InsightMath
California

Solving Algebraic Equations

Family Guide | Grade 6 | Unit 5

> **Your student is exploring how algebraic equations can be used to model and solve real-world problems.**

Key Math Ideas

In this unit, students learn that equations show how two things are equal and can be changed in certain ways without changing their meaning. They continue to build their algebra skills by using simple models to understand more abstract math ideas. Students explore how equations stay balanced and that they can solve for the variable using inverse operations. This helps them see how algebra can be used to understand and solve problems in everyday life.

Using a balance to find the value of the triangle and square.
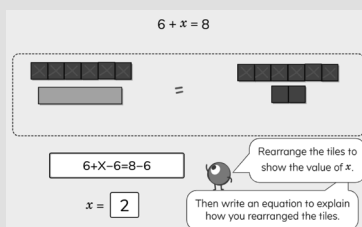
Using algebra tiles to find the value of x.
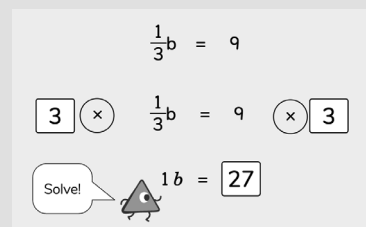
Using inverse operations to solve for x.

→ In the first half of the unit, your student will learn to

- use visual supports such as a pan balance model and algebra tiles to solve equations (find the value of the variable);
- find equivalent equations and describe how to use inverse operations to solve equations involving addition and multiplication;
- determine if a given equation is always true, sometimes true, or never true;
- write equations to model and solve word problems.
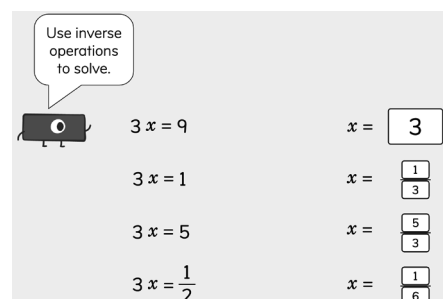
→ In the second half of the unit, your student will learn to

- write expressions and equations to model growing patterns shown in a visual sequence;
- create equations, tables, and graphs to model linear and nonlinear patterns shown in a visual sequence or real-world context;
- describe and compare linear and nonlinear relationships shown on a graph.
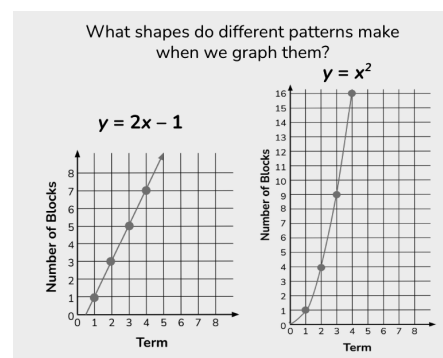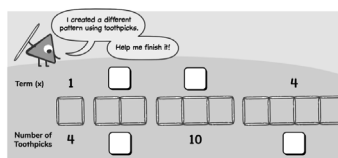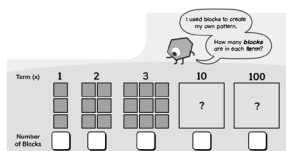
Helpful Hint

In this unit, students use models and substitution to test whether an equation is sometimes, always, or never true. They recognize that equations with the same values on both sides will always be true, while others may only be true for specific values. For example, the equation $4 + 8y = 2(2 + 4y)$ is always true because it is true for all values. On the other hand, the equation $2p + 3 = p + 5$ is only sometimes true since it is true when $p = 2$ but not for other values. If your student is using substitution to check equivalence, ensure that they substitute more than one value for the variable to check.

Tips for Supporting Your Student at Home

Questions to Ask Your Student

→ **In the beginning of the unit:**

- How does the idea of a balance help you solve equations?
- How can you decide if the equation is always, sometimes, or never true?
- How can you use inverse operations to solve addition equations?
- How can you use inverse operations to solve multiplication equations?

→ **By the end of the unit:**

- How can you use math to think about patterns?
- What shapes do different patterns make when they are graphed?
- What are ways people use graphs in everyday life?

If...	Try...
your student struggles to identify or correctly apply the needed inverse operation to isolate and solve for the variable, such as when solving a multiplication equation like $4x = 20$, students add $20 + 4$ instead of dividing $20 \div 4$ . . .	having your student check their solutions by substituting back into the original equation to see if both sides are equal. This process helps student verifying their solution, and it provides them a way to find their mistake.

Student Strengths Spotlight

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I value mistakes.	By analyzing mistakes made by themselves and others, students deepen their understanding and recognize mistakes as opportunities to learn.
I seek out challenges as opportunities to grow.	Challenging problems help students expand their thinking and reasoning. Students recognize that challenges can help them learn!
I notice patterns and try to apply them across situations.	Students use patterns in multiplication and division and patterns in addition and subtraction to explore how to use inverse relationships to solve for a variable.
I use math to represent real-life situations, and I create contexts to match the given math.	Students represent real world situations with equations with variables, then solve for the variable to answer questions within the context.

Try This Together!

- **Balance Scale Logic Puzzles.** Make or find logic puzzles where students are given an equality visually and need to find the value of one or more symbols, such as those shown below. This will support your students to further explore equivalence and find the value of an unknown in a fun way!
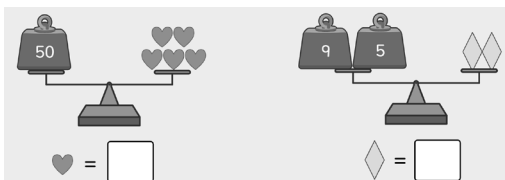
- **Growing Pattern Challenge.** Using toothpicks, marshmallows, or even building blocks, create a pattern that grows in a predictable way, such as the one shown below. After building the first 3–4 stages (terms) in the sequence, challenge your student to:

  - draw or build what the next two stages would look like;

  - find the rule for how many pieces are needed for any term in the sequence;

  - write an algebraic expression to represent the sequence, such as $y = 3x$ for the sequence below.