

Algebra 1 · Graphing Quadratic Functions · Worksheet

Common Core F-IF.C.7a, F-IF.C.8a, F-IF.B.4, A-SSE.B.3b · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

These problems practice graphing quadratic functions and reading their key features, following Common Core F-IF.C.7a. The first problems name coefficients, axes and vertices; the middle ones convert between standard, vertex and factored forms and complete the square.

The last problems apply parabolas to a thrown ball, a garden fence, a T-shirt sale and a fountain. Show every step and label each answer.

Algebra 1 Common Core: F-IF.C.7a · F-IF.C.8a · F-IF.B.4 · A-SSE.B.3b

Problem 1: Name the coefficients

Write the values of a , b and c for each function.

a. $f(x) = 3x^2 - 5x + 2$

b. $g(x) = -x^2 + 4$

Problem 2: Opens up or down

For each function, state whether the parabola opens up or down, whether the vertex is a maximum or a minimum, and the y-intercept.

a. $f(x) = -2x^2 + 7x - 4$

b. $h(x) = \frac{1}{2}x^2 - 3$

Problem 3: Axis of symmetry

Find the equation of the axis of symmetry for each parabola.

a. $y = x^2 + 8x + 3$

b. $y = 2x^2 - 12x + 1$

c. $y = -x^2 + 5x$

Problem 4: Vertex from standard form

Find the vertex of each parabola.

- a. $y = x^2 - 6x + 5$
- b. $y = -2x^2 + 8x - 3$

Problem 5: Read vertex form

Give the vertex, the axis of symmetry, and the maximum or minimum value of each function.

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

Problem 6: Zeros from factored form

The function $y = (x+2)(x-6)$ is in factored form. Find its x-intercepts, its axis of symmetry and its vertex.

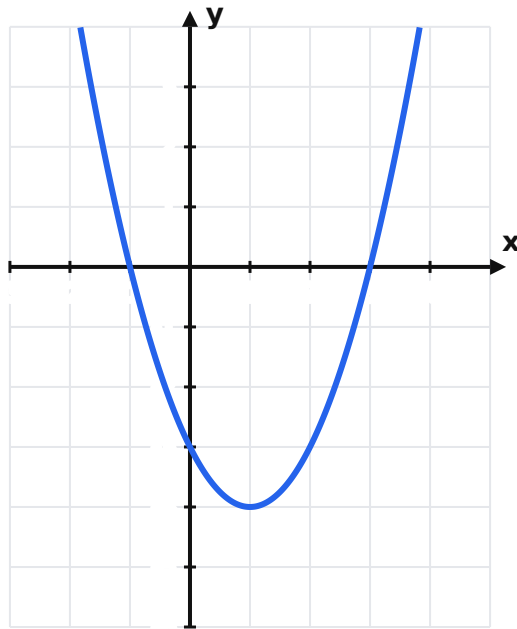
Problem 7: Complete a table

Complete the table for $y = x^2 - 4x + 1$. Then name the vertex and the axis of symmetry.

x	-1	0	1	2	3	4	5
y	?	?	?	?	?	?	?

Problem 8: Read a graph

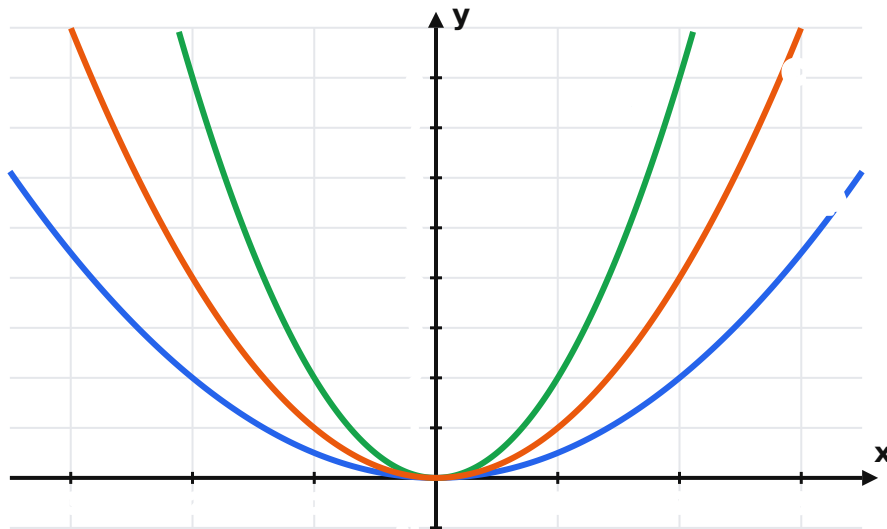
Use the graph to name the vertex, the axis of symmetry, the x-intercepts, the y-intercept, and the range of the function.



A parabola with a lowest point and two x-intercepts.

Problem 9: Effect of a

The equations $y = x^2$, $y = 2x^2$ and $y = \frac{1}{2}x^2$ are graphed below. Match each equation to its curve. Then describe how the graph of $y = -2x^2$ differs from curve B.



Three parabolas with the same vertex and different widths.

Problem 10: Intercepts from standard form

Find the x-intercepts and the y-intercept of $y = x^2 - 5x + 6$.

Problem 11: Maximum or minimum value

Does $f(x) = -x^2 + 6x - 5$ have a maximum or a minimum? Find the value and where it occurs. Then find the zeros.

Problem 12: Factored to standard form

Write $y = (x-3)(x+5)$ in standard form. Then find its vertex.

Problem 13: Complete the square

Rewrite $y = x^2 + 8x + 7$ in vertex form by completing the square. State the vertex.

Problem 14: No x-intercepts

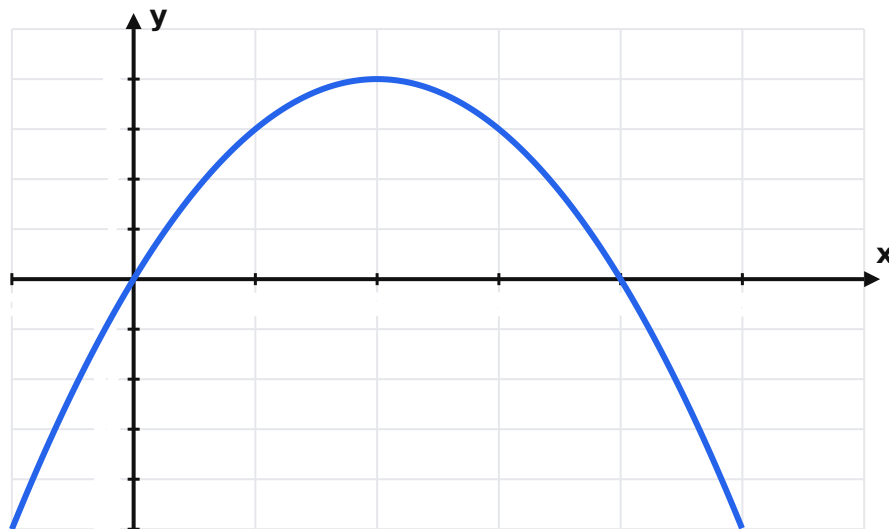
Complete the square for $y = x^2 - 10x + 30$. Find the minimum value and explain why the graph has no x-intercepts.

Problem 15: Leading coefficient 2

Write $y = 2x^2 - 12x + 10$ in vertex form. Then find the zeros.

Problem 16: Increasing and decreasing

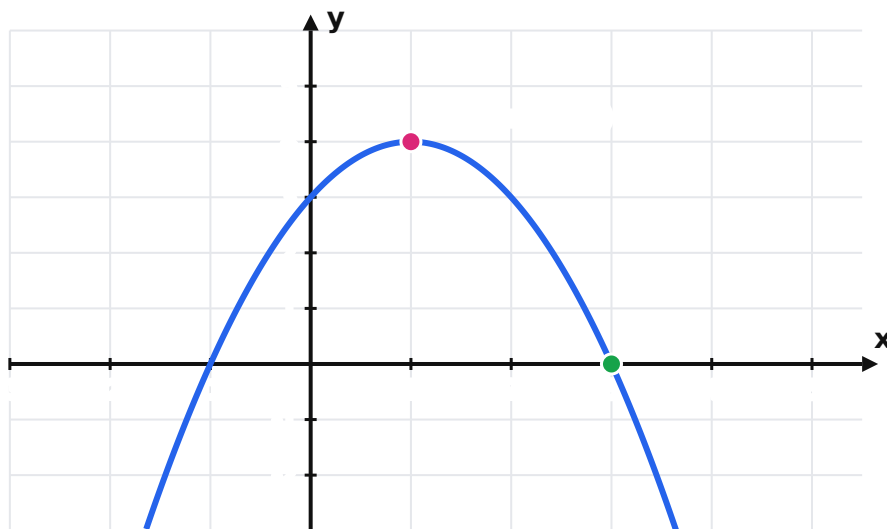
The graph of $f(x) = -x^2 + 4x$ is shown. State the interval where f is increasing, the interval where it is decreasing, and the interval where $f(x) > 0$.



The graph of $f(x) = -x^2 + 4x$.

Problem 17: Equation from a graph

The graph shows a parabola with vertex $(1,4)$ that passes through $(3,0)$. Write its equation in vertex form, then in standard form.



A parabola with vertex $(1,4)$ that passes through $(3,0)$.

Problem 18: Compare two functions

Function f is $f(x) = x^2 - 6x + 11$. Function g is given by the table. Which function has the lower minimum value?

x	0	1	2	3	4
$g(x)$	5	2	1	2	5

Problem 19: Three forms, one parabola

Show that $y = (x-3)^2 - 4$ and $y = (x-1)(x-5)$ are both equal to $y = x^2 - 6x + 5$. Then tell which form shows the vertex, which shows the zeros, and which shows the y-intercept.

Problem 20: Equation from zeros and a point

A parabola has x-intercepts at 2 and 8 and passes through $(5, -9)$. Write its equation in factored form and in standard form. Find the vertex.

Problem 21: Thrown ball

Maya throws a ball upward from a balcony. Its height in feet after t seconds is $h(t) = -16t^2 + 32t + 6$.

- How high is the ball at $t = 0$?
- When does it reach its highest point, and how high is that?
- At what other time is the ball again at the height from part (a)?

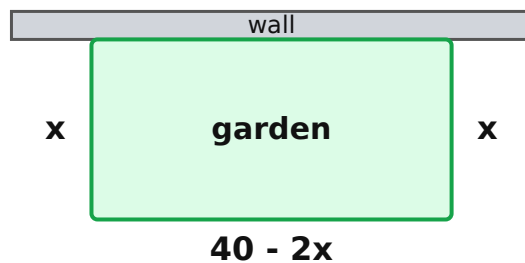


Height of a ball (feet) against time (seconds).

Problem 22: Garden fence

Diego has 40 feet of fence for a rectangular garden. One side is a wall, so only three sides need fence. Let x be the length of each of the two sides that touch the wall.

- Write a function $A(x)$ for the area.
- Find the value of x that gives the largest area.
- Find that area and the dimensions of the garden.



Problem 23: T-shirt sale

The school store sells 100 T-shirts at \$12 each. For every \$1 the price goes up, the store sells 5 fewer shirts. With x dollars of increase, the revenue is $R(x) = (12+x)(100-5x)$.

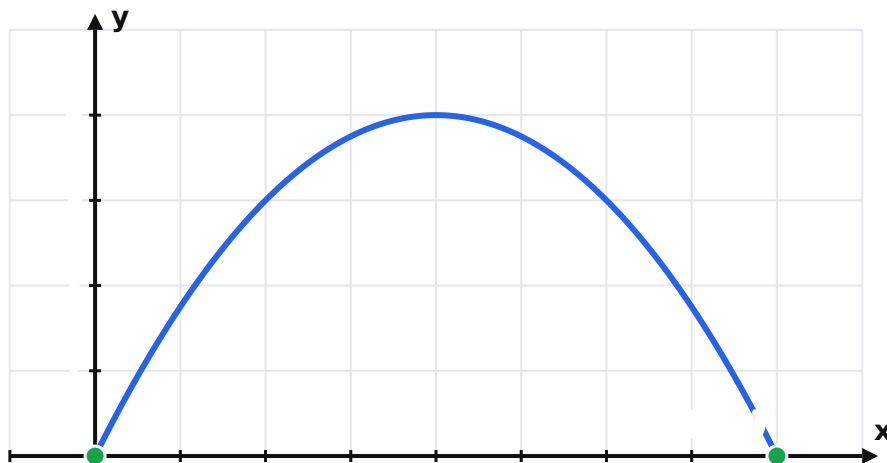
- Write $R(x)$ in standard form.
- What price gives the greatest revenue?

- c. Find the greatest revenue and the number of shirts sold.

Problem 24: Fountain arc

A stream of water from a fountain follows $y = -\frac{1}{4}x^2 + 2x$, where x is the horizontal distance and y is the height, both in feet.

- Find the greatest height of the water.
- How far from the nozzle does the water land?
- Find the height at $x=2$, and another distance at which the water has that same height.



Path of a water stream: x is horizontal distance and y is height, both in feet.