

PART A - This section of the test is CALCULATOR INACTIVE

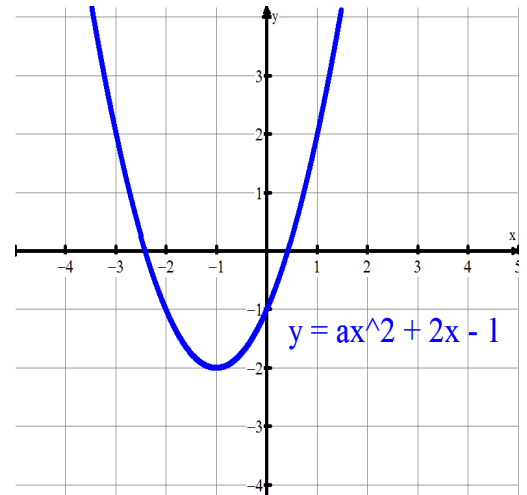
1. The equation of the axis of symmetry of $f(x) = -2(x + 3)(x - 6)$ is: _____ **(1M)**
2. The direction of opening of the parabola $f(x) = (2 - x)(x + 1)$ is: _____ **(1M)**
3. The minimum value of $y = 3(x + 1)^2 + 5$ is: _____ **(1M)**
4. Determine the value of k so that the discriminant of $y = x^2 + 6x + k$ 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)**

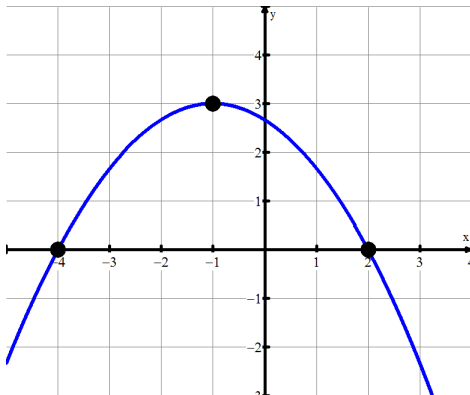
- (i) yes
- (ii) no
- (iii) we can't tell since the value of a is not given

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)**



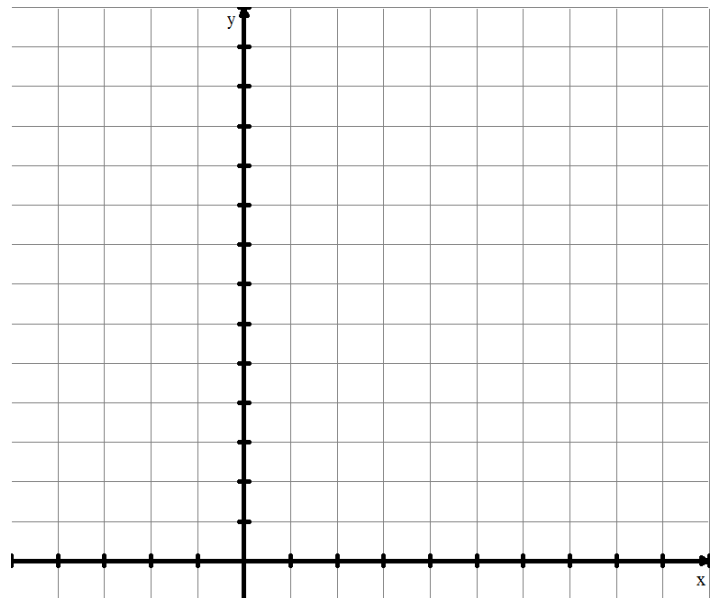
16. A soccer ball is kicked by Mr Atkinson from the roof of a building. The height of the ball is modeled by the equation $h(t) = -5t^2 + 20t + 105$, where $h(t)$ is the height of the ball in meters and t is time in seconds.

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

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

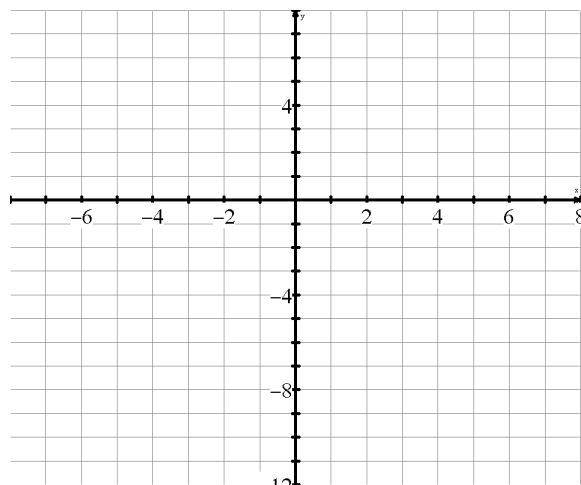
c) For how many seconds is the height of the ball less than 120m? **(3M)**

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)**

PART B - This section of the test is CALCULATOR ACTIVE

Your solution may be algebraic or graphic, but you **MUST** present the equations with which you intend to work. Any algebraic solution must show a minimum of equations, substitutions (if necessary) and **KEY** results from the algebra work. Not **ALL** steps of the algebra need to be shown. Any graphic work needs to be supported with relevant equations and sketches of graphs showing key results/features. All final answers should be rounded given the context of the number!

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)**

A graph of the revenue and expense functions are provided below

