# Episode 204: Preparation for kinematics

In this topic, students learn to describe motion in terms of displacement, velocity, acceleration and time. There is only a limited discussion of the forces involved; kinematics is concerned with *describing* motion, while dynamics is concerned with *explaining* motion in terms of the forces acting.

Episode 205: Describing motion

Episode 206: Uniform and non-uniform acceleration

Episode 207: Projectile motion
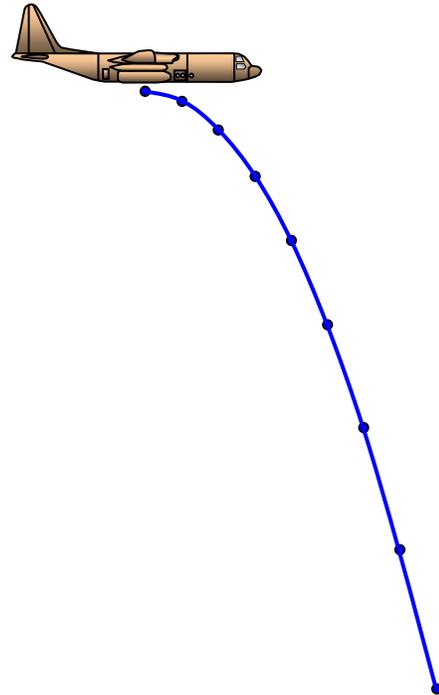
Looking ahead

There are opportunities here for using datalogging equipment and light gates to record and analyse motion, so it would be useful to check in advance what is available and try it out. One approach with unfamiliar equipment is to ask a couple of students to set up an experiment or demonstration in advance, so that they can then demonstrate it to the class (under your guidance, of course). In this way, you can learn alongside them.

Similarly there are opportunities for using modelling software (such as *Modellus*). Try finding some students who are prepared to try it out and give you a driving lesson.

Main aims

Students will:

1. Understand and use the relationships between velocity, acceleration, time and displacement.

2. Know and use the following equations of motion:

3. $s = ut + 1/2\ at^2$

4. $v = u + at$

5. $v^2 = u^2 + 2as$

3. Calculate acceleration from the instantaneous gradient of a velocity time graph.

4. Calculate displacement from the area under a velocity-time graph.

5. Understand the independence of horizontal and vertical velocities.

6. Describe motion in a uniform gravitational field using the independence of vertical and horizontal velocity.

7. Use the equations of motion to calculate ranges of horizontally projected bodies.

Prior knowledge

Students will be familiar with calculations of speed and (perhaps) acceleration. It will help if they are familiar with laboratory methods of determining times, speeds and accelerations using light gates and datalogging equipment.

Where this leads

Explaining motion in terms of forces is covered in the topic of dynamics.