Properties of quadratic functions | Answers

Task: Work out the following features of the function given by the formula $f(x) = x^2 + 6x + 5$

1. Coefficients a, b, c of the standard form $f(x) = ax^2 + bx + c$. $a = 1 \quad b = 6 \quad c = 5$

2. Determinant Δ . $\quad \Delta = b^2 - 4ac = 6^2 - 4 \cdot 1 \cdot 5 = 36 - 20 = 16 \quad \Delta = 16$

3. Coordinates of the vertex $W = (p, q)$ of the parabola, which the graph of the function.

   $p = \frac{-b}{2a} = \frac{-6}{2\cdot 1} = -3 \quad q = \frac{-\Delta}{4a} = \frac{-16}{4\cdot 1} = -4 \quad W = (-3, -4)$

4. Equation of the line of symmetry of the parabola, which is graph of the function $x = p$

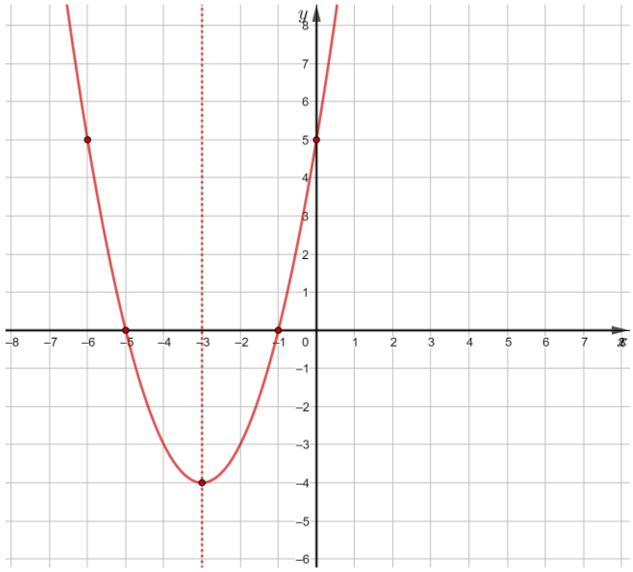
   $x = -3$

5. Vertex form of the function. $\quad f(x) = a(x-p)^2 + q \quad f(x) = (x+3)^2 - 4$

6. Zeros of the function (if they exist). $\quad x_1 = \frac{-b-\sqrt{\Delta}}{2a} = \frac{-6-\sqrt{16}}{2\cdot 1} = -5 \quad x_2 = \frac{-6+\sqrt{16}}{2\cdot 1} = -1$

7. Factored form (if exists). $\quad f(x) = a(x - x_1)(x - x_1) \quad f(x) = \frac{1}{2}(x+5)(x+1)$

8. Graph of the function and line of symmetry.



9. The domain of the function is the set R of all real numbers.
10. The range of the function is $[-4, \infty)$
11. $f(x) > 0$ for $x \in (-\infty, -5) \cup (-1, \infty)$.
12. $f(x) < 0$ for $x \in (-5, -1)$.
13. Maximum interval in which the function increases is $[-3, \infty)$.
14. Maximum interval in which the function decreases is $(-\infty, -3]$.
15. The maximum $f(x)$ for $x \in [-6, -2]$ equals $f(-6) = 5$.
16. The minimum $f(x)$ for $x \in [-6, -2]$ equals $f(-3) = -4$.