## $5^{\text {th }}$ Grade Math Special Session



## Objective 1: Number, Operation, and Quantitative Reasoning

## Place Value



Elementary Mathematics Department

The student uses place value to represent whole numbers and decimals.
(A) The student is expected to use place value to read, write, compare, and order whole numbers through 999,999,999,999.
Verbs: use to represent, read, write, compare and order
Vocabulary: digit, value, position, place value, ones, tens, hundreds, thousands, ten thousand, hundred thousand, millions, ten million, hundred million, billions, ten billion, hundred billion,
Guiding Questions: How do we read and write numbers? How do we use place value to order and compare numbers?
Materials Needed: Spinner or Number Cards, Index Cards, Place Value Chart, Transparency 1
Math Tool: Transparency 1, Place Value Chart
Lesson:
Review vocabulary words for Place Value.

1. Pose the Problem: Put Transparency 1 on the overhead. Read the problem aloud. Have students become familiar with how this TEK could be tested on the TAKS.
2. Today we are going to do an activity to help us practice using place value to read and write numbers. We will also practice using place value to order and compare numbers. Let's start out making the largest 10-digit number possible. Before we begin the activity, let's think about this question that is written on the board. How do we use place value to read and write numbers? How do we use place value to order and compare numbers?
Give students time to think and then talk to their neighbor about the questions. Allow time to share the responses.
3. Let's review using the Place Value Chart as a math tool. You can use this tool to help you remember the values and positions of the digits in whole numbers. Give the students a Place Value Chart or have them draw one on their paper labeling each value. Then have the students use the chart to read the different values together as a group. Talk about the patterns in each period. Give students time to recognize the patterns and share their findings. (Discuss and focus on how the ones, tens, and hundreds, repeat in each period.)

| Billions | Hundred <br> Millions | Ten <br> Millions | Millions | Hundred <br> Thousands | Ten <br> Thousands | Thousands | Hundreds | Tens | Ones |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
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4. The objective of this activity is use the chart to make the largest 10-digit number possible.

Demonstrate with the students. First, I will spin a number and you will write it on your chart. Once you put the number down, you can't remove it or change your mind at a later time.. Spin the second number and have the students write this number on their chart. Continue until the entire chart has been filled in. Once the chart has been completed ask the following questions:
5. Who has the greatest 10-digit number? How do you know? What is the value of your number? How do you know that it is the greatest? Whose number is closest to your number? How do you know? Make sure that each student can read his/her number correctly. If necessary, guide the students in using the chart to help them read the numbers correctly. After determining who has the largest value, give each student an index card. Have each student write the number from the chart in words. As a group, students will use these cards to order the numbers.
6. Guided Practice: Write your number in standard form on the index card. This time, as a group you will use what you know about place value to order and compare all of your numbers from greatest to least. Think about what strategy to use to order and compare the numbers. How does knowing the value of the digits help you with ordering and comparing numbers?

## Listen for the following:

Does the student clearly describe the strategy used to compare and order numbers?
Does the student use the idea of place value to explain and justify his or her strategies and responses?
Look for the following:
Does the student demonstrate a good grasp of the number system and place value?
Can the student identify the different values of the different places in a number?
Does the student recognize the relative values of the places in a number (each place is ten times greater than the place on its right)?

Your final task is to use place value to write each number in words. You should have at least 4 numbers when you finish. Remember, when we read or write whole numbers, we do not include the word "and".

Misconception: Be careful not to let students use the word "and" when reading numbers.

Transparency 1
TAKS Connection

The chart below shows the number of Rap Music CD's sold in 2009 for several cities in Texas. Which number shows how to write the least number of Rap Music CD's sold in the Texas cities listed?

| City | Rap Music |
| :--- | ---: |
| Austin | $22,653,118,245$ |
| Dallas | $22,632,120,109$ |
| Houston | $22,653,018,254$ |
| San Antonio | $22,635,180,119$ |

(A) Twenty-two billion, six hundred fifty-three million, one hundred eighteen thousand, two hundred forty-five
(B) Twenty-two billion, six hundred thirty-two million, one hundred twenty thousand, one hundred nine
(C) Twenty-two billion, six hundred fifty-three million, eighteen thousand, two hundred fifty-four
(D) Twenty-two billion, six hundred thirty-five million, one hundred eighty thousand, one hundred nineteen

The student uses place value to represent whole numbers and decimals.
(A) The student is expected to use place value to read, write, compare, and order whole numbers through 999,999,999,999.

Verbs: use to represent, read, write, compare and order
Vocabulary: digit, value, position, place value, ones, tens, hundreds, thousands, ten thousand, hundred thousand, millions, ten million, hundred million, billions, ten billion, hundred billion
Guiding Questions: How do we read and write increasingly larger numbers? Where might we see increasingly larger numbers?
Materials Needed: Card Set A, B, C, \& D, Greater than/Less than Symbols
Math Tools: Transparency 2, Transparency of Card Set C, Transparency 3 (optional), Place Value Chart
Lesson:

1. Review vocabulary words for place value.
2. Review: We discussed using place value to represent whole numbers through the billions place. Review the patterns that are on the Place Value Chart. Ask the following questions: What patterns did we notice on the Place Value Chart (ones, tens, hundreds, repeat in each period)? How can these patterns help you remember the value of each digit on the Place Value Chart? How do we use place value to read and write whole numbers? How do we use place value to order and compare numbers?
3. As a warm-up activity, show the students Transparency 2, "the US Census". Have the students practice reading the numbers on the chart for the total amount of people in the United States based on the 2000 Census. Remember to NOT use the word "and" when reading whole numbers.

Today we will continue to practice reading and writing whole numbers. Our guiding questions are, "How do we read increasing larger numbers?" "Where might we see increasingly larger numbers?" Make sure to write this on the board or overhead so that students stay focused on the objective.
4. Pose the Problem: The United States Postal Service delivers about 212,000,000,000 pieces of mail each year. Write the number 212,000,000,000 on the board. Which digit is in the ten billions place? Give students time to turn and talk to their neighbor about the question. We will practice looking at large numbers to identify the value of the digit. Use Transparency 3 to practice if time permits (optional).
5. Guided Practice: Use the cards (Set C) to practice identifying the value of each digit with the group. Ask students to explain and justify their responses. (Make a transparency of Card Set C to use on the overhead.)
6. Divide the students into pairs. Now, you will practice reading numbers in standard form and then matching the numbers to its written form. Give each pair of students a set of cards (Sets A and B). Make sure that cards are cut before distribution. Have students work with partners to complete this activity. Students will practice reading numbers and then match them to their written forms.

## Listen for the following:

Are students reading the numbers correctly?
Does the student use the idea of place value to explain and justify his or her strategies and responses?

## Look for the following:

Are students matching the written form to the correct standard form?
Are students using the Place Value Chart as a math tool if they get confused?
Does the student demonstrate a good grasp of the number system and place value?
Can the student identify the different values of the different places in a number?
Have students use cards from Set $C$ and Set $D$ to write the numbers.
7. Extension: Use Card Sets C and D to have students practice using greater than / less than symbols to compare two or more numbers.

## People in the U.S. Census



Card Set A

125
125
125

019
019
019

|  |  |  |  |
| :---: | :---: | :---: | :---: |
|  | 542 | 542 | 542 |
|  |  |  |  |

One hundred twenty-five billion, nineteen million, five hundred fortytwo thousand, two hundred eightyone

One hundred twenty-five billion, five hundred forty-two million, two hundred eighty thousand, nineteen

One hundred twenty-five billion, five hundred forty-two million, nineteen

One hundred twenty-five billion, five hundred forty-two million, nineteen thousand, two hundred eighty-one

Card Set C
What is the value?
$125,019,542,281$

# Two hundred eighty-one billion, five hundred forty-two million, one hundred twenty-five thousand, nineteen 

Five hundred forty-two billion, two hundred eighty-one million, nineteen thousand, one hundred twenty-five

Nineteen billion, one hundred twentyfive million, five hundred forty-two thousand, two hundred eighty-one

Nineteen billion, one hundred twentyfive million, two hundred eighty-one thousand, five hundred forty-two

Transparency 3
TAKS Connection

1. Which digit is in the hundred thousands place in the number $4,281,132,107$ ?
(A) 6
(B) 3
(C) 2
(D) Not here
2. One million, six hundred ninety-eight thousand, nine hundred fifty-two people registered to vote for less taxes in Austin, Texas and the surrounding areas. Which of the following shows this amount written as a numeral?
(A) 1,698
(B) 100,698,952
(C) 1,698,952
(D) Not here

The student uses place value to represent whole numbers and decimals.
(B) The student is expected to use place value to read, write, compare, and order decimals through the thousandths place.

Verbs: use to represent, read, write, compare and order $\quad$ Vocabulary: digit, value, decimal, tenths, hundredths, thousandths, decimal point
Guiding Questions: What is a decimal? How do we read and write decimals? How do we order and compare decimals?
Materials Needed: Index Cards
Math Tool: Transparency 4, Transparency 5, Place Value Chart for Decimals
Lesson:

1. Review vocabulary words for Place Value.

Review:
We have learned how to read, write, order and compare whole numbers. What do you remember about place value using whole numbers through the billions place? Give students time to share their understanding. Today we will practice reading, and writing decimal numbers. These are the guiding questions: What is a decimal? How do we read and write decimals? Make sure to write these questions on the board or overhead and let students know that by the end of the lesson, they should be able to answer these questions. Where are some places that we might see numbers written as decimals? Make a list and post as an anchor for students to have as a referent chart. Have students talk about the difference between decimals and whole numbers.
2. Draw the two charts on the board or overhead. Give each student a decimal chart or have them draw one on their paper.

| Ten <br> Thousands | Thousand | Hundreds | Tens | Ones |
| :--- | :--- | :--- | :--- | :---: |
|  |  |  | 2 | 5 |

$\leftarrow$ Whole Numbers

Decimals $\rightarrow \quad$| Tens | Ones | $\bigcirc$ | Tenths | Hundredths | Thousandths |
| :--- | :--- | :---: | :---: | :---: | :---: |
| 2 | 5 | and | 1 | 2 |  |

What are the differences between the two charts? Point out the differences between the two charts. How do you read this number? Point to the 25. Is this a whole number or a decimal? How do you know?
3. Direct the students' attention to the decimal chart. Let students see that decimals are numbers less than 1 whole. Read each number to the right of the decimal point. Have students took at the pattern and read the words carefully: tenths, hundredths, and thousandths..

Decimals are separated from the whole numbers with a decimal point. Make sure to tell students that we say the whole number, the word "and" and then the decimal when reading numbers. This is how we say this number: 25 and 12 hundredths.
4. Pose the Problem: Put Transparency 4 on the overhead. Read the problem aloud. Have students practice reading and writing the decimal in words and numbers.
5. Guided Practice: Put Transparency 5 on the overhead. Tell the students that they will practice reading, writing, ordering and comparing numbers.

Have students choose 4 numbers from the list of decimals numbers. Give each student 4 index cards. Have the students write each decimal in words on one side of the index card and write the number on the opposite side. After students have finished, ask them to order the number from least to greatest.

## Listen for the following:

Does the student accurately read the decimal value to the thousandths?

## Look for the following:

Can the student write the decimal value to the thousandths?
Does the student demonstrate a good grasp of the number system?
Does the student successfully compare and order decimals to the thousandths?
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## Transparency 4

The chart below shows the rainfall amounts in the city of Round Rock for three consecutive days in December.

| Days | Rainfall Amounts |
| :---: | :---: |
| Monday | 2.69 inches of rain |
| Tuesday | .87 inches of rain |
|  |  |
| Wednesday | 1.49 inches of rain |
|  |  |

(A) Write the decimals on the chart

| Tens | Ones | $\bullet$ | Tenth | Hundredths | Thousandths |
| :---: | :---: | :---: | :---: | :---: | :---: |
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(B) Write the decimals in order from greatest to least

## Transparency 5

1. Choose 4 different numbers from the list below.
2. Write the number on one side of an index card and write the number in words on the opposite side of the index card.
3. Put the cards in order from least to greatest
413.02
20.023
83.012
101.31
110.35
0.54
693.62
73.285

TEKS: 5.1B
The student uses place value to represent whole numbers and decimals.
(B) The student is expected to use place value to read, write, compare, and order decimals through the thousandths place.

Verbs: use to represent, read, write, compare and order $\quad$ Vocabulary: digit, value, decimal, tenths, hundredths, thousandths, decimal point
Guiding Questions: What is a decimal? How do we read and write decimals? How do we order and compare decimals?
Materials Needed: Card Sets E and F, Greater than/Less than Symbols (Cut prior to lesson.)
Math Tool: Transparency 6, Place Value Chart for Decimals

Lesson:

1. Review vocabulary words for place value.
2. Pose the Problem: Use the TAKS Connection Transparency 6 as a Think Aloud for students to see how decimals could be tested on the TAKS test. Demonstrate what thinking aloud looks and sounds like. What is this question asking me to do? What are the text features of the table? What information do I already know, etc.?
3. Review:

We have learned how to read, write, order and compare decimal numbers. What is a decimal? What is important to remember about reading and writing decimals? How do we order and compare decimals? Give students time to share their understanding. We will continue to practice reading, writing, comparing and ordering decimal numbers. How do you read this number? 48.125 (Forty-eight and 125- thousandth.)

Today we will continue to practice reading and writing decimals. I will read a number in words and you will create the number using the digits. Make sure to listen to the sentence carefully.
4. (Activity 1)

Give each student a set of Number Cards. (Have cards cut before distribution) Practice with the students first.
Read the following sentences aloud while students practice displaying the decimals:
I filled my car and the gas pump read thirty-five and two-hundredths. Show me this number.
The boy was forty-nine and five-tenths inches tall. Show me this number.
It rained three and fifty-two-thousandths of an inch. Show me this number.
The odometer read three hundred six and seven-thousandths of a mile. Show me this number.
My microwave stopped at twenty-three and eight-tenths of a second when I heated my bread. Show me this number
The girl ran the 100 meter race in nine and fifteen hundredths of a second. Show me this number.
5. (Activity 2)

Have the students use Decimal Cards to practice comparing. Use the Greater than/Less than Symbols to compare two or more decimals.
6. Independent (Activity 3)

Have students work on activity cards for 5.1B
Listen for the following:
Does the student accurately read the decimal value to the thousandths?

## Look for the following:

Can the student write the decimal value to the thousandths?
Does the student demonstrate a good grasp of the number system?
Does the student successfully compare and order decimals to the thousandths?

Each year, the City of Springfield holds a Frog Jumping Contest. Three friends entered their frogs. The results are shown on the table below.

## Frog Jumping Contest

| Frog Owners | Distance Jump |
| :---: | :---: |
| Sarah | 265.18 cm |
| John | 280.4 cm |
| Gilbert | 298.7 cm |

Which of the following can best express the distance jumped in centimeters by Gilbert's frog?
(A) Two hundred ninety-eight and seven-tenths
(B) Two hundred ninety-eight and seven-hundredths
(C) Two hundred sixty-five and eighteen-hundredths
(D) Two thousand nine hundred eighty-seven

## Card Set E



Card Set F


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The student uses fractions in problem-solving situations
(D) The student is expected to use models to relate decimals to fractions that name tenths, hundredths, and thousandths..

| Verbs: use to models to relate | Vocabulary: digit, value, position, place value, digit, value, <br> decimal, tenths, hundredths, thousandths, decimal point, fraction, <br> decimal, relate |
| :--- | :--- |

Guiding Questions: How can you relate decimals to fractions? How can models be used to represent fractions and decimals?
Materials Needed: Base Ten Models, Blank Grids/Models of Tenths, Hundredths, and Thousandths, Index Cards
Math Tool: Transparency 7
Lesson:

1. Review vocabulary words for place value.
2. Pose the Problem: This is an ad for a Fifth Grade Class Fundraiser. Put Transparency 7 on the overhead. Let students know that money is a common use of decimals. Money is a very common use of decimals. The chart shows how money is read in cent notation and in dollar notation. How would we change the money in cents and dollar notation to decimal notation? Give students time to think about the question. Allow them time to share their understanding.

Have students come to the overhead and write the price of the candy bars in decimal notation on the chart (Transparency 7).

3. Review: Have students review what they know about decimals and fractions.

We have learned how to read, write, order and compare decimal numbers. We have also learned how to read, write, order and compare fractions. Today we will discuss how to relate decimals to fractions using models.
4. Post the guiding questions: How can you relate decimals to fractions? How can models be used to represent fractions that name tenths, hundredths, and thousandths?

Review Base Ten Blocks (tenths, hundredths, thousandths), Sample Grids and Fraction Models with students. On the board write ten and tenth and draw a model underneath each number.

Explain to the students that they are going to be demonstrating how to use models to relate to decimals and fractions. Allow students to select a grid or model. What grid or model do you want to use? Make sure a variety of grids and models is being used by the students. On the overhead, show the models for tenths, hundredths and thousandths. Demonstrate how to shade the model, and then write the fraction and decimal.
5. Have the students cut and glue the model to an index card. Instruct the students to shade an amount on their grid or model. Choose a model, glue it onto your index card, and shade an amount.

After shading, have the students record on the back of the index card the fraction and decimal representing their shaded model or grid. What is the bottom number called? Based on the grid, what number should go in the denominator? What amount did you shade? How would you write that number as a decimal? Have students read aloud the fraction and then read the decimal that is written on the back of the card. Example: 7/10, seven-tenths, 0.7.

Have students show each other the front of the card of their shared model. Other students will correctly identify the decimal and fraction of the card. After identifying the correct names of the decimal and fraction, then have students draw an equivalent representation using a different model. Let students practice creating new models, labeling the fraction and decimal names.
6. Activity: Laminate the cards and have students practice using the models to write the correct decimal and fraction that relates.

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Explore - Activity: Decimal Cards



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## Decimals Lesson

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Explore - Activity: Decimal Cards
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