Name_____

For the graph of the quadratic function, state the direction the parabola opens and the coordinates of the vertex.

1) $f(x) = 3x^2 + 18x + 31$

2) $f(x) = -4(x-3)^2 - 7$

Solve the problem.

3) John owns a hot dog stand. He has found that his profit is given by the equation $P = -x^2 + 80x + 89$, where x is the number of hot dogs sold. How many hot dogs must he sell to earn the most profit?

4) A ball is thrown upward so that its distance above the ground after t sec is given by $h(t) = -12t^2 + 480t$. After how many seconds does it reach its maximum height? How long did it take for ball to hit the ground?

A boy is standing on a flat field and tosses his ball toward a second boy standing at the other end of the field. The path of the ball is a parabola, and the equation of the path is $f(x) = -4x^2 + 8x$. Based on this information, answer the question.

5) What is the name of the place on the path where the ball is highest from the ground?
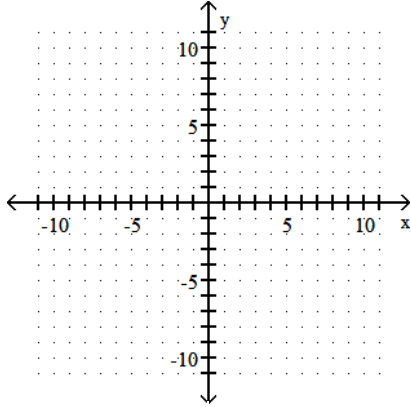
6) What is the highest the ball will be above the flat field and for what value of x?

Write the equation of the quadratic in standard form and identify the vertex of the parabola.

7) $y = 4x^2 - 8x + 14$

Graph the parabola. Identify the vertex, axisof symmetry, x and y-intercepts.
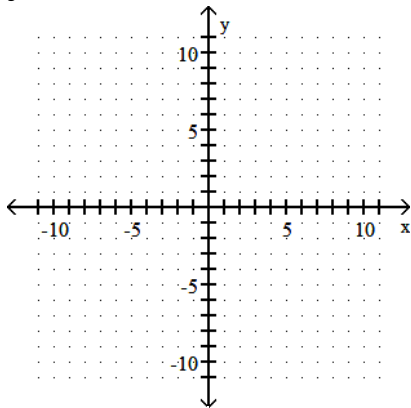
8) $f(x) = -x^2 + 2x - 9$

Solve the problem.

9) If a rocket is propelled upward from ground level, its height in meters after t seconds is given by $h(t) = -9.8t^2 + 107.8t$. During what interval of time will the rocket be higher than 294 m?
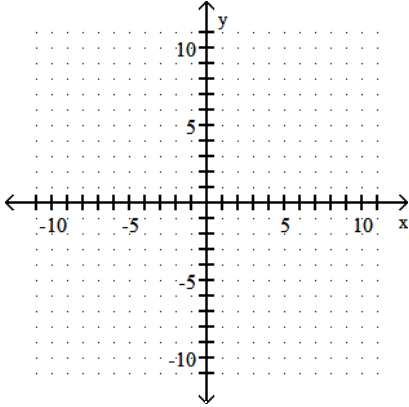
Sketch the graph of the parabola. Label vertex and x-intercepts.

10) $y = x^2 + 2x - 4$

Sketch the graph of the parabola. Label vertex and x-intercepts.

11) $y = -3x^2 - 12x - 3$

Solve the problem.

12) The student population of a small school has been increasing as shown in the following table.

Year	# of Students
1960	190
1970	200
1980	230
1990	280
2000	350
2010	440

Take 1910 as year zero, and determine the linear or quadratic function that best fits the data.

13) Write the standard form (vertex form) of the quadratic function that has the indicated vertex and whose graph passes through the given point.

Vertex: (3,-4) Point: (2,6)

14) The parabola with the points below has an equation in the form $y=ax^2+bx+c$.
First sketch the parabola. Then find the equation of this parabola using technology and also algebraically.
Please explain how you are able to solve it algebraically.

Points: (-3, 10), (-1,0), (2,0), (3,4)

15) There are three forms quadratic functions can be written in.
General form: $f(x)=ax^2+bx+c$
Standard form: $f(x)=a(x-h)^2+k$
Intercept form: $f(x)=a(x-p)(x-q)$

Why is each form useful?

General form:

Standard Form:

Intercept Form: