Staying in Balance

Lesson # 3

Addressing	**6.EE.B.5** Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. **6.EE.B.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. **6.EE.B.7** Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.

Let’s use balanced hangers to help us solve equations.

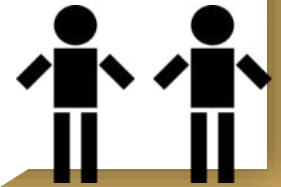
Today's Goals

- ❑ I can compare doing the same thing to the weights on each side of a balanced hanger to solving equations by subtracting the same amount from each side or dividing each side by the same number.
- ❑ I can explain what a balanced hanger and a true equation have in common.
- ❑ I can write equations that could represent the weights on a balanced hanger.

Students, write your response!

Hanging Around

Warm Up 3.1



What do you notice? What do you wonder?

Work on the task quietly (3 min)

1. For diagram A, find:

   a. One thing that *must* be true

   b. One thing that *could* be true or false

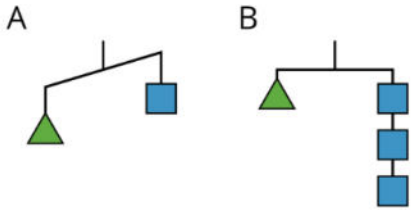
   c. One thing that *cannot possibly* be true

2. For diagram B, find:

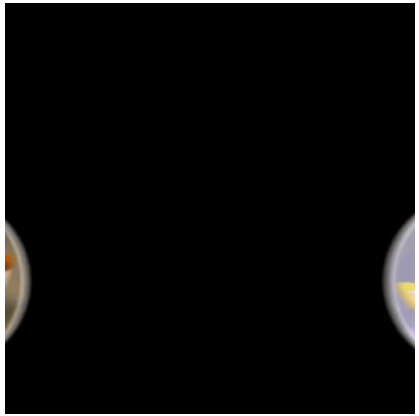
   a. One thing that *must* be true

   b. One thing that *could* be true or false

   c. One thing that *cannot possibly* be true



Match Equations and Hangers

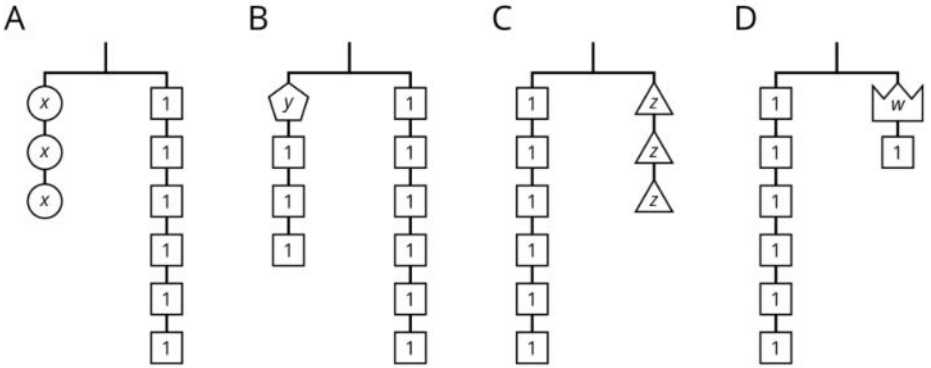


Activity 3.2

- MLR2: Collect and Display
  - Think Pair Share




- Work quietly on the task (3-5 min)
- Share your responses with your partner (3-5 min)



1. Match each hanger to an equation. Complete the equation by writing x, y, z, or w in the empty box.

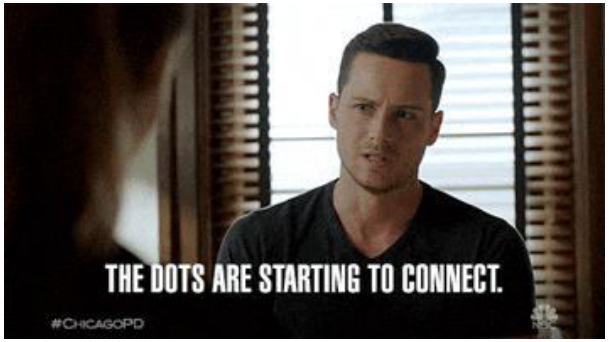
$\square + 3 = 6$ $\quad 3 \cdot \square = 6$ $\quad 6 = \square + 1$ $\quad 6 = 3 \cdot \square$

2. Find a solution to each equation. Use the hangers to explain what each solution means.

Let’s Talk About It

- Explain how you know from looking at a hanger that it can be represented by an equation involving addition.
- Explain how you know from looking at a hanger that it can be represented by an equation involving multiplication.
- What are some moves that ensure that a balanced hanger stays balanced?

Connecting Diagrams to Equations and Solutions

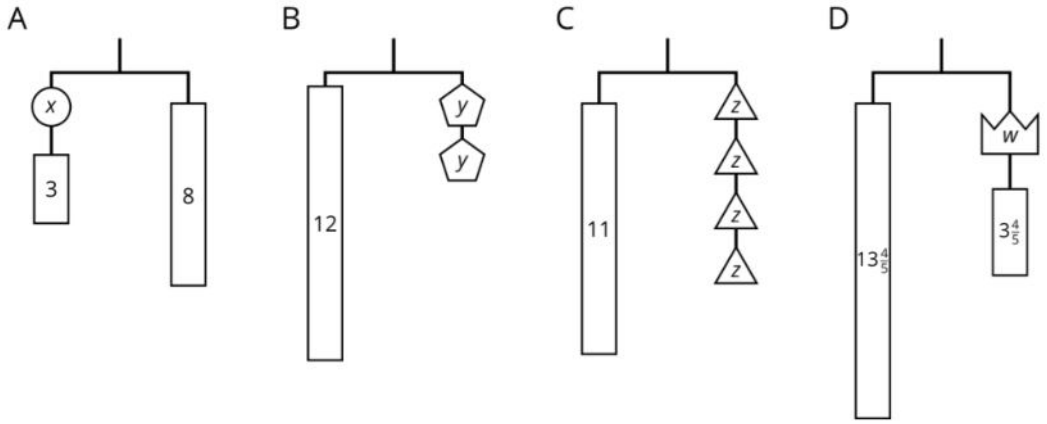


Activity 3.3

- Think Pair Share
- MLR7: Compare and Connect

- Work quietly (3-5 min)
- Share your responses with your partner (3-5 min)

Here are some balanced hangers. Each piece is labeled with its weight.



For each diagram:

1. Write an equation.
2. Explain how to reason with the diagram to find the weight of a piece with a letter.
3. Explain how to reason with the equation to find the weight of a piece with a letter.

Are you ready for more?

When you have the time, visit the site https://solveme.edc.org/Mobiles.html to solve some trickier puzzles that use hanger diagrams like the ones in this lesson. You can even build new ones. (If you want to do this during class, check with your teacher first!)

Lesson Synthesis

$5x = 8$

$5 + x = 8$

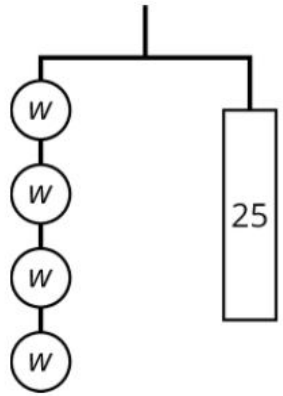
- Draw a hanger to match each equation
- Work with your partner to solve the equation and find the unknown value on the hanger.

Today's Goals

- ❑ I can compare doing the same thing to the weights on each side of a balanced hanger to solving equations by subtracting the same amount from each side or dividing each side by the same number.
- ❑ I can explain what a balanced hanger and a true equation have in common.
- ❑ I can write equations that could represent the weights on a balanced hanger.

Weight of the Circle

Here is a balanced hanger.



1. Write an equation representing this hanger.
2. Find the weight of one circle. Show or explain how you found it.