Name: KEY

Chapter 3 and 4

Microbiology Test Review Tool

Calculating Total Magnification (1 Question)

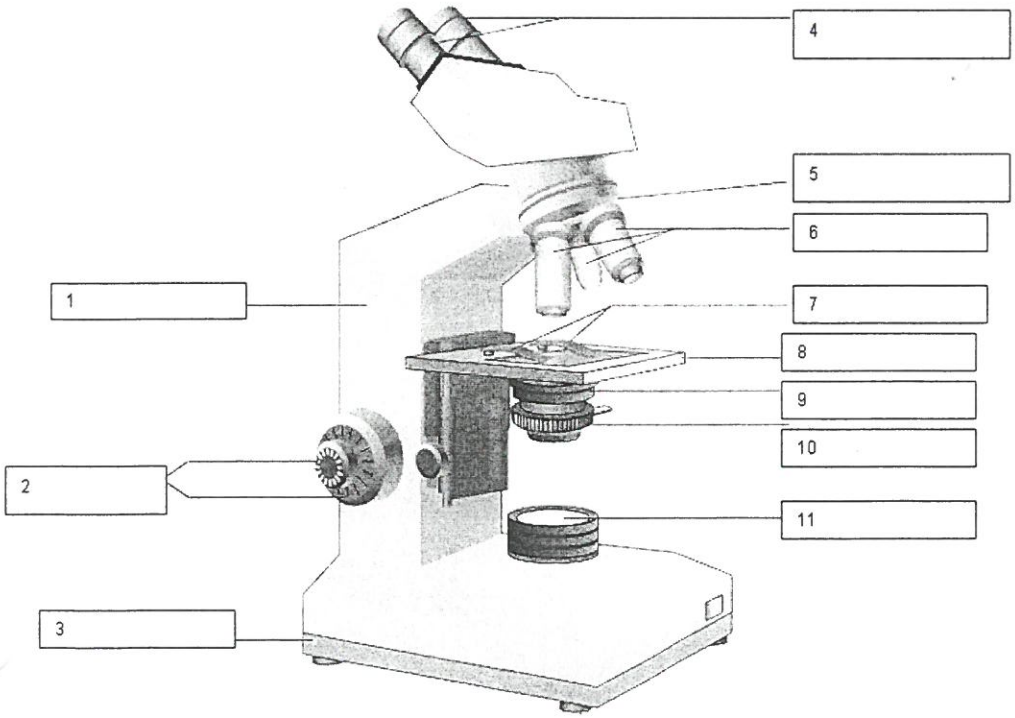
- How do you find the total magnification of a scope? Objective x Eyepiece
- Calculate the total magnification of viewing a specimen if the objective lens is:
  - 40X · 10 = 400
  - 100X · 10 = 1,000

Resolution (2 Questions)

	Definition	Ways to Improve
Resolution	The minimum distance at which a microscope can distinguish 2 points as separate	1. wavelength change (↓) 2. adjust condenser. 3. use oil

Types of Microscopes (4 Questions)

1. Light: Label the following parts of a microscope



#	Name of Part
1	arm
2	course + fine adjustments
3	base
4	eyepieces
5	nosepiece
6	objectives
7	slide clamps
8	stage
9	diaphragm.
10	light source

2. Electron: (1 Question)

Type of Scope	What is it used for?	Advantages	Disadvantages
1). Scanning	viewing external structures in 3D	3-D	kills organism
2). Transmission	viewing internal structures	Great Magnification and Resolution	kills organism needs thin slices

Fixing (1 Question)

	Definition	Methods	Advantages	Disadvantages
Fixing	to attach to slide	heat alcohol	• traps organisms • kills organisms • preserves	• can cause distortion

Morphology (5 Question)

	Bacillus	Coccus	Spirillum
Shape	rod	circle	spiral
Drawing			
Flagella (Yes or No)	yes	no	yes

Negative/Acidic Stains (5 Questions)

Uses	Advantage	Disadvantage
morphology shape/size	less distortion	easy to remove/ wash off
Examples of negative stains:	Nigrosin / Acid Fuchsin	
How does it work?	Repelled by cell walls of bacteria and binds to background.	

Positive/Basic Stains (3 Questions)

Uses	Advantage	Disadvantage
groupings/ arrangements	Doesn't wash off	Fixing can distort bacteria
Examples of positive stains:	Malachite Green, Methylene Blue, Crystal Violet, Saffranin	
How does it work?	It is attracted to bacterial cell walls.	

Gram Staining (14 Questions)

1. Steps of Gram Stain (8 Questions)

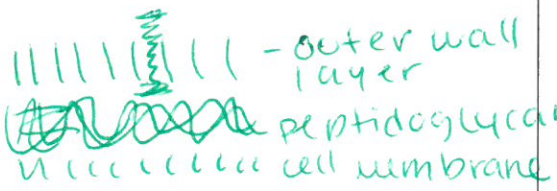
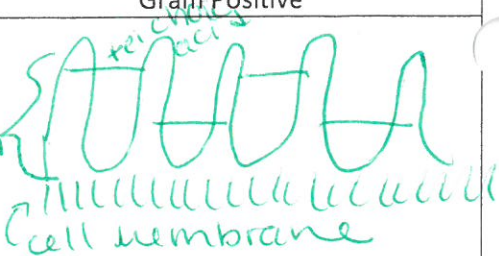
	Substance Used	Purpose	Appearance of Gram Positive	Appearance of Gram Negative
Step One	Crystal Violet	Initial Stain	Purple	Purple
Step Two	Iodine	Mordant	Purple	Purple
Step Three	Alcohol	Decolorize	Purple	Clear
Step Four	Saffranin	Canterstain	Purple	Pink/Red

2. Advantages/Disadvantages (1 Question)

	Uses	Advantages	Disadvantages
Gram Staining	• to differentiate between bacterial cell walls	used to guide antibiotic prescription.	• only for bacteria • young cultures • decolor timing is critical

Gram Staining Continued (14 Questions)

3. Cell Wall Structure (5 Questions)

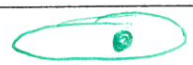
	Gram Negative	Gram Positive
Drawing of cell wall structure (Label all components)		
Amount of peptidoglycan	little	lots
Osmotic Protection (Yes/No)	NO	yes
Endotoxins (Yes/No)	yes	no
Penicillin Resistance (Yes/No)	yes	no

Exceptions to Normal Cell Wall Structure: (1 Question)

1. Why don't archaea cell walls react to gram staining? Different cell wall (no peptidoglycan)

Prokaryote Cell Internal Characteristics (21 Questions)

1. Endospores (6 Questions)
   A. What is an endospore? A resistant dormant resting structural remenant of bacteria designed to protect microbes in adverse conditions.
   B. When do cells produce endospores? Hardship.
   C. What category of bacteria possesses endospores? GP
   D. When would you want to perform an endospore stain? If clear spots are seen.
   E. What technique must be employed to stain endospores? Endospore stain → HEAT
   F. Endospore Locations

Possible Locations	Description of Location	Drawing
Free	outside cell	
Terminal	at the end of cells	
Subterminal	almost at end	
Central	In center	
Central, Swollen	center	
Terminal, Swollen	end	

2. Plasma Membrane: (8 Questions)

Passive Transport Definition:	Passive Transport Types	Types of molecules moved
	1. Diffusion	small molecules / elements
	2. Osmosis	water
	3. Facilitated Diffusion	Larger molecules through channels

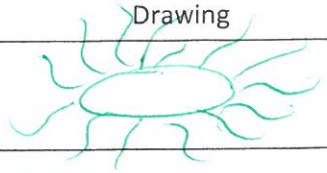
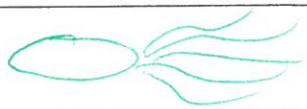
Types of Solution	Direction of water movement	Cell Response
Hypotonic	into cells	cell swells
Hypertonic	out of cells	cell shrivel
Isotonic	in & out cells	stays balanced

3. Chromatophores (1 Question)
   A. What are chromatophores? pigment absorbing molecules in prokaryotes (no nuclei).
4. Nuclear Area (2 Questions)
   A. Where do you find genetic information in a bacterial cell? Nuclear regions
   B. Is there a nucleus? No
      i. Why/Why not? No membrane bound organelles.
5. Plasmids (2 Questions)
   A. What are plasmids? circular extrachromosomal DNA
   B. Uses: Antibiotic Resistance, Toxin production, resistance to toxic metals.
6. Ribosomes (1 Question)
   A. Type found in prokaryotes
      70S
7. Inclusions (1 Question)
   A. Function: Reserve deposits that prevent internal increases in osmotic pressure.

Inhibition of Bacterial Growth: (2 Questions)

1. How do you best inhibit bacterial growth on agar? Use lower molecular mass
2. What substance showed higher inhibitive tendencies?
   a. Why? salt - lower molecular mass = more parts per solution
      - dissociates into Na^+ + Cl^- and doubles its solution.

Flagella Types: (3 Questions)

Types of Flagella	Description	Drawing
Peritrichous	Bacteria with whole surfaces covered in flagella	
Monotrichous	Bacteria with one flagella.	
Lophotrichous	Bacteria with a group of flagella on one end.	
Amphitrichous	Bacteria with flagella on opposite ends	

Cell Structures: (6 Questions)

Cell Structure	Function in Cell
Flagella	Movement
Axial Filaments	Movement
Fimbrae	Adherence
Pilli	Transfer DNA
Capsule	~~Ad~~herence / Prevent Phagocytosis

Eukaryotes (1 Question)

1. What structures are unique to eukaryotic cells?

   membrane bound organelles

2. Describe the origin of organelles such as chloroplasts and mitochondria using evidence.

   Endosymbiotic Theory
   - eukaryotes evolved from prokaryotes living inside other prokaryotes
     - chloroplasts are similar to photosynthetic prokaryotes
     - mitochondria & chloroplasts reproduce by binary fission.