

NAME _____

DATE _____

PERIOD _____

Unit 6, Lesson 8

Reasoning about Solving Equations (Part 2)

Let's use hangers to understand two different ways of solving equations with parentheses.

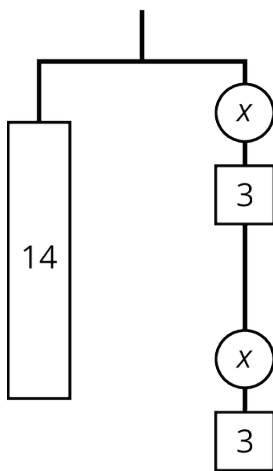
8.1 Equivalent to $2(x + 3)$

Select **all** the expressions equivalent to $2(x + 3)$.

1. $2 \cdot (x + 3)$
2. $(x + 3)^2$
3. $2 \cdot x + 2 \cdot 3$
4. $2 \cdot x + 3$
5. $(2 \cdot x) + 3$
6. $(2 + x)^3$

8.2 Either Or

1. Explain why either of these equations could represent this hanger:



$14 = 2(x + 3)$ or $14 = 2x + 6$

NAME _____

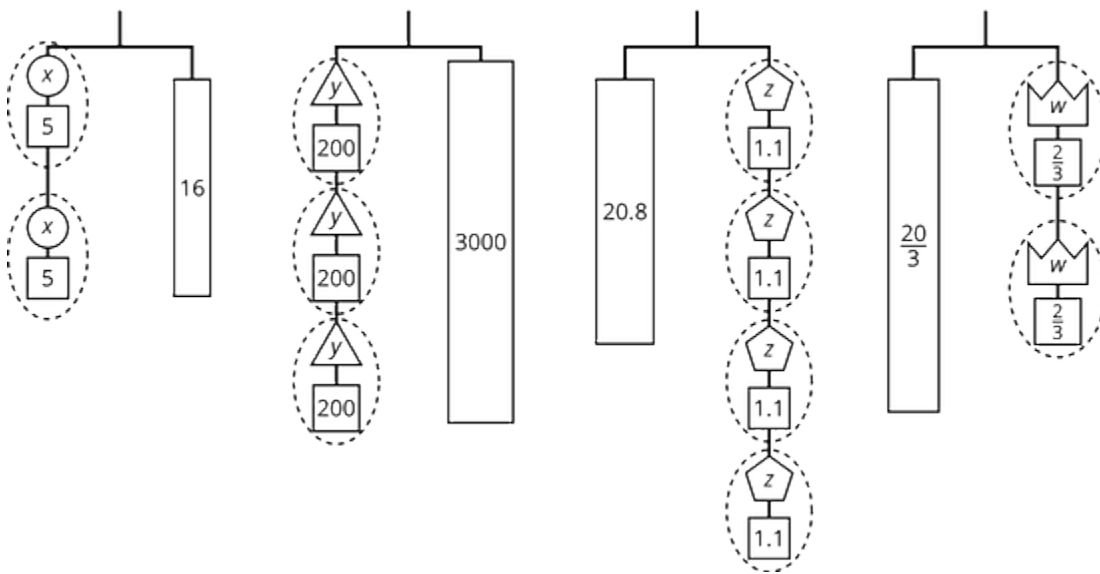
DATE _____

PERIOD _____

2. Find the weight of one circle. Be prepared to explain your reasoning.

8.3 Use Hangers to Understand Equation Solving, Again

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



For each diagram:

1. Assign one of these equations to each hanger:

$$2(x + 5) = 16$$

$$20.8 = 4(z + 1.1)$$

$$3(y + 200) = 3,000$$

$$\frac{20}{3} = 2\left(w + \frac{2}{3}\right)$$

2. Explain how to figure out the weight of a piece labeled with a letter by reasoning about the diagram.

NAME _____

DATE _____

PERIOD _____

3. Explain how to figure out the weight of a piece labeled with a letter by reasoning about the equation.

Lesson 8 Summary

The balanced hanger shows 3 equal, unknown weights and 3 2-unit weights on the left and an 18-unit weight on the right.

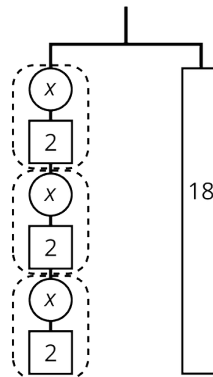
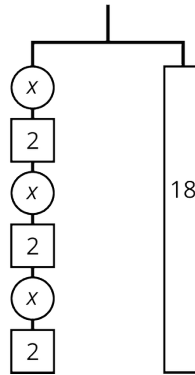
There are 3 unknown weights plus 6 units of weight on the left. We could represent this balanced hanger with an equation and solve the equation the same way we did before.

$$3x + 6 = 18$$

$$3x = 12$$

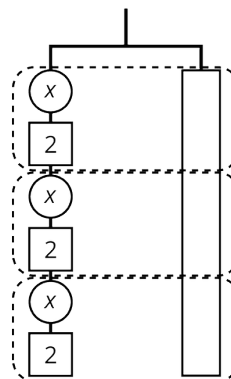
$$x = 4$$

Since there are 3 groups of $x + 2$ on the left, we could represent this hanger with a different equation: $3(x + 2) = 18$.



$$3(x + 2) = 18$$

The two sides of the hanger balance with these weights: 3 groups of $x + 2$ on one side, and 18, or 3 groups of 6, on the other side.



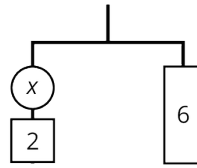
$$3(x + 2) = 18$$

NAME _____

DATE _____

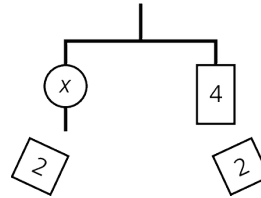
PERIOD _____

The two sides of the hanger will balance with $\frac{1}{3}$ of the weight on each side: $\frac{1}{3} \cdot 3(x + 2) = \frac{1}{3} \cdot 18$.



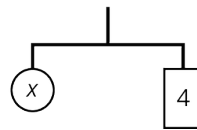
$$x + 2 = 6$$

We can remove 2 units of weight from each side, and the hanger will stay balanced. This is the same as subtracting 2 from each side of the equation.



$$x + 2 = 4 + 2$$

An equation for the new balanced hanger is $x = 4$. This gives the solution to the original equation.



$$x = 4$$

Here is a concise way to write the steps above:

$$3(x + 2) = 18$$

$$x + 2 = 6 \quad \text{after multiplying each side by } \frac{1}{3}$$

$$x = 4 \quad \text{after subtracting 2 from each side}$$