

Misconceptions in Comparing Decimals

The following list describes some of the misconceptions or difficulties children can develop about comparing decimal numbers. The list is based on the work of mathematics education researcher Kaye Stacey, who has gathered data on thousands of children in Australia.

Longer is larger Children with this misconception seem to treat the portion of the number to the right of the decimal point as a whole number, thus thinking that $2.352 > 2.1$ because $352 > 1$.

Longer is larger with exceptions This misconception is the same as the previous one except in the case of intervening zeros, so that children with this misconception correctly identify that $3.6 > 3.07$.

Shorter is larger Children with this misconception think that fewer digits to the right of a decimal point always makes a decimal larger. For example, they would think that $6.31 > 6.482$. These children reason that any number of tenths is greater than any number of hundredths and that any number of hundredths is greater than any number of thousandths, and so on.

Reciprocal or negative reasoning Children with this misconception also think that fewer digits to the right of a decimal point always makes a decimal larger but they use “reciprocal reasoning” or “negative reasoning”, thinking, for example, that $0.2 > 0.3$ because $\frac{1}{2} > \frac{1}{3}$ or because $-2 > -3$, since $2 < 3$.

Reversal Children with this misconception “correctly” order decimals but then reverse their answers, so that all their answers become incorrect. These children may view decimals as less than zero.

Experts to the hundredths Children with this difficulty correctly order decimals as long as there are no entries below the hundredths. They may reason by thinking about money. They are unsure what to do when there are entries in the thousandths place or below, for example, they may not know how to compare 3.64 and 3.6402.

Put the following set of decimal numbers in order from least to greatest. Then show how children with the misconceptions described above might put the numbers in order.

3.62 3.4102 3.41 3.401 3.4 3.3

Correct order (least to greatest):	
Longer is larger misconception:	
Longer is larger with exceptions:	
Shorter is larger:	
Reciprocal or negative reasoning:	
Reversal:	
Experts to the hundredths:	