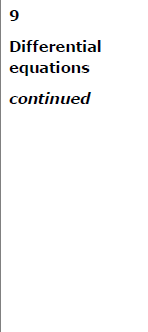
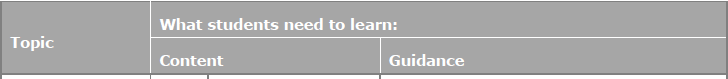
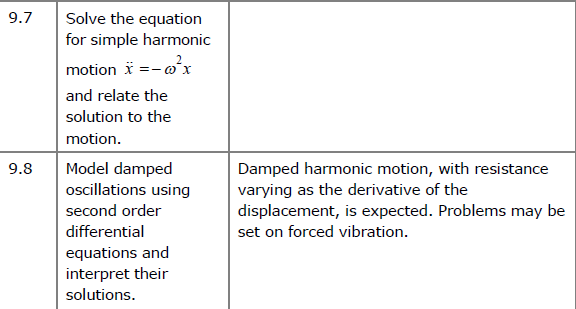
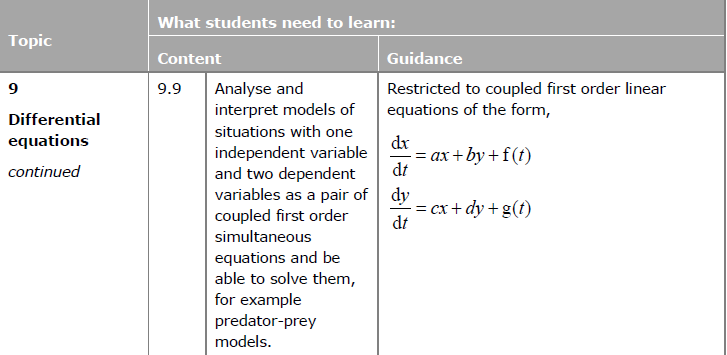
CP2 Chapter 8

Modelling with Differential Equations

Course Structure

1. Modelling with 1st order differential equations.
2. Simple Harmonic Motion
3. Damped and Force Harmonic Motion
4. Coupled First-Order Differential Equations



Modelling with 1st Order Differential Equations

Example

A particle is moving along a straight line. At time seconds, the acceleration of the particle is given by

Given that when , show that the velocity of the particle at time is given by the equation where is a constant to be found.

Common Example Type:

A storage tank initially containers 1000 litres of pure water. Liquid is removed from the tank at a constant rate of 30 litres per hour and a chemical solution is added to the tank at a constant rate of 40 litres per hour. The chemical solution contains 4 grams of copper sulphate per litre of water. Given that there are grams of copper sulphate in the tank after hours and that the copper sulphate immediately disperses throughout the tank on entry,

1. Show that the situation can be modelled by the differential equation
2. Hence find the number of grams of copper sulphate in the tank after 6 hours.
3. Explain how the model could be refined.

Ex 8A