Name:_____   Date:_____

Section 1.2 Quadratic Functions in Standard Form $y = a(x-p)^2 + q$

1. Indicate the values of "a" "p" and "q" in each of the following equations:

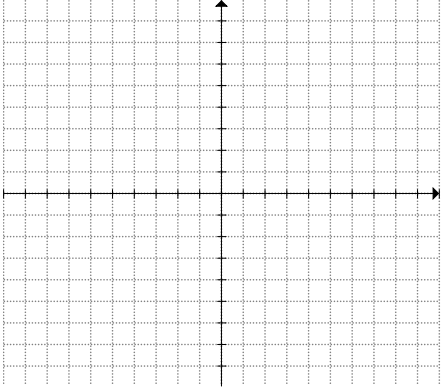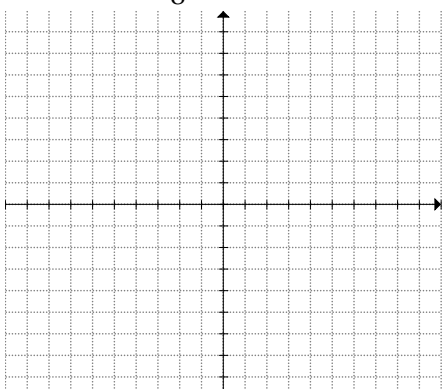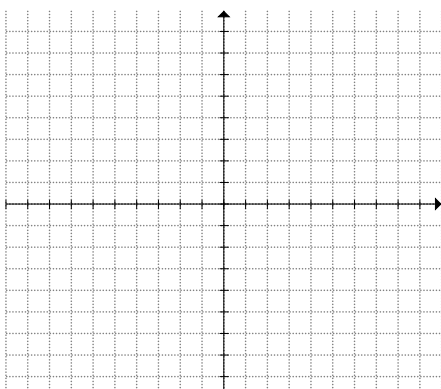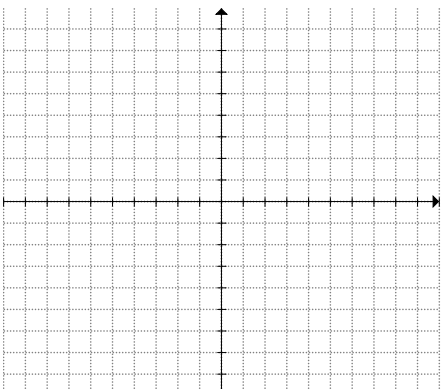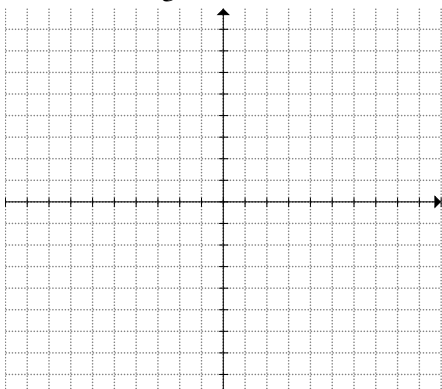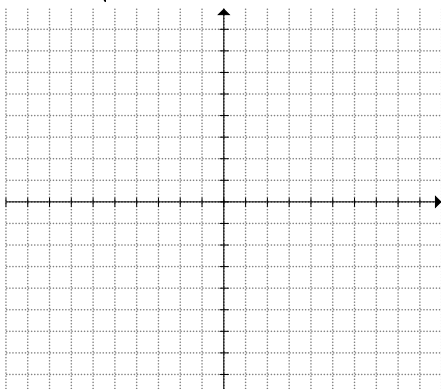| a) $y = 3(x-4)^2 + 8$ $a =$ $p =$ $q =$	b) $y = 2(x+6)^2 - 13$ $a =$ $p =$ $q =$	c) $y = -4x^2 + 10$ $a =$ $p =$ $q =$
d) $y = (-3x)^2 + 2$ $a =$ $p =$ $q =$	e) $y = (5x - 20)^2$ $a =$ $p =$ $q =$	f) $y = \dfrac{4(2x-2)^2 - 8}{8} + 1$ $a =$ $p =$ $q =$

2. Factor each of the following quadratic functions and find i) the Coordinates of the Roots, ii) the Equation of the Axis of Symmetry, iii) Coordinates of the Vertex, iii) Domain and Range
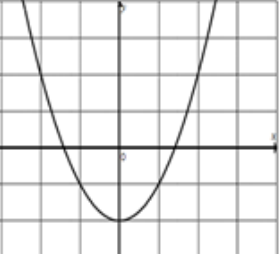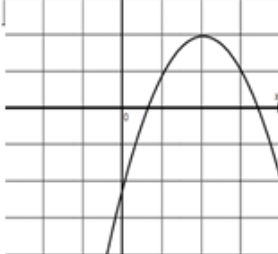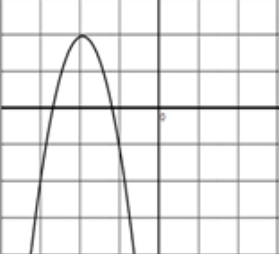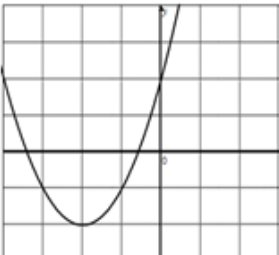
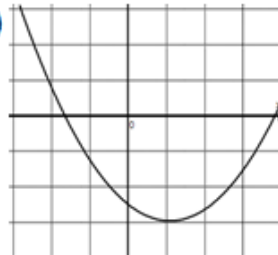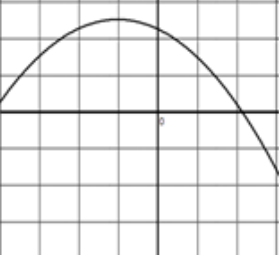| a) $y = x^2 - 5$ $Roots:$ $A\ of\ S:$ $Vertex:$ $Domain:$ $Range:$	b) $y = -2(x+2)^2$ $Roots:$ $A\ of\ S:$ $Vertex:$ $Domain:$ $Range:$	c) $y = 5(x-5)^2 - 10$ $Roots:$ $A\ of\ S:$ $Vertex:$ $Domain:$ $Range:$
d) $y = 7x^2 - 14$ $Roots:$ $A\ of\ S:$ $Vertex:$ $Domain:$ $Range:$	e) $y = (4x-4)^2 - 10$ $Roots:$ $A\ of\ S:$ $Vertex:$ $Domain:$ $Range:$	f) $y = 5(3x)^2$ $Roots:$ $A\ of\ S:$ $Vertex:$ $Domain:$ $Range:$
g) $y = \dfrac{(5x-5)^2 + 15}{5}$ $Roots:$ $A\ of\ S:$ $Vertex:$ $Domain:$ $Range:$	h) $y = -2(3-x)^2 - 14$ $Roots:$ $A\ of\ S:$ $Vertex:$ $Domain:$ $Range:$	i) $y = \dfrac{2\sqrt{(x^4 + 4x^2 + 16)} + 4}{-2} - 1$ $Roots:$ $A\ of\ S:$ $Vertex:$ $Domain:$ $Range:$

3. Graph each of the following quadratic functions and label the following: Roots, Axis of Symmetry, Vertex, and Y-intercepts:

a) $y = (x-4)^2 - 9$	b) $y = -3(x+2)^2 + 8$	b) $y = \dfrac{1}{3}(x+3)^2 + 1$

c) $y = -\dfrac{1}{2}(x-2)^2 + 7$	d) $y = \dfrac{(2x-4)^2 + 8}{8}$	e) $y = (3x-15)^2 - 6$

e) $y = 2(2x-6)^2 + 3$	f) $y = \dfrac{(3x-9)^2 + 3}{3} + 2$	g) $y = \sqrt{\dfrac{(x^4 - 8x^2 + 16)}{4}} + 4$

4. If each parabola is in the form of $y = a(x-p)^2 + q$, then which graph best describes each equation:

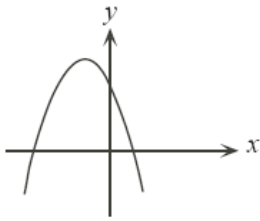| i) $a < -1, p < 0, q > 0$	a)	b)	c)
ii) $0 < a < 1, p > 0, q < 0$			
iii) $a > 0, p = 0, q < 0$	d)	e)	f)
iv) $0 > a > -1, p < 0, q > 0$			

5. Convert the function $y = \dfrac{1}{2}x^2 - 4x + 1$ into standard form.

6. If a ball is thrown upward from a height of 4 metres with an initial veloctiy of 6 m/s, its height, H(t), after t seconds is given by the equation $H(t) = -0.5t^2 + 6t + 4$. Determine the maximum height of the ball.

7. The graph of the function $y = ax^2 + bx + c$ is shown in the diagram. Which of the following statements below must be positive?

   a) a b) bc c) ab^2 d) $b - c$ e) $c - a$

8. Consider the parabola . The value of the real number "c" for which such a parabola touches the x-axis exactly once is:

   a) $-\dfrac{4}{5}$ b) 0 c) $\dfrac{2}{5}$ d) $\dfrac{4}{5}$ e) $\dfrac{\sqrt{5}}{4}$

9. Point "A" and "B" are on the parabola $y = 4x^2 + 7x - 1$, and the origin is the midpoint of $\overline{AB}$. What is the length of $\overline{AB}$?

10. The parabola $y = x^2 - 2x + 4$ is moved 'p" units to the right and "q" units down. The x-intercepts of the resulting parabola are 3 and 5. What are the values of "p" and "q"?

11. If $y = a(x-2)^2 + c$ and $y = (2x-5)(x-b)$ represents the same quadratic function, what is the value of the constant "b"

12. the parabola $y = ax^2 + bx + c$ has vertex (p, p) and y-intercept $(0, -p)$, where $p \neq 0$, what is the value of "b"? a) $-p$ b) 0 c) 2 D) 4 E) p
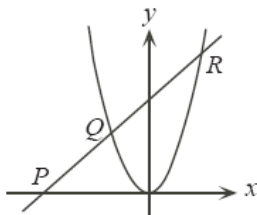
13. The parabola $y = x^2 - 2x + 4$ is moved 'p" units to the right and "q" units down. The x-intercepts of the resulting parabola are 3 and 5. What are the values of "p" and "q"?

14. Sketch the graph of $y = x^2 - 4$ and $y = 2|x|$

15. Determine all the values of "k" for which $y = x^2 - 4$ and $y = 2|x| + k$ do not intersect

16. State the value(s) of "k" for which $y = x^2 - 4$ and $y = 2|x| + k$ intersect in exactly two points.
    (Justify your answer)

17. Challenge: A line with slope 1 passes through the point "P" on the negative x-axis as shown and intersects the parabola $y = x^2$ at points Q and R. If $PQ = RQ$, then what is the y-intercept of line PR?

18. Challenge: square OPQR has vertices O(0,0), P(0,8) , Q(8,8) and R(8,0). The parabola with equation $y = a(x-2)(x-6)$ intersects the sides of the square OPQR at points "K", "L", "M", and "N". Determine all the values of "a" for which the area of the trapezoid KLMN is 36.