# PLANIT TEACHERS

# Year 10 Mathematics Assessment

Student Name: _____          Class: _____

Student ID: _____          Date: {{DATE}}

## Assessment Details

| **Duration:** 2 hours | **Total Marks:** 100 |
| --- | --- |
| **Topics Covered:** | • Advanced Quadratic Equations<br>• Trigonometric Applications<br>• Probability & Statistical Analysis<br>• Advanced Geometric Reasoning |

## Detailed Instructions:

1. Carefully read each question before attempting an answer.
2. Show ALL mathematical working - method marks are crucial.
3. Scientific calculators are permitted unless specifically prohibited.
4. Write answers clearly in the designated spaces.
5. Additional answer sheets are available if needed.
6. Manage your time effectively - approximately 1 minute per mark.
7. Check your work before submission.

## Question 1 [5 marks]

A complex quadratic function f(x) = ax² + bx + c has the following characteristics:

- The vertex is at point (2, -3)
- The parabola passes through the point (0, 5)

| | |
|---|---|
| A) a = 2, b = -4, c = 5 | B) a = 1, b = -4, c = 5 |
| C) a = 3, b = -4, c = 5 | D) a = 2, b = -2, c = 5 |

## Question 2 [5 marks]

In a right-angled triangle, if tan θ = 0.75, what is the value of sin θ?

| | |
|---|---|
| A) 0.6 | B) 0.8 |
| C) 0.5 | D) 0.4 |

## Question 3 [5 marks]

A probability experiment involves drawing marbles from a bag. If P(Red) = 0.4 and P(Blue) = 0.3, what is the probability of drawing a green marble?

| | |
|---|---|
| A) 0.2 | B) 0.3 |
| C) 0.4 | D) 0.5 |

## Question 4 [15 marks]

A rocket is launched vertically with an initial velocity of 25 m/s. Its height h (in meters) after t seconds is modeled by the equation:

$$h = 25t - 4.9t^2$$

a) Determine the maximum height reached by the rocket [5 marks]

b) Calculate the time taken to reach the maximum height [5 marks]

c) Sketch and annotate the height-time graph [5 marks]

### Question 5 [20 marks]

A telecommunications company is designing a triangular communication tower. The base of the tower forms a right-angled triangle with the following measurements:

- The base length is 40 meters
- The angle of elevation from the base to the top is 52°

a) Draw a detailed, labeled diagram representing the tower's structure [4 marks]

b) Calculate the exact height of the tower [8 marks]

c) Determine the total surface area of the triangular tower [8 marks]