**8A Modelling with First Order Differentials**

1. A particle starts from rest at a given point and moves along a straight line. At time seconds, the acceleration, , of is given by:
2. Find the velocity of at time seconds
3. Show that the displacement of from when is given by
4. A particle is travelling along a straight line. At time t seconds, the acceleration of the particle is given by:

Given that when , show that the velocity of the particle at time t is given by the equation:

where is a constant to be found.

1. A storage tank initially contains 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 at a constant rate of 40 litres per hour. The chemical solution contains 4 grams of copper sulphate per litre of water.
2. Given that there are grams of copper sulphate in the tank after hours and that the copper sulphate immediately disperses throughout the tank upon entry, show that the situation can be modelled by the differential equation:
3. Hence, find the number of grams of copper sulphate in the tank after 6 hours.
4. Suggest a possible refinement for the model