



MADDEN



FOOTBALL BY THE NUMBERS

ELEMENTARY LESSON PLAN



Winning with Math

Overview

In this lesson, students develop whole number and fraction skills. The teacher presents problems based on football plays. The yard lines are a model for a number line. Students begin by completing ten independent practice problems that help reinforce understanding of the place value system, the number line concept, and basic math operations. Students then use an online interactive to understand application of science and math to successful plays on offense during a football game. This learning is then applied as students work in teams to solve math problems related to specific plays. Depending on student readiness, students can start with one or the other levels of difficulty. For Level One, students use place value mats (or base ten blocks) to perform subtraction of multi-digit whole numbers. The computation enables students to determine the yards involved in a particular play. For Level Two, students use hundreds blocks to determine the distance traveled by a pass (lob, bullet, touch). To complete the lesson, students get an exit card that has a problem based on the lesson objectives.

Lesson Duration

One 45-minute session

Essential Questions

- What is the place value system?
- How can the number line be used to perform operations with whole numbers?
- How can a number line model the yard lines of a football field?

Objectives

Students will:

- Describe the place value system
- Apply the number line to perform operations with whole numbers
- Relate the number line to the yard lines of a football field

Standards

Common Core Math Standards

- CCSS. Math Content.5.NBT.A: Understand the place value system
- CCSS. Math Content.5.NBT.B: Perform operations with multi-digit whole numbers and with decimals to hundredths





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Materials

- Computer or mobile device with internet access
- Student worksheets
 - Note: Consider modifying or removing problems for younger students or students who need additional support.
- Football field example (one for each small group of students)
- Number line (see Resources)
- Hundreds blocks (see Resources)
- Place value mats (see Resources)
- Optional: Base ten blocks

Teacher Preparation

1. Complete the *Football by the Numbers* interactive.
2. Print out student worksheets.
3. Print out place value mats and 100 blocks.
4. Make up the exit cards.
5. Consider strategies for ELL and struggling students, such as guiding students on performing number operations using the place value system and base ten blocks and on how to locate numbers on a number line. (Also, consider providing a stimulus to prompt thinking about how a number line is a model of the yard lines of a football field.)



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Procedure

1. Working individually, students complete the practice problems.
2. Students complete the Offensive part of the Football by the Numbers interactive. (Note: Depending on your available classroom technology, students may work through the interactive independently, in small groups, or as a whole group.)
3. Arrange students into small groups of 4 or 5. Distribute the football field example. Ask students to look at the way the yard lines are numbered and consider how the field “number line” is different from a regular number line. (The numbers go up and back down as positive integers, rather than as negative integers to zero and then on to positive integers.) If necessary, show students a negative-to-positive number line to help them see the difference. Explain that, for the purposes of these activities, students will create a real number line to solve problems based on football plays.
4. Using the number line worksheet as a model, students create a number line that models the yard lines of a football field. Ensure that the number line starts at 0 in the middle and goes to -50 for one team’s half of the field and +50 for the other team’s half of the field.
5. Working in pairs or small groups, students complete the Level One problems on the worksheet. Students should use the place value mats in their worksheets to calculate the answers.
6. If base ten blocks are available, another pair or group member can use these to calculate the answers. Group members can then compare and analyze their different approaches.
7. Guide groups to use their number lines to model the problems. Students can assume that the Steelers are playing left to right. For more advanced students, ask students to assume the team is playing right to left. This latter scenario gives students practice with adding and subtracting negative numbers.
8. Present student groups with hundreds blocks.
9. Explain that an entire block equals one football field and that each smaller square equals one yard on the field.
10. Students work in pairs or small groups to complete the Level Two problems on the worksheet.
11. Give students the exit cards as a formative assessment class activity or as a homework assignment.



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Practice Problems Student Worksheet

Complete the following practice problems. Circle the correct options and show your work.

- Which numbers underlined digit is worth 7?
 - 7,372
 - 6,772
 - 9,777
 - 3,786
- Consider the number 8,498. What value is the 4?
 - 4
 - 40
 - 400
 - 4000
- Three ten thousands is equal to:
 - 3
 - 1,000
 - 3,000
 - 30,000
- Is -7 greater or less than + 5?
 - Less than
 - Greater than
 - Neither greater or less than
 - Not enough information
- What is a number line?
 - line that starts at 0 and ends at 100
 - line marked with numbers (such as integers) at intervals
 - line that starts at 0 and goes to infinity
 - type of integer
- What is the best use of a place value mat?
 - To compare the tens and ones in the two numbers 23 and 42.
 - To calculate the number of integers in the number 24.
 - To determine the number of digits in the number 145.
 - To write 2017 as a Roman numeral.
- $9272 - \underline{\hspace{2cm}} = 5083$. Write down the missing number.



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FOOTBALL BY THE NUMBERS

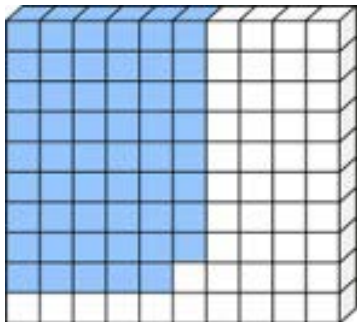
ELEMENTARY LESSON PLAN



8. Consider the statement: $9 - 3 = 1 + \underline{\quad}$. Write the number that makes the statement true. Show your work.

9. A sprinter runs 23 meters in a 200 meter race. How many meters must she run to complete the race?

10. What percentage of blocks in the figure are shaded?





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Practice Problems Student Worksheet

LEVEL ONE PROBLEMS

1. The Steelers are on the Cowboys' fifteen-yard line. Use your place value mat or number line to calculate how much farther the Steelers need to travel to score a touchdown.

2. The Steelers passed for fifty-three yards and lost fifteen due to a penalty. How many yards did they gain?

3. The Steelers ran for three yards. How many more yards do they need to gain for a first down?

LEVEL TWO PROBLEMS

PLAY 1. The Packers are on the Giants 20 yard line. What percentage of the field have they traveled?

PLAY 2. After their gain on the Giants, the Packers quarterback, Aaron Rodgers throws a successful touch pass. The Packers gain 15 yards. What percentage of the field have they traveled from the 50-yard line?

PLAY 3. What percentage of the field do the Packers need to travel to score a touchdown?





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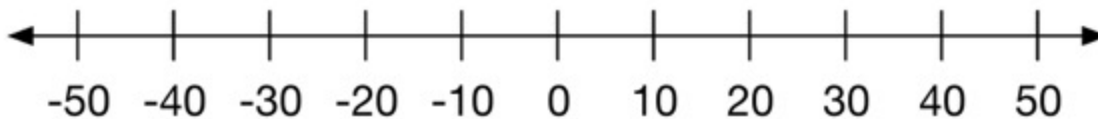
EXIT CARD

NAME: _____ CLASS: _____

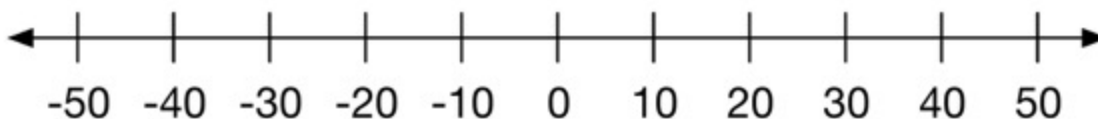
TEACHER: _____

Answer the questions. Show your work.

1. The Giants quarterback, Eli Manning throws a bullet pass. The pass earns the Giants a first down by moving play 12 yards from their 30-yard line. Show on the number line where the next play begins. Assume the Giants are playing left to right.



2. From the Cowboys' 10-yard line, the Green Bay Packers quarterback, Aaron Rodgers thows a lob pass to the wide receiver. The ball travels 27 yards. In the next play, a bullet pass moves the Green Bay Packers another 13 yards toward the end-zone. Show on the number line where the third play begins. Assume the Packers are playing right to left.





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PRACTICE PROBLEMS ANSWER KEY

Correct answers indicated in bold red text.

- Which numbers underlined digit is worth 7?
 - 7,372
 - 6,772
 - 9,777**
 - 3,786
- Consider the number 8,498. What value is the 4?
 - 4
 - 40
 - 400**
 - 4000
- Three ten thousands is equal to:
 - 3
 - 1,000
 - 3,000
 - 30,000**
- Is -7 greater or less than +5?
 - Less than**
 - Greater than
 - Neither greater or less than
 - Not enough information
- What is a number line?
 - A line that starts at 0 and ends at 100
 - A line marked with numbers (such as integers) at intervals**
 - A line that starts at 0 and goes to infinity
 - A type of integer
- What is the best use of a place value mat?
 - To compare the tens and ones in the two numbers 23 and 42.**
 - To calculate the number of integers in the number 24.
 - To determine the number of digits in the number 145.
 - To write 2017 as a Roman numeral.
- $9272 - \underline{4,189} = 5083$. Write down the missing number:
- Consider the statement: $9 - 3 = 1 + ?$ Write the number that makes the statement true. Show your work. **5**



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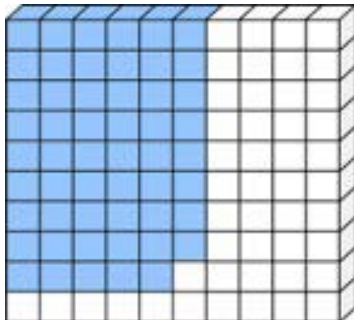


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9. A sprinter runs 23 meters in a 200 meter race. How many meters must she run to complete the race? **177**
10. What percentage of blocks in the figure are shaded? **53%**



LEVEL ONE PROBLEMS – ANSWER KEY

Correct answers indicated in bold red text.

- The Steelers are on the Cowboys' fifteen-yard line. Use your place value mat to calculate how much farther the Steelers need to travel to score a touchdown.
The play is 15 yards from the Cowboys end-zone. Therefore, the Steelers need to travel 15 yards to score a touchdown. The play will begin 35 yards from the center line. To get a touchdown, the Steelers will need to travel +15 yards to the 50-yard line (since $35 + 15 = 50$).
- The Steelers passed for fifty-three yards and lost fifteen due to a penalty. How many yards did they gain?
The play is 53 yards, minus 15 due to the penalty. The total gain is $53 - 15 = 38$ yards.
- The Steelers ran for three yards. How many more yards do they need to gain for a first down?
For a first down a team needs a yardage gain of 10 yards. Therefore, the play needs to continue for another seven yards, since $10 - 3 = 7$.

LEVEL TWO PROBLEMS – ANSWER KEY

Correct answers indicated in bold red text.

- PLAY 1. The Packers are on the Giants 20 yard line. What percentage of the field have they traveled?
Distance traveled = 20 y
Length of field = 100 y
Percentage of field = $20/100 = 0.2 = 20\%$



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PLAY 2. After their gain on the Giants, the Packers quarterback, Aaron Rodgers throws a successful touch pass. The Packers gain 15 yards. What percentage of the field have they traveled from the 50-yard line?

Distance traveled in Play 1 = 20 y

Distance traveled in Play 2 = 15 y

Total distance traveled = 20 + 15 = 35 y

Length of field = 100 y

Percentage of field = $35/100 = 0.35 = 35\%$

PLAY 3. What percentage of the field do the Packers need to travel to score a touchdown?

Play 1 and Play 2 distance traveled = 35

Total distance to end-zone = 50

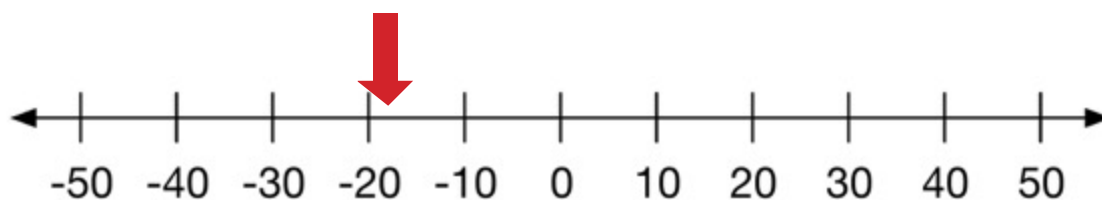
Distance remaining = 50 - 35 = 15 y

Length of field = 100 y

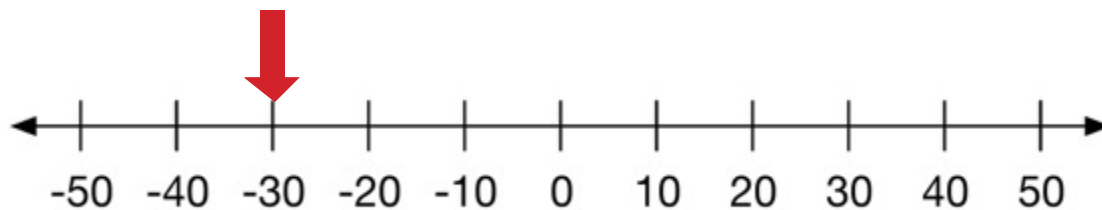
Percentage of field = $15/100 = 0.15 = 15\%$

EXIT CARD PROBLEMS – ANSWER KEY

- The Giants quarterback, Eli Manning throws a bullet pass. The pass earns the Giants a first down by moving play 12 yards from their 30-yard line. Show on the number line where the next play begins. Assume the Giants are playing left to right.
The play is left to right, so the pass starts at -30 on the number line: $-30 + 12 = -18$ yards.



- From the Cowboys' 10-yard line, the Green Bay Packers quarterback, Aaron Rodgers throws a lob pass to the wide receiver. The ball travels 27 yards. In the next play, a bullet pass moves the Green Bay Packers another 13 yards toward the end-zone. Show on the number line where the third play begins. Assume the Packers are playing right to left.
The play is right to left, so the Packers start at +10. The first pass is 27 yards = $10 - 27 = -17$.
The second pass is $-17 - 13 = -30$ yards.





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3. The Kansas City Chiefs are up against the Seattle Seahawks in the playoffs. It's down to the wire, with the score at 23-19, Chiefs lead the Seahawks. The game is in the last few seconds in the 4th quarter. The Chiefs have made it to the Seahawks' 15-yard line, and looking to make a final push to the end-zone. But the Chiefs get an intentional grounding penalty, and the Seahawks have the ball. The Seahawks quarterback, Russel Wilson makes a Hail Mary pass toward the Chiefs' end-zone. What percentage of the field must the Seahawks wide receiver run to win the game for them? Show your work.

The intentional grounding penalty results in a loss of 10 yards for the Chiefs. The Seahawks start the play from the Chiefs' 5-yard line. To score a touchdown, the throw must travel $50 + 5 = 55$ yards. The field is 100 yards long. Since $55/100 = 0.55 = 55\%$.

4. EXTRA CREDIT: If the Seahawks play is made with 7 seconds on the clock, and their wide receiver can run at 19 miles per hour, can he win the game for the Seahawks? (Hint: there are 1760 yards in a mile.)

With 7 seconds left, the player must run 55 yards in 7 seconds, or $55/7 = 7.86$ yards per second. Since there are 1760 yards in a mile, the player's speed is $1760 \times 19 = 33440$ yards per hour. Since there are $60 \times 60 = 3600$ seconds in an hour, the player's speed is $33440/3600 = 9.29$ yards per second. The player's speed is faster than that needed to cover the remaining distance, so he can run fast enough to win the game.





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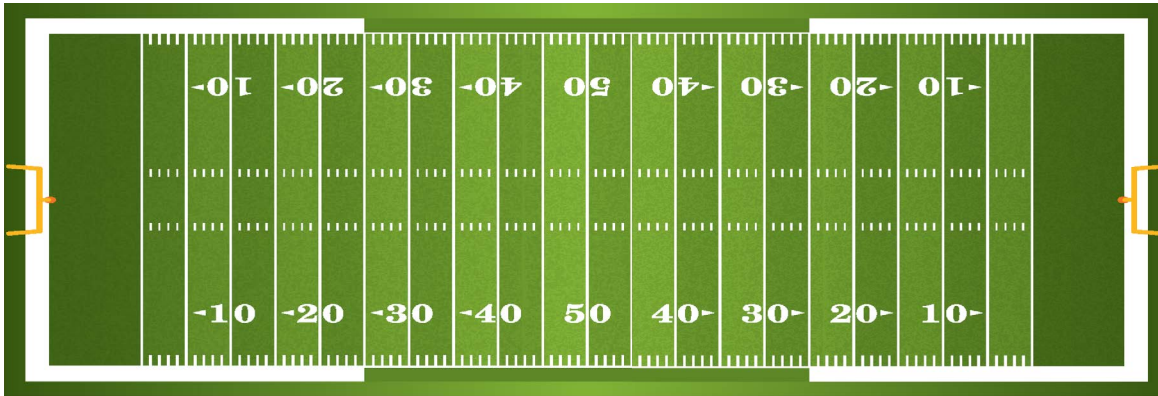
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RESOURCES

Football Field



Place Value Mat

Hundreds	Tens	Ones



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RESOURCES

Number Lines

100 Block

