50. Fill out the table below regarding media types.

Media	Mechanism	Diagrams/Pictures with possible interpretations			What types of organisms are found on this media?
OF-G	Can the organism digest glucose with/without the presence of O_2.	(open) yellow	(oil) green	oxidizer	can digest glucose with use of O_2 only (only aerobic respiration)
		(open) yellow	(oil) yellow	fermenter	can digest glucose with AND without O_2. uses aerobic [oxidative] & ferment-ation to break down lactose
		(open) green	(oil) green	non-utilizer	Anaerobe → uses peptones
TSI	Glucose when fermented produces acid turning the tube yellow. If lactose and sucrose ferment, it stays yellow. If peptones are used tube turns red (no acid).	(slant) yellow (10hrs) red (24)	(butt) yellow -stays yellow	glucose utilizer	Glucose is the only sugar oxidized & will be used up quickly (After glucose, peptones are used → returns to red).
		(slant) yellow -stays yellow	(Butt) yellow -stays yellow	glucose & lactose/sucrose	As glucose is oxidized, the tube turns yellow & will stay yellow due to high acid production during lactose/sucrose use.
		(slant) darker red	(Butt) darker red	peptone utilizer	No sugar is used only peptones are oxidized.
EMB	Selective – methylene blue & eosin inhibits GP growth Differential – contains lactose & a pH indicator that changes color due to acid production if lactose is used.				GN
PEA	Selective - contains alcohol that dissolves GN cells outer membrane				GP

Chap 7 & 20: Control

51. Define the following words:

a. Broad Spectrum - Kills a large # of bacterial groups including normal flora

b. Narrow Spectrum - Only a select group of bacteria are affected so no normal flora is killed

c. Synergism - A combination of drugs with a greater impact than is used alone. This lowers the number of resistant strains.

52. What is an example of synergism?

chemotherapy + radiation

53. Fill out the table below regarding targets of antibiotics.

Target	How is this structure different from Eukaryotic cells?	How does this disrupt bacteria function?	What danger is there to Eukaryotic cells?
Cell Wall	Eukaryotic cells do not have cell walls.	peptide bonds are prevented in peptidoglycan of cell wall causing lysis.	NONE
Folic Acid Synthesis	we dont make folic acid, humans ingest folic acid via dietary entry.	competitive inhibition stops production of folic acid thus stopping growth.	NONE
Ribosomes	Eukaryotic cells have 80S ribosomes. Prokaryotic cells have 70S ribosomes.	targeting ribosomes interferes with/prevents protein and enzyme synthesis.	can be dangerous to Eukaryotic mitochondria; they have 70S ribosomes.
Outer Membranes	It is not different. Eukaryotic cells and Prokaryotic cells BOTH have outer cell membranes	It disrupts the membrane causing cell lysis	This can be dangerous because it can affect human, especially kidney, cells.
DNA synthesis /transcription	Prokaryotic DNA gyrase differs in structure.	It prevents DNA gyrase from relaxing DNA. Prevents DNA from being read and copied.	NONE

54. Compare and Contrast MIC and MBC.

MIC	MBC	Both
Can tell inhibitory concentration from the initial culture.	A subculture is required to see if bacteria were killed	detect effectiveness of antimicrobial substances (such as disinfectants).

55. Use the table below to fill out the MIC and MBC for the drugs Cf and NB.

		Staph		*E. coli*	
Drug	Dilution	Growth	Subculture	Growth	Subculture
Cf	1:2	-	-	-	-
"	1:10	-	+	+	+
"	1:20	+	+	+	+
"	1:100	+	+	+	+
NB	1:4	-	-	-	-
"	1:60	-	_	-	-
"	1:80	+	+	-	+

	Staph	Ecoli
MIC Cf	1:10	1:2
MBC Cf	1:2	1:2
MIC NB	1:60	1:80
MBC NB	1:60	1:60
Which drug most effective? Explain.	NB, inhibits more growth and the lowest concentration →	

56. What is different about reading the results of disk diffusion testing for antibiotic vs. disinfectants?

Disinfectant disk diffusion effectiveness can be quickly discerned by measuring zones of inhibition to find the largest area without bacterial growth.
Antibiotic disk diffusion tests are more complicated because you must compare the size of inhibition zones against known values of antibiotic effectiveness.

57. List four human activities that have caused an increase in antibiotic resistance and explain how they have caused resistance.

a. Incomplete Therapy - Patients stop taking their medicine. The susceptible bacteria die from the first dose of medicine and the resistant bacteria are left behind.

b. Inappropriate/Overprescribing of Antibiotics - Antibiotics are only effective on bacteria but are given for a virus due to patient demand. These antibiotics do not affect the virus but increase bacteria resistance.

c. Livestock/Animal Feed - Antibiotics are given to farm animals to keep them healthy in crowded conditions. The same antibiotics are used on humans and bacteria become resistant and are passed on.

d. Hospitals + Nursing Homes - visitors and nursing staff do not use hygiene/antiseptic techniques. This causes resistant strains to be transferred from patient to patient and the resistance spreads

58. List the microbial life-forms, in order, from most resistant to least resistant to chemical control.

prions, endospores, mycobacteria, pseudomonas, GN, GP, virus

59. Fill in the table below regarding halogens.

Halogen	Use	Disinfectant	Antiseptic
I_2	• skin pre-surgery • purifies H_2O	X	X
Cl_2	• Pools, sewage, bleach	X	
Br_2	• Pools	X	

60. Do the following methods of control sterilize?

a. Pasteurization - NO
b. Boiling - NO
c. Ionizing Radiation - yes
d. Non-ionizing radiation - NO
e. Refrigeration - NO
f. Freezing - NO
g. Autoclaving (steam & pressure) - yes
h. Freeze-drying - NO
i. Filtration - NO

61. What sterilization methods should you use if the object is heat labile?

Filtration to separate bacteria.

62. Are they both osmotic environments, hypo vs. hyper, equally effective in controlling growth?

a. Why or why not?

NO, only hypertonic prevents growth.

63. What is a pH buffer? regulates changes in pH. to maintain consistency.

64. What range of pH do bacteria prefer? 6.5 - 7.0

65. How does UV radiation damage cells? It damages cellular DNA

66. Describe the process of light repair. (How does it work? Where does it occur?)

- occurs in the light and use a two-part response to repair damage to DNA.

(1) Photolyases cut links between thymine dimers

(2) Excision repair is used to cut out damaged segments of DNA and DNA ligase comes in to fill/glue in new segments.

67. Describe the process of dark repair. (How does it work? Where does it occur?)
occurs in the dark. In dark repair, only excision repair occurs so it takes longer for DNA pieces to be cut out and for DNA ligase to glue in new pieces.

68. Are photolyases involved in light and/or dark repair?
light

69. Is DNA ligase involved in light and/or dark repair?
Both: light /dark

70. Define the following vocabulary terms.

a. Disinfectant - destroys vegetative pathogens on non-living surfaces.
- exp: Lysol, bleach, boiling, UV radiation

b. Antiseptic - Destroys vegetative microbes on living tissue

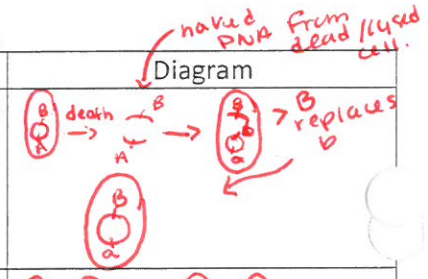
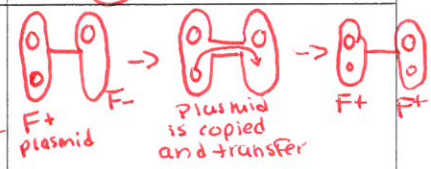
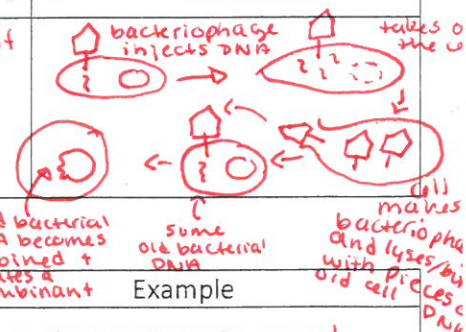
c. Sterilization - Destroys all forms of microbial life (including endospores).

d. Bactericidal - kills bacteria

e. Bacteriostatic - inhibits bacterial growth

Chapter 8&9: Biotechnology:

71. Fill out the table below regarding the 3 means of horizontal gene transfer in bacteria.

Type of Transfer	How it works/Explanation of Process	Resulting Product	Diagram
Transformation	The transfer/uptake and expression of naked/free DNA. *could be plasmids	Recombinant bacteria	
Conjugation	The transfer of DNA by living cell → cell contact (sex pili).	Bacteria sharing plasmidal genes - passed resistance, etc	
Transduction	Transfer of DNA by bacteriophage.	Recombinant bacteria	

72. Fill in the table below regarding plasmids.

Plasmid Type	Function	Example
Dissimilation	Plasmid with genes for catabolism / "breaking" down.	Pseudomonas and Toluene that digest oil spills.
Conjugative	Plasmid with genes for sex-pili and plasmid replication	
R-Factor	Resistance Factors in a plasmid ① Heavy Metal Resistance ② Antibiotics	→ Bioremediation to breakdown arsenic/mercur → Resistance.

73. Referring to the diagram below,

nzyme	Bacterial Source	Recognition Sequence
BamHI	*Bacillus amyloliquefaciens*	G↓G A T C C G C T A G↑G
EcoRI	*Escherichia coli*	G↓A A T T C C T T A A↑G
HaeIII	*Haemophilus aegyptius*	G G↓C C C C↑G G
HindIII	*Haemophilus influenzae*	A↓A G C T T T T C G A↑A

a. Which restriction enzyme would cut the following strand of DNA?

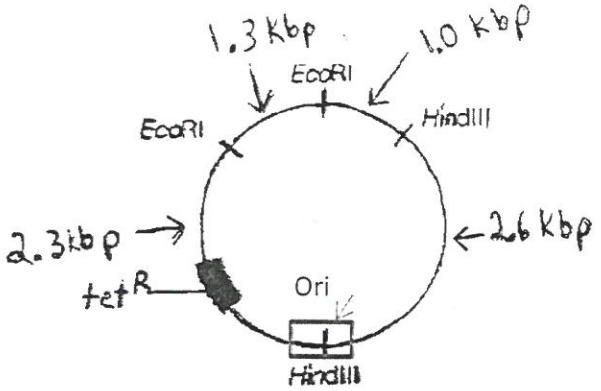
A↓AGC T T
T TCGA↑A HINDIII

b. Which enzymes produce blunt ends?
HaeIII

c. Which enzymes produce sticky ends?
BamHI, EcoRI, HindIII

d. Of what value are sticky ends in making recombinant DNA? they provide a surface to recognize and attach to new DNA.

e. What is the original/natural function of restriction enzymes?
To cut bacteriophage DNA to prevent bacteria cell lysis.



74. The diagram above is a map of plasmid pMICRO.

a. What is the number of restriction fragments that would result from digesting pMICRO with:

i. EcoRI - 2

ii. HindIII - 2

iii. Both enzymes together -4

b. Which enzyme would make the smallest fragment containing the tetracycline-resistance gene?
HINDIII

c. What enzyme would keep the ori site intact? EcoRI

d. Why is it important to maintain the integrity of the origin of replication in bacteria plasmids?
Thats how the bacteria can make copies of DNA to pass on to new cells via binary fission.

e. What is the size of that fragment? 4.9 Kbp

f. Why is it necessary to include an antibiotic-resistant gene in a plasmid used for genetic engineering?
In order to isolate ~~gene~~ bacteria with the plasmid so they are not overwhelmed by bacteria without the plasmid.

75. Define the following miscellaneous vocabulary:

a. sticky ends - Ends of DNA with bases exposed that encourage recombination by allowing DNA to be added in.

b. blunt ends - Ends of DNA with clean/even cuts (no bases exposed) that prevents recombination.

c. vector - A self-replication vehicle used to insert genes (plasmids / bacteriophages).

d. plasmid - Extra chromosomal DNA that is nonessential for life.

76. Define the following miscellaneous vocabulary:

a. Restriction Enzyme - An enzyme that cuts DNA at set points. and leaves sticky ends exposed so DNA from other sources can be added.

b. DNA ligase - An enzyme that ties new DNA nucleotides in place.

c. Competency - when a recipient bacteria is in a state of being capable of taking donor DNA.

d. induced competency - forced capacity to recieve DNA (by CaCl2 and/o temperature shocking).

e. marker - used to identify transformed cells to subculture and clone them (UV fluorescence).

f. selective marker - typically antibiotic resistance used to idenify only transformed cells for subulture and cloning (amp

g. clone - An identical copy used to mass produce desired genes.

h. F+ - plasmid present

i. F- - no plasmid present.

j. Bacteriophage - virus that infects bacteria (used for Transduction

k. Naked DNA - free DNA from either lysed cells and/or free plasmids.

l. Ti plasmid - plasmid used for plants → directly inserts itself into chromosomes and is easily passed on in seeds.

Bioethics

77. Fill in the table below regarding questions types:

Type of Question	How do you recognize this type of question?	Example of this question
Ethical	involve consideration of conflicting choices with several alternative solutions	Is there any time when _____ is justified?
Legal	Questions concerning national, state, or local laws/rules.	If six people pay for a house but only two names are on the title, who is the real owner?
Scientific	Questions that can be empirically tested/governed by scientific laws/principles.	At what rate will an object fall to Earth?
Personal Preference	Questions governed by opinion	If you could go anywhere on vacation, where would you go?

78. Fill in the table below regarding mandatory vaccinations.

Argument Type	Arguments Used/Made
Pro Mandatory Vaccination	• Community Immunity • Public Health
Con Mandatory Vaccination	• Religious views • Medical concerns • Personal choice