# SMS-303: Integrative marine sciences III.

**Assignment #1**

1. The effect of the sun on the tides in the Gulf of Maine (GOM).

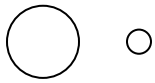
The sun and the moon both contribute to the tides in the GOM, with the moon being the major contributor. For simplicity we will consider only two tidal components (M2-lunar and S2-solar) which often have the largest amplitude of all tidal components and which will be the major contributor were the moon, sun and earth all on the same plane perpendicular to the axis of rotation of the earth.

The elevation (in m) near Rockport, ME for the two tidal wavecomponents is given by:
M2: 1.5cos(28.984t)
S2: 0.23cos(30t)

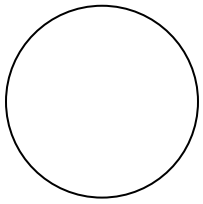
Where t is in hours and the frequency is given in degrees per hour. At time t=0 the sun and the moon are at the same side relative to the earth (new moon).

a) Add the two components together on a spread sheet and plot the resulting amplitude as function of time for a 28day lunar month (remember, t has to be in hours, 1 day = 24hours). Annotate on your plot the different arrangement of the planets every 3.5 days. For example:

t=0



Earth Moon



Sun

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b) Add the two tidal components using trigonometric relationship(s). Explain your results in light of the plot you got in question 1.

2. Seich: The 'natural' (resonant) frequency/period of a gravity wave in an enclosed (or semi-enclosed) basin depends on the depth of the water and the length of the basin (similar to the frequency emitted by a musical instrument). Calculate the seiche period for station I (the length of the tank is 30.5cm). How well does this formula compare with your results for station I of the lab?

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