PHA 5127
Answers Case Study 2
Fall 2007

1. Patient A.M. is given a 60 mg dose of gentamicin. The volume of distribution for this patient is 10 L and the concentration after 8 hours is 1.4 mg/L. Calculate the k_e. What is the half-life?

Answer: C_o=Dose/(Volume of distribution)=60mg/10L=6mg/L
$C=C_o*e^{-ke*t}$ $(\ln C-\ln C_o)=-k_e*t \rightarrow -(\ln C-\ln C_o)/t=k_e \rightarrow k_e=-(\ln 1.4mg/L-\ln 6mg/L)/8$ hours $\rightarrow k_e=0.182$ hours^{-1}

$t_{1/2}=0.693/k_e \rightarrow t_{1/2}=0.693/0.182$ hours$^{-1}=3.81$ hours

2. Assuming a one compartment body model and a 1st order process, please graph the following on semilog paper and predict the concentration after 6 hours.

Time (hours)	Concentration (mg/L)
1	80
3	42
5	22

Answer=~16 mg/L

3. Using 110 mg/L as the starting concentration and a k_e of 0.318 hour^{-1} calculate the concentration after 6 hours.

Answer: $C=C_o*e^{-ke*t}$ $C=110$ mg/L $*$ $e^{(-0.318hour\text{^}-1*6hour)}=16.3$ mg/L

4. True of False

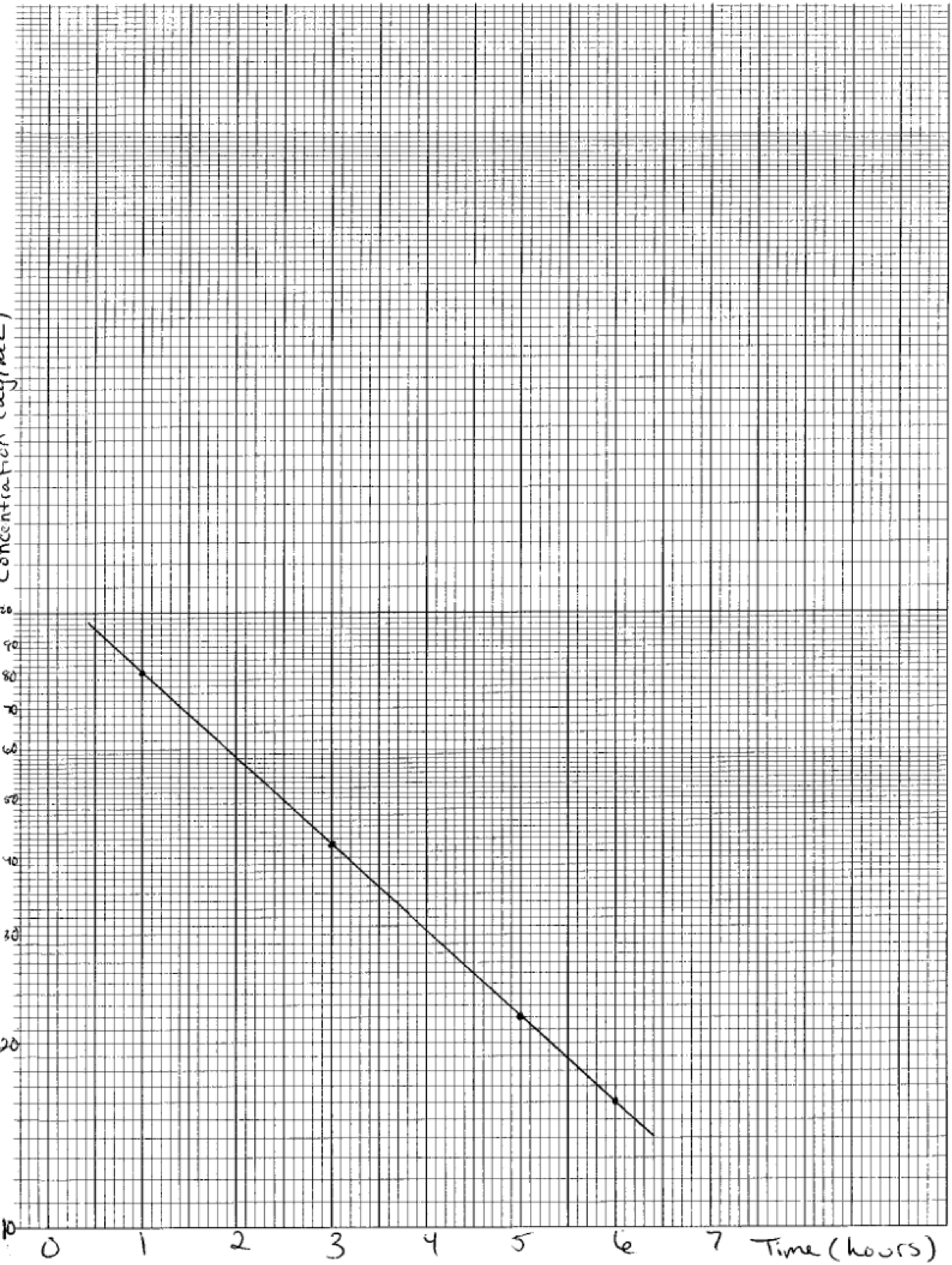
a. In a one-compartment body model it is assumed that a drug distributes to all areas of the body instantaneously. True.

b. Pharmacodynamics is the study of the time course of a drug's absorption, distribution, metabolism, and elimination. False.

Pharmacodynamics refers to the relationship between concentration at the site of action and the resulting effect.

c. The k_e of a drug is 0.00333 min^{-1}. After 2 hours 67% of the drug is remaining in the body. True.

Answer: e^{-ke*t}=fraction remaining $e^{(-0.00333\ min\text{-}1*60\ min/hour*2\ hours)}$=0.67


Concentration (mg/mL)
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
Time (hours)