



Fractions, Decimals, and Percentages

Activity Set 12

Trainer Guide

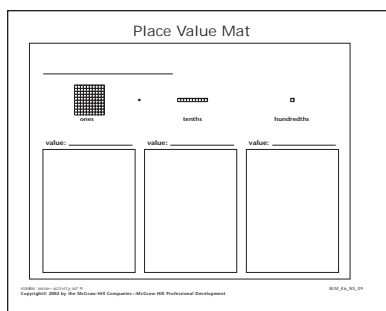
FRACTIONS, DECIMALS, AND PERCENTAGES

ACTIVITY SET #12

INTRODUCE

- Ask participants to identify places where they use decimals on a daily basis. Sample answers include:
 - ◆ shopping or balancing a checkbook
 - ◆ reading the newspaper (1.5 million people attend an event)
 - ◆ measurement and conversions (1.89 liters in a half-gallon of juice)
- Suggest to participants that there are several models that students can use to demonstrate their understanding of decimals.
- Mention that using different models allows students to find one that best fits their learning styles.
- Tell participants that they will practice representing decimals by using some of these models.

DISCUSS AND DO



Transparency: Place Value Mat

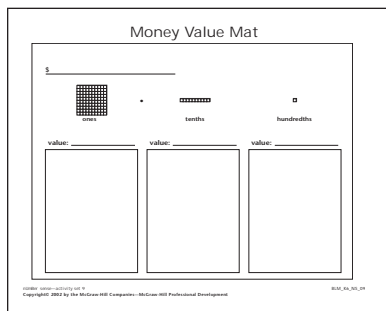
- Display *Transparency: Place Value Mat* and distribute the matching pages to participants.
- Point out the value of each base-10 block on the mat. (Flats equal ones, rods equal tenths, and unit cubes equal hundredths.)

TEACHING TIP: Mention to participants that for this activity, we will use these constant values for the base-10 blocks. Remind them that different values can be assigned to the base-10 blocks depending on lesson content. The important thing to remember is that whatever values are assigned to the pieces, each column is worth 10 times the value of the column to its right.

FRACTIONS, DECIMALS, AND PERCENTAGES

ACTIVITY SET #12

- Write “4.13” on the mat and use overhead base-10 blocks to model the decimal 4.13. (Show 4 flats in the ones box, 1 rod in the tenths box, and 3 units in the hundredths box.)
- Ask participants how they would read this decimal. (four and thirteen hundredths)
- Exchange 10 unit cubes for the rod and place them in the hundredths box.
- Explain to participants that this representation models the correct language for this decimal. Suggest that students might find it easier to make this connection if they see the exchange for themselves.



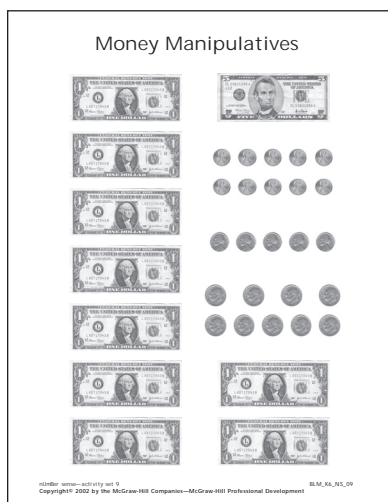
Transparency: Money Value Mat

- Display *Transparency: Money Value Mat* and distribute the matching pages to participants.
- Suggest that money is the decimal representation that students will probably encounter most often.
- Write “\$4.13” on the mat.
- Ask participants why money representations are different from those using base-10 blocks. (Coins go up by values of 5, 10, and 25.)
- Point out that pennies and dimes can be seen as clearly representative of base-10 concepts but that nickels and quarters are not seen that way. Teachers need to ensure that students understand that nickels have the same value as 5 pennies and that quarters have the same value as 2 dimes and 5 pennies.
- Model the money value \$4.13 on the mat by using cutouts from *Transparency: Money Manipulatives*. (Show 4 one-dollar bills in the ones box, 1 dime in the tenths box, and 3 pennies in the hundredths box.)
- Ask participants how they would read this money amount. (Four dollars and thirteen cents.)

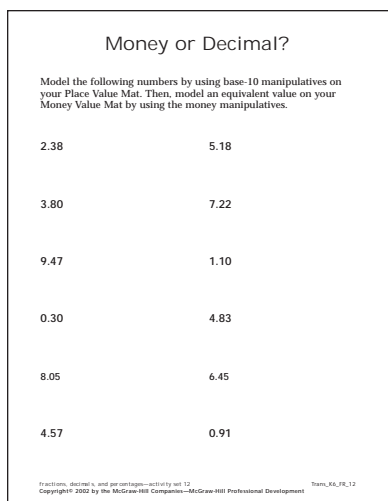
FRACTIONS, DECIMALS, AND PERCENTAGES

ACTIVITY SET #12

- Have participants identify how this is different from reading the decimal value. (Money does not include place value labels. Students must know what the numbers represent.)
- Ask participants where to place a nickel on the mat. (hundredths box; a nickel is the same as 5 pennies)
- Point out that when students are used to working with base-10 concepts with each column having a value of ten times the column to its right, working with nickels and quarters may be confusing.
- Suggest that participants remind students that nickels have the same value as 5 pennies and that quarters have the same value as 2 dimes and 5 pennies.
- Explain that you have just shown participants how to model 4.13 as a decimal and as a money amount and that they will now do the same thing using their mat pages and money manipulatives.
- Have participants move into groups of two and give each group a pair of scissors and a set of base-10 blocks.
- Distribute the *Money Manipulatives* pages.
- Ask participants to cut out the bills and coins on their pages.
- Remind participants that many textbooks and class manipulative sets include money manipulatives.
- Display *Transparency: Money or Decimal?* and distribute the matching pages to participants.
- Assign each group one problem to model on both the Place Value Mat and the Money Mat.



Transparency: Money Manipulatives



Transparency: Money or Decimal

FRACTIONS, DECIMALS, AND PERCENTAGES

ACTIVITY SET #12

Money or Decimal?
Answer Key

Model the following numbers by using base-10 manipulatives on your Place Value Mat. Then, model an equivalent value on your Money Value Mat by using the money manipulatives. Note that these are not the only possible answers.

| | |
|--|--|
| <p>2.38 base-10: 2 flats, 3 rods, 8 units money: 2 one-dollar bills, 3 dimes, 3 pennies</p> | <p>5.18 base-10: 5 flats, 1 rod, 8 units money: 1 five-dollar bill, 1 dime, 1 nickel, 3 pennies</p> |
| <p>3.80 base-10: 3 flats, 8 rods money: 3 one-dollar bills, 8 dimes</p> | <p>7.22 base-10: 7 flats, 2 rods, 2 units money: 1 five-dollar bill, 2 one-dollar bills, 2 dimes, 2 pennies</p> |
| <p>9.47 base-10: 9 flats, 4 rods, 7 units money: 1 five-dollar bill, 4 one-dollar bills, 4 dimes, 1 nickel, 2 pennies</p> | <p>1.10 base-10: 1 flat, 1 rod money: 1 one-dollar bill, 1 dime</p> |
| <p>0.30 base-10: 3 rods money: 3 dimes</p> | <p>4.83 base-10: 4 flats, 8 rods, 3 units money: 4 one-dollar bills, 8 dimes, 3 pennies</p> |
| <p>8.05 base-10: 8 flats, 5 units money: 1 five-dollar bill, 3 one-dollar bills, 1 nickel</p> | <p>6.45 base-10: 6 flats, 4 rods, 5 units money: 1 five-dollar bill, 1 one-dollar bill, 4 dimes, 1 nickel</p> |
| <p>4.57 base-10: 4 flats, 5 rods, 7 units money: 4 one-dollar bills, 5 dimes, 1 nickel, 2 pennies</p> | <p>0.91 base-10: 9 rods, 1 unit money: 9 dimes, 1 penny</p> |

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Transparency: Money or Decimal?
Answer Key

- Tell participants that they may use any combination of bills and coins that correctly matches the money amount.
- Get participants' attention and ask 1 participant from each group to model his or her answers on the overhead.

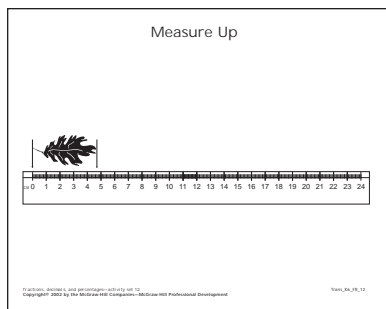
TEACHING TIP: There are multiple correct answers for these models. *Transparency: Money or Decimal? Answer Key* includes descriptions of one possible representation for each problem. If time permits, use only participant answers. This answer key is provided for trainer use only.

- Ask participants to suggest other money representations for each answer.
- Have participants identify coins that were more difficult to use in this mat. (quarters; they included tenths and hundredths)

TEACHING TIP: Mention to participants that they should place quarters in the hundredths place because it is appropriate to say that there are "twenty-five hundredths" while it is not correct to say that there are "twenty-five tenths." Use this opportunity to discuss the reason for this. (Twenty-five tenths equals two and five-tenths.)

FRACTIONS, DECIMALS, AND PERCENTAGES

ACTIVITY SET #12



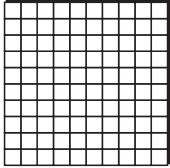


Transparency: Measure Up

CONCLUDE

- Suggest that measurement is another decimal model that students need to know how to use.
- Display *Transparency: Measure Up* and distribute the matching pages to participants.
- Ask participants to identify the units of measurement on the ruler. (metric, centimeters)
- Have participants give a decimal length for the leaf. (4.7 cm)
- Mention that this type of decimal model helps students gain an understanding of the relative value of decimals. (4.7 is greater than 4 and less than 5)
- Have participants give other examples of decimal modeling that they can use in their classes:
 - ◆ circle graphs divided into tenths
 - ◆ rectangular grids
 - ◆ numeric counters (countdown clock on a computer)
- Suggest that the models that participants used today can be modified for the various student levels by limiting the number of manipulatives that students may use or by changing the values of the numbers.

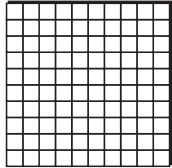
End of Deci-Models

Place Value Mat

| | | |
|--|---------------------|--|
|  ones | \cdot |  tenths |
| | |  hundredths |
| value: _____ | value: _____ | value: _____ |
| | | |

Money Value Mat

\$ _____



ones

.



tenths



hundredths

value: _____

value: _____

value: _____

Money Manipulatives



Money or Decimal?

Model the following numbers by using base-10 manipulatives on your Place Value Mat. Then, model an equivalent value on your Money Value Mat by using the money manipulatives.

2.38

5.18

3.80

7.22

9.47

1.10

0.30

4.83

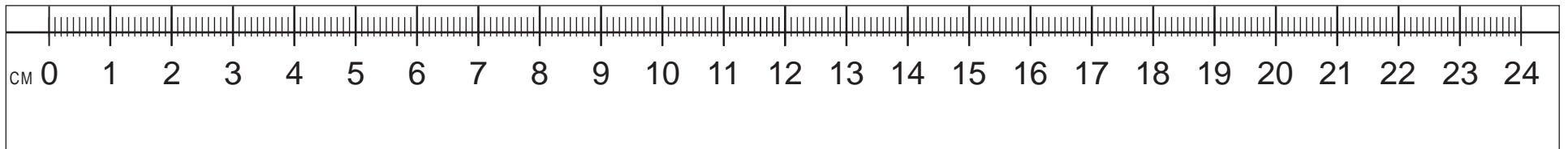
8.05

6.45

4.57

0.91

Measure Up



Glossary

Fractions, Decimals, and Percentages

| | |
|------------------------------|---|
| common denominator | A common multiple of the denominators of 2 or more fractions (e.g., 20 is a common denominator of the fractions $\frac{1}{2}$ and $\frac{1}{10}$). |
| common factor | A number that divides evenly into 2 or more numbers (e.g., 4 is a factor of both 8 and 12). |
| decimal number | A number with a decimal point. Decimal numbers can be used to express fractional values (e.g., tenths, hundredths, and thousandths). |
| denominator | The bottom number of a fraction; the number of equal-sized parts into which the whole is divided. |
| equivalent fractions | Fractions with the same value but different forms (e.g., $\frac{1}{2}$ and $\frac{2}{4}$). |
| fraction | A number that can be expressed in the form of $\frac{a}{b}$, where a and b are whole numbers and $b \neq 0$. |
| fraction area model | A fractional number shown as part of an area. |
| fraction linear model | A fractional number shown as part of a line. |
| fraction set model | A fractional number shown as a part of a group. |

Glossary (Continued)

| | |
|---------------------------------------|---|
| improper fraction | A fraction that is equal to or greater than 1 (e.g., $\frac{4}{4}$ or $\frac{6}{5}$). |
| least common multiple | The least number that is a common multiple of 2 or more numbers. |
| mixed number | A number expressed as a whole number and a fraction (e.g., $2\frac{1}{2}$). |
| Multiplicative Property of One | Also known as Multiplicative Identity Property; multiplying any number by 1 does not change the value of the number (e.g., $1 \cdot 12 = 12$). |
| numerator | The top number of a fraction; the number of parts being used. |
| percent | The ratio of a number to 100; percent means “per hundred.” |
| percentage | A part of a whole expressed in hundredths. |