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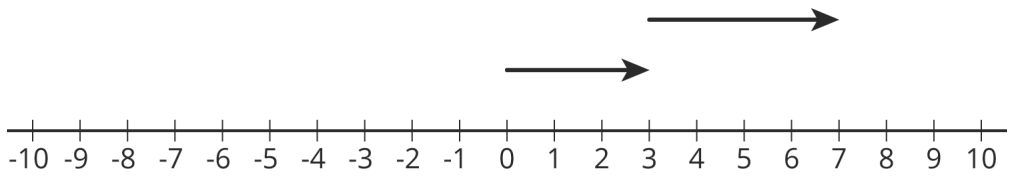
Unit 5, Lesson 2: Changing Temperatures

Let's add signed numbers.

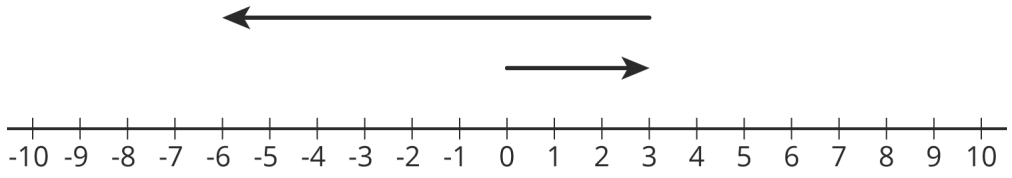
2.1: Which One Doesn't Belong: Arrows

Which pair of arrows doesn't belong?

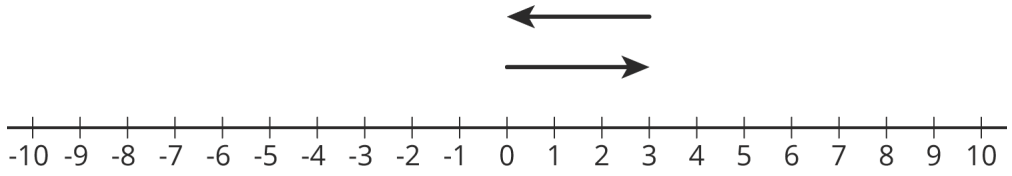
1.



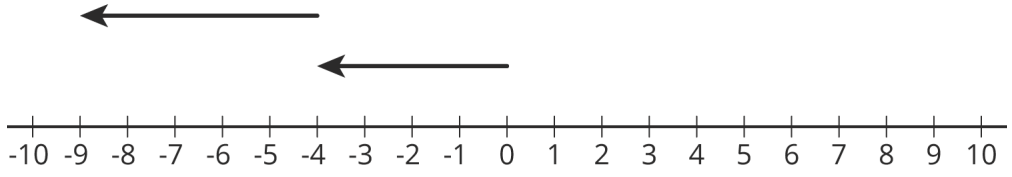
2.



3.



4.



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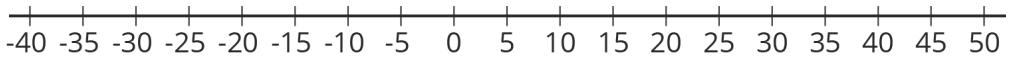
2.2: Warmer and Colder

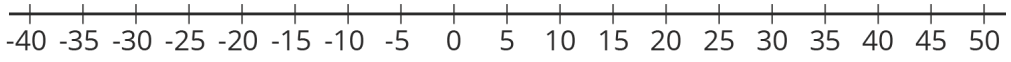
1. Complete the table and draw a number line diagram for each situation.

	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		

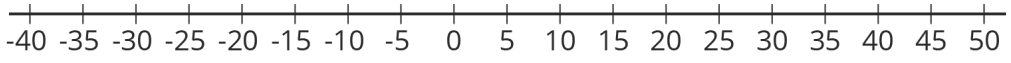
a.



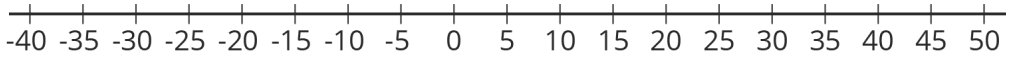
b.



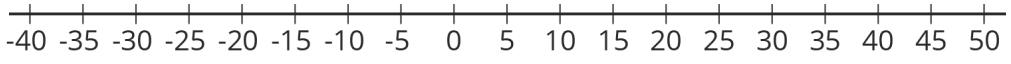
c.



d.



e.



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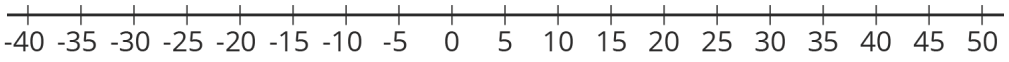
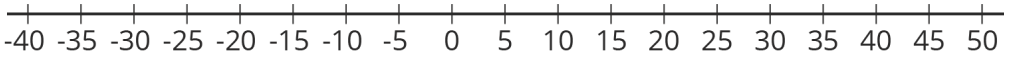
2. Complete the table and draw a number line diagram for each situation.

	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		

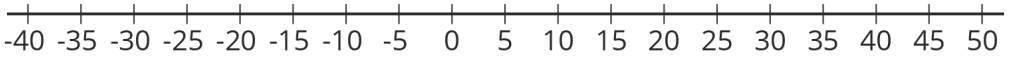
a.



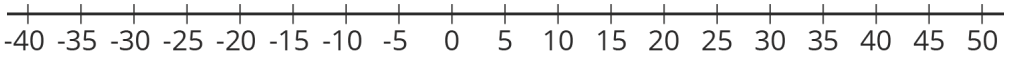
b.



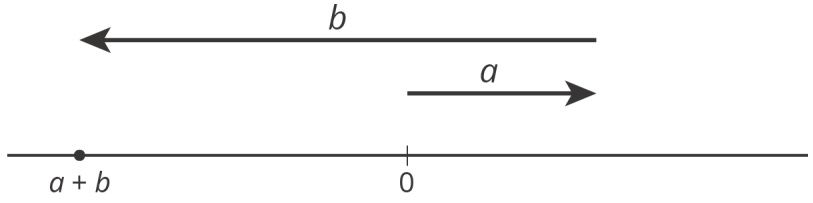
c.



d.



Are you ready for more?



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

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

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2.3: Winter Temperatures

m.openup.org/1/7-5-2-3

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.

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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.

$$42 + 7 = 49$$

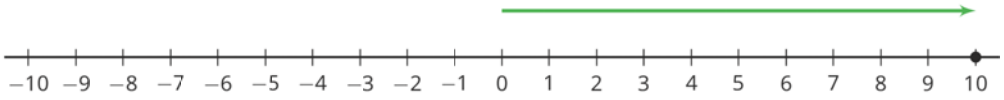
If the temperature decreases by 7°, we can either subtract $42 - 7$ to find the final temperature, or we can think of the change as -7°. Again, we can add to find the final temperature.

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

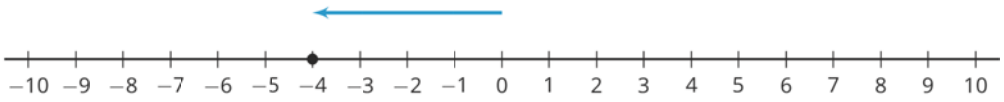
In general, we can represent a change in temperature with a positive number if it increases and a negative number if it decreases. Then we can find the final temperature by adding the initial temperature and the change. If it is 3° and the temperature decreases by 7°, then we can add to find the final temperature.

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

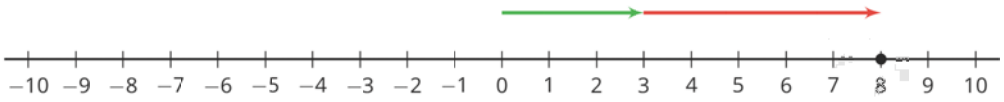
We can represent signed numbers with arrows on a number line. We can represent positive numbers with arrows that start at 0 and points to the right. For example, this arrow represents +10 because it is 10 units long and it points to the right.



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 $3 + (-5)$:

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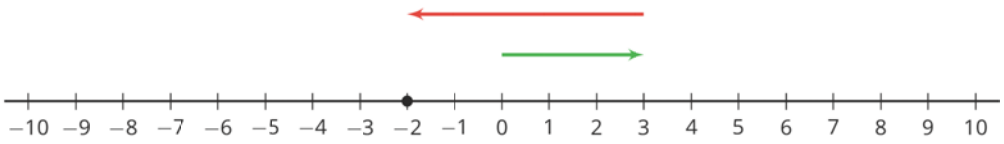

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Unit 5, Lesson 2: Changing Temperatures

1. a. The temperature is -2°C. If the temperature rises by 15°C, what is the new temperature?

   b. At midnight the temperature is -6°C. At midday the temperature is 9°C. By how much did the temperature rise?

2. Complete each statement with a number that makes the statement true.

   a. _____ < 7°C

   b. _____ < -3°C

   c. -0.8°C < _____ < -0.1°C

   d. _____ > -2°C

   (from Unit 5, Lesson 1)

3. Draw a diagram to represent each of these situations. Then write an addition expression that represents the final temperature.

   a. The temperature was 80°F and then fell 20°F.

   b. The temperature was -13°F and then rose 9°F.

   c. The temperature was -5°F and then fell 8°F.

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4. Decide whether each table could represent a proportional relationship. If the relationship could be proportional, what would be the constant of proportionality?

   a. The number of wheels on a group of buses.

number of buses	number of wheels	wheels per bus
5	30	
8	48	
10	60	
15	90	

   b. The number of wheels on a train.

number of train cars	number of wheels	wheels per train car
20	184	
30	264	
40	344	
50	424	

   (from Unit 2, Lesson 7)

5. Noah was assigned to make 64 cookies for the bake sale. He made 125% of that number. 90% of the cookies he made were sold. How many of Noah's cookies were left after the bake sale?

   (from Unit 4, Lesson 7)