Assessment 2: $24 - 27$ August 2015 [10 minutes, 10 marks available]

Name..**Surname**............................**mark**............/**10**

1. Spectra of stars are classified according to the letters O,B,A,F,G,K, and M. These correspond to the following temperature ranges (in degrees K):

spectral class	temperature (K)
O	30 000 - 60 000
B	10 000 - 30 000
A	7 500 - 10 000
F	6 000 - 7 500
G	5 000 - 6 000
K	3 500 - 5 000
M	2 000 - 3 500

Write a program which asks for the temperature and prints out the spectral class. Print a suitable message if the temperature is out of range.

2. Write a script which asks for a series of numbers and prints out the average. Use a loop to ask for the next number and break from the loop if the number entered is a particular number.

3. Write a program that draws graphs of velocity and displacement as a function of time for an object falling under the influence of gravity from $t = 0.0$ to $t = 5.0s$. Ignore air resistance and assume $v_0 = 0.0$ m/s.

4. Two trains approach each other on parallel tracks; Each has a speed of 95 km/hr with respect to the ground. If they are initially 8.5 km apart, write a program that will calculate how long it will take before they reach each other.

5. A can of soft drink at a temperature of 25^0 C is placed in a refrigerator, where the ambient temperature F is 10^0 C. A standard way of determining how the soft drink temperature changes over a period of time is to subdivide the time interval into a number of small steps, each of duration Δt . If $T(i)$ is the temperature at the beginning of step i, the following model can be used to determine $T(i + 1)$:

$$T(i + 1) = T(i) + K\Delta t(FT(i));$$

where K is the conduction coefficient (a parameter that depends on the insulating properties of the can and thermal properties of the soft drink). Using $K = 0.05$, plot a graph of temperature as a function of time until the temperature of the soft drink reaches 15^0 C.

Paradza MW/Physics 222 Assessment 2 of 2015.