Name: _____

Parabolas

1) Each of the quadratic functions below is written in the form $f(x) = ax^2 + bx + c$. The graph of a quadratic function is a parabola with vertex (*h, k*), where $h = -\dfrac{b}{2a}$ and $k = f\left(-\dfrac{b}{2a}\right)$. Using this method, find the coordinates of the vertex of the parabola.

1) $f(x) = x^2 + 6x + 7$

2) $f(x) = x^2 - 8x + 21$

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

4) $f(x) = x^2 - 6x + 9$

5) $f(x) = 2x^2 - 8x + 11$

6) $f(x) = x^2 + 10x$

7) $f(x) = x^2 - 14x + 49$

8) $f(x) = 3x^2 + 18x + 15$

9) $f(x) = x^2 - 16$

10) $f(x) = -x^2 - 8x - 9$

11) $f(x) = -2x^2 - 5$

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

13) $f(x) = 4x^2 - 40x + 115$

14) $f(x) = 5x^2 - 10x + 8$

15) $f(x) = -2x^2 - 8x - 14$

16) $f(x) = -4x^2 + 24x - 27$

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

18) $f(x) = x^2 + 7x - 1$

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

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

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2) Graph the parabola and label the coordinates of the vertex and the intersections with the coordinate axes.

1) $y = x^2 + 2$

2) $y = x^2 - 3$

3) $y = x^2 + 2x - 3$

4) $y = x^2 - 3x - 4$

5) $y = -x^2 + 4x + 5$

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

7) $y = (x - 2)^2$

8) $x^2 - 2x + y = 0$

9) $y = 3x^2 - 2x + 1$

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

11) $x = y^2 - 4y + 5$

12) $y = (x + 3)^2$

3) If a ball is thrown straight up with an initial velocity of 32 ft/s, then after t seconds the distance s above its starting height, in feet, is given by $s = 32t - 16t^2$.

(1) Graph this equation in a ts-coordinate system (t-axis horizontal).

(2) At what time t will the ball be at its highest point, and how high will it rise?