

## Just in Time Quick Check

### Standard of Learning 4.CE.4

#### **Strand:** Computation and Estimation

#### **Standard of Learning 4.CE.4**

The student will estimate, represent, solve, and justify solutions to single-step and multistep problems, including those in context, using addition and subtraction of decimals through the thousandths, with and without models.

*Students will demonstrate the following Knowledge and Skills:*

- a) Apply strategies (e.g., rounding to the nearest whole number, using compatible numbers) and algorithms, including the standard algorithm, to estimate and determine the sum or difference of two decimals through the thousandths, with and without models, in which:
  - i) decimals do not exceed the thousandths; and
  - ii) addends, subtrahends, and minuends are limited to four digits.
- b) Estimate, represent, solve, and justify solutions to single-step and multistep contextual problems using addition and subtraction of decimals through the thousandths.

**\* On the state assessment, items measuring this objective are assessed without the use of a calculator.**

#### Just in Time Quick Check

#### Just in Time Quick Check Teacher Notes

**Supporting and Prerequisite SOL:** 4.NS.4, 4.NS.5, 3.NS.4

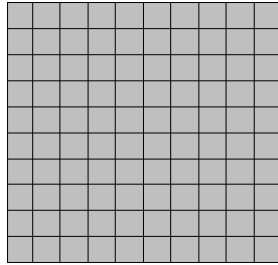
**Just in Time Quick Check 4.CE.4**

1. What is the difference between 12 and 2.803?

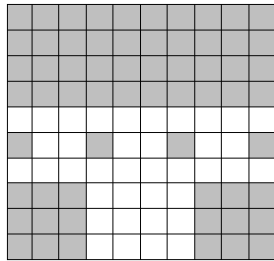
2. Solve the problem shown.

$$5.045 + 18.9$$

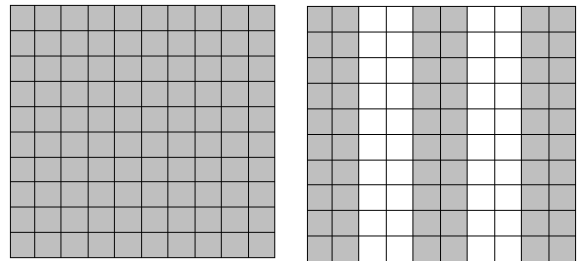
3. This model is shaded to represent one whole.



Model 1 and Model 2 are shaded to represent a decimal.



Model 1



Model 2

What is the sum of Model 1 and Model 2?

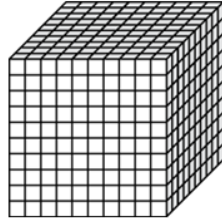
4. A teacher asked three students to estimate the sum of this problem.

$$13.98 + 7.3$$

- Student A stated that the estimated sum was 15.
- Student B stated that the estimated sum was 21.
- Student C stated that the estimated sum was 84.

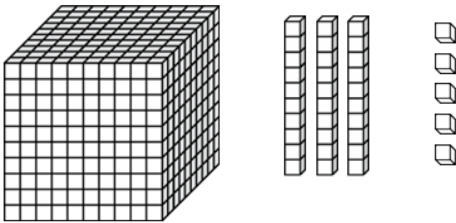
Explain which student has the best estimate and why.

5. This model represents one whole.

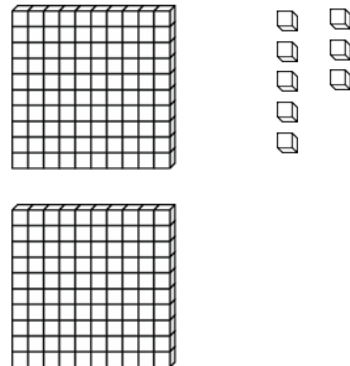


What is the difference between Model 1 and Model 2?

Model 1



Model 2



6. Twin brothers went to the doctors for a checkup. One of the twin brothers, Kevin, weighed 83.42 pounds. If Kevin weighed 4.7 pounds more than his twin brother, how many pounds did his twin brother weigh?

7. A family went out to dinner and to the movies. They spent \$75.98 on dinner and \$56.73 at the movies. About how much money did the family spend on dinner and the movies?

8. This table shows the results of the top three swimmers that competed in the same race. The results show the swimmers' final time in seconds.

Swim Race Results

Results	Time in Seconds
First	25.839
Second	26.07
Third	26.245

What is the difference, in seconds, between the swimmer who finished first and the swimmer who finished second?

9. Ryan purchased \$34.65 in groceries at the store. He paid for his groceries with a \$50 dollar bill. The cashier gave him \$24.65 in change. Did the cashier give Ryan the correct amount of change? Justify your reasoning.

10. The total cost of Mike's water, gas and electric bills for the month of April was \$261.20. Mike's gas bill was \$58.45, and his electric bill was \$106.50. What was the cost of Mike's water bill?

## 4.CE.4 Just in Time Quick Check Teacher Notes

### Common Errors/Misconceptions and their Possible Indications

1. What is the difference between 12 and 2.803?

*A common misconception when subtracting a decimal from a whole number is not understanding the location of the decimal point in a whole number. Some students may place the decimal point before the whole number creating the number 0.12, while other students may place the decimal point in any location, thereby still changing the value of the number. Models will be beneficial to help students apply the concept of decimal number sense when adding or subtracting numbers.*

*A common error some students may make when subtracting numbers that have different numbers of digits is to line up the numbers incorrectly. In this problem, students who do not line up the decimal points may try to invert the numbers and subtract 12 from 2.803. Students who make this error may state that the difference is 2.791. It may be beneficial for students to line up the decimal point or add zeros to help with place value. This strategy can be useful for some students, but it is important for students to understand the basis of the algorithm and make sense of adding and subtracting digits of like place values.*

*Another common misconception is understanding how to subtract with regrouping. When solving this problem, some students will incorrectly subtract  $12.000 - 2.803$ , resulting in a difference of 10.803. These students would benefit from the use of models such as base ten blocks. When modeling with base ten blocks it is always important for students to identify the whole. Using manipulatives, along with place value mats, may be helpful when modeling this problem. Students should also explore pictorial representations such as decimal grids and number lines when solving computation problems.*

*When adding or subtracting with decimals, students should also estimate prior to solving the problem to check for the reasonableness of their answers. When estimating this problem, students should identify that the decimal 2.803 is close to 3, therefore the difference should be around 9.*

2. Solve the problem shown.

$$5.045 + 18.9$$

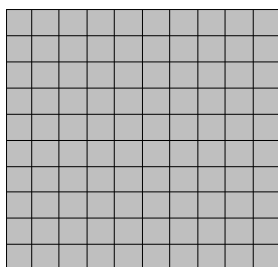
*A common error for some students when solving the problem using the standard algorithm is to line the numbers up with a right alignment and disregard the decimal point. An example of this error is shown.*

$$\begin{array}{r} 5.045 \\ + 18.9 \\ \hline \end{array}$$

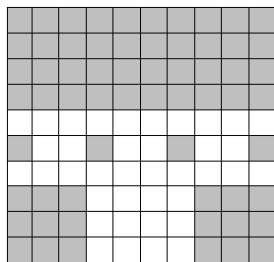
*These students are adding different place values together, obtaining a sum of 5.234, and their answer is not reasonable. These students would benefit from modeling using base 10 blocks. Modeling will provide students with a visual of the related place values of each number, and the importance of combining like place values (e.g., adding tenths with tenths, adding hundredths with hundredths). Using a place value chart is another strategy to assist students in understanding the value of each digit and the significance of the decimal location.*

*Prior to finding the sum, it is important for students to apply estimation strategies. When estimating this problem, 5.045 is close to 5 and 18.9 is close to 19, therefore the sum is around 24. When estimating the sum, students can use their estimation to check for the reasonableness of their answers. It is important for students to explore a variety of different representations to develop a conceptual understanding of decimal computation prior to solving problems procedurally.*

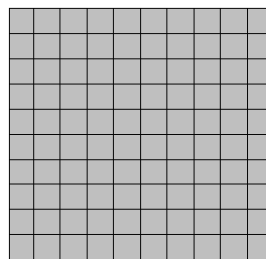
3. This model is shaded to represent one whole.



Model 1 and Model 2 are shaded to represent a decimal.



Model 1



Model 2

What is the sum of Model 1 and Model 2?

*A common misconception when adding or subtracting decimals with pictorial representations is being able to identify the whole. Many students had experience using base ten blocks with whole numbers, where a cube represented 1,000, a flat represented 100, a rod represented 10, and a unit represented 1. Because of this, some students have difficulty shifting their understanding such that the base ten model of the 10 x 10 grid (also known as a flat) represents one whole; therefore, one rod represents one tenth and one unit represents one hundredth. In this problem, Model 1 represents a decimal that is less than a whole, and Model 2 represents a decimal that is greater than a whole.*

*When identifying the sum of these two models, students should first identify the value of each model. Students who transfer their whole number thinking may believe that the value of the flat is 100, and state that Model 1 is 62 instead of 0.62, and that Model 2 is 160 instead of 1.6.*

*Provide students with opportunities to arrange flats, rods, and units to create decimal numbers in a place value chart based on a teacher-defined whole. It is important for students to also explore a variety of problems with pictorial representations where the whole changes.*

*Presenting various representations, and changing the whole, will allow students to develop a deeper understanding of the concept of decimals.*

4. A teacher asked three students to estimate the sum of this problem.

$$13.98 + 7.3$$

- Student A stated that the estimated sum was 15.
- Student B stated that the estimated sum was 17.
- Student C stated that the estimated sum was 21.

Explain which student has the best estimate and why.

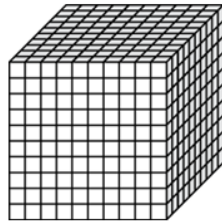
*There are several different strategies that students can apply when estimating sums or differences. It is important for students to apply a strategy that would provide a reasonable estimate when solving problems. If students state that Student A has the best estimate, this may indicate that students tried to solve the problem by lining up the numbers with a right alignment and disregarding the decimal point. An example of this error is shown below.*

$$\begin{array}{r} 13.98 \\ + \quad 7.3 \\ \hline 14.71 \end{array}$$

*In this case, students most likely rounded 14.71 to 15. In addition to needing additional support using models to identify the value of each digit, students may need more experience of estimating decimal computation problems. Rounding the exact answer is not the same as estimating before solving to determine reasonableness.*

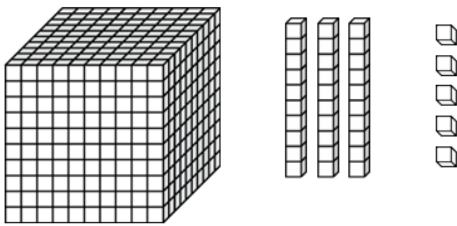
*If students selected Student B as having the best estimate, this may indicate that students rounded 13.98 to 10 and 7.3 to 7, then added  $10 + 7$  to get an estimated sum of 17. It is important for students to be encouraged to determine the best estimate by applying number sense strategies when estimating. In this case, it would be more appropriate to round to the nearest whole number. Using rods and units to build each number will help students understand why it would be more appropriate to round to the nearest whole number.*

5. This model represents one whole.

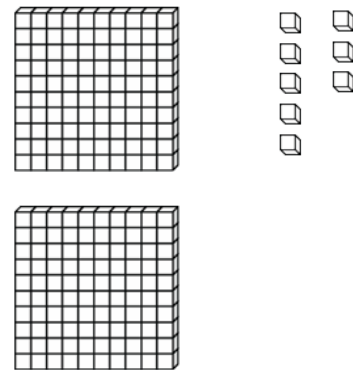


What is the difference between Model 1 and Model 2?

Model 1

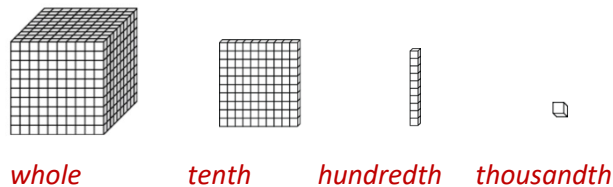


Model 2



*When adding or subtracting decimals with pictorial representations, some students may struggle to identify the whole. In the given problem, the whole is represented by a cube. When identifying the other base ten models that represent each place value, students need to focus on decimal number sense and the relationship between each place value. It is important for students to understand that one tenth is always one-tenth of the whole, one hundredth is one-hundredth of the whole, and so on. The place value chart below shows the corresponding base ten blocks when the cube is modeled as one whole.*

*Base Ten Block Model Representations*



*It is important to look at students' work to identify their decimal for each model. For Model 1, some students may assume that the rods represent the tenths place value creating 1.35 instead of the decimal 1.035. Students may also apply whole number thinking to the base blocks and believe that Model 1 represents the number 1,035. The same is true for Model 2; some students may assume that the unit represents the hundredths place, creating the number 0.28 (or 208 if they apply whole number thinking) instead of the decimal 0.208. If students are unable to identify the place value representation of each model, then the students will be unable to find*

*the difference between the models. Providing students with opportunities to model decimals given different representations of the whole will help them develop a greater understanding of decimal place values.*

6. Twin brothers went to the doctors for a checkup. One of the twin brothers, Kevin, weighed 83.42 pounds. If Kevin weighed 4.7 pounds more than his twin brother, how many pounds did his twin brother weigh?

*A common misconception for some students is not understanding the context of the problem and how to approach the problem to solve it. It is important for students to be exposed to variety of problem types. When they see the word “more,” some students may incorrectly assume this means addition, and may add the two numbers together instead of subtracting to find the weight of the twin brother. When solving contextual problems, students should focus on thinking and reasoning rather than on key words. Using models and visual representations are useful when understanding contextual problems. Students would benefit from exposure to a variety of different problem types as well as the opportunities to create and solve their own practical problems.*

7. A family went out to dinner and to the movies. They spent \$75.98 on dinner and \$56.73 at the movies. About how much money did the family spend on dinner and the movies?

*A common misconception for students is assuming that estimating requires finding an exact solution and then rounding that answer. Students should be encouraged to use estimation skills, such as creating friendly numbers, prior to solving the problem. For example, some students may use the friendly numbers  $\$75 + \$50 = \$125$  to estimate. Other students may use  $\$80 + \$60 = \$140$ . It may be helpful for students to hear the estimation strategies of their classmates and engage in discussions about which estimation strategies will produce estimates that are closer to the exact answer. Additionally, if students did not use estimation strategies and immediately tried to solve the problem procedurally, then students would benefit from exploring a variety of problems to understand the purpose of estimation. Estimation is valuable when solving problems to determine the reasonableness of an answer.*

8. This table shows the results of the top three swimmers that competed in the same race. The results show the swimmers’ final time in seconds.

Swim Race Results

Results	Time in Seconds
First	25.839
Second	26.07
Third	26.245

What is the difference, in seconds, between the swimmers who finished first and the swimmer who finished second?

*A common difficulty for some students when solving problems with a table is being able to determine the information needed to solve the problem. When solving problems with time, some students are unable to understand that the least amount time it takes to complete a race means that the*

individual finished the race sooner. Some students assume that the larger the quantity the better the result.

When finding the difference between first and second place, a common error is to subtract  $25.839 - 26.07$ . Since Grade 4 students do not have experience with negative numbers, they will think this is impossible, or they may subtract the decimal portion and then the whole numbers, obtaining an incorrect answer of 1.769. Using models, such as number lines, to show that the distance between the two race times is the difference between the numbers may be helpful for some students. In addition, modeling using concrete materials will help students recognize place values. When students explore a variety of problem types and different strategies, they will develop a greater understanding of decimals. Using estimation to determine the reasonableness of answers would also benefit students. For example, students may recognize that 25.839 is close to 26 and 26.07 is close to 26, so the difference in the swimmers' times is going to be less than one whole.

9. Ryan purchased \$34.65 in groceries at the store. He paid for his groceries with a \$50-dollar bill. The cashier gave him \$24.65 in change. Did the cashier give Ryan the correct amount of change? Explain why or why not.

When given a word problem it is important for students to understand what to do with information provided and to make sense of the given information. In the given problem, students may use several strategies to determine the correct amount of change. Some students could apply an estimation strategy such as recognizing \$34.65 is close to \$35, therefore the best estimate of change is around \$15. Other students may add the two parts to find the whole. When adding \$34.65 and \$24.65, students may discover that the sum is more than \$50; therefore, the amount of change is incorrect. Another strategy could be to subtract \$50.00 and \$34.65 to determine the change, or to start at \$34.65 and count up to \$50. If students get a difference of \$24.65 and agree that Ryan did receive the correct amount of change, then these students would benefit from additional support with models. Using money to model the problem or base ten blocks are a few examples of manipulatives that could support students' learning.

It is important to identify the strategy the students used to determine whether \$24.65 is the correct amount of change. Students sharing strategies and justifying their answers is important in developing a greater understanding of mathematics.

10. The total cost of Mike's water, gas and electric bills for the month of April was \$261.20. Mike's gas bill was \$58.45 and his electric bill was \$106.50. What was the cost of Mike's water bill?

Some students may see "total" as a key word, and add \$261.20, \$58.45, and \$106.50 to obtain an incorrect answer of \$426.15. Students should be encouraged to think and reason rather than focus on key words. The use of associating key words with specific operations will often lead to incorrect solutions. Modeling the situation and indicating the total cost of Mike's bills as the whole will help students understand they are looking for a portion of the whole.

\$261.20		
\$58.45	\$106.50	?

*Teachers may also wish to have students first estimate the cost of Mike's water bill. His gas bill was close to \$60 and his electric bill was close to \$110, a combined amount of \$170. Therefore, his water bill must be less than \$100 if his "whole" was \$261.20.*