2.1.06R | Test yourself | Properties of quadratic functions | Answers

Task: Work out the following features of the function given by the formula $f(x) = \frac{1}{2}x^2 - 4x + 6$

1. Coefficients a, b, c of the standard form $f(x) = ax^2 + bx + c$. $\boldsymbol{a = \frac{1}{2}}$ $\boldsymbol{b = -4}$ $\boldsymbol{c = 6}$

2. Determinant Δ. $\Delta = b^2 - 4ac = (-4)^2 - 4 \cdot \frac{1}{2} \cdot 6 = 16 - 12 = 4$ $\boldsymbol{\Delta = 4}$

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

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

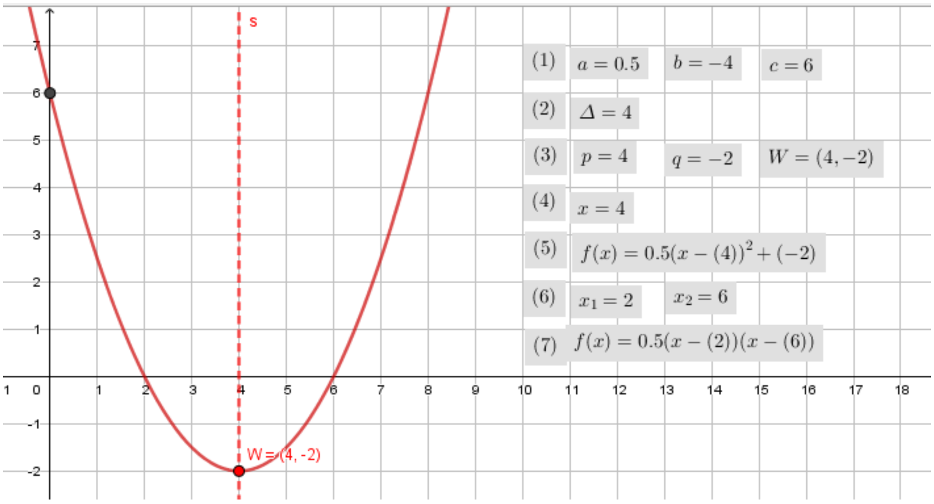
4. Equation of the line of symmetry of the parabola, which is graph of the function $x = p$ $\boldsymbol{x = 4}$

5. Vertex form of the function. $f(x) = a(x - p)^2 + q$ $\boldsymbol{f(x) = \frac{1}{2}(x - 4)^2 - 2}$

6. Zeros of the function (if they exist). $x_1 = \frac{-b-\sqrt{\Delta}}{2a} = \frac{4-\sqrt{4}}{2 \cdot \frac{1}{2}} = \boldsymbol{2}$ $x_1 = \frac{4+\sqrt{4}}{2 \cdot \frac{1}{2}} = \boldsymbol{6}$

7. Factored form (if exists). $f(x) = a(x - x_1)\,(x - x_1)$ $\boldsymbol{f(x) = \frac{1}{2}(x - 2)\,(x - 6)}$

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 $\langle -2, \infty)$.

11. $f(x) > 0$ for $x \in (-\infty, \mathbf{2}) \cup (\mathbf{6}, \infty)$.

12. $f(x) < 0$ for $x \in (\mathbf{2}, \mathbf{6})$**.**

13. Maximum interval in which the function increases is $\langle 4, \infty)$.

14. Maximum interval in which the function decreases is $(-\infty, 4\rangle$.

15. The maximum of $f(x)$ for x from the closed interval $\langle 0,5 \rangle$ is **6**.

16. The minimum of $f(x)$ for x from the closed interval $\langle 0,5 \rangle$ is **– 2**.