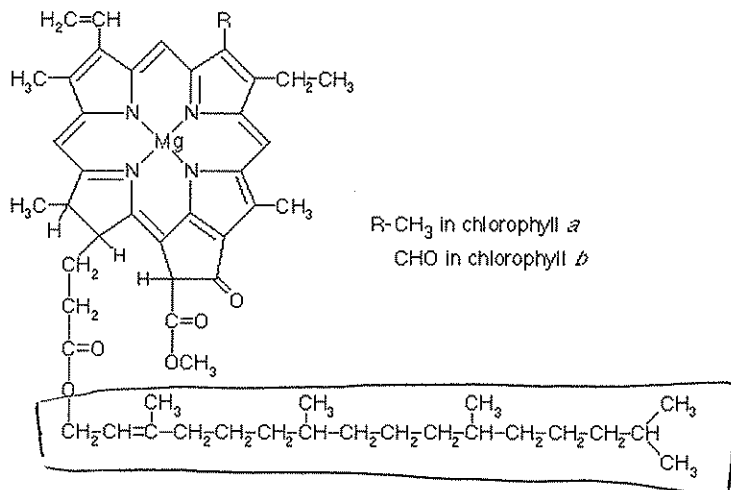Name: Key

Interpretation of Images, Data/Graphs Assignment: Chemistry of Life

Study the diagrams, graphs, data sets, etc... that are shown below and then answer the questions that follow (with detail when necessary AND IN COMPLETE SENTENCES!!).

1. Below is a picture of chlorophyll.
   Would this molecule be soluble in water?
   Why or why not?

   No – its long hydrocarbon tail

   * C-H bonds are nonpolar

   * nonpolar does not dissolve
     in polar solutions, like H2O

R-CH₃ in chlorophyll *a*
CHO in chlorophyll *b*

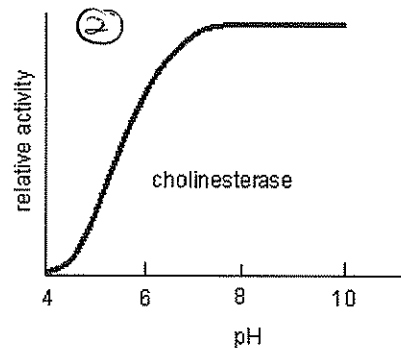The structure of chlorophyll

2. For each of the graphs at right,
   describe what the graph indicates
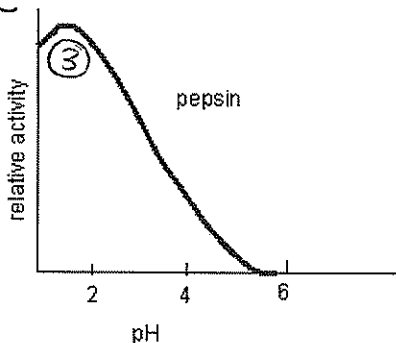   about enzyme activity.

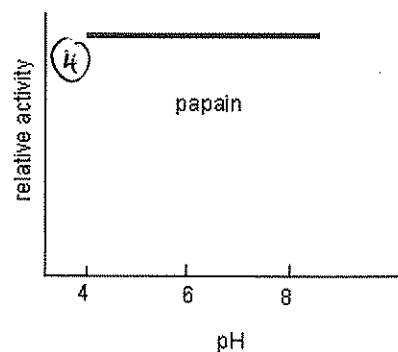① Chymotrypsin ⇒ optimal function
   Near neutral pH
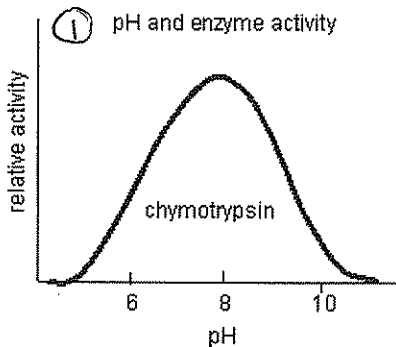
② Cholinesterase ⇒ functions over
   a broad range of pHs (6-10)
   In the neutral to basic range

③ Pepsin ⇒ functions best in
   acidic environments
   (found in stomach)

④ Papain ⇒ enzyme activity is
   pH-independent
   * functions at all pH's *

① pH and enzyme activity

chymotrypsin

② cholinesterase

③ pepsin

④ papain

AP Biology   Name:

Interpretation of Data/Graphs Assignment: Chemistry of Life

Study the diagrams, graphs, data sets, etc… that are shown below and then answer the questions that follow (with detail when necessary AND IN COMPLETE SENTENCES!!).

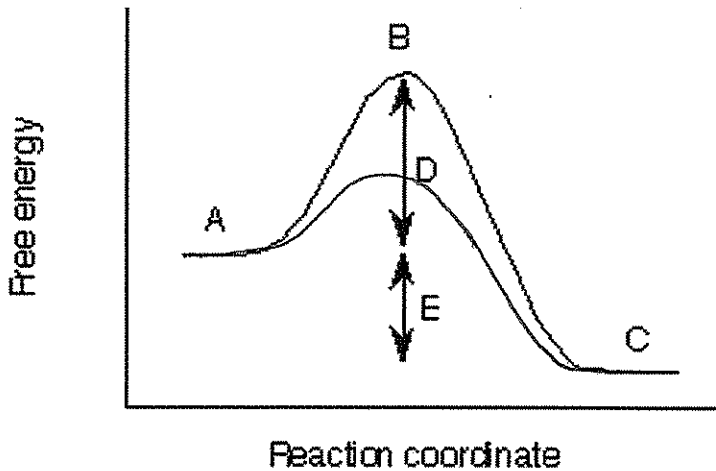1. a. What types of molecule is shown at right? How do you know?

CH_2OH CH_2OH CH_2OH CH_2OH

glycosidic bond

OH   OH   OH   OH

OH   OH   OH   OH
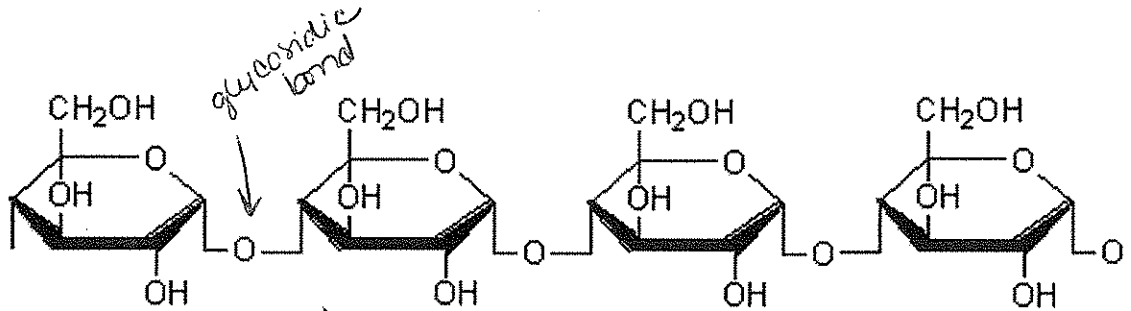
*Polysaccharides (chain of sugars)

Characterized by glycosidic linkages

b. Would this molecule be soluble in water? Why or why not?

Yes - its many hydroxide (-OH) groups make it polar and allow it to form H-bonds readily w/ H_2O

2.

Reaction coordinate

a. Which letter represents the activation energy (E_A)? D
b. Which letter represents the "free energy" from this reaction? E
c. Is this reaction endergonic or exergonic? Explain in detail how you know.
   Exergonic → energy is released (A > C)

d. This represents a reaction NOT catalyzed by an Enzyme. Draw in a line that shows what energy profile of the reaction would be if it was catalyzed by an enzyme.
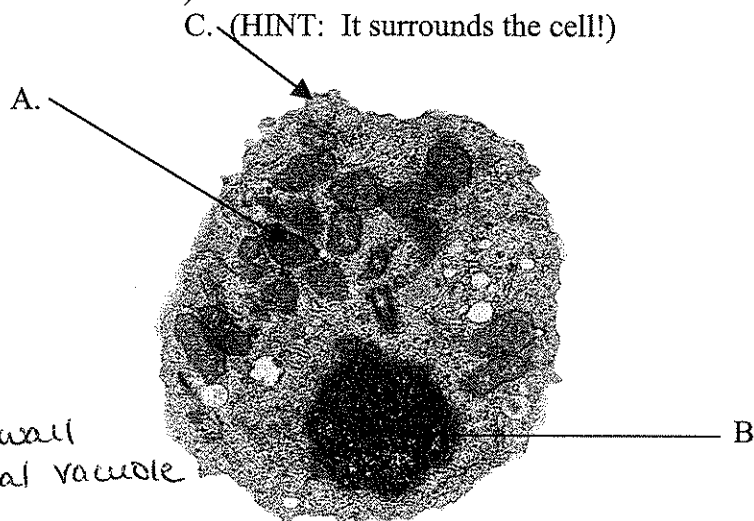   * Lower activation energy (E_A)

AP Biology   Name:

Interpretation of Images, Data/Graphs Assignment: Cells

Study the diagrams, graphs, data sets, etc… that are shown below and then answer the questions that follow
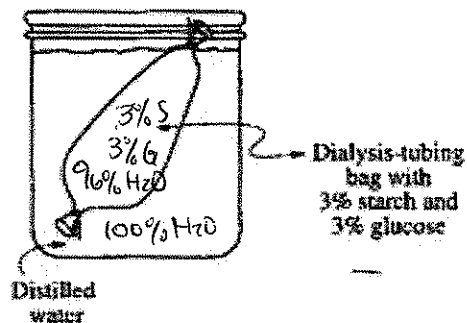(with detail when necessary AND IN COMPLETE SENTENCES!!).

C. (HINT: It surrounds the cell!)

1. a. What are the structures labeled…
   A. Mitochondria?
   B. Nucleus
   C. Cell membrane.

   A.

   b. Is this cell an animal cell or a plant cell? How
      do you know? Animal cell - no cell wall
                    no central vacuole

   B

2.

   3% S
   3% G
   96% H₂O
   100% H₂O

   Dialysis-tubing
   bag with
   3% starch and
   3% glucose

   Distilled
   water

   The picture at left shows an experiment in which a dialysis-tubing
   Bag was filled with a mixture of 3% starch and 3% glucose and
   Placed in a beaker of distilled water. The experimental set up was
   Left (covered) on the lab table for 24 hours.

   a. What are the expected results? Explain where you expect to
      find each of the molecules involved (water, starch, glucose,
      etc…) and what the concentration in each of the locations will
      be. —Sugar will move out of the bag (1.5% in/out)

      —Starch will remain in the bag (too large
        to pass through tubing (3% in ; 0% out)
      —H₂O will move into bag (98% H₂O in/out)

   b. If IKI (Lugol's Solution) was added to the distilled water in the beaker, explain what color changes you
      would expect and where they would happen.
                    IKI is yellow and turns bluish-black in presence of starch

          — Inside bag ⇒ contains starch
                       + solution will turn blue-black as IKI diffuses
                         into the bag

          — Outside bag ⇒ no starch
                        + solution stays yellow

3. a. What process is being shown in
      This picture?

   Mitosis

   b. What type of organism are these
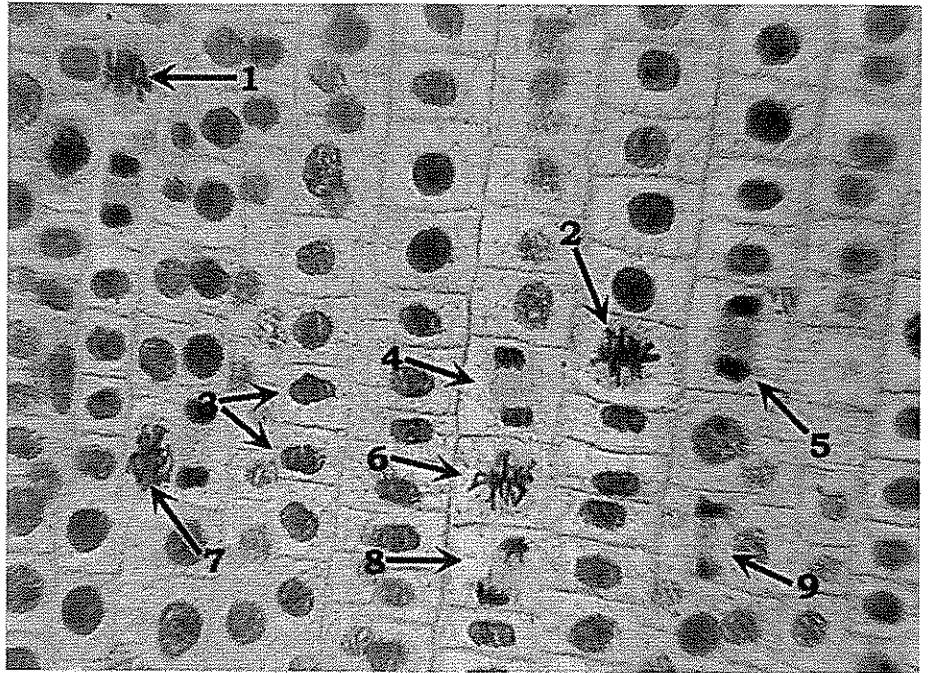   cells from? How do you know?

   Plant cells - square
                 cell wall

   c. What part of the organism is this
      sample from? Why is this a
      good location to view this process?

   - meristemic zone / root

   - plant grows here, so lots
     of cell division

   d. What stage (phase) is
      represented by the cells
      numbered 1, 2, & 6? How do you know?

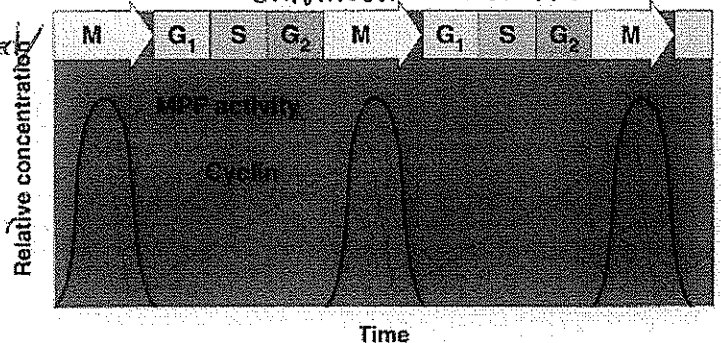   Metaphase - chromosomes lined up along center of cell

   f. In what stage (phase) are most of the cells is this picture? How do you know? What does this indicate
      about what is happening during this stage (phase)? Interphase - nucleus/nucleoli present
                                                                    - chromosomes not visible

   - Cell is growing/performing
     regular functions (DNA must be uncoiled/
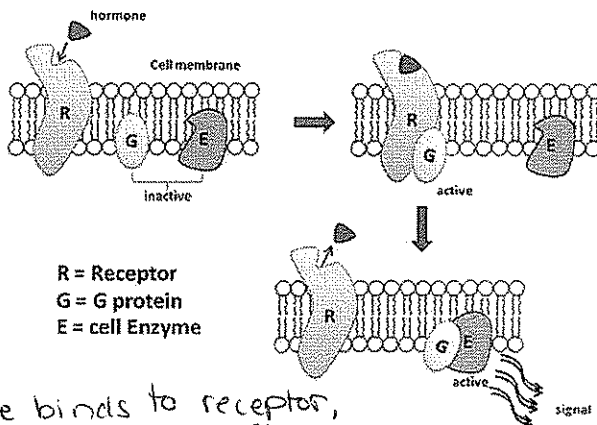   accessible-in chromatin form)

4. What is the relationship between
   cyclin, MPF, and mitosis/cytokinesis
   as shown In the diagram at right?

   MPF = maturation (M-phase) promoting factor
        + CdK-Cyclin Complex

   ↑cyclin = ↑MPF = ↑mitosis

5.

   R = Receptor
   G = G protein
   E = cell Enzyme

   ① Hormone binds to receptor,
      causing it to change shape
   ② Receptor then binds the inactive G protein,
      activating it (GDP → GTP)
   ③ Activated G protein dissociates from receptor and binds to enzyme, activating it.

   a. Is the hormone in this picture fat soluble?
      How do you know? No - cannot
      pass through lipid bilayer of
      plasma membrane

   b. Explain what is happening in this
      picture? Give an example of a disease or
      physiological response that uses this
      pathway. G-protein coupled receptor

   (ex) epinephrine binding stimulates
        glycogen breakdown

AP Biology   Name:

Interpretation of Images, Data/Graphs Assignment: Cellular Energetics

Study the diagrams, graphs, data sets, etc… that are shown below and then answer the questions that follow
(with detail when necessary AND IN COMPLETE SENTENCES!!).

1.
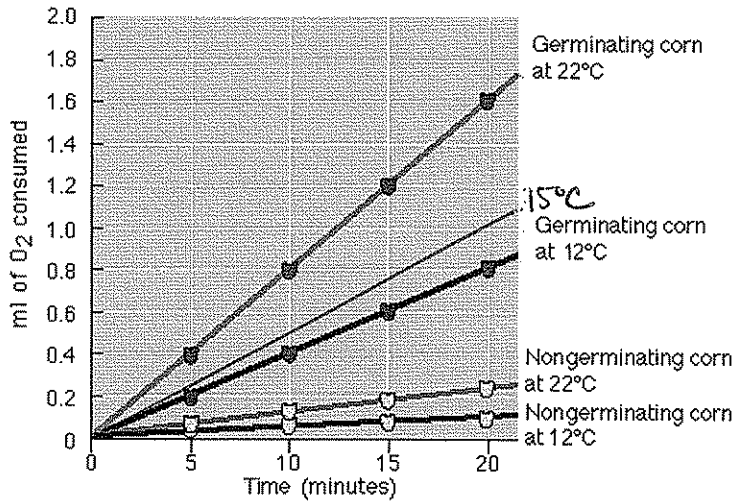
a. What is the relationship between
   germination and cellular respiration?
   Explain WHY!

   ↑cellular respiration = ↑germination

   it takes energy (ATP) to grow!

b. What is the relationship between
   temperature and cellular respiration?
   Explain WHY!

   ↑ temp = ↑ germination

   Higher temps increase molecular
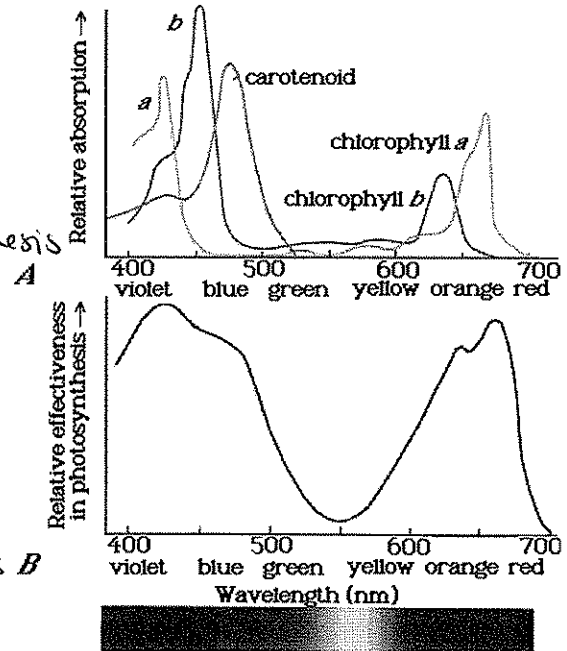   collisions, thereby increasing rate of
   rxns,
c. Draw in a line that would represent   including
   Germinating corn at 15°C.   those of
                                            cell respiration

2. a. What color and wavelength of light is
      reflected (NOT absorbed)? How do you
      know?

      Green

         * Low absorption

         * Low effectiveness in photosynthesis

   b. What wavelength(s) increase the rate of
      photosynthsis to increase? What
      pigment does this correspond to? How
      do you know?

         ~430nm and 660nm

      *chlorophyll a →has high relative
         absorption at those wavelengths B

   c. What color would carotenoid pigments appear to
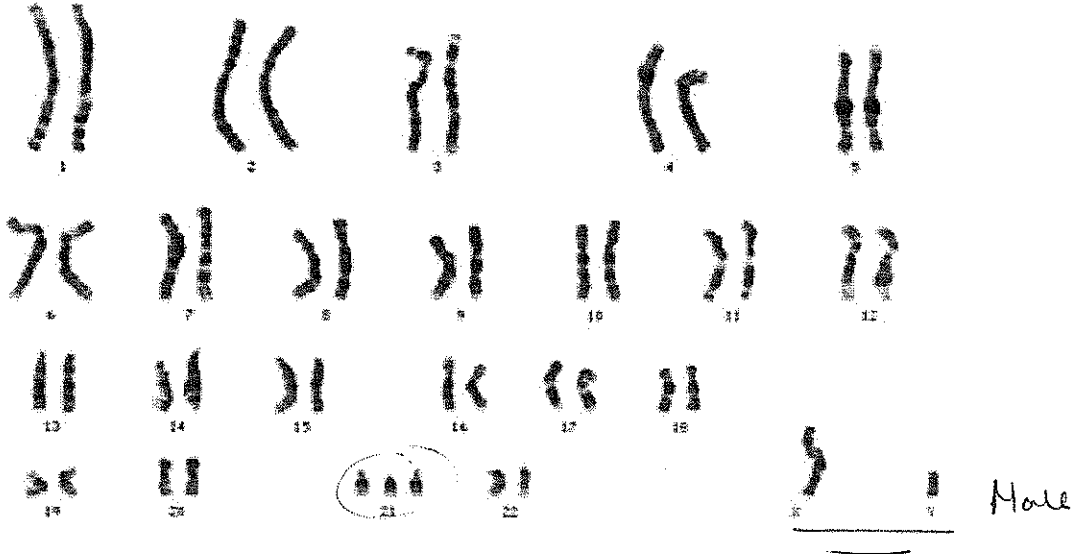   YOUR eye? How do you know?

         Red/Yellow/Orange → low absorption

            we see what is reflected!

AP Biology   Name:

Interpretation of Images, Data/Graphs Assignment: Heredity

Study the diagrams, graphs, data sets, etc… that are shown below and then answer the questions that follow
(with detail when necessary AND IN COMPLETE SENTENCES!!).

1.

a. Is this karyotype showing a male or a female? Explain how you know?

   Male - XY

b. Is this person "normal" or do they have a disorder? If so, which one? Explain how you know.

   Trisomy 21 - Down's syndrome ; 3 chromosome 21's instead of 2

c. What type of mutation would lead to this type of karyotype? Nondisjunction
   a. How could this mutation affect 100% of the gametes? How could it affect 50% of the gametes?

- 100% affected if one of the gametes (egg or sperm) have trisomy 21

- 50% affected if the mutation occurs during development (during 1st cell division
  of zygote); all cells descended from the cell w/ trisomy 21 would also have
  trisomy 21
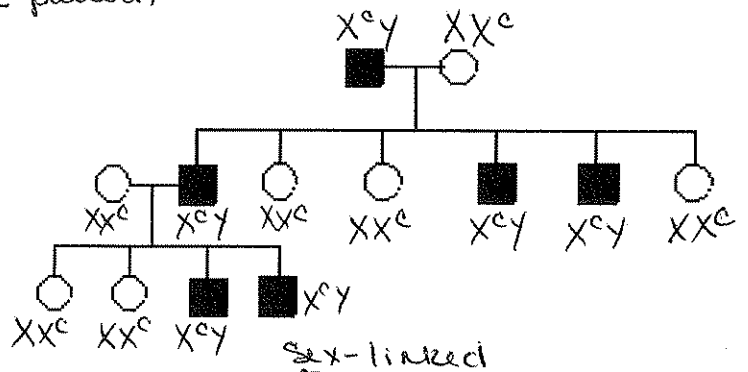2. a. What type of inheritance is shown in each pedigree below? Explain how you know! (mosaicism)
   a. What do the two pedigrees have in common?
   Both show recessive pattern
   of inheritance
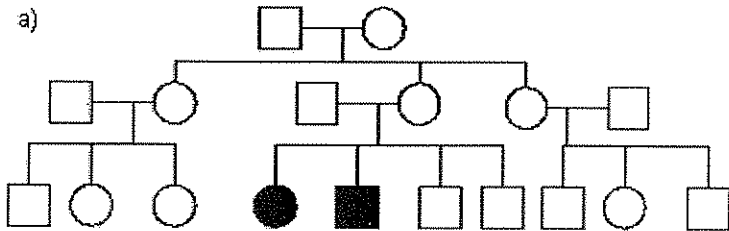
Autosomal recessive

* two unaffected individuals can
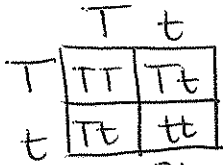have affected offspring *

Sex-linked

*primarily affects males (in this
case - exclusively)

3. A space probe discovers a planet inhabited by creatures that reproduce with the same hereditary patterns seen in humans. Three of the phenotypic characteristics of these creatures are: height, antennae, and nose morphology. Earth scientists were able to do some controlled breeding experiments with these organisms. 100 males and 100 females were used in the experiments and the results of a number of crosses are shown below. Review this information and use it answer the questions that follow.

Cross I: True-breeding tall creatures [TT] were crossed with true breeding short creatures [tt]. ALL of the F1 were tall [Tt]. The F1 creatures were crossed and the following data was obtained.

handwritten: T = tall
t = short
5200 : 2800 ≈ 2 : 1

Punnett square:
	T	t
T	TT	Tt
t	Tt	tt

3 tall : 1 short

F2 Phenotype	Male	Female
Tall	2575	2625
Short	1425	1375

Cross II: True breeding creatures WITH antennae [AA] are crossed with true-breeding creatures WITHOUT antennae [aa]. ALL of the F1 had antennae [Aa]. The F1 creatures were crossed and the following data was obtained. 3 : 1
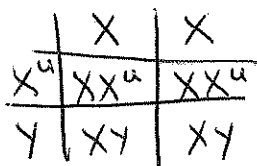
handwritten: 6225 : 1775 ≈ 3.5 : 1

F2 Phenotype	Male	Female
WITH antennae	3125	3100
WITHOUT antennae	875	900

Cross III: Creatures that are true breeding for upturned snout [XX & XY] are crossed with creatures with down turned snouts [X^uY & X^uX^u]. ALL of the F1 offspring had upturned snouts. The F1 creatures were crossed and the following data was obtained. [Uu]

handwritten: X = normal (upturned)
X^u = downturned

F1 Punnett square:
	X	X
X^u	XX^u	XX^u
Y	XY	XY

F2 Punnett square:
	X	X^u
X	XX	XX^u
Y	XY	X^uY

| F2 Phenotype	Male	Female
Upturned Snout	1750	3475
Down Turned Snout	1750	0

Cross IV: True breeding tall, with antennae creatures [TTAA] were crossed with true breeding short, without antennae [ttaa] creatures. ALL of the F1 offspring were tall, with antennae. These F1 offspring were crossed with true breeding short, without antennae creatures. The F2 data is in the table below.

handwritten: F_1 = TtAa
TtAa × ttaa

Punnett square:
	TA	Ta	tA	ta
ta	TtAa	Ttaa	ttAa	ttaa
ta				
ta				
ta				

handwritten left margin: Expected Phenotypic Ratio: 1 : 1 : 1 : 1
*Should have equal #s of each phenotype

F2 Phenotype	Male	Female
Tall, WITH antennae *wild type*	2360	2220
Tall, WITHOUT antennae *recombinant*	220	300
Short, WITH antennae *recombinant*	260	220
Short, WITHOUT antennae *wild type*	2240	2180

handwritten: total recombinants = 1000 ; 10,000 total
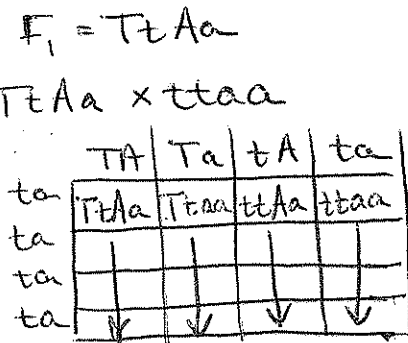
a. What conclusions can be drawn from cross I and cross II? Explain how the data supports your conclusions. *handwritten:* - Height and antennae are inherited in a Mendelian pattern of inheritance (simple dominant/recessive)
- F2 data (and F1) hold true to expected phenotypic ratios (3:1 for F2; 100% F1)

b. What conclusions can be drawn from cross III? Explain how the data supports your conclusions.

handwritten: * Nose morphology is sex-linked (on X chromosome), w/ down-turned snout being the recessive trait. See Punnett Squares above

c. What conclusions can be drawn from cross IV? Explain how the data supports your conclusions.
   a. Draw a picture of what this chromosome might look like with the genes "mapped." (SHOW your calculations!!!)

handwritten: 10 map units
- the genes for height and antennae are linked (on same chromosome)
- recombination frequency = # recombinants/total offspring = 1000/10,000 = 0.1 = 10%
1 map unit = 1% recombination frequency
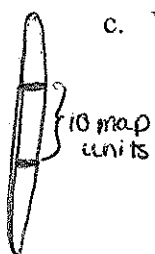
Interpretation of Images, Data/Graphs Assignment: Molecular Genetics & Biotech

Study the diagrams, graphs, data sets, etc... that are shown below and then answer the questions that follow (with detail when necessary AND IN COMPLETE SENTENCES!!).

1. Compare the two DNA sequences shown below. Transcribe them into mRNA and translate them into an amino acid sequence.

   a. GTG CAC CTC ACT CCA |GAG| GAG (Normal Hemoglobin)
   mRNA→ CAC GUG GAG UGA GGu |CUC| CuC
   amino acids→ His   Val Glu Stop Gly Leu   Leu

   b. GTG CAC CTC ACT CCA |GTG| GAG (Sickle Cell Hemoglobin)
   mRNA→ CAC GUG GAG UGA GGu |CAC| CuC
   amino acids→ His   Val Glu Stop Gly His Leu

   a. Circle any differences there are in the DNA, RNA and amino acid sequences that might exist between these two sequences.
   b. Identify the type of mutation that is represented AND EXPLAIN, IN DETAIL, what effect this would have on the protein/pigment (be sure to mention the types of functional groups on the amino acids and how this would affect shape of the molecule).

        Point mutation – causes glutamic acid (hydrophilic) to be replaced w/
              valine (hydrophobic) in the 6th position of hemoglobin's
            β-globin chain
              —this causes aggregation of hemoglobin, distorting RBCs into sickle

2. You can diagnose Sickle Cell Anemia prenatally by running a DNA gel. For prenatal diagnosis you   shape
   need to know that there is a restriction enzyme (ER) which normally recognizes and cleaves the gene at the 6th codon, among other sites, producing a DNA fragment of 1.1 Kb. The mutation responsible for the disease eliminates this site at codon 6. Because the next site is farther on the gene, the fragment will be of 1.3 Kb. Then, by electrophoresis of the DNA, it is possible to discriminate the normal homozygotes (NN), the heterozygotes (NS) and the affected homozygotes (SS). See the figure below:

   1.3kb = sickle cell anemia
   1.1 KB = no sickle cell anemia

Using the figure at right and the information above "diagnose" the patients in the gel shown below.
   A   B   C   D   E   F
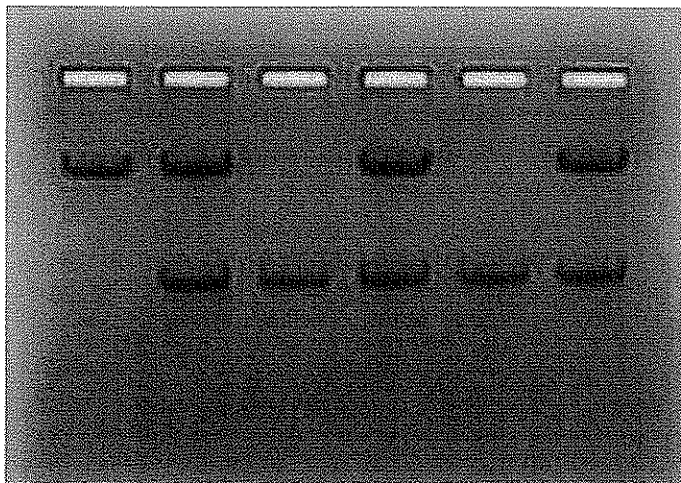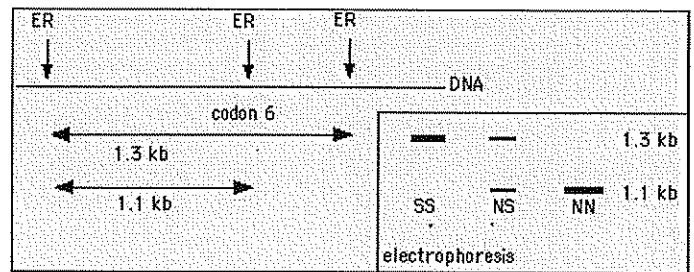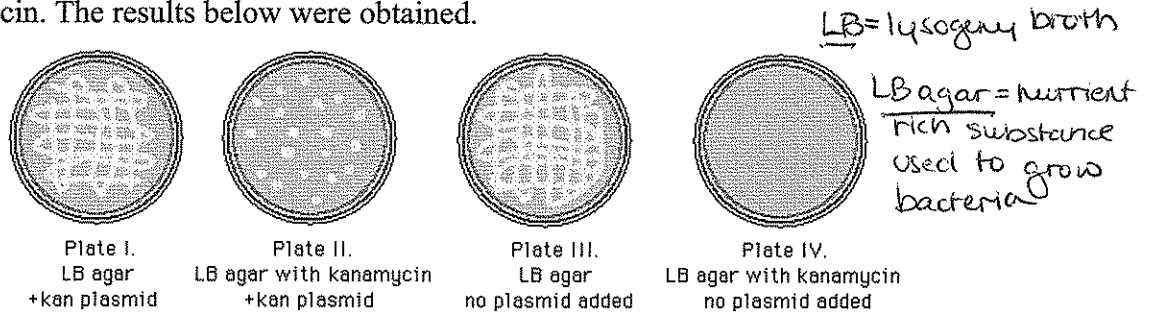

A = SS
B = NS
C = NN
D = NS
E = NN
F = NS

3. The restriction enzyme EcoRI cleaves double-stranded DNA at the sequence 5'-GAATTC-3' and therestriction enzyme HindIII cleaves at 5'-AAGCTT-3'. A 20 kb circular plasmid is digested with each enzyme individually and then in combination, and the resulting fragment sizes are determined by means of electrophoresis. The results are as follows:

EcoRI alone	fragments of 6 kb and 14 kb
HindIII alone	fragments of 7 kb and 13 kb
EcoRI and HindIII	fragments of 2kb, 4kb, 5 kb and 9kb

Make a diagram of the circular molecule and indicate the relative positions of the EcoRI and HindIII restriction sites. (Hint: place one EcoRI site at '12 o'clock' and position the remainder relative to this site.)
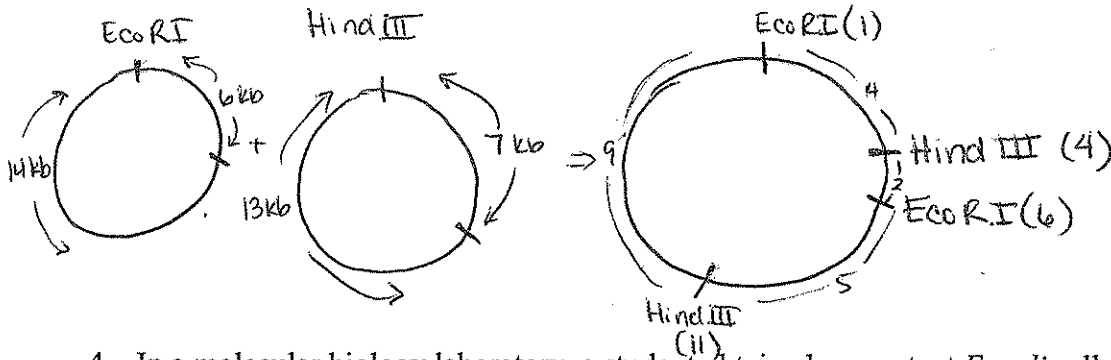
4. In a molecular biology laboratory, a student obtained competent *E. coli* cells and used a common transformation procedure to induce the uptake of plasmid DNA with a gene for resistance to the antibiotic kanamycin. The results below were obtained.

LB= lysogeny broth

LB agar = nutrient rich substance used to grow bacteria

Plate I.	Plate II.	Plate III.	Plate IV.
LB agar	LB agar with kanamycin	LB agar	LB agar with kanamycin
+kan plasmid	+kan plasmid	no plasmid added	no plasmid added

a. What is the purpose of Plate IV? Used as control to show that nontransformed E coli will not grow

b. Explain the growth you see and the type of bacteria (transformed vs. non-transformed or both) in presence of kanamycin that would be on Plate 1. Both transformed and nontransformed

* Bacteria grows evenly wherever it is smeared *   * Some may have taken up plasmid, while some may not have; there is no kanamycin present to kill those that did not.

c. Explain the growth you see and the type of bacteria (transformed vs. non-transformed or both) that would be on Plate II. Only bacteria that has taken up plasmid (transformed) can survive on a plate containing kanamycin.

* The areas of white represent colonies of bacteria that have been transformed

5. A student has forgotten which antibiotic plasmid she used in her E. coli transformation. It could have and thus been kanamycin, ampicillin, or tetracycline. She decides to make up a special set of plates to determine survive the type of antibiotic used. The plates below show the results of the test. Which antibiotic plasmid has been used?

Kanamycin   Tetracycline

Ampicillin   LB agar
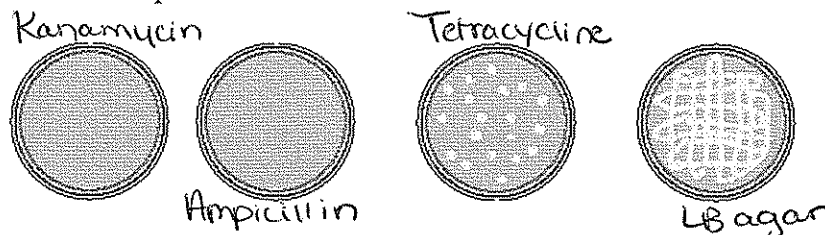
* Tetracycline - only plate (other than control) where bacteria grow

AP Biology   Name:

Interpretation of Images, Data/Graphs Assignment: Evolutionary Biology

Study the diagrams, graphs, data sets, etc… that are shown below and then answer the questions that follow (with detail when necessary AND IN COMPLETE SENTENCES!!).

1. You sample 1,000 individuals from a large population for the MN blood group, which can easily be measured since co-dominance is involved (i.e., you can detect the heterozygotes). They are typed accordingly:

*MN blood group codes for "M" and "N" antigens on RBCs, just like ABO blood group refers to "A" and "B" antigens

BLOOD TYPE	GENOTYPE	NUMBER OF INDIVIDUALS	RESULTING FREQUENCY
M	MM p^2	490	490/1000 = 0.49 = 49%
MN	MN $2pq$	420	420/1000 = 0.42 = 42%
N	NN q^2	90	90/1000 = 0.09 = 9%

*MN blood group usually ignored b/c they do not illustrate strong immunological rxns like ABO does

Using the data provide above, calculate the following:

a. Label each of the genotype with the appropriate variable (p2, 2pq, q2)
b. Determine the "resulting frequency" of each genotype in the population. SHOW YOUR WORK!!

$p^2 = 0.49$ $q = 0.3$ $(p+q=1)$ $2pq = 2(0.7)(0.3) = 0.42$
$p = 0.7$ $q^2 = 0.09$

c. Determine the frequency of each allele in the population. SHOW YOUR WORK!! (see above)

p = frequency of "M" allele = 0.7 = 70%

q = frequency of "N" allele = 0.3 = 30%

2. Phylogeny is the evolutionary history of a species. AP Bio 2009 Free Response; Question 3
   a. Based on the data in the table below, draw a phylogenetic tree that reflects the evolutionary relationships of the organisms based on the differences in their cytochrome c amino-acid sequences.
   b. Explain the relationships of the organisms.
   c. Based on the data, identify which organism is most closely related to the chicken and explain your choice. Penguin — has fewest differences from chicken (less differences = more closely related)

THE NUMBER OF AMINO ACID DIFFERENCES IN CYTOCHROME c AMONG VARIOUS ORGANISMS

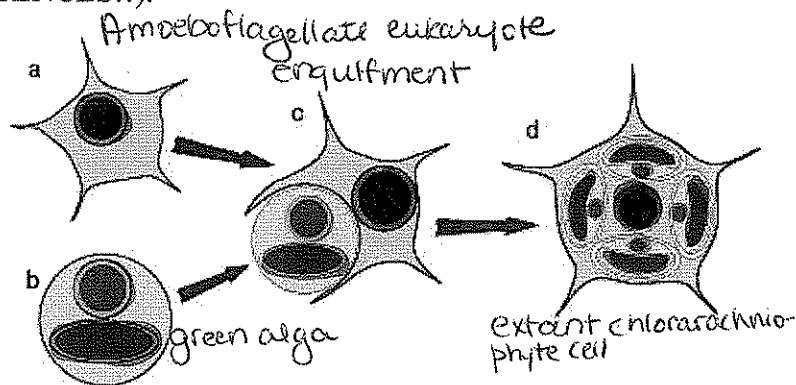|	Horse	Donkey	Chicken	Penguin	Snake
Horse	0	1	11	13	21
Donkey		0	10	12	20
Chicken			0	3	18
Penguin				0	17
Snake					0
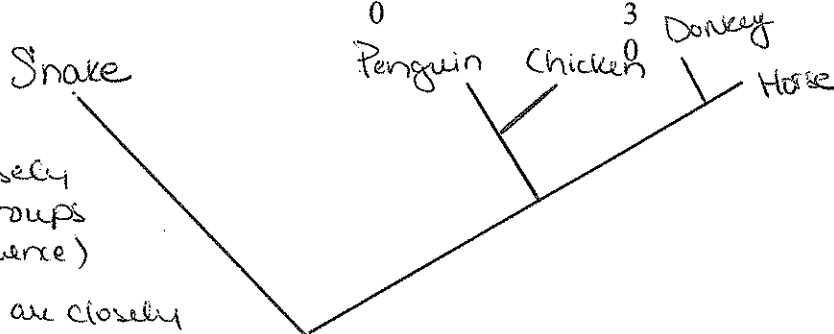
B) Snake is least closely related to other groups (most diff't AA sequence)

- Penguins / Chickens are closely related (Birds)

- Donkey / Horse closely related (mammals)

AP Biology   Name:

Interpretation of Images, Data/Graphs Assignment: Diversity of Life

Study the diagrams, graphs, data sets, etc... that are shown below and then answer the questions that follow (with detail when necessary AND IN COMPLETE SENTENCES!!).

1. The picture at right shows what theoretical process?
   endosymbiosis

2. Is this primary or secondary?
   Secondary

3. Which organisms (a, b, c, or d) are eukaryotic? How do you know?
   A, C, D - contain nucleus (blue)

4. Which organism (a, b, c, or d) are photosynthestic? How do you know?
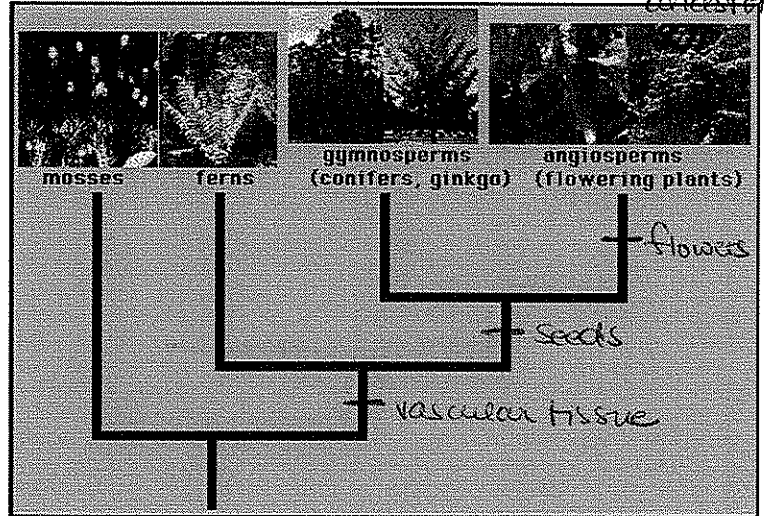   *B, C, D - contain chloroplasts (green)*

Amoeboflagellate eukaryote
engulfment

a   c   d

b   *green alga*   *extant chlorarachnio-phyte cell*

primary ⇒ one organism engulfs another
secondary ⇒ product of primary endo-symbiosis is engulfed by another free-living eukaryote

Synapomorphy = trait shared by 2+ taxa and their *most recent common ancestor but not ancestor's ancestor*

5. Place the "synapomorphies" on the tree at right.
   a. Identify what the Advantage of each of the "synapomorphies" would be...
      i. flowers *help attract organisms that will help disperse pollen*
      ii. seeds *nourishes and protects embryo while allowing for dispersal*
      iii. vascular tissue

   Allows transport of H₂O/nutrients throughout plant

mosses   ferns   gymnosperms (conifers, ginkgo)   angiosperms (flowering plants)

+ flowers
+ seeds
+ vascular tissue

6. Place the "synapomorphies" on the tree at right. (Don't worry about the numbers).

Porifera
radial symmetry Cnidaria
Ctenophora
multicellularity *no body cavity* Platyhelminthes
bilateral symmetry *pseudocoelom* Nematoda
Arthropoda
coelom *segmentation* Annelida
Mollusca
Echinodermata

1 2 3 4 5
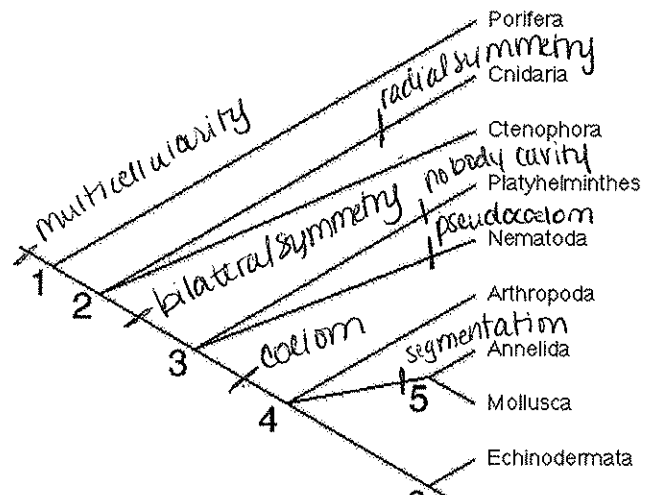
Interpretation of Images, Data/Graphs Assignment: Plant Structure and Function

Study the diagrams, graphs, data sets, etc… that are shown below and then answer the questions that follow (with detail when necessary AND IN COMPLETE SENTENCES!!).

1. This is a cross section through what part of the plant? Stem
2. Is this a monocot or a dicot? How do you know? dicot — vascular bundles arranged in ring
3. What type of tissue is labeled A? epidermis/cortex
4. What is the name of structure B? Vascular bundles

C=ground tissue/pith
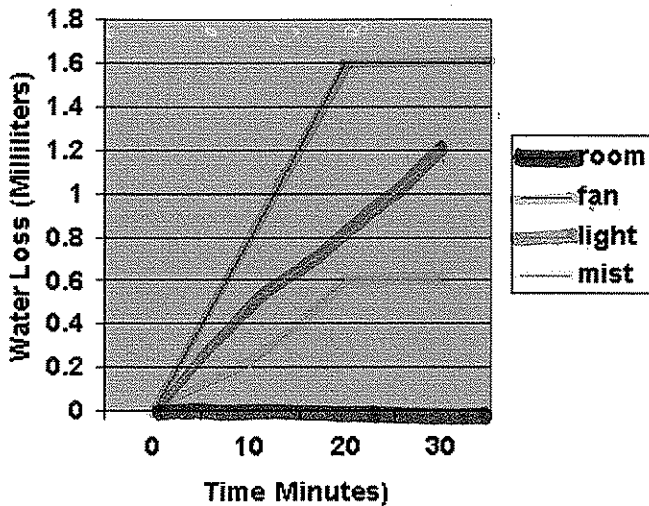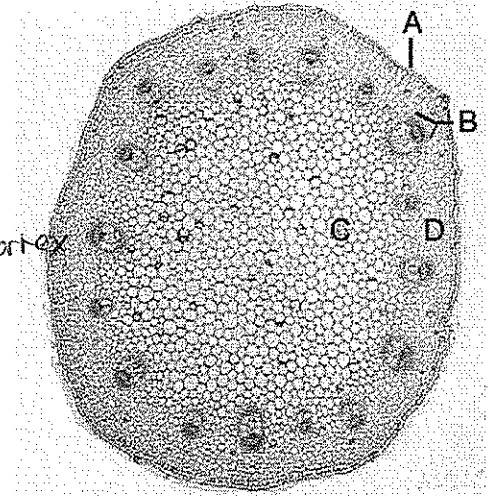
5. The graph at right shows the results of a transpiration experiment. Use this information to answer the following questions.
   a. Why would you expect the fan and light conditions to have a higher rate of water loss than room?

   b. Why would you expect the mist to have a lower rate of water loss than room?

   c. Calculate the Transpiration rate for each condition.
      Use the equation → $\frac{\text{(mL water loss @ 30 min} - \text{mL water loss @ 0 min)}}{\text{(30 min} - \text{0 min)}}$

      SHOW YOUR WORK!!!

Room = 0mL - 0mL/30-0 min = 0/30 = 0mL/min

Fan = 1.6 mL - 0mL/30-0min = 1.6/30 = 0.053 mL/min

Light = 1.2 mL - 0mL/30-0min = 1.2/30 = 0.04 mL/min

Mist = 0.6mL - 0mL/30-0min = 0.6mL/30 = 0.02mL/min

Graph:
Y-axis: Water Loss (Milliliters) — values 0, 0.2, 0.4, 0.6, 0.8, 1, 1.2, 1.4, 1.6, 1.8
X-axis: Time Minutes) — values 0, 10, 20, 30
Legend: room, fan, light, mist

6. What is summarized in the diagram at right?

Angiosperm Life Cycle

a. Label the following in the diagram:
Mature Sporophyte, Ovule,
Anther, Microsporangium,
Megasporangium, Polen
Tube, Egg, Sperm, Synergids,
Polar Nuclei, Micropyle
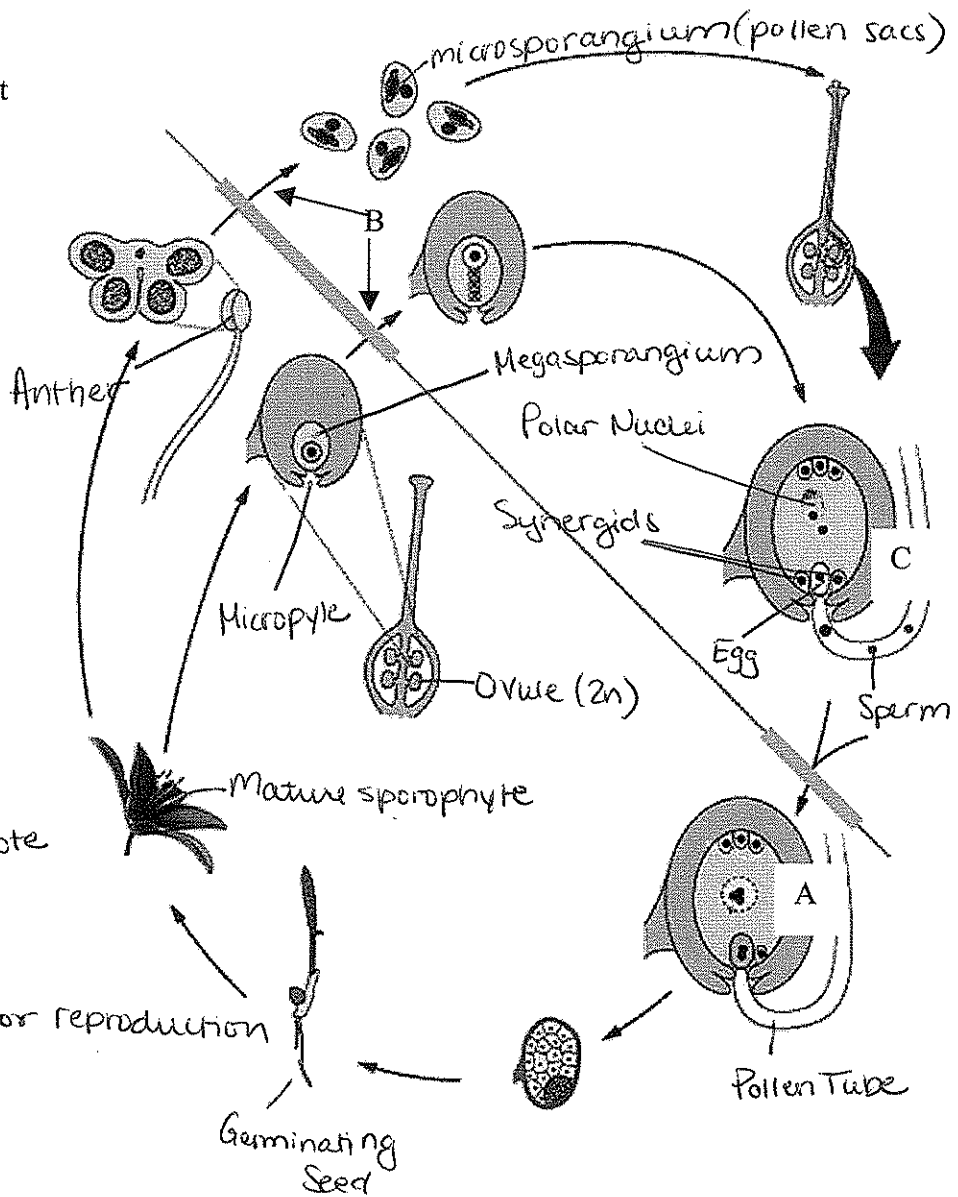
b. What Process is occurring at
the point labeled B?
Meiosis

c. Are the red and black dots at
the point labeled C diploid or
haploid? Why is this important?
**Haploid - Joining of the
2 haploid gametes will
restore diploid # in zygote**

d. What process is taking place at the
point labeled A? Why is this
important?
Fertilization - Allows for reproduction

microsporangium (pollen sacs)

B

Anther

Megasporangium

Polar Nuclei

Synergids

Micropyle

Ovule (2n)

Egg

Sperm

C

Mature sporophyte

A

Pollen Tube

Germinating
Seed

AP Biology   Name:

Interpretation of Images, Data/Graphs Assignment: Animal Structure and Function

Study the diagrams, graphs, data sets, etc… that are shown below and then answer the questions that follow (with detail when necessary AND IN COMPLETE SENTENCES!!).

1. What do the "internal" surfaces of the digestive, Respiratory, and excretory systems have in common?

   - Specialized for exchanging chemicals w/ surroundings
     *finely branched/folded to maximize surface area

2. Using the picture at right of an "idealized" complex animal, identify which systems are related to each other and describe how they are related.

   Respiratory system brings in O_2 necessary for digestion → Digestive system breaks down food into glucose and other necessary molecules → The Circulatory system transports these nutrients throughout the body → Excretory system removes metabolic waste products
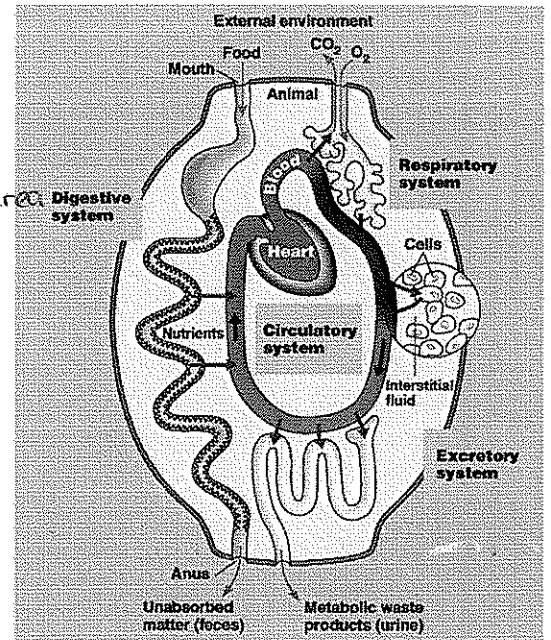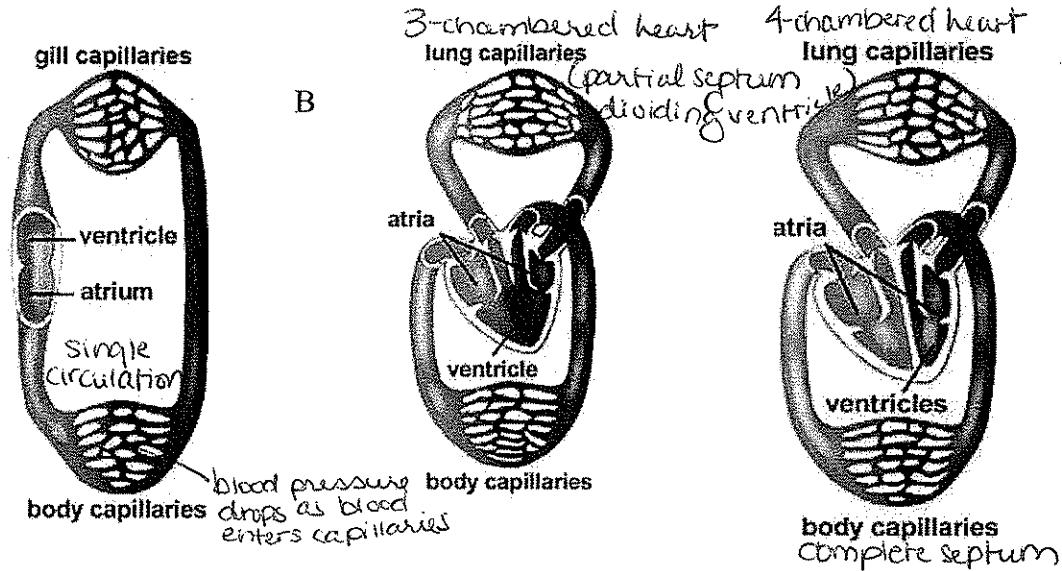
3. a. Which diagram represents YOU? C Which one represents a fish? A

   Single circulation produces much lower blood pressure, meaning the blood cannot supply O_2/glucose as quickly; therefore, they cannot produce energy as efficiently

   b. What advantage do B and C have over A?
   What is the disadvantage of B? O_2-rich and O_2-poor blood mix, making O_2 delivery much less efficient

   A — gill capillaries — ventricle — atrium — single circulation — body capillaries — blood pressure drops as blood enters capillaries
   B — 3-chambered heart lung capillaries (partial septum dividing ventricle) — atria — ventricle — body capillaries
   4-chambered heart lung capillaries — atria — ventricles — body capillaries complete septum

4. In the ECG/EKG at right, what is happening electrically In the heart during the P wave? What is happening Electrically in the heart during the Q, R and T waves?
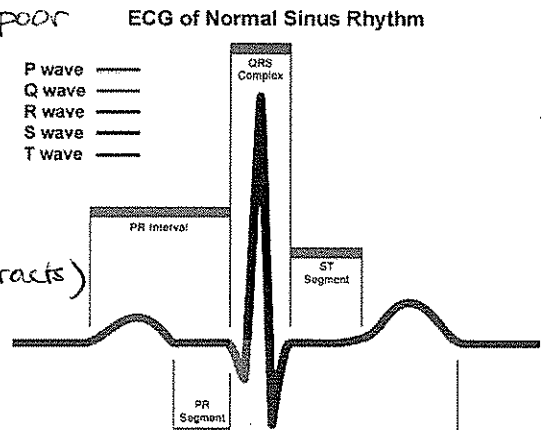
   ECG of Normal Sinus Rhythm
   P wave ——
   Q wave ——
   R wave ——
   S wave ——
   T wave ——

   P wave → SA node depolarization (right atrium contracts)

   QRS → depolarization through ventricles
           AV node → AV bundle → ventricle

   T wave → ventricular repolarization (repolarization of atria occurs during ventricular depolarization and is not seen on ECG b/c of QRS complex

5. Which immune response in shown in the picture below: cell mediated or (humoral) Explain how you know. Antibodies Secreted into body humors (blood)

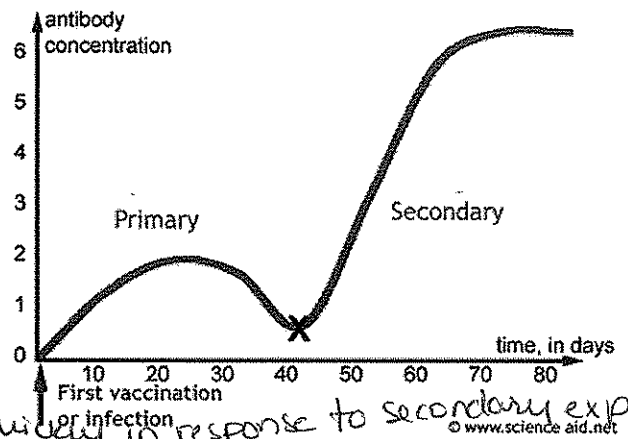a. What are the "Y" shaped molecules called? What is their role in the immune response?

antibodies → bind to antigens on surface of pathogens, marking them for distruction

A
white blood cell
nucleus
helper T cell
pathogen
B
B cell
C
D
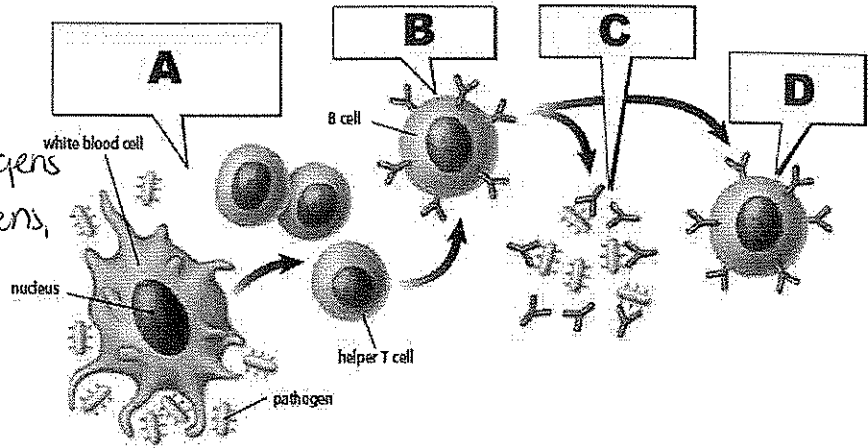
b. How are the "Y" shaped Molecules responsible for Immunological memory? How relate to the diagram at right→→→→→→

Some of the B cells, whose function is the secretion of antibodies, remain at low concentrations following primary exposure to a pathogen. These B cells are called plasma cells and allow antibodies to be generated quickly in response to secondary exposure

antibody concentration
6
5
4
3   Primary   Secondary
2
1
0   10 20 30 40 50 60 70 80   time, in days
First vaccination
or infection
© www.science aid.net
X

6. Fill in the blanks with the correct names of the parts of the nephron.
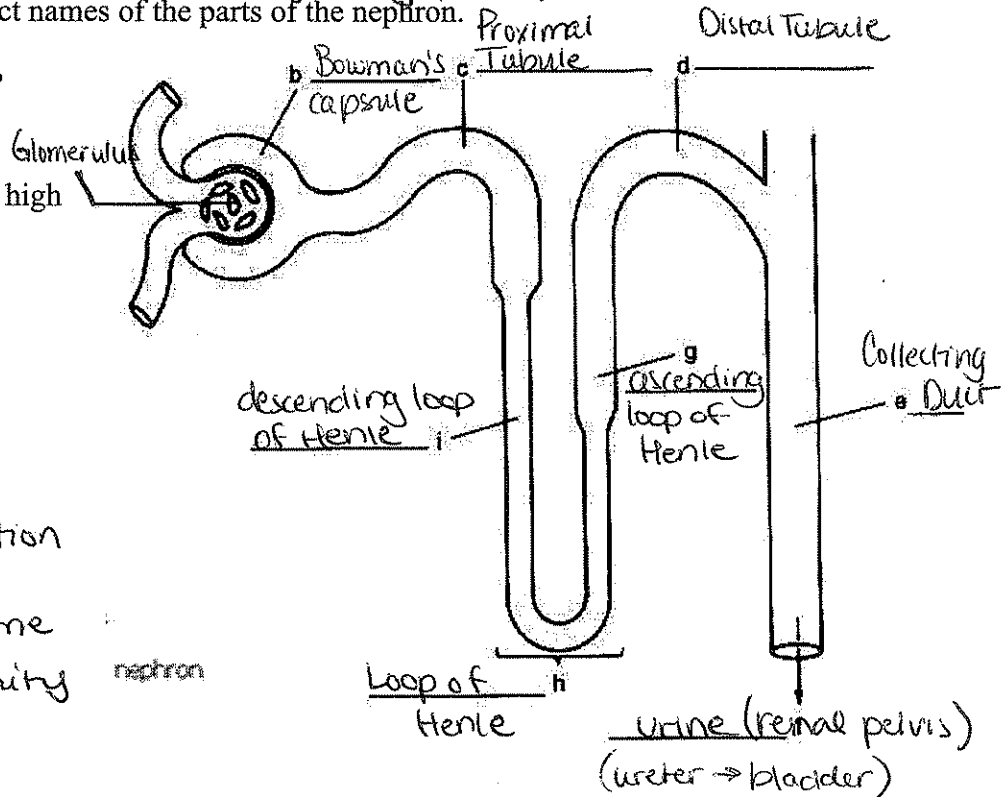
a. Where is glucose and bicarbonate reabsorbed?

Proximal Tubule

b. Where would there be a high concentration of ADH receptors? What would ADH do here?

distal tubules
Collecting ducts

* make epithelium more permeable to H₂O
  - increase H₂O reabsorption
  - concentrates urine
  - reduces urine volume
  - lowers blood osmolarity

Proximal Tubule
Distal Tubule
b Bowman's capsule   c   d
Glomerulus
descending loop of Henle   i
g ascending loop of Henle
Collecting Duct e
Loop of Henle   h
urine (renal pelvis)
(ureter → bladder)
nephron

ADH = antidiuretic hormone (helps retain H₂O in body)

7. Name 3 responses to insulin that would happen at point number 3.

① Liver takes up glucose and stores it as glycogen

② Body cells take up more glucose

③ Blood glucose levels decline

Copyright © Pearson Education, Inc., publishing as Benjamin Cummings.

8. Name 3 responses to glucagons that would happen at point 6.

① Liver breaks down glycogen and releases glucose into blood

② Blood glucose levels rise

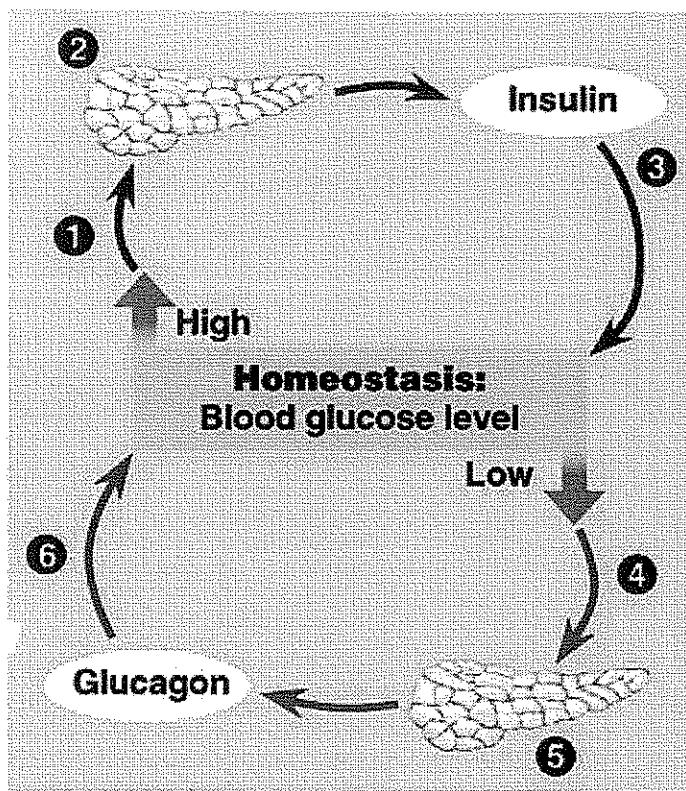③ Liver cells also convert AA's and glycerol to glucose, to be released into bloodstream

9. a. At what point(s) are the NA/K pump working?   All points   (3Na⁺ out, 2 K⁺ in)

b. At what point(s) do the Na gates open? Close?
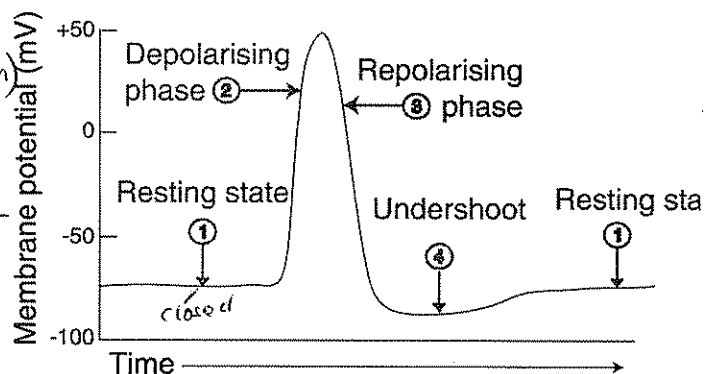Open: (2) Depolarization
Close: (4) undershoot, (3) Repolarization (1) rest

c. At what point(s) do the K gates open? Close?
Open: (3) Repolarization (5) Undershoot
Closed: (1) Rest (2) Depolarization

10. Label the following in the picture below: I band, A band, Z line, H zone, M line, actin filament, myosin filament
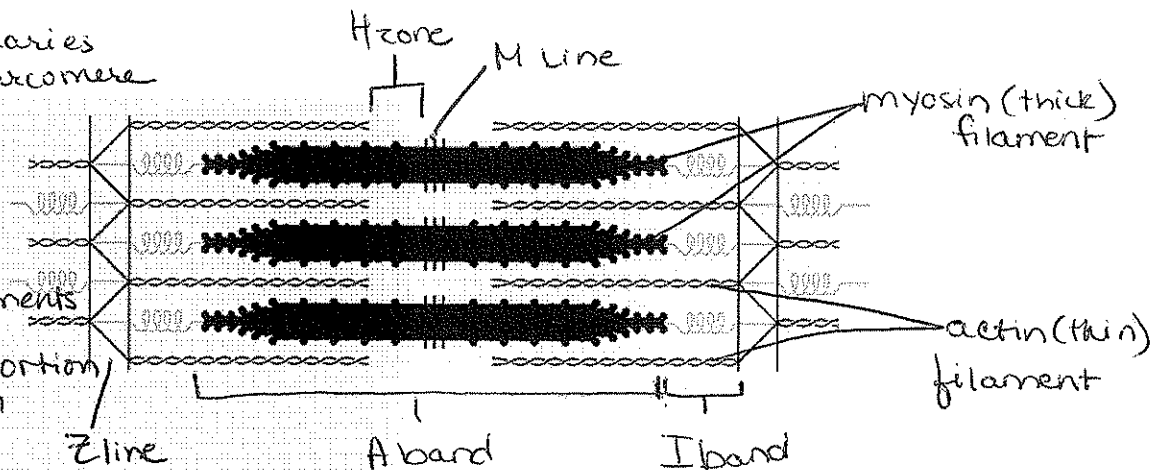
Z line → marks boundaries of a single sarcomere

I band → only thin filaments

A band → thick + thin filaments

H zone → A band portion w/out thin filaments

M line → middle of sarcomere

H zone   M Line

myosin (thick) filament

actin (thin) filament

Z line   A band   I band

①

Copyright © 2001 Benjamin Cummings, an imprint of Addison Wesley Longman, Inc.

AP Biology   Name:

Interpretation of Images, Data/Graphs Assignment: Ecology and Behavioral Biology

Study the diagrams, graphs, data sets, etc… that are shown below and then answer the questions that follow (with detail when necessary AND IN COMPLETE SENTENCES!!).

1. What biome is represented by the climatogram shown at right?
   a. How do you know?

   Arctic Tundra
      * Low Temps (-30°C winter, 10° Summer)
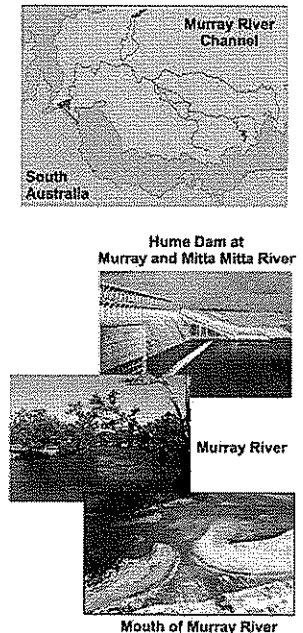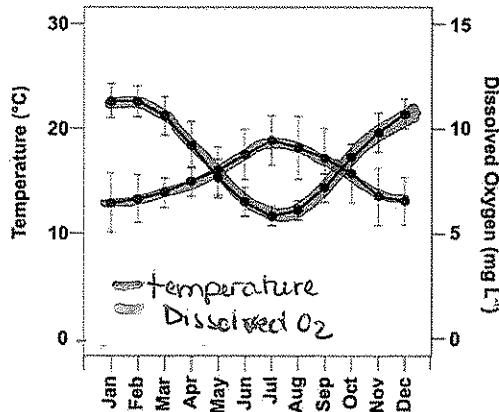   * Low Precipitation (20-60cm annually)

Barrow, Alaska
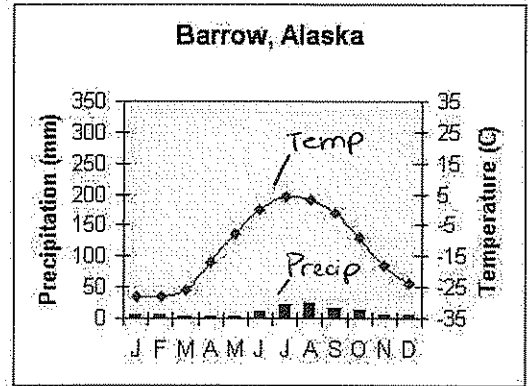
2. The diagram and graph at right shows data obtained from the Murray River in Austrailia.

a. What is the relationship between the temperature of the river and the time of year?

   ↑ air temp = ↓ water temp

      Summer = coolest
      Winter = warmest

b. What is the relationship between the temperature and the dissolved oxygen?

   ↑ Temp = ↓ DO

Murray River Channel

South Australia

Hume Dam at Murray and Mitta Mitta River

Murray River

Mouth of Murray River

3. The graph at right shows penguin dive behavior studied over a 24 hour period.
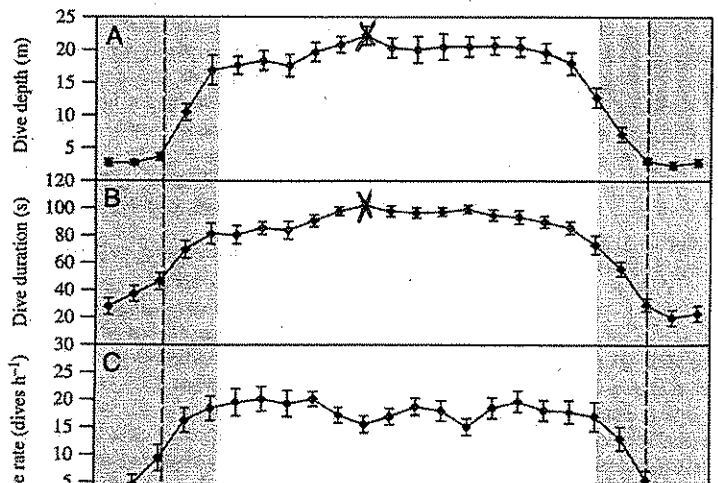   a. At what time of day do the penguins Make their deepest and longest dives?

      Time X - see graph
         (10 AM?)

   b. What relationship does there seem to be between penguin diving behavior and time of day?
      i. Give at least two reasons for this behavior pattern.

      * More dives during the day than at night
         - Better able to see prey/ predators
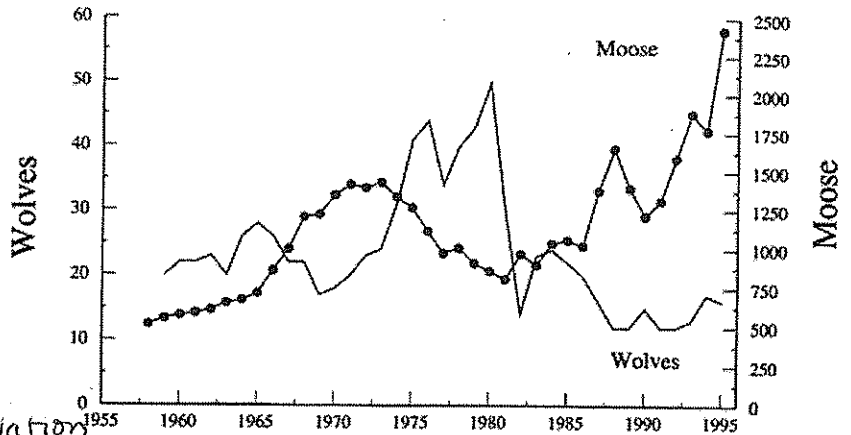   - Higher temps

4. What type of relationship is shown in the graph? Boom-bust cycles

   * inverse *

   a. Explain how the population numbers of the wolves and the moose are related to each other?

Rolf O. Peterson:
Ecological Studies of Wolves in Isle Royale
Annual Report 1994-95

* Rises in moose population is followed by rises in wolf population b/c food (moose) is more abundant for the wolves

* Decreases in moose population are followed soon after by decreases in wolf populations, since food is scarce

5. What relationship is summarized In this graph?

   Runoff rate for different land cover types

   a. Give at least one reason that a forest and/or a grassland would have less runoff than and orchard.

   There is a greater surface area of roots (more trees/plants/grass)
   * this removes H2O from the soil, allowing room for more