

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**A KINEMATIC ANALYSIS TO EVALUATE THE SAFENESS IN
HIGH FALL JUMP-LANDING
P15S23**

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ABSTRACT

This study focuses on the kinematic analysis of high fall jump-landing, a subfield of physics examining object motion, with a specific emphasis on trajectories and the optimal placement of life-saving mattresses. The problems that can be seen in this research are determining the value of initial velocity and initial angle, distinguishing different falls based on initial velocity and the challenge on estimating the best position of the mattress during rescuing in high fall. The objectives include calculating trajectories based on different take-off and initial velocity conditions and determining the most optimal mattress placement during high-fall jump landing. The scope is limited to building falls, with specific conditions for height of the building, the size of safety air cushion and victim characteristics considered. The study incorporates a safety air cushion as an additional component, providing a potential escape route for falling individuals in emergencies. The study employs Projectile Motion to determine both horizontal and vertical positions in trajectories formed during high fall jump-landings to explore the potential trajectories under various angles and initial velocities. This analysis allows for the examination of cases related to high fall jump-landings, including the identification of the jumper's initial velocity based on impact position, determining optimal locations for life-saving mattress placement, and discerning whether the fall resulted from an accident, suicide, or homicide. The trajectory graphs generated in this study enable informed judgments about the landing techniques employed by firefighters during rescue attempts, particularly in building fires. Assuming escape by jumping from the building, the study considers the use of a life-saving mattress, specifically designed for jumps from heights up to 16 meters. Moreover, the study suggests broader applications, such as investigating incidents involving jump-landings, differentiating between suicides and potential foul play. One of the recommendations that can be used for next project will be calculating trajectories of high fall jump landing with air resistance. It is important to include it in the calculation in order for accurately estimate the landing distance.

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