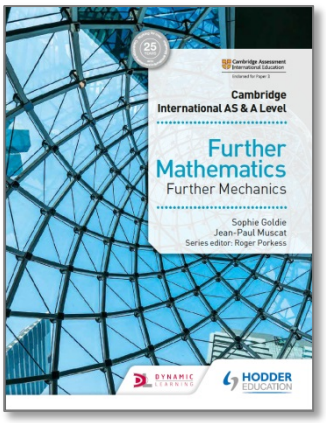

Syllabus Change Mapping Document for *Cambridge AS & A Level Further Mathematics* *Further Mechanics Student's Book*

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We are working with Cambridge Assessment International Education towards endorsement of this forthcoming title

Take mathematical understanding to the next level with this accessible series, written by experienced authors, examiners and teachers.

Find out how our new Further Mechanics Student's Book covers the changes in the revised Cambridge International AS & A Level Further Mathematics syllabus (9231) from 2020 below. For more information about the full series of four Student's Books and components for this syllabus, go to www.hoddereducation.com/cambridgeasalevelmathematics

Changes to the syllabus for examination from 2020:

Please visit www.cambridgeinternational.org for information about current syllabuses and full details of changes

The syllabus for Further Mechanics* is now organised into the following main topics:
3.1 Motion of a projectile
3.2 Equilibrium of a rigid body
3.3 Circular motion
3.4 Hooke's law
3.5 Linear motion under a variable force
3.6 Momentum

New areas of study include the following:

New content in syllabus	**Chapter in Hodder Education book**
3.1 Motion of a projectile • model the motion of a projectile as a particle moving with constant acceleration and understand any limitations of the model • use horizontal and vertical equations of motion to solve problems on the motion of projectiles, including finding the magnitude and direction of the velocity at a given time or position, the range on a horizontal plane and the greatest height reached • derive and use the cartesian equation of the trajectory of a projectile, including problems in which the initial speed and/or angle of projection may be unknown	Chapter 1, Section 1.1 Chapter 1, Sections 1.1, 1.2, 1.3 Chapter 1, Sections 1.4, 1.5
3.2 Equilibrium of a rigid body • calculate the moment of a force about a point • use the result that the effect of gravity on a rigid body is equivalent to a single force acting at the centre of mass of the body, and identify the position of the centre of mass of a uniform body using considerations of symmetry	Chapter 2, Section 2.1 Chapter 2, Section 2.1

• use given information about the position of the centre of mass of a triangular lamina and other simple shapes • determine the position of the centre of mass of a composite body by considering an equivalent system of particles • use the principle that if a rigid body is in equilibrium under the action of coplanar forces then the vector sum of the forces is zero and the sum of the moments of the forces about any point is zero, and the converse of this • solve problems involving the equilibrium of a single rigid body under the action of coplanar forces, including those involving toppling or sliding	Chapter 3, Section 3.2 Chapter 3, Sections 3.1, 3.2 Chapter 2, Sections 2.4, 2.3 Chapter 3, Section 3.4
3.3 Circular motion • understand the concept of angular speed for a particle moving in a circle, and use the relation $v = r\omega$ • understand that the acceleration of a particle moving in a circle with constant speed is directed towards the centre of the circle, and use the formulae $r\omega^2$ and $\frac{v^2}{r}$ • solve problems which can be modelled by the motion of a particle moving in a horizontal circle with constant speed	Chapter 4, Sections 4.1, 4.2 Chapter 4, Sections 4.3, 4.4 Chapter 4, Section 4.6
3.4 Hooke's law • use Hooke's law as a model relating the force in an elastic string or spring to the extension or compression, and understand the term modulus of elasticity • use the formula for the elastic potential energy stored in a string or spring • solve problems involving forces due to elastic strings or springs, including those where considerations of work and energy are needed	Chapter 5, Sections 5.1, 5.2, 5.3 Chapter 5, Sections 5.4 Chapter 5, Sections 5.4, 5.5
3.5 Linear motion under a variable force • solve problems which can be modelled as the linear motion of a particle under the action of a variable force, by setting up and solving an appropriate differential equation	Chapter 6, Sections 6.1, 6.2
3.6 Momentum • use conservation of linear momentum and/or Newton's experimental law to solve problems that may be modelled as the direct or oblique** impact of two smooth spheres, or the direct or oblique impact of a smooth sphere with a fixed surface	Chapter 7, Sections 7.2, 7.3, 7.4, 7.5

*Note that this includes learning objectives which were previously in Mechanics 2

**Note that this is the only addition to this learning objective

The previous Further Mechanics (9231) content examined up to 2019 has been largely removed. It has been replaced with the content of Mechanics 2 from International AS & A Level Mathematics (9709), which will be tested at Further Mathematics level.

Content items are retained for only two topics from the previous 9231 Further Mechanics syllabus. A small item is added to Momentum, in addition to the new content from Mechanics 2 (9709):

- **Momentum**: Newton's experimental law, restitution and direct/oblique impacts of a sphere with a surface retained. Oblique impacts of two spheres added.
- **Circular motion**: motion in a vertical circle retained.

All other previous 9231 Mechanics topics: removed and no longer assessed.