Biology 4605/7220 Quiz #2b NAME_____
20 September 2005

1a. A series of experimental measurements by Holligan *et al* 1984 (*Marine Ecology Progress Series* 17:201) suggest that the vertical flux of nutrients through the thermocline in the ocean follows an exponential relation:

$$F_N = \alpha (K_V \Delta N / \Delta Z)^{3/4}$$ Dimensions

were F_N is the vertical flux of nutrients (milligram-atoms m^{-2} s^{-1}) _____

ΔZ is the thickness of the thermocline (metres) _____

K_V is the vertical eddy diffusivity (10^{-4} m^2 s^{-1})

ΔN is the nitrate difference across the thermocline (mg-atoms)

In the blank spaces above and to the right, fill in the dimensions for F_N ΔZ

What units does α have ? _____

1b. Convert an eddy diffusivity of $K_V = 3.6 \times 10^{-4}$ m^2 s^{-1} to units of mm^2 $hour^{-1}$

2. Another series of experiments by Holligan *et al* suggest that nutrient flux depends upon the temperature gradient across the thermocline.

$$F_N = \beta (\Delta T/\Delta Z)^{1/3}$$

$\Delta T/\Delta Z$ = °C/metre

2a. Compute the nutrient flux across a gradient of 10 °C over 2 metres, assuming $\beta = 1.5$.

2b. Write a data equation for an observed value of F_N = 0.80 milligram-atoms m^{-2} s^{-1} measured across a temperature gradient of 10 °C over 2 metres.

0.80 = _____ + _____