



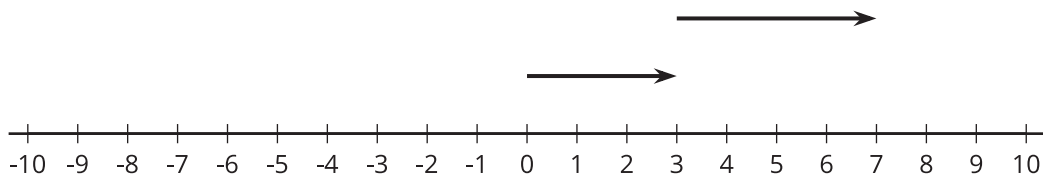
# Changing Temperatures

Let's add signed numbers.

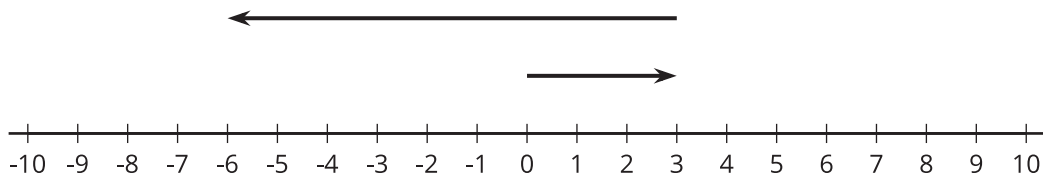
## 2.1 Which Three Go Together: Arrows

Which three go together? Why do they go together?

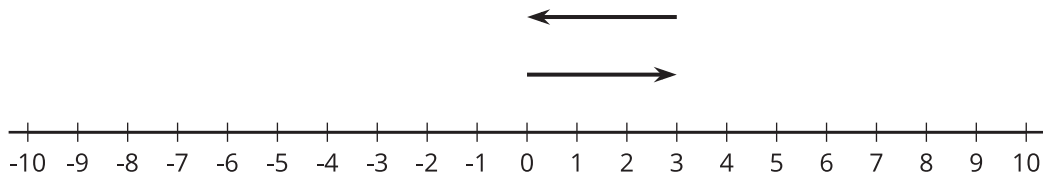
A.



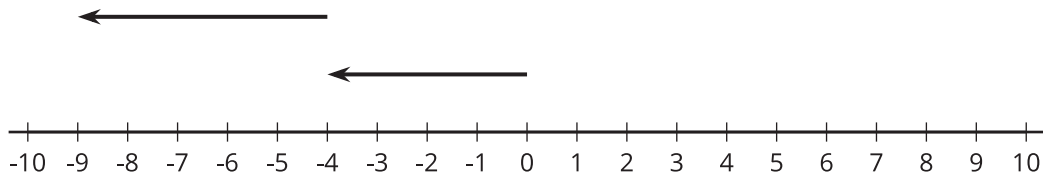
B.



C.



D.

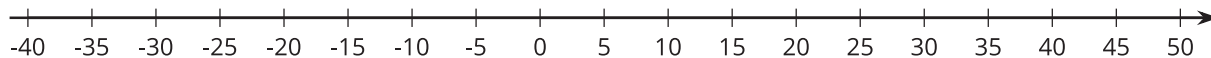


## 2.2 Warmer and Colder

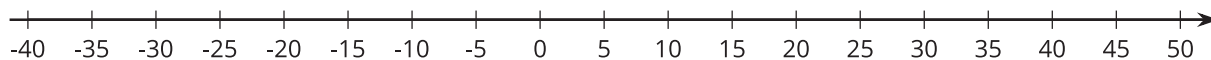
1. Complete the table, and draw a number line diagram for each situation.

	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		

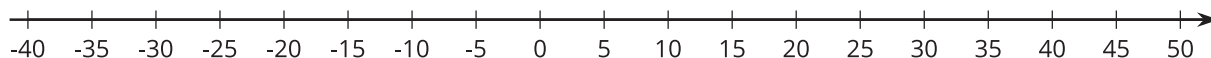
a.



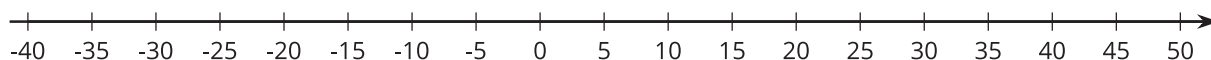
b.



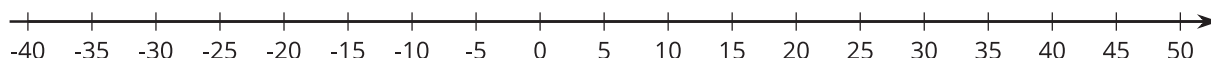
c.



d.



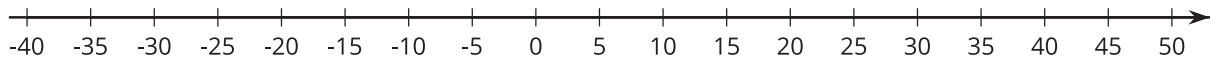
e.



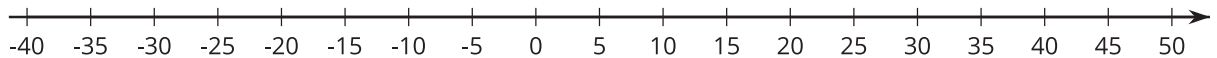
2. Complete the table, and draw a number line diagram for each situation.

	start ( $^{\circ}\text{C}$ )	change ( $^{\circ}\text{C}$ )	final ( $^{\circ}\text{C}$ )	addition equation
a	-20	30 degrees warmer		
b	-20	35 degrees warmer		
c	-20	15 degrees warmer		
d	-20	15 degrees colder		

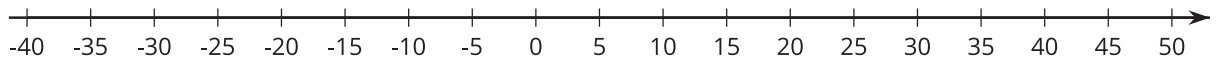
a.



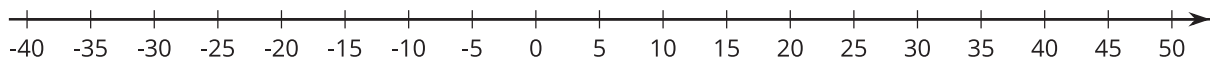
b.



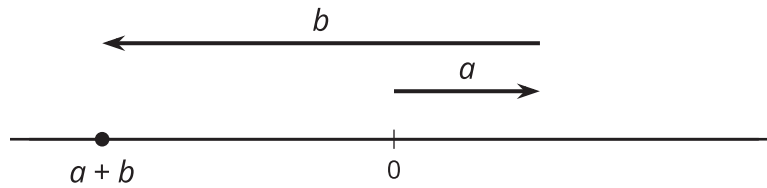
c.



d.



💡 Are you ready for more?



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

$|a| + |b|$

$|a| - |b|$

$|b| - |a|$

## 2.3 Winter Temperatures

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

1. In Orlando, it is  $10^\circ$  warmer than it is in Houston.
2. In Salt Lake City, it is  $8^\circ$  colder than it is in Houston.
3. In Minneapolis, it is  $20^\circ$  colder than it is in Houston.
4. In Fairbanks, it is  $10^\circ$  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  $42^{\circ}\text{F}$  outside and the temperature increases by  $7^{\circ}\text{F}$ , then we can add the initial temperature and the change in temperature to find the final temperature.

$$42 + 7 = 49$$

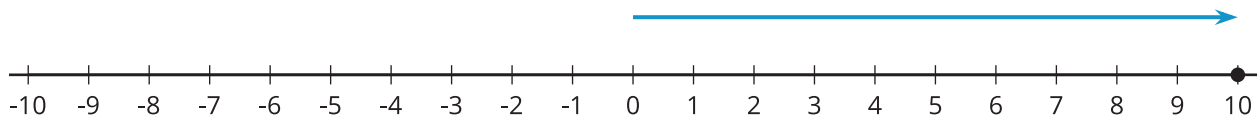
If the temperature decreases by  $7^{\circ}\text{F}$ , we can either subtract  $42 - 7$  to find the final temperature, or we can think of the change as  $-7^{\circ}\text{F}$ . As in the previous example, we can add to find the final temperature.

$$42 + (-7) = 35$$

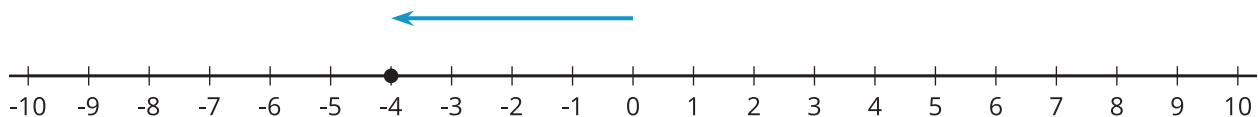
In general, we can represent a change in temperature with a positive number if it increases and with a negative number if it decreases. Then we can find the final temperature by adding the initial temperature and the change. If it is  $3^{\circ}\text{F}$  and the temperature decreases by  $7^{\circ}\text{F}$ , then we can add to find the final temperature.

$$3 + (-7) = -4$$

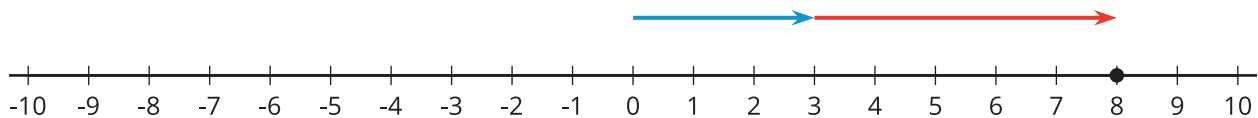
We can represent signed numbers with arrows on a number line. We can represent positive numbers with arrows that start at 0 and point to the right. For example, this arrow represents  $+10$  because it is 10 units long and it points to the right.



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 diagram represents  $3 + (-5)$ :

