Greatest Integer Function

The Greatest Integer Function Step function or floor function

$f(x) =$ [x] or [[x]]

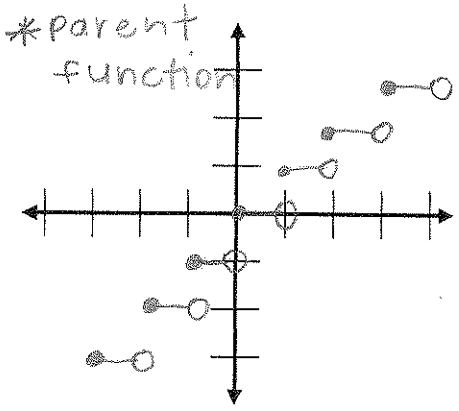
This function takes the input and finds the greatest integer closest to that number without going over

Examples:	*Answers*	*Examples:*	*Answers:*
1. [7.35] =	7	3. [-2.5]	-3
2. $\left[\frac{4}{3}\right]$ =	1	4. $\left[-\frac{10}{5}\right]$	-2

Graphing the Greatest Integer Function

The greatest integer function got its nickname, the step function, from its graph.

$f(x) = [x]$



x	$f(x)$
-2.00	-2
-1.75	-2
-1.5	-2
-1.25	-2
-1.00	-1
-0.75	-1
-0.5	-1
-0.25	-1
0.00	0
0.25	0
0.5	0
0.75	0
1.00	1
1.25	1
1.5	1

Transformations of the Greatest Integer Function

Don't forget the transformations do not change!

Graphing Form: $y = a[\![b(x-h)]\!] + k$

- (h, k) is a starting point for your steps.
- The length of your steps is $\frac{1}{b}$.
- The space between your steps (vertically) is a.
- If a is positive the steps go up to the right
- If a is negative then the steps down to the right

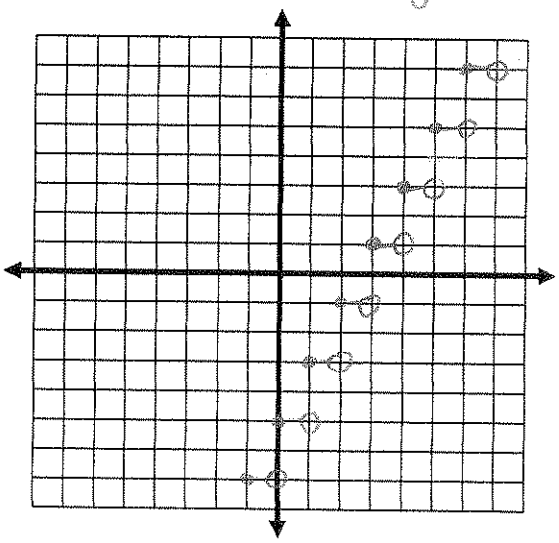
Example 1: Graph $f(x) = 2[\![x - 3]\!] + 1$

Start $(3, 1)$

Step length $\frac{1}{1} = 1$

Step height 2

- vertical stretch → 2
- right 3
- up 1



Example 2: Graph $y = [\![2x + 4]\!] - 5$

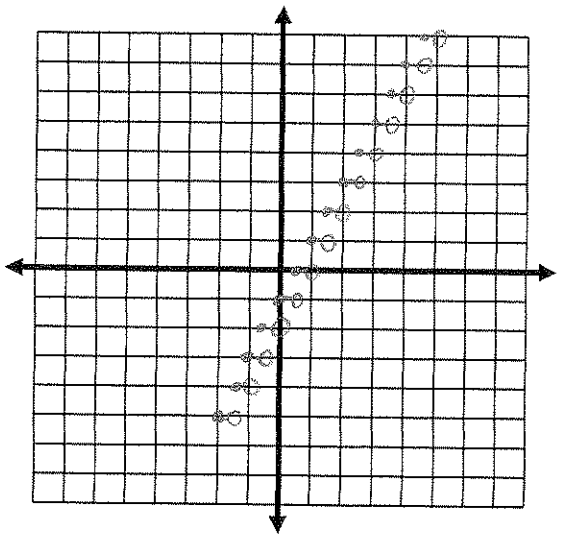
Get in graphing form! $y = [\![2(x+2)]\!] - 5$

Start $(-2, -5)$

Step length $\frac{1}{2}$

Step height 1

- horizontal shrink
- down 5
- left 2



$[\![x]\!]$ is the Greatest Integer Function. It is the largest integers less than or equal to x.

Evaluate the following:

1. $[\![7.1]\!]$ 7

2. $[\![1.8]\!]$ 1

3. $[\![\pi]\!]$ 3

4. $[\![-6.8]\!]$ -7

5. $[\![-2.1]\!]$ -3

6. $[\![0]\!]$ 0

7. $[\![5.28]\!]$ 5

8. $\left[\!\left[\frac{8}{3}\right]\!\right]$ 2

9. $[\![0.25]\!]$ 0

10. $[\![-0.25]\!]$ -1

11. $3[\![0.75]\!]$ 0
$3(0)$
0

12. $-5[\![-2.5]\!]$ 15
$-5(-3)$
15

13. $[\![2(1.55)]\!]$
$[2 \cdot 1.55]$
$[3.1]$
3

14. $2[\![1.55]\!]$
$2(1)$
2

15. $0.5[\![1.5]\!]$
$.5(1)$
$.5$

16. $[\![1.25 - 5]\!]$
$[-3.75]$
-4

17. $[\![5 - 1.25]\!]$
$[3.75]$
3

18. $[\![3(1.25)]\!]$
$[3.75]$
3

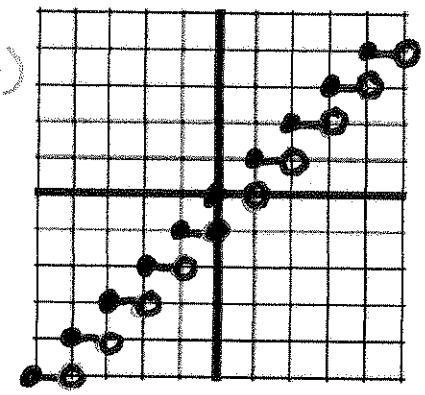
19. $3[\![1.25]\!]$
$3(1)$
3

20. $[\![-5]\!]$ -5

Using a table of values, graph each function.

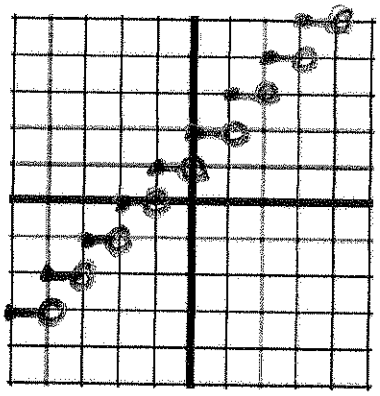
3. $f(x) = [\![x]\!]$

start → (0, 0)
lengh → 1
height → 1



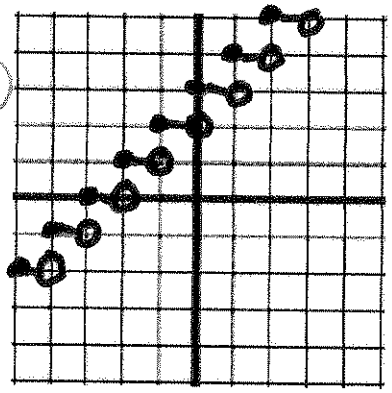
4. $f(x) = [\![x]\!] + 2$

start → (0, 2)
lengh → 1
height → 1
- up 2



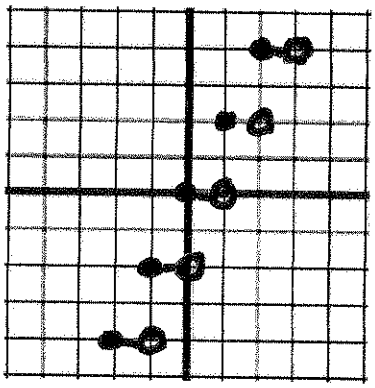
5. $f(x) = [\![x]\!] + 3$

start → (0, 3)
lengh → 1
height → 1
- up 3



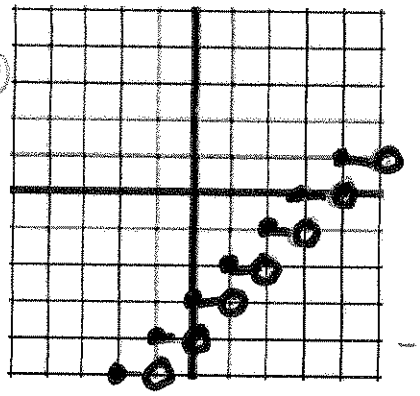
6. $f(x) = 2[\![x]\!]$

start → (0, 0)
lengh → 1
height → 2
- V stretch 2



7. $f(x) = [\![x - 3]\!]$

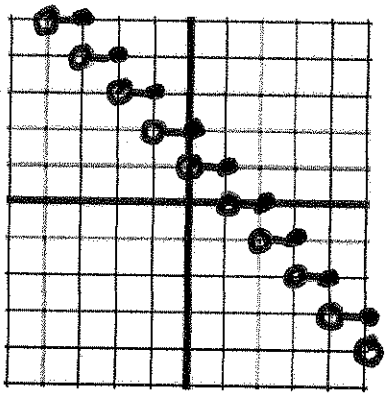
start → (3, 0)
lengh → 1
height → 1
- right 3



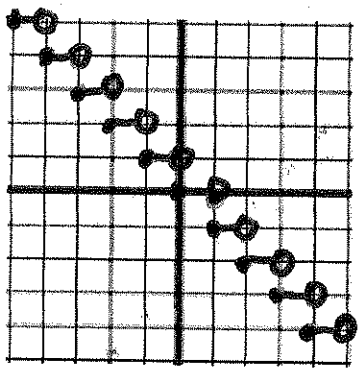
$f(x) = [\![-1(x-2)]\!]$

8. $f(x) = [\![-x + 2]\!]$

start → (2, 0)
lengh → -1
height → 1
- right 2
- reflect over y-axis

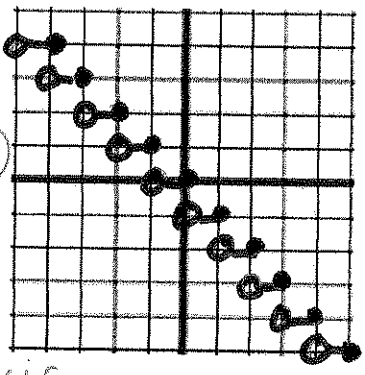


9. $f(x) = -[x]$



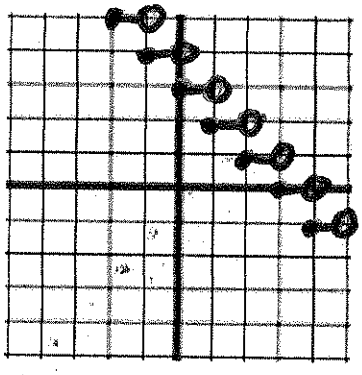
start → (0,0)
lengh → 1
height → -1
- reflect over x-axis

10. $f(x) = [-x]$



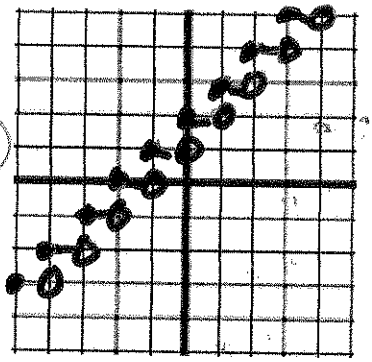
start → (0,0)
lengh → -1
height → 1
- reflect over y-axis

11. $f(x) = -[x] + 3$



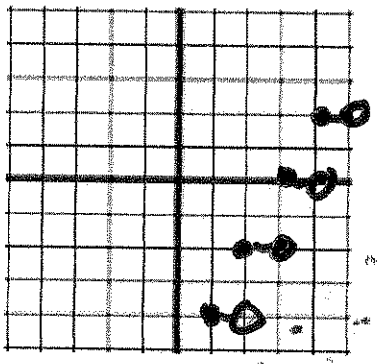
start → (0,3)
lengh → 1
height → -1
- reflect over x-axis
- up 3

12. $f(x) = [x + 2]$



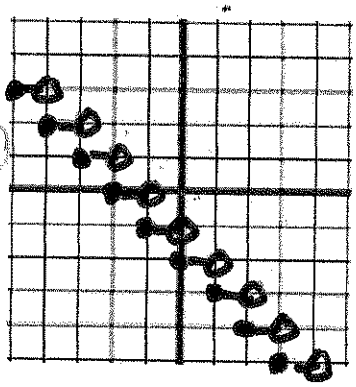
start → (-2,0)
lengh → 1
height → 1
- left 2

13. $f(x) = 2[x - 3]$



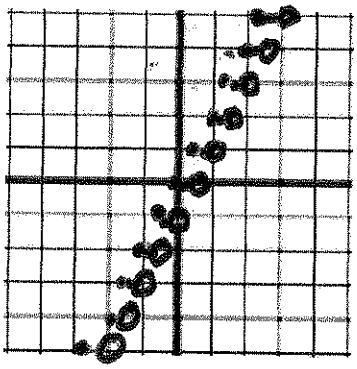
start → (3,0)
lengh → 1
height → 2
- right 3
- v stretch 2

14. $f(x) = -[x + 2]$



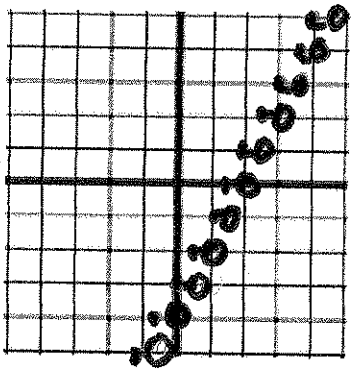
start → (-2,0)
lengh → 1
height → -1

14. $f(x) = [2x]$



start → (0,0)
lengh → $\frac{1}{2}$
height → 1
- horizontal shrink $\frac{1}{2}$

15. $f(x) = [2x]-3$



start → (0,-3)
lengh → $\frac{1}{2}$
height → 1
- horizontal shrink $\frac{1}{2}$
- down 3