

Ohio Standards Connections

Number, Number Sense and Operations

Benchmark F

Count money and make change using both coins and paper bills.

(Grades 3 - 4)

Indicator 4

Count money and make change using coins and paper bills to ten dollars.

(Grade 3)

Mathematical Processes Standard

Benchmark G

Use reasoning skills to determine and explain the reasonableness of a solution with respect to the problem situation.

(Grades 3 - 4)

Benchmark I

Represent problem situations in a variety of forms (physical model, diagram, in words or symbols), and recognize when some ways of representing a problem may be more helpful than others.

(Grades 3 - 4)

Benchmark K

Use mathematical language to explain and justify mathematical ideas, strategies and solutions.

(Grades 3 - 4)

Lesson Summary:

Students will use counting and estimation strategies to solve problems involving counting collections of coins and bills and making change for amounts up to ten dollars.

Estimated Duration: 120-180 minutes (for example, 4 to 6 30-minute periods)

Commentary:

In this lesson students will be making change using coins and paper bills. Since subtraction of decimals is not addressed in the academic content standards until Grade Four, no formal subtraction algorithm should be expected.

All the work should take place using estimating and counting up strategies. For example, if the question asks for change from a ten-dollar bill for a \$3.89 purchase, then a good estimate would be \$6 because \$3.89 is about \$4 and $10 - \$4 = \6 . Children in third grade should be able to easily handle this whole number subtraction. When getting the exact answer, children might count up, using coins and bills, from \$3.89 to \$10. [One script may be "\$3.89 and one penny makes \$3.90, a dime makes \$4, a one-dollar bill makes \$5, and a five-dollar bill makes \$10." The students can see that the bills and coins needed to make \$10 are equal to \$6.11 (one penny, one dime, one dollar bill and one five-dollar bill). The estimate of \$4.00 was very good.]

As is pointed out in the lesson, there are several ways to make changes and several strategies that could be used to do it. The students should not be shown algorithms for adding decimals. The concepts we are working on for this lesson are making change, counting money and estimating using money.

A child may first make the \$3.89 with bills and coins. Then add a five-dollar bill and recount, then add another one-dollar bill and recount, until he/she reaches a total of \$10. Instead of the dime, students may use two nickels and likewise, instead of a five-dollar bill and a one-dollar bill some students may use six one-dollar bills.

Similar strategies work for adding a long list of prices. For example, if students must find the total cost of items that are \$1.50, \$0.75, and \$2.15. They could first put the bills and coins on the table for each of the items. Then consolidate and recount for the total \$4.40.

These different solutions make for a rich discussion with the students about how all these various sets of bills and coins show the same amount of money and all could be given in change for the purchase. Some students may need to be carefully shown a substitution; then a recount shows that there is still the same amount of money displayed.

It is vitally important that a context be included with each example. To quickly turn this lesson into \$10.00 - \$3.89 with no context will ensure that the students lose interest. Some suggestions are made for contexts, but feel free to change them to better meet your students' needs. Perhaps there is a school play coming up and the price of a ticket and change from \$5 could be part of the context. Or students have to purchase books or clothes for a special event.

Make the questions and situations fit your students.

This is just one of a number of lessons (and assessments) that may be needed to fully address the target indicator.

Pre-Assessment:

Pose problem situations to the students to demonstrate their ability and knowledge in making and counting change, as well as representing the same amount of money in different ways. Blackline Master #1 provides a sample pre-assessment.

Commentary:

The sample pre-assessment for this lesson includes items assessing skills related to benchmarks and indicators associated with Grade Two (making change for values up to one dollar and counting collections of coins and dollar bills). Some items provide information about how well students can apply those skills in new or more challenging situations.

Scoring Guidelines:

Sample scoring guide for the pre-assessment provided.

Items 1-3: One point for each correct response.

Item 4: Sample scoring rubric:

2 = Response is accurate and complete. All three different sets of bills and coins drawn are correct.

1 = Response shows partial understanding. The drawings contain one or two errors or minor flaws.

0 = Response shows major gaps in understanding or fails to address most components of the task. The drawings contain many errors.

Teacher Tip:

Some students may be able to make change easier than others because of life experiences. For example, some students may have lots of personal experience handling money and making purchases outside of school. It might be a good idea to pair these students with those who may be less experienced in handling money so one can learn from the other.

Post-Assessment:

The sample post-assessment (Blackline Master #2) includes items measuring skills in using counting or other techniques to find the total cost of a small number of items, estimating or determining the amount of change when making a purchase.

Scoring Guidelines:

This is a sample scoring rubric for the post-assessment.

4 = In each problem situation, the value of the total amount and the change is correct. The bills and coins drawn are correct and a valid explanation is given.

3 = In each problem situation, the response correctly addresses the majority of the components relevant to the tasks. However, one component of the tasks is incorrect, e.g., values or total incorrect or explanation is invalid or missing.

2 = In each problem situation, the response correctly addresses some of the components relevant to the tasks. However, two components of the tasks are incorrect, e.g., flaws in the values of the total amount or change and the explanation is missing.

1 = In each problem situation, the response correctly addresses one of the components of the tasks.

0 = No attempt is made to solve the problem. However, may copy the items but does not attempt a total. The value of the change is missing the bills and coins are not shown.

Instructional Procedures:

1. It is recommended that students work in pairs. Provide a supply of punch-out, paper or plastic coins and bills for each pair of students.
2. Present the problem on the overhead or provide each pair of students a copy of the problem written on a strip of paper:

I gave Ms Samuels \$5 so she can buy her lunch today. If her lunch came to \$2.12, how much change did she bring me?

3. Have the student pairs estimate the amount of change and share their responses. Lead a discussion on the strategies students used to determine the estimations and the reasonableness of their estimates.

Instructional Tip:

Post estimations on the board or chart paper. Learning to make quick, reasonable estimates is important. Allow and encourage use of informal strategies and comparative language, such as, "she would give me less than \$3 because her lunch cost a little more than \$2 and $3+2 = 5$." Avoid leading students to use a single or prescribed, pencil-paper estimation algorithm, as rounding decimals is not included in the indicators for Grade Three. Remember to return to the estimation when the exact answer has been determined.

4. Suggest students work with their partner to use the bills and coins to model the problem situation and verify their solution. For example, one student gives the other \$5 to pay for the lunch and that student use the bills and coins to show the cost of the lunch. Have the students determine how much and what coins and bills could be returned as change.

5. Choose students with different strategies to demonstrate with overhead coins and bills. Then lead a discussion about how different strategies used for solving the problem can lead to a correct solution. Verify or show how different combinations of bills and coins can be used to represent the solution.
6. Compare the solution with the estimates generated earlier. Have students discuss and defend the reasonableness of their estimates. The reasonableness should be a decision of the class. Developing skills using informal, mental estimation strategies should be the focus rather than more formal, written procedures.
7. Present the following problem situation on the overhead or provide each student a copy of the problem written on a strip of paper:

Maria has a \$10 bill that her grandmother gave her for her birthday. She uses some of the money to buy a belt for \$2.95. How much change did Maria receive? Show or explain how you found your answer.

8. Give students time to work individually on this problem and write responses to the questions. Partners should then compare their responses to the questions. Lead a class discussion of the various solutions found by the students. Ask questions such as:
 - How did you determine the exact amount of change she would receive?
 - What coins and bills might have been given to Maria as change?
 - How do you know your answer is correct?
 - What is another combination of coins and bills Maria could have received?

Teacher Tip:

Encourage all students to use a counting strategy for finding and/or verifying a solution. For example, ask one student to show the cost of the belt (\$2.95) using coins and bills. Ask another student to show, using bills and coins, the amount of change Maria would receive and to use them to verify the sum of the amount of the change and the cost of the belt is \$10.00 by counting on. For example, the student may start with two one-dollar bills, three quarters and two dimes, then add one five-dollar bill to make \$7.95, two more one-dollar bills to make \$9.95 and one nickel to make \$10.00. See the commentary for additional examples of counting strategies.

9. Present the following problem situation, allowing the students to work as pairs.

Teacher Tip:

Encourage the students to act out the problem to find the solutions.

Devon and his older brother are going to the "50 Cents Movie Theater."

Making Change — Grade Three

They can choose two items from the snack bar. Items on the snack bar's menu include:

bag of popcorn (\$.75)	small soda pop (\$1.25)
medium soda pop (\$1.50)	large soda pop (\$1.75)
candy bar (\$.75)	chips (\$.60)
small frozen drink (\$1.25)	medium frozen drink (\$1.75)
large frozen drink (\$2.25)	iced tea (\$1.50)

- Copy the name and cost of the snacks Devon and his brother bought.
- Use your coins and bills to show the total cost for the movie and snacks for Devon and his brother. Explain how you found your answer.
- Find the exact amount of change using the bills and coins. Explain your strategy.

Instructional Tip:

Notice that this task requires students to first total the costs, then to find the change. It may be necessary to help students see that it cost 50 cents per person to attend the movie.

10. When the pairs have worked a reasonable amount of time, have them share their solutions with the rest of the class. Again, lead a discussion about the different solutions and how they are correct and the equivalent. Be sure to discuss and share the strategies each pair used in their problem solving, using the overhead when appropriate.

Teacher Tip:

If the students tend to use just one method, discuss and model other strategies that could be used to solve the problem situation.

Extension:

These are ideas for all students to continue learning on this topic – in the classroom or outside of the classroom.

- Increase the level of difficulty by asking students to solve the problem $\$20.00 - \13.52 by first estimating their response and then solving. However put this into a problem situation such as the following:

Devora needs to buy a book for school. It costs \$13.52. Her mother gave her \$20 to use for the purchase. Estimate the amount of change Devora needs to take back to her mother. Show the exact change in bills and coins. Explain your strategy.

- Direct each pair of students to generate 3-5 problems. Have pairs exchange problems with other pairs, solve and then return to the original pair of

students to check responses.

- Provide students with a menu from a restaurant. Have them select three items that they would like to purchase. Inform them that they have \$10.00 to pay for the items. They are to provide the strategy and explanation used to answer the following questions:
 - Is \$10.00 enough money to purchase the items you selected? Explain why or why not.
 - If you were planning to select from the menu for four people, estimate how much money you would need. Explain how you arrived at your answer.

Materials/Resources Needed:

For the teacher: Chart paper, markers, overhead projector, overhead transparencies, pre-assessment (Blackline Master #1), post-assessment (Blackline Master #2), and overhead replicas of money (bills and coins)

For the students: Copy of task questions, paper or math journals, pencils or markers, paper, plastic or punch-out bills and coins

Attachments:

- Blackline Master #1 (Pre-Assessment)
- Blackline Master #2 (Post-Assessment)
- Student Work Commentary
- Student Sample A
- Student Sample B
- Student Sample C
- Student Sample D