Algebra 2

Module 2, Quadratic Functions Assignment

There are so many items for sale in our world! Some of the items you can buy will appreciate in value. This means that as time passes, the value of the item increases. If you decide to sell the item at a later time, you should be able to sell it for more than you paid. Some common examples of items that appreciate in value include houses, stocks, and some types of art.

Other items you can buy will depreciate in value. This means that as time passes, the value of the item decreases. If you decide to sell the item at a later time, you will likely have to sell it for less than you paid for it. Cars, game systems, and jewelry are examples of items that usually depreciate as time passes. The majority of items that depreciate never reach a value of $0. Their worth attains some minimum, positive value that is greater than $0 and then their price stabilizes.

In 1986, one of the first video games, the Nintendo, sold for $180. Similar to many items, its value depreciated over time. The function that models how its value has changed over time is,

$$\mathbf{f(x) = 3x^2 - 40x + 180},$$ where:

- x is the number of years after 1986 , and
- f(x) is the value of the Nintendo video game, in dollars ($)

Use what you have learned about quadratic functions to help you answer these questions.

1. What is f(0)? From the information above, what does this number mean?

2. Is this formula in Standard or Vertex form of a Quadratic formula? How do you know?

3. What is the rule for finding the vertex of a formula in Standard form? Use that rule to find the vertex of our formula, from above (Once you find the x value, plug it into the equation to find the value of f(x)). What do the x and f(x) values you got represent?

4. Please graph the function using the Desmos graphing calculator. **Sketch the graph here.**
    a) Does the vertex you see on the graph agree with the one you just calculated?
    b) Is the vertex you got in question 3 a maximum or minimum?
    https://www.desmos.com/calculator

5. Looking at your graph, does the function ever touch or cross the x-axis (reach a value of 0$)? You may have to zoom in to be sure.

6. Use the quadratic formula to solve for the "solutions", or "zeros" of the equation. Did you get 2 real answers, 1 real answer, or 2 imaginary answers?
    Show your work.

7. If you get 2 imaginary answers when using the quadratic formula, how does this relate to how many times (0, 1 or 2) a quadratic graph touches/crosses the x-axis?

8. Your teacher recently found an old Nintendo in a thrift store. Use the formula to predict the value of the Nintendo in 2020? (Remember, x is the years after 1986, and y is the value, in $.) Do you think this is a realistic prediction of the value of that Nintendo?