Fruit Monster

Grade 3   Multiplication and Division Relationships   4 levels

Probing Questions
- What question does this puzzle ask?
- How do you decide how many to choose?

What Concepts Are Being Developed?
Students explore the relationships among the quantities without any symbols. This develops an understanding of multiplication and division as inverse operations.
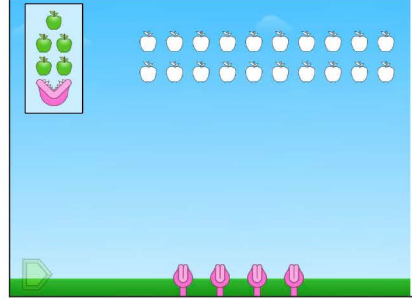
Classroom Connection
Explore strategies students are using to solve. Ask students to develop word problems for different types of puzzles and compare them, reflecting on how the unknown shifts.
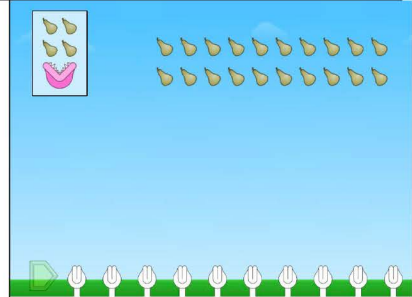
Equal groups situation: Product unknown.

Equal groups situation: Number of groups unknown

Leg Drape Symbolic

Grade 3   Multiplication and Division Relationships   3 levels

Probing Questions
- What does the number represent?
- What do you need to find?
- How are you figuring it out?

Something to Think About
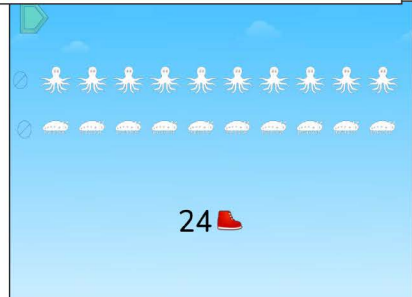The snake puzzle helps students explore and discuss the 0 property of multiplication.

Uncover the Thinking
Present puzzles where the unknown is in different places and ask students to explain how they decide how to solve the varying puzzles.

Equal groups: number of groups unknown

0 1 2 3 4 5 6 7 8 9

8
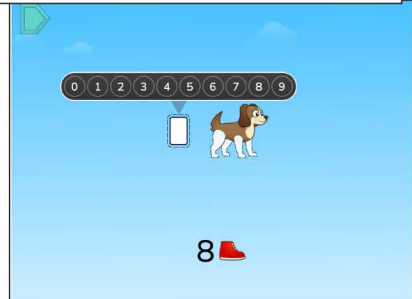
Equal groups: size of groups unknown

24

Multiplication Facts

Grade 3   Multiplication and Division Relationships   4 levels

Probing Questions
- What do you have to find in this puzzle?
- How do you know how many to choose?

Supporting Struggling Students
If a student is struggling with basic facts, let the student choose which materials will help. Use this as an opportunity to make their counting strategies more efficient.

What Strategies Are Being Used?
Ask students to share how they are solving puzzles where the:
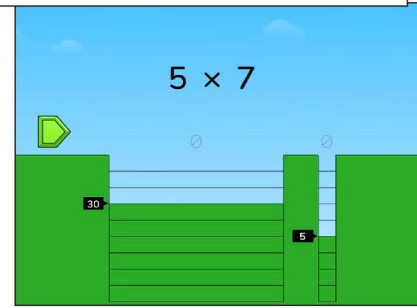- The group size is unknown
- The number of groups is unknown

Help students connect these strategies to the inverse nature of multiplication and division.
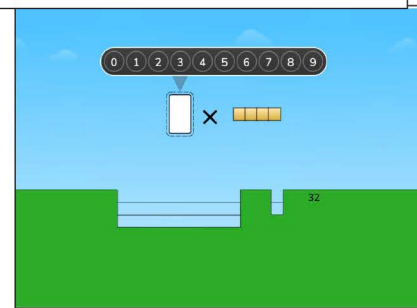
ST Math

Place value is reinforced as students show the product.

$$5 \times 7$$

Level 4 shows the unknown in all positions.

Build Expressions

Grade 3   Multiplication and Division Relationships   3 levels

Probing Questions
- How does this symbol relate to which way you move the cursor?
- What do these groups represent?

What's Important Here?
Paired problems throughout this game illustrate the inverse relationship between multiplication and division. Projecting the games and drawing this out in class will help students solidify this understanding.
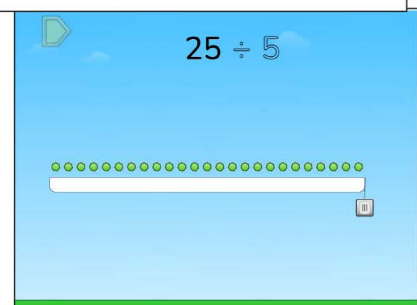
The Bigger Picture
Using small numbers helps students focus on the inverse relationship of multiplication and division rather than on computing answers.

ST Math

This version of the game focuses on the difference between multiplication and division.

$$2 \times 5$$
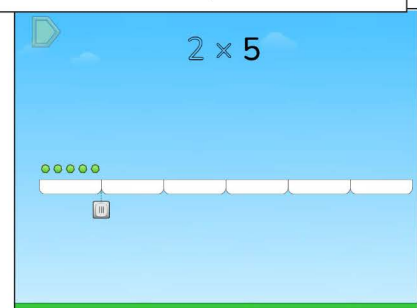
Using factors of 2, 3, 4, and 5 keeps the focus on relationships.

$$25 \div 5$$

Multiplication Division Fact Family

Grade 3   Multiplication and Division Relationships   4 levels

Probing Questions
- What true equations can you write?
- What will you see in the animation?
- How will you decide which number to use first?

Research is Clear
Students tend to overgeneralize the commutative property and apply it to division. For example, while $a×b=b×a$, $a÷b ≠ b÷a$.
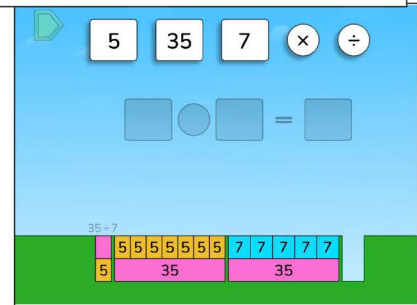
Supporting Struggling Students
Ask students to read the equations as they create them and to evaluate if it is viable. Use the scrub bar to pause and examine the model of their equation. This will help them understand the difference between $12÷3$ and $3÷12$.

ST Math.
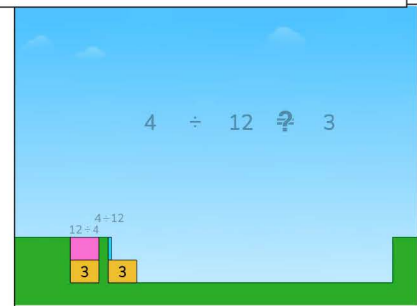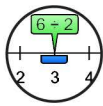
Look at what has been completed to determine what equation is missing.

Examining errors helps students understand how to write division equations.

Number Line Division

Grade 3   Multiplication and Division Relationships   4 levels

Probing Questions
- How will this problem be illustrated on the number line?
- How can knowing multiplication help you with division?

What's Important Here?
Calling out the paired problems might help students solve division as a missing factor problem. Project the puzzles and ask students to see how the two puzzles connect. Ask how knowing the multiplication can help with the division.
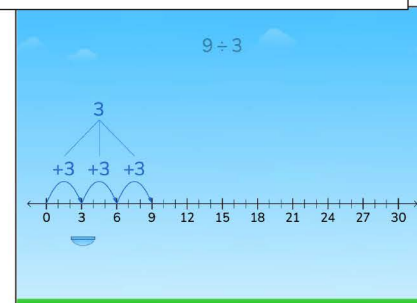
Something to Think About
Use the number line to show operations rather than just identifying numbers. Students can generate their own number line models of the expressions.

ST Math.

The animation shows multiplication as repeated addition.
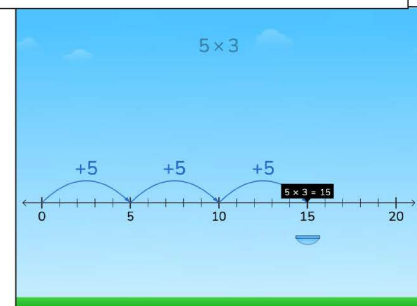
Discuss division as repeated subtraction.

Select Box

Grade 3 ⬡ Multiplication and Division Relationships   ⬚ 4 levels

Probing Questions
- What does this puzzle ask you to find?
- How are you finding the unknown?

What's Important Here?
Levels 3 and 4 pair a missing factor problem with a division problem using the same numbers. Discuss these in class to help students deepen their understanding of the inverse relationship between the two operations.
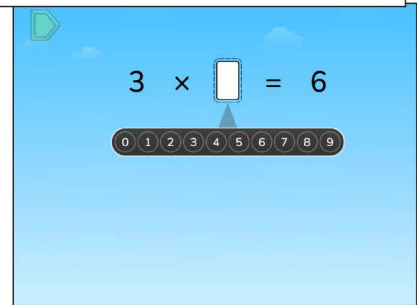
What Strategies Are Being Used?
Some students may see the division as finding the number of groups rather than the size of the groups as shown in the animation. Encourage them to use whichever definition works best for them for the given problem.
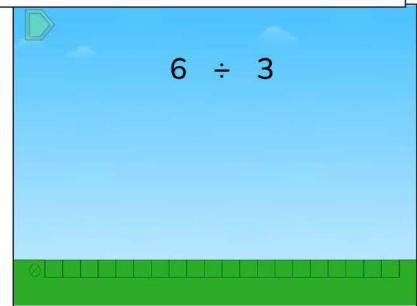
ST Math

The unknown changes throughout this game.

$$3 \times \boxed{} = 6$$

0 1 2 3 4 5 6 7 8 9

Levels 3 and 4 use paired problems.

$$6 \div 3$$