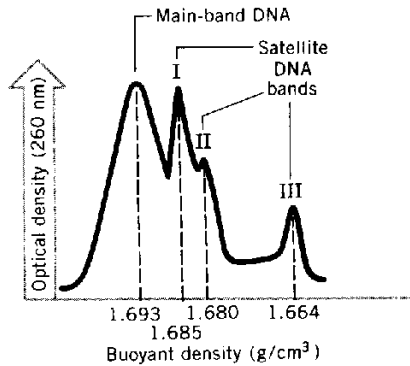


# SAMPLE PROBLEMS

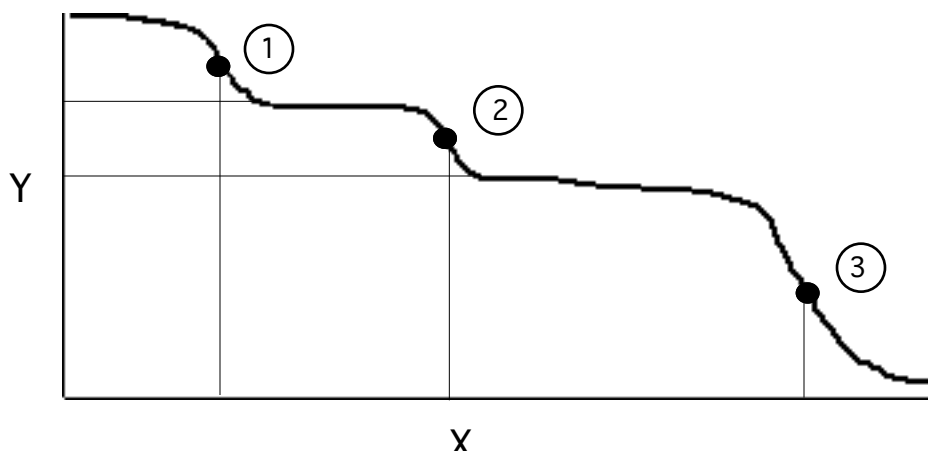
1. The graph below shows a CsCl density gradient with one main band and three satellite peaks. From the density of each peak, calculate the %GC.



2. The genome sizes in 1000's of base pairs is given for a variety of organisms. Assuming that the  $C_{ot}1/2$  of *E. coli* is 9.0, calculate the  $C_{ot}1/2$  of each DNA

Genome	bp x 1000	CoT 1/2	Genome	bp x 1000	CoT 1/2
<i>SV40</i>	5		<i>yeast</i>	15,000	
<i>OX174</i>	5		<i>nematode</i>	100,000	
<i>M13</i>	6		<i>wall cress</i>	100,000	
<i>Lambda</i>	50		<i>fruit fly</i>	165,000	
<i>Herpes</i>	152		<i>human</i>	3,000,000	
<i>T2</i>	165		<i>maize</i>	4,500,000	
<i>smallpox</i>	267		<i>amphibian</i>	76,500,000	
<i>Mycoplasma</i>	760				
<i>E coli</i>	4,200				

3. The C-value of a eukaryotic DNA is given below for each table. The genome size of *E. coli* is  $4.2 \times 10^6$  bp. Under the conditions in your lab, *E. coli* DNA renatures with a  $C_{ot}1/2$  of 4. The renaturation curve for the eukaryotic DNA under similar situations is given below.



C-value =  $3.35 \times 10^9$  bp

DNA Component	% of Total DNA	CoT1/2 at Midpoint	space for your use	# Bases Per Repeat	space for your use	#Repeats
#1	15	$4 \times 10^{-3}$				
#2	25	2.0				
#3	60	$8 \times 10^2$				

C-value =  $2.3 \times 10^{10}$  bp

DNA Component	% of Total DNA	CoT1/2 at Midpoint	space for your use	# Bases Per Repeat	space for your use	#Repeats
#1	20	$2.5 \times 10^{-3}$				
#2	30	3.4				
#3	50	$6 \times 10^2$				

C-value =  $6.4 \times 10^9$  bp

DNA Component	% of Total DNA	CoT1/2 at Midpoint	space for your use	# Bases Per Repeat	space for your use	#Repeats
#1	8	$9 \times 10^{-2}$				
#2	22	1.75				
#3	70	$1.2 \times 10^3$				

# ANSWERS

DENSITY = 1.660 + 0.00098(%GC)

Peak	GC Ratio
1.693	33.67
1.685	25.51
1.68	20.41
1.664	4.08

Genome	Base Pair	CoT 1/2
<i>SV40</i>	5 bp of organism/bp <i>E.coli</i> = cot1/2 organism/cot1/2 <i>E. coli</i>	1.07E-02
<i>OX174</i>	5	"
<i>M13</i>	6	"
<i>Lambda</i>	50	"
<i>Herpes</i>	152	"
<i>T2</i>	165	"
<i>smallpox</i>	267	"
		"
<i>Mycoplasma</i>	760	"
<i>E coli</i>	4,200	"
		"
<i>yeast</i>	15,000	"
<i>nematode</i>	100,000	"
<i>wall cress</i>	100,000	"
<i>fruit fly</i>	165,000	"
<i>human</i>	3,000,000	"
<i>maize</i>	4,500,000	"
<i>amphibian</i>	76,500,000	"

DNA Component	Frac Total DNA	Cot 0.5 @ midpoint	Adj CoT 0.5	# bases per repeat	C value	Adj C value	# repeats
1	0.15	4.00E-03	0.0006	6.30E+02	3.35E+09	5.03E+08	797619.0
2	0.25	2	0.5	5.25E+05	3.35E+09	8.38E+08	1595.2
3	0.60	8.00E+02	480	5.04E+08	3.35E+09	2.01E+09	4.0
1	0.20	2.50E-03	0.0005	5.25E+02	2.30E+10	4.60E+09	8761904.8
2	0.30	3.4	1.02	1.07E+06	2.30E+10	6.90E+09	6442.6
3	0.50	6.00E+02	300	3.15E+08	2.30E+10	1.15E+10	36.5
1	0.80	9.00E-02	0.072	7.56E+04	6.40E+09	5.12E+09	67724.9
2	0.22	1.75	0.385	4.04E+05	6.40E+09	1.41E+09	3483.0
3	0.70	1.20E+03	840	8.82E+08	6.40E+09	4.48E+09	5.1