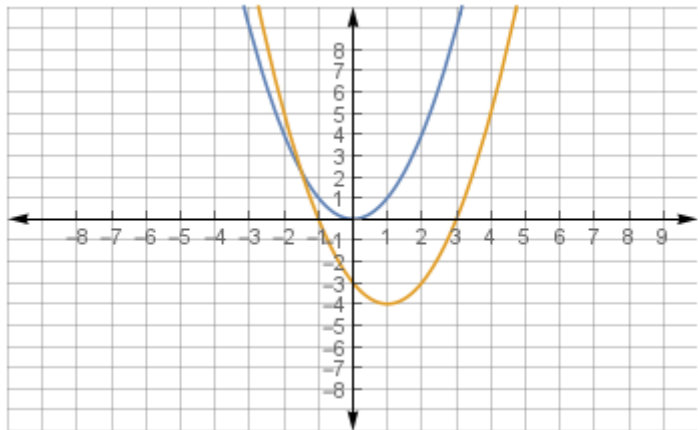
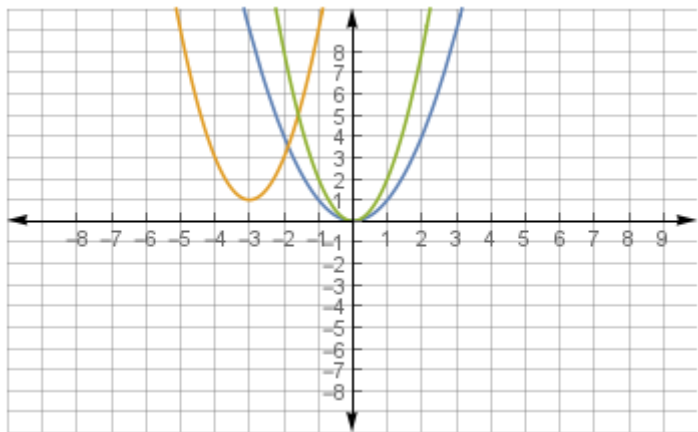


MPM2DI_Unit 6_Review Solutions

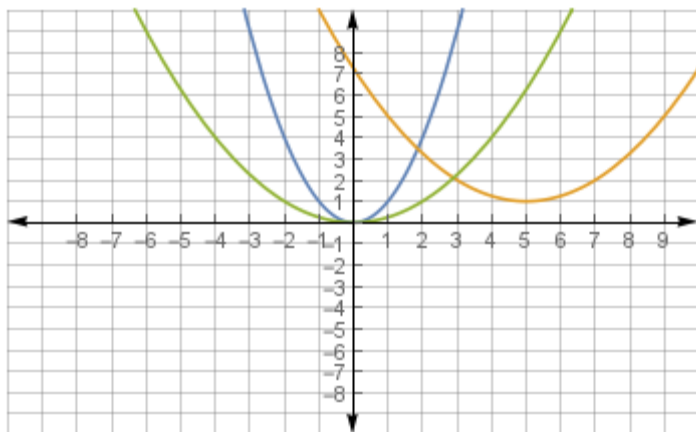
1. a) Shift right 1 unit
Shift down 4 units



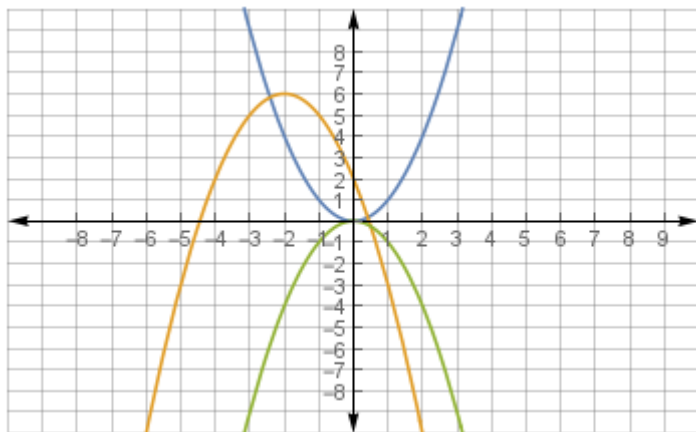
- b) Vertical stretch by a factor of 2
Shift left 3 units
Shift up 1 unit



- c) Vertical compression by a factor of 4 (or $\frac{1}{4}$)
Shift right 5 units
Shift up 1 unit



- d) Reflect over the x-axis
Shift left 2 units
Shift up 6 units



2. a) $y = (x + 3)(x - 5)$
 $y = x^2 - 5x + 3x - 15$
 $y = x^2 - 2x - 15$

b) $y = 3(x - 5)(x + 6)$
 $y = 3(x^2 + 6x - 5x - 30)$
 $y = 3(x^2 + x - 30)$
 $y = 3x^2 + 3x - 90$

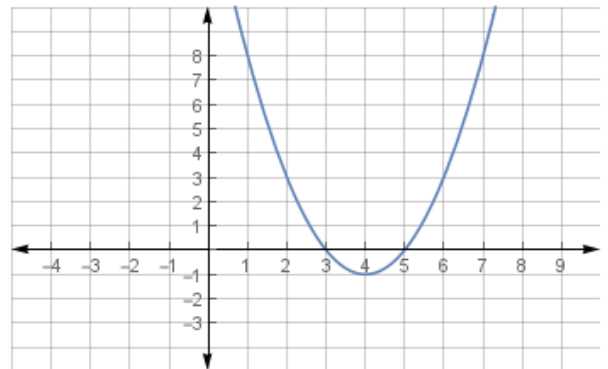
c) $y = -2(x - 7)(x - 9)$
 $y = -2(x^2 - 9x - 7x + 63)$
 $y = -2(x^2 - 16x + 63)$
 $y = -2x^2 + 32x - 126$

3. a) Vertex: (-3, -10)
 $y = (x + 3)^2 - 10$
 $y = (x + 3)(x + 3) - 10$
 $y = (x^2 + 3x + 3x + 9) - 10$
 $y = x^2 + 6x + 9 - 10$
 $y = x^2 + 6x - 1$

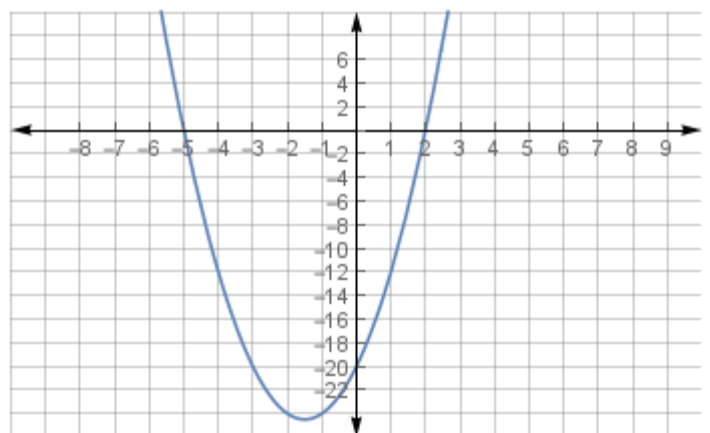
b) Vertex: (-15, -625)
 $y = 3(x + 15)^2 - 625$
 $y = 3(x + 15)(x + 15) - 625$
 $y = 3(x^2 + 15x + 15x + 225) - 625$
 $y = 3x^2 + 90x + 675 - 625$
 $y = 3x^2 + 90x$

c) Vertex: (7, 4)
 $y = -7(x - 7)^2 + 4$
 $y = -7(x - 7)(x - 7) + 4$
 $y = -7(x^2 - 7x - 7x + 49) + 4$
 $y = -7x^2 + 98x - 343 + 4$
 $y = -7x^2 + 98x - 339$

4. a) $y = x^2 - 8x + 15$
 $y = (x - 5)(x - 3)$
Zeros: 5 and 3
 $x = \frac{5 + 3}{2} = \frac{8}{2} = 4$
 $y = (4)^2 - 8(4) + 15 = 16 - 32 + 15 = -1$
Vertex: (4, -1)



b) $y = 2x^2 + 6x - 20$
 $y = 2(x^2 + 3x - 10)$
 $y = 2(x + 5)(x - 2)$
Zeros: -5 and 2
 $x = \frac{-5 + 2}{2} = \frac{-3}{2} = -1.5$
 $y = 2(-1.5)^2 + 6(-1.5) - 20$
 $= 2(2.25) - 9 - 20$
 $= -24.5$
Vertex: (-1.5, -24.5)



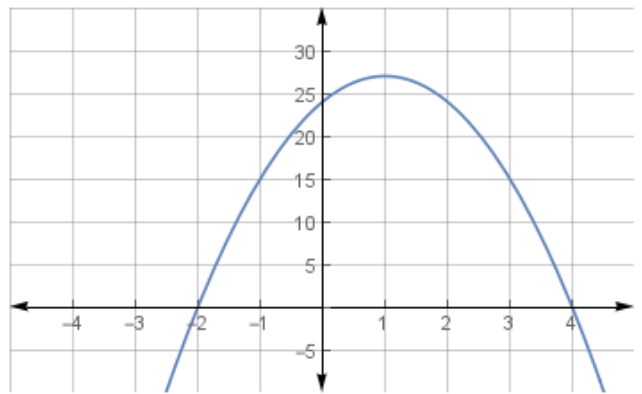
c) $y = -3x^2 + 6x + 24$
 $y = -3(x^2 - 2x - 8)$
 $y = -3(x - 4)(x + 2)$

Zeros: 4 and -2

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

$$y = -3(1)^2 + 6(1) + 24 = -3 + 6 + 24 = 33$$

Vertex: (1, 33)



d) $y = 2x^2 - x - 15$
 $y = (2x + 5)(x - 3)$

$$2x + 5 = 0$$

$$2x = -5$$

$$x = -2.5$$

Zeros: -2.5 and 3

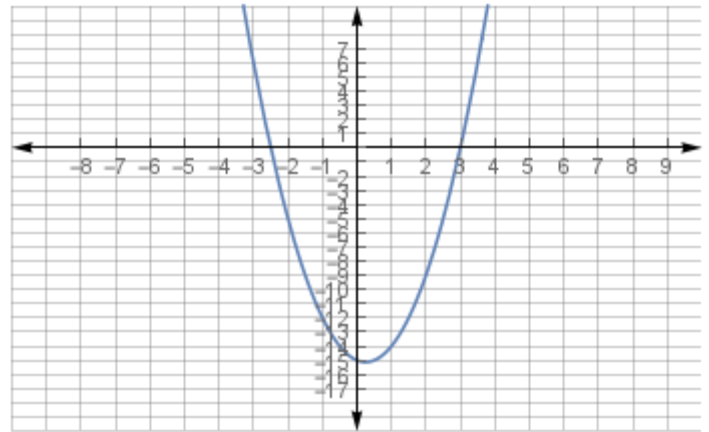
$$x = \frac{-2.5 + 3}{2} = \frac{0.5}{2} = 0.25$$

$$y = 2(0.25)^2 - 0.25 - 15$$

$$= 0.125 - 0.25 - 15$$

$$= -15.125$$

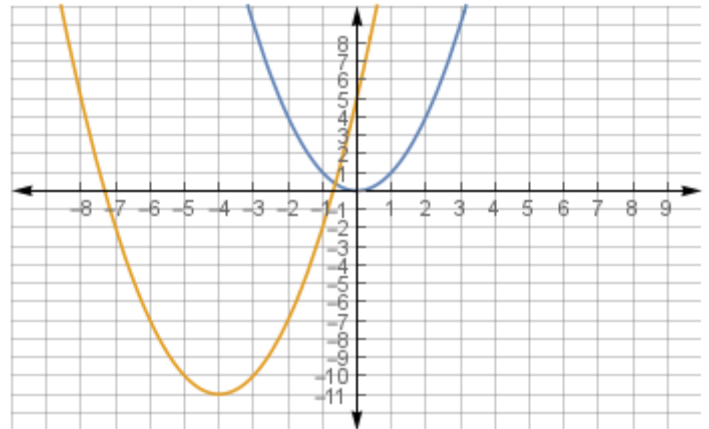
Vertex: (0.25, -15.125)



5. a) $y = x^2 + 8x + 5$
 $y = (x^2 + 8x) + 5$
 $y = (x^2 + 8x + 16 - 16) + 5$
 $y = (x^2 + 8x + 16) - 16 + 5$
 $y = (x + 4)^2 - 11$

Optimum Value is -11.

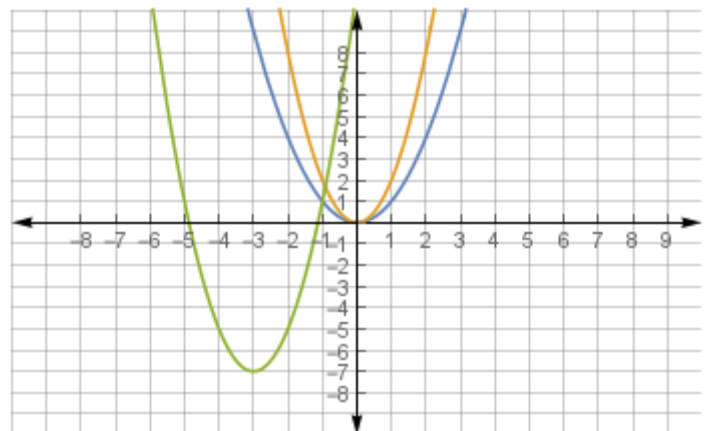
Axis of Symmetry: $x = -4$



b) $y = 2x^2 + 12x + 11$
 $y = (2x^2 + 12x) + 11$
 $y = 2(x^2 + 6x) + 11$
 $y = 2(x^2 + 6x + 9 - 9) + 11$
 $y = 2(x^2 + 6x + 9) - 18 + 11$
 $y = 2(x + 3)^2 - 7$

Optimum Value is -7.

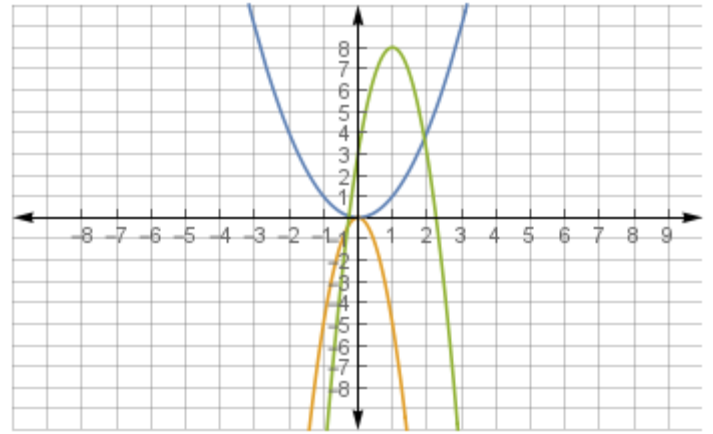
Axis of Symmetry: $x = -3$



$$\begin{aligned}
 \text{c)} \quad & y = -5x^2 + 10x + 3 \\
 & y = (-5x^2 + 10x) + 3 \\
 & y = -5(x^2 - 2x) + 3 \\
 & y = -5(x^2 - 2x + 1 - 1) + 3 \\
 & y = -5(x^2 - 2x + 1) + 5 + 3 \\
 & y = -5(x - 1)^2 + 8
 \end{aligned}$$

Optimum Value is 8.

Axis of Symmetry: $x = 1$



$$\begin{aligned}
 6. \quad & h = -5 \\
 & k = -1 \\
 & x = -4 \\
 & y = 2 \\
 & y = a(x - h)^2 + k \\
 & 2 = a(-4 - (-5))^2 + (-1) \\
 & 2 = a(1)^2 - 1 \\
 & 2 = a - 1 \\
 & 2 + 1 = a \\
 & a = 3
 \end{aligned}$$

$$\begin{aligned}
 & y = 3(x + 5)^2 - 1 \\
 & y = 3(x + 5)(x + 5) - 1 \\
 & y = 3(x^2 + 5x + 5x + 25) - 1 \\
 & y = 3(x^2 + 10x + 25) - 1 \\
 & y = 3x^2 + 30x + 75 - 1 \\
 & \therefore y = 3x^2 + 30x + 74
 \end{aligned}$$

$$\begin{aligned}
 7. \quad & s = 6 \\
 & t = -3 \\
 & x = 2 \\
 & y = 3 \\
 & y = a(x - s)(x - t) \\
 & 3 = a(2 - 6)(2 - (-3)) \\
 & 3 = a(-4)(5) \\
 & 3 = -20a \\
 & a = -\frac{3}{20} \\
 & \therefore y = -\frac{3}{20}(x - 6)(x + 3)
 \end{aligned}$$