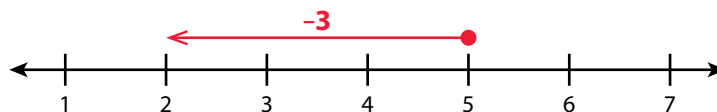# *Understand* Subtraction of Positive and Negative Integers

💭 Think It Through

What happens when you subtract positive and negative numbers?

In the previous lesson you represented a problem like $5 + (-3)$ on a number line. You started at 5 and **moved left (in the negative direction) 3** units to represent adding -3. You ended at 2.

Now let's look at another way to think about this problem.

Think How is subtracting integers like adding integers?

Think about this subtraction problem: $5 - 3 = \boxed{}$.

Because addition and subtraction are inverse operations, you can rewrite this equation as an addition equation.
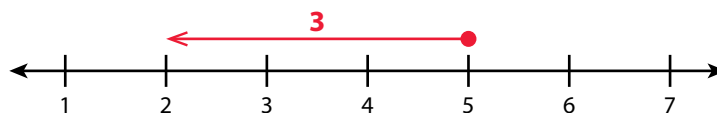
$3 + \boxed{} = 5$

What number do I add to 3 to get 5?

> ✏️ **Circle** the answers on the number line showing $5 + (-3)$ and the number line showing $5 - 3$.

You can also use a number line to represent this equation.

Start at 5 and **move left 3**.

When you look at the number line at the top of the page that represents $5 + (-3)$ and the number line above that represents $5 - 3$, you should notice that they are exactly the same. So, $5 - 3 = 5 + (-3)$.

These two number lines show an important relationship between addition and subtraction. Any subtraction problem can be written as an addition problem.

Look at the two equivalent expressions on the previous page.

$$5 \quad - \quad 3$$

$$5 \quad + \quad (-3)$$
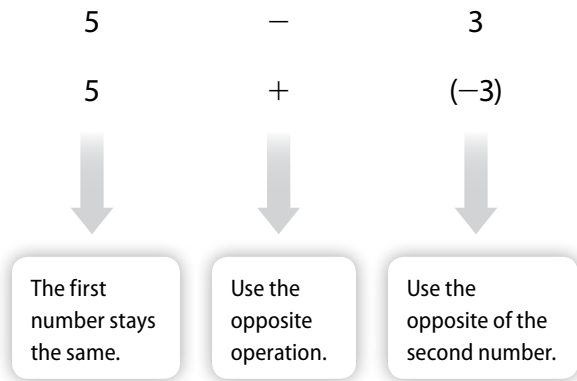
What operation is the opposite of subtraction? What is the opposite of a number, n?

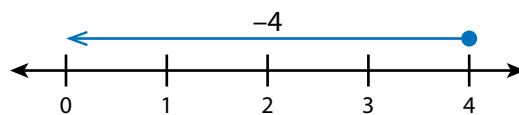| The first number stays the same. | Use the opposite operation. | Use the opposite of the second number. |

This means that every subtraction problem can be written as an addition problem.

So, if you know how to add positive and negative numbers, you know how to subtract them. Here are some other examples:
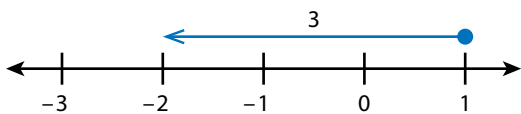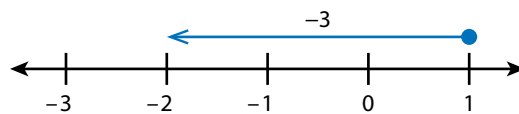
$4 - 4 = 0$
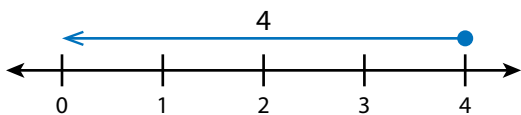
$4 + (-4) = 0$

$1 - 3 = -2$

$1 + (-3) = -2$

▶ Reflect

1 Why can you write a subtraction problem as an addition problem? How do you write a subtraction problem as an addition problem?

_____

_____

_____

_____

Think About ⟩ **Subtracting Positive and Negative Integers**

🔍 **Let's Explore the Idea** **You can write a subtraction problem as an addition problem.**

In problems 2–5, write a subtraction problem to represent the situation. Then write the subtraction problem as an addition problem. Model the addition problem on a number line, and use the number line to answer the question.

**2** Adam buys 9 gift cards and gives 6 away. How many does he have left?

_____

```
←——+——+——+——+——+——+——+——+——+——+——→
    0   1   2   3   4   5   6   7   8   9  10
```
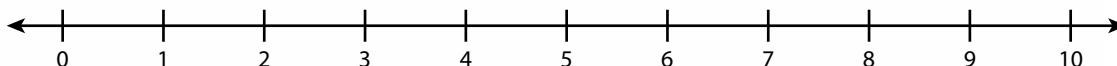
3 Renee is playing a game online. If she gets a total of 25 points, she will have a new high score. She currently has −5 points. What is the difference between a high score of 25 points and the number of points she currently has?

_____

```
←——+——+——+——+——+——+——+——+——+——+——→
  −10  −5   0   5  10  15  20  25  30  35  40
```
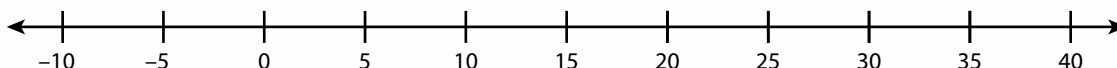
4 Rob is trying to read for 30 minutes each Saturday. He only read for 20 minutes last Saturday. He represents the amount of time he was short of the total 30 minutes as −10 minutes. This Saturday, he wants to make up the difference between the number of minutes he usually reads on Saturday and the number of minutes he was short last Saturday. How many minutes will Rob need to read this Saturday?

_____

```
←——+——+——+——+——+——+——+——+——+——+——→
 −50  −40  −30  −20  −10   0   10  20  30  40  50
```
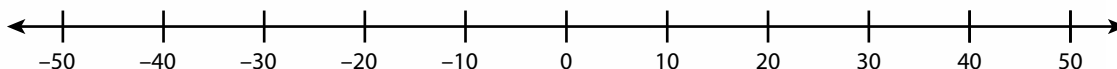
5 The temperature at noon is −4°F. The temperature at 6:00 PM is −12°F. What is the difference between the noon and the 6:00 PM temperatures?

_____

```
←——+——+——+——+——+——+——+——+——+——+——→
  −6  −4  −2   0   2   4   6   8  10  12  14
```
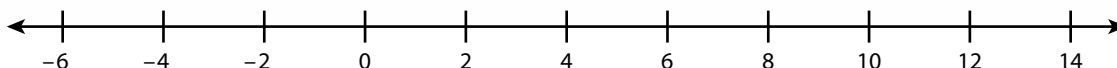
Let's Talk About It
Solve the problems below as a group.

6 Fran rewrites a subtraction problem as an addition problem. The addition problem she writes is $-3 + (-4)$. How could you use a number line to help you write $-3 + (-4)$ as a subtraction problem? _____

_____

7 Look back at problem 6. What was Fran's original subtraction problem? Explain how you got your answer. _____

_____

_____

Use the number line below for problems 8–10.
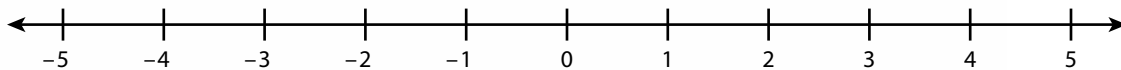
8 What is the distance between 2 and 3 on the number line? _____

What is $|\, 3 - 2\,|$? _____ What is the distance between -3 and -2? _____

What is $|\, -3 - (-2)\,|$? _____

9 What is the distance between 4 and 1 on the number line? _____

What is $|\, 4 - 1\,|$? _____ What is the distance between -4 and -1? _____

What is $|\, -4 - (-1)\,|$? _____

10 Look at your answers to problems 8 and 9. What do you notice about the absolute value of the difference between two numbers? _____

_____

▶ Try It Another Way Work with your group to solve this problem.

11 Write an absolute value expression to represent the distance between -2 and 4 on a number line. Then evaluate the expression.

_____

Connect **Subtracting Positive and Negative Integers**

Talk through these problems as a class and write your answers below.

12 **Compare** How are the expressions $8 - 15$ and $8 + (-15)$ alike? How are they different?

_____

_____

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13 **Explain** Describe why you can change a subtraction problem into an addition problem and how to do it. Include an example in your answer and graph each problem on the number lines below. _____
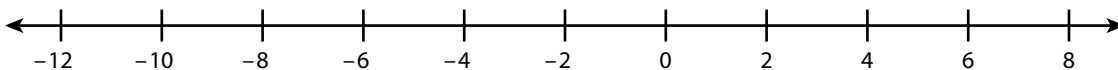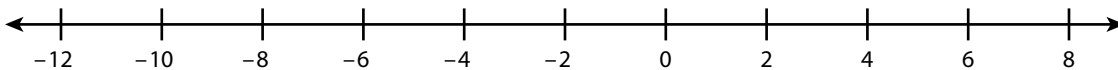
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14 **Analyze** Does it matter which way you subtract the values when you are finding the distance between two numbers on a number line? Explain. Give examples to support your answer. _____

_____
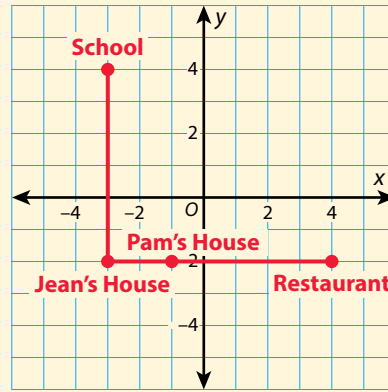
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15 **Put It Together** Use what you have learned to answer the questions below.

The map of Jean's neighborhood shows the location of Jean's house, her school, her friend Pam's house, and her favorite restaurant.

Part A Find each distance described below by finding the absolute value of the difference between the x-coordinates of the two points on the map. Write a subtraction problem and a related addition problem for each distance. Then evaluate your expressions to find the distance.

Restaurant to Pam's House

Subtraction problem _____

Addition problem _____

Distance _____

Pam's House to Jean's House

Subtraction problem _____

Addition problem _____

Distance _____

Part B Refer to the map above. What coordinates do you subtract to find the distance from Jean's house to her school? Explain your reasoning. _____

_____

_____

Part C Write a subtraction problem and a related addition problem for the distance described below. Then evaluate your expressions to find the distance.

Jean's house to school

Subtraction problem _____

Addition problem _____

Distance _____