RAQ Advanced Challenge Syllabus Version 1

Questions in Advanced Challenges require knowledge of specific mathematical areas. The topics within each area are represented as units in this document. The areas and units that can be tested in Advanced Challenges under this syllabus version are listed below.

Mechanics

'Simple rigid body' refers to a uniform rigid body consisting of a prism with a cross-section formed from one or more circles, triangles or rectangles.

'Tipping percentage' refers to the overturning moment divided by the maximum restoring moment about the centre of mass of a body, expressed as a percentage. At 100%, a body is on the point of tipping. Above 100%, the body tips.

Unit	Content
1.1	Newton's second law
1.2	Projectile motion, including equations of constant acceleration
1.3	Static and kinetic friction
1.4	Moments of forces
1.5	Sliding of simple rigid bodies on rough planes that are horizontal or inclined, with a surface that is either fixed or moving
1.6	Tipping of simple rigid bodies by determining tipping percentages
1.7	Connected simple rigid bodies using: ● String: uniform cylinder that has constant mass, and variable length up to its maximum length ● Rod: uniform rigid cylinder
1.8	Inelastic 1D collisions using conservation of momentum and a coefficient of restitution, where the direction of motion is perpendicular to the surfaces in contact, between: ● Two sliding simple rigid bodies: $v_2 - v_1 = e(u_1 - u_2)$ ● A sliding simple rigid body and a fixed plane: $v = -eu$

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