

# Alabama Journal of Mathematics Activities

## Place Value: Whole and Decimal Numbers

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### Introduction

“Teaching mathematics is much like building a house: if we do not lay a strong foundation, innumerable difficulties will appear later” ([1] p. 10). Place value is a large part of the foundation in elementary mathematics instruction. The use of explicit activities and practice are the building blocks of understanding place value for children. The National Council of Teachers of Mathematics’ *Principles and Standards for School Mathematics* suggests that children in pre-K-2 should use many models to develop an initial understanding of place value [2]. Children in grades 3-5 should be able to understand the place value structure of the base-ten system when representing and comparing whole numbers and decimals. By the sixth grade, students should be able to compare and order decimals. To develop the understanding of place value, teachers should use a variety of activities in their instruction. Activities can range from concrete learning to the use of technology that reinforces the concepts of place value. The activities below can be used throughout the school year for continued practice of place value concepts. In addition to the activities, the websites listed below are helpful for reinforcing place value concepts:

- <http://education.jlab.org/placevalue/index.html>  
(Try to create largest number possible)
- <http://www.toonuniversity.com/flash.asp?err=503&engine=15>  
(Practice place value with number words and numerals)
- <http://www.dositey.com/addsub/Mystery10.htm>  
(Mystery Picture with Place Value)
- <http://www.quia.com/rr/32598.html>  
(Place Value Millionaire)
- <http://www.quia.com/cb/8142.html>  
(Decimal and Whole Number Jeopardy)
- <http://www.decimalsquares.com/dsGames/games/placevalue.html>  
(Decimal Place Value Strategy)
- <http://www.mrnussbaum.com/placevaluepirates1.htm>  
(Place Value Pirates- Numbers to the Thousandths Place)
- <http://www.teachingideas.co.uk/maths/contents08fracdecperatprop.htm>  
(Decimal lesson plans and activities)

#### **Place Value Activities: Whole Numbers**

**Activity 1** (Grades 1-3) *Roll ‘em High or Roll ‘em Low*

**Materials:** 2-4 dice and a recording sheet

- (1) The number of dice is dependent on how many places you are working with in place value. The recording sheet will correspond with the number of places as well.
- (2) The students play in pairs. If the students are playing roll ‘em high, the objective of the game is to create the largest number possible with the numbers they roll. The opposite is true for roll ‘em low.
- (3) The first student rolls all the dice at one time. Then he/she creates the largest number possible using the numbers from the dice and records it on his/her sheet. The second student does the same thing.
- (4) They compare and say the numbers aloud. A point is given to the student with the largest number.
- (5) Have the students play at least 10 times. The winner is the person with the most points.

**Activity 2** (Grades 1-2) *Spill, Group, Create***Materials:** Two-colored counters, a recording sheet

- (1) Each child has 9 counters. The red side of the counter is the tens and the white side of the counter is the ones.
- (2) In turn, students *spill* the counters. Then they *group* the red counters and the white counters. Last, they *create*, say, and record the number.
- (3) Example: if 5 reds and 4 whites spill, then the student says and records the number 54.

**Activity 3** (Grades K-3) *Go Fish***Materials:** Set of cards with the numbers 11-20 (4 of each number in the set); for Kindergarten students, have the children match numbers 1-20 and for 2<sup>nd</sup> or 3<sup>rd</sup> graders use larger numbers (up to 99). The key to this activity is to have the children practice the vocabulary of tens and ones.

- (1) Students are in a small group (2-3). Each child gets 4 cards. The remaining cards are placed face down in the middle of the table. The rules are the same as the regular Go Fish card game.
- (2) The first student asks another student for a card by stating the number in the tens and one places. For example: The student will ask if the other student has a card with a 1 in the tens place and a 4 in the ones place. If so, that student gives it to the student who asked. The student who made the pair lays on the desk face up. If the student is unable to make a pair then he/she is told to “go fish” for the top card from the remaining deck.
- (3) The other students, in turn, repeat this procedure until one student gets rid of all their cards. This student is the winner.

**Activity 4** (Grades 1-2) *Arrow Math***Materials:** hundreds board and counter (per student), arrow math cards for the teacher

The arrow cards are based on the following system:

one more:   →                   ten more:   ↓  
 one less:   ←                   ten less:   ↑

Sample Cards:

36 →
(37)

82 →↑
(73)

Using index cards, the teacher writes a starting number such as 36, 82, or 45. Then the arrows for the tens and/or ones are added. Several sets of cards can be made. The easiest set has just one arrow. The medium level includes two arrows. The hardest set includes several arrows.

- (1) Each student has a hundreds board and a counter. The arrow meanings are written on the board.
- (2) Give the students the starting number on the arrow card and have them put their counter on that number.
- (3) Then ask them what the arrow(s) on the card means. Have them move the counter to correspond to the arrow. As a group response, have the students indicate the new number. Ask: "How many tens in the new number? How many ones?"
- (4) Repeat with a new card.
- (5) Once the students know how to work with the arrow cards, they can work independently with the cards in small groups.

#### **Place Value Activities: Decimal Numbers**

##### **Activity 5** (Grades 4-6) *Read the Number*

**Materials:** Set of small digit cards 0-9, place value board (a sheet of paper lined into 8 equal sections, horizontally), and one M&M per student pair.

- (1) Students turn the sheet of paper to landscape position so lines on the paper become vertical.
- (2) Students place the digits 1-8, in order from left to right in the 8 sections. Then as a teacher-directed class response, the students say the number on the board (12,345,678).
- (3) Now the M&M is placed between the 7 and 8 (as the decimal point) and the number is read again as a class response (1,234,567.8). Continue moving the decimal one space to the left each time and reading the number aloud as a class.
- (4) Then have the students work in pairs, shuffle the cards, and deal the top 8 cards up on the board. Repeat the activity in pairs with the teacher monitoring the groups as they work.

##### **Activity 6** (Grades 4-6) *Make the Number*

**Materials:** teacher-made set of 10-20 word cards of numbers which include a decimal such as three-tenths, one and four-hundredths, six ten-thousandths, etc.; place value board from Activity 5; set of small digits 0-9 with at least six zero cards, M&M.

- (1) Students can work in pairs (or individually). The teacher will read the number on the word card. The students will make that number on the place value board. When all students have completed the task, they will read the number aloud as a group. The teacher then (randomly) asks for the place value name of each number.
- (2) This activity can be extended by replicating enough cards for the students to use in pairs as the teacher monitors the work.

**Activity 7** (Grades 4-6) *Create the Smallest Number*

**Materials:** place value board from Activity 5, M&M, small set of digits 0-9 (per student)

- (1) Students have their own set of materials and work in groups of 2. Each student shuffles own deck of 10 cards.
- (2) Then each student draws the top 3 cards. Using the M&M as the decimal, the 3 cards are arranged immediately after the M&M to create the smallest possible 3-digit decimal.
- (3) Each student reads his/her number aloud. The person with the smallest decimal number wins all of the cards for that round. However, if a student reads the number incorrectly, his/her cards are immediately given to the other player.
- (4) Play continues for the next round with 3 cards and the last round with 4 cards. The winner is the person with the most cards at the end of the 3 rounds.

**Activity 8** (Grades 4-6) *Create the Smallest Number and Largest Number*

**Materials:** Place value board from Activity 5, M&M, small set of digits 0-9, a sheet of paper with 2 columns: Smallest Number and Largest Number

- (1) Students have their own set of materials and work in groups of 2-4. Each student shuffles their own deck of 10 cards.
- (2) Then each student draws the top 5 cards. The decimal is placed at the left of the board. The student then arranges the 5 cards to form the smallest possible decimal number. That number is written on the sheet of paper under the Smallest Number column. Then the student rearranges the 5 digits to form the largest possible decimal number (decimal point still in the same place). That number is written in the Largest Number column.

- (3) Students read and compare their smallest numbers. The person with the smallest number circles that number on his/her sheet. Then students read and compare their largest number. The person with the largest decimal number circles the number on his/her sheet. However, if a player reads the number incorrectly, he/she cannot circle the number on their sheet.
- (4) Those 5 cards are discarded and the remaining 5 cards are used. Same procedure is followed. Then cards are reshuffled and play continues for a total of 6-10 rounds.
- (5) The winner is the person with the most circled numbers.

### References

- [1] Gluck. D. S. (1991). Helping students understand place value. *The Arithmetic Teacher*, 38(7), 10-13.
- [2] National Council of Teachers of Mathematics (2000). *Principles and Standards for School Mathematics*, Reston, VA: Author.

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