

A Big Spill

KEY CONCEPTS

Mathematics Objective Use number sense to subtract across zeros.

Language Objective Explain predictions and solutions for real-world problems in writing and verbally.

Essential Understanding Many real-world problems can be represented with a mathematical model, but that model may not represent a real-world situation exactly.

COHERENCE

Look Back Earlier in the topic, students learned to add and subtract greater numbers.

This Lesson In this lesson, students solve a real-world problem by employing their understanding of subtraction.

Look Ahead In later topics, students will use strategies to multiply and divide multi-digit numbers.

BALANCE

Conceptual Understanding Students draw on their conceptual understanding of subtraction.

Application Students use math they know to solve a real-world problem.

Reinforce Vocabulary

model

Materials

Provide manipulatives and other tools that students request.



Teacher Resources

Available at
Savvas Realize®



Editable Lesson Plan



enVision on the Go: Planning Support

 Texas Essential Knowledge and Skills (TEKS)**Mathematical Process Standards**

The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

4.1B use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

4.1A apply mathematics to problems arising in everyday life, society, and the workplace.

4.1D communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.

4.1E create and use representations to organize, record, and communicate mathematical ideas.

4.1F analyze mathematical relationships to connect and communicate mathematical ideas.

4.1G display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

Number and operations. The student applies mathematical process standards to develop and use strategies and methods for whole number computations and decimal sums and differences in order to solve problems with efficiency and accuracy. The student is expected to:

4.4A* add and subtract whole numbers and decimals to the hundredths place using the standard algorithm.

4.4B determine products of a number and 10 or 100 using properties of operation and place value understandings.

4.4G round to the nearest 10, 100, or 1,000 or use compatible numbers to estimate solutions involving whole numbers.

*Readiness Standard

Act 1 The Hook



10-15 min

Act 1

Name _____

A Big Spill

I can ... model with math to solve a problem that involves subtraction.

Mathematical Process Standards 4.1B The student is expected to use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Also 4.1A, 4.1D, 4.1E, 4.1F, 4.1G TEKS 4.4A, 4.4B, 4.4G

Let's Model in 3 Acts

Lesson 2-9

ACT 1



ACT 1

- 1. Apply Math** What do you notice? What do you wonder?
Sample answer: How many pieces of candy were in the container at the start?, How many pieces spilled?, How many pieces remain in the container?
- 2.** Predict a reasonable answer to the Main Question. Explain your prediction.
Students will predict a range of numbers.
Check students' explanations.

Copyright © Savvas Learning Company LLC. All Rights Reserved. Lesson 2-9 **67**

Students are tasked with determining how many pieces of candy spilled from a container given information about the number of pieces in the full container and the number of pieces that remained in the container after the spill.

Play the Video **WHOLE CLASS**

Take advantage of your students' initial reactions to watching the video. Ask: *What do you notice about the video? What do you wonder?*

Brainstorm Questions **WHOLE CLASS**

Item 1 Apply Math Encourage students to share their questions in a class discussion. Record their questions and store them for later. Listen for interesting mathematical and *non*-mathematical questions.

To help students work on posing interesting, mathematical problems, ask: *Which question do you find most interesting? Which questions could we use mathematics to answer?*

Pose the Main Question **WHOLE CLASS**

Use the Main Question screen in Act 1 to pose the problem situation students will be tasked with modeling and solving.

Main Question

How many pieces of candy spilled?

Make Predictions **INDIVIDUAL**

Item 2 Before reading, students should use pre-reading strategies. If needed, replay the video and discuss the visuals. Focus on items that may assist in making predictions. Point out that the prediction is only an estimate for the number of pieces that spilled. Do not give students time to make calculations.

Ask About Predictions **WHOLE CLASS**

Analyze You can survey the class for a range of predictions. Point out that, without any information, you expect a wide range of predictions. Ask: *Why do you think your prediction is the answer to the Main Question? Who has a similar prediction? How many of you agree with that prediction? Who has a different prediction?*

Make sure students understand it is equally important to think about unreasonable predictions to the Main Question. Ask: *What is a number too small to be the number of pieces that spilled? What number is too big?*

Lesson 2-9 **67**

Act 2 The Model



20-30 min

Act 2

ACT 2

3. What information do you need to answer the Main Question?

Sample answer: The number of pieces of candy in the full container, The number of pieces that remained after the spill.

Build G.R.I.T.
Trust yourself.

4. **Plan** Show how you can find the answer to the Main Question.

Check students' work. See sample solutions.

ACT 3

5. What is the answer shown in the video?
1,448 pieces

6. **Check** Does your answer match the Act 3 video? If not, what is one reason that could explain the difference?

Sample answer: Yes, I used a subtraction algorithm.

68 Lesson 2-9

Copyright © Savvas Learning Company LLC. All Rights Reserved.

Sample Student Work

$$\begin{array}{r} 491 \\ 1,500 \\ - \quad 52 \\ \hline 1,448 \end{array}$$

1,448 pieces spilled

Tanji's Work

Tanji used a subtraction algorithm to solve.

Maria's Work

Maria used number sense to determine that the amount spilled had to be 1,400 plus more.

52 is less than 100, so there are $1,500 - 100 = 1,400$ pieces plus some more that spilled.
 $52 + 48 = 100$
 $1,400 + 48 = 1,448$
1,448 pieces spilled

68 Lesson 2-9

Identify Important Information WHOLE CLASS

Item 3 Before showing any information, give students time to think about what quantities are relevant to the problem situation. Ask: **What information do you need to answer the Main Question?** I will only give you the information you ask for.

Connect After discussing what information would be useful, ask: **How could you get that information? How would you use it once you have it?** You can also have students complete the sentence frame "If I knew _____, then I could figure out _____."

Reveal the Information WHOLE CLASS

Use the Image Gallery screen in Act 2 to reveal each piece of information. Record information as students identify it and keep the information where students can refer to it. Have students discuss whether this information matches their expectations.

- Container at start had 1,500 pieces
- Container after spill has 52 pieces

Develop a Model SMALL GROUP

Item 4 Plan To support productive struggle, observe. If needed, ask guiding questions that elicit thinking. **How can you determine the number of pieces of candy that spilled?** [Subtract the number remaining from the number at the start.] **How can you subtract across zeros?** [Regroup place values]

Share Solution Strategies WHOLE CLASS

Communicate Have students share their solution methods. If needed, use the student work shown in Act 2, also shown here. Ask: **Does Tanji's strategy make sense? How did Maria use number sense to help solve?**

Act 3 The Solution



15-30 min

Act 3

Use the Video to Reveal the Answer

WHOLE CLASS

Item 5 The Act 3 video shows how to determine the number of pieces that spilled. Have students record this real-world answer. To support the connection between variability and mathematical modeling, ask: *Why does our class have a variety of answers, and the video has only one answer? Why are some predictions closer to the answer in the video than others?*

Main Question Answer

1,448 pieces

Validate Conclusions **SMALL GROUP**

Item 6 Check Encourage students to discuss possible sources of error involved in using math to model this real-world situation. Accept a model as useful even if it is not perfect. Use the Answer screen in Act 3 to ask: *How useful was your model at predicting the answer? Would you change your model after watching the video? How would you change it?*

Explain You can also use the following question to test students' understanding of the real-world situation. *What is one way you might estimate the number of pieces that spilled?* [Use rounding.]

Reflect on Thinking **WHOLE CLASS**

If time allows, ask students the following questions to discuss how they incorporated math processes during the task.

Represent Explain how you used math to represent the situation. How did doing that help you answer the Main Question?

Explain Explain how you can subtract across zeros.

Check How might you analyze and evaluate the efficiency of the approach you chose to solve the problem?

Create a Problem **INDIVIDUAL**

Have students create a problem. Write your own problem related to the video in Act 1. Include any additional information needed to solve your problem. Explain how you would use math to solve your problem. Then solve your problem. Remind students that they could use a question they came up with in Act 1.

How can you use rounding and place value to subtract 53 from 1,500?

I can round 53 to 50.

I could write 1,500 in expanded form, then regroup.

1,500 is 1 thousand + 5 hundreds

1,500 is 1 thousand + 4 hundreds + 10 tens

50 is 5 tens.

10 tens - 5 tens = 5 tens

So, $1,500 - 50$ is equal to 1 thousand + 4 hundreds + 50 tens or 1,450.

$1,500 - 53$ is about 1,450.