



MADDEN



FOOTBALL BY THE NUMBERS

ELEMENTARY LESSON PLAN



Analyzing the Impact of Angles

Overview

In this lesson, students will develop geometry skills by exploring the three types of angles and describing the impact of kicking ball angle on punting accuracy. Students begin by conducting a card sort to define the three types of angles. Students then work to construct the three types of angles. Next, the teacher conducts a demonstration to help students understand the impact of the throwing angle on passing. After the demonstration, the students explore the offensive portion of the interactive to determine if all angles are equal when trying to score a touchdown or move the ball down the field. To extend their thinking, students create paper footballs and work in groups to conduct an investigation to determine the best kicking angle for scoring a field goal. The lesson closes with generating conclusions to justify the best kicking ball angle and an exit card that requires students to identify angles.

Lesson Duration

One 60-minute session

Essential Questions

- What are the different types of angles?
- How can kicking/ball angle impact punting accuracy?

Objectives

Students will:

- Describe the three types of angles
- Describe how the ball angle impacts punting accuracy

Standards

Common Core Math Standards

- CCSS. Math Content.4.G.A.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
- CCSS. Math Content.4.MD.C.6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.





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Materials

- 1 protractor per student
- 2 wooden sticks or plastic straws per student
- *Card Sort set* per group
- 1 *How to Make a Paper Football* worksheet per group
- 1 *Punt Practice Investigation* per student
- 1 *Exit Card* per student

Teacher Preparation

1. Preview the chapter, [Velocity and Angles with Quarterback Kirk Cousins](#) in the *Madden Football by the Numbers* Virtual Field Trip. This chapter focuses on the important role angles play in America's favorite game.
2. Gather wood sticks/straws and protractors.
3. Make Card Sort sets.
4. Make copies of worksheets.
5. Practice making a paper football.





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Procedure

1. Distribute Card Sort sets to each group; students work together to conduct a card sort to define the three types of angles.
2. When prompted by the teacher, students work independently to use their wooden sticks or plastic straws to construct the three types of angles. For example, if the teacher says 30° , students work to construct a 30° angle. Encourage students to use their protractor to check and modify their thinking.
3. The teacher conducts the demonstration below and leads a class discussion to discuss how throwing angle impacts passing.
Demonstration: The teacher poses as quarterback and asks students to predict what will happen if she attempts to throw a football at a 120° angle. After students make their predictions the teacher throws the ball. Then repeats the demonstration with 90° and 45° angle throws.
4. As a class, students watch the [Velocity and Angles with Quarterback Kirk Cousins](#) chapter in the *Madden Football by the Numbers* Virtual Field Trip to learn about the important role angles play in America's favorite game.
5. Students explore the [Madden Football by the Numbers](#) digital interactive to determine what it's like to play offense, the different types of passes, and how throwing angle and velocity affect pass completion.
6. Students explore the Offensive portion of the interactive to determine if all acute angles are equal when trying to score a touchdown or move the ball down field.
7. Next, students collaborate in small groups to construct, test, and modify paper footballs with the goal of determining the best kicking angle for scoring a field goal.
8. Working individually, students generate conclusions to explain how the kicking angle impacted field goal accuracy.
9. Give each student an Exit Card as a formative assessment class activity or as a homework assignment.





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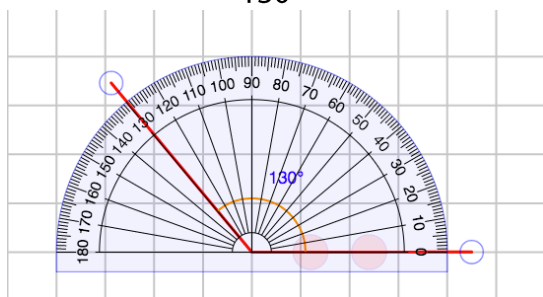
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Card Sort Set Resource

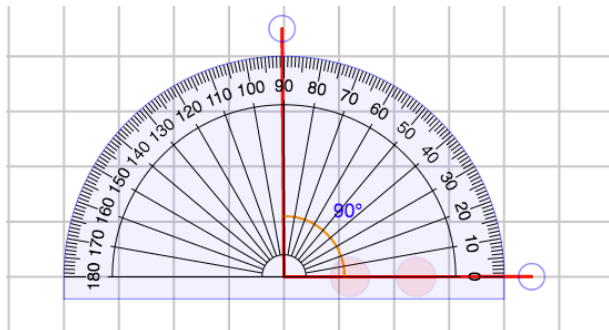
Directions: Copy and cut one set per group.

130°



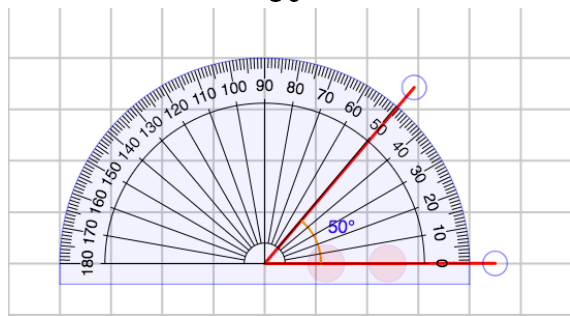
An **obtuse angle** is an angle that measures wider than 90° and less than 180° .

90°



A **right angle** is when two perpendicular straight lines intersect.

50°



An **acute angle** measures less than 90° but more than 0° .





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Summary of Angle Information in the [Football by the Numbers Digital Interactive](#)

ANGLE

You might think that if two quarterbacks throw footballs with the exact same velocity, their footballs will travel the same distance. Not necessarily! There's another important factor that plays a role in determining how far a football will travel – **angle**.

ANGLE

Think about what happens if you throw a football straight up in the air. It will fall straight back down, either into your waiting hands or onto the ground.



ANGLE

What if you throw a football at a downward angle? The football will hit the ground before it can travel very far. This kind of pass may even result in an **Intentional Grounding** penalty.





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ANGLE

The quarterback will not move the football down the field if he throws in either of these ways, so in addition to velocity, he thinks about throwing angle. A ball thrown at a steep angle will take longer to reach a receiver than a ball thrown at a lower angle.

This is known as **hang-time**. A long hang-time allows a receiver to make it down field to catch a long pass. A short hang-time will allow the pass to be completed before the defense has time to react.



ANGLE

Can you find the angle that will make the football travel the greatest distance down field?





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How to Make a Paper Football Student Worksheet



1. Fold a sheet of 8.5 x 11 paper in half.



2. Cut or tear along the crease.



3. Fold one of the halves lengthwise.



4. Fold the lower left corner to form a triangle.



5. Continue folding triangles until you reach the top.



6. Undo the last fold and fold it down to form a triangle. Do not worry about making a perfect triangle.



7. Trim approximately one-half inch of the right point.



8. Tuck the remaining paper into the crease and flatten your football.





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Punt Practice Investigation Student Worksheet

EXPLORE

1. Practice punting your football into a finger field goal (have a partner make a goal post with their fingers!).
2. Make final modifications to your football as needed.
3. Conduct a test with multiple trials to determine which ball angle results in the most accurate punt.

TEST

1. Position your football at a 90° angle (see below);
2. Punt your football into your finger field goal five times from this position;
3. After each trial, write "yes" if you score a field goal and "no" if you do not;
4. Position your football at a 140° angle (see below);
5. Punt your football into your finger field goal five times from this position;
6. After each trial, write "yes" if you score a field goal and "no" if you do not;
7. Based on your findings, select and test two more ball/kicking angles; and
8. Record your results in the data chart.

Important Notes: Do not modify your football once you have started the test. Be sure to keep your finger field goal in the same location for each trial. The only variable that should change throughout the test is the angle of the paper football. Use your protractor to accurately position your paper football for each trial/punt.





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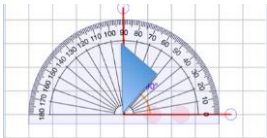



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Punt Accuracy Data

Angle	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
90° 					
140° 					

4. Write a conclusion that explains which kicking angle is best for punting accuracy. Use data to support your thinking.





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EXIT CARD: Punt Practice Investigation

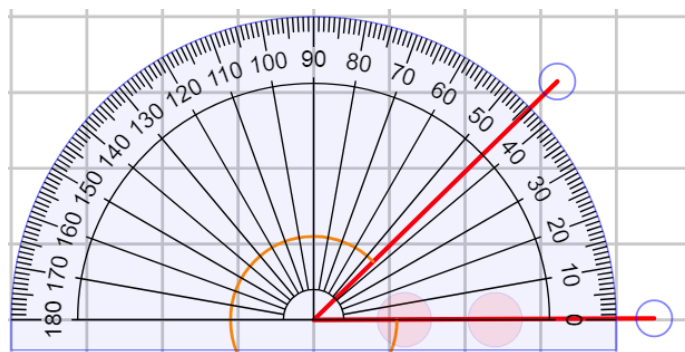
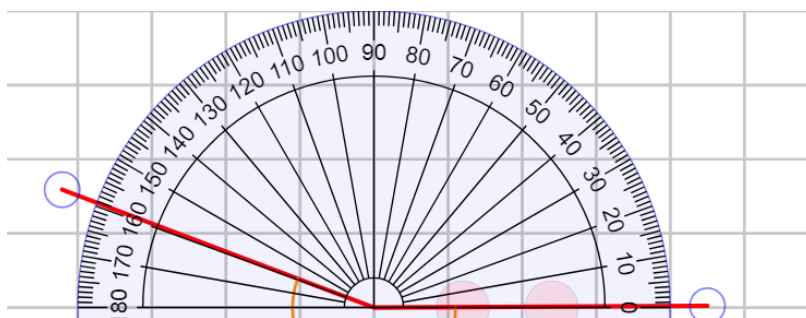
NAME: _____ CLASS: _____

TEACHER: _____

Directions: Answer the questions below.

1. Describe the characteristics of a right angle. You may use pictures, symbols and/or words.

2. Circle the acute angle below.





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Explain how you know which angle is the acute angle. _____

