



Mice Island Two-Step Problems

Grade 3

Unknowns in Two-Step Problems

3 levels

Probing Questions

- What do you see in the diagram?
- How is that shown in the equation?
- What are you being asked to fill in?
- Describe the action shown by the equation.

Classroom Connection

Ask students to create a word problem to match the situation shown. For an extra challenge, make sure that the question asked matches the unknown in the equation.

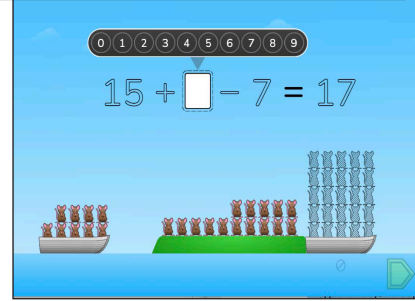
Something to Think About

This game is not about computation, but about matching an equation to a specific context. Ask students to describe what is happening in the animation and how that connects to the equation.

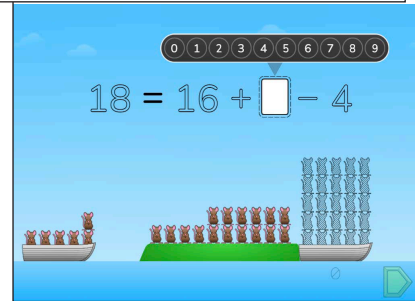
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The action of the equation is from the island's point of view.



Sometimes the result is on the left side of the equal sign.



Unknowns in Two-Step Problems - 1



Pie Monster

Grade 3

Unknowns in Two-Step Problems

4 levels

Probing Questions

- What do the striped pies do?
- How do you decide how many you need?

Uncover the Thinking

Project puzzles from Level 4. Have students share how they determine whether to add or subtract pies. Ask students to write equations to match the puzzle. Be sure to indicate the unknown.

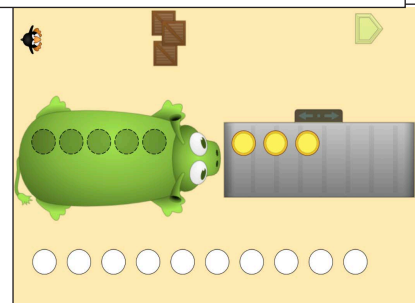
What Strategies Are Being Used?

Ask students to share how they are solving the puzzles. Compare and contrast different strategies. Help students connect the inverse operations to the different ways of solving the puzzles.

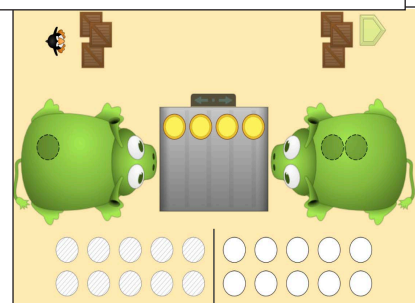
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Level 1 reviews how to play the Pie Monster game.



Level 4 requires students to choose whether to add or subtract.



Unknowns in Two-Step Problems - 2



How Many Legs?

Grade 3

Unknowns in Two-Step Problems

3 levels

Probing Questions

- How do you know how many boots to choose?
- How can you figure it out without counting each leg?

What Concepts Are Being Developed?

Students must multiply before adding. This game provides a visual context to build an intuitive understanding of the order of operations which is further developed through subsequent games in the objective.

Classroom Connection

Project a puzzle and ask students to write an equation using addition and multiplication. Discuss why the puzzle makes it clear that you must multiply first. Ask them to connect each number in the equation with a visual in the puzzle.

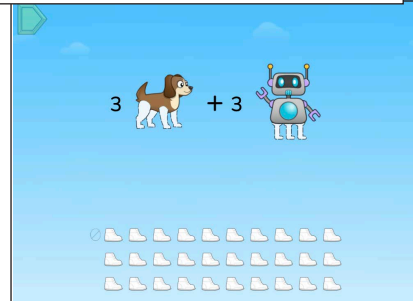
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Level 1 is all visual.



In levels 2-3, numbers replace some of the visuals.



Unknowns in Two-Step Problems - 3



How Many Creatures?

Grade 3

Unknowns in Two-Step Problems

5 levels

Probing Questions

- How do you know how many of each animal to choose?
- Where do you start?
- What do you notice about the different animals?
- How many boots will you need for 1? For 2?

What's Important Here?

Since there are two unknowns in most levels, this game provides challenging problems that can't be easily solved by writing an equation and solving for an unknown. Students must manage multiple variables and try different strategies for solving the puzzles. Counting and adjusting the next attempt based on the previous try builds important problem-solving muscle.

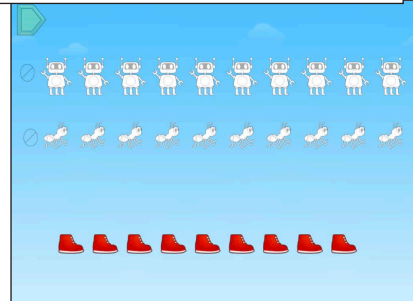
Classroom Connection

Choose a puzzle and have students work in pairs to determine if the puzzle has multiple solutions. Ask them to generate equations to show how they figured out their solutions. Look for patterns in multiple solutions.

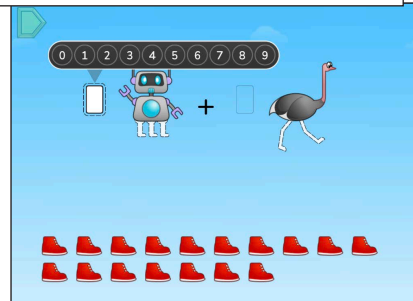
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There are multiple solutions for some of the puzzles.



Levels 4-5 introduce more symbolic language.



Unknowns in Two-Step Problems - 4



Operation Race

Grade 3

Unknowns in Two-Step Problems

3 levels

Probing Questions

- What does the race show you about which operation to do first?
- What happens when there is a tie?
- What rules can you make based on this game?

What's Important Here?

Pause to show the animals jumping into the boots. Discuss Since the order of operations is an agreed upon convention, the race provides a visual to help students learn this. The previous games built an intuition for multiplying and dividing before adding and subtracting. Here students practice the left-to-right rule and doing the operations inside the parentheses first.

Something to Think About

Rather than teaching the inaccurate acronym PEMDAS, use the puzzles in Level 2 to illustrate the left-to-right convention. Be sure to get it wrong to show how the animation illustrates this.

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PEMDAS doesn't always work.

$$5-3+2$$

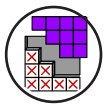


Do grouped operations first.

$$10 \div (1 \times 5)$$



Unknowns in Two-Step Problems - 5



Complete Box

Grade 3

Unknowns in Two-Step Problems

4 levels

Probing Questions

- How did you decide whether to add or subtract?
- Why do you have to multiply first?

What do the Standards Say?

Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity.

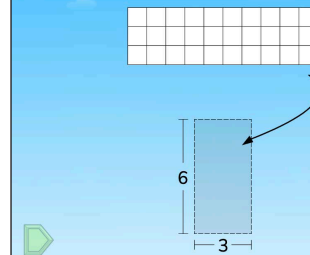
Something to Think About

This game provides another model for two-step problem solving. The multiplication is shown as an array with quantities added or subtracted.

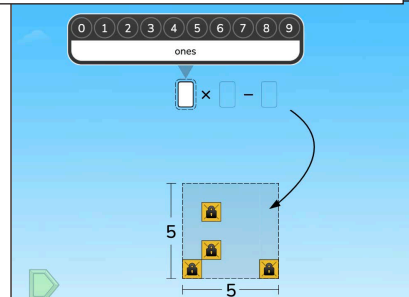
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Level 1 reminds students what the array model looks like.



Students create an expression to match the visual.



Unknowns in Two-Step Problems - 6



Which Parentheses

Grade 3

Unknowns in Two-Step Problems

2 levels

Probing Questions

- How do you know where to put the parentheses?
- How could you describe the arrangement of blocks?

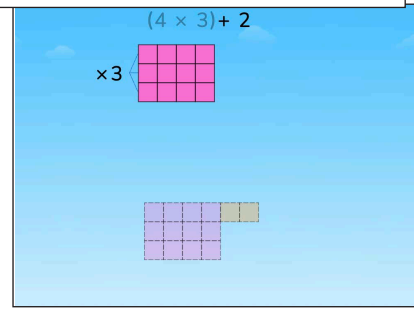
Stop the Animation Using the Scrub Bar

Choose a wrong answer and pause animation after both visual models are shown. Discuss the difference between the two arrangements and expressions.

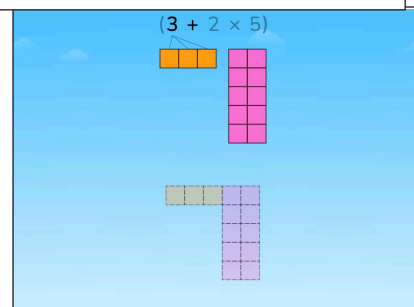
Something to Think About

In this game, students must use parentheses and order of operations to record an expression that represents a configuration of blocks.

Using the scrub bar clearly shows the importance of parentheses.



Order of operations is followed inside parentheses.



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Unknowns in Two-Step Problems - 7