

Answer on Question #56094 – Math – Algebra

1. Which of the following are quadratic functions? There can be multiple right answers. Check all that apply.

$$\begin{aligned}y &= 5x - 3x^2 \\y &= x - x^3 \\y &= 2x^2 - 3x + 7 \\y &= 3x - 4\end{aligned}$$

Solution

The quadratic function is a function, which has the form $y = ax^2 + bx + c$. Then $y = 5x - 3x^2$ and $y = 2x^2 - 3x + 7$ are quadratic functions.

Answer: $y = 5x - 3x^2$ and $y = 2x^2 - 3x + 7$.

2. Which of the following quadratic functions has a graph that opens downward. There can be multiple right answers. Check all that apply.

$$\begin{aligned}y &= 3x^2 - x - 1 \\y &= -(2x^2 - 1) \\y &= 5/2 x - 3x^2 \\y &= 3/2x^2 - 3x + 15\end{aligned}$$

Solution

The quadratic function $y = ax^2 + bx + c$ has a graph that opens downward if coefficient at x^2 is negative ($a < 0$).

The $y = -(2x^2 - 1)$ and $y = 5/2 x - 3x^2$ are such quadratic functions.

Answer: $y = -(2x^2 - 1)$ and $y = 5/2 x - 3x^2$.

3. In which form is the following function written

$$y = -2(x - 3)(x + 5)$$

Solution

The function

$$y = -2(x - 3)(x + 5)$$

is written in the intercept form $y = a(x - p)(x - q)$.

Here $a = -2 < 0$, hence the graph will open downwards, Besides, y-intercept is $y(0) = -2 \cdot (-3) \cdot 5 = 30$, x-intercepts are $p = 3$ and $q = -5$.

We can transform this function into the standard form

$$y = -2(x - 3)(x + 5) = -2x^2 - 4x + 30$$

or into the vertex form

$$y = -2(x - 3)(x + 5) = -2(x^2 + 2x + 1) + 32 = -2(x + 1)^2 + 32.$$

Answer: intercept form.

4. In which form is the following function written.

$$y - 3 = 1/2 (x - 1)^2$$

Solution

Rewrite $y - 3 = \frac{1}{2}(x - 1)^2$ as $y = 1/2 (x - 1)^2 + 3$

The function

$$y = \frac{1}{2}(x - 1)^2 + 3$$

Is written in the vertex form $y = a(x - h)^2 + k$. Here $a = \frac{1}{2} > 0$, hence the graph will open upwards, $(h; k) = (1; 3)$ will always be the coordinates of the vertex of the quadratic function. We can transform the function into the standard form:

$$y = \frac{1}{2}(x - 1)^2 + 3 = \frac{1}{2}x^2 - x + \frac{7}{2}.$$

Answer: vertex form.

5: Which of the following represents this function written in standard form. There can be multiple right answers. Check all that apply.

$$y = 2(x + 1)(x - 6)$$

$$y = 2x^2 - 10x - 12$$

$$y = 2x^2 - 10x + 6$$

$$y = 2x^2 - 5x - 12$$

$$y = 2x^2 - 14x + 12$$

Solution

The function

$$y = 2(x + 1)(x - 6)$$

is written in the intercept form $y = a(x - p)(x - q)$.

We can transform this function into the standard form:

$$y = 2(x + 1)(x - 6) = 2(x^2 - 5x - 6) = 2x^2 - 10x - 12.$$

Answer: $y = 2x^2 - 10x - 12$.