5. SPREADSHEET MODELS

1. Investigating motion using a spreadsheet (Textbook pgs 141, 161, 433)

Use the spreadsheet motion.xls to investigate motion in a straight line in air or in a viscous fluid. See p 432-3 for more about spreadsheets. For each spreadsheet, display a graph of displacement v time by highlighting the columns representing displacement and time and using the chart facility of the spreadsheet (eg. 'ChartWizard').

The spreadsheet offers choices as follows;-

1. For constant acceleration from zero initial speed , key in a value for acceleration α (+ or -) and key in b = 0 and c = 0.

2. For vertical motion due to gravity , key in the value of $\alpha = -9.8\ m\ s^{-2}$ for the acceleration and b = 0 and c = 0

3. For vertical motion from rest in a viscous fluid , key in the value of $\alpha = -9.8\ m\ s^{-2}$ for the acceleration, and a value for $b < 0$ and $c = 0$

2. A model of capacitor discharge using a spreadsheet (Textbook p216)

Use the spreadsheet exponential decay.xls to see how exponential decay occurs when a quantity (in this case the charge on a capacitor) decreases such that it goes down by a fixed percentage in equal intervals of time. The linked chart facility can be used to display the decrease of the quantity with time.

3. Computer models of radioactive decay (Textbook p334)

Use the spreadsheet exponential decay.xls to see how exponential decay occurs when a quantity (in this case the number of undecayed nuclei) decreases such that it goes down by a fixed percentage in equal intervals of time. The linked chart facility can be used to display the decrease of the quantity with time.

4. Modelling oscillating motion using a spreadsheet (Textbook p419)

Use the spreadsheet motion.xls to investigate motion for different types of motion. See p 432-3 for more about spreadsheets. For each spreadsheet, display a graph of displacement v time by highlighting the columns representing displacement and time and using the chart facility of the spreadsheet (eg. 'ChartWizard').

The spreadsheet offers choices to investigate oscillating motion as follows ;-

1. For undamped simple harmonic motion , key in $\alpha = 0$, $b = 0$ and $c < 0$. Note that the frequency $f = (-c)^{½} / 2\pi$ as $c = -(2\pi f)^2$ where -c has a positive value as $c < 0$.

2. For damped simple harmonic motion , key in as above + a negative value for b.

For all the above choices, the time interval dt must be keyed in. Note that the shorter the time interval, the more exact the results become.