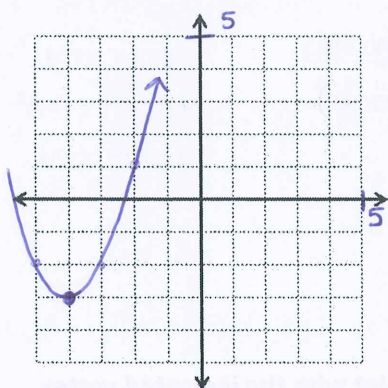


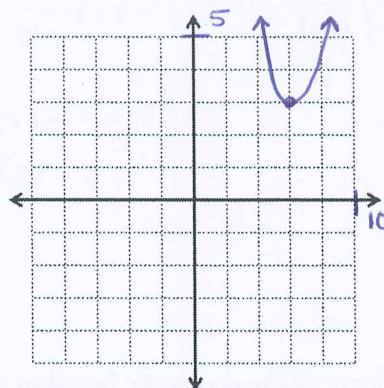
Find the vertex of the following functions, then SKETCH a GRAPH.

1. $f(x) = (x + 4)^2 - 3$



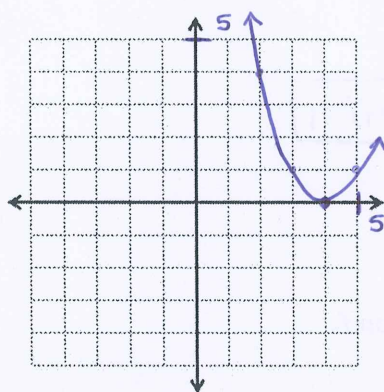
VERTEX
 (-4, -3)

2. $f(x) = (x - 6)^2 + 3$



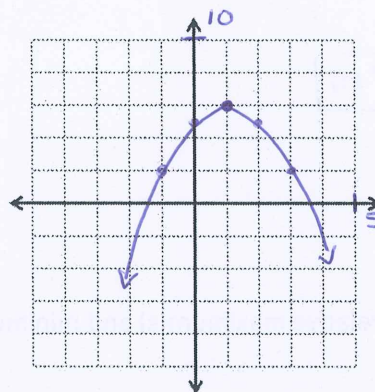
VERTEX
 (6, 3)

3. $h(x) = x^2 - 8x + 16 = (x - 4)^2$



VERTEX
 (4, 0)

4. $h(x) = -x^2 + 2x + 5$

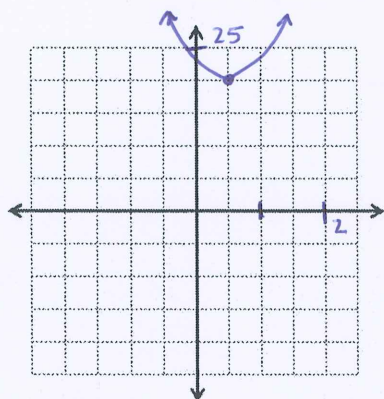


$$\frac{-B}{2A} = \frac{-(-2)}{2(-1)} = 1$$

$$h(1) = -(1)^2 + 2(1) + 5 = 6$$

VERTEX
 (1, 6)

5. $g(x) = 4x^2 - 4x + 21$

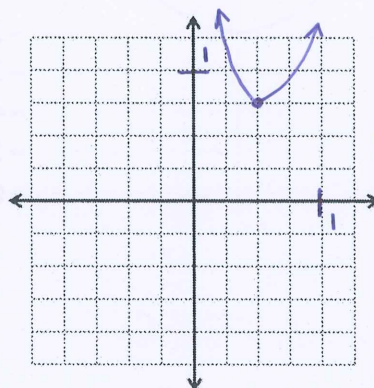


$$\frac{-B}{2A} = \frac{-(-4)}{2(4)} = \frac{1}{2}$$

$$g\left(\frac{1}{2}\right) = 4\left(\frac{1}{2}\right)^2 - 4\left(\frac{1}{2}\right) + 21 = 20$$

VERTEX
 (1/2, 20)

6. $g(x) = x^2 - x + 1$



$$\frac{-B}{2A} = \frac{-(-1)}{2(1)} = \frac{1}{2}$$

$$g\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2 - \left(\frac{1}{2}\right) + 1 = \frac{3}{4}$$

VERTEX
 (1/2, 3/4)

Describe the graph of the quadratic function by identifying the vertex and x-intercept(s).

7. $f(x) = -(x^2 + 2x - 3)$
 $= -(x+3)(x-1)$

x-intercepts

$(-3, 0) (1, 0)$

VERTEX

$(-1, 4)$

$\frac{-3+1}{2} = -1$

$f(-1) = -(-1+3)(-1-1)$
 $= -(2)(-2)$

8. $g(x) = x^2 + 8x + 11$

VERTEX

$(-4, -5)$

$\frac{-8}{2} = -4$

$g(-4) = 16 - 32 + 11$

x-intercepts

$(-4 \pm \sqrt{5}, 0)$

$0 = (x+4)^2 - 5$

$+5 = (x+4)^2$

$\pm\sqrt{5} = x+4$

Write the standard form of the quadratic function passing through the given point with the indicated vertex.

9. Vertex: $(-2, 5)$; Point: $(0, 9)$

$y = a(x-h)^2 + k$

$9 = a(0+2)^2 + 5$

$9 = 4a + 5$

$a = 1$

$y = (x+2)^2 + 5$

10. Vertex: $(-4, -1)$; Point: $(-2, 4)$

$y = a(x-h)^2 + k$

$4 = a(-2+4)^2 - 1$

$4 = 4a - 1$

$a = \frac{5}{4}$

$y = \frac{5}{4}(x+4)^2 - 1$

11. Identify the relative maximum(s) and minimum(s) of the following function f .

MINIMUMS

$(-3, -2)$

$(2, -6)$

MAXIMUMS

$(-1, 2)$

$(4, 5)$

