## Lesson 7: Reasoning about Solving Equations (Part 1)

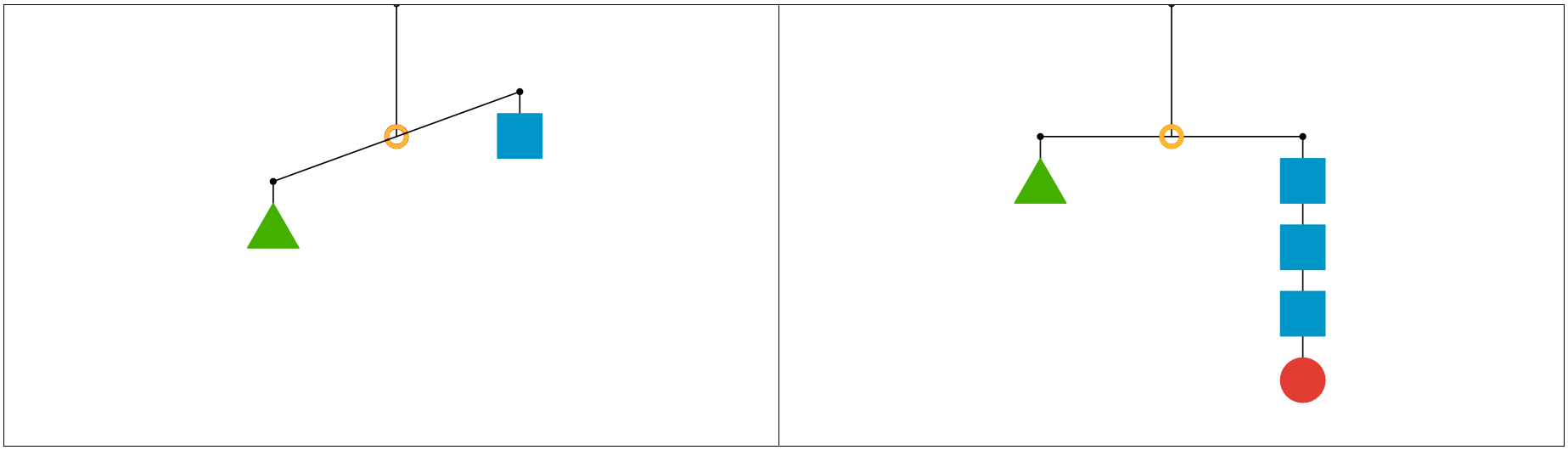
Let’s see how a balanced hanger is like an equation and how moving its weights is like solving the equation.

### 7.1: Hanger Diagrams

In the two diagrams, all the triangles weigh the same and all the squares weigh the same.

For each diagram, come up with . . .

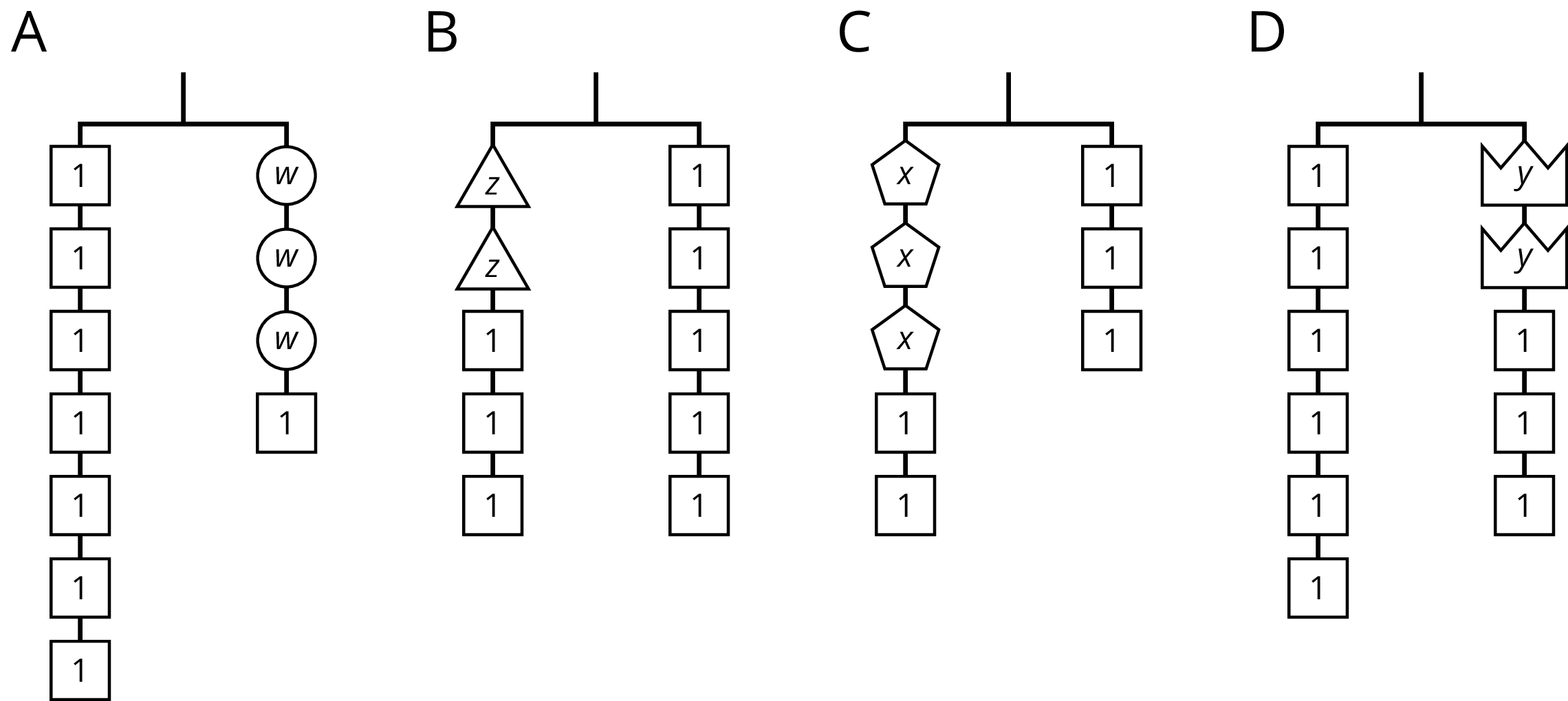
1. One thing that *must* be true
2. One thing that *could* be true
3. One thing that *cannot possibly* be true



### 7.2: Hanger and Equation Matching

On each balanced hanger, figures with the same letter have the same weight.

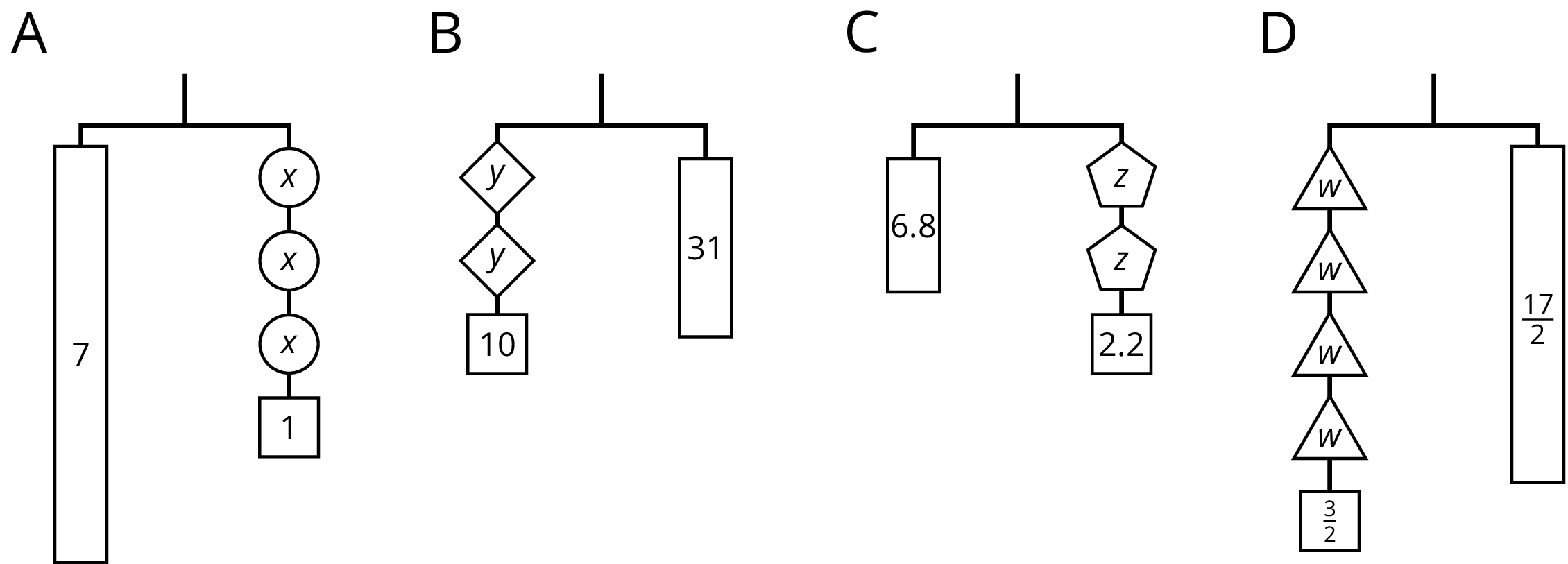
1. Match each hanger to an equation. Complete the equation by writing , , , or in the empty box.
2. Find the solution to each equation. Use the hanger to explain what the solution means.



### 7.3: Use Hangers to Understand Equation Solving

Here are some balanced hangers where each piece is labeled with its weight. For each diagram:

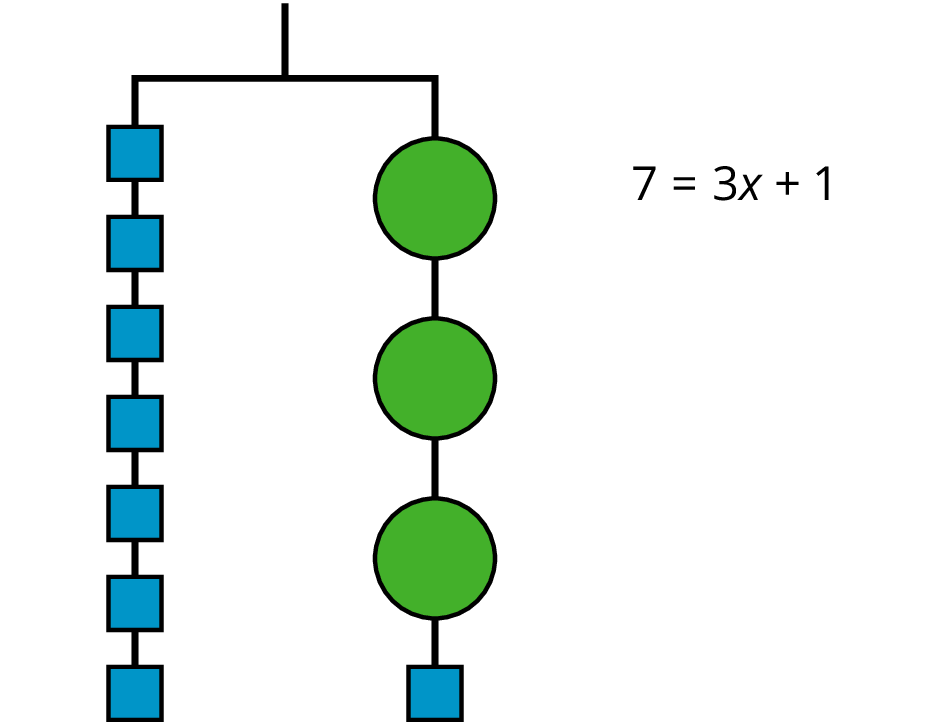
1. Write an equation.
2. Explain how to figure out the weight of a piece labeled with a letter by reasoning about the diagram.
3. Explain how to figure out the weight of a piece labeled with a letter by reasoning about the equation.



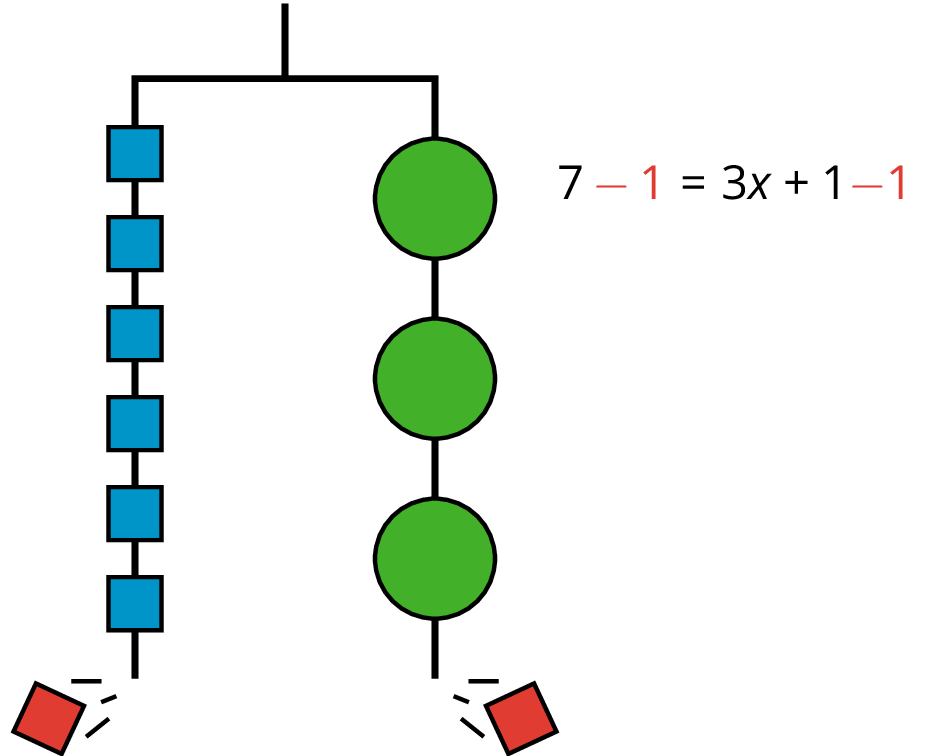
### Lesson 7 Summary

In this lesson, we worked with two ways to show that two amounts are equal: a balanced hanger and an equation. We can use a balanced hanger to think about steps to finding an unknown amount in an associated equation.

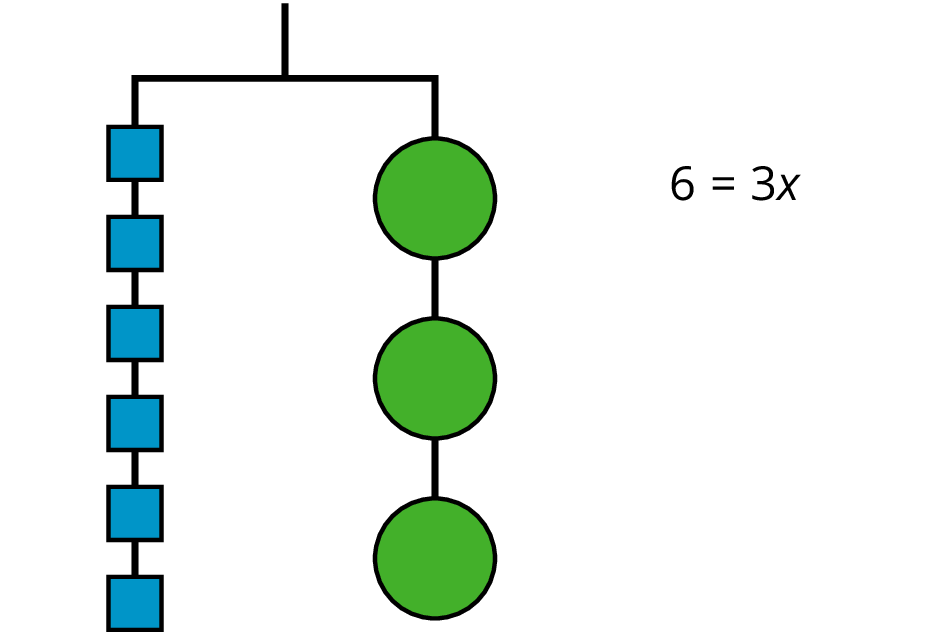
The hanger shows a total weight of 7 units on one side that is balanced with 3 equal, unknown weights and a 1-unit weight on the other. An equation that represents the relationship is .



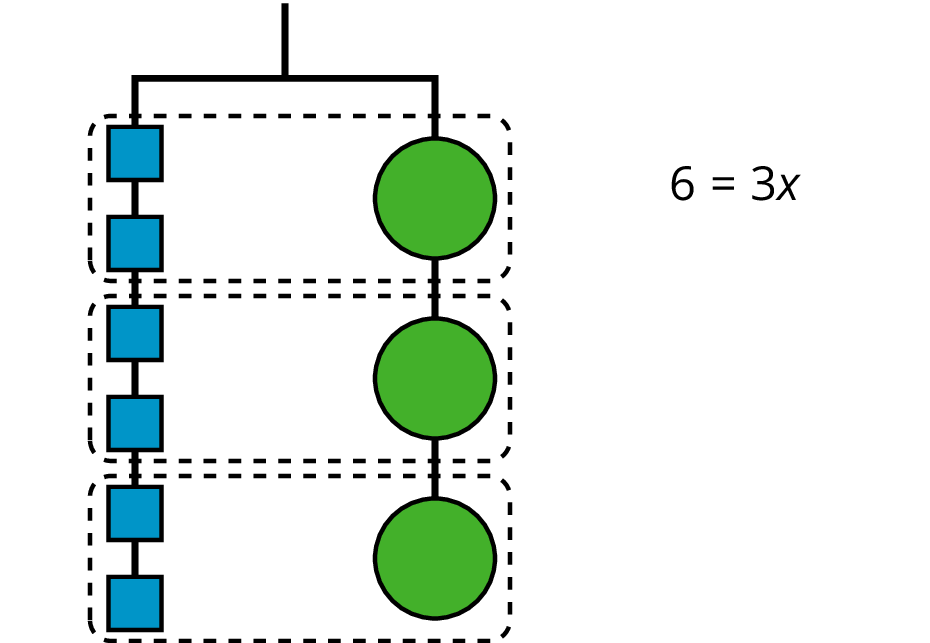
We can remove a weight of 1 unit from each side and the hanger will stay balanced. This is the same as subtracting 1 from each side of the equation.



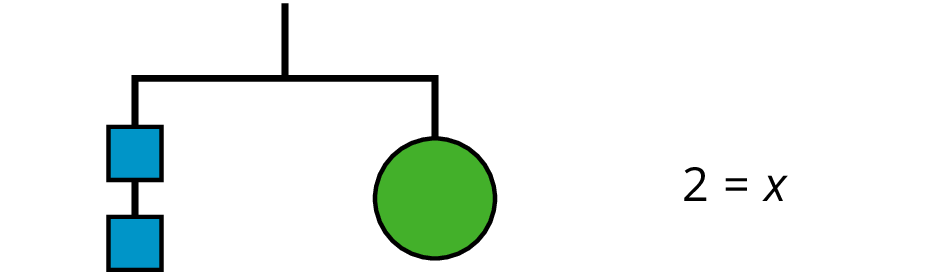
An equation for the new balanced hanger is .



So the hanger will balance with  of the weight on each side: .



The two sides of the hanger balance with these weights: 6 1-unit weights on one side and 3 weights of unknown size on the other side.



Here is a concise way to write the steps above:



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