Section 6.2 – Practice Questions

Complete the square, and state if the vertex is a minimum and maximum

1. $y = x^2 - 2x + 4$

$(x^2 - 2x) + 4$

$(x^2 - 2x + 1 - 1) + 4$

$(x^2 - 2x + 1) + 3 \rightarrow (x-1)^2 + 3$

Vertex: $(1, 3)$ minimum

2. $f(x) = -2x^2 - 8x + 3$

$= -2(x^2 + 4x) + 3$

$-2(x^2 + 4x + 4 - 4) + 3$

$-2(x^2 + 4x + 4) + 8 + 3$

$-2(x+2)^2 + 11$

vertex: $(-2, 11)$ Maximum

3. $y = 3x^2 - 6x + 1$

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

$= 3(x^2 - 2x + 1 - 1) + 1$

$= 3(x^2 - 2x + 1) - 3 + 1$

$= 3(x-1)^2 - 2$

vertex: $(1, -2)$ minimum

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

$-(x^2 - 3x) - 4$

$-(x^2 - 3x + \frac{9}{4} - \frac{9}{4}) - 4$

$-(x^2 - 3x + \frac{9}{4}) + \frac{9}{4} - 4 \rightarrow -(x - \frac{3}{2})^2 - \frac{7}{4}$

Vertex: $(\frac{3}{2}, -\frac{7}{4})$ max

5. $y = -\frac{1}{3}x^2 + 2x - 4$

$y = -\frac{1}{3}(x^2 - 6x) - 4$

$y = -\frac{1}{3}(x^2 - 6x + 9 - 9) - 4$

$y = -\frac{1}{3}(x^2 - 6x + 9) + 3 - 4 \rightarrow -\frac{1}{3}(x-3)^2 - 1$

Vertex: $(3, 1)$ max

6. $i(x) = 3x^2 - 5x + 2$

$= 3(x^2 - \frac{5}{3}x) + 2$

$3(x^2 - \frac{5}{3}x + \frac{25}{36} - \frac{25}{36}) + 2$

$3(x^2 - \frac{5}{3} + \frac{25}{36}) - \frac{25}{12} + 2 \rightarrow 3(x - \frac{5}{6})^2 - \frac{1}{12}$

Vertex: $(\frac{5}{6}, -\frac{1}{12})$ min

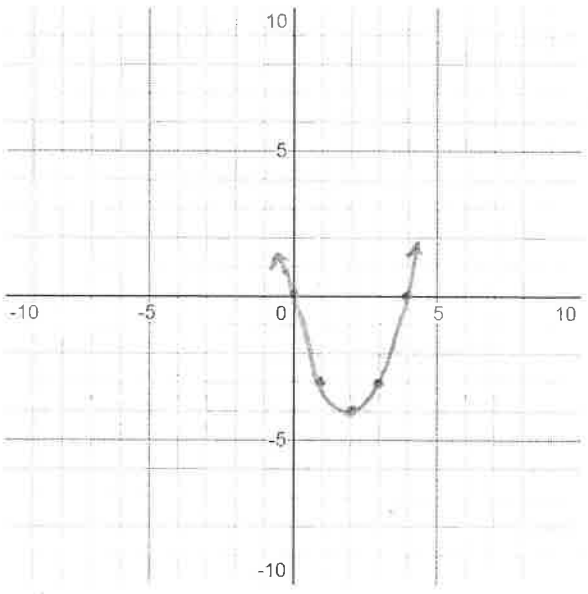
Graph the following quadratic functions. Plot at least four points other than the vertex.

7. $y = x^2 - 4x$

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

$= (x-2)^2 - 4$

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



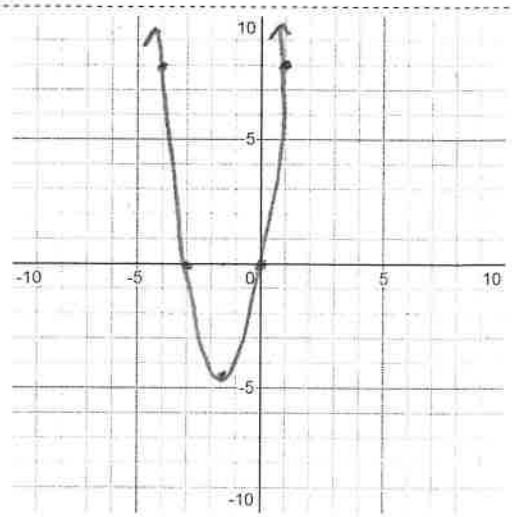
8. $y = 2x^2 + 6x$

x	y
-3	0
0	0
-4	8
1	8

$2(x^2+3x)$

$2(x^2+3x+\frac{9}{4}-\frac{9}{4})$

$2(x+\frac{3}{2})^2-\frac{9}{2}$



9. $y = -x^2 + 2x + 3$

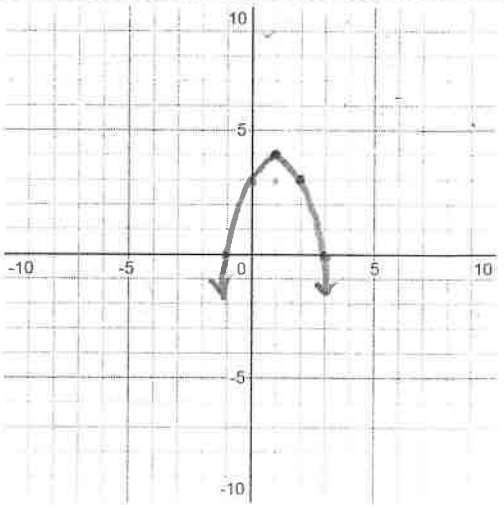
$= -(x^2-2x)+3$

$= -(x^2-2x+1-1)+3$

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

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

$(x-3)(x+1)$

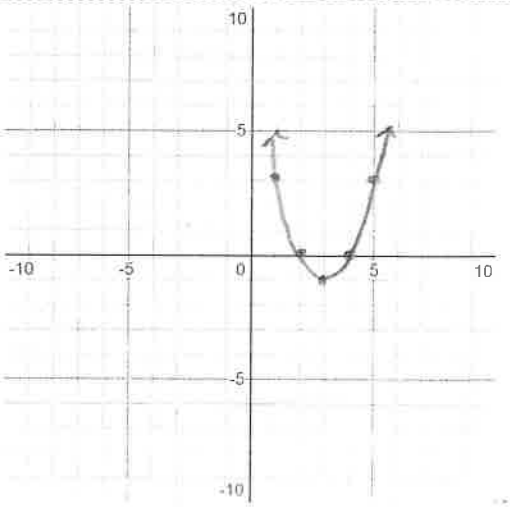


10. $y = x^2 - 6x + 8$

$(x-2)(x-4)$

$(x^2-6x+9)-9+8$

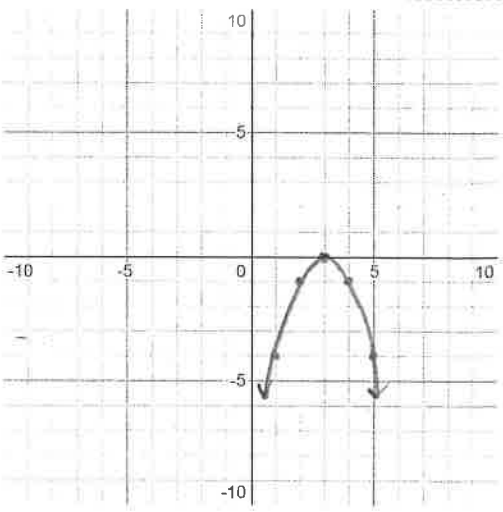
$(x-3)^2-1$



11. $y = -x^2 + 6x - 9$

$-(x^2-6x+9)$

$-(x-3)^2$



12. $y = -\frac{1}{2}x^2 + 4x - 6$

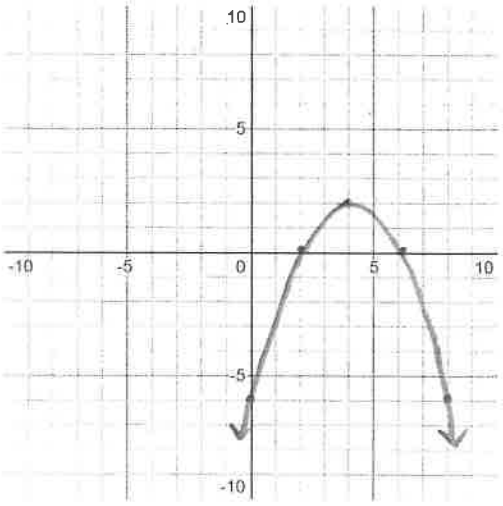
$-\frac{1}{2}(x^2-8x+12)$

$-\frac{1}{2}(x-6)(x-2)$

$-\frac{1}{2}(x^2-8x) - 6$

$-\frac{1}{2}(x^2-8x+16-16) - 6$

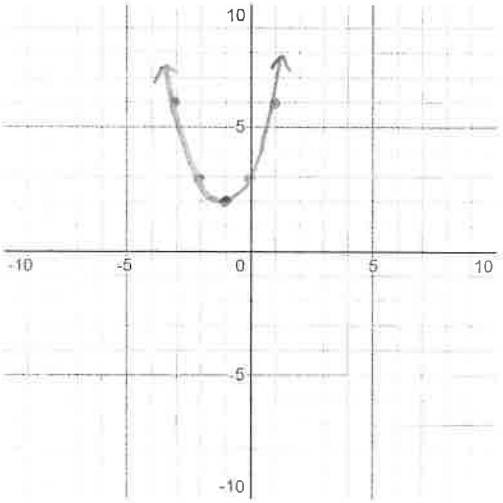
$-\frac{1}{2}(x-4)^2+2$



13. $y = x^2 + 2x + 3$

$(x^2+2x+1) - 1 + 3$

$(x+1)^2+2$

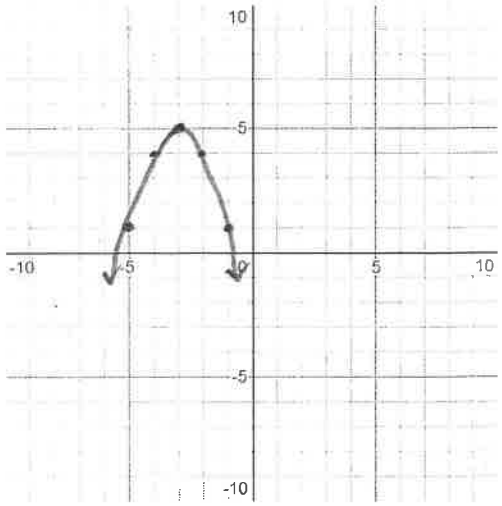


14. $y = -x^2 - 6x - 4$

$-(x^2+6x+4)$

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

$-(x+3)^2+5$

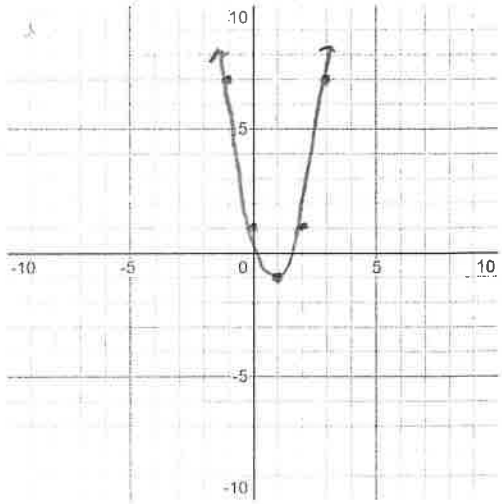


15. $y = 2x^2 - 4x + 1$

$2(x^2-2x)+1$

$2(x^2-2x+1)-2+1$

$2(x-1)^2-1$



16. $y = -3x^2 - 12x - 8$

$-3(x^2+4x)-8$

$-3(x^2+4x+4)+12-8$

$-3(x+2)^2+4$