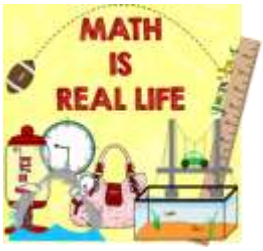

Quadratic function - Test Yourself

All Multiple choice

Instructions:

1. Read the questions carefully.

2. Solve each problem and decide which of the offered answer choices is correct.

3. ENJOY

1. Which relation is quadratic?

◯ $y = -3x + 7$ ◯ $y = (3x)^2(x + 2)$ ◯ $y = x^3 - x^2 + 5x - 4$ ◯ $y = (x + 9)^2$

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2. What are the *x - intercepts* of $y = 2(x - 3)(x + 4)$?

◯ $x = -2,\ x = -4\ and\ x = 3$ ◯ $x = -4,\ x = 3\ and\ x = 2$

◯ $x = 4\ and\ x = -3$ ◯ $x = -4\ and\ x = 3$

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3. What is the *y - intercept* for $y = 2x^2 - 5x + 2$?

◯ $y = 2$ ◯ $y = -2$ ◯ $y = 0.5$ ◯ $y = -0.5$

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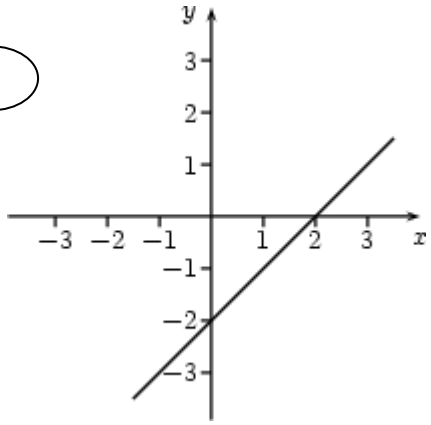
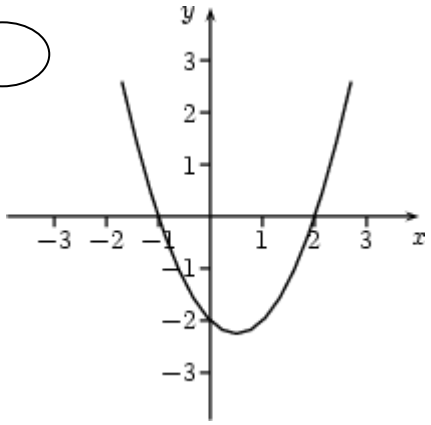
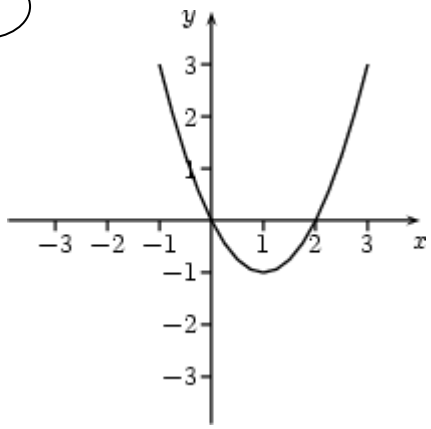
4. Which of the quadratic functions has the widest graph?

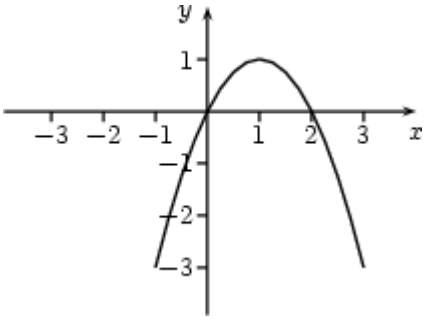
◯ $y = -4x^2$ ◯ $y = -\frac{4}{5}x^2$ ◯ $y = 0.3x^2$ ◯ $y = \frac{1}{3}x^2$

5. Which of the following graphs represents $y = x^2 - 2x$?

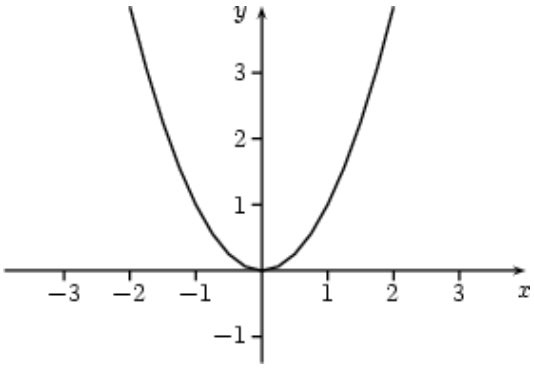








6. Consider the graph of $y = ax^2$ below.
Which of the following statements about the graph is true?



The graph has a minimum and the coefficient ***a*** is negative.

The graph has a maximum and the coefficient ***a*** is negative.

The graph has a maximum and the coefficient ***a*** is positive.

The graph has a minimum and the coefficient ***a*** is positive.

7. What is the equation of the axis of symmetry of the function $f(x) = -2(x-3)^2 + 5$?

◯ $x = -2$ ◯ $x = -3$ ◯ $x = 5$ ◯ $x = 3$

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8. What is the range of the function $y = 2(x-1)^2 - 3$

◯ $y \geq -3$ ◯ $y \leq -3$ ◯ $y \geq 3$ ◯ $y \leq 3$

---

9. Which quadratic function contains the points $(1, -6), (-2, 15), (3, 30)$?

◯ $f(x) = 2x^2 - 9x + 5$ ◯ $f(x) = 9x^2 - 2x - 5$

◯ $f(x) = 5x^2 - 9x - 2$ ◯ $f(x) = 5x^2 - 2x - 9$

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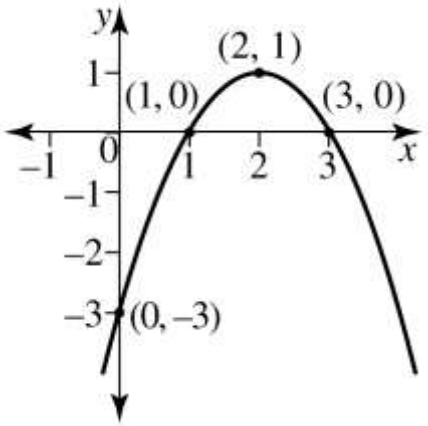
10. What is the quadratic function, in vertex form, represented by the parabola below?



◯ $f(x) = -(x-2)^2 + 1$ ◯ $f(x) = -(x-1)^2 + 2$

◯ $f(x) = (x-2)^2 + 1$ ◯ $f(x) = -(x-2)^2 - 1$

Graphing Quadratic Inequalities

Steps for Graphing (quickly)

1. Rewrite the quadratic inequation into an equation of the form $f(x)=0$.

   Solving the equation gives $x=x_1$ *and* $x=x_2$ (*x - intercepts)*.

2. Sketch the graph of the quadratic function $a > 0$  $a < 0$ 

3. Deduce the **range of values of x** satisfying the inequality .

   Pick a test value to find out which is > 0 or < 0 .

Example 1:

Solve the quadratic inequality $x^2 – x – 6 < 0$ graphically.

Step (1): The corresponding quadratic function is $y = x^2 – x – 6$.

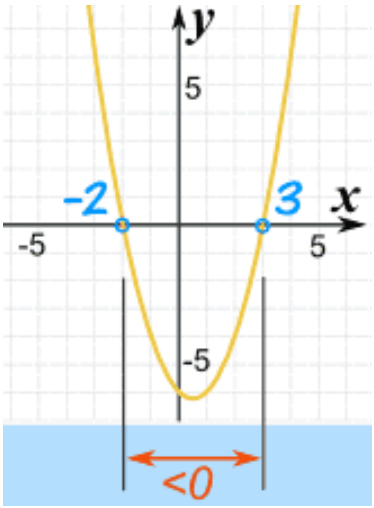
For $y=0$, $x^2 – x – 6 = 0$, $x_1 = –2$ *and* $x_2 = 3$, $a > 0$ 

Step (2): Sketch the graph of $y = x^2 – x – 6$

Step (3): Find the solution from the graph . Let's pick a value in- between and test it:

At x = 0 : $x^2 – x – 6 = 0 – 0 – 6 = – 6$ **< 0**.

So between – 2 and 3 , the function is **less** than zero.

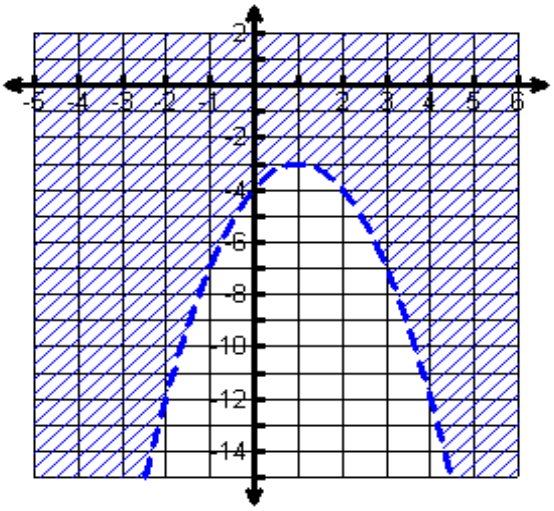


The **inequality** "< 0" is true **between** −2 and 3.

What if it doesn't go through zero?

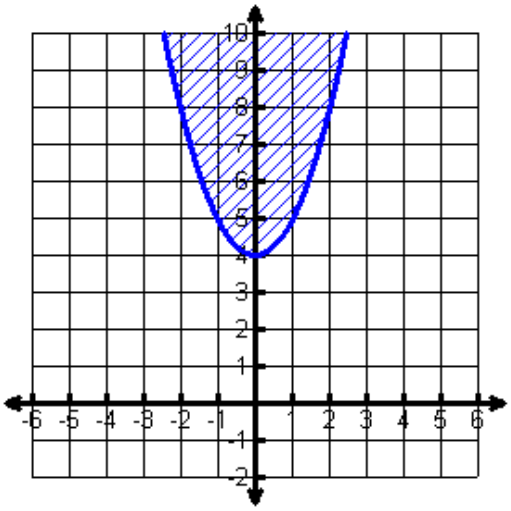
Graph it!

Solve: $-(x-1)^2 - 3 < 0$



Answer: all real numbers

Solve: $x^2 + 4 \le 0$



Answer: no solution

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11. If $x^2 - 4 > 0$, then x could be:

◯ 0 ◯ 1 ◯ 2 ◯ 3

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12. Solve the quadratic inequality $x^2 - 4x - 21 \le 0$. Write the solution set in the interval notation.

◯ $[7,+\infty)$ ◯ $(-\infty,-3]$ ◯ $(-\infty,-3]\cup[7,+\infty)$ ◯ $[-3,7]$

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13. If $x^2 \le 25$, then:

◯ $-5 \le x \le 5$ ◯ $-25 \le x \le 25$ ◯ $x \le -5$ or $x \ge 5$ ◯ $0 \le x \le 5$

14. Angry birds is a popular game in which birds are flung by the use of parabolas.

An angry bird's flight is described by the equation $h(t) = -5(t-4)(t+2)$, where ***h*** is the height of the angry bird in meters and at time, ***t*** seconds .

a) When does an angry bird hit the ground?

◯ 4 seconds ◯ 3 seconds ◯ 2 seconds ◯ 1 second

b) From which height is the angry bird launched ?

◯ 35 m ◯ 40 m ◯ 45 m ◯ 50 m

c) What is the maximum height reached by the angry bird ?

◯ 35 m ◯ 40 m ◯ 45 m ◯ 50 m

d) How long does it take for the angry bird to reach the maximum height?

◯ 4 seconds ◯ 3 seconds ◯ 2 seconds ◯ 1 second

15. A biologist took a count of the number of migrating waterfowl at a particular lake, and recounted the lake's population of waterfowl on each of the next six weeks.

Week	0	1	2	3	4	5	6
Population	585	582	629	726	873	1070	1317

a) Find a quadratic function that models the data as a function of ***x***, the number of weeks.

b) Use the model to estimate the number of waterfowl at the lake on week 8.

◯ $P(x) = 25x^2 - 28x + 585$; 1614 waterfowls

◯ $P(x) = 30x^2 + 28x + 535$; 2679 waterfowls

◯ $P(x) = 25x^2 - 28x + 585$; 1961 waterfowls

◯ $P(x) = 30x^2 + 28x + 535$; 2201 waterfowls

16. *Parabola Manufacturing* estimates that its weekly profit, *P*, in hundreds of euros, can be approximated by the formula $P(x) = -3x^2 + 6x + 10$, where *x* is the number of units produced per week, in thousands.

a) How many units should the company produce per week to earn the maximum profit?

b) Find the maximum weekly profit.

- ◯ 1000 units; € 1300
- ◯ 1000 units; € 600
- ◯ 3000 units; €100
- ◯ 2000 units; €1100

17. A peach orchard farmer now has 20 trees per acre. Each tree produces, on average, 300 peaches. For each additional tree the farmer plants, the number of peaches per tree is reduced by 10. How many more trees should the farmer plant to achieve the maximum yield of peaches? What is the maximum yield?

HINTS:

Yield = number of peaches per tree · number of trees

- *Yield = 300 · 20 = 6000 (currently)*
- *Plant one more tree:*
  Yield = $(300 - 1 \cdot 10) \cdot (20 + 1)$ *= 290 · 21* = 6090 peaches
- *Plant two more trees:*
  Yield = $(300 - 2 \cdot 10) \cdot (20 + 2)$ *=280 · 22 = 6160 peaches*

a) How many more trees should the farmer plant to achieve the maximum yield of peaches?

- ◯ 4 additional trees
- ◯ 5 additional trees
- ◯ 6 additional trees
- ◯ 7 additional trees

b) Which is the maximum yield?

- ◯ 6240 peaches
- ◯ 6260 peaches
- ◯ 6250 peaches
- ◯ 6270 peaches