Section 5.3 Unfamiliar Functions

Drawing graphs of familiar functions requires fewer ordered pairs since the shape of the graph is already known reasonably well. Drawing the graphs of unfamiliar functions can be more tedious, since the final shape is not necessarily known at all. Therefore you should plot points or use your graphing calculator or both. To be successful on the exam you should be able to do both.

Some examples of unfamiliar functions that can be classified are
Logarithmic: $f(x) = \log x$

Rational: $f(x) = \frac{x^2-x-6}{x+1}$

Absolute Value: $f(x) = |x|$

Greatest Integer: $f(x) = [\![x]\!]$

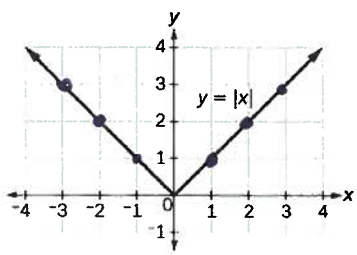
Piecewise: $f(x) = \begin{cases} x^2 & ,x \geq 2 \\ 2x+1, & x < 2 \end{cases}$

absolute value
Go to math → num
or Go to catalog
(2nd "0")

ABSOLUTE VALUE FUNCTIONS:

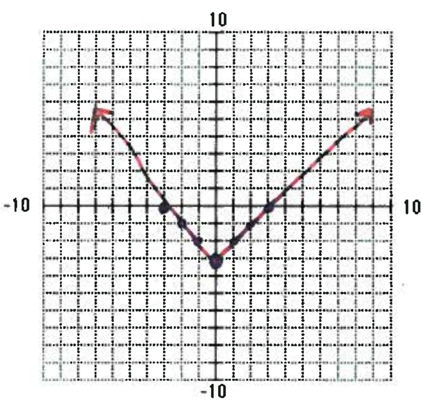
Parent Function: : $f(x) = |x|$

This graph can be transformed like other graphs.

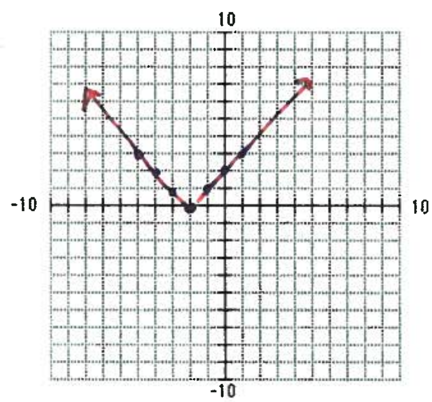


Examples: Graph the following absolute value functions:

(a) y = |x| - 3 down 3



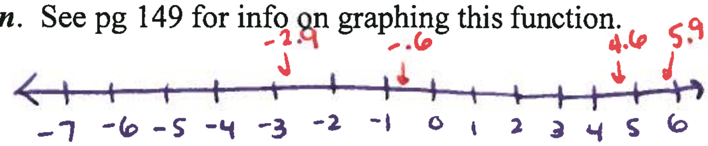
(b) y = |x + 2| left 2



Evaluating Greatest Integer (Step) Functions $f(x) = [x]$

The greatest integer function **[X]** = the greatest integer less than or equal to x. This is also commonly referred to as a step – function. The function ***rounds down***. See pg 149 for info on graphing this function.

**Use a number line to help you answer the following



[4.6] = 4 Round down!

[5.9999] = 5

[-.6] = -1 Round down!

[-2.9] = -3

[2] = 2

[-7] = -7

Since these are whole numbers... they stay same

A piecewise function has different rules (equations) for different parts of its domain. To evaluate a piecewise function for a given value of x, find the interval that x belongs to. Then find the corresponding definition of the function for that interval.

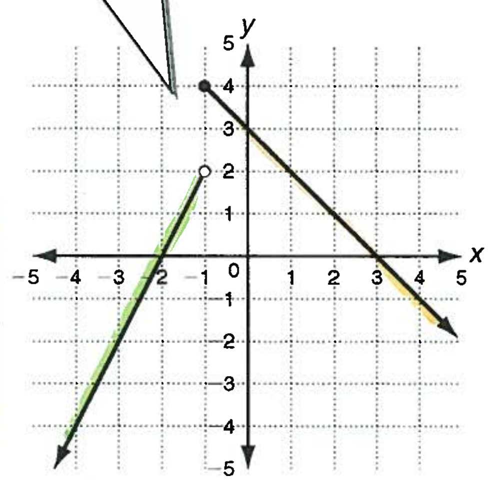
Use a table of values to graph a piecewise function.

Graph: $f(x)=\begin{cases}2x+4 & \text{if } x<-1\\ -x+3 & \text{if } x\geq -1\end{cases}$

Check the split.
At $x=-1$, $f(x)=-x+3$.
Put a closed circle at $(-1, 4)$.
Put an open circle at $(-1, 2)$.

Make a table of values.

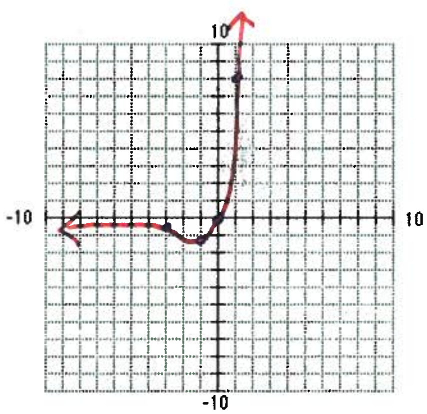
x	$f(x)=2x+4$	$f(x)=-x+3$
-4	$2(-4)+4=-4$	
-3	$2(-3)+4=-2$	
-2	$2(-2)+4=0$	
-1	$2(-1)+4=2$	$-(-1)+3=4$
0		$-(0)+3=3$
1		$-(1)+3=2$
2		$-(2)+3=1$



you must plot -1
on this graph even though $x<-1$
because you need to account for all the decimals between -2 and -1.

UNFAMILIAR FUNCTIONS:

Examples: A function is defined by the equation $f(x) = (3x)(e^x)$. Make a table of values to plot.



x	y
-3	-.448
-1	-1.10
0	0
1	8
2	44

Note: If graphing a rational function, make sure you graph the asymptotes. Remember, the vertical asymptote can be found by setting the denominator equal to zero. The corresponding x-value is your vertical asymptote. The horizontal asymptote can be found by plugging in large values of x's. The corresponding y-value is your horizontal asymptote.