

## Objective

Write an appropriate linear equation for a given word problem and find the solution.

## Common Core State Standards

7.EE.4a Solve word problems leading to equations of the form $p x+q=r$ and $p(x+q)=r$, where $p, q$, and $r$ are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm . Its length is 6 cm . What is its width?

## Solving Linear Equations

Students have learned that a linear equation is made up of up to 2 polynomials or monomials that have variables of only the first degree. They know how to determine whether a given equation is linear and how to solve linear equations with one variable. This lesson focuses on how to solve applications of linear equations with variables on both sides of the equal sign.

## Try lit! Perform the Try It! activity on the next page.

## Talk About lt

Discuss the Try It! activity.

- Ask: Is the amount of money the children have expressed in terms of Corina or in terms of Matsu?
- Ask: Are there any like terms you can combine on either side?
- Ask: If you take (subtract) an x-block from the left side and an x-block from the right side, will the balance hold? What if you take a second x-block from each side?


## Solve It

Reread the problem with students. Ask: What should you do now that you know that the x-block is worth $\$ 3$ ? Help students understand that " $x=3$ " means that Matsu has $\$ 3$. Since Corina has 3 more than 4 times that much, she has $\$ 15$.

## More Ideas

For other ways to teach about equations-

- Have students solve the problem using Algebra Tiles ${ }^{\text {TM }}$.
- Extend the activity by having students solve $3 x-8=2-2 x$ and $6 x+5=8 x-1$.


## Formative Assessment

Have students try the following problem.
Solve the given equation.
$3 x+7=5 x+3$
A. $2 x+3=7$
B. $x=2$
C. $3 x+4=5 x$
D. $x=4$

## Try $\mid t!15$ minutes $\mid$ pairs

Here is a problem about writing equations.

Corina has \$3 more than four times the amount of money that Matsu has. Together they have six times the amount that Matsu has. How much money does each child have?

Introduce the problem. Then have students do the activity to solve the problem. Distribute the materials.


1. Help students model the amount of money from the information given in the word problem. Ask: How can you express the amount of money that Matsu has? How can you express the amount of money that Corina has? How can you express the amount of money that they have together?

2. Ask students to take a yellow $x$-block from the left side at the same time that they take an $x$-block from the right side until their mat shows 3 green unit blocks on the left and 1 $x$-block on the right side. Ask: What is the value of $x$ ? Have students find the solution and write the answer on a piece of paper.

3. Have students write the equation on a piece of paper. Have students place Algeblocks on the Sentences Mat to create a model of the linear equation and show that together they have six times as much as Matsu.

## A Look Out!

Some students will stop working when they have found the value of $x$. Ask them to reread the problem to see what question is being asked. Ask: Does each child have \$3? Explain to students that they must take the $x$-value and apply it to the word problem in order to determine the amount of money that each child has.

## Use Algeblocks and an Algeblocks Sentences Mat to model the equation shown and then solve it. Write the equation and the solution.

1. 



Using Algeblocks and an Algeblocks Sentences Mat, model each equation. Sketch the model. Write each solution.
2. $3 x+9=4 x$

3. $4 x=12+3 x$


## Find each solution.

4. $x+1=2 x$
$\qquad$
5. $6 x+5=7 x$

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x=5
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8. $10 x=9 x+9$

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x=9
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5. $4 x=1+3 x$
$\square$
6. $x+6=2 x$
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7. $8 x+8=7 x$

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x=-8
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## Answer Key

Challenge! When solving an equation, how do you get both the variable terms on the same side of the equal sign? Explain.

Challenge: (Sample) Add the opposite of the term that is with the constant term to both sides of the equation.
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Name

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BLM 7 Algeblocks Sentences Mat

