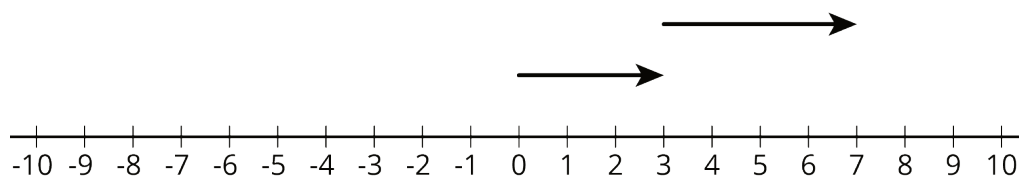# Lesson 2: Changing Temperatures

Let's add signed numbers.
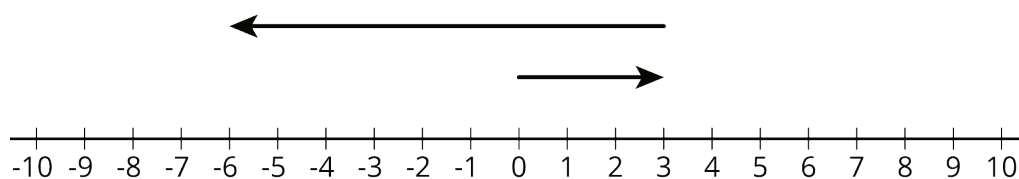
2.1: Which One Doesn't Belong: Arrows

Which pair of arrows doesn't belong?
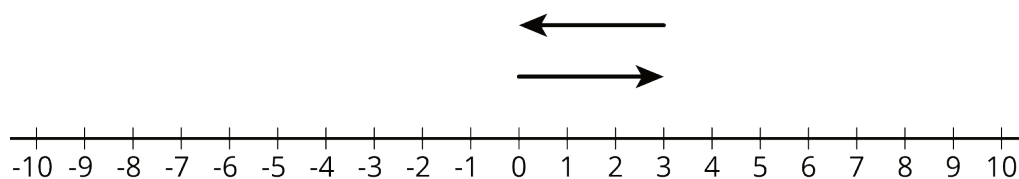
1.

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

2.

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

3.

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

4.

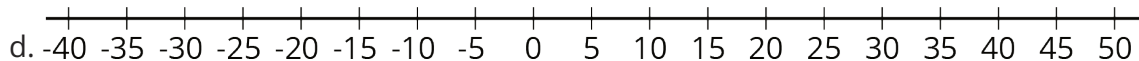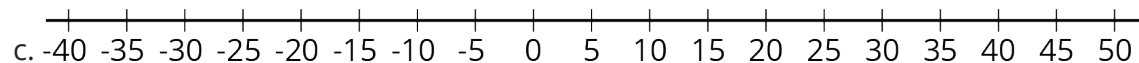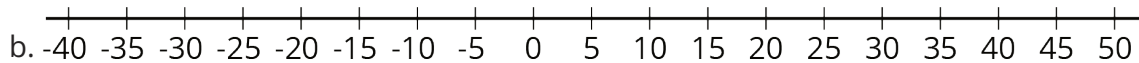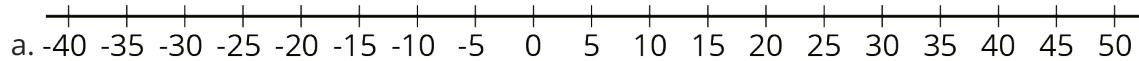-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

Grade 7 Unit 5
Lesson 2

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1

2.2: Warmer and Colder

1. Complete the table and draw a number line diagram for each situation.

	start (°C)	change (°C)	final (°C)	addition equation
a	+40	10 degrees warmer	+50	$40 + 10 = 50$
b	+40	5 degrees colder		
c	+40	30 degrees colder		
d	+40	40 degrees colder		
e	+40	50 degrees colder		

a. -40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50

b. -40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50

c. -40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50

d. -40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50
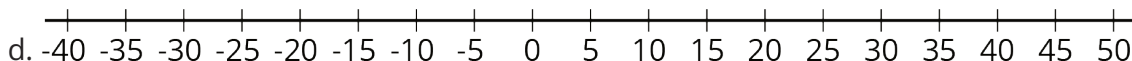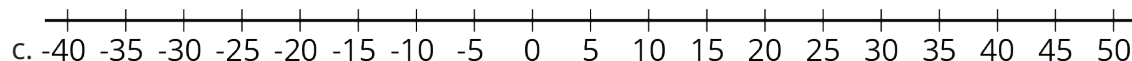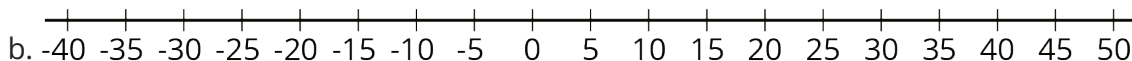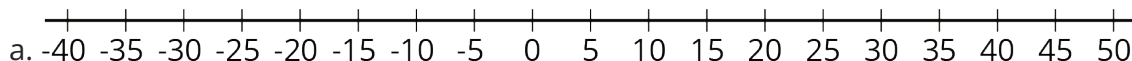
e. -40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50

2. Complete the table and draw a number line diagram for each situation.

	start (°C)	change (°C)	final (°C)	addition equation
a	-20	30 degrees warmer		
b	-20	35 degrees warmer		
c	-20	15 degrees warmer		
d	-20	15 degrees colder		

a.
```
-40 -35 -30 -25 -20 -15 -10 -5  0  5  10 15 20 25 30 35 40 45 50
```

b.
```
-40 -35 -30 -25 -20 -15 -10 -5  0  5  10 15 20 25 30 35 40 45 50
```

c.
```
-40 -35 -30 -25 -20 -15 -10 -5  0  5  10 15 20 25 30 35 40 45 50
```

d.
```
-40 -35 -30 -25 -20 -15 -10 -5  0  5  10 15 20 25 30 35 40 45 50
```

Are you ready for more?

For the numbers a and b represented in the figure, which expression is equal to $|a + b|$?

$|a| + |b|$ $|a| - |b|$ $|b| - |a|$

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Lesson 2

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3

2.3: Winter Temperatures

One winter day, the temperature in Houston is $8°$ Celsius. Find the temperatures in these other cities. Explain or show your reasoning.

    1. In Orlando, it is $10°$ warmer than it is in Houston.

    2. In Salt Lake City, it is $8°$ colder than it is in Houston.

    3. In Minneapolis, it is $20°$ colder than it is in Houston.

    4. In Fairbanks, it is $10°$ colder than it is in *Minneapolis*.

    5. Write an addition equation that represents the relationship between the temperature in Houston and the temperature in Fairbanks.

Lesson 2 Summary

If it is 42° outside and the temperature increases by 7°, then we can add the initial temperature and the change in temperature to find the final temperature.
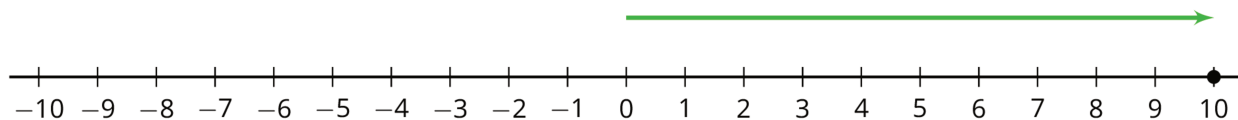
$$42 + 7 = 49$$

If the temperature decreases by 7°, we can either subtract $42 - 7$ to find the final temperature, or we can think of the change as -7°. Again, we can add to find the final temperature.
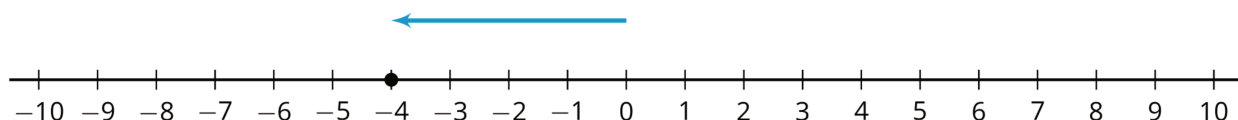
$$42 + (\text{-}7) = 35$$

In general, we can represent a change in temperature with a positive number if it increases and a negative number if it decreases. Then we can find the final temperature by adding the initial temperature and the change. If it is 3° and the temperature decreases by 7°, then we can add to find the final temperature.
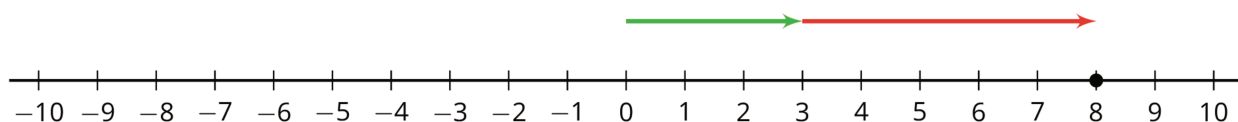
$$3 + (\text{-}7) = \text{-}4$$

We can represent signed numbers with arrows on a number line. We can represent positive numbers with arrows that start at 0 and point to the right. For example, this arrow represents +10 because it is 10 units long and it points to the right.

We can represent negative numbers with arrows that start at 0 and point to the left. For example, this arrow represents -4 because it is 4 units long and it points to the left.

To represent addition, we put the arrows "tip to tail." So this diagram represents $3 + 5$:

And this represents $3 + (\text{-}5)$:

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Lesson 2

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