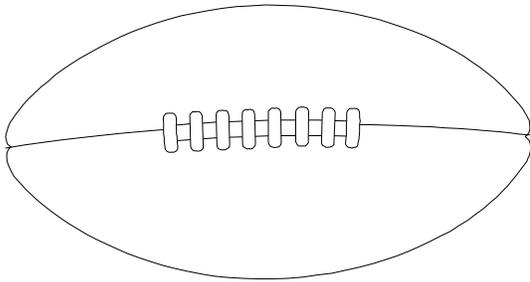
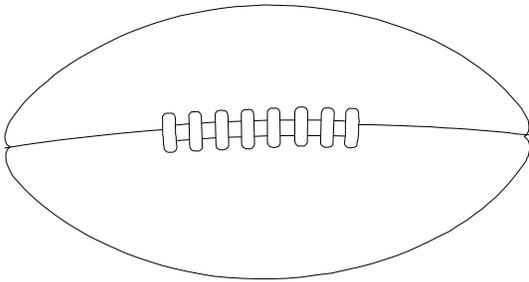


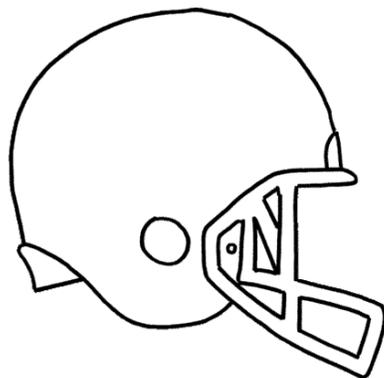
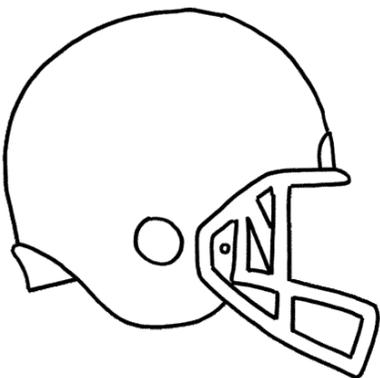
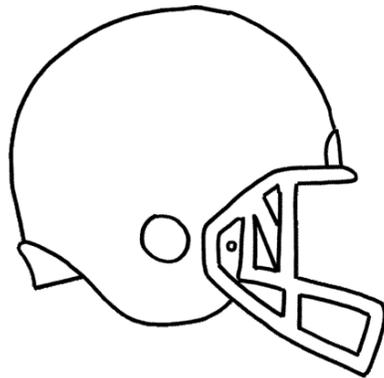
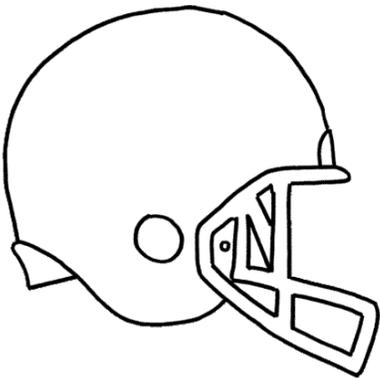
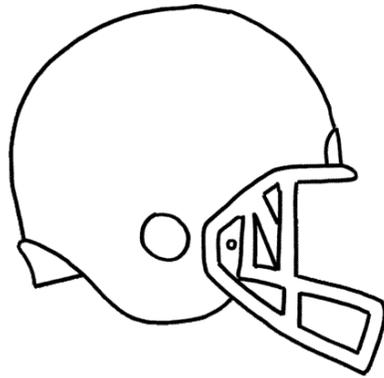
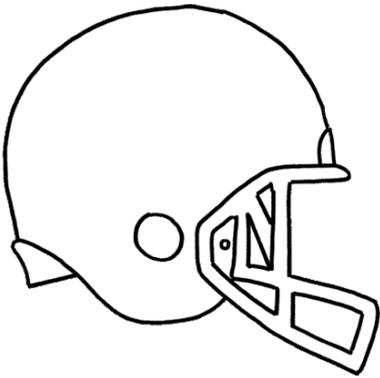
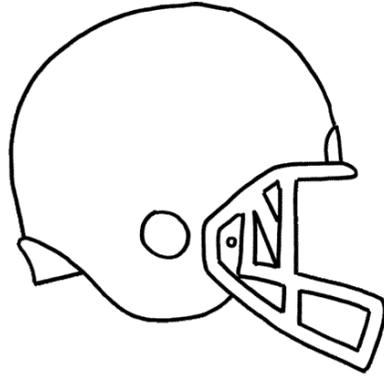
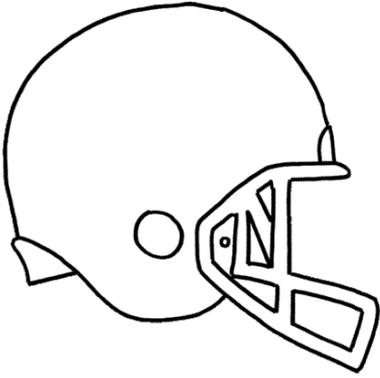
Key: _____ || _____ = _____

Look at the field goal stem and leaf plot and the shape of the data.

Step A. List any gaps _____

Step B. Where does it cluster?





Brief Constructed Response

The Sparrows Football Team invited ten kickers to Spring Training Camp. Monica kicked 39 feet, Todd kicked 25 feet, Drew kicked 13 feet, Emilio kicked 37 feet, Harry kicked 32 feet, Barry kicked 24 feet, Ralph kicked 28 feet, Michael kicked 37 feet, Jeremy kicked 11 feet, and Maurice kicked 46 feet.

Step A

Create a line plot of the data. In order to make the first cut the kickers had to successfully complete field goals from at least thirty feet away. How many kickers made the first cut?

Step B

Use what you know about line plots to explain why your answer is correct. Use words and/or numbers in your explanation.

Brief Constructed Response

At the Sparrows Football Team Spring Training Camp Monica kicked 39 feet, Todd kicked 25 feet, Drew kicked 13 feet, Emilio kicked 37 feet, Harry kicked 32 feet, Barry kicked 24 feet, Ralph kicked 28 feet, Michael kicked 37 feet, Jeremy kicked 11 feet, and Maurice kicked 46 feet.

Step A

Create a line plot of the data. What is the range of the data? Identify a cluster or a gap.

Step B

Use what you know about range, clusters, and gaps to explain why your answer is correct. Use words and/or numbers in your explanation.

Brief Constructed Response

Monica, Emilio, Harry, Michael, and Maurice made the first cut at The Sparrows Football Team Spring Training Camp. The Data Set shows their successful field goals from the second round.

Data Set: 36, 20, 50, 31, 25, 22, 35, 29, 21, 44, 34, 25, 56, 26, 58, 50, 37, 28, 51, 23, 27, 23, 27, 42, 39

Step A

Create a stem and leaf plot of the data. In order to make the second cut the kickers had to successfully complete field goals from at least forty feet. How many field goals were at least forty feet? Label your answer.

Step B

Use what you know about stem and leaf plots to explain why your answer is correct. Use words and/or numbers in your explanation.

Brief Constructed Response

The Data Set shows successful field goals from the second round at the Sparrow Football Team's Spring Training Camp.

Data Set: 36, 20, 50, 31, 25, 22, 35, 29, 21, 44, 34, 25, 56, 26, 58, 50, 37, 28, 51, 23, 27, 23, 23, 42, 39

Step A

Create a stem and leaf plot of the data. What are the mean, median, and mode of the data set? Label your answers.

Step B

Use what you know about mean, median, and mode to explain why your answer is correct. Use words and/or numbers in your explanation.

Brief Constructed Response

At the Sparrows Football Team Spring Training Camp Monica kicked 39 feet, Todd kicked 25 feet, Drew kicked 13 feet, Emilio kicked 37 feet, Harry kicked 32 feet, Barry kicked 24 feet, Ralph kicked 28 feet, Michael kicked 37 feet, Jeremy kicked 11 feet, and Maurice kicked 46 feet.

Step A

Create a line plot of the data. Identify an outlier in the data.

Step B

Use what you know about outliers to explain why your answer is correct. Use words and/or numbers in your explanation.

Brief Constructed Response **Line Plot Answer Key**

The Sparrows Football Team invited ten kickers to Spring Training Camp. Monica kicked 39 feet, Todd kicked 25 feet, Drew kicked 13 feet, Emilio kicked 37 feet, Harry kicked 32 feet, Barry kicked 24 feet, Ralph kicked 28 feet, Michael kicked 37 feet, Jeremy kicked 11 feet, and Maurice kicked 46 feet.

Step A

Create a line plot of the data. In order to make the first cut the kickers had to successfully complete field goals from at least thirty feet away. How many kickers made the first cut?

Sparrows Football Team Field Goals



5 players made the first cut

Step B

Use what you know about line plots to explain why your answer is correct. Use words and/or numbers in your explanation.

Line plots show information along a portion of a number line.

There are five players with scores greater than 30. I can see that on
the line plot because I counted the Xs (points) after 30 and wrote down
the answer.

Brief Constructed Response **Range, Cluster, Gap Answer Key**

At the Sparrows Football Team Spring Training Camp Monica kicked 39 feet, Todd kicked 25 feet, Drew kicked 13 feet, Emilio kicked 37 feet, Harry kicked 32 feet, Barry kicked 24 feet, Ralph kicked 28 feet, Michael kicked 37 feet, Jeremy kicked 11 feet, and Maurice kicked 46 feet.

Step A

Create a line plot of the data. What is the range of the data?
Identify a cluster or a gap

Sparrows Football Team Field Goals



35 is the range of the data. There is a gap between 14 and 23, and 39 and 45. Most of the data is clustered between 24 and 39. 11 and 13 could also be a cluster.

Step B

Use what you know about range, clusters, or gaps to explain why your answer is correct. Use words and/or numbers in your explanation.

Line plots show information along a portion of a number line. Range is found by subtracting the largest and smallest number so I subtracted 11 from 46 to get my answer. Clusters are lots of data/points together in an area on the number line and gaps are spaces between clusters.

Brief Constructed Response **Stem and Leaf Plot Answer Key**

Monica, Emilio, Harry, Michael, and Maurice made the first cut at The Sparrows Football Team Spring Training Camp. The Data Set shows their successful field goals from the second round.

Data Set: 36, 20, 50, 31, 25, 22, 35, 29, 21, 44, 34, 25, 56, 26, 58, 50, 37, 28, 51, 23, 27, 23, 27, 42, 39

Step A

Create a stem and leaf plot of the data. In order to make the second cut the kickers had to successfully complete field goals from at least forty feet. How many field goals were at least forty feet? Label your answer.

Successful Second Round Field Goals

```
2 | 0, 1, 2, 3, 3, 3, 5, 5, 6, 7, 8, 9
3 | 1, 4, 5, 6, 7, 9
4 | 2, 4
5 | 0, 0, 1, 6, 8
```

7 field goals were at least 40 feet 2|0 = 20 feet

Step B

Use what you know about stem and leaf plots to explain why your answer is correct. Use words and/or numbers in your explanation.

I used a stem and leaf plot because there were 25 numbers in the data set. I know at least 7 field goals were 40 feet away because there are seven leaves or numbers after the 4 in the stem.

Brief Constructed Response **Mean, Median, Mode Answer Key**

The Data Set shows successful field goals from the second round at the Sparrow Football Team's Spring Training Camp.

Data Set: 36, 20, 50, 31, 25, 22, 35, 29, 21, 44, 34, 25, 56, 26, 58, 50, 37, 28, 51, 23, 27, 23, 23, 42, 39

Step A

Create a stem and leaf plot of the data. What are the mean, median, and mode of the data set? Label your answers.

Successful Second Round Field Goals

2		0, 1, 2, 3, 3, 3, 5, 5, 6, 7, 8, 9	
3		1, 4, 5, 6, 7, 9	
4		2, 4	
5		0, 0, 1, 6, 8	2 0 = 20 feet

The mode is 23 feet. The median is 31 feet. The mean is 34.2 feet

Step B

Use what you know about mean, median, and mode to explain why your answer is correct. Use words and/or numbers in your explanation.

The mean is 34.2 feet. I added all the numbers in the data set and divided them
by 25 (total) to get the mean. The mode is the number that occurs the most so it
is 23 feet. The median is the middle number when the data is in order so I counted
from the back and front on each side till I got to the middle and found 31 feet.
I used a stem and leaf plot because there were 25 numbers in the data set.

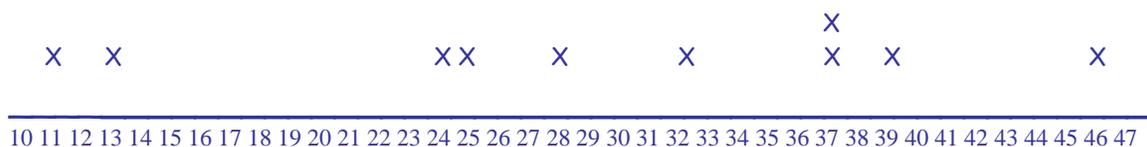
Brief Constructed Response **Outlier Answer Key**

At the Sparrows Football Team Spring Training Camp Monica kicked 39 feet, Todd kicked 25 feet, Drew kicked 13 feet, Emilio kicked 37 feet, Harry kicked 32 feet, Barry kicked 24 feet, Ralph kicked 28 feet, Michael kicked 37 feet, Jeremy kicked 11 feet, and Maurice kicked 46 feet.

Step A

Create a line plot of the data. Identify and label an outlier in the data.

Sparrows Football Team Field Goals



46 feet is an outlier on the line plot

Step B

Use what you know about outliers to explain why your answer is correct. Use words and/or numbers in your explanation.

Line plots show information along a portion of a number
line. Outliers are points far away from clusters or the main
points. 46 is all by itself away from the rest of the points and
feet is the label, from the story. 11 and 13 could be outliers
too, but they are together so they could also be a cluster.