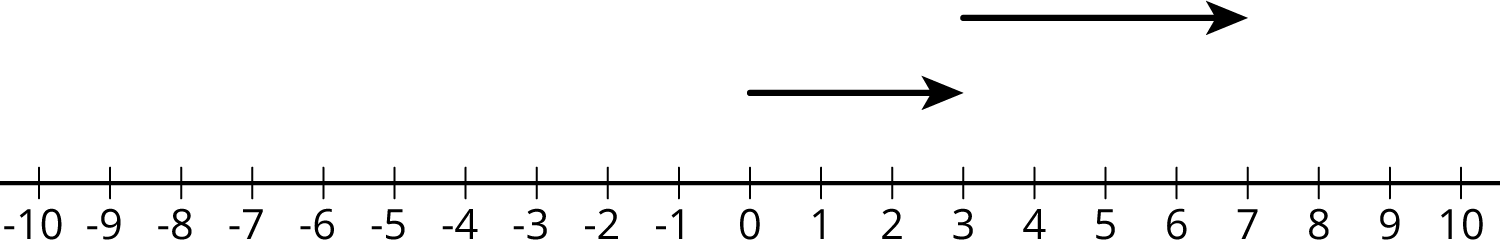
## Lesson 2: Changing Temperatures

Let's add signed numbers.

### 2.1: Which One Doesn’t Belong: Arrows

Which pair of arrows doesn't belong?

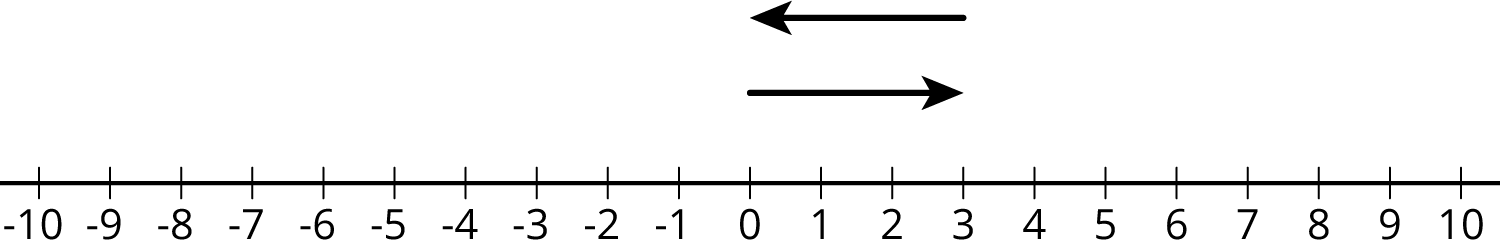


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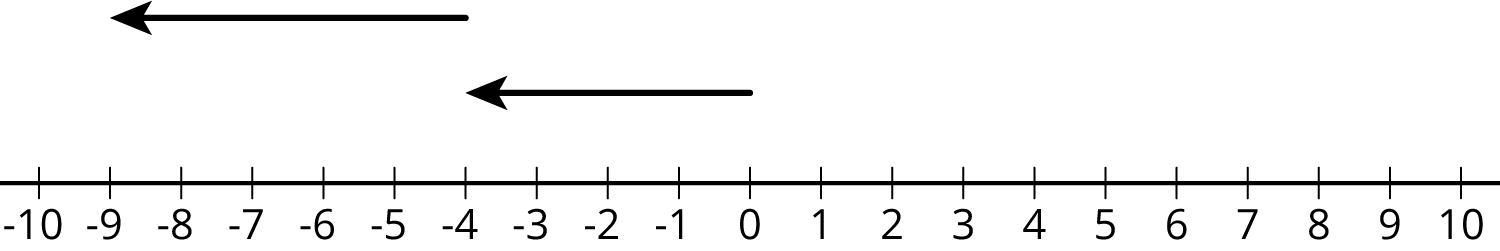


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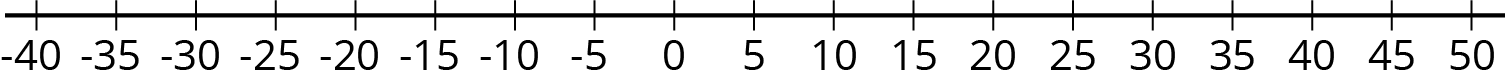
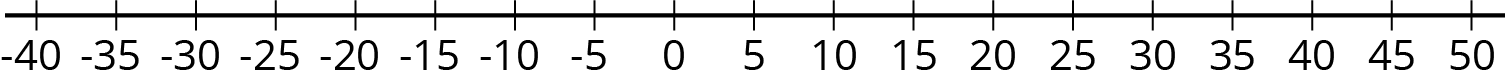
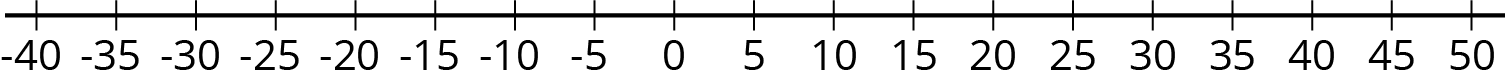
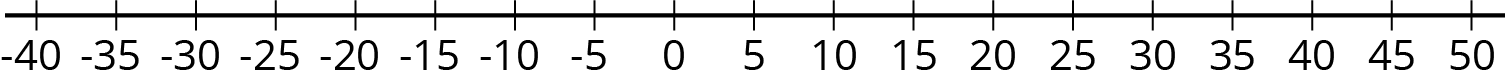
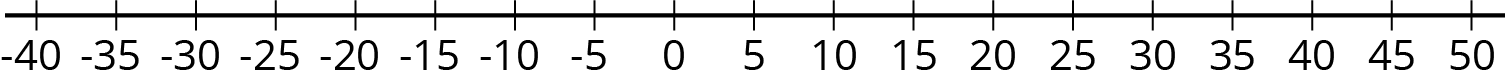


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### 2.2: Warmer and Colder

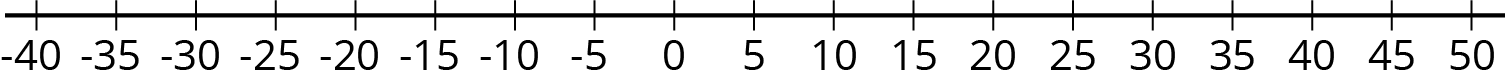
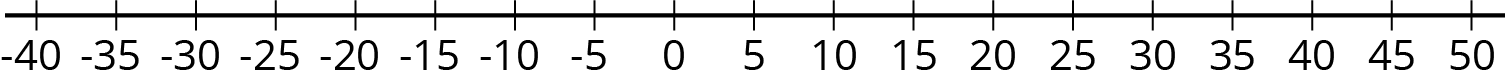
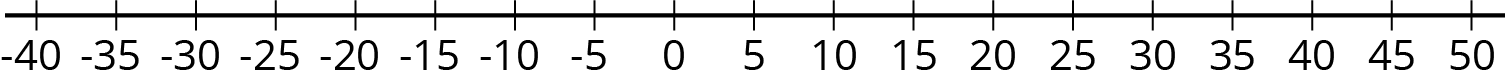
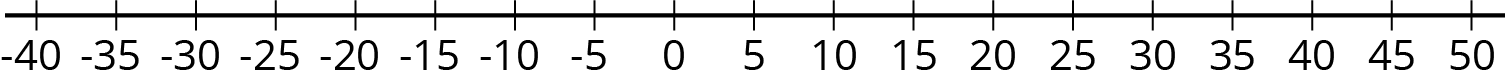
1. Complete the table and draw a number line diagram for each situation.

|  | * start () | * change () | * final () | * addition equation |
| --- | --- | --- | --- | --- |
| * a | * +40 | * 10 degrees warmer | * +50 |  |
| * b | * +40 | * 5 degrees colder |  |  |
| * c | * +40 | * 30 degrees colder |  |  |
| * d | * +40 | * 40 degrees colder |  |  |
| * e | * +40 | * 50 degrees colder |  |  |

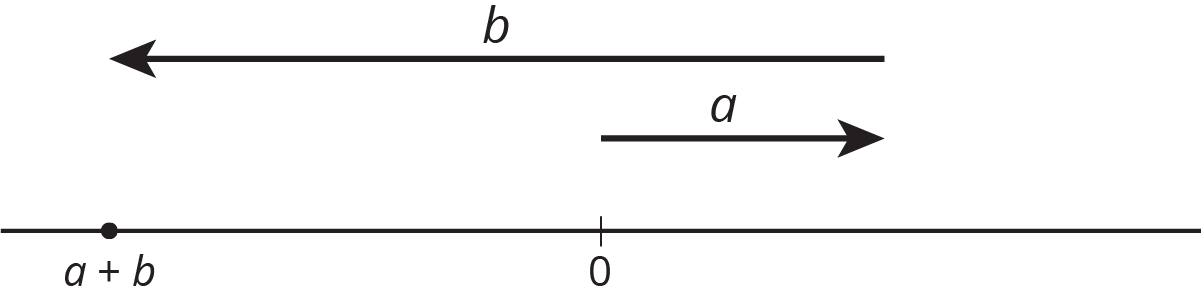
* 1. 
  2. 
  3. 
  4. 
  5. 

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

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

* 1. 
  2. 
  3. 
  4. 

#### Are you ready for more?



For the numbers and represented in the figure, which expression is equal to ?

### 2.3: Winter Temperatures

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

1. In Orlando, it is warmer than it is in Houston.
2. In Salt Lake City, it is colder than it is in Houston.
3. In Minneapolis, it is colder than it is in Houston.
4. In Fairbanks, it is 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.

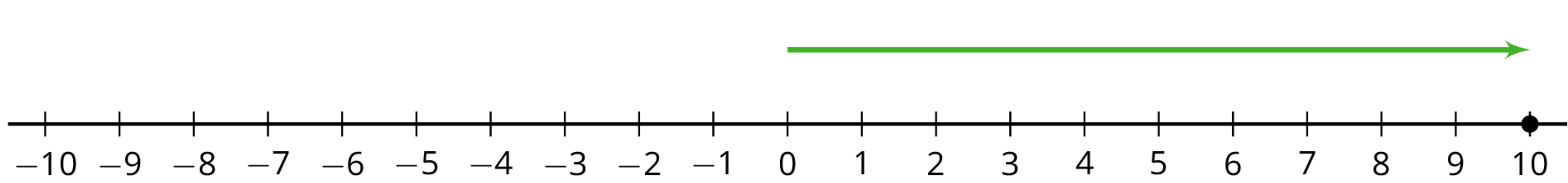
### Lesson 2 Summary

If it is outside and the temperature increases by , then we can add the initial temperature and the change in temperature to find the final temperature.

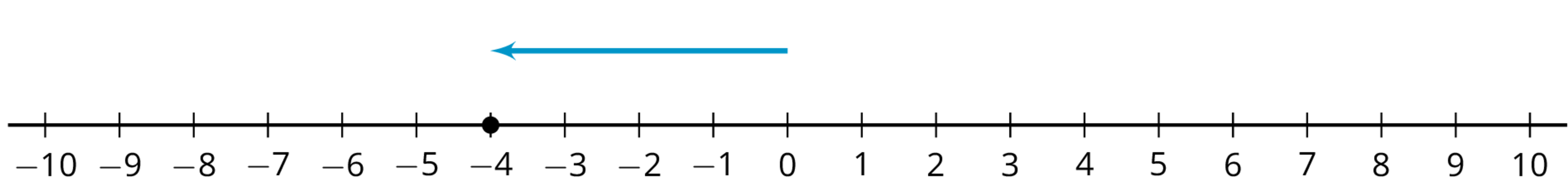
If the temperature decreases by , we can either subtract to find the final temperature, or we can think of the change as . Again, we can add to find the final temperature.

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 and the temperature decreases by , then we can add to find the final temperature.

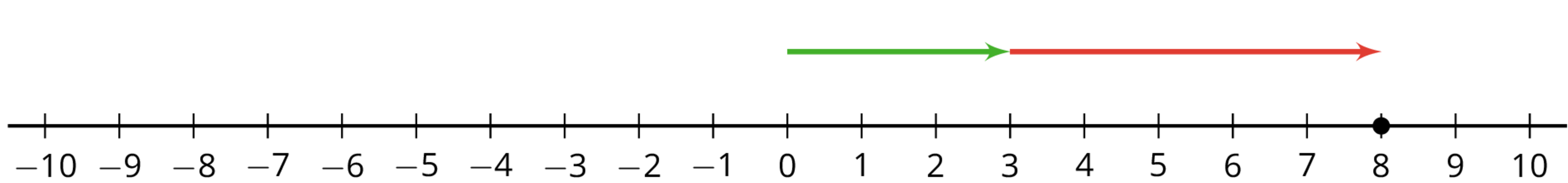
We can represent signed numbers with arrows on a number line. We can represent positive numbers with arrows that start at 0 and point to the right. For example, this arrow represents +10 because it is 10 units long and it points to the right.



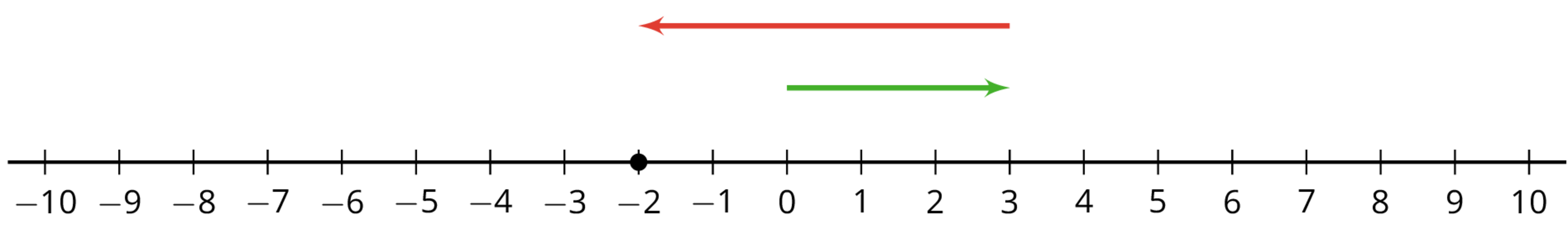
We can represent negative numbers with arrows that start at 0 and point to the left. For example, this arrow represents -4 because it is 4 units long and it points to the left.



To represent addition, we put the arrows “tip to tail.” So this diagram represents :



And this represents :





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