AP Bio Unit Reviews

CRAM Session

@apbiopenguins

AP Biology students are penguins because they are Dressed for Success!

You are now an AP Bio Penguin!

Today's Plan

Exam Format

Overview of Units

Practice Questions

Q&A

Exam Format

Section 1: MCQ

Time: 90 minutes
60 Questions
50% of Exam Weight

Section 2: FRQ

Time: 90 minutes
6 Qs (2 long & 4 short)
50% of Exam Weight

Based on the 2020 Practice Exam Scoring Guidelines

You need approximately 54 of the available 120 points for a 3 on the exam

Topic Breakdown

Units	Exam Weighting	#Qs
Unit 1: Chemistry of Life	8 – 11% (5 – 7)	5.7
Unit 2: Cell Structure and Function	10 – 13% (6 – 8)	6.7
Unit 3: Cellular Energetics	12 – 18% (7 – 10)	9.3
Unit 4: Cell Communication and Cell Cycle	10 – 15% (6 – 9)	6.7

Topic Breakdown

Units	Exam Weighting	#Qs
Unit 5: Heredity	8 - 11% (5 - 7)	6
Unit 6: Gene Expression and Regulation	12 - 16% (7 - 10)	8
Unit 7: Natural Selection	13 - 20% (8 - 12)	9.3
Unit 8: Ecology	10 - 15% (6 - 9)	8.3

Section 1: MCQs

Independent Qs

small prompt/one graphic
ONE question

Set Qs

long prompt/multiple graphics
3-5 questions

Based on the 2020 Practice Exam

31 - 38 Independent Questions
22 - 29 Set Questions

Section 1: MCQs

Independent Qs

Insulin is a protein hormone that is secreted in response to elevated blood glucose levels. When insulin binds to its receptors on liver cells, the activated receptors stimulate phosphorylation cascades that cause the translocation of glucose transporters to the plasma membrane.

Based on the information provided, which of the following best describes the role of insulin in this liver cell signal transduction pathway?

(A) It acts as a ligand.

(B) It acts as a receptor.

(C) It acts as a secondary messenger.

(D) It acts as a protein kinase.

Section 1: MCQs

Set Qs

40. Plates that have only ampicillin-resistant bacteria growing include which of the following?

(A) I only
(B) III only
(C) IV only
(D) I and II

41. Which of the following best explains why there is no growth on plate II?

(A) The initial *E. coli* culture was not ampicillin-resistant.
(B) The transformation procedure killed the bacteria.
(C) Nutrient agar inhibits *E. coli* growth.
(D) The bacteria on the plate were transformed.

42. Plates I and III were included in the experimental design in order to

(A) demonstrate that the *E. coli* cultures were viable
(B) demonstrate that the plasmid can lose its *amp*^{r} gene
(C) demonstrate that the plasmid is needed for *E. coli* growth
(D) prepare the *E. coli* for transformation

43. Which of the following statements best explains why there are fewer colonies on plate IV than on plate III?

(A) Plate IV is the positive control.
(B) Not all *E. coli* cells are successfully transformed.
(C) The bacteria on plate III did not mutate.
(D) The plasmid inhibits *E. coli* growth.

44. In a second experiment, the plasmid contained the gene for human insulin as well as the *amp*^{r} gene. Which of the following plates would have the highest percentage of bacteria that are expected to produce insulin?

(A) I only
(B) III only
(C) IV only
(D) I and III

Section 1: Strategies for MCQs

Timing

1.5 minutes per Q

Every 10 Qs check clock for 15 minutes elapsed

Annotate your Qs

- Underline important words as you read the question
- Make quick reference notes from prompts and figures
- Write on the graphs and show your work

Trust Yourself

Cover up the answer choices and develop your own answer then check if its an option

Use your Resources

Use the figures or diagrams to help you answer the questions

Section 2: FRQs

Long FRQs
(8 – 10 pts)

Q1: Interpreting and Evaluating Experimental Results

Q2: Interpreting and Evaluating Experimental Results with Graphing

Short FRQs
(4 pts each)

Q3: Scientific Investigation

Q4: Conceptual Analysis

Q5: Analyze Model or Visual Representation

Q6: Analyze Data

Q2 = Graphing

Q5 = Modification of Diagram

Section 2: FRQs

AP Biology CED pg. 206

Calculate: Perform mathematical steps to arrive at a final answer, including algebraic expressions, properly substituted numbers, and correct labeling of units and significant figures.

Construct/Draw: Create a diagram, graph, representation, or model that illustrates or explains relationships or phenomena. Labels may or may not be required.

Describe: Provide relevant characteristics of a specified topic.

Determine: Decide or conclude after reasoning, observation, or applying mathematical routines (calculations).

Evaluate: Judge or determine the significance or importance of information or the quality or accuracy of a claim.

Explain: Provide information about how or why a relationship, process, pattern, position, situation, or outcome occurs, using evidence and/or reasoning to support or qualfiy a claim. Explain "how" typically requires analyzing the relationship, process, pattern, position, situation, or outcome; whereas explain "why" typically requires analysis of motivations or reasons for the relationship, process, pattern, position, situation, or outcome.

Identify: Indicate or provide information about a specified topic, without elaboration or explanation.

Justify: Provide evidence to support, qualify, or defend a claim, and/or provide reasoning to explain how that evidence supports or qualifies the claim.

Make a claim: Make an assertion that is based on evidence or knowledge.

Predict/Make a prediction: Predict the causes or effects of a change in, or disruption to, one or more components in a relationship, pattern, process, or system.

Represent: Use appropriate graphs, symbols, words, illustrations, and/or tables of numerical values to describe biological concepts, characteristics, and/or relationships.

State (the null/alternative hypothesis): Indicate or provide a hypothesis to support or defend a claim about a scientifically testable question.

Support a claim: Provide reasoning to explain how evidence supports or qualifies a claim.

Section 2: Strategies for FRQs

Timing

5 min: Read ALL Qs/quick notes

20 min/long FRQ

8 min/short FRQ

10 min: Read over responses/add extra information

Format

Read the question, Read the question,

Read the ...

Label your responses (a), (b), (c) & (d)

Write in knowledge order

Logistics

Beware of contradictions

Use the diagrams

Define your terms

Helpful Resources for Content

AP Bio Penguins

www.apbiopenguins.weebly.com

374 pg review guide

120+ Quizizz Games

Review PPTs/Videos

TikToks for each CED Topic

Podcast

The APsolute RecAP

Practice Qs

AP Classroom & AP Central

YouTube

Bozeman Bio, Crash Course, Amoeba Sisters, Gabe Poser Carrara

Review Book

Barron's

Study Cards

Etch

Practice...Practice...Practice...

Multiple Choice

AP Classroom

2013 Released AP Exam

Free Response

AP Central -> AP Biology -> The Exam

1999 - 2023 Released FRQs

Questions

Scoring Guidelines

Student Responses

AP Classroom

Unit 1: Chemistry of Life

Water Properties & Biochemistry

- Hydrogen Bonds
- Proteins
- Lipids
- Nucleic Acids
- Carbohydrates

This is the foundational knowledge that we will build upon for all of AP Biology.

Multiple Choice Practice:

Scientists examined the folded structure of a purified protein resuspended in water and found that amino acids with nonpolar R groups were primarily buried in the middle of the protein, whereas amino acids with polar R groups were primarily on the surface of the protein. Which of the following best explains the location of the amino acids in the folded protein?

a) Polar R groups on the surface of the protein can form ionic bonds with the charged ends of the water molecules.

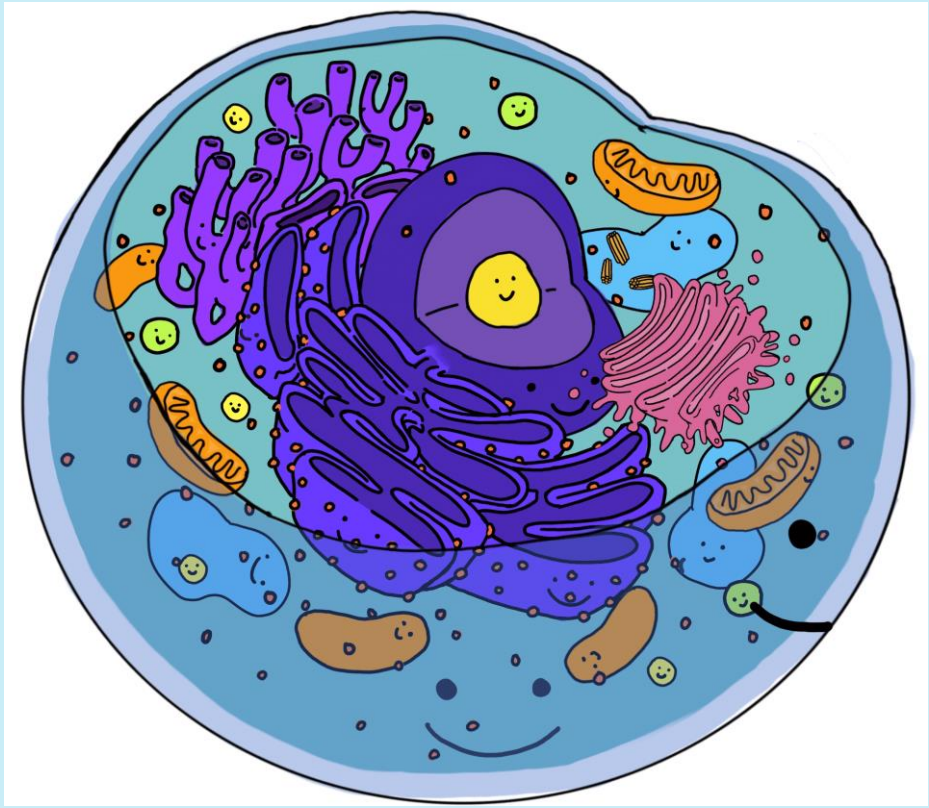
b) Polar R groups are too bulky to fit in the middle of the protein and are pushed toward the protein's surface.

c) Nonpolar R groups that cannot form hydrogen bonds with water are pushed into the middle of the protein.

d) Nonpolar R groups from different parts of the protein form covalent bonds with each other to maintain the protein's structure.

Unit 2: Cell Structure & Function

Organelles & Membrane Transport



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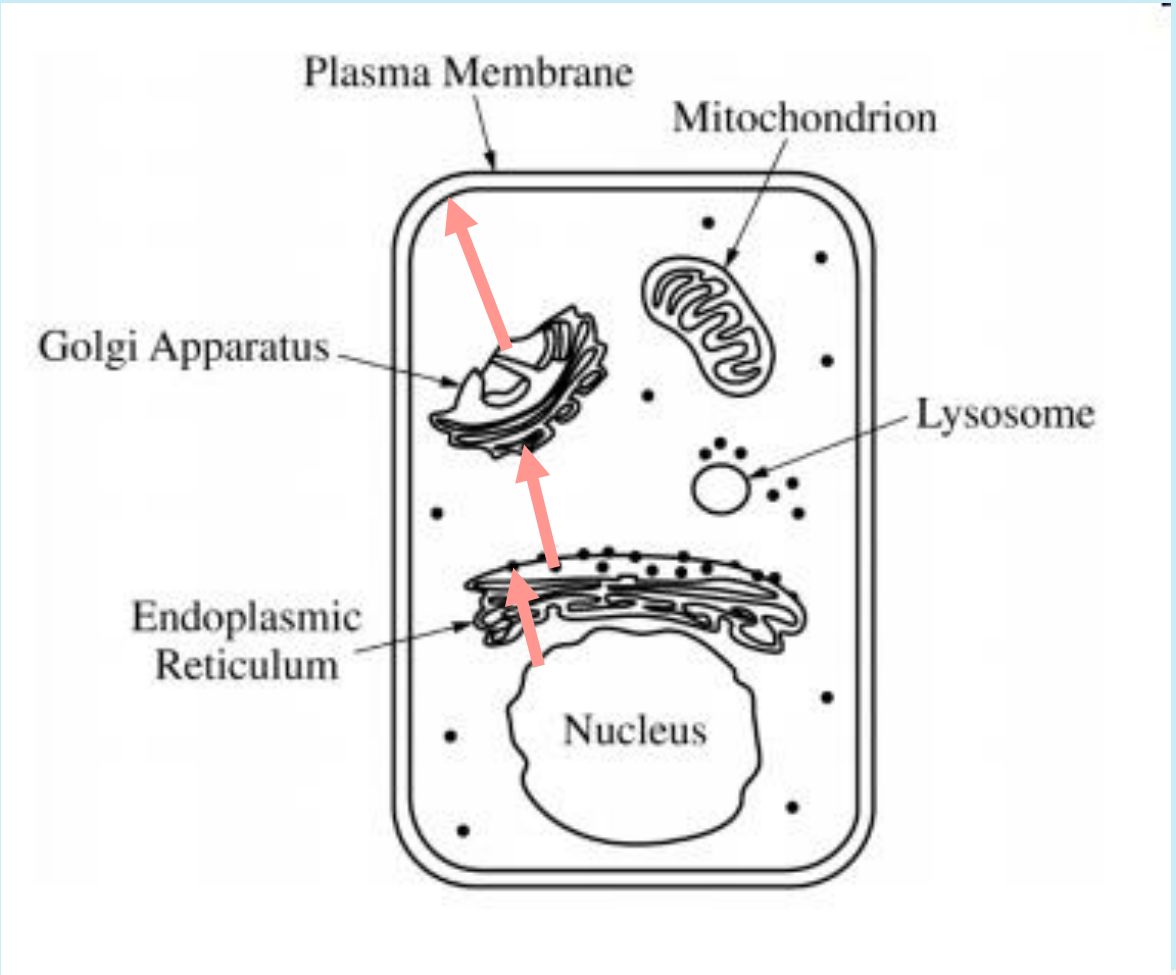

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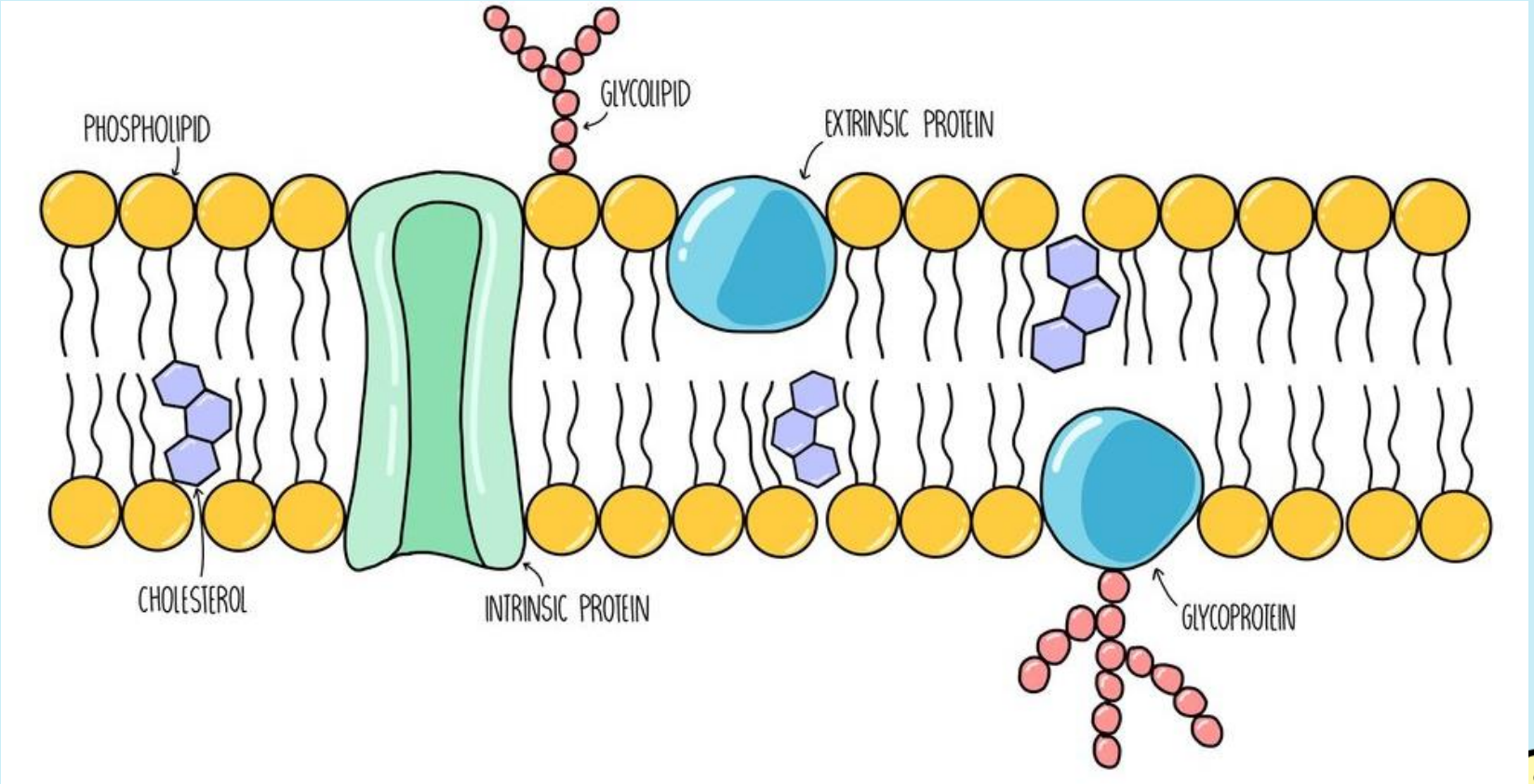
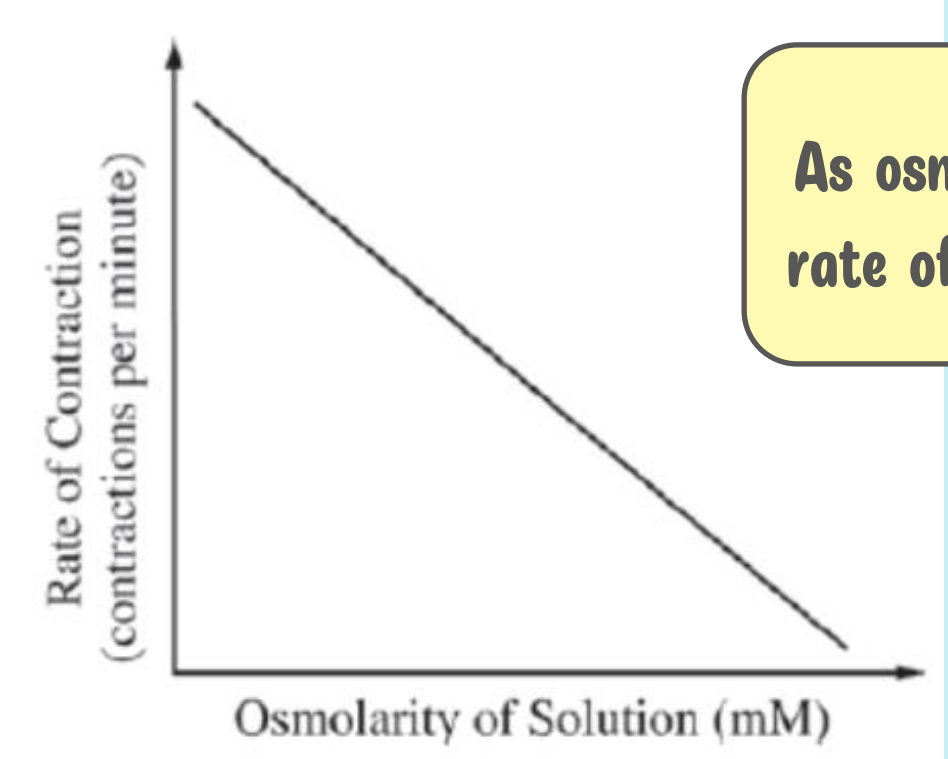


Multiple Choice Practice:

Paramecia are unicellular protists that have contractile vacuoles to remove excess intracellular water. In an experimental investigation, paramecia were placed in salt solutions of increasing osmolarity. The rate at which the contractile vacuole contracted to pump out excess water was determined and plotted against osmolarity of the solutions, as shown in the graph. Which of the following is the correct explanation for the data?



As osmolarity increases, the rate of contraction decreases

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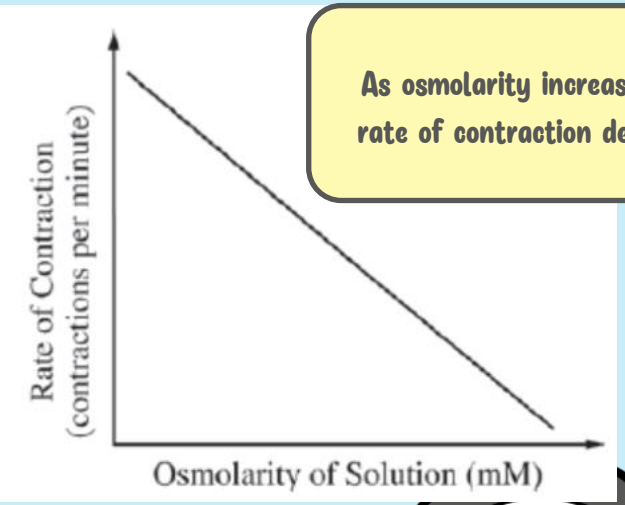


As osmolarity increases, the rate of contraction decreases

a. At higher osmolarity, lower rates of contraction are required because more salt diffuses into the paramecia.

b. The contraction rate increases as the osmolarity decreases because the amount of water entering the paramecia by osmosis increases.

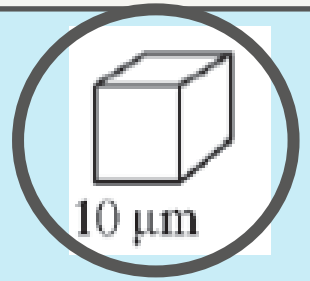
c. The contractile vacuole is less efficient in solutions of high osmolarity because of the reduced amount of ATP produced from cellular respiration.

d. In an isosmotic salt solution, there is no diffusion of water into or out of the paramecia, so the contraction rate is zero.

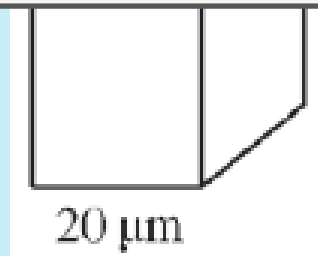
Multiple Choice Practice:

Simple cuboidal epithelial cells line the ducts of certain human exocrine glands. Various materials are transported into or out of the cells by diffusion. (The formula for the surface area of a cube is $6s^2$, and the formula for the volume of a cube is s^3, where s = the length of a side of the cube.) Which of the following cube-shaped cells would be most efficient in removing waste by diffusion?

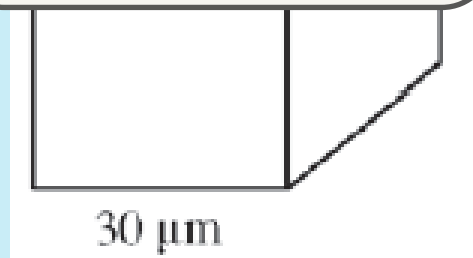
SA: $6(10)^2 = 600$
V: $10^3 = 1000$
SA/V: 0.6



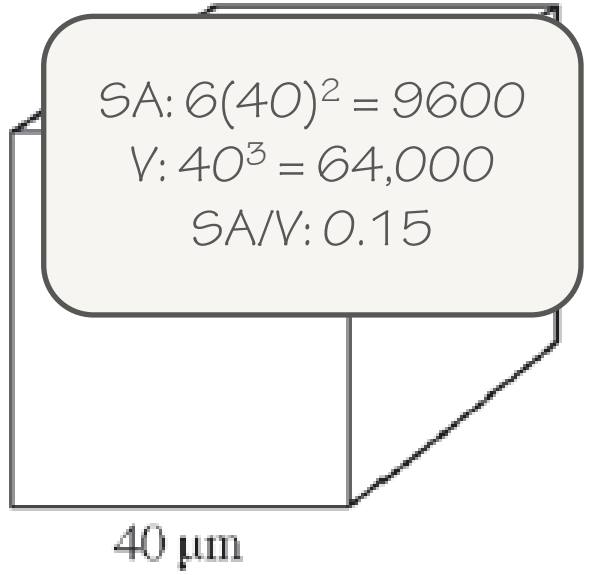
SA: $6(20)^2 = 2400$
V: $20^3 = 8000$
SA/V: 0.3



SA: $6(30)^2 = 5400$
V: $30^3 = 27{,}000$
SA/V: 0.2



SA: $6(40)^2 = 9600$
V: $40^3 = 64{,}000$
SA/V: 0.15



Unit 3: Cellular Energetics

Enzymes & Energy

- Proteins
- Cellular Respiration
- Photosynthesis

Don't get stuck on the minor details...

What goes in?

What comes out?

Where?

Why is it important?

Unit 3: Cellular Energetics

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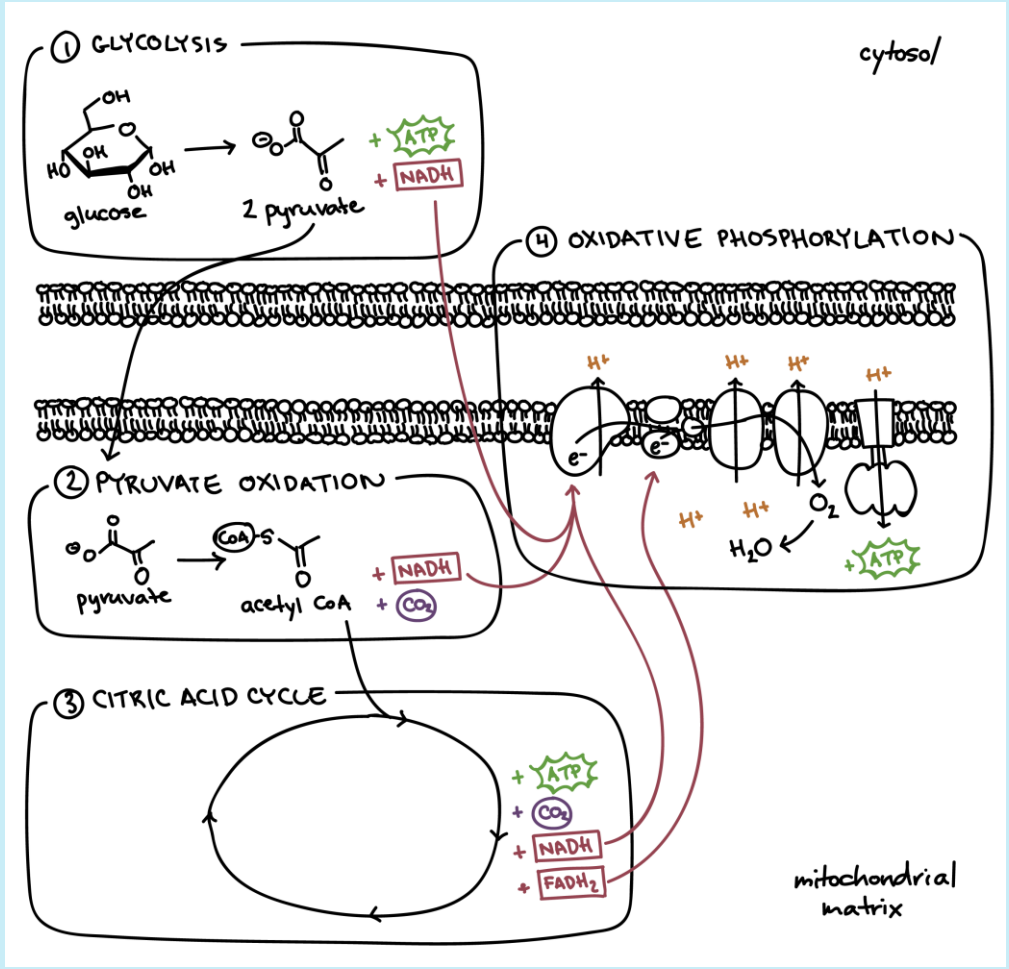

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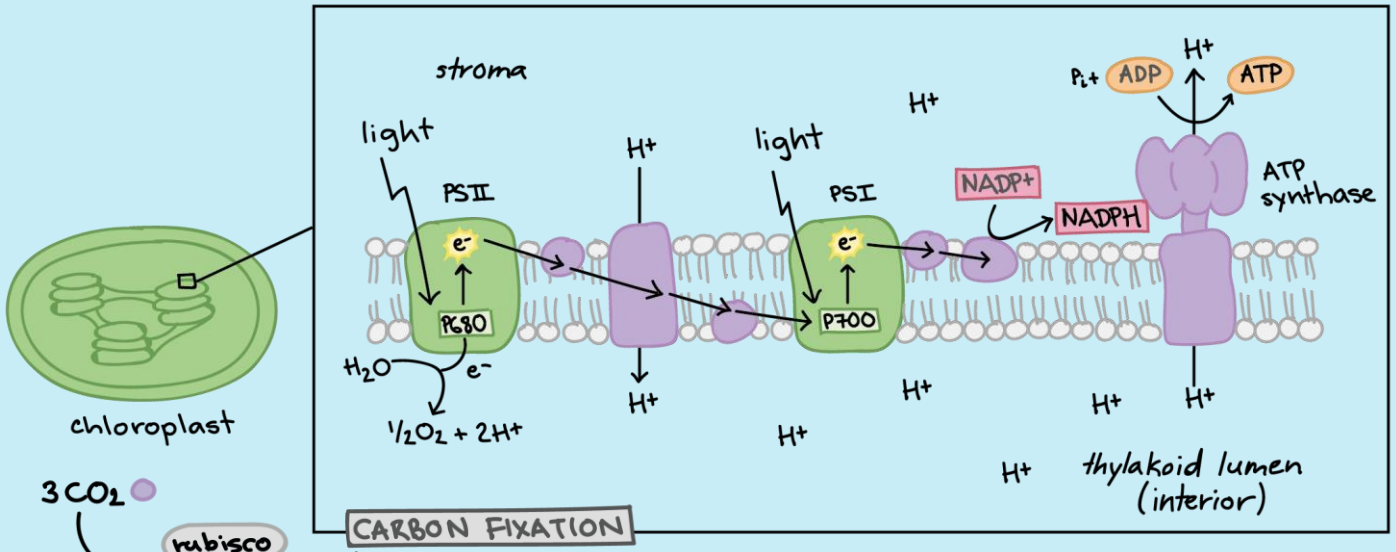
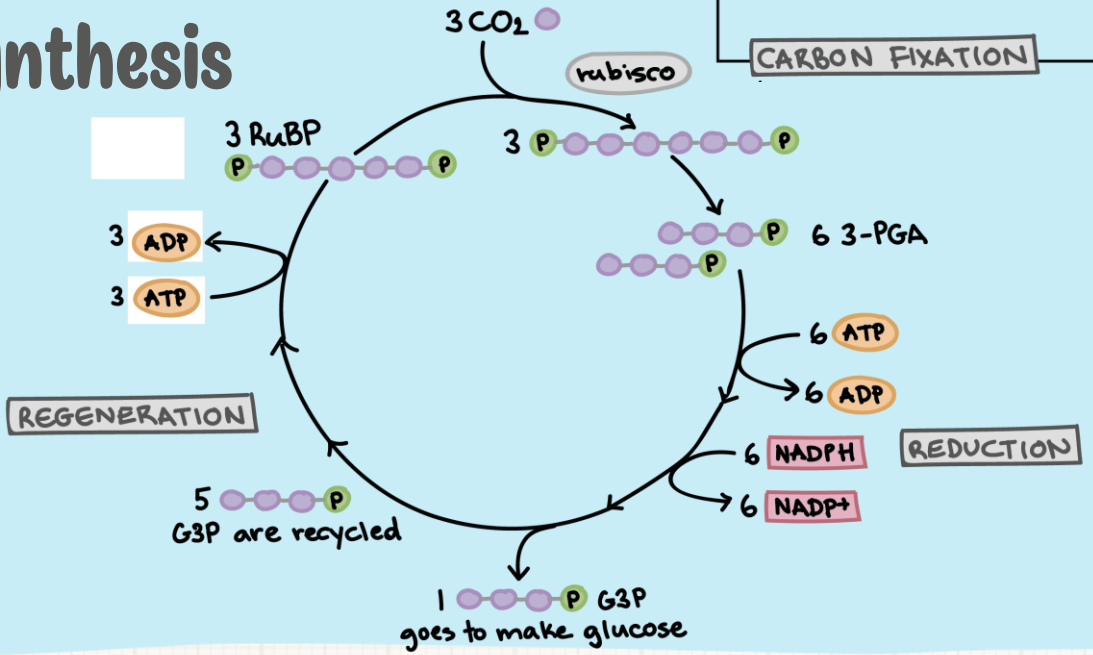




Free Response Practice (2015 #2):

Cellular respiration includes the metabolic pathways of glycolysis, the Krebs cycle, and the electron transport chain, as represented in the figures. In cellular respiration, carbohydrates and other metabolites are oxidized, and the resulting energy-transfer reactions support the synthesis of ATP.

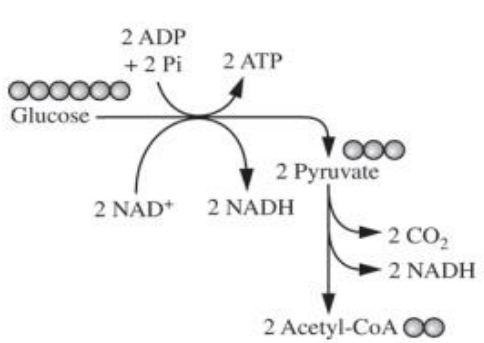


Figure 1. Glycolysis and pyruvate oxidation

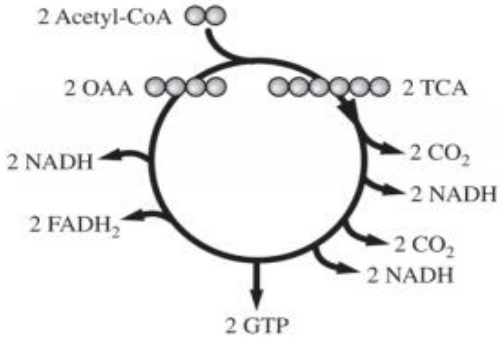


Figure 2. Krebs cycle

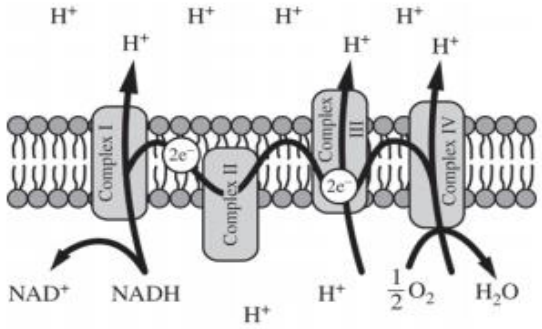


Figure 3. Electron transport chain

Free Response Practice (2015 #2):

(a) Using the information above, **describe** ONE contribution of <u>each</u> of the following in ATP synthesis.

- Catabolism of glucose in glycolysis and pyruvate oxidation

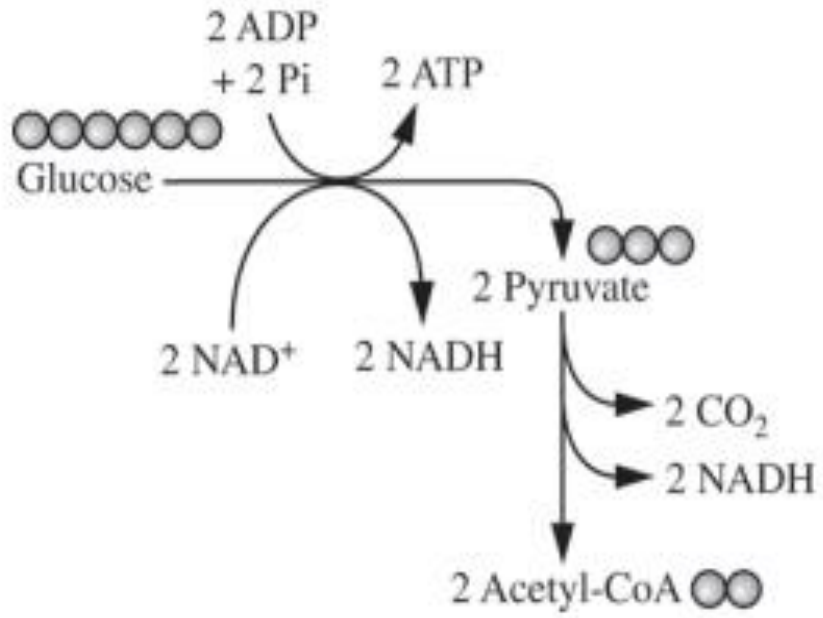


Figure 1. Glycolysis and pyruvate oxidation

Description **(1 point each box; 3 points maximum)**
• Produces NADH for use in ETC • Produces acetyl-CoA for entry into Krebs cycle • Provides energy for (substrate level) phosphorylation of ADP

Free Response Practice (2015 #2):

(a) Using the information above, **describe** ONE contribution of <u>each</u> of the following in ATP synthesis.

- Oxidation of intermediates in the Krebs cycle

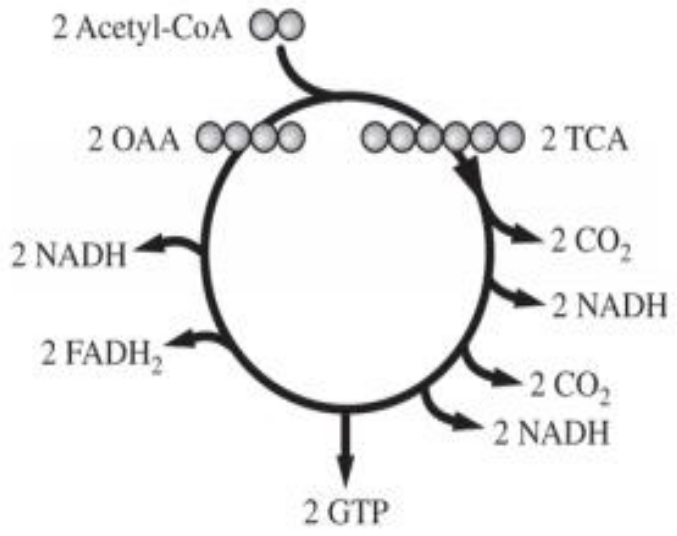


Figure 2. Krebs cycle

Description **(1 point each box; 3 points maximum)**
• Produces NADH or FADH2 for use in ETC • Releases high energy electrons for use in ETC • Provides energy to pump protons against their concentration gradient • Produces GTP for (substrate level) phosphorylation of ADP

Free Response Practice (2015 #2):

(a) Using the information above, **describe** ONE contribution of <u>each</u> of the following in ATP synthesis.

- Formation of a proton gradient by the electron transport chain

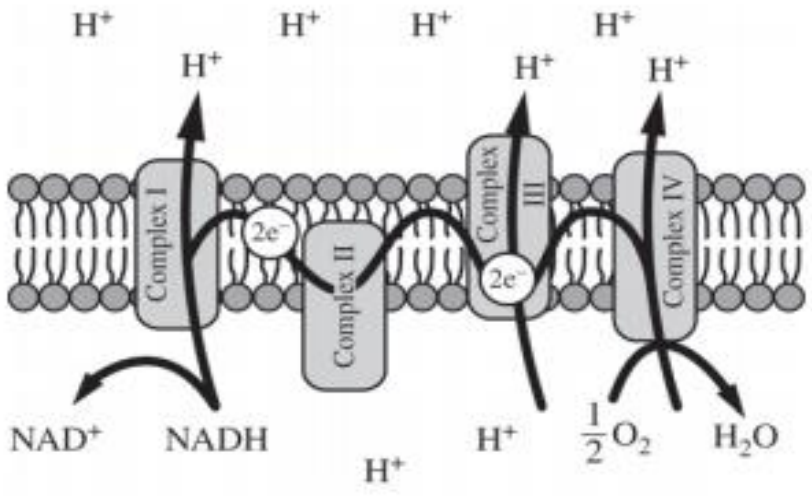


Figure 3. Electron transport chain

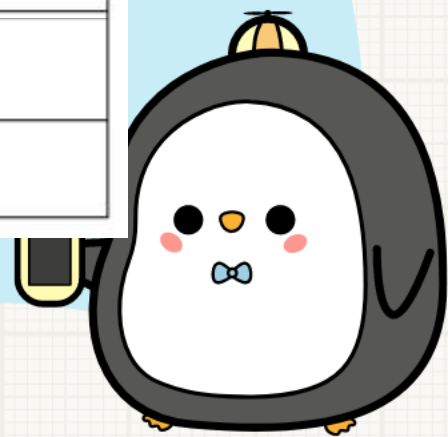
Description **(1 point each box; 3 points maximum)**
• The flow of protons through membrane-bound ATP synthase generates ATP • Provides energy for (oxidative) phosphorylation of ADP

Free Response Practice (2015 #2):

(b) Use each of the following observations to **justify** the claim that glycolysis first occurred in a common ancestor of all living organisms.

- Nearly all existing organisms perform glycolysis.
- Glycolysis occurs under anaerobic conditions.
- Glycolysis occurs only in the cytosol.

Observation	**Justification (1 point each box; 3 points maximum)**
Nearly all existing organisms perform glycolysis	• Trait/gene/process originated early and was inherited/passed down/highly conserved • Glycolysis provided a selective advantage that was passed on to descendants
Glycolysis occurs under anaerobic conditions	Origin of glycolysis pre-dates free atmospheric oxygen/photosynthesis
Glycolysis occurs only in the cytosol	Origin of glycolysis pre-dates cell types with membrane-bound organelles/eukaryotes/endosymbiosis



Free Response Practice (2015 #2):

(c) A researcher estimates that, in a certain organism, the complete metabolism of glucose produces 30 molecules of ATP for each molecule of glucose. The energy released from the total oxidation of glucose under standard conditions is 686 kcal/mol. The energy released from the hydrolysis of ATP to ADP and inorganic phosphate under standard conditions is 7.3 kcal/mol. **Calculate** the amount of energy available from the hydrolysis of 30 moles of ATP. **Calculate** the efficiency of total ATP production from 1 mole of glucose in the organism. **Describe** what happens to the excess energy that is released from the metabolism of glucose.

30 moles produced x 7.3 kcal/mole = 219 kcal

Glucose has 686 kcal/mol

Efficiency = 219 kcal/686 kcal = 0.319

31% or 32%

The excess energy is released as heat.

Unit 4: Cell Communication & Cell Cycle

Signal Transduction & Mitosis

- Receptor, Transduction, Response
- Checkpoints
- Interphase
- Mitosis
- Cytokinesis

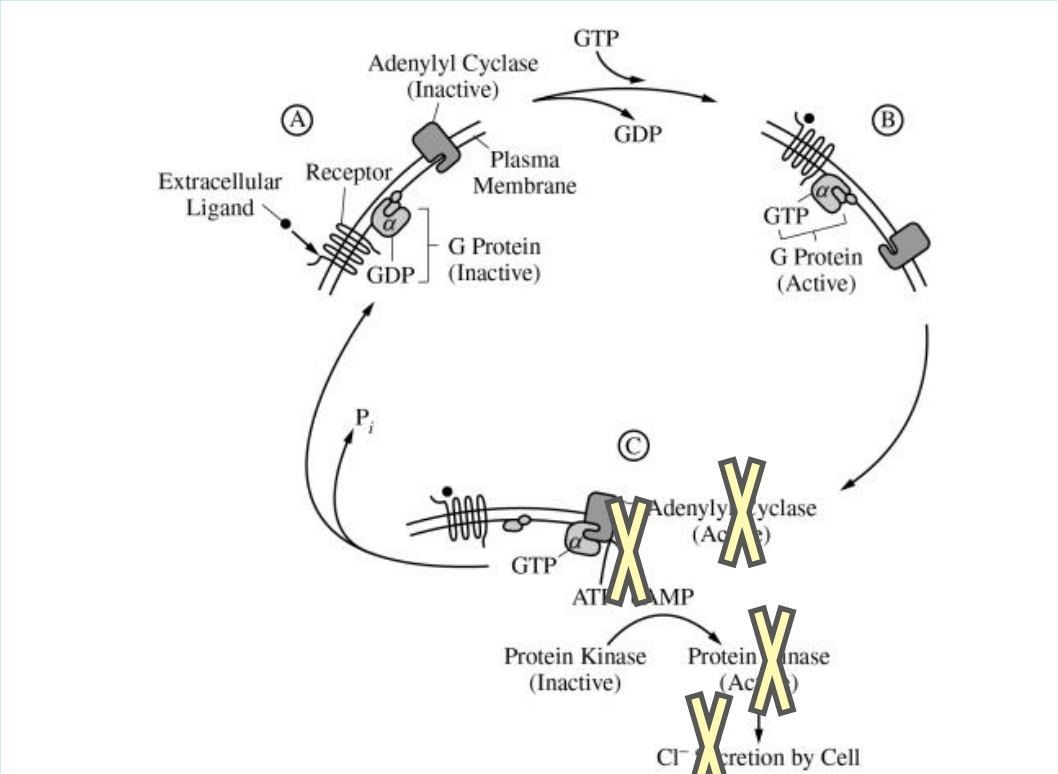


Figure 1. Under normal conditions, ligand binding to a G protein-coupled receptor results in chloride ion transport from an intestinal cell.

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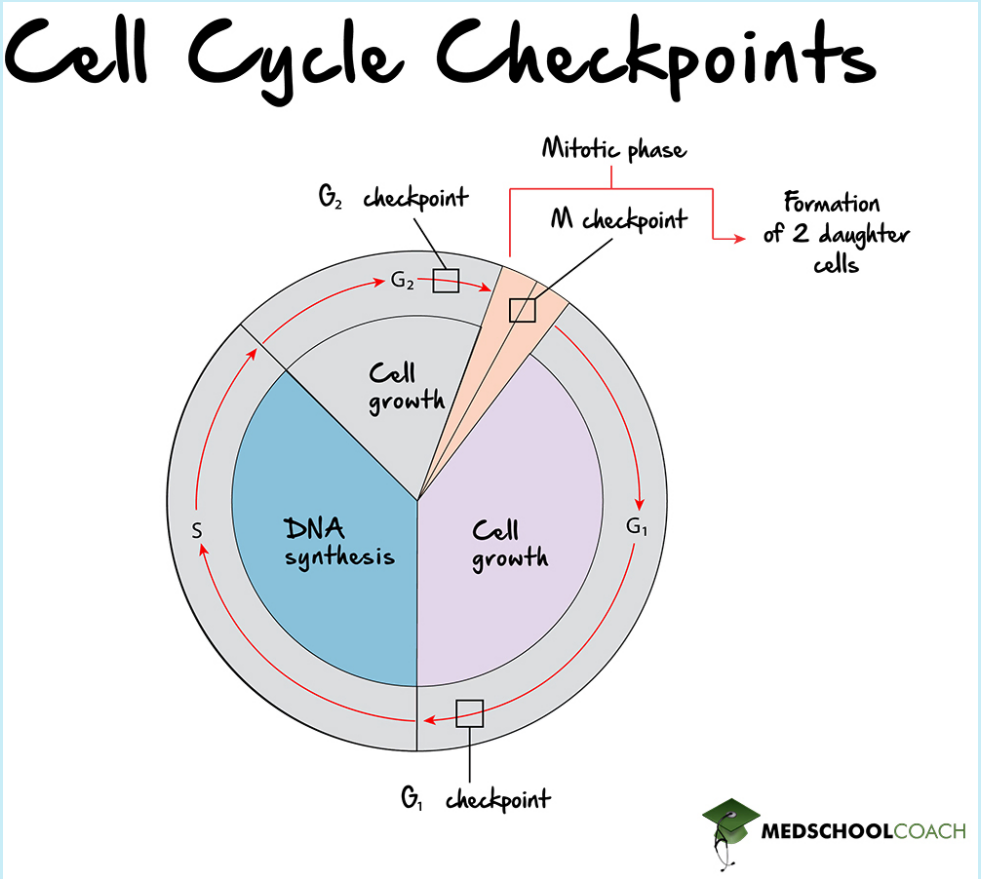

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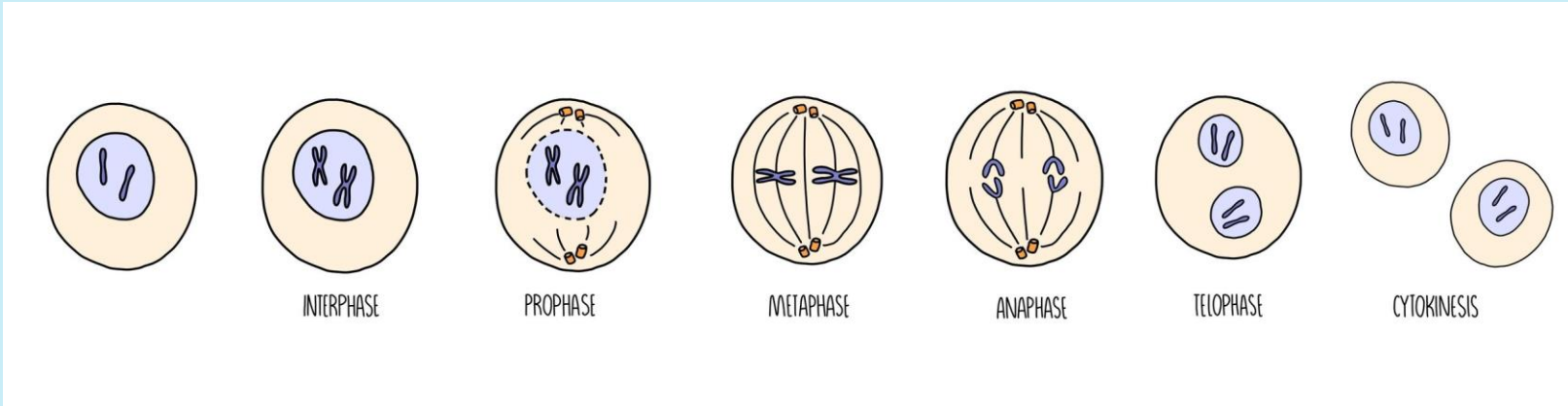

Unit 4: Cell Communication & Cell Cycle

Signal Transduction & Mitosis

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Multiple Choice Practice:

Insulin is a protein hormone that is secreted in response to elevated blood glucose levels. When insulin binds to its receptors on liver cells, the activated receptors stimulate phosphorylation cascades that cause the translocation of glucose transporters to the plasma membrane.

Based on the information provided, which of the following best describes the role of insulin in this liver cell signal transduction pathway?

a. It acts as a ligand.

b. It acts as a receptor.

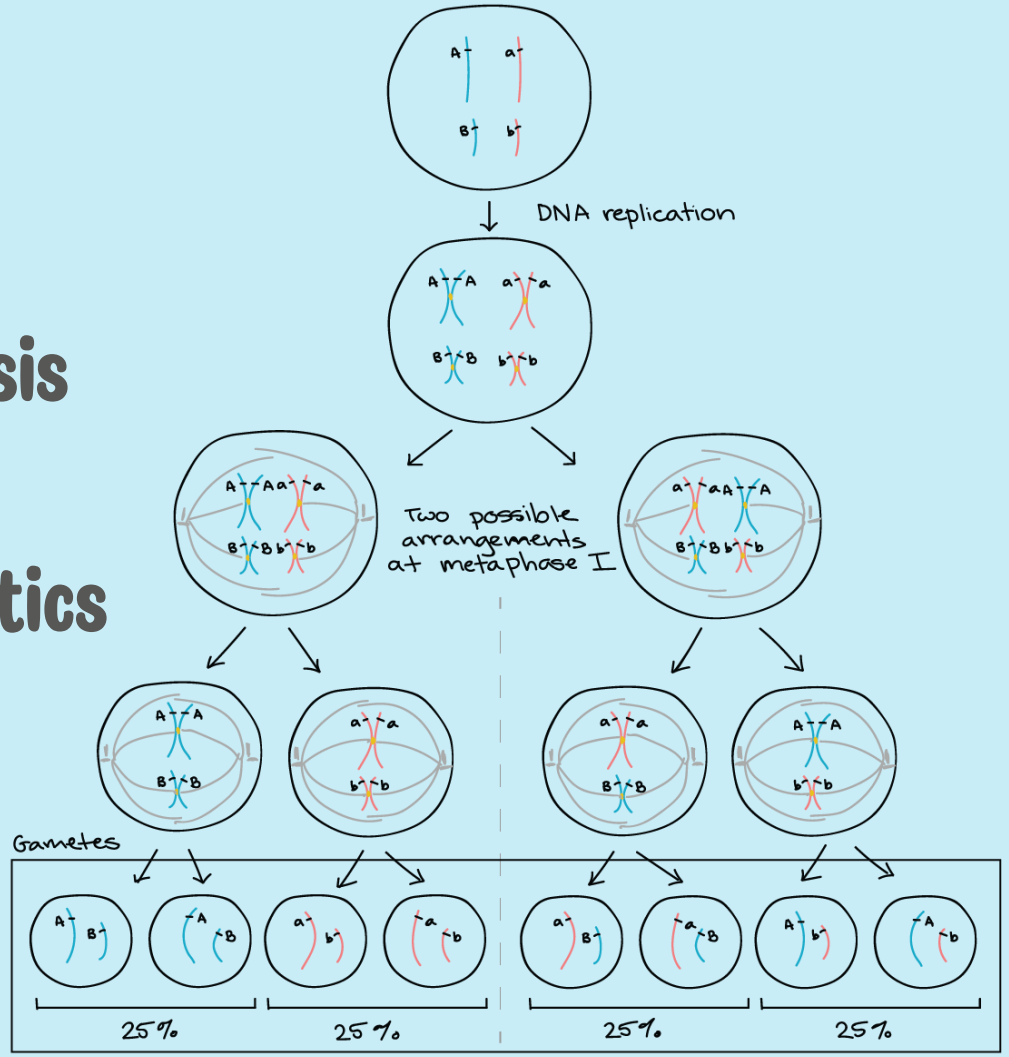
c. It acts as a secondary messenger.

d. It acts as a protein kinase.

Unit 5: Heredity

Meiosis & Genetics

- Meiosis
- Comparison w/ Mitosis
- Mendelian Genetics
- Non-Mendelian Genetics



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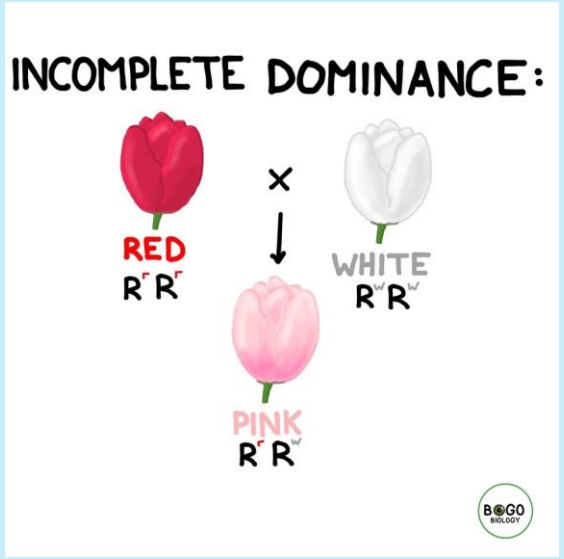

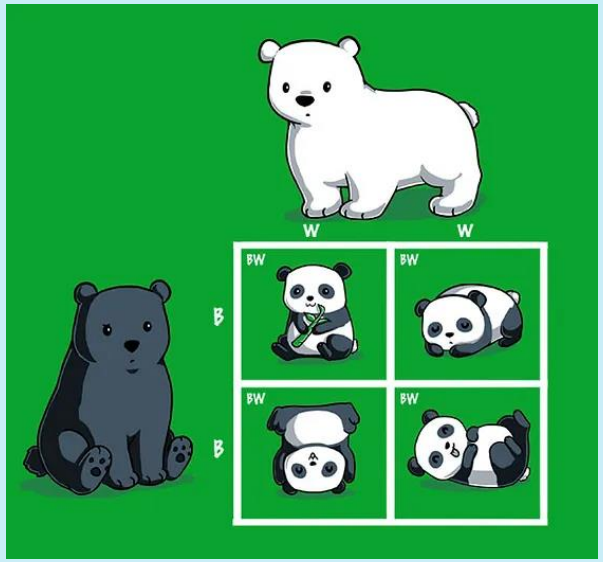

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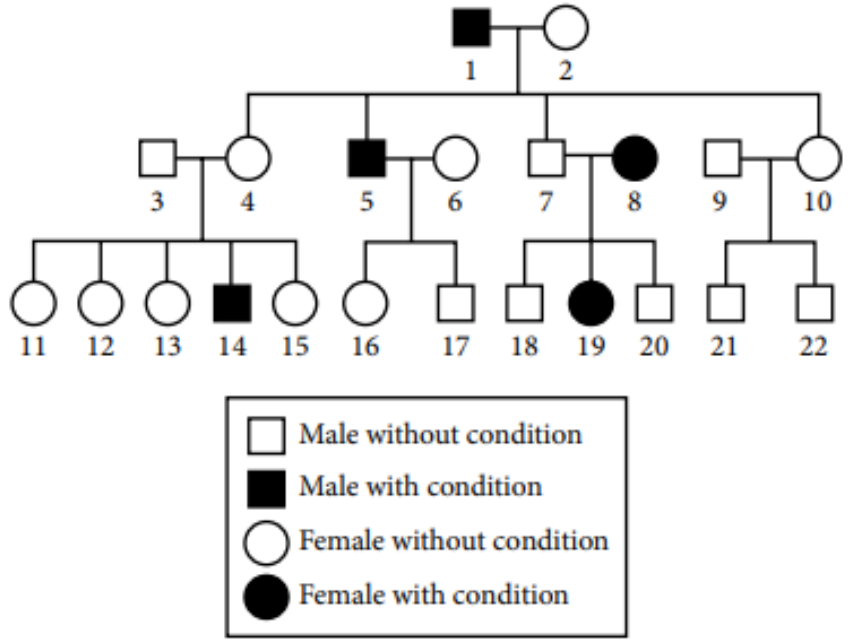


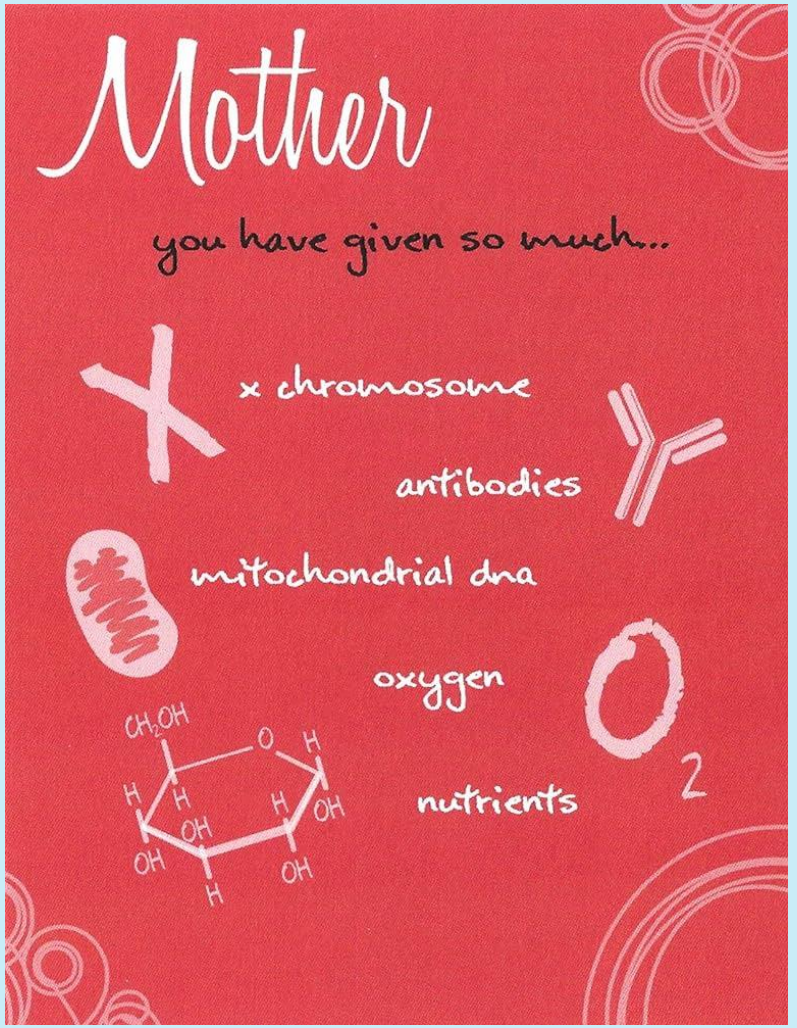
Figure 1. Inheritance of a particular condition over three generations of a family

Unit 5: Heredity

Meiosis & Genetics

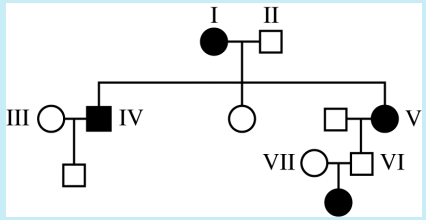
- Meiosis
- Comparison w/ Mitosis
- Mendelian Genetics
- Non-Mendelian Genetics

Happy Mother's Day to all the "moms" in your life



Multiple Choice Practice:

The following figures display data collected while studying a family, some members of which have sickle-cell disease—a rare genetic disorder caused by a mutation in the hemoglobin beta gene (HBB). There are at least two alleles of the HBB gene: the HbA allele encodes wild-type hemoglobin and the HbS allele encodes the sickle-cell form of hemoglobin. Genetic testing provided insight into the inheritance pattern for sickle-cell disease.

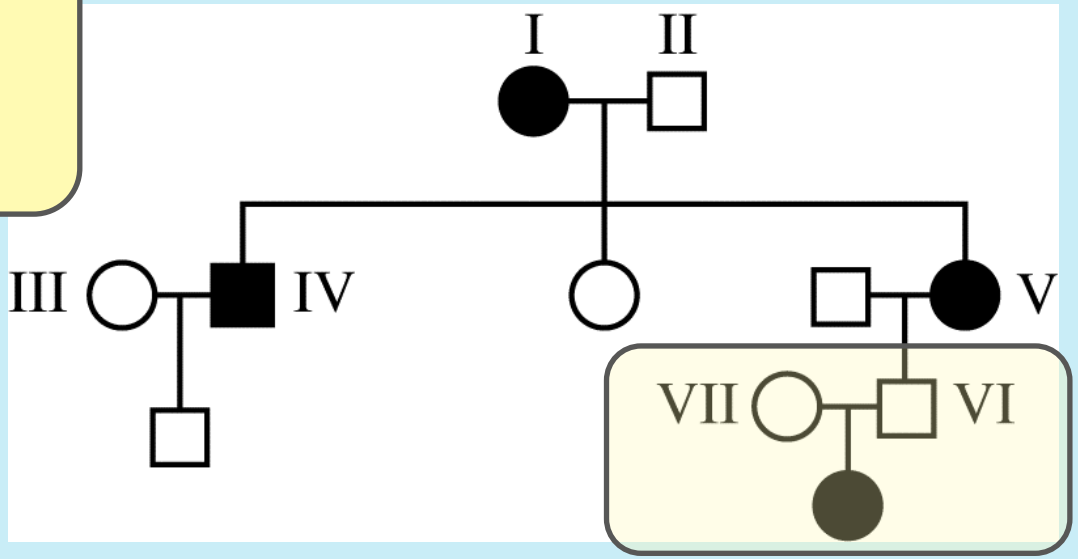


Based on the data shown in Figure 1, which of the following best describes the genotypes of individual family members in the pedigree?

a. All affected individuals possess at least one dominant allele of the hemoglobin beta gene.
b. Healthy individuals may possess one mutant allele (HbS) of the hemoglobin beta gene.
c. Individuals IV and V must be heterozygous for the HbS (mutant) allele.
d. Individuals II and VI possess two copies of the HbA (wild-type) allele.

Multiple Choice Practice:

Recessive



Affected individuals: HbS/HbS

Non-affected individuals: HbS/HbA HbA/HbA

Based on the data shown in Figure 1, which of the following best describes the genotypes of individual family members in the pedigree?

a. All affected individuals possess at least one dominant allele of the hemoglobin beta gene.

b. Healthy individuals may possess one mutant allele (HbS) of the hemoglobin beta gene.

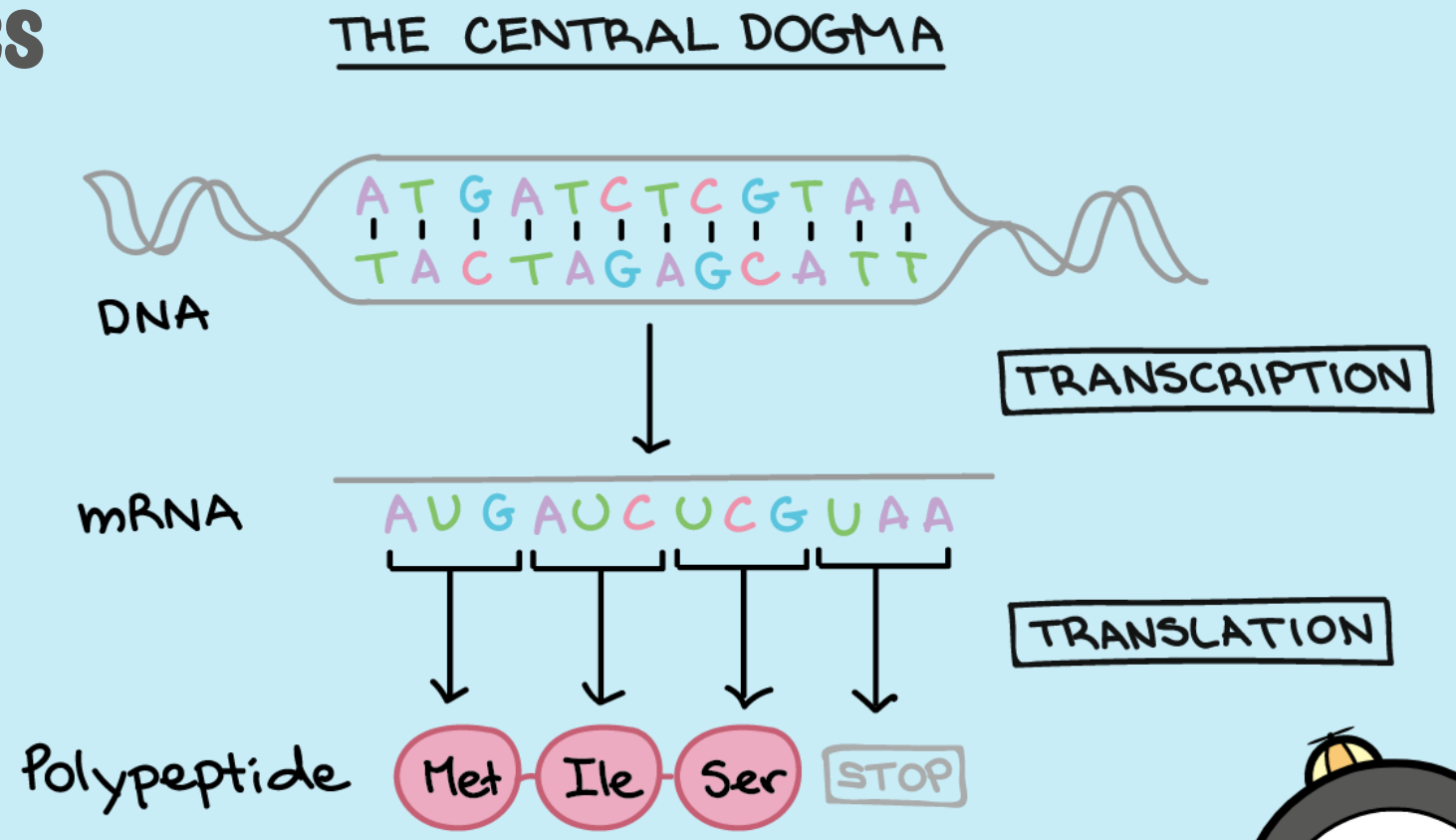
c. Individuals IV and V must be heterozygous for the HbS (mutant) allele.

d. Individuals II and VI possess two copies of the HbA (wild-type) allele.

Unit 6: Gene Expression & Regulation

Molecular Genetics

- DNA vs. RNA
- Replication
- Transcription
- Translation
- Mutations
- BioTechnology



Free Response Practice (2021 #2):

Geneticists investigated the mode of inheritance of a rare disorder that alters glucose metabolism and first shows symptoms in adulthood. The geneticists studied a family in which some individuals of generations II and III are known to have the disorder. Based on the pedigree (Figure 1), the geneticists concluded that the disorder arose in individual II−2 and was caused by a mutation in mitochondrial DNA.

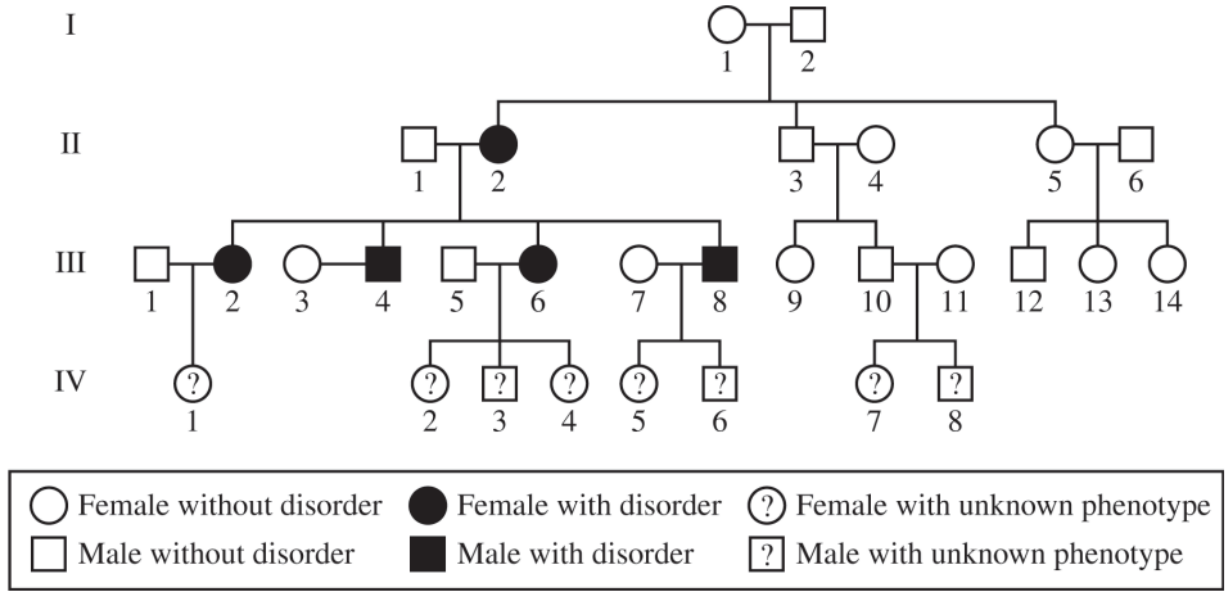


Figure 1. Pedigree of a family showing individuals with the glucose metabolism disorder. A question mark indicates that the phenotype is unknown.

Free Response Practice (2021 #2):

TABLE 1. AVERAGE BLOOD GLUCOSE LEVELS OF INDIVIDUALS IN GENERATION IV

Individual	Average Blood Glucose Level (mg/dL $\pm$ $2SE_{\bar{x}}$)
IV–1	170 ± 15
IV–2	190 ± 10
IV–3	145 ± 5
IV–4	165 ± 15
IV–5	110 ± 15
IV–6	125 ± 5
IV–7	105 ± 15
IV–8	120 ± 10

TABLE 2. PHENOTYPIC CLASSIFICATIONS BASED ON BLOOD GLUCOSE LEVELS

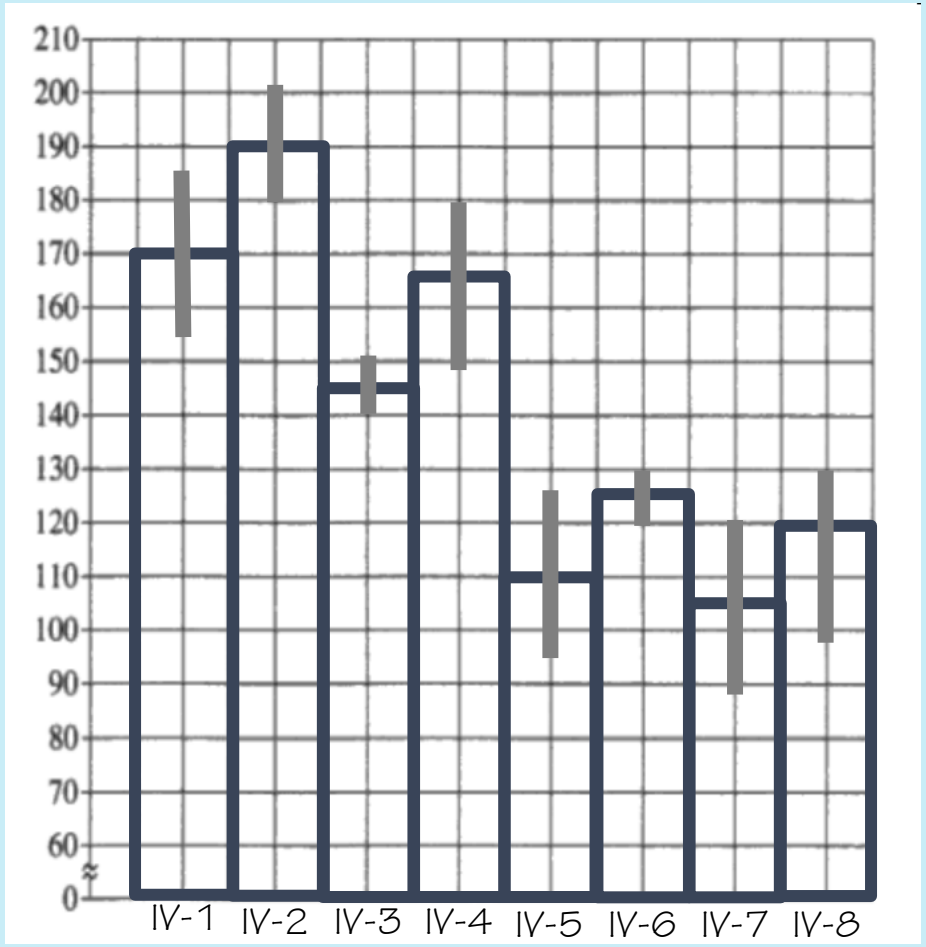
Phenotype	Blood Glucose Level (mg/dL)
Normal	< 140 mg/dL
At risk	140 – 199 mg/dL
Affected	≥ 200 mg/dL

Free Response Practice (2021 #2):

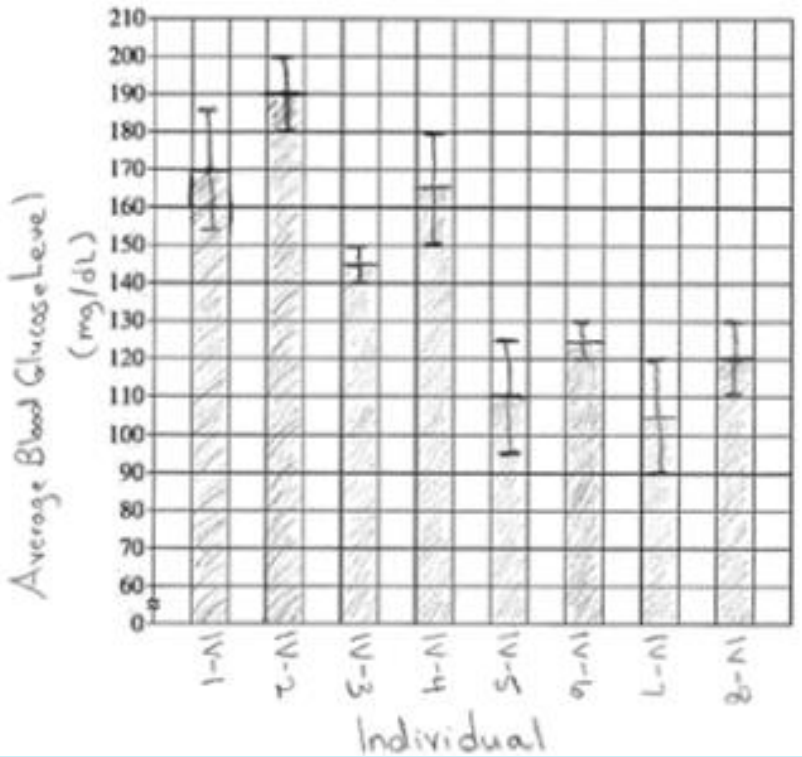
(a) The disorder alters glucose metabolism. **Describe** the atoms AND types of bonds in a glucose molecule.

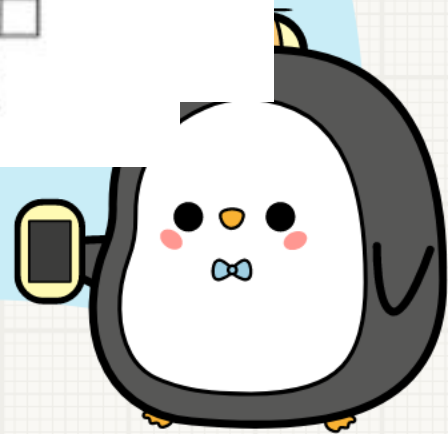
- The atoms are carbon, hydrogen, and oxygen (C, H, and O) and are held together by covalent bonds.

(b) Using the template in the space provided for your response, **construct** an appropriately labeled graph based on the data in Table 1. **Determine** one individual who is both at risk of developing the disorder and has a significantly different blood glucose level from that of individual IV–1.



TABL N IV





- Point distribution: Axis labels; plotting in a bar graph or modified bar graph; error bars

Free Response Practice (2021 #2):

(b) Using the template in the space provided for your response, **construct** an appropriately labeled graph based on the data in Table 1. **Determine** one individual who is both at risk of developing the disorder and has a significantly different blood glucose level from that of individual IV–1.

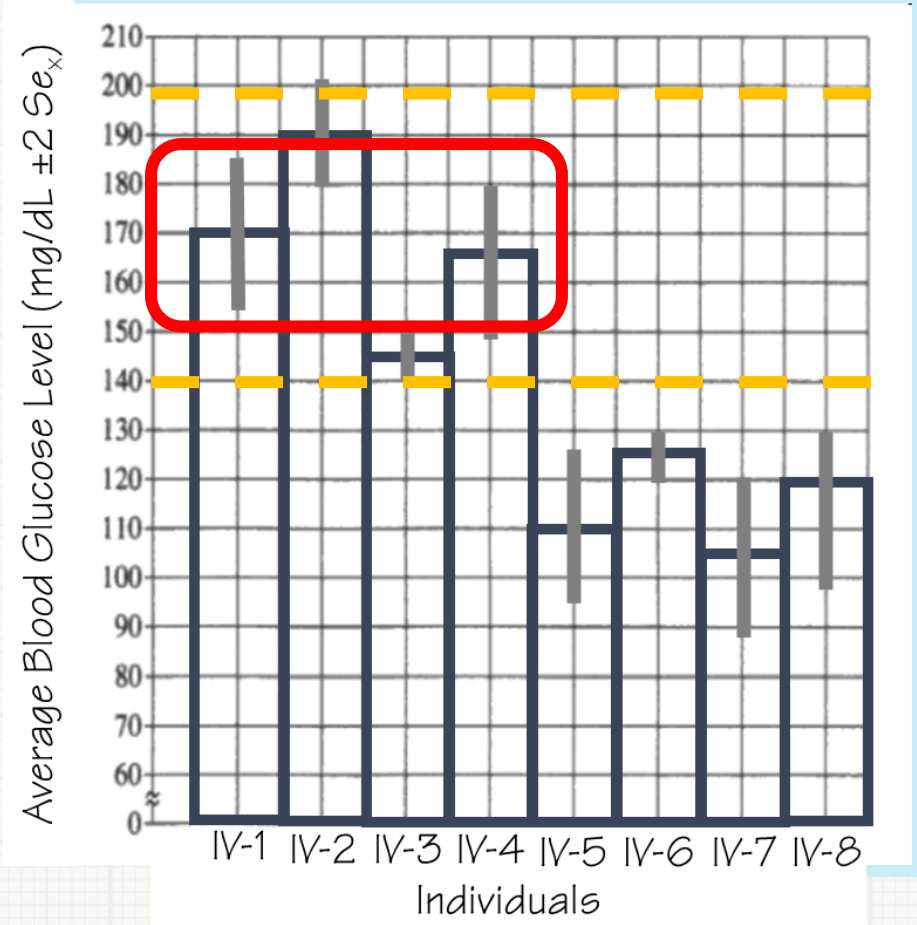


TABLE 2. PHENOTYPIC CLASSIFICATIONS BASED ON BLOOD GLUCOSE LEVELS

Phenotype	Blood Glucose Level (mg/dL)
Normal	< 140 mg/dL
At risk	140 – 199 mg/dL
Affected	≥ 200 mg/dL

- IV-3

Free Response Practice (2021 #2):

(c) Based on the pedigree, **identify** all individuals in generation IV who can pass on the mutation to their children.

Prompt stated that it was MITOCHONDRIAL inheritance

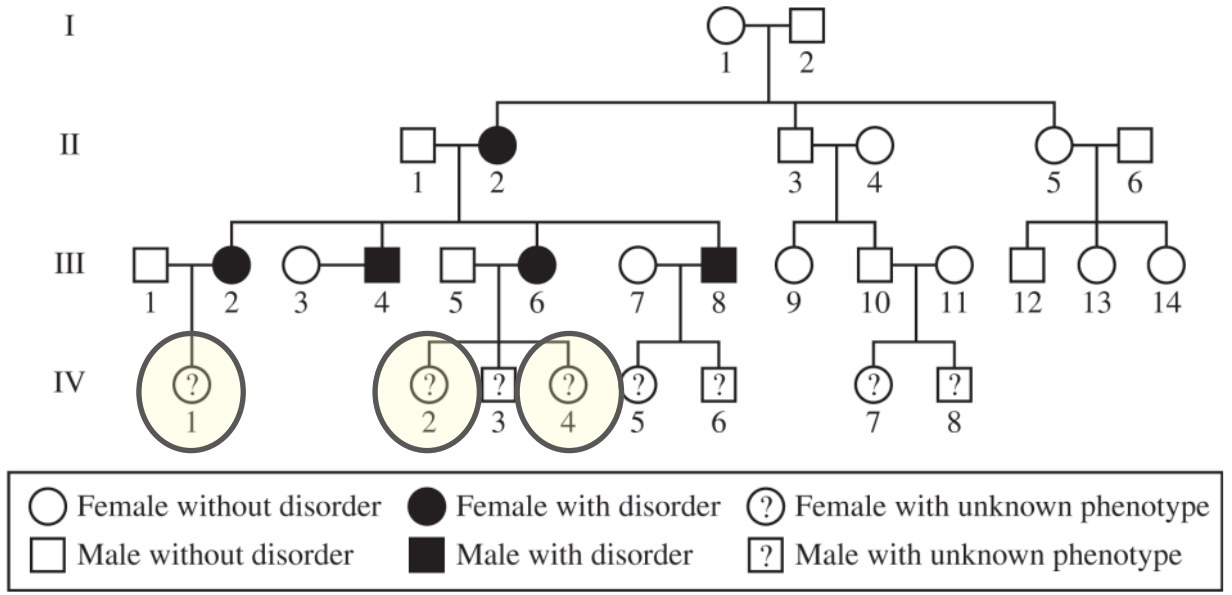


Figure 1. Pedig
indicates that t

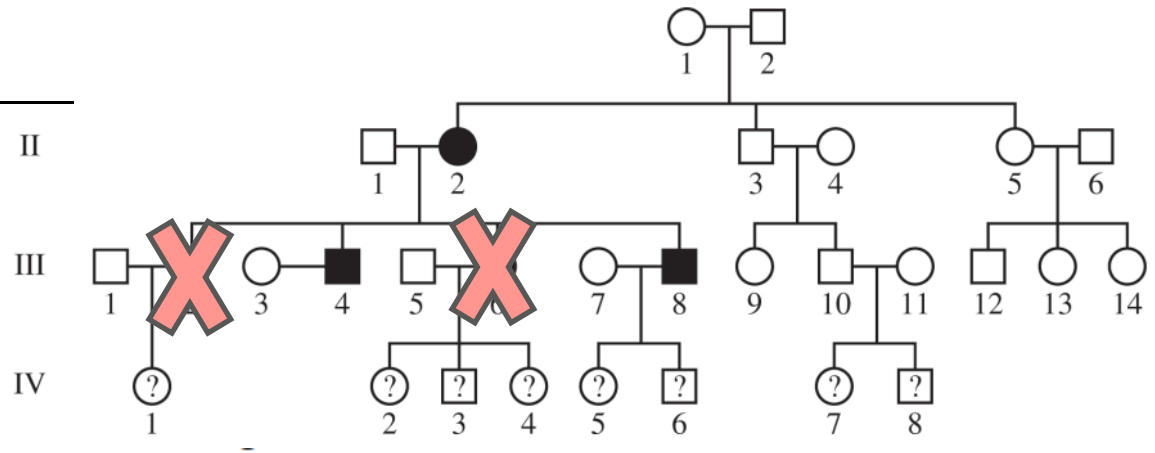
A question mark

- IV-1, IV-2, IV-4

Free Response Practice (2021 #2):

(d) Based on the fact that individual II−2 is affected, a student claims that the disorder is inherited in an X-linked recessive pattern. Based on the student's claim, **predict** which individuals of generation III will be affected by the disorder. Based on the pedigree, **justify** why the data do NOT support the student's claim.

- III-4 and III-8

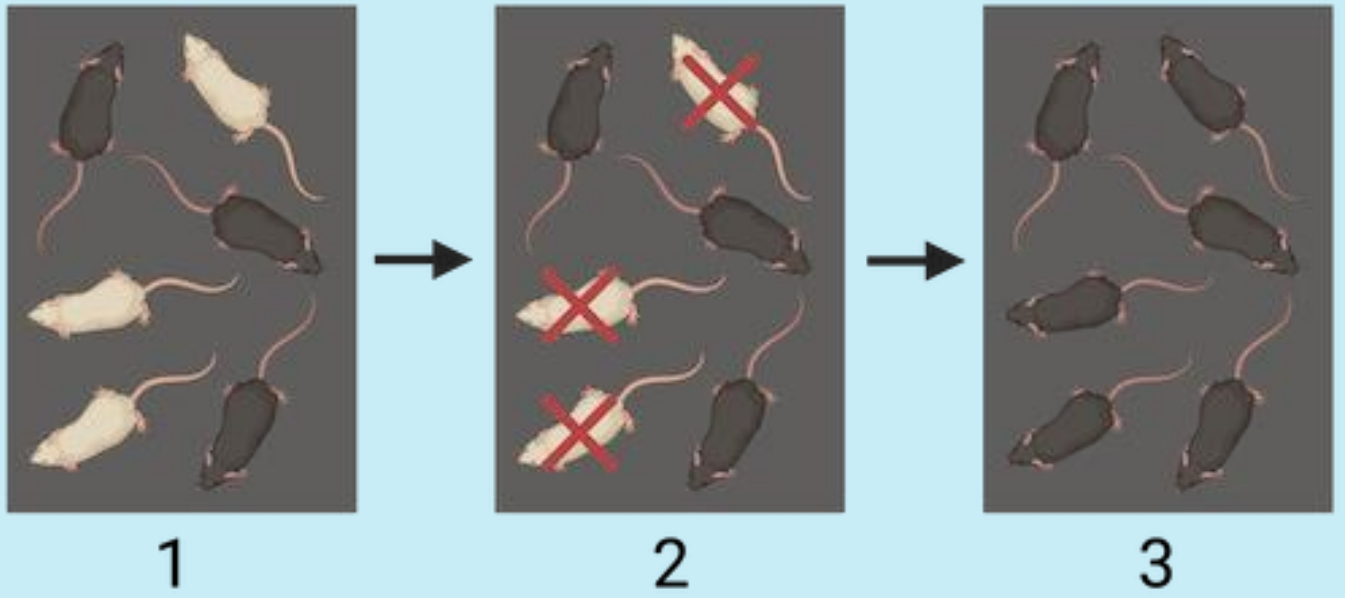


- The data do not support the claim because females III-2 and III-6 have the disorder and, if inheritance is X-linked recessive, they could only do so if their father II-1 had the disorder, which he does not.
- The data instead support mitochondrial inheritance, because all of the offspring of individual II-2 , not only the sons, have the disorder.

Unit 7: Evolution

Evolution

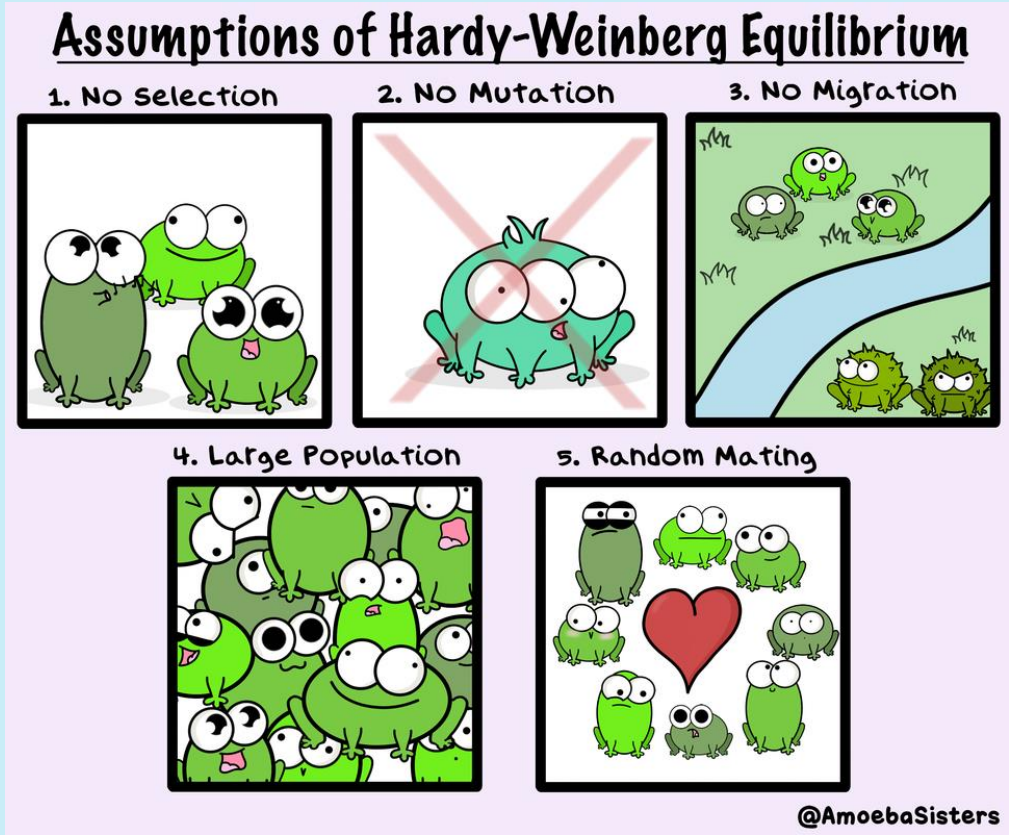
- Selection
- Hardy-Weinberg
- Phylogeny
- Evidence of Evolution



Unit 7: Evolution

Evolution

- Selection
- Hardy-Weinberg
- Phylogeny
- Evidence of Evolution



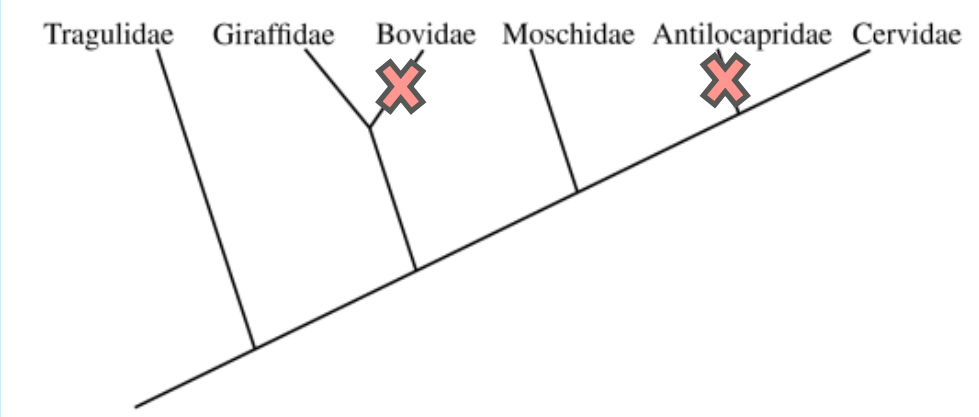
Unit 7: Evolution

Evolution

- Selection
- Hardy-Weinberg
- Phylogeny
- Evidence of Evolution

TABLE 1. MORPHOLOGICAL CHARACTERISTICS FOUND IN EACH RUMINANT FAMILY

Characteristic Number	Morphological Characteristic	Tragulidae	Giraffidae	Bovidae	Moschidae	Antilocapridae	Cervidae
1	Extra tooth material			X		X	
2	Third stomach		X	X	X	X	X
3	Double opening for tear ducts					X	X



Unit 7: Evolution

Evolution

- Selection
- Hardy-Weinberg
- Phylogeny
- Evidence of Evolution

Phylogenetic Tree

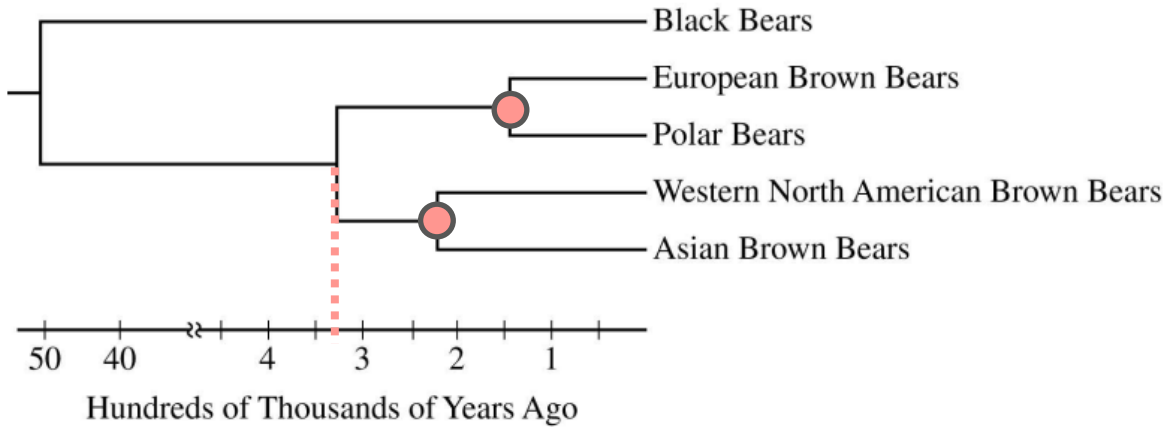
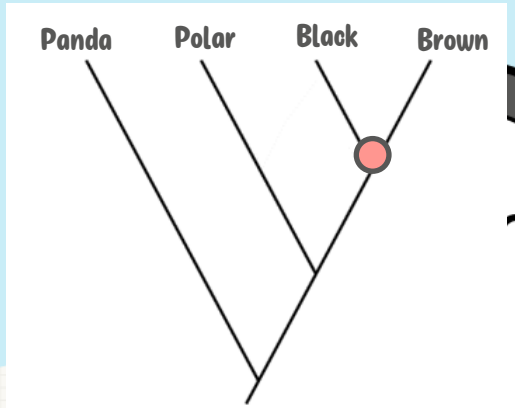


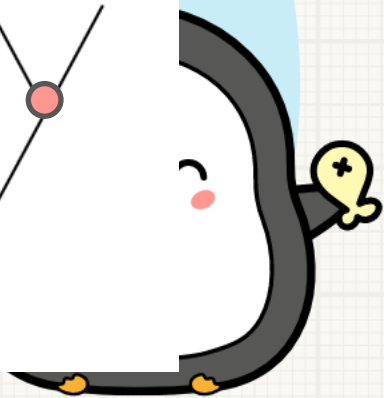
Figure 1. Phylogenetic tree representing the evolutionary relatedness among bear populations based on mitochondrial DNA sequence comparisons

Cladogram

TABLE 1. AMINO ACID DIFFERENCES IN THE LYST PROTEIN AMONG BEAR SPECIES

	Panda	Black	Brown	Polar
Panda	–			
Black	33	–		
Brown	34	1	–	
Polar	40	7	8	–





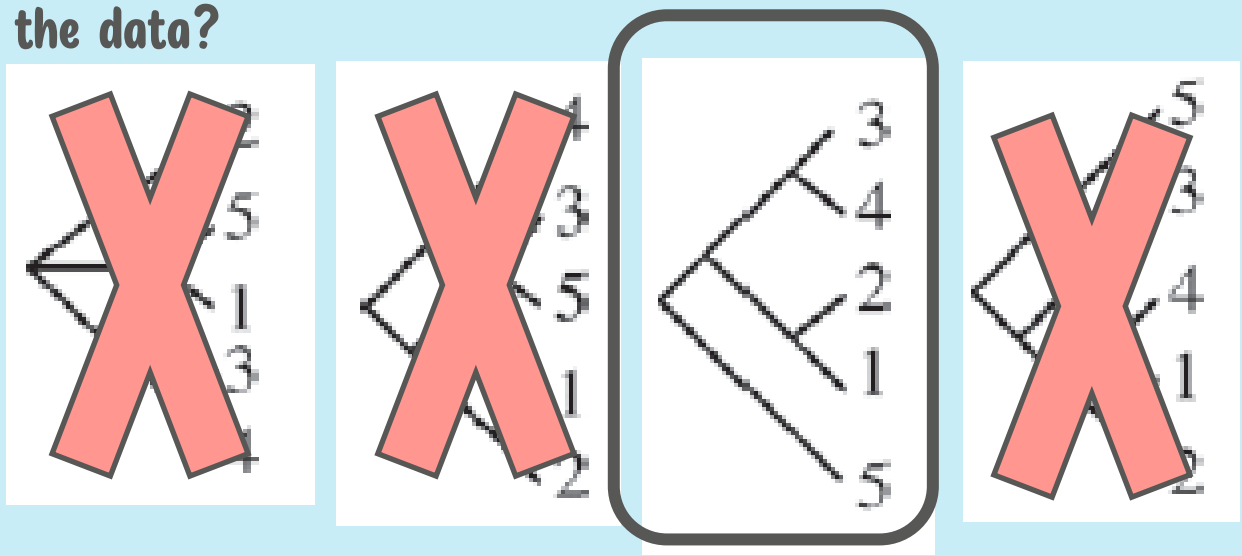
Multiple Choice Practice:

Five new species of bacteria were discovered in Antarctic ice core samples. The nucleotide (base) sequences of rRNA subunits were determined for the new species. The table below shows the number of nucleotide differences between the species.

NUCLEOTIDE DIFFERENCES

Species	1	2	3	4	5
1	–	3	19	18	27
2		–	19	18	26
3			–	1	27
4				–	27
5					–

Which of the following phylogenetic trees is most consistent with the data?



Numeric Response Practice:

A scientist is studying a population of flowers with three different color phenotypes. The color phenotype demonstrates incomplete dominance. The scientist collected data on the color of 100 flowers. The data are shown in the table. To test the hypothesis that the population is in Hardy-Weinberg, the scientist performed a chi-square test. Calculate the chi-square value.

Phenotype	Red (AA)	Purple (Aa)	Blue (aa)
Number Observed	70	20	10

Numeric Response Practice:

To test the hypothesis that the population is in Hardy-Weinberg, the scientist performed a chi-square test. Calculate the chi-square value.

Phenotype	Red (AA)	Purple (Aa)	Blue (aa)
Number Observed	70	20	10

Solve for p	Solve for q
$2(70) + 20 = 160$ $\frac{160}{2(100)} = 0.8$	$2(10) + 20 = 40$ $\frac{40}{2(100)} = 0.2$
Solve for p^2	**Solve for q^2**
$0.8^2 = 0.64$ So, AA = 0.64 x 100 = 64 individuals	$0.2^2 = 0.04$ So, AA = 0.04 x 100 = 4 individuals
Solve for 2pq	
$2(0.8)(0.2) = 0.32$	So Aa = 0.32 x 100 = 32 individuals

Numeric Response Practice:

To test the hypothesis that the population is in Hardy-Weinberg, the scientist performed a chi-square test. Calculate the chi-square value.

Phenotype	Red (AA)	Purple (Aa)	Blue (aa)
Number Observed	70	20	10

	Observed	Expected	O-E	$(O-E)^2$	$(O-E)^2/E$
Red	70	64	6	36	0.5625
Purple	20	32	12	144	4.5
Blue	10	4	6	36	9
	100	100		Sum:	14.06

Numeric Response Practice:

To test the hypothesis that the population is in Hardy-Weinberg, the scientist performed a chi-square test. Calculate the chi-square value.

p value	Degrees of Freedom							
	1	2	3	4	5	6	7	8
0.05	3.84	5.99	7.81	9.49	11.07	12.59	14.07	15.51
0.01	6.63	9.21	11.34	13.28	15.09	16.81	18.48	20.09

X^2:	14.06

3.84 < 14.06

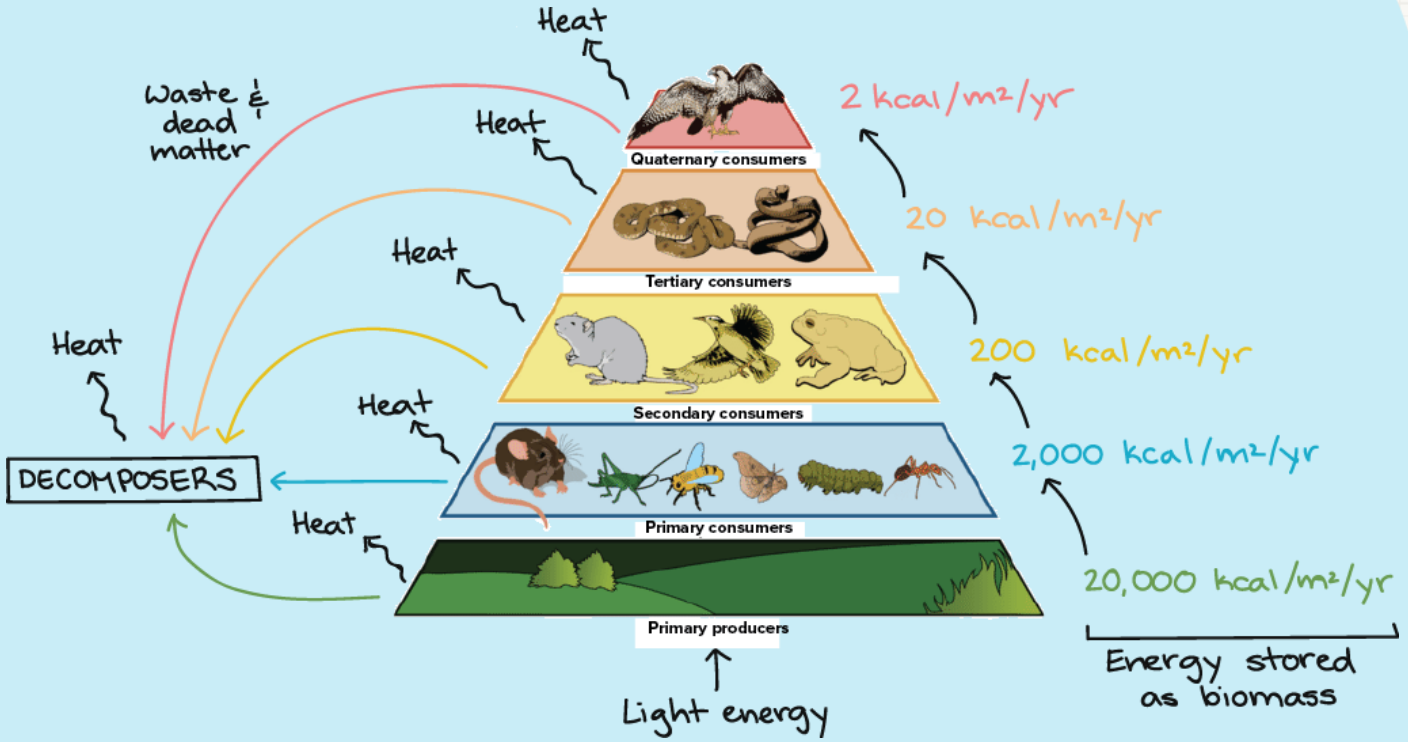
Reject the Null Hypothesis

(aka the population is NOT in Hardy-Weinberg)

Unit 8: Ecology

Evolution

- Energy Flow
- Population Ecology
- Community Ecology



Unit 8: Ecology

Evolution

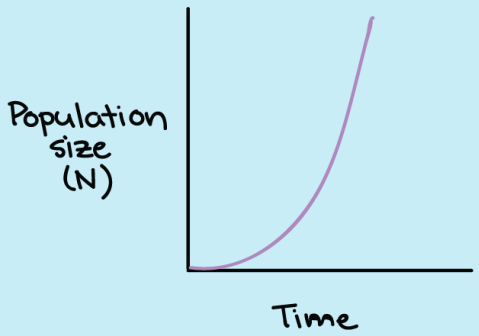
- Energy Flow
- Population Ecology
- Community Ecology

$\frac{dN}{dt} = rN$

Exponential growth

Per capita growth rate (r) doesn't change, even if pop. gets very large.

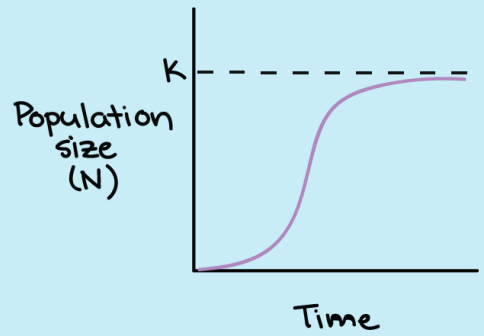
$\frac{dN}{dt} = r_{max}N$



Logistic growth

Per capita growth rate (r) gets smaller as pop. approaches its max. size.

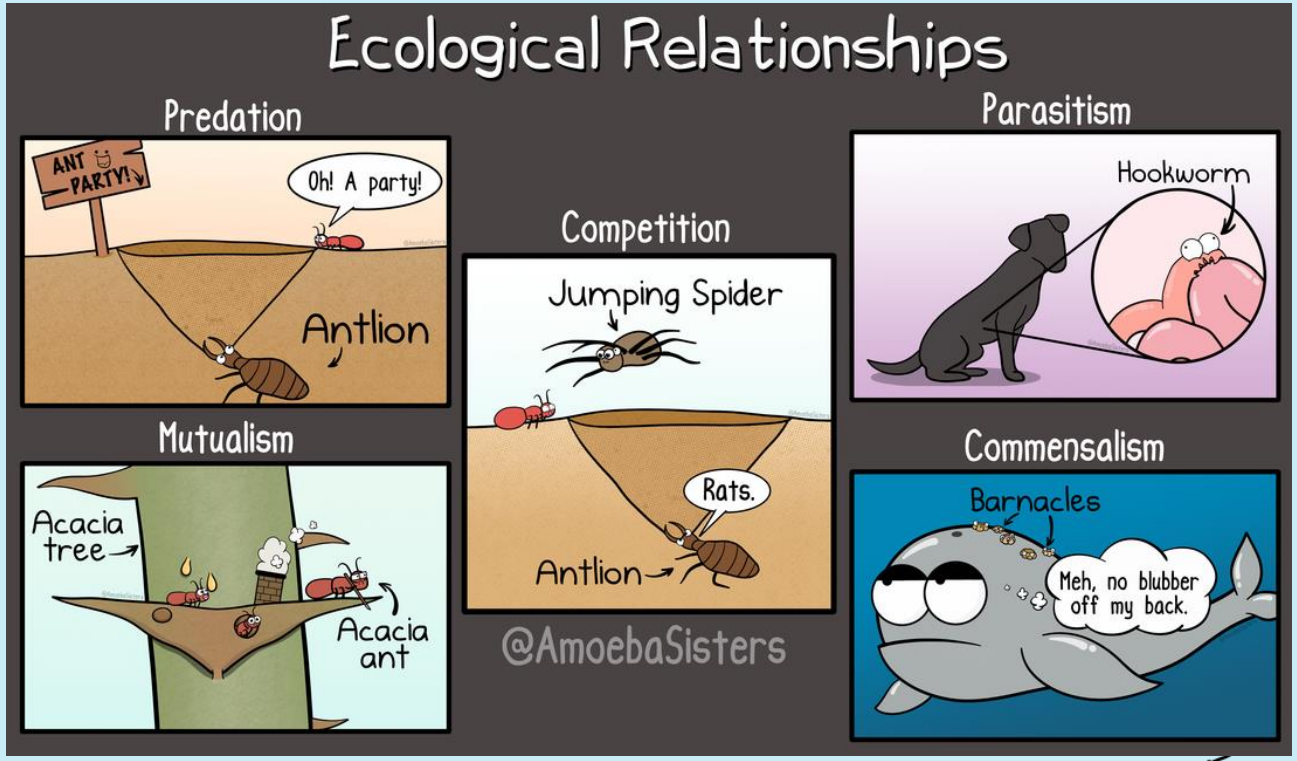
$\frac{dN}{dt} = r_{max}\left(\frac{K-N}{K}\right)N$



Unit 8: Ecology

Evolution

- Energy Flow
- Population Ecology
- Community Ecology



Multiple Choice Practice:

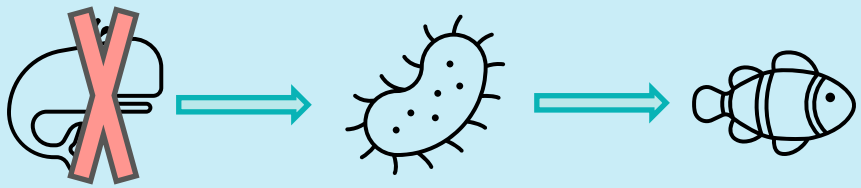
Beaked whales feed at various depths, but they defecate at the ocean's surface. Nitrogen-rich whale feces deposited in surface waters supply nutrients for algae that are eaten by surface dwelling fish. Which of the following best predicts what would happen if the whale population decreased?

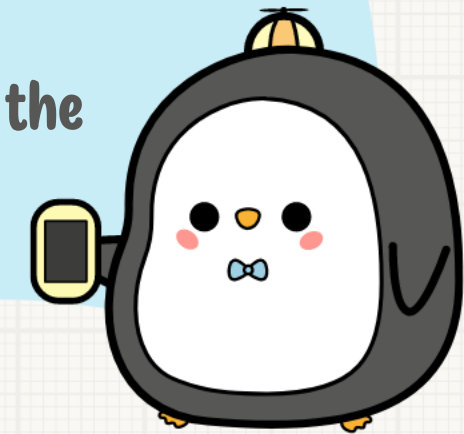
a. There would be a reduction in surface nitrogen concentration, which would cause an algal bloom.

b. The surface fish populations would decline due to reduced populations of algae.

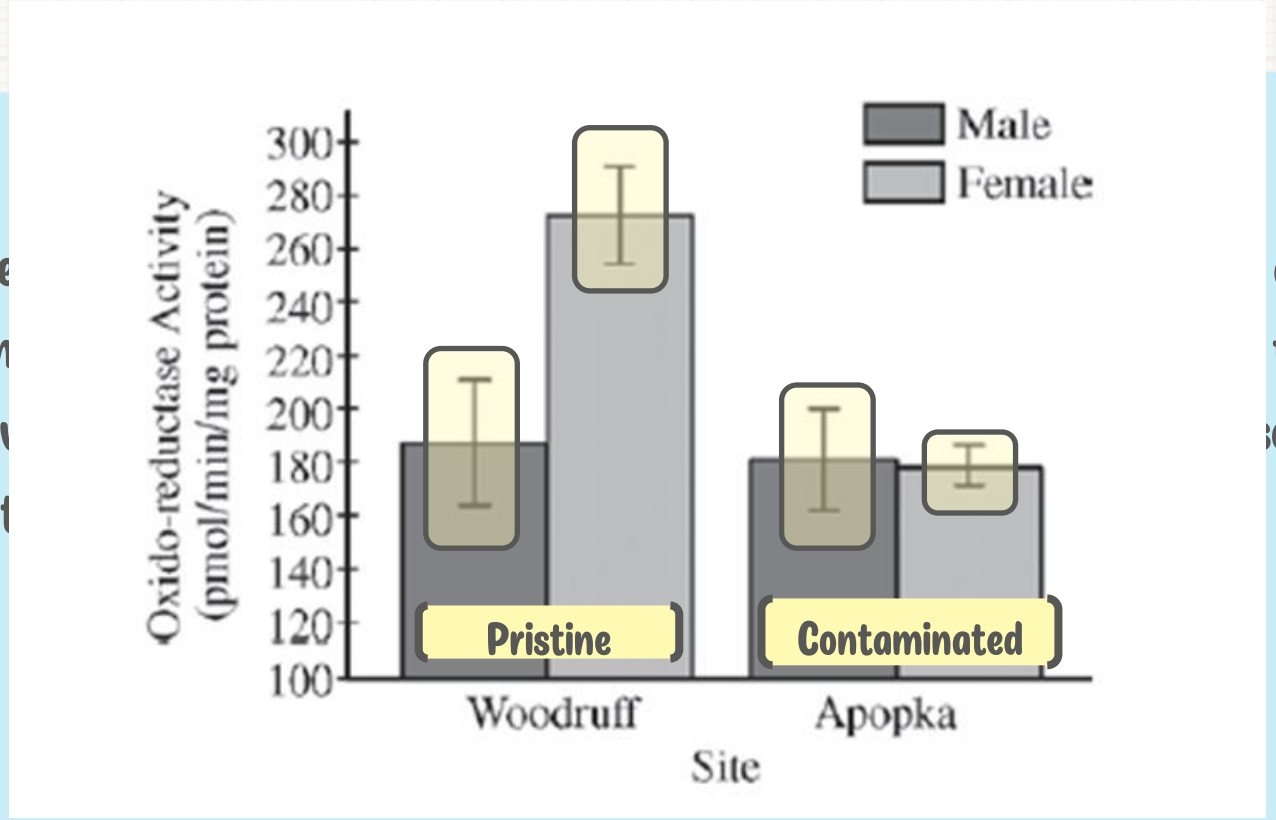
c. The remaining whales would accumulate mutations at a faster rate.

d. The remaining whales would be forced to forage in the deepest parts of the ocean.





Testosterone oxido-re alligators. One study compared testosteron from Lake Woodruff, a relatively pristine env severe contamination. The graph above depicts t



The data in the graph best support which of the following claims?

a. Environmental contamination elevates total testosterone oxido-reductase activity in females.

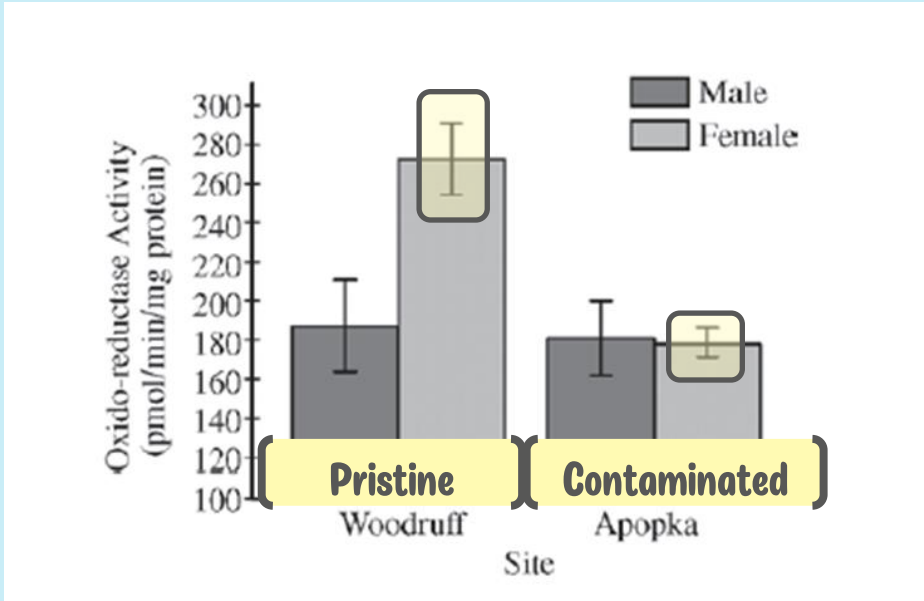
b. Environmental contamination reduces total testosterone oxido-reductase activity in females.

c. Environmental contamination elevates total testosterone oxido-reductase activity in males.

d. Environmental contamination reduces total testosterone oxido-reductase activity in males.

Multiple Choice Practice:

Testosterone oxido-reductase is a liver enzyme that regulates testosterone levels in alligators. One study compared testosterone oxido-reductase activity between male and female alligators from Lake Woodruff, a relatively pristine environment, and from Lake Apopka, an area that has suffered severe contamination. The graph above depicts the findings of that study.



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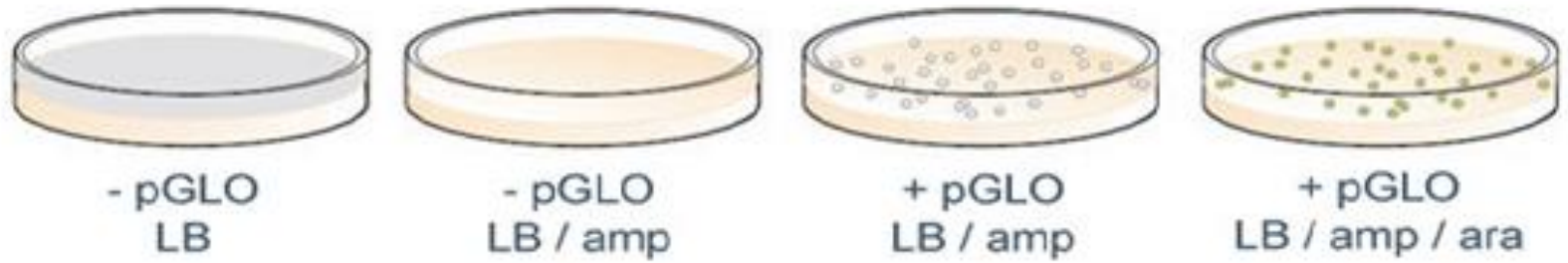
c. Environmental contamination elevates total testosterone oxido-reductase activity in males.

d. Environmental contamination reduces total testosterone oxido-reductase activity in males.

Science Practice

Experimental Design

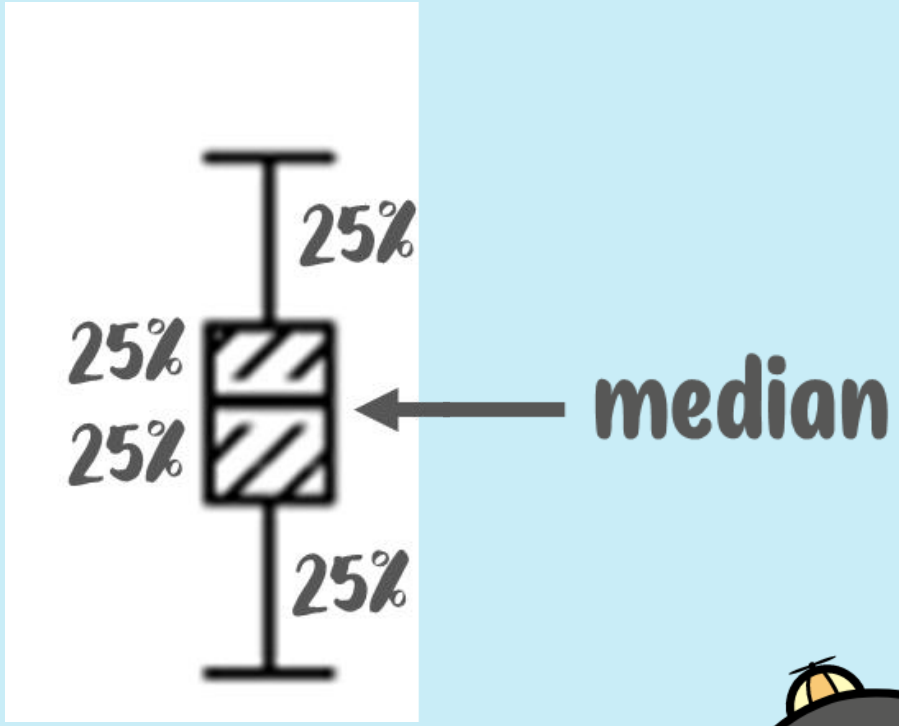
- Independent vs. Dependent Variables
- Null hypothesis
- Positive vs. Negative Control



Science Practices

Graphing Tips & Tricks

- Types of Graphs
- Label your AXIS (title & units)
- Scale your axis
- Data Points
- Error Bars



Percent Change

(c) Based on the data in Table 1, **identify** the yeast strain and growth conditions that lead to the highest relative amount of *PHO1* mRNA. **Calculate** the percent change in APase activity in wild-type yeast cells in a high-Pi environment compared with that of wild-type cells in a low-Pi environment.

Yeast Strain	Mutation	APase Activity in High-Pi Environment (mU/mL/OD_{600}) $\pm 2SE_{\bar{x}}$	APase Activity in Low-Pi Environment (mU/mL/OD_{600}) $\pm 2SE_{\bar{x}}$	Relative Amounts of *PHO1* mRNA in High-Pi Environment $\pm 2SE_{\bar{x}}$	Relative Amounts of *PHO1* mRNA in Low-Pi Environment $\pm 2SE_{\bar{x}}$
Wild-type	None	0.5 ± 0.1	17.3 ± 0.9	0.1 ± 0.0	10 ± 2.0
pho81mt	Nonfunctional Pho81	0.4 ± 0.1	0.6 ± 0.1	0.7 ± 0.2	0.9 ± 0.8
pho4mt	Nonfunctional Pho4	0.5 ± 0.0	0.8 ± 0.2	0.6 ± 0.4	0.3 ± 0.1

$$percent\ change = \frac{final - inital}{initial} x100$$

$$= \frac{17.3 - 0.5}{0.5} x100 \quad = \frac{16.3}{0.5} x100 \quad = 33.6\ x\ 100 \quad = 3360\%$$

Q & A

Wednesday 5/15 @8pm

MarcoLearning

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AP Bio Insta-Review

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