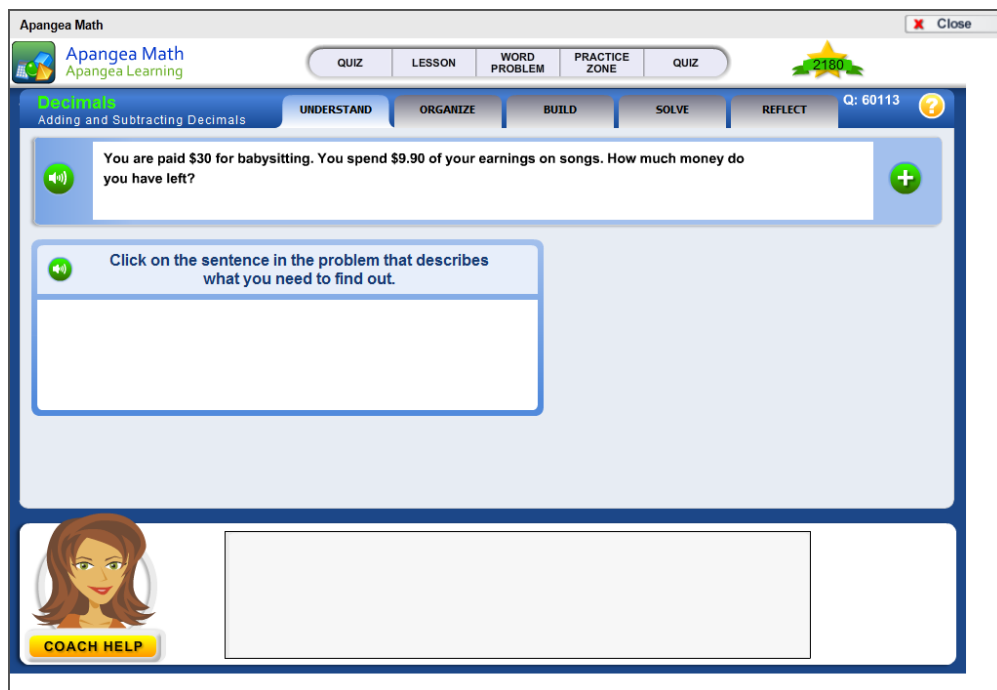


## Instruction on a 5-Step Process Provides Problem-Solving Power

The five steps include Understand, Organize, Build, Solve, and Reflect. This moves the student from understanding the pieces of the problem and the relationships between the pieces through solving the problem using diagrams and equations. In the solve step, students are instructed that the answer to an equation is not the answer to the problem and the importance of understanding how the numeric answer applies to the problem situation. Once the initial problem is solved, the reflect step extends the mathematical thinking to a related problem that depends on connections and relationships inherent in the initial problem.

### Understand

The first problem solving step is **Understand**. In this step, students identify the question they are trying to answer.



The screenshot shows the Apangea Math interface. At the top, there is a navigation bar with buttons for QUIZ, LESSON, WORD PROBLEM, PRACTICE ZONE, and QUIZ. A star icon with the number 2180 is visible. Below this, the main content area is titled "Decimals" and "Adding and Subtracting Decimals". The interface is divided into five steps: UNDERSTAND, ORGANIZE, BUILD, SOLVE, and REFLECT. The "UNDERSTAND" step is currently active. The problem text reads: "You are paid \$30 for babysitting. You spend \$9.90 of your earnings on songs. How much money do you have left?". Below the problem text is a large empty box for the student to write their answer. At the bottom left, there is a "COACH HELP" button with a cartoon character icon.

## Organize

The second problem solving step is **Organize**. In this step, students analyze the problem to identify the pieces.

Apangea Math

Apangea Math  
Apangea Learning

QUIZ LESSON WORD PROBLEM PRACTICE ZONE QUIZ

2195

Decimals  
Adding and Subtracting Decimals

UNDERSTAND ORGANIZE BUILD SOLVE REFLECT Q: 60114 ?

Last year, your town got 2.5 inches of rain. This year, your town got 3.2 inches. How much more rain did your town get this year than last year?

Complete!

Number	Unit	Description	
2.5	in	last year's rain	✓
3.2	in	this year's rain	✓
unknown	in	more rain	✓

NEXT

COACH HELP

For more information & On-Site Demonstrations, call Backbone at 800-480-3935  
<http://www.backbonecommunications.com>

Then they choose a diagram that represents the mathematical relationships between the pieces.

The screenshot shows the Apangea Math interface. At the top, there is a navigation bar with buttons for QUIZ, LESSON, WORD PROBLEM, PRACTICE ZONE, and QUIZ. A star icon with the number 2200 is visible. Below this is a sub-header for 'Decimals' with the topic 'Adding and Subtracting Decimals' and a progress indicator 'Q: 60114'. The main content area contains a word problem: 'Last year, your town got 2.5 inches of rain. This year, your town got 3.2 inches. How much more rain did your town get this year than last year?'. Below the problem is a question: 'Which diagram shows how the pieces of the problem are related?'. Two diagrams are presented: the first is a simple bar chart with two bars labeled 'This Year's Rainfall' and 'Last Year's Rainfall' under a bracket labeled 'Two-Year Rainfall'; the second is a bar chart with two bars, 'This Year's Rainfall' and 'Last Year's Rainfall', where the top bar is extended to show the difference, labeled 'Amount More Rain This Year' and 'One Inch'. A green checkmark is next to the second diagram. A 'NEXT' button is at the bottom right. A 'COACH HELP' button with a cartoon coach icon is at the bottom left.

## Build

The third problem solving step is **Build**. In this step, students use what they have learned about the problem in the organize step to write an equation for the problem. The equation builder will accept any of the equivalent equations that describe the problem situation. The Learning Coach and the Live Online Teacher are available to help students who need help with the math concepts and translating them into an equation.

The screenshot shows the Apangea Math interface. At the top, there are navigation tabs: QUIZ, LESSON, WORD PROBLEM, PRACTICE ZONE, and QUIZ. The current lesson is "Decimals: Adding and Subtracting Decimals". The problem is: "Last year, your town got 2.5 inches of rain. This year, your town got 3.2 inches. How much more rain did your town get this year than last year?". The equation builder shows the equation:  $\text{lastyearsrain} + \text{more rain} = \text{thisyearsrain}$ . Below the equation is a calculator with buttons for numbers, operations, and mathematical symbols. To the right, there is a visual representation of rainfall using bars. The top bar represents "This Year's Rainfall" (3.2 inches) and the bottom bar represents "Last Year's Rainfall" (2.5 inches). The difference between the two bars is labeled "Amount More Rain This Year". A "Check" button is visible at the bottom right. At the bottom left, there is a "COACH HELP" button with a cartoon character of a woman.

## Solve

The fourth problem solving step is **Solve**. In this step, students isolate the unknown and simplify the equation. The interface provides the appropriate support for students. The decision tree mirrors the thinking process that successful equation solvers employ. The Learning Coach and Live Online Teachers are available to support and encourage students who need it.

The screenshot shows the Apangea Math interface in the 'Solve' phase. The problem is: "Last year, your town got 2.5 inches of rain. This year, your town got 3.2 inches. How much more rain did your town get this year than last year?"

The interface provides a decision tree for solving the equation:

$2.5 + \text{morerain} = 3.2$	
	Subtract 2.5 to Both Sides
$2.5 + \text{morerain} - 2.5 = 3.2 - 2.5$	
	Simplify Addition & Subtraction
$\text{morerain} = 3.2 - 2.5$	
	Simplify Addition & Subtraction
$\text{morerain} = 0.7$	

Buttons available: **EDIT EQUATION**, **CLEAR ALL**, **UNDO**, **CHECK**. A **COACH HELP** button is also visible at the bottom left.

Because the solution to an equation is not necessarily the solution to the problem, students next choose how the numeric solution relates to the problem.

The screenshot shows the Apangea Math interface. At the top, there is a navigation bar with buttons for QUIZ, LESSON, WORD PROBLEM, PRACTICE ZONE, and QUIZ. A star icon with the number 2225 is visible. Below this, the current topic is 'Decimals' with the subtopic 'Adding and Subtracting Decimals'. The interface is divided into five stages: UNDERSTAND, ORGANIZE, BUILD, SOLVE, and REFLECT. The 'SOLVE' stage is active, displaying a word problem: 'Last year, your town got 2.5 inches of rain. This year, your town got 3.2 inches. How much more rain did your town get this year than last year?'. Below the problem, there are four multiple-choice options. The first option, 'My town got 0.7 inch of rain this year.', is selected. The second option is 'My town got 0.7 inch of rain in the last two years.'. The third option, 'My town got 0.7 inch more rain this year than last year.', is marked with a green checkmark, indicating it is the correct answer. The fourth option is 'My town needs 0.7 inch more rain.'. To the right of the options is a text input field labeled 'Your value?' containing the text 'morerain = 0.7'. A 'NEXT' button is located at the bottom right of the question area. At the bottom left, there is a 'COACH HELP' button next to a cartoon character of a woman.

### Reflect

For more information & On-Site Demonstrations, call Backbone at 800-480-3935

<http://www.backbonecommunications.com>

The fifth problem solving step is **Reflect**. In this step, take advantage of the math understanding they now have about the mathematical relationships in the problem. Now that they understand the problem thoroughly, they apply that understanding in a different way, using higher order thinking.

The screenshot shows the Apangea Math interface. At the top, there's a navigation bar with 'QUIZ', 'LESSON', 'WORD PROBLEM', 'PRACTICE ZONE', and 'QUIZ' buttons. A star icon with '2230' is visible. Below this, the 'Decimals' section is active, with sub-sections 'UNDERSTAND', 'ORGANIZE', 'BUILD', 'SOLVE', and 'REFLECT'. The current question is 'Q: 60114'. The problem text is: 'Last year, your town got 2.5 inches of rain. This year, your town got 3.2 inches. How much more rain did your town get this year than last year?'. Below the problem, there are four multiple-choice options: 'This year's total rainfall would be about 10 inches more than last year's.', 'This year's rainfall would be about 4 fewer inches less than last year's.', 'This year's total rainfall would be about 4 inches more than last year's.', and 'This year's rainfall would be about the same as last year's rainfall.'. The third option is highlighted in green with a checkmark. To the right, the 'ANSWER' box shows 'My town got 0.7 inch more rain this year than last year.'. A 'NEXT' button is at the bottom right. At the bottom left, there is a 'COACH HELP' button with a cartoon character icon.

## Effective Pedagogic Model Provides Access for All students

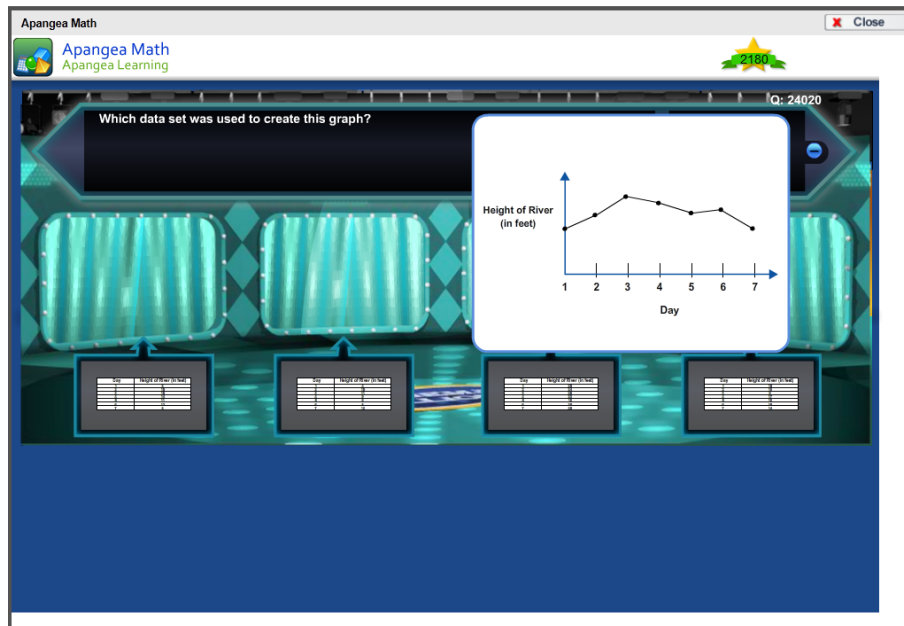
The pedagogic model used in the Algebra 1 lessons is grounded in practices proven effective by years of research. First, students complete problems that address mathematics that are foundational to the current lesson, activating prior knowledge.

Next students begin the instructional process where they experience an interactive introduction to the math, move through a series of guided practice problems with their Learning Coach and Live Online Tutor, and finally solve a series of problems independently.

This gradual release of supportive scaffolding for students insures they will be successful with learning the math content.

### Warm Up

The first activity in the lesson is **Warm Up**. In this activity, students encounter problems in an engaging game format. This activity is designed to activate prior knowledge, allowing students to build their new knowledge on a solid base.



For more information & On-Site Demonstrations, call Backbone at 800-480-3935  
<http://www.backbonecommunications.com>

## Learn

The second activity in the lesson is **Learn**. This is the instructional part of the lesson and is comprised of two parts, an interactive presentation and guided practice that is scaffolded to match each student's needs. The interactive presentation presents the math content for the lesson in a real-world, engaging, graphic manner to maximize access for all students.

Apangea Math

Apangea Math  
Apangea Learning

QUIZ QUIZ LESSON PRACTICE ZONE QUIZ

2180

Interactive Lesson  
7. Interpret Graphs of Real-World Functions Lesson

8:00 9:00 10:00 11:00 Noon 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00

Doors Open

NEXT

Doors Close

Do you see what it is? Click to find out if you're right.

Doors Close

For more information & On-Site Demonstrations, call Backbone at 800-480-3935  
<http://www.backbonecommunications.com>

The guided practice is a carefully-sequenced set of increasingly difficult problems that advance from easily-accessible to high-stakes test-like problems. Hints from the Learning Coach and help from Live Online Teachers coupled with feedback for correct and incorrect answers provide the support that students need to progress through the content successfully.

Students may choose as little or much support as they desire.

The screenshot shows the Apangea Math interface. At the top, there is a navigation bar with buttons for QUIZ, LESSON, PRACTICE ZONE, and QUIZ. A score of 2180 is displayed next to a star icon. The main content area features a question: "Miranda is keeping track of how fast her baby girl is growing. The baby was 20 inches tall at birth and grew 10 inches during her first year. Which of the following graphs shows these two pieces of information?" Below the question are four coordinate planes, each with Height (inches) on the y-axis (0 to 30) and Age (years) on the x-axis (0 to 3). The data points for each graph are as follows:

Graph	Age (years)	Height (inches)
1	0	20
1	1	20
2	0	10
2	1	20
3	0	20
3	1	10
4	0	20
4	1	30

At the bottom of the interface, there is a "COACH HELP" button and a chat area with two empty speech bubbles.

For more information & On-Site Demonstrations, call Backbone at 800-480-3935  
<http://www.backbonecommunications.com>

## Practice

The last activity in the lesson is independent **Practice**. In this activity, students solve problems that mirror those found on high-stakes tests. They receive feedback for correct and incorrect answers. Data is gathered here to determine whether students have mastered lesson content.

The screenshot shows the Apangea Math interface. At the top, there is a navigation bar with the Apangea Math logo, the text "Apangea Learning", and a menu with buttons for "QUIZ", "LESSON", "PRACTICE ZONE", and "QUIZ". A green star icon with the number "2180" is visible in the top right corner. Below the navigation bar, a blue header displays "Question: 1 out of 10" and "Q: 7465". The main question area contains a text box with a speaker icon on the left and a plus icon on the right, containing the text: "After your bus picks you up, it makes 2 more stops before reaching your school. Which graph best represents your trip from home to school?". Below the question are four graph options, each labeled "Distance" on the y-axis and "Time" on the x-axis. The first graph shows a line that increases linearly, then has a horizontal segment, then decreases linearly, then has another horizontal segment, and finally decreases linearly to zero. The second graph shows a line that increases linearly, then has a horizontal segment, then decreases linearly, then has another horizontal segment, and finally decreases linearly to zero. The third graph shows a line that increases linearly, then has a horizontal segment, then increases linearly, then has another horizontal segment, and finally increases linearly. The fourth graph shows a line that decreases linearly, then has a horizontal segment, then decreases linearly, then has another horizontal segment, and finally decreases linearly to zero. At the bottom of the interface, there is a cartoon avatar of a woman wearing a headset and a large empty rectangular box for the student's answer.

## Data Adapts Instruction to Meet Individual Student Needs

A combination of a placement test and ongoing formative assessment embedded in every lesson adapts instruction on a lesson-by-lesson basis to meet individual student needs. The placement test identifies how much support students will need with below-grade-level material in order to be successful in on-grade-level lessons. Students' performance on each lesson determines what material they receive next, whether it is the next lesson in the learning sequence or a precursor lesson.



For more information & On-Site Demonstrations, call Backbone at 800-480-3935  
<http://www.backbonecommunications.com>

Educators have access to the data that the program gathers. Reports provide information that can be used to inform in-class instruction, or to evaluate program usage.

Class Name		Lessons Completed		Lessons Passed		Lessons Skipped By Passing PreQuiz		Problems Solved		Points Earned		Math Coach and Live Teacher Sessions		Time On System		Evenings and Weekend Time On System		Percent of Time During Evenings and Weekends		Lessons not skipped by passing prequiz	
		Total	Avg.	Total	Avg.	Total	Avg.	Total	Avg.	Total	Avg.	Total	Avg.	Total	Avg.	Total	Avg.	Avg.	Avg.		
Dr. Herron Period 1		101	7	72	5	11	1	2241	149	39306	2620	202	13	2d 16h	4h 15m	6h 26m	10%	50%	55%		
Dr. Herron Period 2		140	9	86	6	21	1	3140	209	55348	3690	31	2	3d 8h	5h 19m	16h 48m	21%	54%	64%		
Dr. Herron Period 3		128	9	77	5	15	1	2837	189	53026	3535	302	20	3d 10h	5h 28m	4h 6m	5%	51%	64%		
Dr. Herron Period 4		154	10	122	8	28	2	3593	240	67554	4504	195	13	4d 3h	6h 36m	12h 49m	13%	49%	60%		
Dr. Herron Period 5		113	8	79	5	8	1	2502	167	50018	3335	120	8	3d 8h	6h 1m	12h 36m	17%	62%	73%		
Mrs. Smith Lab 2		156	10	116	8	2	0	3446	230	68054	4537	56	4	3d 1h	4h 49m	5h 48m	8%	59%	71%		
Mrs. Smith Lab 3		97	6	70	5	5	0	2055	137	40794	2720	221	15	2d 12h	4h 2m	9hr 1m	15%	67%	75%		
Mrs. Smith Lab 4		170	11	101	7	29	2	3786	252	69084	4606	131	9	4d 7h	6h 51m	23h 42m	23%	48%	66%		
Mrs. Smith Lab 5		176	12	109	7	30	2	3947	263	79578	5305	342	23	4d 2h	6h 32m	26h 28m	27%	53%	67%		
Mrs. Smith Lab 6		167	11	131	9	27	2	3773	252	76994	5133	420	28	4d 12h	7h 18m	15h 7m	14%	55%	63%		
Mr. Zalinski After School		99	7	83	6	15	1	2191	146	44390	2959	122	8	2d 11h	3h 57m	24h 48m	42%	60%	76%		
Mr. Zalinski Period 3		195	13	143	10	15	1	4311	287	79796	5320	282	19	3d 22h	6h 28m	3h 45m	4%	57%	73%		
Mr. Zalinski Period 5		216	14	162	11	31	2	4796	320	86782	5785	398	27	4d 14h	7h 21m	11hr 1m	10%	44%	58%		
Mr. Zalinski Period 6		179	12	140	9	25	2	3991	266	77516	5168	249	17	4d 4h	6h 40m	7hr 1m	7%	58%	75%		
Mr. Zalinski Period 7		213	14	179	12	35	2	4646	310	87990	5866	370	25	5d 8h	8hr 32m	16h 36m	13%	51%	64%		
<b>School Totals and Averages</b>		<b>2304</b>	<b>154</b>	<b>1670</b>	<b>111</b>	<b>297</b>	<b>20</b>	<b>51255</b>	<b>3417</b>	<b>976230</b>	<b>65082</b>	<b>3441</b>	<b>229</b>	<b>55d 18h</b>	<b>2d 8h</b>	<b>7d 21h</b>	<b>14%</b>	<b>55%</b>	<b>67%</b>		

For more information & On-Site Demonstrations, call Backbone at 800-480-3935  
<http://www.backbonecommunications.com>