Name: _____ **Show work needed to justify your answer.** Date: _____

HW: # 20a: Math IBSL - Standard 20 - Applications of Arithmetic and Geometric Patterns 5 points

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1 A high white blood cell count can indicate that the patient is fighting an infection. A doctor is monitoring the number of white blood cells in one of her patients after receiving antibiotics. The lab returns the following data.

Hour	0	12	24	36
White blood cells (cells mcL^{-1})	12 500	11 000	9680	8518.4

0 1 2 3

$\frac{11000}{12500} = 0.88$ $\frac{9680}{11000} = 0.88$

a Create a general formula to model the patient's white blood cell count at any given time.

(a) $u_n = 12500(0.88)^t$

t is time every 12 hours.

b Use your general formula to calculate the number of white blood cells this patient will have after three days. $\frac{72}{12} = 6$

(b) $u_6 = 12500(0.88)^6$

$u_6 = 5805$

c Discuss the limitations of your general formula.

(c) white blood cell count will go back to normal after virus is gone.

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3 Half-life is the time required for a substance to decay to half of its original amount.

a A radioactive isotope has a half-life of 1.23 years. Explain what this means.

(a) Every 1.23 years half of the original Amt is left

b Write a general formula to calculate the amount remaining of the substance.

(b) $A = A_0\left(\frac{1}{2}\right)^{\frac{t-1}{h}}$

where A is Amount remaining after t years, A_0 is original Amount and h is half life.

c Use your GDC to sketch a graph of this situation.

d If you start with a 52-gram sample of the isotope, how much will remain in 7.2 years?

(d) $A = 52\left(\frac{1}{2}\right)^{\frac{7.2-1}{1.23}}$

$A = 1.58$ grams