

## 8.6

# Communicating the Solution for an Equation

**You will need**

- red and blue counters

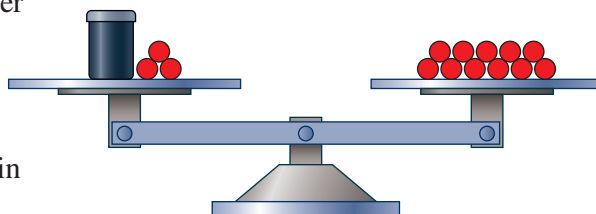
**▶ GOAL**

Communicate about solving equations using correct mathematical language.

**Communicate about the Math**

Omar and Tynessa are trying to figure out the number of counters in the container on this pan balance.

Omar says that he knows how many counters are in the container. He tries to show his thinking using algebra. Tynessa asks him to explain what he means.


**? How can Omar improve his explanation?**
**Omar's Explanation**

$$c + 3 - 3 = 11 - 3 = 8$$

$$c = 8$$

I subtracted 3 from 11.

There are 8 red counters in the container.

**Tynessa's Questions**

I see where  $c + 3$  comes from, but how do you get 8?

Why did you subtract?

How do you know your solution is correct?

- Would you have asked any of the same questions? Explain why or why not.
- Which parts of Omar's solution and explanation were not clear?
- What other questions would you ask about Omar's explanation?
- Write your explanation. (You can use any method that makes sense to you.) Make sure that Tynessa's questions and your questions from step C are answered.

**Communication Checklist**

- ☒ Did you show each step of your thinking?
- ☒ Did you express yourself clearly?
- ☒ Were you convincing?

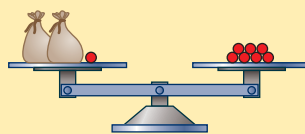
## Reflecting

1. Which parts of the Communication Checklist did Omar cover well? Explain.
2. How could Omar have made his solution easier to understand?
3. Why is it important to show your steps in a logical order when solving an algebraic equation?

## Work with the Math

### Example: Explaining the solution for an equation

Omar wants to help Mei make her algebraic solutions easier to understand. He shows his solution to this balance problem.



#### Omar's Solution

$n$  represents the number of counters in each bag.

$$\begin{aligned}2n + 1 &= 7 \\2n + 1 - 1 &= 7 - 1 \\2n &= 6 \\n &= 3\end{aligned}$$

Check.

Left side	Right side
$2n + 1$	7
$= 2(3) + 1$	
$= 6 + 1$	
$= 7 \checkmark$	

There are 3 counters in each bag.

I wrote the balance problem as an algebraic equation using the variable  $n$ .

When I take away 1 counter from each side, both sides still balance.

I solved for  $n$ .

I made sure that there was only one equal sign in each step.

I checked my solution by substituting the answer for the variable and checking that it made the equation true.



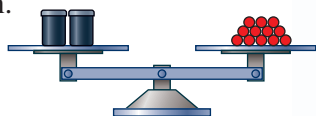
## A Checking

4. Explain what is happening in each step of Tynessa's solution.

$$\begin{aligned}2c &= 12 \\2c \div 2 &= 12 \div 2 \\c &= 6\end{aligned}$$

Check.

Left side	Right side
$2c$	12
$= 2(6)$	
$= 12 \checkmark$	



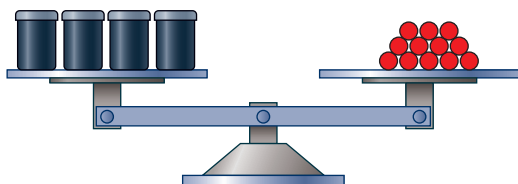
Tynessa said, "When I remove one of the groups from each side, both sides still balance."



## B Practising

Use the Communication Checklist to help you write clear solutions.

5. Explain what is happening in each step of the following solution.

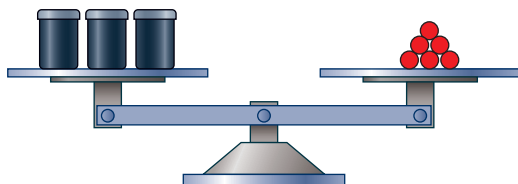


$$\begin{aligned} 4c &= 12 \\ 4c \div 4 &= 12 \div 4 \\ c &= 3 \end{aligned}$$

Check.

Left side	Right side
$4c$	12
$= 4(3)$	
$= 12 \checkmark$	

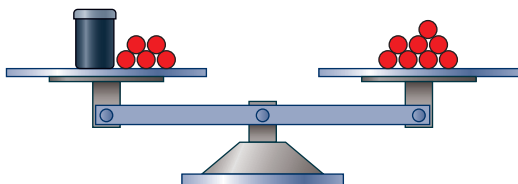
6. Use pictures and words to explain each step in the solution to this balance problem.



7. Explain why the steps in this solution for the equation  $a + 4 = 13$  are confusing. Correct the steps.

$$a + 4 = 13 = 13 - 4 = 9$$

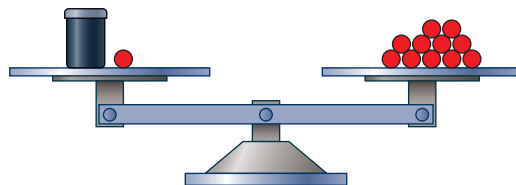
8. Improve Tynessa's solution and explanation.



$$\begin{aligned} x + 5 &= 8 \\ x &= 8 - 5 \\ x &= 3 \end{aligned}$$

"I subtracted 5 because of the zero principle, so  $8 - 5$  equals 3."

9. Find and explain any errors in each solution to this balance problem. Rewrite each solution correctly, and check your work.



- a) Mei's method using inspection:

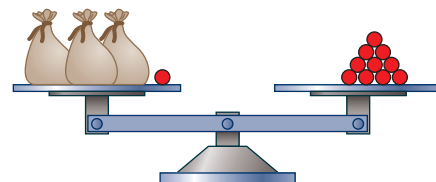
$$\begin{aligned} \text{What number added to 1 gives 11?} \\ 11 + 1 &= 12 \end{aligned}$$

- b) Tynessa's method using operations that balance:

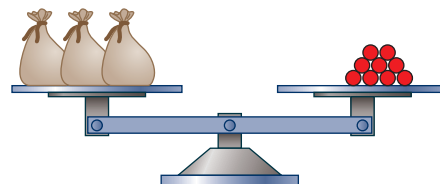
$$\begin{aligned} n + 1 &= 11 \\ n + 1 - 1 &= 11 - 1 \\ n + 0 &= 10 \end{aligned}$$

10. Use words, numbers, and diagrams to explain how you would solve this balance problem.

Step 1:



Step 2:



11. Write a clear algebraic solution for each balance problem. Check that your solution makes the equation true.

- $4x = 8$
- $x + 4 = 9$
- $2x + 5 = 21$
- $x - 2 = 9$