

LessonTitle: Decimal Sense		Pre 0.8
Utah State Core Standard and Indicators Pre-Algebra Standards 1, 3.1 Process Standards 1-5		
Summary		
We have traditionally placed much emphasis on computation with decimals. If we place more emphasis on “what makes sense,” we will help student understanding significantly. The activities below help students gain a sense for the size of decimals, arrive at estimates and explain why the estimates are reasonable. Activities below are adapted from <u>Developing Number Sense in the Middle Grades</u> from NCTM.		
Enduring Understanding	Essential Questions	
Decimals are everywhere in our world. Estimation using decimals is very valuable in this world. Learning to estimate with decimal values also improves understanding of decimals.	What are the sizes of decimal values? How does the decimal system work in our world?	
Skill Focus	Vocabulary Focus	
Estimating with decimal numbers.		
Assessment		
Materials: Base 10 blocks, Metric Measurement tools, Money, Worksheets and game-boards below.		
Launch		
Explore		
<ul style="list-style-type: none"> • What are the sizes of decimal numbers? • How do you use benchmarks to help you estimate using decimals? • How can you compare metric measurement, base-10 blocks, money and our decimal system? 		
Summarize		
Apply		

I. Decimals in the News: Look for articles in which decimals are used. Choose one to present to the class. In your presentation, explain the meaning of the decimals.

II. Write a number between 3.76 and 3.77. Each group receives a long strip of paper. They write a number between 3.76 and 3.77, filling up the strip of paper. Then, as an entire class, they must order the group numbers from small to large.

III. Metric Measurement, Cubes and Money

1) Measure the dimensions of your box and record them on the table below. Begin with centimeters. Use the patterns in the numbers to figure out the measurements for which you do not have a measuring tool.

2) Write about the patterns found in metric measurement. What makes this measurement easy? What makes it difficult?

	Length	Width	Height
Millimeters			
Centimeters			
Decimeters			
Meters			
Decameters			
Hectometers			
Kilometers			

3) Use the meter stick, the blocks, and money to help you explain how decimals are like fractions?

IV. The Place Value Game: The object of this game is to make a specified size number (see below). Players agree before play begins which object they will play for. Players take turns rolling a dice or spinning a 0-9 spinner. Each player makes their own game board (see below). Each time a number comes up, every player writes it in one space on his or her game board. Once written, the number cannot be moved. The winner has the largest (or smallest) number and must be able to read it.

- The greatest number,
- The smallest Number,
- The number nearest to 0.5,
- The number nearest to 20,
- The smallest number that is greater than 20.
- The smallest number that is greater than 0.05.
- The greatest number that is less than 5,
- The greatest number that is less than 80.
- You choose

_____._____._____._____._____._____. (this game board may also be altered)

Individual Assessment:

Some digits in this decimal number are hidden. ____0.____9

- Name the number if it is the largest number possible and has no two digits alike.
____0.____9
- Name the number if it is the smallest number possible and has no two digits alike.
____0.____9
- Name the number if it is between 30 and 40. ____0.____9
- Name the number if it is about 40 and ½. ____0.____9

V. In Order of Magnitude

a) Arrange each set of numbers below from smallest to greatest.

4/3 1 and ¼ 1.2 3/7 .37 4/9

4 and 2/9 4.3 9/2 2.7 11/4 2 and 2/3

b) Arrange the entire set of numbers from smallest to largest.

VI. Estimating with Decimals

a) **Approximate answers.** Do not calculate! Use your knowledge of multiplying and dividing with fractions to decide upon an approximate answer. Describe the answer using phrases like “more than ____,” or “less than ____” or about half of ____, etc.

1) 127×0.76

2) 9.5×0.98

3) 35.2×1.02

4) $12 \div 0.5$

5) $274 \div 0.61$

6) 73.5×1.2

b) Four-Decimals-in-a Row GAME

One member of the class or group works the calculator. The rest of the class or group is divided into two teams. Using the grid and the factor boards below, each team chooses two factors, one from the circular factor board and one from the square factor board. If the product of those numbers is displayed on the grid, the team captures that cell. The first team to capture four cells in a row (vertically, horizontally, or diagonally) is the winning team.

46	98
123	5

1.1
0.9
1.8
0.49

221.4	88.2	82.8	110.7
107.8	9	60.27	135.3
2.45	176.4	41.4	48.02
4.5	50.6	5.5	22.54

c) **Placing Decimals.** Estimate the solution in order to place the decimal correctly.

1) $7.836 \times 4.92 = 3855312$

2) $534.6 \times 0.545 = 291357$

3) $5.03 \times 17.6 = 88528$

4) $49.05 \times 6.044 = 2964582$

5) $4.436 \times 0.49 \times 29.5 = 6412238$

6) $68.64 \div 4.4 = 156$

7) $400.14 \div 85.5 = 468$

8) $.735 \div 0.7 = 105$

9) $51.1875 \div 1.05 = 4875$

10) $3.773 \div 0.98 = 385$

d) **Less than, Equal, Greater Than:** Use estimation to place the correct symbol in the boxes below.

1) 349×1.2 349

2) 765×0.9 765

3) 98×2.01 196

4) $36 \times 1/2$ 36

5) $45 \times .5$ 45

6) $1/4 \times 5/8$ $5/8$

7) $1/4 \times 5/8$ $1/4$

8) $.25 \times .75$ $.75$

9) $.25 \times .75$ $.25$

10) $.25 \times .25$ $.25$

11) What happens when you multiply a whole number by a decimal number close to 0 such as .03?

12) What happens when you multiply a whole number by a decimal number close to 1/2?

13) What happens when you multiply a whole number by a decimal number close to 1 such as .98?

e) **Finding Equivalence:** Use your reasoning to find and circle the expressions which would have the equivalent solution as 15.6×23 .

156×2.3

13.6×25

$156 \times 2 \times .3$

78×4.6

$2 \times 39 \times 4.6$

7.8×46

31.2×11.5

$7.8 \times 4 \times 11.5$