Name:_____ Date:_____

M10 Honours: Section 2.1 Quadratic Functions $y = ax^2 + bx + c$

1. Indicate the values of "a" "b" and "c" in each of the following equations:

a) $y = x^2 - 2x - 5$ $a =$ $b =$ $c =$	b) $y = \frac{1}{2}x^2 + 5$ $a =$ $b =$ $c =$	c) $y - x^2 + 2 = 0$ $a =$ $b =$ $c =$
d) $y = x(x - 7)$ $a =$ $b =$ $c =$	e) $f(x) = x^2 + 1$ $a =$ $b =$ $c =$	f) $y = -3(x + \frac{4}{3})^2 - 10$ $a =$ $b =$ $c =$

2. Solve each of the following quadratic equations. Provide your answers in exact form

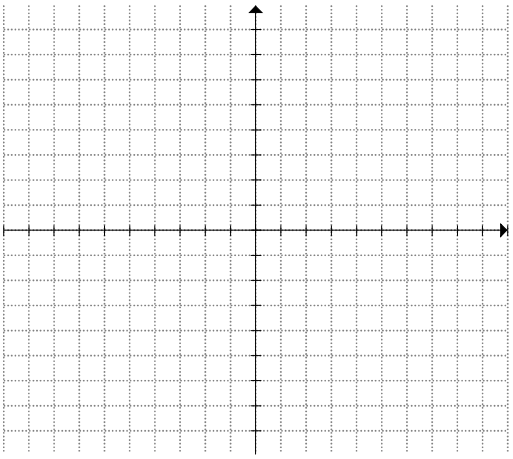
a) $5x - 1 = 2x^2$	b) $8x + 8 = 12x^2$
c) $x^2 - 5x + 3 = 0$	d) $6x + 6 = 15x^2$

3. 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) $y = x^2 + 3x - 18$ Roots: A of S: Vertex: Range:	b) $y = 2x^2 + 3x - 2$ Roots: A of S: Vertex: Range:	c) $y = -x^2 - 12x - 35$ Roots: A of S: Vertex: Range:
d) $y = x^2 + \frac{5}{2}x - \frac{3}{2}$ Roots: A of S: Vertex: Range:	e) $y = 6x^2 + 13x - 5$ Roots: A of S: Vertex: Range:	f) $y = 15x^2 - 7x - 2$ Roots: A of S: Vertex: Range:
g) $y = 32x^2 - 60x - 27$ Roots: A of S: Vertex: Range:	h) $y = \frac{1}{2}x^2 + \frac{1}{2}x - 6$ Roots: A of S: Vertex: Range:	i) $y = x^2 + \frac{1}{6}x - \frac{1}{6}$ Roots: A of S: Vertex: Range:

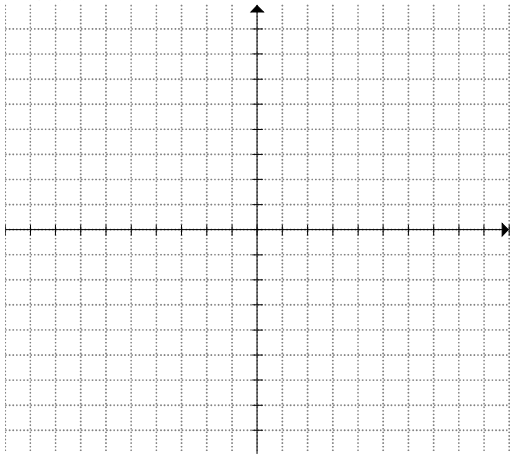
4. Graph the quadratic functions and label on the graph the Roots, AOS, Vertex, and Y-intercepts:

a) $f(x) = x^2 + 7x + 10$



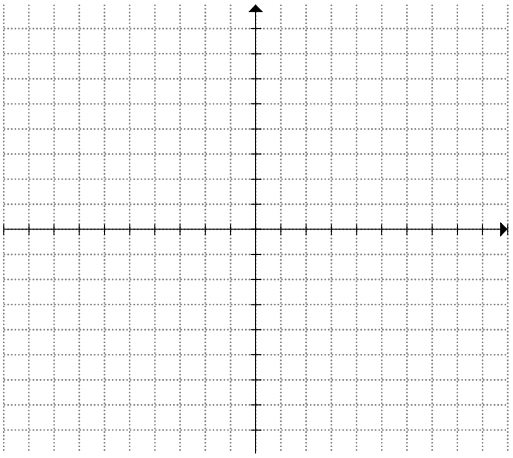
Roots: A of S:
Vertex: Y-intercept:

b) $f(x) = 2x^2 + 15x + 18$



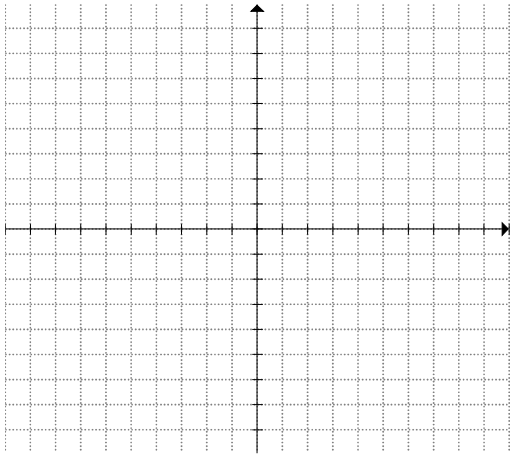
Roots: A of S:
Vertex: Y-intercept:

c) $f(x) = 12 + 5x - 3x^2$



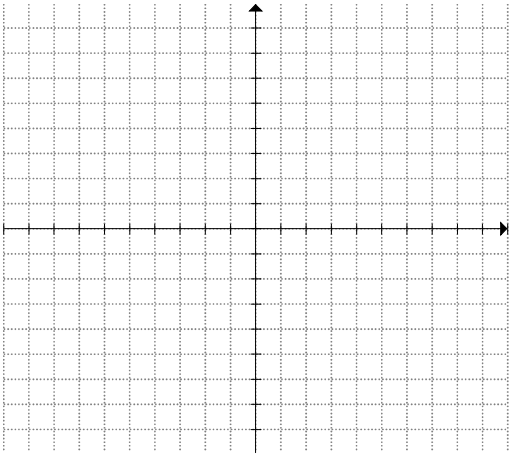
Roots: A of S:
Vertex: Y-intercept:

d) $f(x) = -2x^2 - 11x + 6$



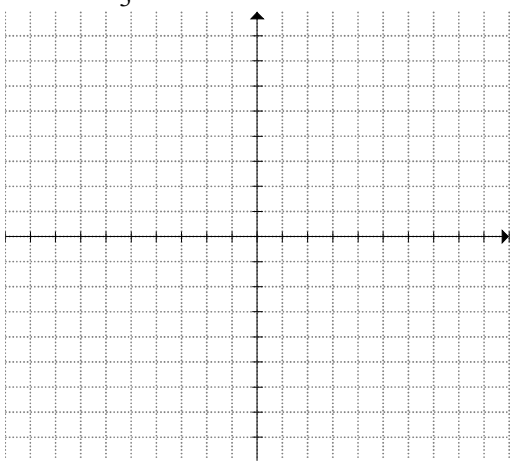
Roots: A of S:
Vertex: Y-intercept:

e) $f(x) = \frac{15}{2} - 2x - 2x^2$



Roots: A of S:
Vertex: Y-intercept:

f) $f(x) = -\frac{8}{3} + 2x + 3x^2$



Roots: A of S:
Vertex: Y-intercept:

5. Determine the coordinates of the vertex and eqn of the AOS for the parabola $y = 3(x-20)(x+22)$

6. A pebble is dropped from a bridge into a river at height "h" meters above. Let "t" be the number of seconds after the release. If $h(t) = 65 - 4.9t^2$, then

   a) How high is the pebble after 3 seconds?

   b) When is the pebble at the maximum height?

   c) What is the maximum height?

   d) When will the pebble hit the ground?

   e) What is the domain and range of this scenario?

7. Tom throws a football from the top of his building. The height of the ball is given by the formula: $h(t) = -3t^2 + 60t + 132$, where "h" is the height of the football and "t" is the number of seconds after the throw.

   a) How high was the building?

   b) What is the maximum height of the ball?

   c) For how many seconds will the ball be above the height of 82m?

   d) When will the ball be falling to 50m?

   e) What is the domain and range of this scenario?

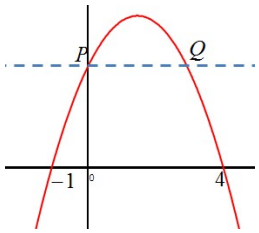
8. If the quadratic equation $(x-2)^2 + k = 0$ has two distinct real roots, then what is the range of "k"? (Multiple choice, circle one) Justify your answer.

   a) $k > 2$ b) $k < 0$ c) $k \le 0$ d) $k \le 4$

9. Find the values of "A" and "B" if $x^2+6x+16=(x+A)^2+B$

10. Find the values of "A" and "B" if $x^2-10x+27=(x+A)^2+B$

11. The figure below shows the graph of $y=-x^2+px+q$. The graph cuts the y-axis at point "P". A horizontal line is drawn through points "P" and "Q". What are the coordinates of point "Q"?



12. If the quadratic function $y=ax^2+bx+c$ has two equal roots and opens up, then which of the following statements are correct?

i) $a>0$ ii) $c>0$ iii) $b^2-4ac>0$

13. If $y=(x-2)^2$ and $y=2x+1$ intersect at points (x_1,y_1) and (x_2,y_2), then which of the following quadratic functions has the roots at x_1 *and* x_2?

a) $y=x^2-6x+3$ b) $y=x^2-2x+3$ c) $y=x^2-6x+1$ d) $y=x^2-2x+1$

14. Determine all values of "k" with $k \neq 0$ for which the parabola has its vertex on the x-axis.
$y = kx^2 + (5k+3)x + (6k+5)$

15. Point "A" is the vertex of the parabola $y = x^2 + 2$, point "B" is the vertex of the parabola $y = x^2 - 6x + 7$, and "O" is the origin. Determine the area of $\triangle AOB$.

16. Consider the function $f(x) = 2x^2 - 4x + c$. What value of "c" maximizes the product of the roots of the function, given that at least one root is real?

17. 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.