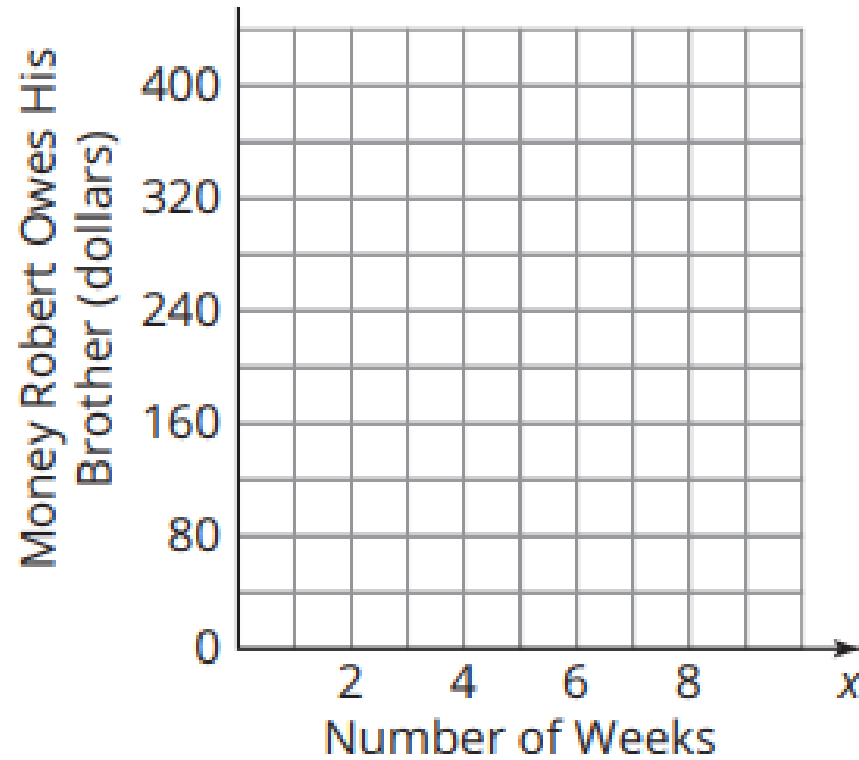


Robert borrowed \$400 from his older brother to take a weekend trip with his friends. A week after he returns from his trip, he will begin paying his brother \$80 per week until he has completely paid off his debt.

M3-58

1. Define a piecewise function,  $f(x)$ , for the total amount of Robert's debt based on the number of weeks he pays his brother back. Then create a graph to represent the function.



The *greatest integer function* is a special linear piecewise function. The **greatest integer function**, also known as a **floor function**,  $G(x) = \lfloor x \rfloor$ , is defined as the greatest integer less than or equal to  $x$ .

1. Evaluate each expression using the greatest integer function.

a.  $\lfloor 2 \rfloor =$  \_\_\_\_\_

b.  $\lfloor 0.17 \rfloor =$  \_\_\_\_\_

c.  $\lfloor 2.34 \rfloor =$  \_\_\_\_\_

d.  $\lfloor -1.2 \rfloor =$  \_\_\_\_\_

e.  $\lfloor 2.99999 \rfloor =$  \_\_\_\_\_

f.  $\lfloor -0.2 \rfloor =$  \_\_\_\_\_

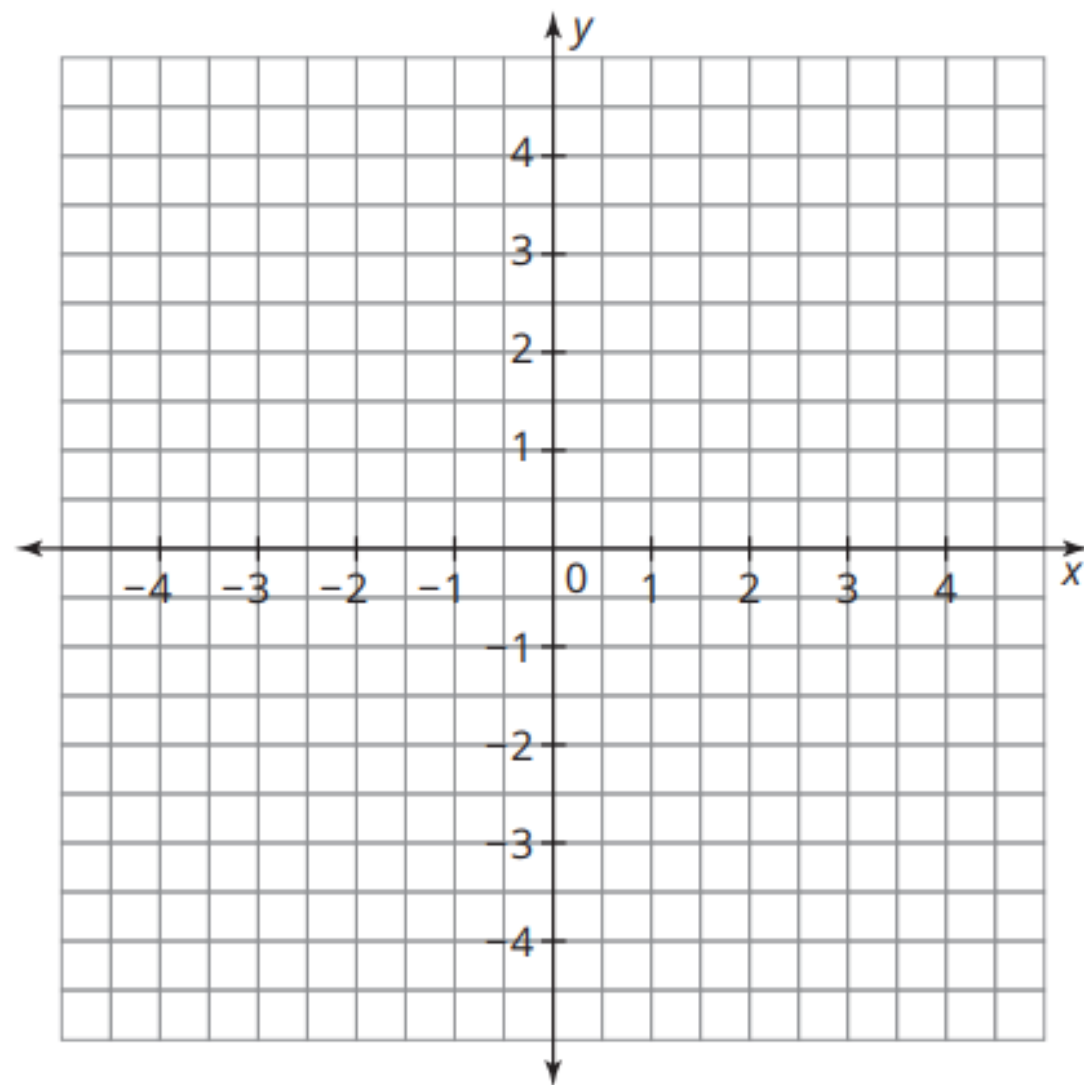
2. Graph  $G(x) = \lfloor x \rfloor$ .



Round  
Down!

2. Graph  $G(x) = \lfloor x \rfloor$ .

M3-59



The *least integer function* is another special linear piecewise function. The **least integer function**  $L(x) = \lceil x \rceil$ , also known as the **ceiling function**, is defined as the least integer greater than or equal to  $x$ .

4. Evaluate each expression using the least integer function.

a.  $\lceil 2 \rceil =$  \_\_\_\_\_

b.  $\lceil 0.17 \rceil =$  \_\_\_\_\_

c.  $\lceil 2.34 \rceil =$  \_\_\_\_\_

d.  $\lceil -1.2 \rceil =$  \_\_\_\_\_

e.  $\lceil 2.99999 \rceil =$  \_\_\_\_\_

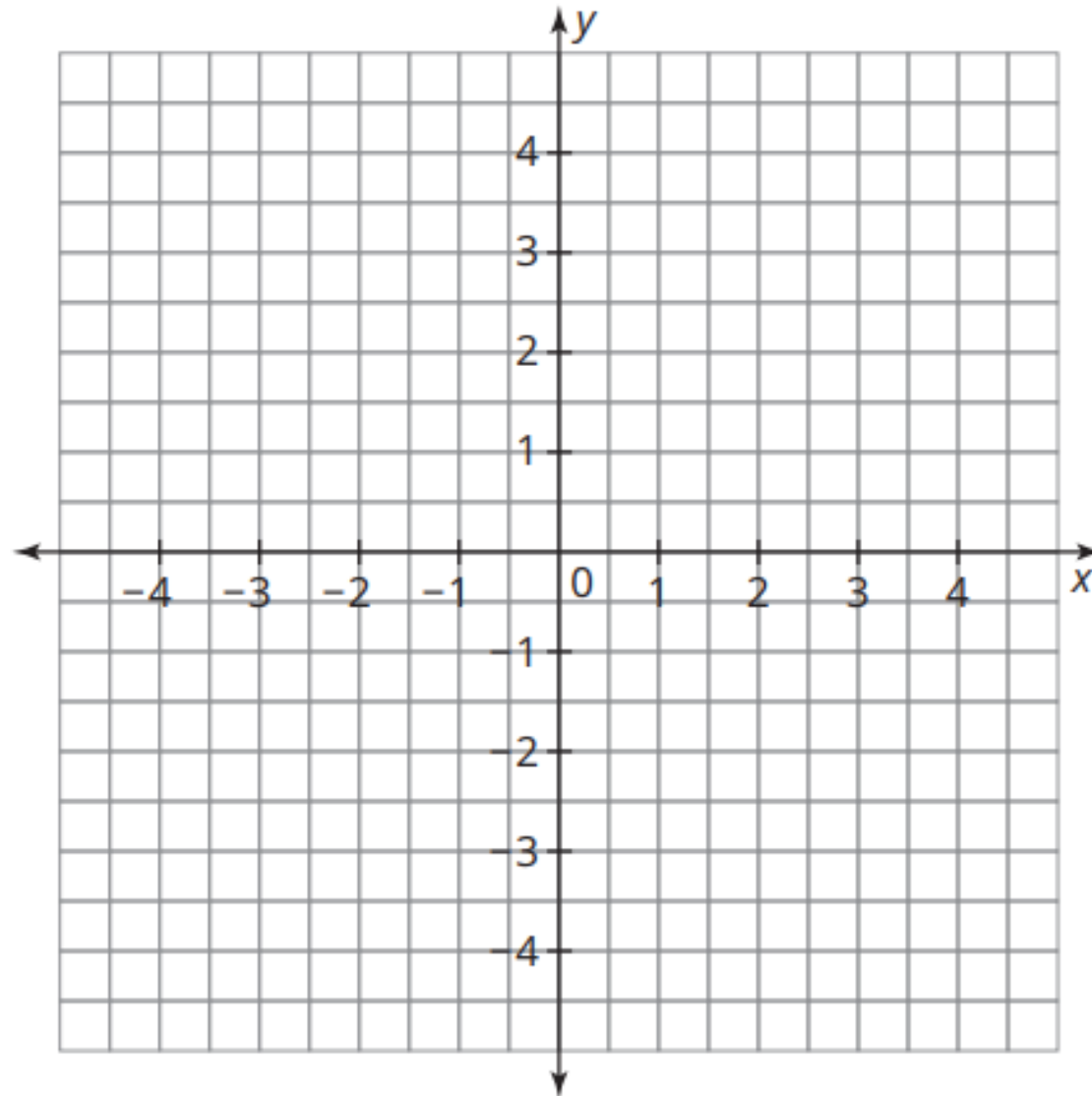
f.  $\lceil -0.2 \rceil =$  \_\_\_\_\_



Round  
Up!

5. Graph  $L(x) = \lceil x \rceil$ .

M3-60

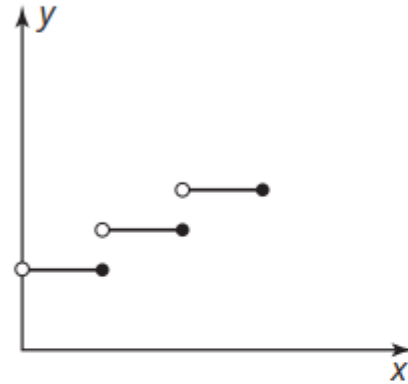


- 10. Determine whether each scenario identifies the greatest integer function, least integer function, or neither.**
- a. Mark is parking his car in a garage that charges by the hour. When he parks there for 3.2 hours, he is charged for 4 hours. When he parks there for 3.9 hours, he is charged for 4 hours.**
  
  - b. Tamara gets reward points for every dollar she spends at the mall. When she spent \$34.25, she received 34 reward points. When she spent \$15.95, she received 15 reward points.**

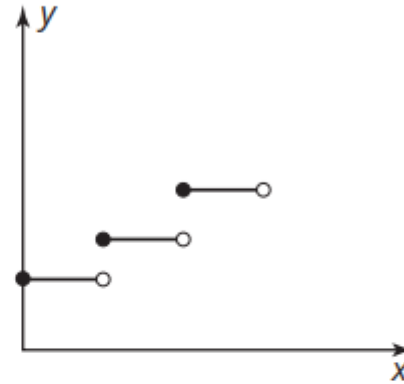
- c. Julie's teacher records only whole number values in her gradebook. When Julie earned 88.3 points, the teacher recorded 88 points. When Julie earned 92.5 points, the teacher recorded 93 points.
  
- d. The yogurt shop charges by the weight of the yogurt sundae you create. Everly is charged as if her 4.2-ounce sundae weighs 5 ounces, and Greyson is charged as if his 5.7-ounce sundae weighs 6 ounces.

2. Which graph best represents this situation? Explain your reasoning.

Graph A



Graph B



3. Complete each statement using *always*, *sometimes*, or *never*.

- a. Step functions are \_\_\_\_\_ piecewise functions.
- b. Piecewise functions are \_\_\_\_\_ step functions.
- c. The graphs of step functions are \_\_\_\_\_ discontinuous.
- d. The graphs of piecewise functions are \_\_\_\_\_ discontinuous.