

Scheme of Learning: Forces – energy and interactions

Topic Sequence:

1	2	3	4	5	6
Forces & Interactions	Organic Chemistry	Inheritance, Variation & Evolution	Forces & Motion	Chemical Analysis	Space (Separate Physics only)

Topic Overview:

Engineers analyse forces when designing a great variety of machines and instruments, from road bridges and fairground rides to atomic force microscopes. Anything mechanical can be analysed in this way. Recent developments in artificial limbs use the analysis of forces to make movement possible.

Lesson Sequence:

This topic continues on from the topic of forces and interactions by revisiting the idea of scalar and vector quantities, but focusing on displacement and velocity in a straight line. With a brief look at motion in a circle we then move into the detail of motion graphs (this is also covered in Maths) and the calculation of acceleration, either when distance is unknown or when time is unknown, including a brief introduction of the 'suvat' quantities. The section focusing on motion in a straight line finishes with the concept of terminal velocity and how it can be applied to various situations.

The topic then moves onto Newton's Laws of motion including a required practical to investigate his second law. This also covers the concept of inertia and inertial mass.

Stopping distances are covered in a single lesson, looking at the definition and the factors that can affect the distance covered when a vehicle stops. This directly relates to information contained within the theory driving test later in life.

Finally the topic considers momentum and the conservation of momentum as applied to collisions and explosions. With, for separate physics, an extra look at the concept of impulse and how it is the basis for all crash safety measures used.

Sequence of Lessons:

Resources:

1	Displacement and velocity	1	n/a
2	Circular motion	2	Bungs on strings, plastic tubes, 100g mass hangers, timers, GCSE question
3	Distance-time graphs	3	Worksheet – tortoise and hare graph, GCSE question
4	Acceleration (including SUVAT)	4	Worksheet – acceleration calculations, Worksheet – SUVAT calculations
5	Velocity-time graphs mid-topic assessment	5	Worksheet – velocity-time graph, GCSE questions
6	Terminal velocity	6	Cake cases, metre rulers, timers
7	Newton's 1 st Law	7	Trolley, ramp, timer, metre ruler, GCSE question
8	Newton's 2 nd Law including Required practical & mid-topic assessment	8	Worksheet – RP instructions, light gates, data logger, metre ruler, 50g masses and hanger, string, trolley, 10cm x 5cm card linear air track and pump, GCSE question
9	Newton's 3 rd Law and Inertia	9	Trolley with 2 vertical screws, thick elastic band, film canister, selection of masses to fit in canister
10	Stopping distances	10	30cm rulers, calculators, GCSE question
11	Momentum and conservation of momentum	11	Gauss gun demo, newton's cradle demo, GCSE question
12	Momentum and impulse separate physics only	12	GCSE questions
13	Revision	13	n/a
14	Test	14	n/a

Supportive Reading:

Comprehension activity	TBC
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Assessment:

Knowledge:	Multiple choice and short answer questions.
Application of Knowledge:	Exam questions