

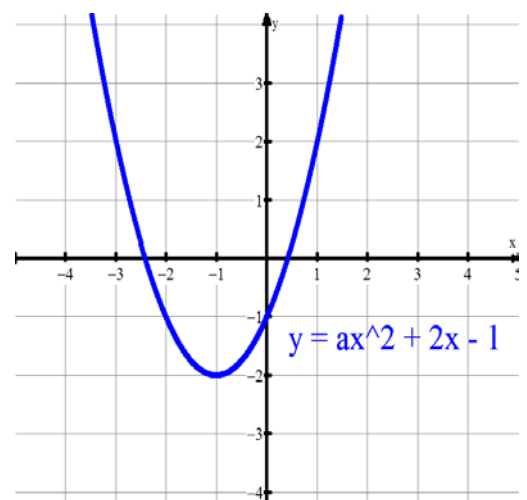
PART A - This section of the test is CALCULATOR INACTIVE

1. The equation of the axis of symmetry of $f(x) = -2(x + 3)(x - 6)$ is: _____ **(1M)**
2. The direction of opening of the parabola $f(x) = (2 - x)(x + 1)$ is: _____ **(1M)**
3. The minimum value of $y = 3(x + 1)^2 + 5$ is: _____ **(1M)**
4. Determine the value of k so that the discriminant of $y = x^2 + 6x + k$ is 0. _____ **(1M)**
5. The value of k that makes $y = x^2 + kx + \frac{81}{4}$ a perfect trinomial is: _____ **(1M)**
6. T or F? The point (1,2) is part of the solution to $y > x^2 + x - 5$. Show supporting evidence. _____ **(1M)**
7. The zeroes of $p(x) = (x + 1)^2 - 9$ is/are: _____ **(2M)**
8. The ordered pair of the vertex of $y = x^2 + 2x + 1$ is: _____ **(2M)**
9. The solution to $(x + 5)(x - 2) > 0$ is: _____ **(2M)**
10. Determine the range of the quadratic relation $y = -(x + 2)^2 + 12$. _____ **(2M)**
11. The zeroes of $x^2 + px + q = 0$ are 5 and -2. What are the values of p and q ? _____ **(2M)**

PART B - This section of the test is CALCULATOR INACTIVE

12. You are given the graph of $y = ax^2 + 2x - 1$.

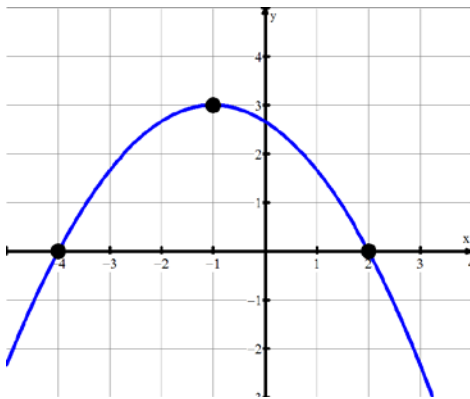
- a) The solution to the inequality $ax^2 + 2x - 1 > 2$ is: **(2M)**
- b) The discriminant of this parabola must have a value of: **(1M)**
 - (i) more than 0
 - (ii) equal to zero
 - (iii) less than 0
 - (iv) we can't tell since the value of a is not given
- c) Is the solution to the equation of $0 = ax^2 + 2x - 1$ an element of the set of complex numbers? **(1M)**
 - (i) yes
 - (ii) no
 - (iii) we can't tell since the value of a is not given



13. Solve the equation $3(2x + 1)^2 + 5 > 14$. Leave answer in simplified radical form (if necessary). **(4M)**

14. Determine the value for k such that system $\begin{cases} 6x + 9y = 18 \\ \sqrt{k} - \frac{2}{3}x - y = 0 \end{cases}$ has infinitely many solutions. **(4M)**

15. Determine the equation of the quadratic function whose graph is given. Write the equation in standard form. **(4M)**



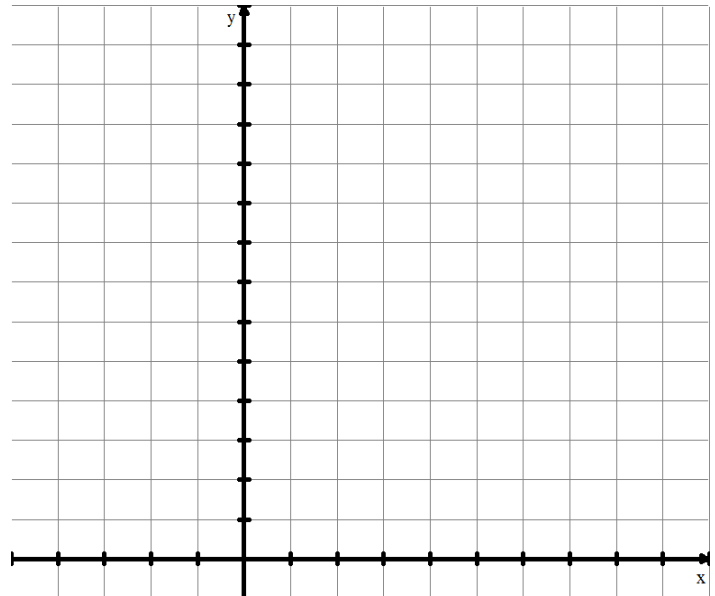
16. A soccer ball is kicked by Mr Atkinson from the roof of a building. The height of the ball is modeled by the equation $h(t) = -5t^2 + 20t + 105$, where $h(t)$ is the height of the ball in meters and t is time in seconds.

a) Determine the maximum height of the ball. **(2M)**

b) For how long is the ball in flight? **(2M)**

c) For how many seconds is the height of the ball less than 120m? **(3M)**

d) Sketch $h(t) = -5t^2 + 20t + 105$, showing the key features of the graph. **(2M)**



PART A - This section of the test is **CALCULATOR ACTIVE**

1. Solve the system $\begin{cases} y = -\frac{1}{2}x^2 + x - 2 \\ 3x - 2y = 12 \end{cases}$ algebraically. To verify your solution, sketch a graph from your TI-83/4 illustrating the solution . **(5M)**
2. If $(-2,7)$ is the maximum point for $f(x) = -2x^2 - 4ax + k$, determine the value of k . **(4M)**
3. If $x - (2 + i)$ is one factor of a quadratic function, determine (i) the second factor and (ii) the equation of the quadratic function in standard form. **(4M)**
4. Determine the quotient of $\frac{2-i}{4-3i}$. **(3M)**
5. Mr Santowski runs a Math tutoring service. The revenue, in thousands of pesos, from this business are modeled by the equation $R(n) = -0.2n(5n - 100)$ where n represents the number of students per month that he tutors. His expenses, or costs, are modeled by the equation $E(n) = \frac{1}{4}n^2 - 8n + 100$. Answer the following questions pertaining to Mr S business:
- (a) How many students must Mr S tutor if he wants his revenue to exceed 60,000 pesos? **(2M)**
- (b) Determine the equation for Mr S's business profits. Present your equation in standard form. **(2M)**
- (c) How many students must Mr S tutor if he hopes to maximize his profits? **(2M)**
- (d) What is his maximum profit? **(1M)**

