

Classroom to Campus: Math and Stats Challenge

Grade 11 – MCF3M

Topic A: Quadratic Functions Analyzing the Flight of a Soccer Ball

A group of friends are practicing their soccer skills on the school field. One of them, Jake, kicks the soccer ball into the air, and his friends notice the ball follows a curved path. Curious about how high and how long the ball stays in the air, they decide to analyze its motion using math.

The ball's height, $h(t)$, in metres above the ground, is modeled by the quadratic function:

$$h(t) = -4.9t^2 + 14t + 1$$

where t represents the time in seconds since the ball was kicked.

Using the given equation, the friends aim to answer the following questions:

- At what time does the ball reach its maximum height? (Round your final answer to two decimal places. Include units.)
- Determine the maximum height of the ball. (Round your final answer to two decimal places. Include units.)
- How long does the ball stay in the air before hitting the ground? (Round your final answer to two decimal places. Include units.)
- Determine the time interval that the height of the ball is greater than 3 metres. (Round your final answers to two decimal places. Include units.)
- Determine the initial velocity of the ball when it is kicked. (Round your final answer to two decimal places. Include units.)

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