A Different Approach

PICK-A-PATH

Start

Finish
PICK YOUR METHOD

Use an appropriate operation to solve each problem.

1. Francine and Gwen were selling cookies. Francine sold 42 cookies and Gwen sold 19 cookies. How many cookies did Francine and Gwen sell altogether?

2. Jim jumped a distance of 142 meters. Reynaldo jumped 55 meters less than Jim. How many meters did Reynaldo jump?

3. The price of a computer at Big Bob’s Electronics Store was 79 dollars. This week, Bob is taking 15 dollars off the price. What is the price of a computer at Bob’s this week?
4. Lanie made 54 copies of the school newsletter. At parents' night, 31 newsletters were handed out. How many newsletters were not handed out?

5. Molly purchased 75 plastic plates for the neighborhood picnic. Emilio found a bag of 73 plates left over from last year's picnic. How many plates do Molly and Emilio have available for the picnic?

6. Jim's class has a goal to sell 900 candy bars. In the first week of the candy sale, his class sold 209 candy bars. In the second week, Jim's class sold 370 candy bars. How many more candy bars must Jim's class sell in order to reach their goal?
HOME CONNECTION: MAP-A-PATH

Draw a map of your neighborhood. Show your house and one other special place that is several blocks away. You might choose to show a place like your school, or a favorite shop, or a park you play in. Draw a red line to show one route from your house to the special place.

Now draw a blue line to show a different route from the special place to your house. Count how many blocks you walk on both routes.

Route 1: _____
Route 2: _____

Write an addition sentence to show how many blocks you walk from your house to the special place and back.

_____ + _____ = _____

I can walk from my house to _______________ and back.

I walk ______ blocks.
A Different Approach

MATERIALS

Excursions student pages 209–211
Teacher-made transparency of Excursions student page 209
Home Connection pages 213 and 214

LESSON OVERVIEW

Children begin by completing a maze, which is then presented as a metaphor for the variety of algorithms that can be used to find sums and differences. Then they explore different addition and subtraction algorithms. After practicing each method, children solve problems using the algorithm they find most useful.

SETTING THE STAGE

Complete and discuss a maze.

Show children the following algorithms. Don’t try to teach them all in the same day. Instead, use them as you feel they are needed. You may decide to teach one different algorithm each day during this topic.

Tell children that you will be showing them some different approaches to addition and subtraction. They needn’t learn and use all of the different approaches, but exposure to them will allow children to choose the approach that makes the most sense to them and with which they are most successful. Children who are having difficulty with addition or subtraction computation often just need to be exposed to a different algorithm. It is not necessary that all of your children use the same algorithm (often the traditional one) to add or subtract. What is important is that they understand the algorithm they use and that they are successful with it.

BUILDING CONCEPTUAL KNOWLEDGE

Explore different addition and subtraction algorithms.

- Show children the following algorithms. Don’t try to teach them all in the same day. Instead, use them as you feel they are needed. You may decide to teach one different algorithm each day during this topic.

**Focus on Language**

An algorithm is a method of completing a task. In this case, different step-by-step procedures are described that can be used for adding and subtracting.

**Addition Algorithms**

- **Left-to-Right Addition:**

  Starting at the left, children add column by column. Since 9 is the greatest value for any place, children adjust.

  \[
  \begin{array}{c}
  37 \\
  + 46 \\
  \hline
  83
  \end{array}
  \]

  Add columns left to right.

  Adjust the tens column.
**Partial Sums:**
This algorithm is very similar to the one on the previous page, but adjustments are made as the columns are added. The partial sums are lined up in the proper place values in order to find the final total.

\[
\begin{array}{c}
3 & 7 \\
+ & 4 & 6 \\
\hline
\end{array}
\]

The tens column is added. \( \rightarrow \) 7

Add the ones column. Thirteen ones is 1 ten and 3 ones, so line up the digit "1" in the tens column. \( \rightarrow \) 1 3

Add left to right to left to find the total. \( \rightarrow \) 8 3

**Opposite Change or Rename Method:**
This addition method involves adding a number to one addend and subtracting the same number from the other addend. Prove to children that this works through simple problems:

\[7 + 5 = 12 \quad \rightarrow \quad (7 + 3) + (5 - 3) = 12\]

The point of this method is to change one of the addends so that it is an easy number to work with. Numbers ending in zero are easy to work with, and are often thought of as "friendly" numbers.

Depending on the addends, this strategy can be easier or more difficult than other strategies. As children become familiar with this strategy, they will be able to tell when to use it. It's great for mental calculations.

**Example A**

\[
\begin{array}{c}
3 & 7 \\
+ & 4 & 6 \\
\hline
\end{array}
\]

\( (+3) \rightarrow \) 4 0

\[
\begin{array}{c}
3 & 7 \\
+ & 4 & 6 \\
\hline
\end{array}
\]

\( (-3) \rightarrow \) 4 3

\[
\begin{array}{c}
3 & 7 \\
+ & 4 & 6 \\
\hline
\end{array}
\]

8 3

Children should notice that adding 3 to 37 will give them 40, a "friendly" number. So, 3 is subtracted from the other addend.

You may point out that adding 4 to 46 makes it 50, a "friendly" number. In that case, 4 would be subtracted from the other addend. Have children try both methods.

**PICK YOUR METHOD**
- Use an appropriate operation to solve each problem.

1. Francine and Gwen were selling cookies. Francine sold 42 cookies and Gwen sold 19 cookies. How many cookies did Francine and Gwen sell altogether?

\[
\begin{array}{c}
42 \\
+ & 19 \\
\hline
61
\end{array}
\]

Francine and Gwen sold 61 cookies altogether.

2. Jim jumped a distance of 142 meters. Reynaldo jumped 55 meters less than Jim. How many meters did Reynaldo jump?

\[
\begin{array}{c}
142 \\
- & 55 \\
\hline
87
\end{array}
\]

Reynaldo jumped 87 meters.

3. The price of a computer at Big Bob's Electronics Store was 79 dollars. This week, Bob is taking 15 dollars off the price. What is the price of a computer at Bob's this week?

\[
\begin{array}{c}
79 \\
- & 15 \\
\hline
64
\end{array}
\]

A computer costs 64 dollars this week.
Example B

\[
\begin{array}{c}
\begin{array}{c}
4 \ 8 \\
+ 8 \ 8
\end{array}
\Rightarrow
\begin{array}{c}
3 \ 6 \\
1 \ 0 \ 0
\end{array}
\Rightarrow
1 \ 3 \ 6
\end{array}
\]

Tell children to look at both addends before deciding how to change them. In this example, adding 12 to the second addend makes it 100, a "friendly" number that makes it very easy to find the total mentally.

**Subtraction Algorithms**

**Left-to-Right Subtraction:**

In this algorithm, digits in the subtrahend (number being subtracted) are subtracted from the left to the right. The value of the digits is always subtracted from the existing minuend (number being subtracted from). This method depends on a student's ability to subtract across place values (regrouping is sometimes needed).

\[
\begin{array}{c}
8 \ 2 \\
- 5 \ 8
\end{array}
\]

Original problem

\[
\begin{array}{c}
8 \ 2 \\
- 5 \ 0
\end{array}
\Rightarrow
\begin{array}{c}
3 \ 2
\end{array}
\]

Tens are subtracted.

\[
\begin{array}{c}
3 \ 2 \\
- \ 8
\end{array}
\Rightarrow
\begin{array}{c}
2 \ 4
\end{array}
\]

Ones are subtracted from the previous difference.

Children will have to do some mental regrouping. When children first learn this method, you may want to provide them with some base-ten manipulatives to assist with their calculations.

**Partial Differences:**

This method of subtraction requires an understanding of integers. Numbers are subtracted in a left-to-right format. Results are added together to find the total difference.

\[
\begin{array}{c}
8 \ 2 \\
- 5 \ 8
\end{array}
\Rightarrow
\begin{array}{c}
3 \ 0
\end{array}
\]

Tens are subtracted.

\[
\begin{array}{c}
3 \ 0 \\
+ \ 6
\end{array}
\Rightarrow
\begin{array}{c}
2 \ 4
\end{array}
\]

Ones are subtracted. Rather than stating that 8 can't be subtracted from 2, express the difference as -6.

The sum of the differences is found.

**Home Connections:**

4. Lanie made 54 copies of the school newsletter. At parents' night, 31 newsletters were handed out. How many newsletters were not handed out?

\[
\begin{array}{c}
54 \\
- 31
\end{array}
\Rightarrow
\begin{array}{c}
23
\end{array}
\]

23 newsletters were not handed out.

5. Molly purchased 75 plastic plates for the neighborhood picnic. Emilio found a bag of 73 plates left over from last year's picnic. How many plates do Molly and Emilio have available for the picnic?

\[
\begin{array}{c}
75 \\
+ 73
\end{array}
\Rightarrow
\begin{array}{c}
148
\end{array}
\]

Molly and Emilio have 148 plates available.

6. Jim's class has a goal to sell 900 candy bars. In the first week of the candy sale, his class sold 209 candy bars. In the second week, Jim's class sold 370 candy bars. How many more candy bars must Jim's class sell in order to reach their goal?

\[
\begin{array}{c}
209 \\
+ 370
\end{array}
\Rightarrow
\begin{array}{c}
579
\end{array}
\]

\[
\begin{array}{c}
900 \\
- 579
\end{array}
\Rightarrow
\begin{array}{c}
321
\end{array}
\]

Jim's class must sell 321 more candy bars to reach their goal.
**Counting Up:**

Using this method, children start with the subtrahend and count up until they reach the value of the minuend. When possible, children should count up in “friendly number” increments. As they count up, children write the increments to the side. Once children reach the value of the minuend, they find the sum of their increments.

\[
\begin{array}{c}
8 \\
- 5 \\
\end{array} \quad \rightarrow \quad + 2 \, (60) + 20 \, (80) + 2 \, (82)
\]

Count up by increments from the subtrahend until you reach the value of the minuend.

\[
\begin{array}{c}
2 \\
0 \\
\end{array} + 2 \\
\hline
2 \\
4
\]

The sum of the increments results in the difference.

**Same Change/Renaming Method:**

This algorithm relies on the concept that if you add the same number to the subtrahend and the minuend, the difference will stay the same. Prove to your children that this works through simple problems:

\[
7 - 5 = 2 \quad \rightarrow \quad (7 + 3) - (5 + 3) = 2
\]

The key to using this method relies on adding a number to the subtrahend that will change it to a “friendly” number. Computation then proceeds from left to right or right to left.

\[
\begin{array}{c}
8 \\
- 5 \\
\end{array} \quad + (2) \quad \rightarrow \quad 8 \\
\hline
4 \\
6 \\
\end{array} + (2) \quad \rightarrow \quad 6 \\
\hline
0 \\
2 \\
4
\]

Show children that it will be easier to make the subtrahend the “friendly” number. Adding 2 to 58 makes an easy number, 60, to subtract.

**BUILDING SKILLS AND STRATEGIES**

**Solve problems using algorithms.**

Allow children to practice the algorithm or algorithms taught that day. Assign children a few problems to practice. Remember that it is not necessary for every student to learn, understand, and use each different algorithm. They should discover which algorithm works best for them and which one they understand most completely.

As children work on assigned problems, circulate and help. By analyzing the mistakes or shortfalls a child has with a particular algorithm, you may be able to find a more suitable algorithm for that child.

**PUTTING IT INTO ACTION**

**Use and identify addition and subtraction algorithms.**

Have children turn their Excursions books to Pick Your Method, pages 210–211. Children may use an algorithm of their choice to solve the problems. Go over the problems with children on the overhead and verify answers. Have children tell which algorithm they used, and explain why they chose it.

**HOME CONNECTION**

**Map two paths in the neighborhood.**

Have children take home Excursions book Home Connection: Map-A-Path, pages 213–214. Read the instructions with the children and make sure they understand the task. Draw a map of your neighborhood. Show your house and one other special place that is several blocks away. You might choose to show a place like your school, a favorite shop, or a park you play in.

Tell children to bring their completed maps to school. Post the maps and invite children to explain the routes they chose and the number sentences they wrote to show the round-trip distance.