

Creating Keychains

FOCUS

Mathematics Objective Apply understanding of division with decimals to solve a real-world problem.

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 estimate and divide with decimals.

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

Look Ahead In later topics, students will divide fractions.

BALANCE

Conceptual Understanding Students draw on their conceptual understanding of division with decimals.

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



Act 1 The Hook



10-15 min

Act 1

Name _____

Creating Keychains

Let's Model in 3 Acts

Lesson 6-9

ACT 1

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

ACT 1

1. Apply Math What do you notice? What do you wonder?

Sample answer: How much ribbon is needed for each keychain?, How many keychains are being made?

2. Predict a reasonable answer to the Main Question. Explain your prediction.

Students will predict a range of answers. Check students' explanations.

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Students are tasked with determining the length of a piece of ribbon for a keychain given the total length of the ribbon and the number of keychains that need to be made.

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 much ribbon can be used for each keychain?

Make Predictions INDIVIDUAL

Item 2 Point out that the prediction is only an estimate for the length of ribbon for each keychain. 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 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 length? What number is too large to be the length?*

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 length of the ribbon, The number of keychains being made.

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

Check students' work. See sample solutions.

Build G.R.I.T.
Keep trying.



ACT 3

5. What is the answer shown in the video?

0.75 foot (9 inches)

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 divided correctly.

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Sample Student Work

$$2.25 \div 3 = ?$$

$$\begin{array}{r} 0.75 \\ 3 \overline{) 2.25} \\ \underline{- 21} \\ 15 \\ \underline{- 15} \\ 0 \end{array}$$

Each keychain can use 0.75 foot of ribbon.

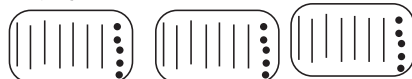
Kenisha's Work

Kenisha used an algorithm to find how much ribbon could be used for each keychain.

Javed's Work

Javed sketched base-ten blocks to show how to divide 2.25 by 3.

$$2.25 \div 3$$



0.75 foot per keychain

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 the 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.

- Ribbon length: 2.25 feet
- Number of keychains needed: 3

Note: Students may be unfamiliar with using decimals to describe lengths given in customary units. If needed, discuss that there are many ways to describe measures. For example, the length of the ribbon could be described as $2\frac{1}{4}$ feet, 2.25 feet, 2 feet 3 inches, etc. When solving, students can multiply 12 inches by $\frac{3}{4}$ (or 0.75) to get 9 inches to verify the measures.

Develop a Model SMALL GROUP

Item 4 Plan To support productive struggle, observe. If needed, ask guiding questions that elicit thinking. **How can you describe the relationship between the total length of the ribbon and the length needed for each keychain?** [You can use division to describe the relationship.] **What assumption do you need to make to use a math model?** [The ribbon will be the same length for each keychain.]

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: **What strategy did Kenisha use? What strategy did Javed use?**

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 the ribbon being cut into thirds and the thirds being measured. 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

0.75 foot (9 inches)

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. *Is there more than one way to calculate the length of the ribbon for each keychain? Explain.* [Yes, there are many ways to divide.]

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?

Justify How can you use estimation to check the reasonableness of your answer?

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.

About how much ribbon would be used for each keychain if 5 keychains were created?

The ribbon is 2.25 feet long.

2.25 is about 2.5

$2.5 \div 5 = 0.5$

Each ribbon would be about 0.5 foot long.