Function Absolutes

For each function:

a. Sketch $f(x)$
b. Find the zeros.
c. Determine where $f(x) < 0$.
d. Sketch $|f(x)|$

1. $y = |-2(x+3)^2 + 4|$

2. $y = |3(x+2)^3 - 5|$

3. $y = \left|-\frac{1}{2}\sqrt{x-4} + 2\right|$

4. $y = |(x-2)(x+4)|$

5. If $f(x)$ has zeros at $x = a$ and $x = b$, what happens to those points under $y = |f(x)|$?

6. If a quadratic opens downward and has maximum value 5, what is the maximum value of $|f(x)|$? What about the minimum?

7. If $f(x)$ never becomes negative, what does $y = |f(x)|$ look like?

8. If $f(x)$ has exactly one zero, what must $f(x)$ look like? What will $|f(x)|$ look like near that zero?

9. If $f(x)$ has two distinct zeros and is negative between them, describe exactly how $|f(x)|$ changes the graph on that interval.

10. If a quadratic opens upward and has minimum value -4, what is the minimum value of $|f(x)|$? Where does it occur?

11. If $f(x) \leq 0$ for all x, describe $|f(x)|$ in terms of $f(x)$. What geometric transformation has occurred?

12. Suppose $f(x)$is symmetric about $x = h$. Is $|f(x)|$ also symmetric about $x = h$? Explain.

13. If the vertex of a quadratic lies below the x-axis, how does $|f(x)|$change the location of the vertex?

14. A quadratic crosses the x-axis at $x = 2$ and $x = 6$. Describe the shape of $|f(x)|$ on these intervals:
    - $x < 2$
    - $2 < x < 6$
    - $x > 6$

15. Can $|f(x)|$ ever have more zeros than $f(x)$? Explain.

16. Describe how the maximum and minimum values of $f(x)$ compare to those of $|f(x)|$.