# 3. Kinematics

**3.1 Linear motion**

**3.2 Non-linear motion**

*(a)* define

Displacement

Speed

Velocity

Acceleration

*(b)* use graphical methods to represent displacement, speed, velocity and acceleration

*(c)* find displacement from the area under a velocity-time graph

*(d)* use the slope of a displacement-time graph to find the velocity

*(e)* use the slope of a velocity-time graph to find the acceleration

*(f)* derive, from the definitions of velocity and acceleration, equations that represent uniformly accelerated motion in a straight line

*(g)* solve problems using equations that represent uniformly accelerated motion in a straight line, including the motion of bodies falling in a uniform gravitational field without air resistance

*(h)* recall that the weight of a body is equal to the product of its mass and the acceleration of free fall

*(i)* describe an experiment to determine the acceleration of free fall using a falling body

Method

Diagram

*(j)* describe qualitatively the motion of bodies falling in a uniform gravitational field with air resistance

*(k)* describe and explain motion due to a uniform velocity in one direction and a uniform acceleration in a perpendicular direction.

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**PART 2**

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A ball falls from rest onto a flat horizontal surface. Fig. 3.1 shows the variation with time *t* of the velocity *v* of the ball as it approaches and rebounds from the surface.



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