

# 6.1 Comparing Positive and Negative Numbers

You will need  
• number lines

**GOAL**  
Compare and order positive and negative numbers.

## Learn about the Math

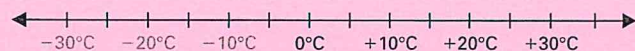
On the Celsius temperature scale,  $0^{\circ}\text{C}$  is the freezing point of water. Weather forecasters use **integers** to describe temperatures.

- Temperatures above the freezing point of water are positive.
- Temperatures below the freezing point of water are negative.

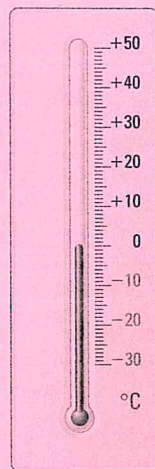
**integers**  
all positive and negative whole numbers, including zero:  
...,  $-3, -2, -1, 0, +1, +2, +3, \dots$

? How can you compare temperatures using a number line?

- A. Mark each temperature on a number line:  
 $+10^{\circ}\text{C}, 0^{\circ}\text{C}, -20^{\circ}\text{C}, +30^{\circ}\text{C}, +20^{\circ}\text{C}, -5^{\circ}\text{C}$



- B. Write the temperatures in step A in order from coldest to warmest. How does your order compare with the temperatures marked on the number line?
- C. How are the positions of  $+20^{\circ}\text{C}$  and  $-20^{\circ}\text{C}$  on the number line in step A alike? How are their positions different?
- D. Use  $<$  or  $>$  to make each statement true. Use a number line to justify each answer.
- a)  $-20^{\circ}\text{C}$   $+30^{\circ}\text{C}$   
b)  $-5^{\circ}\text{C}$   $-20^{\circ}\text{C}$   
c)  $+20^{\circ}\text{C}$   $+30^{\circ}\text{C}$



## Reflecting

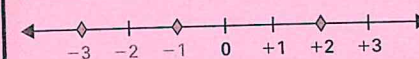
1. How can thinking about temperature help you list integers in order from least to greatest?
2. How can using a number line help you list integers in order from least to greatest?
3. How did you use a number line in step D to help you decide which number in a pair is greater?

## Work with the Math

### Example 1: Ordering integers

Write  $-3, +2,$  and  $-1$  in order from least to greatest.

#### Miguel's Solution



From least to greatest, the numbers are  $-3, -1,$  and  $+2.$

I marked each value on a number line.

I read the integers in order, from left to right, on the number line.

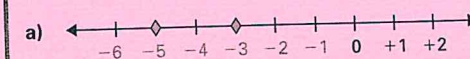


### Example 2: Comparing integers using $<$ and $>$

Use  $<$  or  $>$  to compare each pair of integers.

- a)  $-3$   $-5$       b)  $-7$   $-5$

#### Romona's Solution

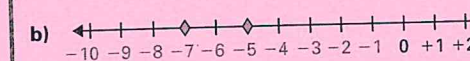


$$-3 > -5$$

I marked each value on a number line.

$-3$  is to the right of  $-5$ , which means that  $-3$  is greater than  $-5$ , and  $-5$  is less than  $-3$ .

If they were temperatures,  $-3^{\circ}\text{C}$  would be warmer than  $-5^{\circ}\text{C}.$



$$-7 < -5$$

$-7$  is to the left of  $-5$  on the number line, which means that  $-7$  is less than  $-5$ , and  $-5$  is greater than  $-7$ .

If they were temperatures,  $-7^{\circ}\text{C}$  would be colder than  $-5^{\circ}\text{C}.$



## A Checking

4. Which integer is greater?

- a)  $+3, +2$       c)  $+3, -2$   
b)  $-3, +2$       d)  $-3, -2$

5. a) Draw a number line from  $-10$  to  $+10$ . Mark the following integers on your number line:

$+8, -7, -2, +1, 0, -5$

b) Order the integers from least to greatest.

6. Use  $<$  or  $>$  to compare each pair of integers. Use a number line to justify each answer.

- a)  $-5$   $0$   
b)  $-5$   $-10$   
c)  $+20$   $-30$







## B Practising

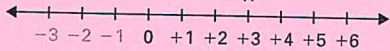
7. Mark each group of integers on a separate number line.
- $-10, -5, 0, +5, +10$
  - $-35, -10, +25$
  - $-27, -13, +8, +19$
8. Order each group of integers from least to greatest.
- $-3, +7, 0, -8, +2$
  - $+7, +4, -7, -5, +1$
  - $+37, +14, -21, -11, +1$
  - $-120, -100, -140, -2$
  - $-5, -37, +9, +110, 0$
9. Use  $<$  or  $>$  to make each statement true.
- $+1$   $\square$   $-4$       **d)**  $+3$   $\square$   $-3$
  - $+13$   $\square$   $0$       **e)**  $-15$   $\square$   $-16$
  - $-1$   $\square$   $0$       **f)**  $-21$   $\square$   $+18$
10. Draw a number line from  $-8$  to  $+8$ . Mark each integer described below on the number line.
- three greater than zero
  - four less than zero
  - two greater than positive four
  - three greater than negative three
  - five less than negative two
11. a) Write two integers that are less than  $-4$ .  
 b) Write two integers that are between  $-10$  and  $-2$ .  
 c) Write one positive integer and one negative integer that are between  $-5$  and  $+5$ .  
 d) Write an integer that is less than  $-15$ .  
 e) Write an integer that is the same distance from  $-10$  as it is from  $0$ .
12. Explain why  $-4$  is greater than  $-10$ , even though  $4$  is less than  $10$ .

13. Explain why  $-10$  is less than  $+10$ , even though both numbers are the same distance from  $0$ .

14. These temperatures were reported.

Date	Daily high temperature (°C)	Daily low temperature (°C)
March 26  variable cloudiness	+10	0
March 27  variable cloudiness	+5	-6
March 28  light rain	+9	-7
March 29  scattered showers	+8	-3

Write the date when each occurred.

- the highest daily high temperature
  - the lowest daily high temperature
  - the highest daily low temperature
  - the lowest daily low temperature
15. Copy the diagram. Assign letters by following the clues. What is the message?
- R
- 
- R to S is  $-6$ .
  - S to A is  $+4$ .
  - A to M is  $-1$ .
  - M to T is  $+5$ .

16. A basketball coach rated each player's skill. The five players with the highest scores will start the next game. The player with the highest score will be captain.

Name	Score
Jan	$-2$
Raj	$+3$
Toni	$+3$
Monica	$-1$
Arvin	$-4$
Ming	$+4$
Barbara	$+3$
Riki	$-2$

- Which player will be captain?
- Name the starting players.

17. In golf, the player with the lowest score wins. The final scores for six players in the 2003 Masters Golf Tournament are listed below. Rank the scores from lowest to highest. Who won?

Player	Country	Final score
Phil Mickelson	United States	$-5$
Retief Goosen	South Africa	$+1$
Mike Weir	Canada	$-7$
Vijay Singh	Fiji	$-1$
Jim Furyk	United States	$-4$
Angel Cabrera	Argentina	$+2$

18. Use positive numbers to describe income and negative numbers to describe debt.

- Write an integer to represent each.
  - an income of \$10
  - a debt of \$5
  - an income of \$2
  - a debt of \$8
- Order the integers in part (a) from least to greatest.
- What do you think the integer  $0$  represents when discussing income and debt? Explain your answer.

## C Extending

19. Decide whether each statement is true or false. Justify your answer.
- All integers less than  $-2$  are negative.
  - The farther an integer is from  $0$  on a number line, the greater it is.
  - No negative integer is greater than  $-1$ .
  - All integers greater than  $0$  are positive.
20. An integer is between  $-4$  and  $-19$ . It is twice as far from  $-4$  as it is from  $-19$ . What is the integer?

## Mental Math

## QUICK SUBTRACTION

Adding the same whole number to all the numbers in a subtraction question can help you subtract quickly.

$$\begin{aligned}
 54 - 28 &= (54 + 2) - (28 + 2) \\
 &= 56 - 30 \\
 &= 26
 \end{aligned}$$

It is easier to subtract a number that is a multiple of 10. Add 2 to 28 to get a multiple of 10. Then you must add 2 to 54.

1. How does this strategy help you subtract?

2. Subtract.

- $55 - 36$
- $38 - 17$
- $27 - 19$
- $54 - 29$
- $249 - 98$
- $385 - 66$
- $471 - 62$
- $238 - 94$