

# enVision A|G|A Mathematical Modeling in 3 Acts

## *Introduction*



**enVision™ A|G|A**

**Mathematical Modeling in 3 Acts**

**High-interest,  
low-entry lessons**

Students use mathematical models to **solve real-world problems**



Hi, **enVision** teachers!

Let's learn about Mathematical Modeling in 3 Acts lessons. These high-interest, low-entry lessons help students learn to use mathematical models to solve real-world problems.

## Planning and Pacing

The screenshot shows the Savvas Realize interface for 'enVision Algebra 1 2018'. The main content area is titled 'Topic 1: Mathematical Modeling in 3 Acts: Collecting Cans'. It features an 'Assign All' button, an objective section, and a list of resources. A red box highlights the first resource: 'Topic 1: Collecting Cans - Act 1 Video with Questions'. Other resources include 'Act 2 Content', 'Act 2 Questions', 'Act 3 Video', and 'Act 3 Questions'. A sidebar on the left provides navigation options for various topics and editions.

There is a Mathematical Modeling in 3 Acts lesson in every topic; plan to teach it as the lesson for the day.

The lesson may occur at the beginning, in the middle, or at the end of a topic, depending on when students will have learned the relevant content. Find pacing details in the Table of Contents of your Teacher's Edition.

Use the Topic Overview to preview and plan for the task. Use the Mathematical Modeling in 3 Acts preview page in the Student's Edition to generate your students' interest at the beginning of the topic.

When teaching the lesson, play the videos from your computer and have students record their ideas at each step.

## Quick Tip

The screenshot shows the Savvas Realize interface for the course 'enVision Algebra 1 2018'. The main content area is titled 'Topic 1: Mathematical Modeling in 3 Acts: Collecting Cans'. It features an 'Assign All' button at the top right. Below the title, there is an 'Objective' section stating 'Students will be able to:' followed by three bullet points: 'Use mathematical modeling to represent a problem situation and to propose a solution.', 'Test and verify the appropriateness of their math models.', and 'Explain why the results from their mathematical models might not align exactly with the problem situation.' To the right of the objective, the standards 'AR\_LEQ\_00', 'AR\_LIN\_00', and 'AR\_LIN\_00' are listed. Below the objective is a 'View More' link. A 'Select multiple Items' toggle is set to 'Off'. A list of six items is displayed, each with an icon and an 'Assign' button highlighted with a red box:

- Topic 1: Collecting Cans - Act 1 Video with Questions
- Topic 1: Collecting Cans - Act 2 Content
- Topic 1: Collecting Cans - Act 2 Questions
- Topic 1: Collecting Cans - Act 3 Video
- Topic 1: Collecting Cans - Act 3 Questions

**QUICK TIP** You can also assign Mathematical Modeling in 3 Acts lessons to students online so they can work on them in their Interactive Student's Editions.

## Act 1: The Hook

The screenshot shows a digital interface for a math problem. At the top, there is a navigation bar with 'Exit' and 'Topic 1: Collecting Cans - Act 1 Video with Questions'. Below this is a header for 'ACT 1 Collecting Cans'. The main content area is titled 'Identify the Problem' and contains the instruction: '3. Make an initial conjecture that answers this main question.' Below the instruction is a text input field with the placeholder text 'Enter your answer.'. To the right of the input field are two blue callout boxes: the top one says 'Students make predictions and justify their reasoning' and the bottom one says 'Students share predictions and teachers record them'. At the bottom left is a calculator icon, and at the bottom right is a page indicator '4 of 7'.

In Act 1: The Hook, play the Act 1 video. The video presents a problem situation and provides just enough information to get students thinking and talking.

Give students time to brainstorm possible questions they have about the video. Students can write their questions in the Interactive Student's Edition, in the optional *Student Companion*, or on paper.

Have students share some of their questions, and then reveal the Main Question.

Give students time to predict answers to the Main Question and justify their reasoning. Finally, ask them to share their ideas and record their predictions for the whole class to see.

## **Act 2: The Model**



In Act 2: The Model, ask students to identify information they need to answer the Main Question.

After you collect students' ideas, reveal the information in Act 2. Ask students to discuss whether this information matches their expectations and predictions.

Then ask students to work individually to develop a model and solution to the Main Question. Encourage them to use any model to arrive at a solution that makes sense to them.

Have students share and discuss their strategies. Make sure to discuss a variety of different models and solutions.

## Quick Tip



You can use the Sequel in the Teacher's Edition in a variety of ways:

- Assign a challenge to early finishers in Act 2
- Assign practice to all students after Act 3
- Assign homework to the whole class

PearsonRealize.com

**TOPIC 1 Mathematical Modeling in 3 Acts**

**ACT 3 The Solution**

Play the video. The final video shows the number of cans in each friend's bag. Offer praise to the students whose conjectures are closest to the actual answer.

**MAIN QUESTION ANSWER**  
Angela has 24 cans, Carlos has 12 cans, Brian has 8 cans, and Danielle has 5 cans.

Do the "post-game" analysis. Ask students if there could be other numbers of cans that would work for this situation. The numbers for Angela, Brian, and Carlos are fixed. Danielle has less than 8 cans. If we knew the total number of cans the group collected, we could figure out how many Danielle has.

**ONE POSSIBLE SOLUTION**  
Define variables  $a$ ,  $b$ ,  $c$ , and  $d$  to represent the number of cans collected by Angela, Brian, Carlos, and Danielle, respectively. Write and solve equations.

Angela has three times as many cans as Brian, so  $a = 3b$ . Brian has four fewer cans than Carlos, so  $b = c - 4$ . We know Carlos has twelve cans, so  $c = 12$ . We only know that Danielle has fewer cans than Brian, so write an inequality:  $d < b$ .

Substituting 12 for  $c$  in the second equation yields  $b = 12 - 4$ , or  $b = 8$ . Substituting into the first equation gives  $a = 3(8)$ , or  $a = 24$ . Substituting 8 for  $b$  in the inequality reveals that  $d < 8$ . Since Danielle cannot collect a negative number of cans,  $0 \leq d < 8$ , where  $d$  is an integer.

Show the solutions on a number line. Use closed points for  $a$ ,  $b$ , and  $c$ . Use an open point for  $d$  at 8, a closed point at 0, and shade the region between.

**SEQUEL**  
As students finish, have them construct their own problem with a certain number of friends, cans, and clues. Challenge students to include at least one clue that can be modeled with an equation and one that can be modeled with an inequality. Then have them trade with a partner to solve.

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## Act 3: The Solution

The screenshot shows a software interface for 'Act 3: The Solution' under the topic 'TOPIC 1 Mathematical Modeling in 3 Acts'. On the left, there is a sidebar with 'ACT 3 Collecting Cans' and a section titled 'Interpret the Results' containing question 8: 'Is your refined conjecture between the highs and lows...'. Below this is an input field 'Enter your answer' and a blue button 'Discuss and make connections'. At the bottom left, there is a calculator icon and the text 'Revise models or work on the Sequel'. The main content area features a video player showing four students (Angela, Brian, Carlos, Danielle) with their can counts: Angela (24), Brian (8), Carlos (12), and Danielle (5). Below the video, there is a 'MAIN QUESTION ANSWER' section stating the can counts and a 'ONE POSSIBLE SOLUTION' section with a detailed algebraic derivation. At the bottom of the solution section, there is a number line diagram for variable  $d$  with points at 0, 8, and  $a$ , and a shaded region between 8 and  $a$ . A 'SEQUEL' box at the bottom right of the main content area provides instructions for a follow-up activity. The footer of the software shows 'TOPIC 1 | 368 | Mathematical Modeling in 3 Acts'.

In Act 3: The Solution, play the video to reveal an answer to the Main Question.

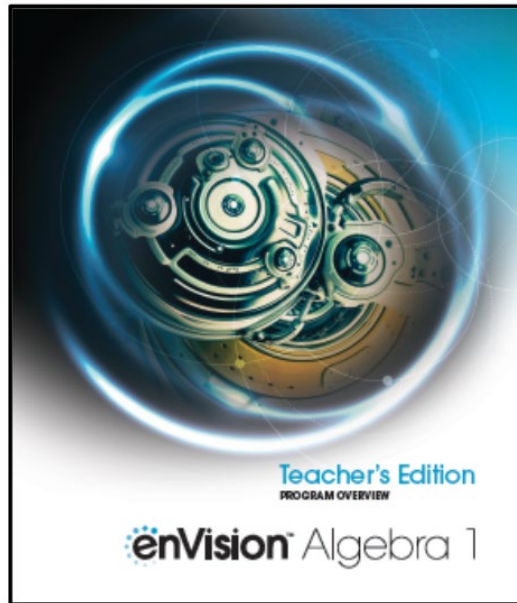
Give students time to reflect, analyze, and explain differences between their answers and the actual solution. Lead a discussion to help students make math connections.

Finally, give students time to revise their models or work on the Sequel.

## Quick Tip



For more information,  
check out the  
Mathematical Modeling  
in 3 Acts section of your  
*Teacher's Edition*  
*Program Overview*.





## *Closing*



Thanks for learning more about Mathematical Modeling in 3 Acts lessons. These tasks provide an engaging way for students to learn mathematical modeling skills that they'll use throughout their lives!

Keep digging in to My Savvas Training to learn more about **enVision** Mathematics!