Absolute Value Functions

Work within a small group to answer these questions. Do not race through the exercises on your own. Always make sure that your entire group feels good about a question and answer before you move to the next exercise. Ask your group mates for explanations if you feel uncertain about something, and offer your explanations to others when you understand an exercise but someone else may not.

1. Evaluate each of these expressions.

a) $|-4-7|$

$= |-11|$

$= 11$

b) $-|4-7|$

$= -|-3|$

$= -3$

c) $|7-4|+3$

$= |3| + 3$

$= 3 + 3$

$= 6$

d) $3-6|-1+(3-5)^3|$

$= 3-6|-1+(-2)^3|$

$= 3-6|-1+(-8)|$

$= 3-6|-9|$

$= 3-6\cdot 9 = 3-54$

$= -51$

2. Given h defined by $h(x) = |-2x-22|$, find and simplify:

a) $h(17)$

$= |-2(17)-22|$

$= |-34-22|$

$= |-56|$

$= 56$

b) $h\left(\frac{13}{3}\right)$

$= \left|-2\left(\frac{13}{3}\right)-22\right|$

$= \left|\frac{-26}{3}-22\right|$

$= \left|\frac{-26}{3}-\frac{66}{3}\right|$

$= \left|\frac{-92}{3}\right| = \frac{92}{3}$

c) $h(0.3)$

$= |2(0.3)-22|$

$= |-0.6-22|$

$= |-22.6|$

$= 22.6$

d) $h(-17)$

$= |-2(-17)-22|$

$= |34-22|$

$= |12|$

$= 12$

3. Find the domain of these functions.

a) H where $H(x) = |3x+4|$

b) K where $K(x) = 5x-|-4x-8|$

There is no way any input would cause us to not get an output. So no bad inputs.

So the domain is $(-\infty, \infty)$ in both cases.

4. Make a table of values for each function.

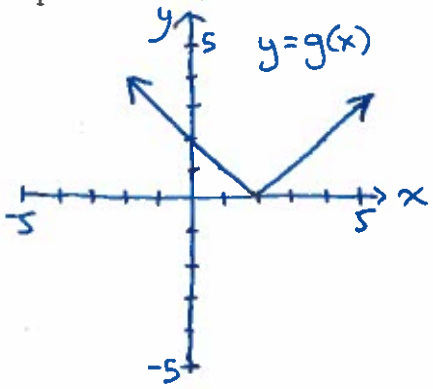
a) g where $g(x) = |x-2|$

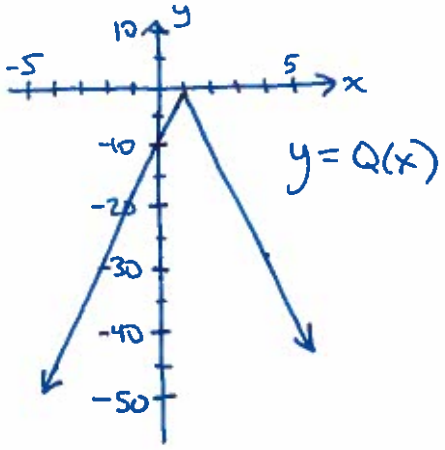
x	$g(x)$
-4	6
-3	5
-2	4
-1	3
0	2
1	1
2	0
3	1
4	2

b) Q where $Q(x) = -3|3x-3|-1$

x	$Q(x)$
-4	-46
-3	-37
-2	-28
-1	-19
0	-10
1	-1
2	-10
3	-19
4	-28

5. For each function from question 4, use technology to make a graph in a good viewing window. *Part of the point is to use graphing technology. Don't just plot your points from the previous question's tables.*





6. What are the domain and range of the functions in question 4? Use your graphs from question 5 to help.

both have domain $(-\infty, \infty)$

The range of g is $[0, \infty)$.

The range of Q is $(-\infty, 0]$.

7. Simplify these expressions.

a) $\sqrt{(-20)^2}$ $= |-20|$ $= 20$

b) $\sqrt{(-9599)^2}$ $= |-9599|$ $= 9599$

c) $\sqrt{(a+3)^2}$ $= |a+3|$

d) $\sqrt{x^2+4x+4}$ $= \sqrt{(x+2)^2}$ $= |x+2|$