

California Math & YOU: Problem-Based Learning in Action

Problem-Based Learning (PBL) is central to the California Mathematics Framework, emphasizing **real-world problem-solving, reasoning, and student-driven inquiry**. *California Math & YOU* fully supports this approach with research-backed features that foster deep mathematical understanding and critical thinking.

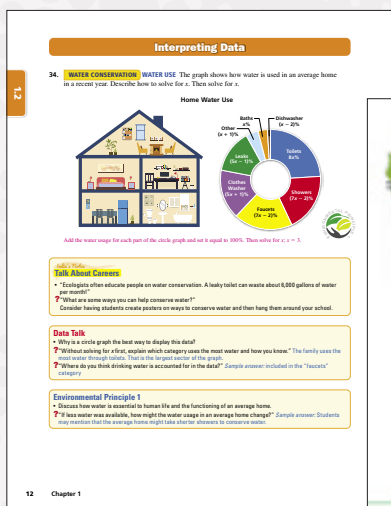
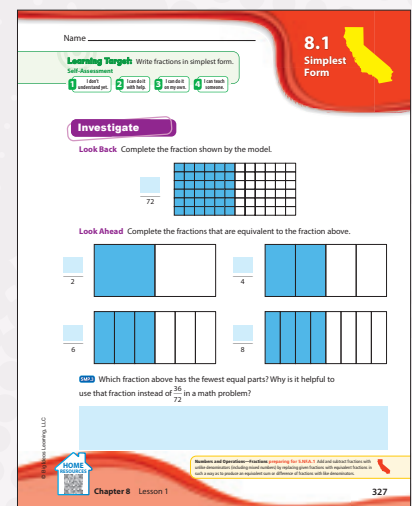


How California Math & YOU Supports PBL

Big Ideas Framework: Every chapter begins with a **Big Idea**, helping students connect key mathematical concepts to real-world applications and interdisciplinary topics. This structure ensures students build flexible problem-solving skills by recognizing patterns and relationships across different contexts.

Investigate & Inquiry-Driven Lessons:

Lessons start with an **Investigate** activity, encouraging students to explore mathematical concepts through guided inquiry. This fosters a sense of curiosity and perseverance as students engage in discovery-based learning.



Connections to Real Life & Data: Real-world applications are embedded through **Connect to Real Life** problems and **Interpreting Data** tasks, helping students analyze, model, and interpret real situations using mathematics.

Performance Tasks for Authentic Application:

Each chapter culminates in a **Performance Task** where students apply their learning to solve complex, real-world problems. These tasks promote higher-order thinking and mirror the kinds of challenges they will encounter in college and careers.

Performance Task 12

Avenue of the Giants

Each ranger guide for Sequoia National Park includes information about the park's history, geology, and ecology. The park's rangers also collect data on the number of people who visit the park each year.

1. A park ranger operates the trail booth at Chamberlain Tree Visitors Center each day. The trail booth is open from 9:00 a.m. to 5:00 p.m. The ranger collects data on the number of people who visit the park each day.

2. Complete the table. Then graph the data.

Time of Day	Number of People
9:00 a.m.	10
10:00 a.m.	20
11:00 a.m.	30
12:00 p.m.	40
1:00 p.m.	50
2:00 p.m.	60
3:00 p.m.	70
4:00 p.m.	80
5:00 p.m.	90

3. The ranger collected 1,400 on Monday and 1,200 on Tuesday from people walking through the trail. How many more people walked through the trail on Monday than on Tuesday?

4. In early 1990, a wildfire destroyed the trail booth. The park's rangers collected data on the number of people who visited the park each day. The data is shown in the table below.

Year	Number of People
1990	1,400
1991	1,200
1992	1,100
1993	1,000
1994	900
1995	800
1996	700
1997	600
1998	500
1999	400
2000	300
2001	200
2002	100
2003	0
2004	0
2005	0
2006	0
2007	0
2008	0
2009	0
2010	0
2011	0
2012	0
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0
2020	0
2021	0
2022	0

5. How are visitors to the trail booth changing over time?

7 PERFORMANCE TASK

Robotics

Applications of robots include manufacturing, cleaning, computing, agriculture, transportation, and space exploration. The table shows how the industrial robot industry has changed in recent years.

Year	Number of new robots (in thousands)
2011	166
2012	159
2013	178
2014	221
2015	254
2016	304
2017	400
2018	423
2019	391
2020	394
2021	517

Analyzing Data

Use the information on the previous page to complete the following exercises.

- 1 Explain what is shown in the data display. What do you notice? What do you wonder?
- 2 Find the mean, median, mode, range, and standard deviation of the data in the table.
- 3 Analyze the data in the table. Then create a display that best represents the data. Compare your display with a classmate's.

CONDUCT A SURVEY

Create a survey of at least four questions that involves both qualitative and quantitative data about the use of robotics in everyday life. Then survey a random sample of at least 50 people and record the results. Analyze the data using measures and methods from the chapter and create a presentation of your findings. Include several different data displays in your presentation.

Lesson Insights

- Discuss what is meant by graph of an inequality and how it differs from a line.
- Graph the inequality $y < 2x + 3$ on a coordinate plane. What does the graph represent?

Engage with the data. "What information is shown in the infographic? What mathematical concepts can you make about the data? What do you notice? What do you wonder?"

Data Talk

"Who might be interested in studying these statistics?"

- "The EPA recommends installing radon mitigation systems in buildings that measure more than 4 picocuries per liter (pCi/L)." "Which zone(s) may choose to install radon mitigation systems? Explain."

Environmental Principle 5

"How can measuring radon levels in the home help us to keep people safe?"

Assess

6. $x < 2$

Talk About It

Put a Face There. Have students reflect on their understanding of each measure. Then have small groups discuss why they chose the number they did.

Data Talk

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Collaborative Math Talks & Discourse:

California Math & YOU includes **Talk About It** discussions, **Math Talks**, and **Data Talks**, which encourage students to explain their reasoning, critique others' arguments, and refine their problem-solving strategies through rich mathematical discourse.

Talk About It Math Talk (Exercise 15)

- Read the problem aloud and allow time for students to formulate their answers.
 - Have students solve $45 \div 9$ and $4,500 \div 90$ on their whiteboards. Then have them discuss with their partners how these two equations are related.
- 7 Math** "How are you showing the meaning of the numbers in the equation? What mathematical language can you use to help explain your thinking? Listen for correct use of math terms such as division facts, place value, tens, hundreds, and thousands. Share several student explanations recording all unique answers on the board."

California Math & YOU provides the tools, structure, and **engaging real-world experiences** to help students thrive in a **problem-based learning environment**.



Learn more!
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