

Biology Review Packet

Benchmarks

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Evolution

Classification

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Human Body

Cells

Genetics

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Biochem

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Ecology

Learning Objectives:

- SWBAT explain the movement of matter in the water cycle.
- SWBAT explain the movement of matter in the carbon cycle.
- SWBAT explain the movement of matter in the nitrogen cycle.
- SWBAT explain the movement of matter in the phosphorus cycle.
- SWBAT explain how energy is transferred between organisms.
- SWBAT differentiate between the movement of energy and matter through the ecosystem.

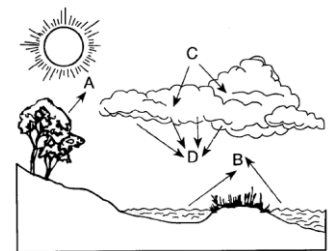
Vocabulary:

- Matter
- Energy
- Evaporation
- Condensation
- Transpiration
- Decomposition

Key Points, Examples, and Diagrams:

- A. Matter:
- Anything that has mass and occupies volume
 - Carbon, Nitrogen, Oxygen, Hydrogen, and Phosphorus are the most common types of matter in our ecosystems.
 - Matter can be in different phases and can combine with different elements.
 - Matter is recycled, meaning it can be used over and over again.

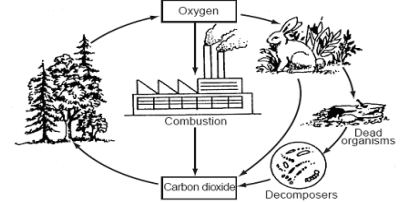
DIAGRAM A (Water Cycle)



- B. Water cycle:
- H₂O is cycled. (H₂O is the symbol for water.)
 - Evaporation: H₂O changes from liquid to gas from the earth to the atmosphere.
 - Condensation: H₂O changes from gas to liquid in the atmosphere.
 - Precipitation: H₂O falls to the earth from the atmosphere.
 - Transpiration: H₂O is released from plants into the atmosphere.

- C. Carbon cycle:
- C is cycled. (C is the symbol for Carbon.)
 - Photosynthesis: C enters plants from the atmosphere.
 - Cell Respiration: C is released from animals into the atmosphere.
 - Decomposition: C is released from animals into the earth.
 - Fossil Fuels: C is underground in the form of Coal, Oil and Gas.
 - Combustion: C is released to the atmosphere from the burning of Fossil Fuel.

DIAGRAM B (Carbon Cycle)



- D. Phosphorus cycle:
- P is cycled. (P is the symbol for Phosphorus.)
 - P combines with other elements to take different forms.
- E. Nitrogen cycle:
- N is cycled. (N is the symbol for Nitrogen.)
 - combines with other elements to take different forms.

DIAGRAM C (Phosphorus Cycle)

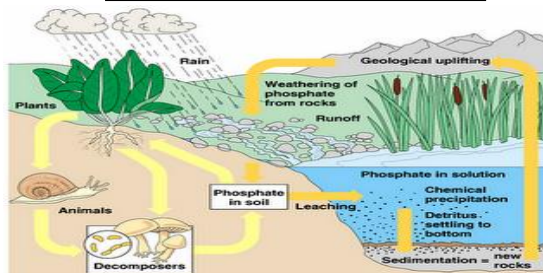
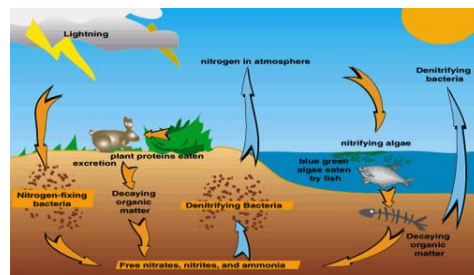
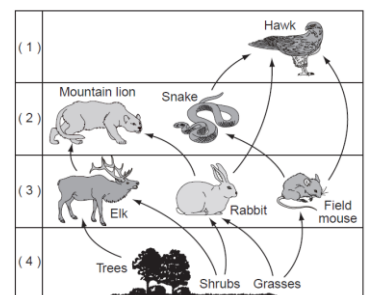


DIAGRAM D (Nitrogen Cycle)



- F. Energy:
- All energy comes from the sun.
 - Plants receive 100% energy from the sun through the process of photosynthesis. Plants are known as Producers.
 - Consumers are organisms that need to feed on other organisms to obtain energy.
- G. Energy Transfer
- Energy is not cycled. Energy transfers from one organism to another organism in one direction.
 - Energy is reduced as it is transferred from one organism to another organism. There is less energy after it is transferred.
 - Energy can be transferred from *producer to consumer* or from *consumer to consumer*.

DIAGRAM E (Energy Transfer)



Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Use the T chart to list *at least* 3 differences (Ecological Principles) between the movements of **energy** and **matter** through the ecosystem

ENERGY	MATTER
1. 2. 3.	1. 2. 3.

2. Using the T chart above and ecological diagrams A, B, and E (from the key points section above), explain what specific principle(s) you listed in your T chart above is best illustrated by the diagrams. Explain Why you chose each principle.

Diagram	Ecological Principle(s)	Why did you choose this?
Diagram A		
Diagram B		
Diagram E		

3. Use the following word bank to match the ecological processes involved in diagrams A, B, and E. Use the terms in the word bank only once.

Diagram	Ecological Processes
Diagram A	
Diagram B	
Diagram E	

Word Bank
Photosynthesis
Cell Respiration
Evaporation
Condensation
Fossil Fuel
Food Web
Energy Transfer
Matter Cycle
Precipitation
Water Cycle
Carbon Cycle

4. In Diagram B, how do Decomposers, Producers, and Consumers affect the movement of matter in the carbon-oxygen cycle? Is Carbon and Oxygen added or removed from the environment? You may use the terms in the Word Bank more than once.

Organism	Movement of Matter
Decomposer	
Producer	
Consumer	

Word Bank
Carbon Removed
Carbon Added
Oxygen Removed
Oxygen Added

5. Using Diagram A, match the correct letter to the following processes and explain the role of each process in the Water Cycle.

Process	Letter	What happens?
Evaporation		
Condensation		
Precipitation		
Transpiration		

6. Using Diagrams C and D, explain which processes happen in each cycle, the location of each process, and what happens in each process.

Process	Which Cycle?	Location	What happens?
Run-off			
Decomposition			
Sedimentation			

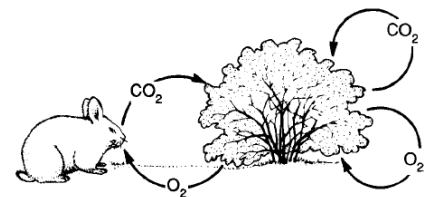
7. Why is nitrogen needed by living organisms? _____

8. Why is phosphorus needed by living organisms? _____

9. Fossil fuels, such as petroleum, are formed by the decomposition of living material. Large amounts of known oil reserves are located deep in the ground in deserts and tundra. How can you explain that we currently find the largest oil reserves in arid deserts?

10. The movements of energy and nutrients through living systems are different because _____

11. In the diagram to the right, which ecological principle (listed in question 1) is best described?



Learning Objectives:

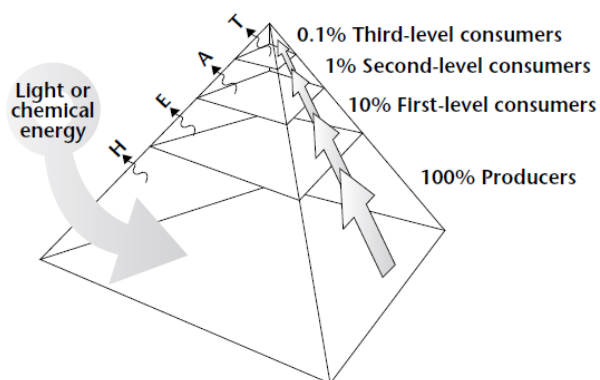
- SWBAT identify the essential relationships of organisms in a food web diagram
- SWBAT explain the difference between a food web and food chain
- SWBAT predict the outcome of an ecosystem when an organism increases or decreases

Vocabulary:

- Producer / Consumer
- Decomposer
- Herbivore / Carnivore / Omnivore
- Predator / Prey
- Biodiversity
- Trophic Level

Key Points, Examples, and Diagrams:Organisms

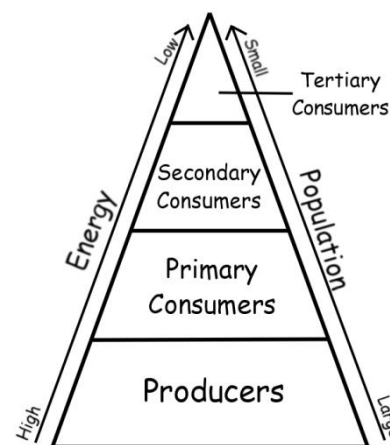
- Producer – an organism that creates its own energy. Also known as an autotroph.
- Consumer – an organism that gets its energy from producers or other consumers. Also known as heterotrophs.
- Decomposer - organisms that break down the dead or decaying organisms
- Herbivore – any animal that eats only plants
- Carnivore – any animal that eats only meat (other animals)
- Omnivore – an animal that eats both plants and meat
- Predator – an animal that lives by eating other animals
- Prey – an animal that is eaten by another animal

Relationships

- If predators increase, prey decreases
- If predators decrease, prey increase
- If prey increase, predators increase
- If prey decrease, predators decrease

Energy Pyramids

- Trophic Level: each section of the energy pyramid
 - 10% of the energy is transferred from organisms at one trophic level to the next trophic level. Energy is reduced.
 - The bottom trophic level has 100% and are composed of Producers.
 - The next trophic level has 10% and are composed of 1st Level Consumers.
 - The next trophic level has 1% and are composed of 2nd Level Consumers.
 - The next trophic level has .1% and are composed of 3rd Level Consumers.
- Plants have the most energy because they produce it themselves.
- Population decreases the higher up on the energy pyramid.

Biodiversity

- Biodiversity: The number of different species in an ecosystem.
- The more biodiversity an ecosystem has, the less it is affected by disease.
- The less biodiversity an ecosystem has, the more it is affected by disease.

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

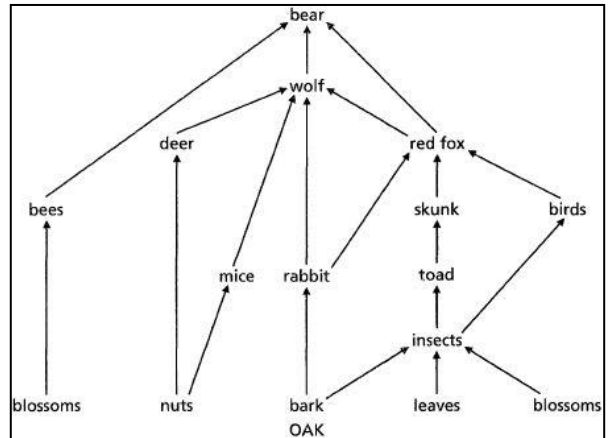
Use the image at the right for questions 1-6.

1. For the following questions, write increase, decrease, or "same" for stays the same.

- a. If prey increase, predators _____.
- b. If predators increase, prey _____.
- c. If predators _____, prey increase.
- d. If prey _____, predators decrease.

For e. – k. use the image at the right

- e. If deer decrease, wolves _____
- f. If mice increase, nuts _____
- g. If toads decrease, insects _____
- h. If bark increase rabbits _____
- i. If birds decrease, red fox _____
- j. If bear increase, wolves _____
- k. If bees increase, bears _____



2. In the image at the right, what are the primary consumers?

3. What are the producer(s)?

4. If the Toad went extinct, which 2 organisms would be directly affected and how?

5. If a possum moved into the ecosystem and started to feed upon the toads, how would the skunks be affected?

6. The African Sahara changes less when a disease hits than when that same disease hits the American Prairies. How can you explain this observation?

Use the following selection for questions 7, 8, 9, and 10.

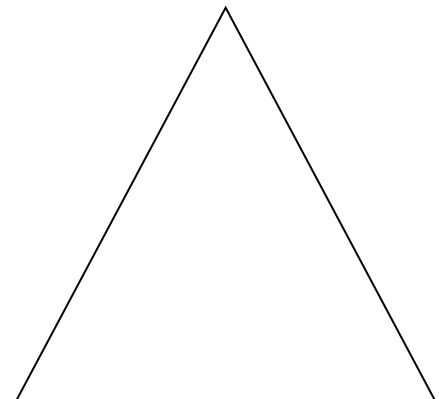
There are many tall trees in the rainforest of South America. The trees receive much sunlight at the equator, growing tall. These trees provide food and shelter for the flying squirrels, who swing from their branches and eat their fruit. The trees are also good for the Panthers, which climb the trees and eat the flying squirrels.

7. Create an energy pyramid based upon the selection above. For each level, label the amount of energy, the trophic level, the organisms in each trophic level, the least populated level and the most populated level. (hint: your pyramid should have 3 trophic levels)

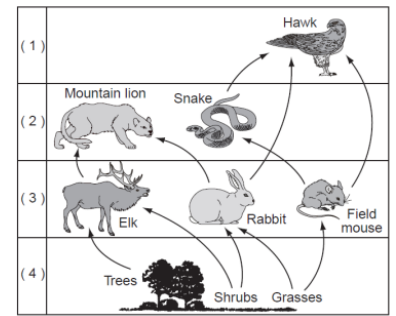
8. What percentage of the food web's energy do the flying squirrels receive? _____

9. What percentage of the food web's energy do the Panthers receive? _____

10. What percentage of the food web's energy do the trees have? _____



11. Using the image to the right, which statement best describes energy in this food web?
- The energy content of level 3 depends on the energy content of level 2.
 - The energy content of level 1 depends on the energy provided from an abiotic source.
 - The energy content of level 3 is greater than the energy content of level 1.
 - The energy content of level 1 is transferred to level 2.



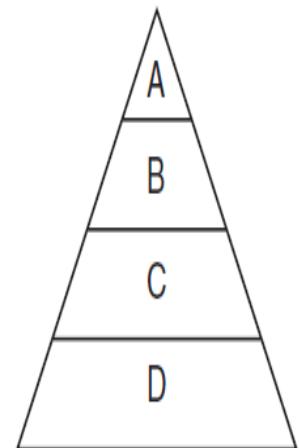
12. Using the image to the right, which statement best describes the snake?
- Tertiary Consumer
 - 1st Level Consumer
 - Producer
 - 2nd Level Consumer

For Questions 13-19, use the energy pyramid to the right.

13. In the energy pyramid to the right, which level of organisms contains the greatest amount of energy available?

14. Which process provides the initial energy to support all the levels in the energy pyramid to the right?
- Respiration
 - Photosynthesis
 - Digestion
 - Transpiration

15. Which statement about the pyramid of energy shown to the right is correct?
- The amount of energy needed to sustain the pyramid enters at level A.
 - The total amount of energy decreases with each successive feeding level from A to D.
 - The total amount of energy at level A is less than the total amount of energy at level C.
 - The amount of energy is identical in each level of the pyramid.



16. List 4 organisms that would most likely be found at level D?

17. a) If there is 1830 kcal of energy at D, how much energy is available at A, B and C?

A _____ B _____ C _____

- b) If there is 2420 kcal of energy at C, how much energy is available at A, B, and D?

A _____ B _____ D _____

Use the following food web for questions 18-20.

18. If the population of mice is reduced by disease, which change will most likely occur in the food web?

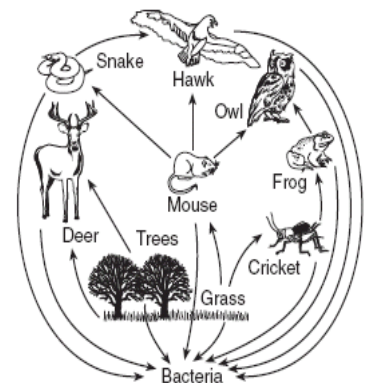
19. What is the original source of energy for this food web?

20. Starting with the Trees, create 3 food chains using the food web to the right.

_____ → _____ → _____ → _____

_____ → _____ → _____ → _____

_____ → _____ → _____ → _____



Learning Objectives:

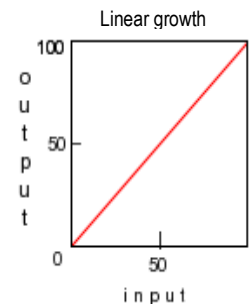
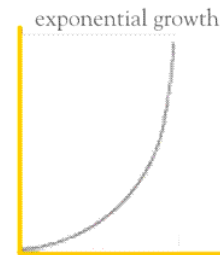
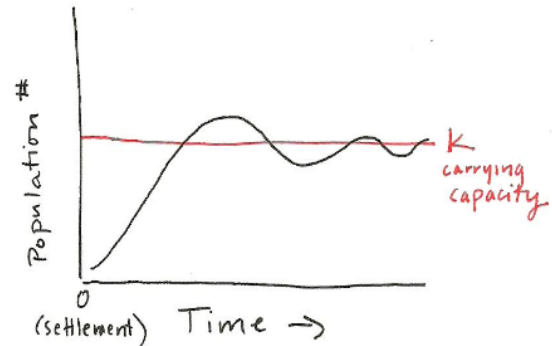
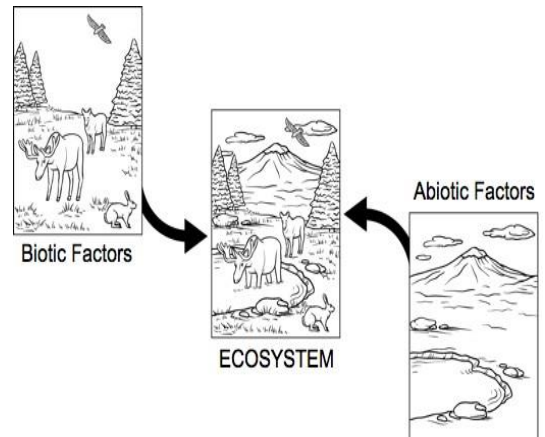
- SWBAT: Explain how population size is determined by births and deaths.
- SWBAT: Explain how population size is determined by immigration and emigration.
- SWBAT: Explain how population size is determined by limiting factors (abiotic and biotic).

Vocabulary:

- Biotic / Abiotic Factors
- Habitat / Niche
- Population / Community
- Ecosystem
- Birth Rate / Death Rate
- Immigration / Emigration
- Carrying Capacity
- Limiting Factor

Key Points, Examples, and Diagrams:

- A. Biotic: Living
- B. Abiotic: Non-Living
- C. Biosphere: the regions of the surface and atmosphere of the Earth (or other planet) where living organisms exist
- D. Population: A population consists of individuals of the same species. There can be only ONE species in a population.
- E. Community: A community consists of ONLY biotic factors. For example, more than one species living together.
- F. Habitat: A habitat consists of ONLY abiotic factors. For example, the lakes and mountains.
- G. Ecosystem: An ecosystem consists of BOTH biotic and abiotic factors.
- H. Niche: A niche is the "job" or "role" that an individual has in an ecosystem.
- I. Birth Rate: If birthrate is higher than death rate then population will increase.
- J. Death Rate: If death rate is higher than birthrate then population will decrease.
- K. Immigration: Immigration is when individuals go INTO an ecosystem. Immigration will increase population size.
- L. Emigration: Emigration is when individuals EXIT an ecosystem. Emigration will decrease population size.
- M. Carrying Capacity: the maximum number of individuals an ecosystem can support.
- N. Limiting Factor: something (either biotic or abiotic) that affects how much life an ecosystem can support. Resources are limited.
- O. Exponential Growth: Growth that continues Increase Positively. The growth gets bigger.
- P. Linear Growth: A constant positive increase. The growth is always the same.
- Q. Symbiosis: relationship in which two species live closely together
- R. Mutualism: Symbiotic relationship in which both species benefit from the relationship
- S. Parasitism: symbiotic relationship in which one organism lives in or on another organism (the host) and consequently harms it
- T. Commensalism: symbiotic relationship in which one member of the association benefits and the other is neither helped or harmed
- U. Predation: interaction in which one organism captures and feeds on another organism



Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

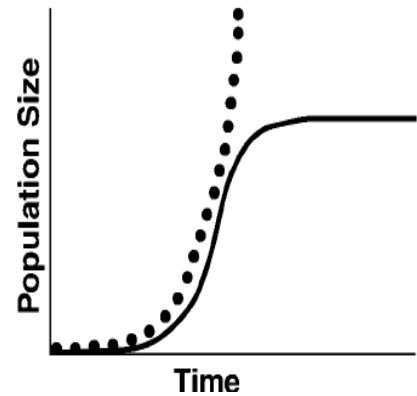
1. Tell whether the following scenarios will INCREASE or DECREASE population size. Write I for Increase, D for Decrease, or S for stay the same.

- a. Birthrate = 20/min & death rate = 15/min _____
- b. Birthrate = 5/min & death rate = 5/min _____
- c. Birthrate = 2/min & death rate = 1/50 seconds _____
- d. Immigration = 4/min & Emigration = 1/min _____
- e. Immigration = 12/min & Emigration = 13/min _____
- f. Immigration = 1/min & Emigration = 1/55 seconds _____
- g. Resources become less available _____
- h. Resources become more available _____

2. The dotted line on the graph below represents the potential size of a population based on its reproductive capacity. The solid line on this graph represents the actual size of the population.

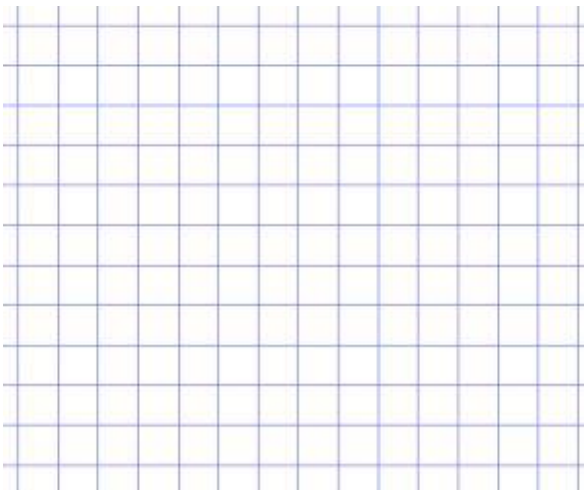
a. The solid line started to grow exponentially and decreased growth until the population was represented by a straight horizontal line. What is the name of the horizontal line that the population is remaining at called?

b. Why is the actual population growth less than the potential population growth?



3. A single protist was placed in a large test tube containing nutrient broth. The tube was then kept at room temperature for 24 hours. Samples from the tube were observed periodically during the 24 hours. The data are summarized in the table below:

a. Use the following chart to graph the data represented in the table below. Be sure to Label both the X and Y axis and scale your axis correctly. Give the graph a title.



Data Table

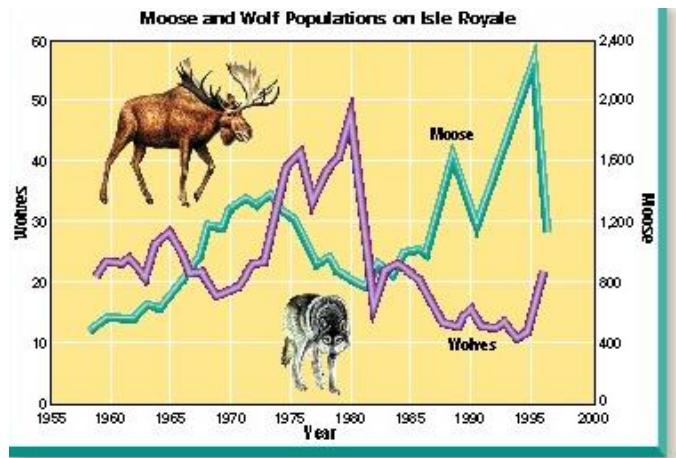
Age of the Population in Hours	Number of Protists in the Population
0	1
6	2
8	3
10	4
13	8
16	16
18	32
20	64
22	128
24	256

b. Does this graph represent *linear* or *exponential* growth? How do you know?

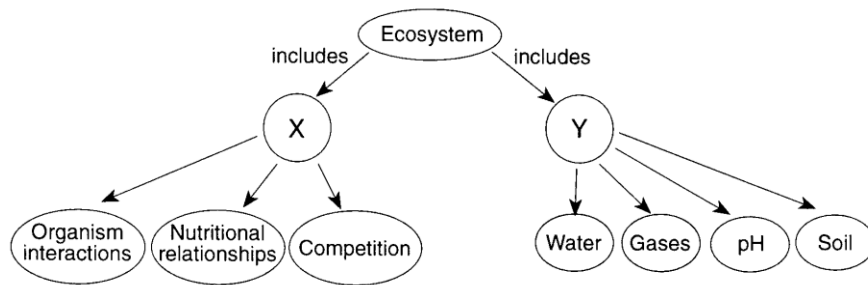
6. For the following questions, use the graph to the right.

a. Why does the wolf population generally rise whenever the moose population increases?

b. Why is an increase in the number of wolves usually followed by a decline in the moose population?



13. Information relating to an ecosystem is contained in the diagram shown below.



a. Is X abiotic, or biotic? Why? _____

b. Is Y abiotic or biotic? Why? _____

14. Give at least 5 examples of Biotic and Abiotic factors by filling in the T chart below.

Biotic	Abiotic

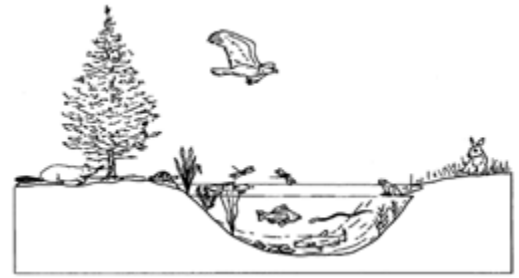
15. What are **three** biotic factor that limit the carrying capacity of any habitat? Why is it considered a limiting factor?

Biotic Factor	Why is it a limiting factor?
1.	
2.	
3.	

Use picture below for questions 16-17.

16. Which is an abiotic factor that functions as a limiting factor for the autotrophs in the ecosystem below?

17. Which ecological term refers to all the organisms shown in the diagram?



18. Put the following terms **Population**, **Ecosystem**, **Community**, and **Biosphere** in order of increasing complexity of levels of ecological organization?

1. _____ 2. _____ 3. _____ 4. _____

For questions 19 – 24 Use the following word bank to answer each question. Terms in the word bank may be used more than once. Some terms might not be used at all.

19. Two closely related species of birds live in the same tree. Species A feeds on ants and termites while species B feeds on caterpillars. Why do the two species coexist?

20. Knowing the type of food consumed by an organism helps to identify the role of the organism in the community. This role is known as its:

21. Great horned owls and red-tailed hawks have similar requirements for food, space, and nesting materials. What would most likely be the result of great horned owls and red-tailed hawks living in the same community?

22. What is the portion of Earth in which all life exists known as? _____

23. Which level of biological organization includes the greatest total number of different species? _____

24. The diagram below shows living and nonliving factors and the interaction between them. This diagram best represents: _____

25. Use the table listed in **question 5** to answer the following question. A Barnacle and a whale live together in an aquatic environment. The Barnacle benefits by eating bacteria off the whale and the Whale benefits by getting harmful bacteria eaten off of it. What type of relationship is this?

Word Bank

- Habitat
- Population
- Community
- Ecosystem
- Niche
- Competition
- Parasitism
- Biosphere
- Symbiosis
- Mutualism
- Succession



Student Name:	Date:	Period:	
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Learning Objectives:	Vocabulary:
<ul style="list-style-type: none"> SWBAT explain what sustainability is. SWBAT explain how human lifestyles affect sustainability. SWBAT predict the impact that individuals have on the environment. 	<ul style="list-style-type: none"> Sustainability Green revolution Biosphere Biodiversity Industrial Revolution

Key Points, Examples, and Diagrams:
V. Read pages 139 to 160 in the Biology Textbook for information on how human lifestyles affect the environment.

Independent Practice	Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.
<p>1. List three types of human activities that can affect the biosphere. For each activity, give one environmental cost and one environmental benefit.</p> <p style="margin-left: 20px;">a. _____ _____</p> <p style="margin-left: 20px;">b. _____ _____</p> <p style="margin-left: 20px;">c. _____ _____</p> <p>2. Identify three of Earth's resources on which humans and other organisms depend for the long-term survival of their species.</p> <p style="margin-left: 20px;">a. _____</p> <p style="margin-left: 20px;">b. _____</p> <p style="margin-left: 20px;">c. _____</p> <p>3. Explain how the development of agriculture and the Green Revolution both affected humans. Then explain how agriculture and the Green Revolution affected the environment. Please be detailed in your response and write in complete sentences for full credit.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>4. What was the Industrial Revolution?</p> <p>_____</p> <p>_____</p>	

5. Identify two ways in which the Industrial Revolution has affected living things:

- a. _____

- b. _____

6. What is pollution? _____

7. The following shows two ways that human activity can negatively affect that part of the environment. Explain what each concept is and how it affects the environment.

a. Land

i. Soil erosion _____

ii. Deforestation - _____

b. Water

i. Overfishing - _____

ii. Sewage - _____

c. Air

i. Smog - _____

ii. Acid Rain - _____

8. Why is biodiversity worth preserving? _____

9. List four activities that could threaten biodiversity? _____

Resources	Benchmark: SC.912.L.17.11 Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.	Page 16 of 96
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Learning Objectives:	Vocabulary:
<ul style="list-style-type: none"> • SWBAT: Distinguish between renewable and non-renewable resources. • SWBAT: Analyze the costs and benefits of the use of water, energy, fossil fuels, wildlife, and forests. 	<ul style="list-style-type: none"> • Renewable resources • Non-renewable resources • Fossil fuels

Key Points, Examples, and Diagrams:
<p>A. Humans use resources for modern society (energy, drinking water, building materials, sanitation, products, etc).</p> <p>B. Renewable resources are resources that do not run out. No matter how much we use this resource it will not change the environment.</p> <p style="padding-left: 20px;">a. Examples include: wind, solar, and geothermal energy.</p> <p>C. Non-renewable resources are resources that are finite (this means there is only 'so much' of them and will eventually run out).</p> <p style="padding-left: 20px;">a. Examples include: oil, coal, natural gas, nuclear energy, forests, water, wildlife, etc.)</p> <p style="padding-left: 20px;">b. Non-renewable resources can be living or non-living things.</p> <p style="padding-left: 20px;">c. Finite resources – resources that are not unlimited; there is a limited amount of it on Earth.</p> <p>D. Fossil fuels – energy sources that are carbon-based and take millions of years to form. Fossil fuels form under high pressures deep underground over the course of millions of years. Humans cannot replenish them (they are non-renewable).</p> <p style="padding-left: 20px;">a. Example include: oil, coal, and natural gas</p>

Independent Practice	Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.
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Please answer the following questions in complete sentences to receive full credit.

1. Describe the difference between renewable and non-renewable resources in your own words (do not copy the definitions from above).

2. Aluminum is an expensive metal used in the construction of various man-made projects. Do you think that the recycling of aluminum preserves finite resources? Justify your answer in at least two complete sentences.

3. Deforestation is the process by which humans cut down large areas of trees to make room for construction or to sell the timber. Predict what affect deforestation might have on an ecosystem. Also explain whether deforestation would help preserve finite resources. Make sure to justify your answer in at least three sentences.

4. For each of the following circle the word that does not belong with the rest and in one complete sentence explain why it does not fit.

- a. Coal | Oil | Solar Power | Natural Gas

- b. Biodegradable | Recycling | Sustainability | Deforestation

5. Choose a renewable resource and identify two advantages to it and two disadvantages to using it (wind power is done as an example for you. You may not use wind power as your example).

- a. *My Example: Wind power is an example of a renewable resource because it does not run out. Two advantages are that it does not create pollution and that it does not increase the amount of greenhouse gasses in the atmosphere. Two disadvantages are that wind turbines need to be located in windy areas and migratory birds can get caught in the wind turbines.*
- b. *Your Example:*

6. Define the following key terms in your own words. You may use the textbook, the internet, notes, and background knowledge to help. You should also try to decode the word using context clues, root words, prefixes, and suffixes. In addition, for each vocabulary word you must write one sentence explaining how it is related to renewable / non-renewable resources.

- a. Biodegradable - _____

- b. Sustainable - _____

- c. Biodiversity - _____

- d. Wildlife - _____

Learning Objectives:

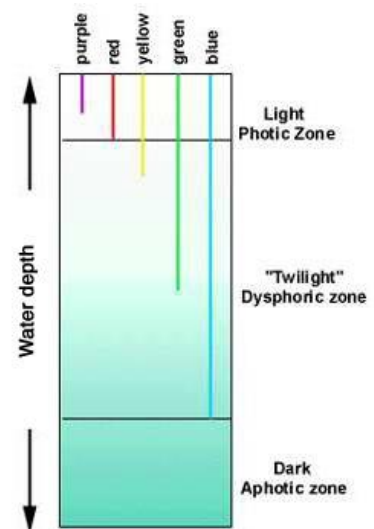
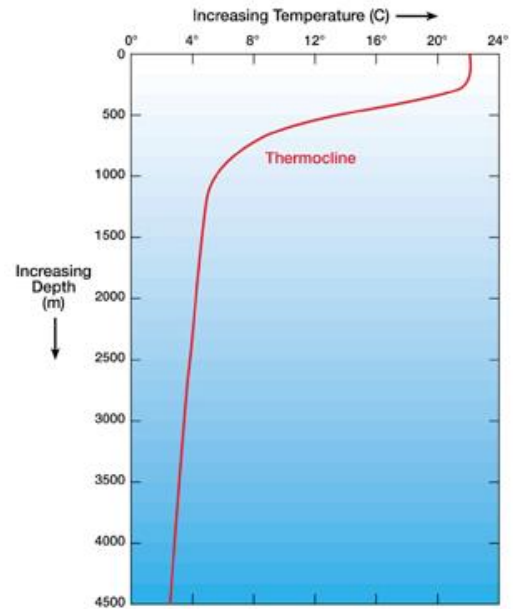
- SWBAT: Identify different types of aquatic systems.
- SWBAT: Explain how depth, salinity, and temperature affect life in an aquatic system.
- SWBAT: Explain how chemistry, geography, and light affect life in an aquatic system.

Vocabulary:

- Marine ecosystem
- Fresh-water ecosystem
- Standing-water
- Flowing-water
- Photic / aphotic
- Salinity
- Chemosynthesis
- Thermocline

Key Points, Examples, and Diagrams:

- A. Two categories of aquatic ecosystems:
- a. Freshwater = lakes, rivers, ponds (does not contain salt)
 - b. Marine = oceans, salt marshes, seas (contains salt)
- B. Flow of water in aquatic ecosystems:
- a. Standing-water: water that is not moving that much such as lakes, ponds, oceans
 - b. Flowing-water: water that is moving rapidly such as rivers, streams, creeks
- C. Depth – the deeper you go the LESS light there will be (the light can't penetrate that far down)
- a. Photic – area where light does penetrate (only area where algae and producers can grow)
 - b. Aphotic – permanently dark (no plants grow here)
 - c. At deep depths photosynthesis cannot occur because there is no sunlight.
 - d. However, chemosynthesis does occur = uses methane as a source of energy rather than sunlight.
- D. Temperature – the deeper you go the colder the temperature.
- a. A thermocline is a rapid decrease in temperature.
- E. Chemistry of Aquatic Systems is determined by:
- a. Salt concentration (this is known as salinity)
 - i. Marine ecosystems have higher salinity.
 - ii. Freshwater ecosystems have lower salinity.
 - b. Nutrients
 - c. Dissolved oxygen (remember, fish need to breathe in oxygen)



Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. What happens to the amount of light as you go deeper in an aquatic system? _____
2. What happens to the temperature as you go deeper in an aquatic system? _____
3. Which has higher salinity; oceans or lakes? _____
4. What is the difference between photic and aphotic? _____
5. Why won't you find plant life in the aphotic zone? _____

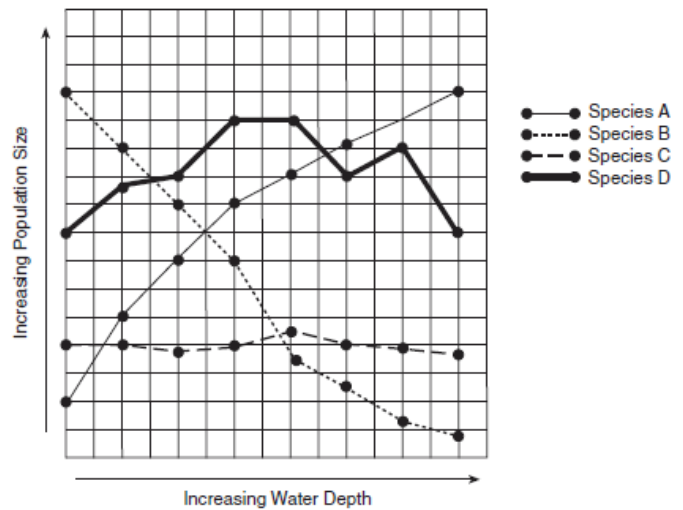
6. Use the graph to the right to answer the following questions:
- a. Which species is mostly likely a producer? _____

- b. Which species is best adapted to deep depths? _____

- c. Which species is probably least affected by temperature? _____

- d. What is the x-axis of this graph? _____

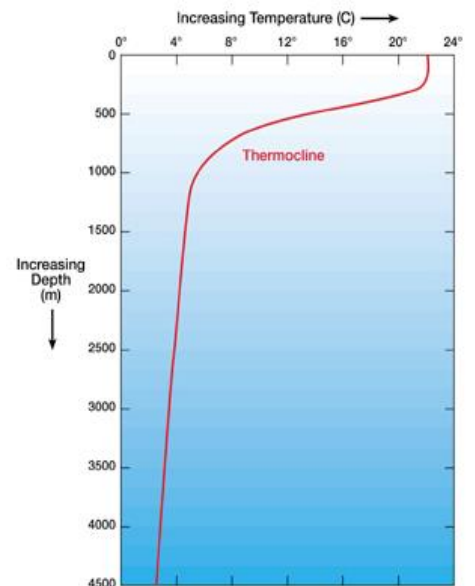
- e. Give this graph an appropriate title. _____



7. What is the relationship between light and depth? _____

8. Look at the graph to the right. During which 500 meter interval does the temperature decrease most rapidly? _____

9. What is a thermocline? _____



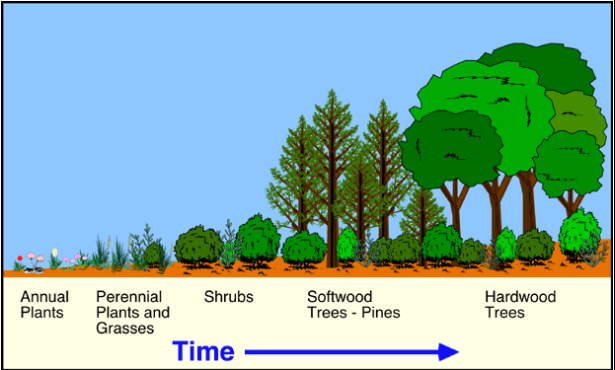
10. The chemistry of aquatic ecosystems is determined by the
 - a. Amount of salts, nutrients, and oxygen dissolved in the water.
 - b. Number of organisms present in the water.
 - c. Amount of rainfall the water receives.
 - d. Biotic and abiotic factors in the water.

11. A student collects a sample of water in Florida with a high salinity. Where is the most likely place for this water to have come from?
 - a. St. Johns River
 - b. Pond at school
 - c. Atlantic Ocean
 - d. Lake Okeechobee

Learning Objectives:	Vocabulary:
<ul style="list-style-type: none"> • SWBAT: Explain how seasonal variations affect ecosystems. • SWBAT: Explain how climate change affects an ecosystem. • SWBAT: Distinguish between primary and secondary succession. • SWBAT: Explain how succession affects an ecosystem. 	<ul style="list-style-type: none"> • Seasonal variations • Climate change • Primary succession • Secondary succession • Pioneer species • Climax community

Key Points, Examples, and Diagrams:

- A. Succession = natural, gradual changes in the types of species that live in an area. Can be primary or secondary.
- B. Succession can take place both in water and on land.
- C. Succession is often difficult to observe because it takes place over LONG periods of time.
- D. Primary succession = begins in a place with NO soil (just bare rock).
 - a. Examples include sides of volcanoes, glaciers, and new volcanic islands.
 - b. Starts with the arrival of living things such as lichens that do not need soil to survive.
 - c. First organisms to arrive are called pioneer species.
 - d. There are 5 stages to primary succession:
 - i. 1 – soil starts to form when erosion and lichens break down the rocks. When the lichens die and decompose they add small amounts of organic matter to the rock to make soil.
 - ii. 2 – simple plants like mosses and ferns can grow in the new soil.
 - iii. 3 – when the simple plants die they add more soil and organic matter. Then the soil thickens and grasses, wildflowers, and other smaller plants begin to take over.
 - iv. 4 – these small plants also die and add more organic material to the soil and more nutrients. Now shrubs and trees can begin to grow and survive.
 - v. 5 – insects, small birds, and mammals begin to move in to the area. A place that was once bare rock now supports a variety of life.
 - vi. NOTE: This process takes thousands of years!!!
- E. Secondary succession = begins in a place that already HAS soil.
 - a. Occurs faster than primary succession because you skip some of the stages. Also has different pioneer species.
 - b. Example – after a forest fire, a mudslide, or a flood the soil is still there but plants will still have to regrow.
- F. **MOST IMPORTANT PART: primary succession = NO SOIL and secondary succession = HAS SOIL**
- G. Climax community = a stable group of plants and animals that is the end result of the succession process (this does not always mean big trees and lots of animals; for example, a desert's climax community is cacti and small reptiles).
- H. Change in the seasons also affects an ecosystem:
 - a. During winter some species go into hibernation.
 - b. In northern climates lakes and rivers can freeze over.



Independent Practice	<p><u>Directions:</u> Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.</p>
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1. What would happen if our school was abandoned? What would the school look like after 1 year? After 10 years? After 20 years? After 100 years? What types of plants and animals would you see at each stage? Be specific and answer all parts of the question!

2. A volcanic island called Nova was newly created in the Pacific ocean 50 years ago. Lichens began to grow on the volcanic rock. Then about 10 years ago some grasses began to grow in the soil that was created by the lichens.

a. What type of succession is this and how do you know? _____

b. What is the pioneer species? How do you know? _____

c. Predict what will happen on the island in the next 100 years. What will the island look like? _____

3. A forest fire sweeps through the Colorado Rockies and burns everything to the ground. The following year there are small grasses and shrubs growing where the fire had swept through. What type of succession is this and how do you know? _____

4. Several years after a building had been torn down and the ground cleared, grasses began to grow in that area. After 10 years, small bushes replaced the grasses. This pattern of plant growth is known as:

- a. Biological control
- b. Cover cropping
- c. Ecological succession
- d. Land-use management

5. Abandoned railroad tracks are overgrown with weeds. Ten years later there are small aspen trees growing in the middle of the tracks. This change is an example of:

- a. Primary succession
- b. Biological evolution
- c. Secondary succession
- d. Heterotrophic nutrition

6. A volcano in a mountainous, wooded region erupts, spewing tons of ash and destroying the forested area around the volcano. If the volcano remains dormant during the next 1000 years, what will probably happen?

- a. The area will be repopulated by trees, eventually becoming a forest again.
- b. The mountains will erode and remain without life.
- c. The area will remain unchanged, covered by volcanic ash.
- d. The area will turn into a completely different habitat, such as desert of plains.

7. Which of the following is not a result of climate change partially caused by burning fossil fuels?

- a. Leaves changing color in the fall months.
- b. Caribou not being able to receive food for their young because of an earlier spring season.
- c. Ice melting in the polar regions, causing polar bears to drown.
- d. Acid rain falling on homes and buildings.

8. Create and draw a storyboard for the five stages of ecological succession (starting with bare rock).

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Biodiversity	Benchmark: SC.912.L.17.8 Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.	Page 22 of 96
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Learning Objectives:	Vocabulary:
SWBAT: Understand the importance of biodiversity in an ecosystem. SWBAT: Explain how catastrophic events lead to a loss of biodiversity. SWBAT: Explain how climate change may lead to a loss of biodiversity. SWBAT: Explain how human activity may lead to a loss of biodiversity. SWBAT: Explain how the introduction of invasive, non-native, species may lead to a loss of biodiversity.	<ul style="list-style-type: none"> • Biodiversity • Climate change • Catastrophic • Invasive species • Biosphere

Key Points, Examples, and Diagrams:
<p>A. Biodiversity = the sum total of the variety of organisms in the biosphere.</p> <p>B. Biosphere = the part of Earth in which life exists including on land, water, and air.</p> <p>C. Biodiversity is one of Earth’s greatest natural resources. Species of many kinds have provided us with foods, industrial products, and medicines – including painkillers, antibiotics, heart drugs, antidepressants, and anticancer drugs.</p> <p>D. Threats to biodiversity:</p> <ol style="list-style-type: none"> a. Human activity – can reduce biodiversity by altering habitats, hunting species to extinction, introducing toxic compounds into food webs. b. Invasive species – humans may bring a new plant or animal into a new area and it does not have any natural predators. Because of this this new organism can grow rapidly and can drive native species close to extinction. c. Climate change – humans contribute to global climate change by emitting carbon dioxide into the atmosphere. CO₂ increases global temperatures. This can alter the environments and habitats of species including temperature, salinity, fresh-water, sea-levels, and how arid a geographic location is. d. Catastrophic events such as volcanoes, earthquakes, oil spills, or other large-scale disasters can harm life.

Independent Practice	Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.
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Read the following article and answer all questions.

Invasion Of Gigantic Burmese Pythons In South Florida Appears To Be Rapidly Expanding

ScienceDaily (May 22, 2008) — The invasion of gigantic Burmese pythons in South Florida appears to be rapidly expanding, according to a new report from a University of Florida researcher who’s been chasing the snakes since 2005.

Associate professor Frank Mazzotti of UF’s Institute of Food and Agricultural Sciences has published a new fact sheet outlining updated python statistics and methods being used to find and eliminate the snakes.

The new document follows the February release of a U. S. Geological Survey climate map that showed — based solely on climate, not habitat — pythons could potentially survive across the lower third of the United States.

Though Mazzotti’s findings may make some nervous, he said the information should be reassuring. Knowing the extent of a problem makes it much easier to solve, he said.

“All of this is good. We’ve defined the problem, and science is really coming to the aid of management efforts,” he said.

He stresses that humans are far more likely to be hurt by animals that don’t typically induce fear, such as hitting a deer with one’s car or being bitten by a dog, than by the nonvenomous snakes. But now, solving the problem must become a priority, Mazzotti said.

“People might argue the ultimate boundaries, but there’s no part of this state that you can point at and say that pythons couldn’t live here,” he said. “We really need to be addressing the spread of these pythons. They’re capable of surviving anywhere in Florida, they’re capable of incredible movement — and in a relatively short period.”

Pythons are likely to colonize anywhere alligators live, he said — including North Florida, Georgia and Louisiana. So far, most of the snakes have been found in Everglades National Park, but they’ve moved beyond its borders, too: as far north as Manatee County.

The Burmese python, native to Burma in Southeast Asia, is one of the world’s largest snake species. The largest found in the Everglades was 16 feet long and 152 pounds.

Mazzotti said there are a few places where eradication of the snakes might be possible, such as the Florida Keys.

“We need to do something so that five years from now, we’re not looking at an exponentially bigger population in those areas because we didn’t go in and get the first ones before they started breeding,” he said.



In most places, he said, the best strategy is likely a larger, focused effort to contain and reduce the population by tracking, capturing and euthanizing the reptiles.

"As soon as you know they're breeding, eradication gets to be out of the question," he said. "Females may store sperm, so they can produce fertile clutches for years. And a 100-something pound snake can easily be producing 60, 80 eggs a year."

State rules that went into effect this year should help, including a \$100 annual permit to own "reptiles of concern," and a mandatory microchip, he said. But it's imperative that more be done to educate people about the problem of turning loose non-native species, he said.

Other highlights from Mazzotti's fact sheet:

- From 2002-2005, 201 pythons were captured or found dead in and around Everglades National Park. In 2006-2007, the number more than doubled, to 418. Everglades wildlife biologist Skip Snow has estimated the population at more than 30,000.
- Since May 2006, trackers have found seven pregnant female snakes and one nest of eggs; one recently captured python had 85 developing eggs.
- Autopsied pythons found in Key Largo contained the remains of the endangered Key Largo woodrat. Other species on the pythons' prey menu include rabbit, gray squirrel, fox squirrel, domestic cats, raccoons, bobcats, white-tailed deer, limpkin, white ibis and the American alligator.
- Not only are pythons fantastic swimmers, they can cover a lot of ground, as well. Two pythons with surgically implanted radio transmitters were found to have traveled 35 miles and 43 miles. Trackers stepped in and caught the male, concerned that it was too close to homes near a Miccosukee Indian Reservation.

1. What is the invasive species that the article is talking about? _____

2. Where did this invasive species come from? _____

3. Provide at least three problems the article discussed about the invasive species. _____

4. What effect does this invasive species have on biodiversity? Be specific! _____

5. What are at least two things that humans are doing to address the problem? _____

6. Why is the population of the invasive species able to grow so quickly? Use your knowledge of food chains to answer this question!

The remaining questions are not from the article.

7. Choose an example of a catastrophic event and explain at least 2 effects it might have on biodiversity and on an ecosystem.

8. Write your own definition of biodiversity: _____

9. Why is biodiversity worth preserving? _____

Biochemistry

Student Name:

Date:

Period:

Original
Mastery:Reassessed
Mastery:**Learning Objectives:**

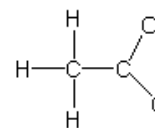
- SWBAT: Distinguish between elements, molecules, and compounds.
- SWBAT: Interpret formula representations of molecules and compounds.
- SWBAT: Identify the elements that are most common in living things.
- SWBAT: Distinguish between covalent bonds and ionic bonds.
- SWBAT: Identify the components of a reaction equation.

Vocabulary:

- Element
- Molecule
- Compound
- Ionic bond
- Covalent bond

Key Points, Examples, and Diagrams:

- All matter is made up of atoms. Atoms are microscopic particles that join together to create everything.
 - There are different types of atoms. Each different type is called an element. Element is one type of atom.
 - A molecule is made up of more than one atom. A compound is made up of more than one element. All compounds are molecules.
 - Formulas are used to represent molecules and compounds in writing (*for example: CO₂ represents carbon dioxide*)
 - Symbols are used to represent/abbreviate individual elements. For example, N=nitrogen, O=oxygen, C=carbon, H=hydrogen, Au=gold
 - Subscripts are used to tell us how many atoms of a particular element there are. For example, in CO₂ it tells us there are 2 oxygen atoms. H₂O = two hydrogen. If there is no subscript it means there is just 1 atom.
 - When atoms join together it is called bonding.
 - Covalent bonding is when atoms share electrons. Strong bonds.
 - Ionic bonding is when electrons are gained or lost. Weaker bonds.
 - A reaction is a process that leads from one set of substances to a new set (think about photosynthesis; what do we start with and what do we end with? This is an example of a reaction).
 - Atoms are not lost or gained in a reaction. This is called conservation of energy/matter.
 - The substances that you start with are called the reactants. The substances you end up with are called the products.
- E. The arrow represents the direction of the reaction.
- F. The diagram to the right represents a molecule/compound. To write the formula you would count up the number of each element and write them down with the correct subscript. For the example below it would look like: C₂H₃O₂ (there are 2 carbon, 3 hydrogen, and 2 oxygen)

**Independent Practice**

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

You must answer all questions to get credit for this assignment. Use the notes above and/or the textbook to help you find the answer.

1. What is the difference between an element and a compound? _____

2. What is the difference between ionic bonds and covalent bonds? _____

3. In a reaction equation you start with the _____ and end up with the _____.
4. What happens to the number of atoms during a reaction? _____
5. What is a reaction? _____

6. What does an arrow represent in a reaction equation? _____

Use the following reaction to answer questions 7 through 11: $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$

7. What is/are the reactant(s)? _____
8. What is/are the product(s)? _____
9. Does the number of oxygen atoms change in the reaction? How many are on each side? _____
10. Does the number of compounds change in the reaction? How many are on each side? _____
11. Label each element in the equation and state how many atoms of each element there are. _____

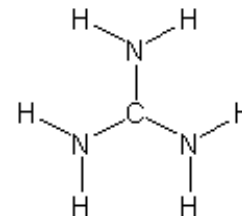
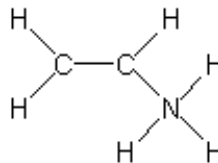
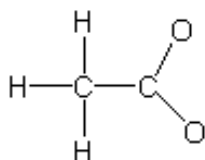
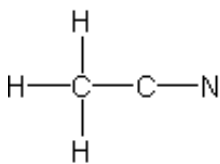
Classify the following as elements or compounds.

12. N _____
13. H _____
14. H_2O _____
15. $\text{C}_6\text{H}_{12}\text{O}_6$ _____

Use the following reaction for questions 16 and 18: $\text{CH}_4 + 2 \text{O}_2 \rightarrow \text{CO}_2 + 2 \text{H}_2\text{O}$

16. Which term best defines CH_4 from the reaction above?
 - a. Atom
 - b. Element
 - c. Molecule
17. In SO_3 how many Oxygen atoms are there?
 - a. 1
 - b. 2
 - c. 3
 - d. 4
18. In the reaction above what does the arrow represent?
 - a. Direction of the reaction from reactants to products.
 - b. The speed of the reaction
 - c. The type of reaction
 - d. Direction of the reaction from products to reactants.
19. Which type of bond results when one or more valence electrons are transferred from one atom to another?
 - a. a hydrogen bond
 - b. a nonpolar covalent bond
 - c. an ionic bond
 - d. a polar covalent bond

20. Write the formula for the following four structure diagrams.



Student Name:

Date:

Period:

Original
Mastery:

Reassessed
Mastery:

Learning Objectives:

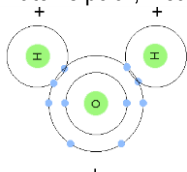
- SWBAT explain the significance of each properties of water (polarity, solubility, cohesion, adhesion, changes in state, pH) on life.
- SWBAT identify hydrogen bonds and their significance.

Vocabulary:

- Adhesion
- Cohesion
- Solubility
- pH
- hydrogen bond

Key Points, Examples, and Diagrams:

G. Water is polar, meaning not parallel. This results in different charges on different ends, illustrated by the following diagram



- H. The positive hydrogen of one water molecule and negative oxygen of another attract resulting in hydrogen bonds between water molecules
- I. Water is essential for all life on earth because of 5 key properties
- a. 1. Cohesion occurs due to hydrogen bonds between water molecules and allows water to stick together
 - b. 2. Adhesion allows water to stick to other substances and move against gravity.
 - c. 3. Water has high heat absorption allowing bodies of water help keep a moderate temperature o land
 - d. 4. Solubility allows for water to dissolve substances such as sugar and salt
 - e. 5. Water causes different pH's and the resulting acidic or basic environments

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. In the box to the right, draw two water molecules hydrogen bonded to one another.

- Label:
1. The symbol for all elements
 2. the negative and positive charges on all 6 elements
 3. the hydrogen bond

2. In the following chart, fill in the missing property, definition, or example.

Property	Definition	Example
Cohesion		
	Water sticks to other substances	
pH		
		Long Island stays moderate all year round because it is surrounded by water
		Ocean water contains a lot of salt that fish rely on.

3. Write true or false for each statement. If it is false, correct the incorrect part of the statement.

- _____ In a water molecule oxygen has a positive charge and hydrogen has a negative charge.
- _____ Cohesion is the attraction of water molecules to each other.
- _____ The property of water called 'adhesion' allows spiders to walk across the surface of water.
- _____ Water can only dissolve certain substances such as sugar and salt.
- _____ The reason why ice floats in liquid water is because it is more dense than liquid water.
- _____ It does not take a lot of energy to heat up or cool down water.

4. Which of the following properties of water is essential to life processes?

- A. Water strengthens bonds between molecules.
- B. Water dissolves many substances.
- C. Water has a relatively high freezing point.
- D. Water as a liquid is less dense than water as a solid.

5. What property of water allows water spiders to walk across the surface of a pond?

- A. pH
- B. Adhesion
- C. Cohesion
- D. It is non-polar.

6. Water is able to move up the stem of a plant because:

- A. Cohesion of water molecules with themselves
- B. Cohesion of water molecules to other surfaces
- C. Adhesion of water molecules with themselves
- D. Adhesion of water molecules to other surfaces

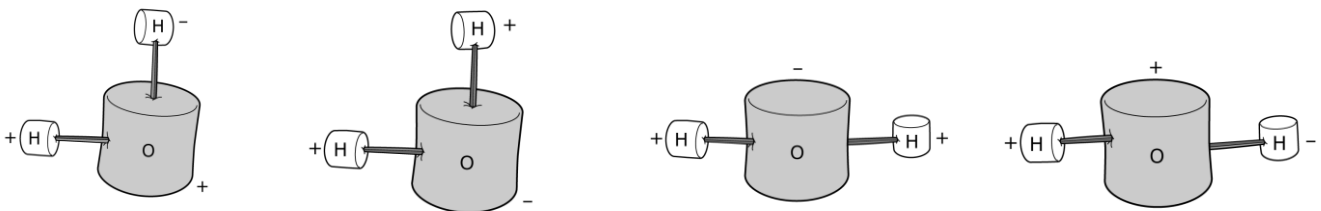
7. Fish living at the bottom of ponds do not die in the winter because:

- A. Water in solid phase is denser than in liquid phase.
- B. Water in solid phase is less dense than in liquid phase
- C. Water is non-polar
- D. Water has adhesive properties

8. The reason why Kool-Aid dissolves in water is because water

- A. has a high Specific heat
- B. has a high density
- C. has a high surface tension
- D. is a Universal Solvent

9. Circle the diagram that best characterizes the structure of a water molecule.



10. In your own words describe the difference(s) between adhesion and cohesion. _____

Student Name: _____

Date: _____

Period: _____

Original
Mastery: Reassessed
Mastery: **Learning Objectives:**

- SWBAT describe the structure of molecules in terms of elements, compounds, and organic properties.
- SWBAT draw an organic molecule
- SWBAT explain the difference between polymers and monomers.

Vocabulary:

- Covalent
- Carbon
- Monomer
- Polymer

Key Points, Examples, and Diagrams:

- A substance is considered "organic" if it contains carbon
- A monomer is a single unit of a molecule
- A polymer is more than one subunit (many monomers)
- Carbon can make up to 4 covalent bonds. These bonds are strong. Covalent bonds are when electrons are shared.
 - Since carbon can attach to 4 other atoms it can create many different types of compounds. This makes the diversity of carbon-based compounds very high and is why we find carbon in almost all structures of living things.
- J. Carbon can attach to other carbon molecules and create a polymer (more than 1 organic unit).

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

Identify the following compounds as organic or non-organic:

1. $C_6H_{12}O_6$ _____
2. CO_2 _____
3. O_2 _____
4. NO_3 _____

5. Draw an organic molecule in the box to the upper-right. Using your molecule, complete the following:

- a. Is this an element or a compound? Why?
- b. What component of this molecule makes it organic?

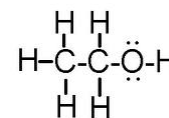
6. What is the difference between a polymer and a monomer?

7. Carbon atoms are important for all of the following reasons *except*

- e. They can form strong stable covalent bonds
- f. They can form four covalent bonds at once
- g. They can form multiple bonds
- h. They can form ionic bonds

8. Explain why carbon is found in many of the basic structure of living things (such as lipids, carbohydrates, cell membranes, proteins).

9. Look at the diagram to the right. Write the chemical formula and identify whether it is organic or inorganic. How do you know?



Benchmark: SC.912.L.18.1 Describe the basic molecular structures and primary functions of the four categories of biological macromolecules.
 SC.912.L.18.3 Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo.
 SC.912.L.18.4 Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.

Student Name:

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Mastery:

Learning Objectives:

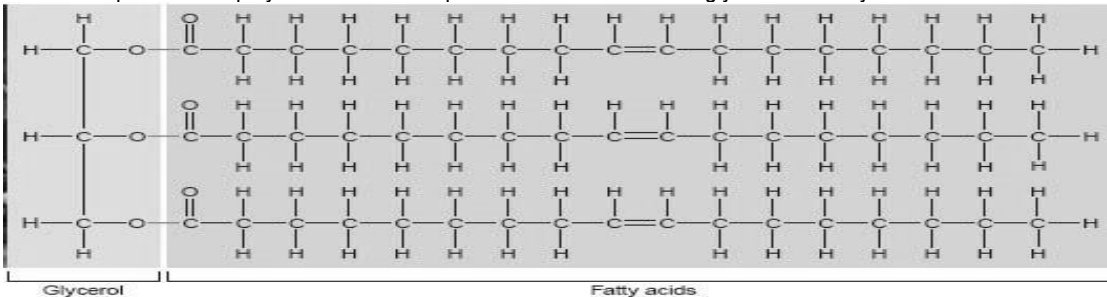
- SWBAT: Describe the structure of lipids in terms of monomers and polymers.
- SWBAT: Describe the function of lipids.
- SWBAT: Explain the structure functions of carbohydrates in terms of monomers and polymers.
- SWBAT: Analyze the function of carbohydrates in living things.
- SWBAT: Describe the structure of proteins in terms of monomers and polymers.
- SWBAT: Analyze the function of proteins in living things.
- SWBAT: Describe the structure of nucleic acids in terms of monomers and polymers.

Vocabulary:

- Polymer / Monomer
- Carbohydrates
- Disaccharides
- Polysaccharides
- Proteins
- Amino Acids
- Nucleic Acids
- Nucleotide
- Lipids
- Fatty Acids / Glycerol

Key Points, Examples, and Diagrams:

- K. A polymer is like a chain and a monomer is one link in that chain.
- L. All living things contain carbohydrates, lipids, proteins, and nucleic acids and use them for daily functions
- M. Lipids are used for insulation, cell membrane structure and long term storage of energy
 - a. Lipids are the polymer unit and composed of the monomers of glycerol and fatty acids.



- Carbohydrates are used as a source of energy for all living things
 - The monomer unit of a carbohydrate is a monosaccharide. Glucose is one such monosaccharide.
 - Carbohydrate polymers are disaccharides (2 sugars) or polysaccharides (3 or more sugars). Starch is an example of a polysaccharide.
- Proteins function by facilitating growth and repair, serve as enzymes, and are used for transport.
 - Proteins are the polymer unit and amino acids are the monomer unit.
- Nucleic acids function as the carrier for genetic information for all organisms.
 - Nucleotides are the monomers which make us nucleic acids such as DNA and RNA

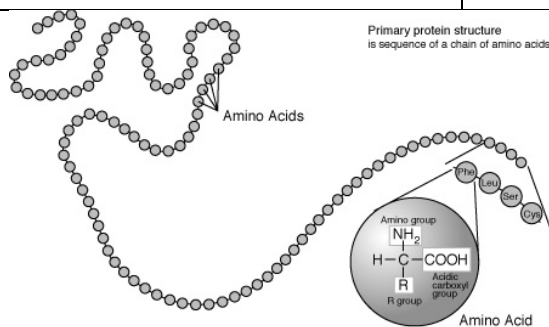
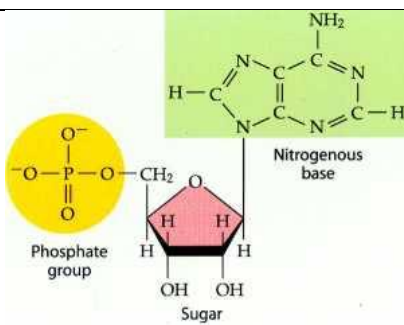
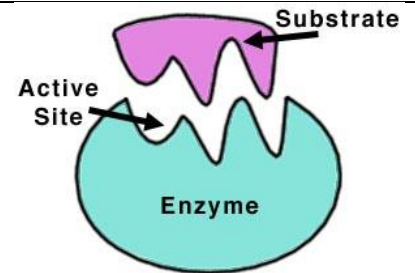
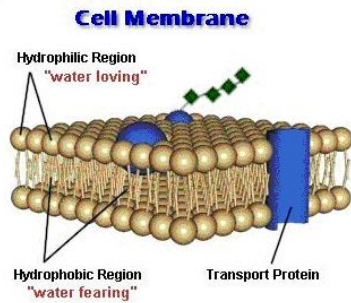
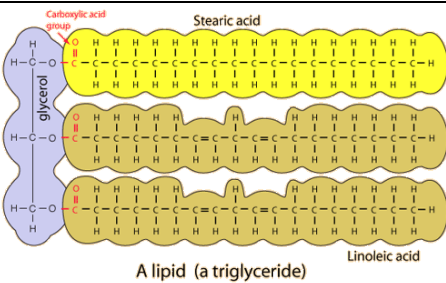
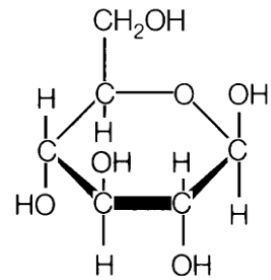
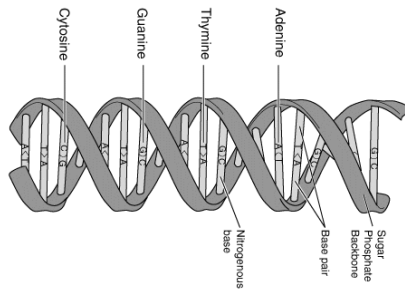
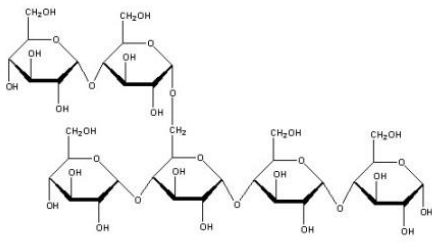
Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Use the example of a link of chains, illustrate the difference between a monomer and a polymer.

2. Underneath each picture, write as many of the following concepts/words that apply to that diagram. You may use words more than once.

Protein, carbohydrates, lipids, nucleic acids, DNA, RNA, amino acid, nucleotide, monosaccharide, disaccharide, polysaccharide, glycerol, fatty acid, energy storage, immediate energy, genetic information, enzymes, growth and repair, transport, monomer, polymer



3. Fill in the following chart labeling the structural and functional component of the 4 macromolecules

4. Proteins are used by the body mainly for _____.

	Structure		Function
	Monomer Unit	Polymer Unit	
Carbohydrate			
Lipid			

- i. energy
- j. storage
- k. respiration and movement
- l. growth and repair

5. Monosaccharide is to carbohydrates as _____ is to protein.

- a. Amino acid
- b. Fatty acid
- c. Nucleotide
- d. Glucose

6. Before running a race, an athlete will consume more of a certain type of macromolecule as an energy source. One example of a food that contains this type of macromolecule is pasta. Which type of macromolecule are athletes most likely to consume as an energy source before running a race?

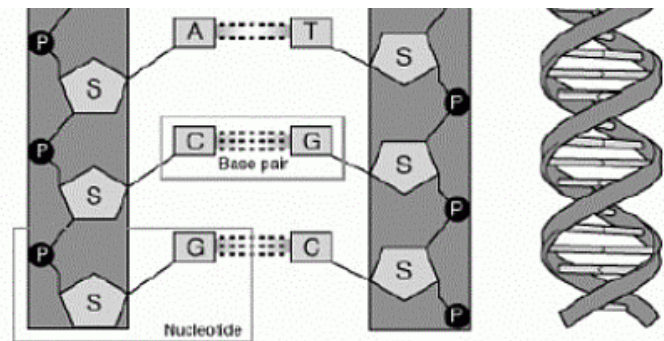
- a. Proteins
- b. Lipids
- c. Carbohydrates
- d. Nucleic acids

7. Which type of organic compound is generally not soluble in water and is an important part of cellular membranes?

- a. Lipids
- b. Proteins
- c. Nucleic acids
- d. Carbohydrates

8. What is the correct name of the macromolecule in the diagram to the bottom-right and what is its correct function?

- a. Nucleic acid / Storage of energy
- b. Protein / Formation of enzymes
- c. Nucleic acid / Contains genetic information
- d. Lipid / Water soluble membranes



Student Name:

Date:

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Mastery:Reassessed
Mastery:**Learning Objectives:**

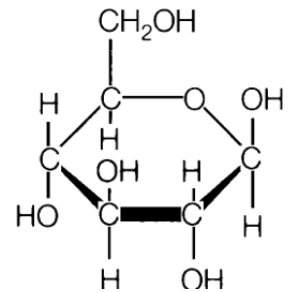
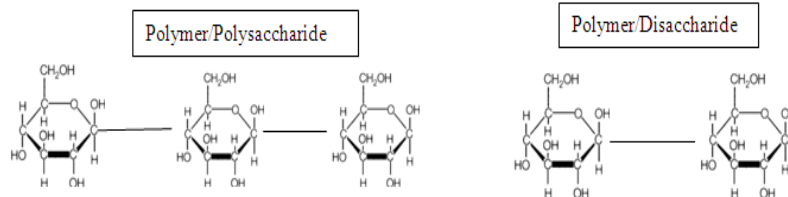
- SWBAT: Explain the function of carbohydrates in living things.
- SWBAT: Describe the structure of the following carbohydrates monosaccharides, disaccharides, and polysaccharides.

Vocabulary:

- Carbohydrate
- Monosaccharide
- Disaccharide
- Polysaccharide
- Starches

Key Points, Examples, and Diagrams:

- Monomer = single unit of something. Polymer = connected chain of monomer units.
- Carbohydrates are a polymer of glucose (in other words, carbohydrate is made up of a chain of glucose molecules)
 - Glucose is the monomer. Carbohydrates are the polymer. Diagram to the right is glucose.
 - The equation for glucose is: $C_6H_{12}O_6$
- We consume carbohydrates and either:
 - Break it down into glucose for quick energy.
 - Store energy in lipids.
- **Structure:** Composed of Carbon, Hydrogen, and Oxygen atoms (see diagram to right)
- Monosaccharide = 1 sugar (or one glucose molecule)
- Disaccharide = 2 sugars (or two glucose molecules)
- Polysaccharide = many sugars (many glucose molecules in a chain) – see diagram below

**Starch**

- Starch is the main type of carbohydrate in plants. Found in potatoes, bread, pasta, cereal.
- **Function:** living things use carbohydrates as their main source of energy. QUICK ENERGY!

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

- Each type of polymer in living things has a basic subunit. What is the basic subunit of a carbohydrate polymer?
 - Amino acid
 - Fatty acid
 - Nucleotide
 - Monosaccharide
- Before running a race, an athlete will consume more of a certain type of macromolecule as an energy source. One example of a food that contains this type of macromolecule is pasta. Which type of macromolecule are athletes most likely to consume as an energy source before running a race?
 - Proteins
 - Lipids
 - Carbohydrates
 - Nucleic acids
- $C_6H_{12}O_6$ is an example of —
 - an amino acid
 - a lipid
 - a carbohydrate
 - a nucleic acid

4. Glucose is generally used in cells as a source of _____.
 - a. energy.
 - b. material for growth.
 - c. material for repair.
 - d. answer not given

5. The proper name for a Carbohydrate polymer with 2 subunits is:
 - a. Disaccharide
 - b. Monomer
 - c. Polysaccharide
 - d. Monosaccharide

6. The single subunit of a Carbohydrate polymer is:
 - a. Disaccharide
 - b. Starch
 - c. Polysaccharide
 - d. Monosaccharide

7. A molecule that is used as quick energy and is composed of C,H, and O in a 1:2:1 ratio would best be classified as:
 - a. Carbohydrate
 - b. Inorganic molecule
 - c. Lipid
 - d. Polymer

8. Draw a diagram or set of diagrams that illustrates the difference between monosaccharides, disaccharides, and polysaccharides. Be sure to show the structure of each in terms of what they are made out of.

9. Fill in the blanks using the words:

<i>glucose</i>	<i>monosaccharide</i>	<i>energy</i>	<i>carbon</i>	<i>lipids</i>	$C_6H_{12}O_6$	<i>polysaccharide</i>	<i>carbohydrates</i>
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All matter, must contain _____ to be considered organic. _____, composed of starches and sugars are generally used in cells as a source of _____. If a carbohydrate has more than one sugar, it is considered a _____. The single subunit of a polysaccharide is a _____. The formula for this monomer is _____ and is known as _____. If Glucose is not used, it is converted into fat, or _____.

10. Define the following vocabulary in **your own words**:

- a. Carbohydrate - _____

- b. Polymer - _____

- c. Disaccharide - _____

Student Name:

Date:

Period:

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Mastery:**Learning Objectives:**

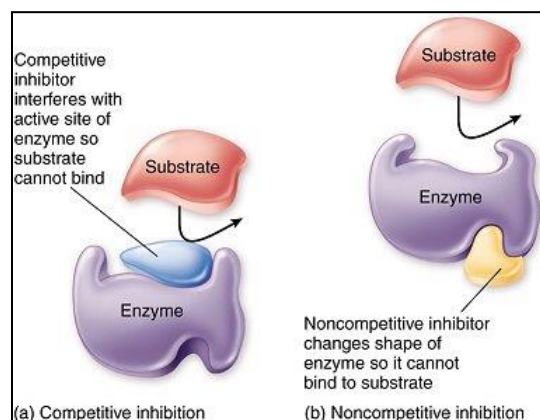
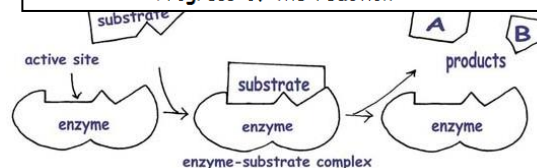
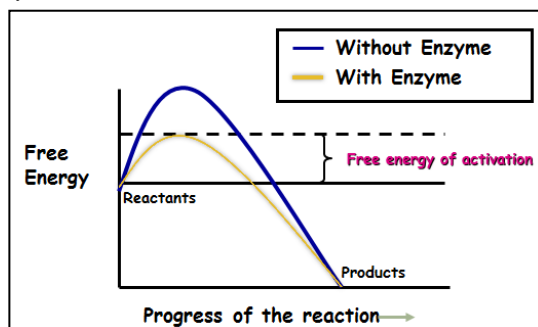
- SWBAT explain the relationship between catalysts and activation energy.
- SWBAT explain how enzymes lower activation energy.
- SWBAT predict the effect that pH and temperature will have on enzyme activity.
- SWBAT explain how enzyme inhibitors affect enzyme activity.

Vocabulary:

- activation energy
- active site
- catalyst
- enzyme
- substrate

Key Points, Examples, and Diagrams:

- N. A chemical reaction is when one set of substances is converted into a new set of substances. This process requires energy, however no matter is gained or lost. For instance, if you start with six carbon atoms, you will end with six carbon atoms.
- O. In a chemical reaction the substances you start with are known as the reactants. The substances you end with are known as the products.
- a. For example: $\text{CO}_2 + \text{H}_2\text{O} + \text{sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$ (carbon dioxide, water, and sunlight are the reactants. Glucose and oxygen are the products)
- P. Activation energy is the amount of energy that is needed to START a reaction.
- Q. A catalyst is something that speeds up a chemical reaction (makes the reaction happen more quickly).
- R. Enzymes are proteins and act as a catalyst (so enzymes speed up a reaction).
- a. Enzymes are not used up or changed in the process!!!! This means enzymes are reusable!!!
- S. What are enzymes used for?
- a. Enzymes break down the food we eat (your saliva contains enzymes, your stomach contains digestive enzymes)
- T. Enzymes are specific for what they catalyze. THIS MEANS that an enzyme used to speed up digestion CANNOT be used in a different reaction. It's only made for that one type of reaction.
- U. Enzymes end in the suffix -ASE (for example: sucrase, lactase, maltase)
- V. Enzymes work by weakening the bonds between atoms which lowers the activation energy (remember, that activation energy is the energy needed to start a reaction). SEE DIAGRAM TO THE UPPER RIGHT.
- W. **Enzyme-Substrate Complex (see diagram to right)**
- a. The substance that an enzyme acts on is the substrate.
- b. The active site is where the enzyme binds with the substrate.
- c. Notice how the enzyme does not change during the reaction. The enzyme converts the substrate into two new substances. But the enzyme can be used again and again.
- X. **Enzyme Inhibitors**
- a. An inhibitor is something that prevents an enzyme from working properly. For example, if you break your arm it would inhibit you from playing basketball. If an enzyme is inhibited, it cannot speed up reactions.
- b. There are two types of enzyme inhibitors:
- Competitive Inhibitors** – are chemicals that resemble an enzyme's normal substrate and compete for the active site (this means that the ACTUAL substrate won't be able to bind with the enzyme). See the diagram right for a visual.
 - Non-Competitive Inhibitors** – chemicals that do not bind to the active site BUT instead change the shape of the active site so that the substrate won't fit anymore. See diagram to the right.
- Y. Environmental conditions such as temperature and pH can affect the rate an enzyme can speed up reactions.
- a. Enzymes only work properly in a certain temperature range and a certain pH range.
- b. Most enzymes in your body like to work at your normal body temperature (98.7 degrees) and neutral pH (6 – 8)
- c. That's why a high fever is dangerous – because it can damage your enzymes!



Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. _____ is the energy needed to start a chemical reaction.
2. The substrate bonds to a specific area on the enzyme molecule known as the enzyme's _____.
3. Compounds similar in shape to an enzyme's substrate, that can compete with the substrate molecules by binding with the active site of the enzyme are said to be _____.
4. Inside a human stomach, hydrochloric acid is important in digestion. Which reason best explains why the enzymes found in other parts of the body would not function well in the stomach?
 - a. The temperature is too high
 - b. There is not enough water
 - c. The pH is too low
 - d. There are not enough substrates
5. Some snake venoms are harmful because they contain enzymes that destroy blood cells or tissues. The damage caused by such a snakebite could BEST be slowed by
 - a. Applying ice to the bite area
 - b. Drinking large amounts of water
 - c. Inducing vomiting
 - d. Increasing blood flow to the area
6. Lactase is an enzyme that breaks down lactose (milk sugar) in the small intestine. A scientist studied the activity of lactase under the different conditions (different temperature and pH) shown in the table below. In which trial will the activity of lactase most likely be the highest (which one will lactase work the best at)?

- a. Trial 1
- b. Trial 2
- c. Trial 3
- d. Trial 4

Trial	Temperature (Celsius)	pH
1	35 C	2.0
2	50 C	2.0
3	35 C	6.0
4	50 C	6.0

pH & Temperature of Small Intestines:

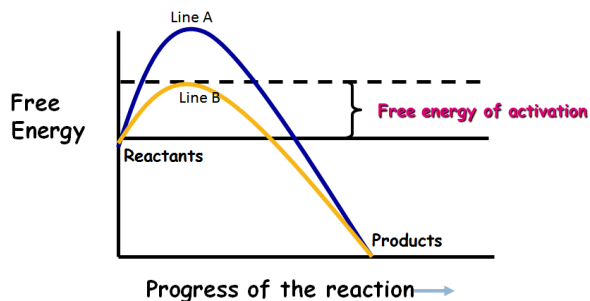
- pH = 5.9
- temperature = 37 C°

7. Lactase, maltase, and sucrose are all types of enzymes. How do you know this?

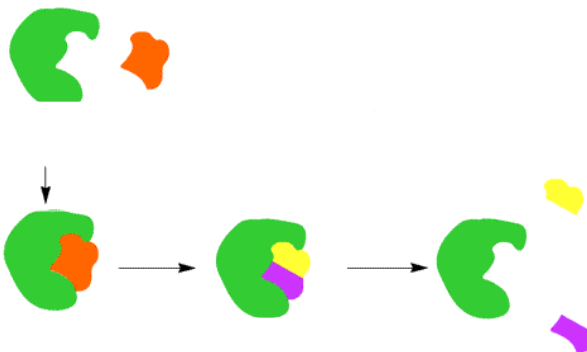
8. **True or False?** Enzymes are permanently changed when they are used as a catalyst.

9. In a complete sentence, describe what a catalyst is.

10. In the graph to the right it shows the activation energy needed in a reaction. Assuming that both Line A and Line B are of the same reaction which line likely had an enzyme present? How do you know?



11. Which of the following options best explains how a scientist could decrease the rate of an enzyme catalyzed reaction?
- Add more reactants as they are consumed by the reaction.
 - Remove the product as it is formed by the reaction.
 - Increase the concentration of enzyme substrate.
 - Add an inhibitor for the enzyme molecule.
12. An enzyme has optimal activity at a temperature of 30 °C and at a pH of 7. Biologists are studying the activity of this enzyme as they manipulate cellular conditions in the lab. Under which of the following conditions would this enzyme's activity be most severely decreased?
- The pH of the cellular fluid is 6.8.
 - The pH of the cellular fluid is 7.0.
 - The cell temperature is 42.0 °C.
 - The cell temperature is 30.0 °C.



13. In the diagram to the right label the following parts:

- Enzyme
- Active site
- Substrate(s)
- Product(s)

14. Which of the following about an enzyme is false:
- Enzymes are NOT used up by a chemical reaction
 - Enzymes help to speed up chemical reactions
 - Enzymes are made up of proteins
 - Enzymes are needed for a chemical reaction to occur

15. **Critical Thinking:** Some antibiotics and medicines such as penicillin are a type of enzyme inhibitor. Based on what you know about the function of enzymes and inhibitors, why do you think that your doctor would prescribe you a medicine that would *slow down* the rate some of your enzymes worked?

16. **Application:** You were just asked to teach a class to a group of middle school students learning about enzymes. In preparation for your lesson you have been asked to come up with the five most important facts about enzymes. In complete sentences, write what you think those five facts should be:

- _____
- _____
- _____
- _____
- _____

Unit 5 – Cell Structure & Theory

Biology Review Packet	Benchmark: SC.912.L.14.1 Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the processes of science. SC.912.L.14.3 Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.	Page 39 of 96
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Learning Objectives:	Vocabulary:
<ul style="list-style-type: none"> • SWBAT Outline the three assumptions of cell theory • SWBAT distinguish between plant and animal cells • SWBAT distinguish between a prokaryotic and eukaryotic cell • SWBAT identify the structures that differentiate between prokaryotic and eukaryotic cells. 	<ul style="list-style-type: none"> • Prokaryotic • Eukaryotic • Spontaneous Generation • Organelle

Key Points, Examples, and Diagrams:

Scientist of Cell Theory

- Spontaneous Generation: People thought that living things came from inanimate objects. This theory is not true and has been proven wrong. The theory was proven wrong by the scientists Francesco Redi & Luis Pasteur.
- Robert Hooke: is responsible for naming cells. Hooke observed cork under a microscope and saw dead plant cell walls and named them "CELLS" because they looked like the small rooms that monks lived in.
- Matthias Schleiden: concluded that all plants were made of cells
- Theodore Schwann: concluded that all animals were made of cells
- Rudolph Virchow: observed cells dividing. He reasoned that all cells come from other pre-existing cells by cell division

Cell Theory

The Cell Theory has 3 parts:

- All living things are made of cells.
- Cells are the most basic units in living things.
- New cells are made from existing cells.

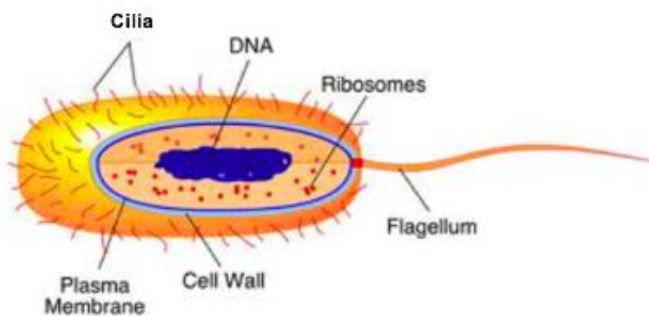
Prokaryotic vs. Eukaryotic Cells

- Prokaryotic = small and simple cells (bacteria)
 - **Do not have a nucleus!**
- Eukaryotic = large and more complex cells (plants and animals)
 - **Have a nucleus containing DNA!**
 - Has many organelles

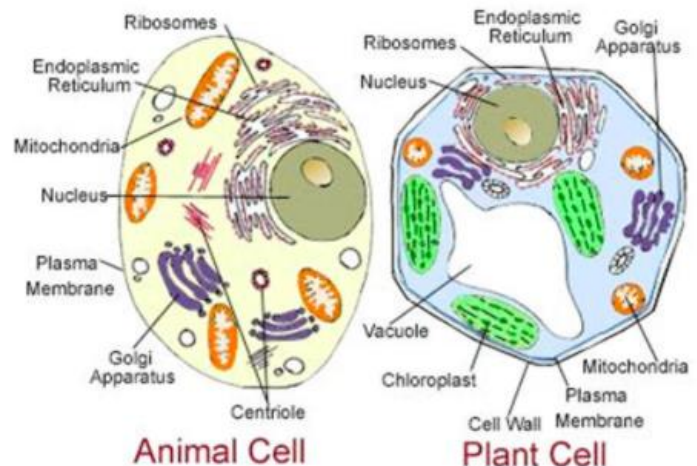
Plant vs. Animal Cells

- Plant cells have a cell wall and chloroplast and animal cells do not.
- Plant cells have a large central vacuole (storage space) an animal cells have small vacuoles.
- Animal cells are typically more round and plant cells are more rectangular.

Prokaryotic Cell



Eukaryotic Cells



Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

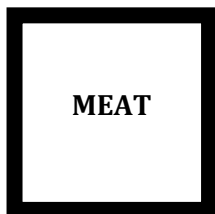
For Questions 1 and 2 use the diagram to the right.

1. Which part of cell theory is the diagram to the right evidence of?

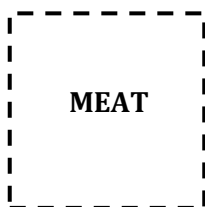
2. What scientist first discovered this part of cell theory?



3. The theory of spontaneous generation included the idea that simple organisms like worms and flies were created from abiotic (non-living) things like mud. In the 1600's Francesco Redi performed an experiment. Maggots developed from the eggs laid by flies in jar C.



Solid Lid (A)



Lid with Screen



No Lid (C)

a) What did the results of this experiment provide evidence of? _____

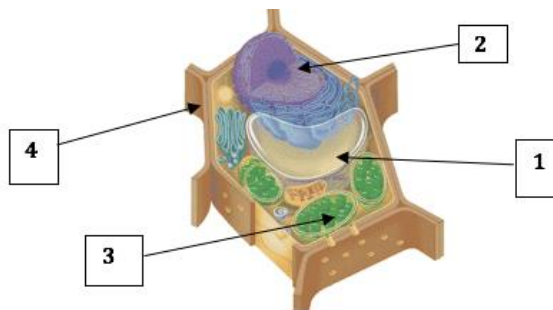
b) Why was this important for the development of cell theory? _____

4. Put the following structures in the order of smallest to largest: DNA, Tissue, Organ, Organism, Cell, Carbon Atom, Organelle

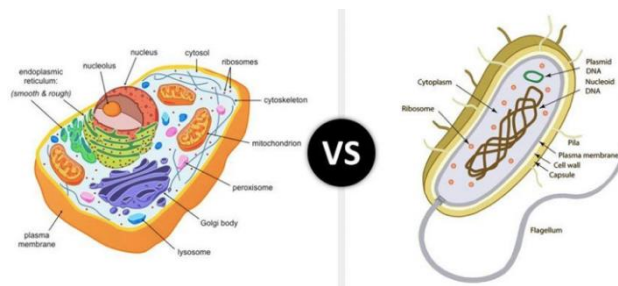
5. Which structures in the diagram below enable the observer to identify it is a plant cell?

6. What organelles are structures 1, 2, 3, and 4?

Organelle
1
2
3
4



7. Using the diagram to the right, tell which cell is prokaryotic or eukaryotic and why?



8. Use the following table to fill in the function and structure of each organelle. For nickname, give a metaphor for the organelle (for example, a nucleus could be nicknamed the "brain" of the cell).

Organelle	In Plant, Animal, or Both?	Structure (What does it look like?)	Function (What does it do?)	Nickname
Nucleus				
Cytoplasm				
Cell Membrane				
Mitochondria				
Ribosome				
Lysosome				
Endoplasmic Reticulum				
Golgi Apparatus				
Chloroplast				
Cell Wall				
Vacuole				

9. Mitochondria are nicknamed the "powerhouse" of the cell. Which body cell would mitochondria probably be the MOST abundant? Why?

10. A cell in your stomach just produced the enzyme amylase. What organelle was responsible for creating it? _____

11. The mitochondria are to production of energy as _____ is to the breakdown of waste.

12. If the cell was a city which of the following would be the best analogy for the Golgi apparatus? _____

13. If a cell of an organism contains a nucleus, that organism is classified as what type of cell? _____

14. In which organelle does cell respiration take place? _____

15. In which organelle does photosynthesis take place? _____

16. Using the diagram to the right, which structure in "Figure 2" corresponds (is the same) to structure I in "Figure 1." How do you know?

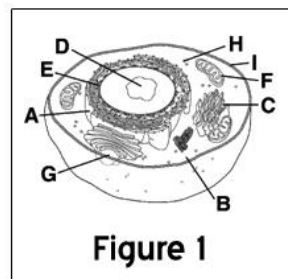


Figure 1

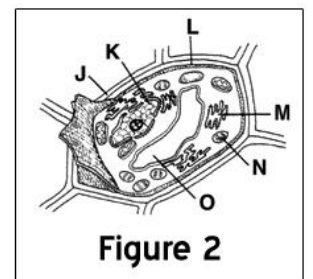


Figure 2

Learning Objectives:

- SWBAT Explain the relationship between surface area and transport of materials in and out of the cell.
- SWBAT describe the structure of the cell membrane.
- SWBAT explain the process of passive transport including diffusion, facilitated diffusion, and osmosis.
- SWBAT explain the process of active transport.

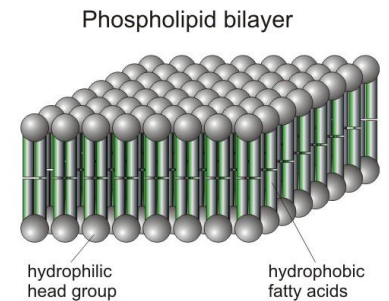
Vocabulary:

- Cell membrane
- Phospholipid bilayer
- Hydrophobic
- Hydrophilic
- Diffusion
- Osmosis
- Active transport
- Passive transport

Key Points, Examples, and Diagrams:

A. Structure of a cell membrane:

- Made of a phospholipid bilayer (see diagram to the right)
- Phosphorus 'head' is hydrophilic (attracted to water)
- Lipid 'tail' is hydrophobic (afraid of water)
- Proteins embedded in the membrane so large particle can pass through (known as a channel)

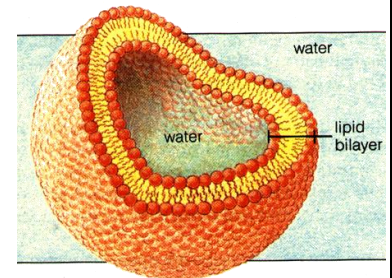


B. Cell membranes are 'selectively permeable'

- This means that particles/molecules can pass through the cell membrane (carbon dioxide, oxygen, glucose, salt, water, etc.)
- However, not all things can pass through the cell membrane (it's selective, remember!)
- Two types of transport across a cell membrane: Passive Transport and Active Transport

C. Passive Transport – does not require energy. Movement from areas of high concentration to low concentration. Three types:

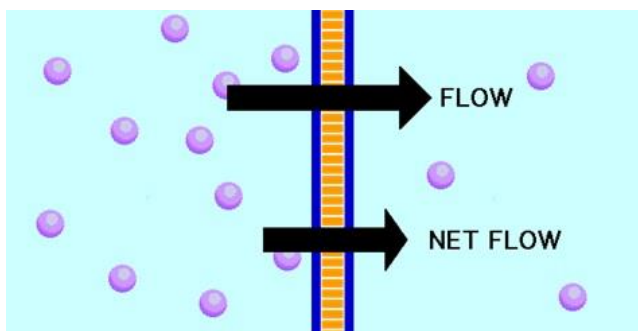
- Diffusion – movement of particles from high concentration to low concentration.
- Facilitated diffusion – movement of particle from high concentration to low concentration through a protein channel.
- Osmosis – diffusion of water (this means movement of water from high concentration to low concentration).



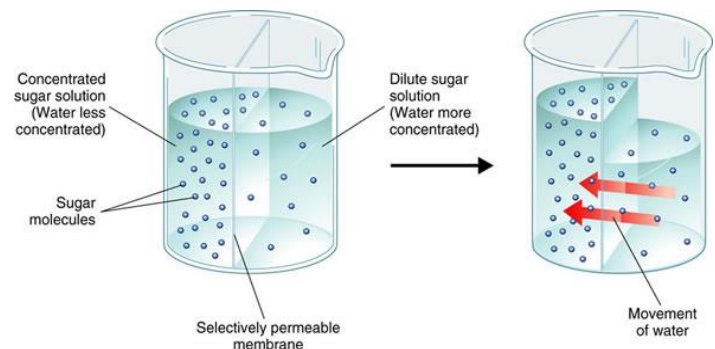
D. Active Transport – requires the use of energy. Movement from low concentration to high concentration. Moves through a protein channel.

E. Types of Solutions Cells Might Be Found In:

- Hypotonic – water moves into a cell and it swells up (gets larger) – remember hypo – hippo (gets BIG)!
- Hypertonic – water moves out of a cell and it shrivels up (gets smaller)
- Isotonic – no movement of water (stays the same size)



This is an example of diffusion (movement of particles)



This is an example of osmosis (movement of water)

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Fill out the chart below.

Transportation Type	Movement of Particles (in terms of concentration gradients)	Energy Required? (yes or no)	Use of a Channel? (yes or no)
Osmosis	_____ concentration → _____ concentration		
Diffusion	_____ concentration → _____ concentration		
Facilitated Diffusion	_____ concentration → _____ concentration		
Active	_____ concentration → _____ concentration		

2. Which types of transport require energy? _____

3. Which types of transport do NOT require energy? _____

4. What is the main way that diffusion and facilitated diffusion differ? _____

5. Oil does not dissolve in water. Does that mean that it is hydrophilic or hydrophobic? How do you know? _____

6. Salt dissolves easily in water. Does that mean that it is hydrophilic or hydrophobic? How do you know? _____

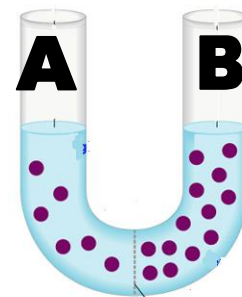
7. Use the diagram to the right to answer the following questions:

a. Which side has more solute? _____

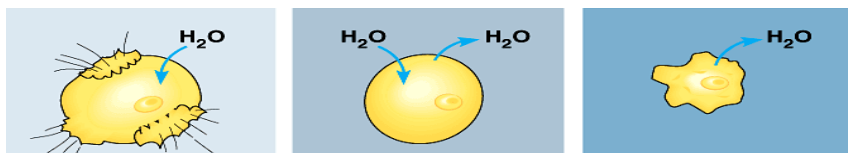
b. Which side has more water? _____

c. If the membrane is permeable to solute, in which direction will the particles move?

d. If the membrane is permeable to water, in which direction will the water move?



8. Label each cell below as hypotonic, hypertonic, or isotonic.



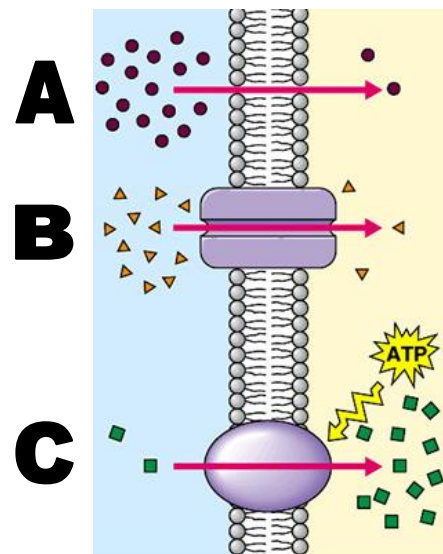
a. _____ b. _____ c. _____

9. Label what type of transport each arrow represents in the diagram to the right:

a. _____

b. _____

c. _____



Learning Objectives:

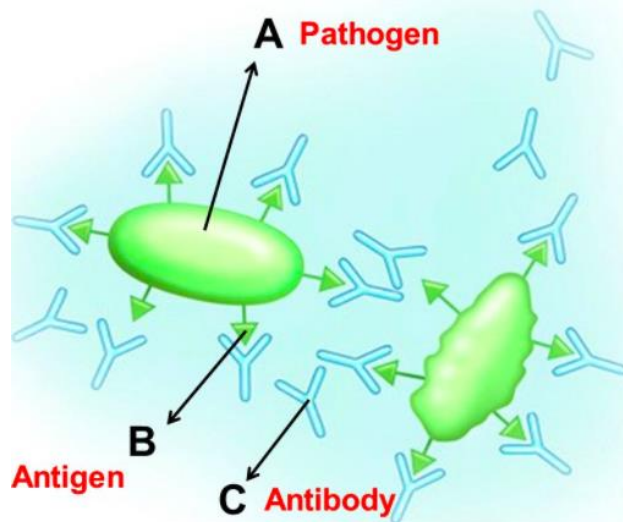
- SWBAT explain the basic functions of the human immune system
- SWBAT explain the difference between specific and non specific immune response

Vocabulary:

- Immunity
- Inflammatory response
- Fever
- Interferon
- Immune response
- Antigen
- Antibody
- Vaccination
- Active immunity
- Passive immunity

Key Points, Examples, and Diagrams:

- Pathogen: disease-causing agent that triggers an immune response.
- Antigen: a substance able to get past the nonspecific immune response and trigger the immune response.
- Antibody: A type of protein produced by B-cells that attach to antigens to help destroy pathogens.
- Interferon: a type of protein that is made by cells that have been infected with a virus, that prevents/inhibits the virus from replicating.



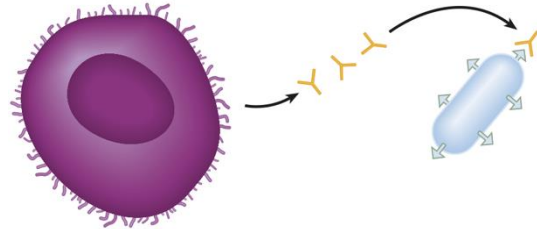
- Nonspecific immune response: nonspecific defenses do not discriminate between one threat and another. These defenses include physical and chemical barriers.
 - First Line of Defense - Skin, mucus, saliva, tears, sweat glands, and cilia keep pathogens from entering the body.
 - Second Line of Defense:
 - Inflammatory response: white blood cells enter the infected tissue
 - Fever: raises temperature to destroy pathogens
 - Interferons: Proteins that interfere with growths of viruses
- Specific defense: after a pathogen is able to get past the body's nonspecific defenses (above), the immune system reacts with a series of specific defenses that attack the particular disease-causing agent. This is called the **Immune Response**.
 - Third Line of Defense:
 - T cells provide a defense against specific pathogens.
 - "Memory" B cells provide immunity by creating specific antibodies against specific pathogens.
- Vaccines: Used to stimulate the immune system to produce plasma cells, creating a humoral immunity.
- Antibiotics: Medicine used to kill bacteria.

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. What is the body's most important non-specific defense against pathogens? _____
2. What is a nonspecific defense reaction to tissue damage caused by injury or infection known as? _____
3. What are the swelling and pain from inflammation caused by? _____
4. What are 2 proteins that help cells resist viral infection? _____
5. A substance that triggers an immune response is a _____

6. Label the following figure: Antigen, Antibody, Pathogen, B-cell



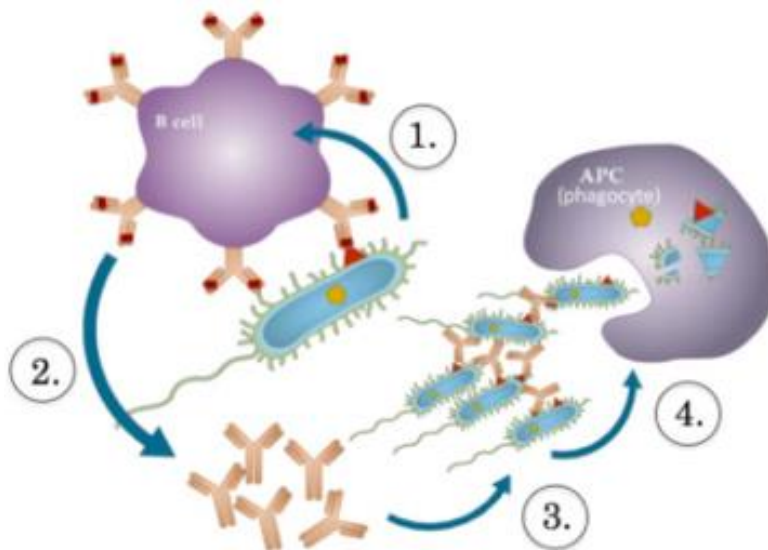
7. Describe how antibiotics work. _____

8. Describe how vaccines work. _____

9. How might a fever be beneficial to a person who is sick? _____

10. How did people develop an immunity to a disease before the development of vaccines? _____

11. Match the events shown in each phase of the diagram below to the correct explanation of each step (A-D)



- A. Specific antibodies are produced and released by memory B cells to attack a particular pathogen.
- B. White blood cells attack and digest pathogens
- C. Memory B cell encounters a pathogen
- D. Antibodies attach to the matching antigens on the surface of a pathogen, which weakens the pathogen and signals white blood cells to come destroy it.

1. _____ 2. _____ 3. _____ 4. _____

Learning Objectives:

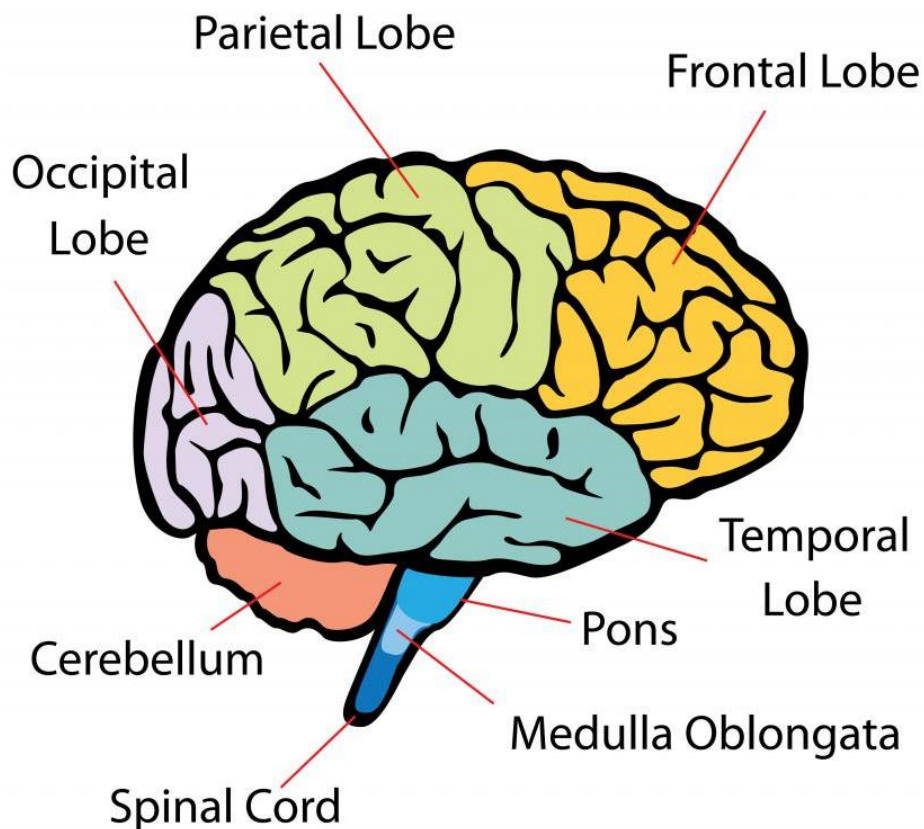
- SWBAT Identify the major parts of the brain on diagrams or models.

Vocabulary:

- Cerebrum
- Cerebellum
- Brain stem
- Pons
- Medula Oblongata

Key Points, Examples, and Diagrams:

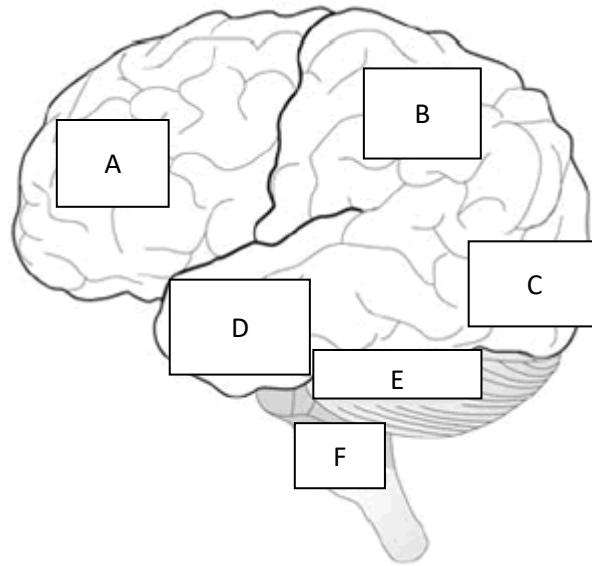
- Cerebrum: largest part of the brain, in charge of voluntary, or conscious, activities of the body. Has four different parts:
 - Frontal lobe: voluntary muscle movement
 - Parietal lobe: integrates (combines) sensory information
 - Temporal lobe: Auditory perception and processing meaning for speech and vision
 - Occipital lobe: visual processing center
- Cerebellum: Located at the back of the skull, coordinates and balances the actions of the muscles so that the body can move gracefully and efficiently.
- Brain stem: Connects the brain and spinal cord. Has 2 regions:
 - Pons
 - Medulla Oblongata



Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Label the following diagram. Use the terms from the key points section above.

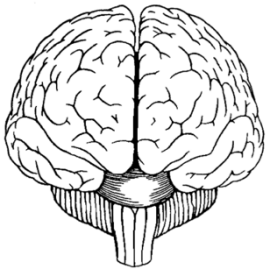


2. Is F a part of the cerebellum? Why or Why not? _____

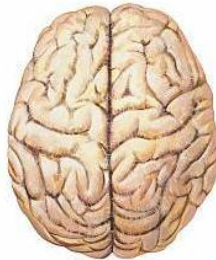
3. Describe the structure of the Cerebrum. _____

4. What is the difference between the Pons and the Medula Oblongata? _____

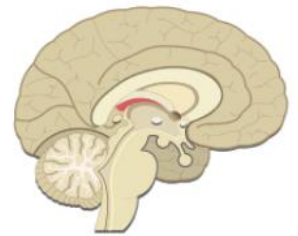
5. From what viewpoint are each of the brains below being seen?











6. Label the frontal lobe in each of the above diagrams with an "F".

7. Label the pons in each of the above diagrams with a "P".

8. When looking at a brain, how can you determine its orientation? _____

Learning Objectives:

- SWBAT describe the structure (anatomy) and function (physiology) of the human reproductive system.
- SWBAT illustrate the process of human development from fertilization to birth.

Vocabulary:

Sperm, egg, vas deferens, seminal vesicle, epididymis, urethra, ovary, oviduct, cervix, fallopian tubes, fetus, zygote, embryo

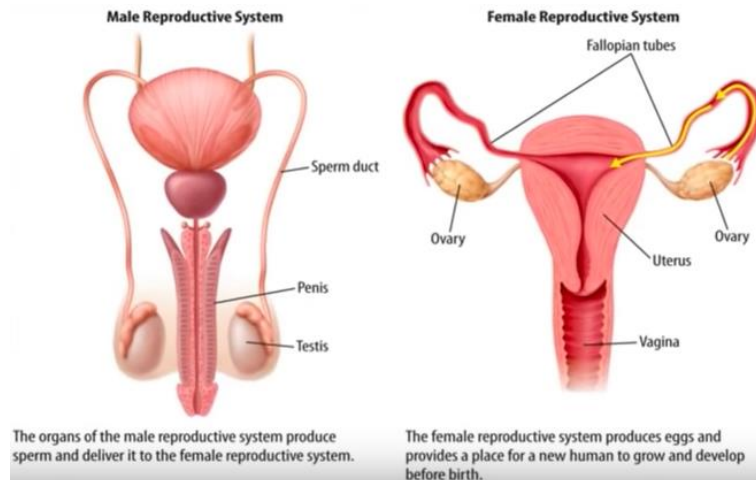
Key Points, Examples, and Diagrams:

A. Male Anatomy:

- Testis are out of body because they need to be cool to make sperm.
- Sperm have a head which contains the DNA. A mid-piece which has mitochondria and a tail which allow them to swim.
- Mature sperm move to the epididymis where they can be stored.
- Eventually the sperm will travel out the vas deferens which is a tube that connects the testis to the penis.
- The vas deferens eventually merge with the urethra and the sperm leaves the body though the penis.

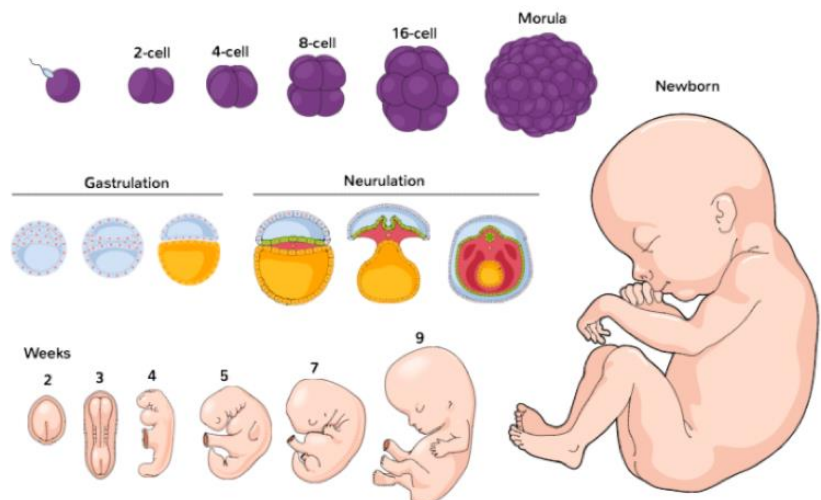
B. Female Reproduction:

- Each ovary contains about 400,000 follicles which each contain a single egg. The follicles job is to help the egg mature before it is released.
- Each month, a process called ovulation happens where one egg moves from one of the ovaries into the fallopian tubes.
- Once the egg is released, it needs a safe place to go where a potential zygote could survive. The uterus makes a lining containing blood to prepare of a potential baby.
- If egg not fertilized the lining is moved out of the uterus by muscle contractions.



C. Human Fetal Development:

- First Trimester**
 - Fertilization
 - Heart begins to beat
 - Placenta & Umbilical cord forms
 - Internal Organs develop
- Second Trimester**
 - Increased muscle movements
 - Skin formation
 - Eyes open
- Third Trimester**
 - Fetus doubles in size
 - Advanced brain activity
 - Organs mature



Independent Practice

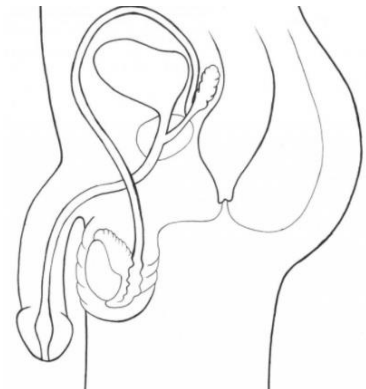
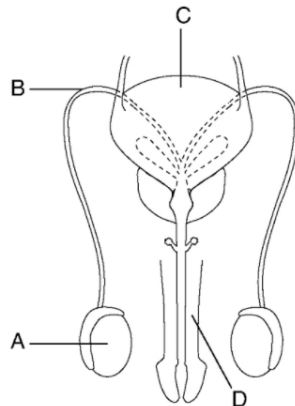
Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Fill in the table:

Structure	Description
	1. Organ that delivers semen to the female reproductive tract
	2. Where sperm are produced
	3. The tube that carries sperm from the epididymis to the urethra.
	4. The tube that carries both sperm and urine down the penis.
	5. Organs that contribute to the semen.
	6. Tubules where sperm are stored.

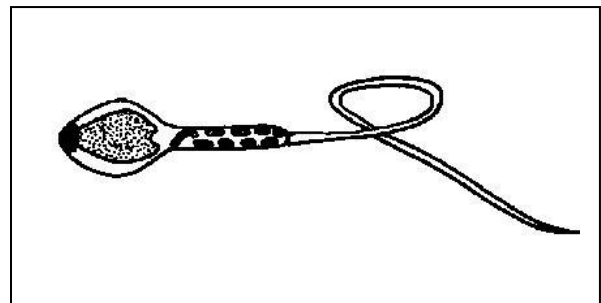
2. The diagram to the right shows the male reproductive system. Label the structures in the diagram.

- A. Scrotum
- B. Vas deferens
- C. Urethra
- D. Penis
- E. Seminal vesicle
- F. Epididymis
- G. Prostate gland
- H. Testes



3. The diagram below shows a sperm. Label the following areas.

- a) The DNA-containing area.
- c) The midpiece - contains mitochondria for energy for sperm movement.
- d) The tail – flagella propels the sperm along the female tract.



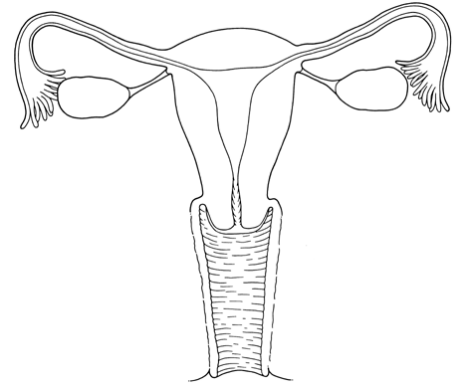
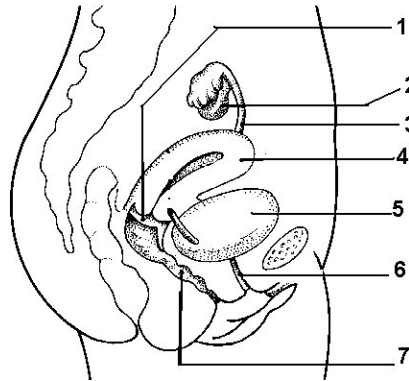
4. What is the difference between sperm and semen?

5. Place the path the sperm travel correctly in order:

(Word Bank: vas deferens, urethra, penis, seminal vesicle, epididymis, prostate gland, testes)

6. Add the following labels to the diagram of the female reproductive system below.

- A. Cervix
- B. Ovary
- C. Vagina
- D. Uterus
- E. Fallopian tube



7. Fill in the following table with the words from the list below. (You may need to use some words more than once).

- A. ovary B. uterus C. fallopian tube D. cervix E. vagina**

Term	Description
	1. Organ that houses the developing fetus.
	2. Slightly acidic organ that receives the semen.
	3. Usual site of fertilization.
	4. Duct through which the ovum travels to reach the uterus.
	5. The muscular structure that separates the uterus and the vagina.
	6. Site where implantation occurs.
	7. Where the ova/eggs are produced

8. After puberty in females, several follicles in the ovary begin to grow each month. Usually only one follicle matures and releases an egg cell. What is the correct path of the egg cell after it leaves the ovary?

- a. Vas deferens to uterus
- b. Uterus to Fallopian tube
- c. Fallopian tube to uterus
- d. Fallopian tube to vas deferens

9. During human development, the fertilized egg divides into many cells. These cells become specialized and develop into an embryo. Cells in the embryo continue to divide, becoming a fetus. Many changes occur in the fetus during pregnancy. What are the main developments during the third trimester of pregnancy?

- a. Hands, feet, eyes and ears are developing.
- b. Most of the organs are forming and the heart begins to beat.
- c. The fetus doubles in mass and the lungs are fully developed.
- d. The umbilical cord forms and eyes and eye lids are developing.

10. What is the difference between a zygote, embryo and fetus?

11. The drinking of alcoholic beverages by a pregnant woman is harmful to the development of her fetus. Why is this MOST damaging early in a pregnancy?

Unit 6 – Cellular Energy

Learning Objectives:

- SWBAT: describe the structure of major plant organs and tissues and their functions (chlorophyll, chloroplast, grana, stroma, thylakoid, membrane, glucose, stomata, guard cell).

Vocabulary:

Stoma/stomata, guard cell, chloroplast, chlorophyll

Key Points, Examples, and Diagrams:

Key Points:

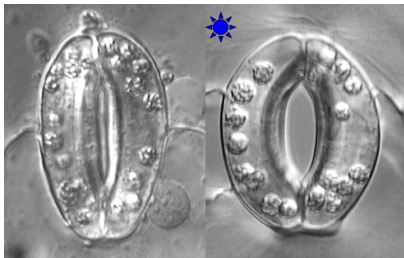
1. The structure of a plant's cells, tissues and organs allows it to carry out 5 important physiological processes.
 - Photosynthesis
 - Cellular Respiration
 - Transpiration
 - Reproduction
 - Growth

Overview:

- Plants must carry out photosynthesis in order to obtain energy from the sun to grow and reproduce. Photosynthesis is the process of converting sunlight into energy. A plant needs two important structures to capture the sunlight, leaves and chloroplasts which are inside of the leaves.
- Leaf Structure:
 - Stomata-small opening located on the leaf that allows CO₂ and oxygen in and out of a plant.
 - Guard cell-what controls the size of the opening of the stomata.

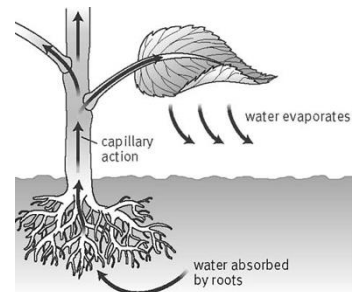
Closed Stoma

Open Stoma



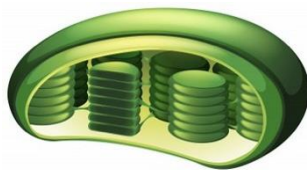
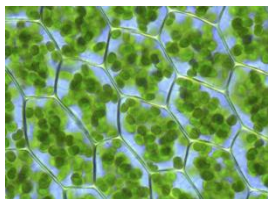
The *stomata* is important because it allows Carbon Dioxide into the plant for photosynthesis and oxygen out of the plant which is the plants waste product. Water vapor, which is a product of Cellular Respiration is released through the stomata through transpiration. The *guard cell* controls the size of the stomata so not too much water evaporates out of the plant.

Transpiration



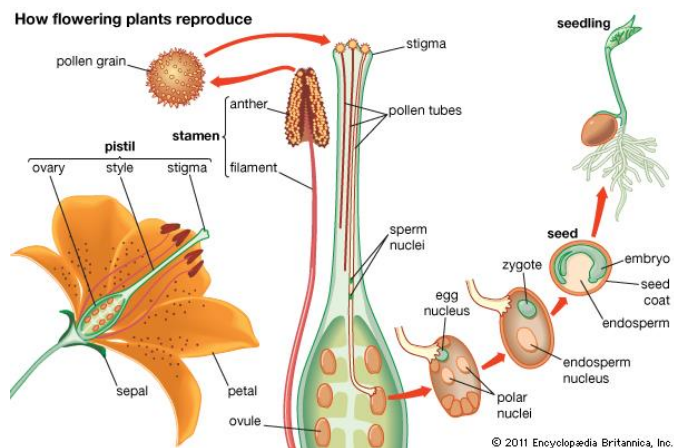
Chloroplast Structure:

- Each plant cell has many chloroplasts.
- Chloroplast = organelle in plants that converts light into energy. This is where photosynthesis occurs.
- Chlorophyll = light absorbing molecule found in the chloroplast. Also gives plants their green color.



A chloroplast is a small organelle that is located in plants and algae. The Chlorophyll fills the chloroplast and is the pigment that makes the plant green and absorbs the suns energy.

Plants are sexually reproducing organisms. Pollen (the male gamete in plants) is carried by wind, insects, or animals and must fertilize the ovules (female gamete in plants) stored in the ovary in order for a plant to be able to produce the seeds that will become offspring.



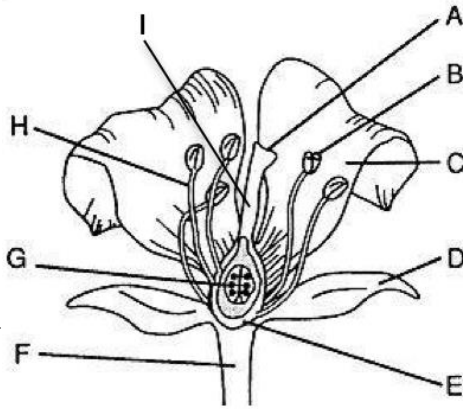
Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

Directions: Identify the following structures:

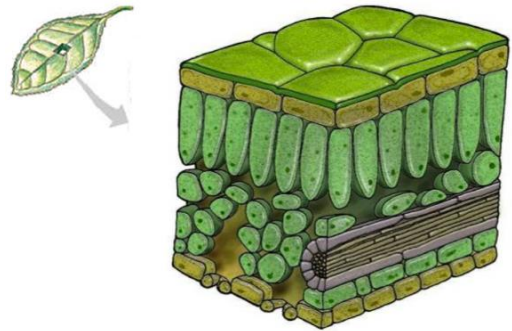
Anther, Sepal, Style, Ovule, Stigma, Filament, Stem, Petal, Ovary.

- A _____
- B _____
- C _____
- D _____
- E _____
- F _____
- G _____
- H _____
- I _____



Directions: Label the following structures:

Stoma, Guard Cell, Dermal Tissue, Vascular Tissue, Ground Tissue,



Directions: Answer each question with a complete sentence.

1. What is the difference between the pistil and the stamen on a flower?
2. What is the difference between a guard cell and the stomata?
3. Why does the plant need to allow carbon dioxide in?
4. What is the purpose of a chloroplast in cells?
5. What is the purpose of chlorophyll *and* where can you find it?
6. What role does meristematic tissue play in plants?
7. Bonus! (but it's not optional): What property of water allows it to move up the stem of a plant to reach the leaves? _____
8. When Mr. Williams was mowing the yard, he accidentally hit a young tree with the mower and scraped off a large section of bark all the way down to the wood. Within a few days, leaves on several of the branches began to die. What is the most likely cause of the leaves dying?
 - A. The leaves were diseased already, and they died coincidentally when the bark was injured.
 - B. The wood was weakened by the injury and could no longer support the weight of the branches above it
 - C. The bark contained the xylem and phloem tubes and, once they were damaged, they could not feed the leaves.
 - D. The vascular tissue under the bark was damaged and could no longer transport water and nutrients to the leaves.

Learning Objectives:

SWBAT understand the equation of photosynthesis (identify the reactants, products, and basic functions of photosynthesis).

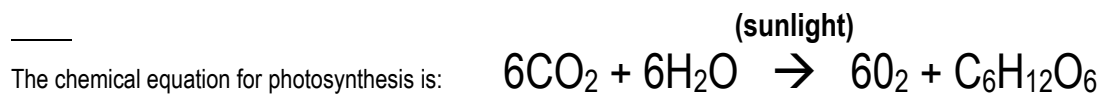
Vocabulary:

ATP, glucose, carbon dioxide, oxygen, photosynthesis, reactant, product, autotrophs.

Key Points, Examples, and Diagrams:

Key Points

1. Photosynthesis occurs in autotrophs (all plants and photosynthetic algae/protists).
2. Photosynthesis is the process of turning water, carbon dioxide, and sunlight in to the sugar molecule glucose.
3. The glucose that is produced as a result of photosynthesis is then broken down in the process of Cellular Respiration in order to provide the energy the plant needs to survive.

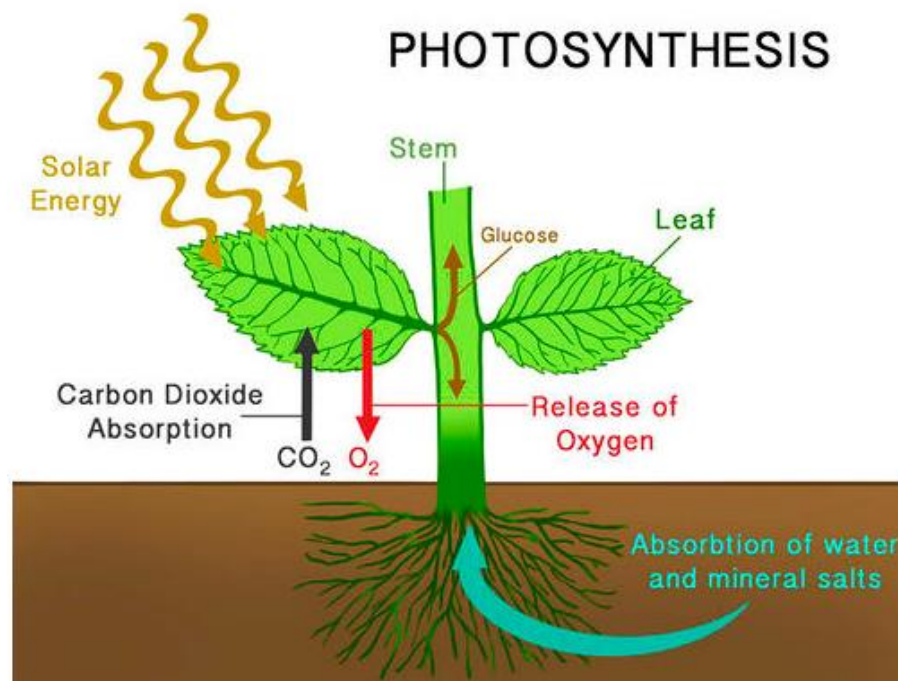


This can be translated into words like this: **Carbon Dioxide + Water $\xrightarrow{\text{(sunlight)}}$ Oxygen + Glucose (sugar)**

The large number 6's in front of each chemical means there are 6 of those molecules. (ex: 6CO_2 means there are 6 carbon dioxide molecules)
 The small numbers after the letters mean how many of that element is in each molecule. (ex: 6CO_2 means there are 2 oxygen atoms)
 If you break down the equation as it is written above you have:

Reactants	Products
Carbon= 6	Carbon=6
Oxygen=18	Oxygen= 18
Hydrogen=12	Hydrogen=12

***This is important because this means you have the same number of elements on both side and elements can never be created or destroyed.



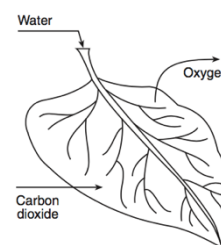
Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

12. What is the chemical formula for photosynthesis? _____
13. Where does photosynthesis take place? _____
14. What pigment absorbs the energy from sunlight during photosynthesis? _____
15. Air samples taken in Canada since 1986 show that atmospheric carbon dioxide concentration is higher on average in winter than in summer. Explain the reason for this difference in carbon dioxide concentrations:

16. The arrows in the diagram below represent the movement of materials. This movement of materials indicated by the arrows is most directly involved in the processes of

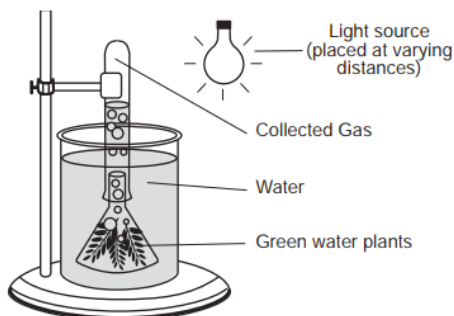
- A. respiration and replication C. digestion and secretion
 B. photosynthesis and excretion D. circulation and transpiration



4. If carbon dioxide is removed from a plant's environment, what would you expect to happen to the plant's production of high-energy sugars?
- a. More sugars will be produced.
 - b. Fewer sugars will be produced.
 - c. The same number of sugars will be produced but without carbon dioxide.
 - d. Carbon dioxide does not affect the production of high-energy sugars in plants.

5.

The laboratory setup represented below was used to investigate the effect of light on aquatic plants. Equal amounts of a green water plant were placed in beakers with gas-collecting tubes. The beakers were placed in a temperature-controlled environment. The light source was placed at different distances from the beakers. After an hour, the amount of gas collected from the plants in each tube was measured and recorded in the data table.



Basic Setup

Gas Collected with Light Source at Different Distances from Plant

Distance of Light Source from Plant (cm)	Gas Collected in Tube (mm)
5	85
10	37
15	15
20	8
25	5

- a. What is being tested in this experiment?

- b. What is the gas being produced by the plant and collected in the test tube?

- c. How do you know?

- d. What conclusion can be drawn from this experiment?

Learning Objectives:

- SWBAT: Identify the reactants and products of cellular respiration.
- SWBAT: Track the production of energy beginning with the input of sugar.
- SWBAT: Distinguish between anaerobic and aerobic cellular respiration.

Vocabulary:

Fermentation, electron transport chain, Krebs cycle, glycolysis, ATP, aerobic and anaerobic respiration

Key Points, Examples, and Diagrams:Key Points

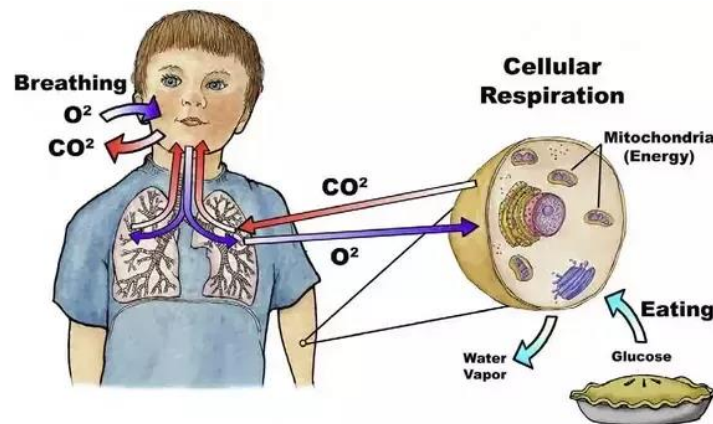
- 1) Cellular respiration takes place in the mitochondria of BOTH plant and animal cells.
- 2) Cellular respiration uses glucose and turns it into cellular energy (ATP).
- 3) Glucose is MADE by plants during photosynthesis, and CONSUMED (eaten) by animals/humans via their diet.
- 4) Oxygen must be available for cellular respiration to happen if it is not available, then fermentation will break down the glucose.

Vocabulary

Aerobic-(stem: aero=air) something that requires oxygen or air to work.

Anaerobic-(stem: an=non) something that does not require oxygen to work.

The Cellular Respiration Equation: $6\text{O}_2 + \text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Energy (ATP)}$
(memorize the equation and know the products and the reactants)

Fermentation

If there is no oxygen available then fermentation will take place. There are two main types of fermentation alcoholic and lactic acid.

Alcoholic Fermentation:

- Happens in yeast and other small microorganisms.
- Makes alcoholic beverages.
- Makes a little ATP

Lactic Acid Fermentation:

- Happens in the muscles of animals (such a humans) when there is not enough oxygen to use cellular respiration.
- Produces lactic acid that will make the muscles sore after working out.
- Makes a little ATP.
- Extra info: Some bacteria can also use lactic acid fermentation. Many foods such as cheese, yogurt, buttermilk, sour cream, and pickles are made using lactic acid fermentation.

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Cellular respiration is called an aerobic process because it requires _____
2. Write the formula for cellular respiration: _____
3. What are the products of Cellular Respiration? _____
4. What are the reactants of Cellular Respiration? _____
5. The two main types of fermentation are called
 - a. _____
 - b. _____
6. Why does your body automatically breathe heavily after a race? _____

7. True or False: Fermentation is the first step of cellular respiration _____

Why??? _____

8. Cellular respiration releases energy by breaking down what organic molecule? _____
9. How are photosynthesis and Cellular Respiration similar?
 - A. They take place in the same organelle
 - B. They occur in animal cells.
 - C. They involve the conversion of energy
 - D. They produce the same complex carbohydrate
10. The bacteria that cause tetanus can survive in a puncture wound that has healed on the outer surface of the skin. Through what process do these bacteria acquire the energy they need to survive?
 - A. aerobic respiration
 - B. anaerobic respiration
 - C. chemosynthesis
 - D. photosynthesis
11. Which statement best distinguishes aerobic from anaerobic respiration?
 - A. Only aerobic respiration involves fermentation.
 - B. Only anaerobic respiration occurs in the mitochondria.
 - C. Only aerobic respiration requires oxygen.
 - D. Only anaerobic respiration produces carbon dioxide.

Learning Objectives:

- SWBAT: Explain the relationship between photosynthesis and cellular respiration.

Vocabulary:

Photosynthesis, cellular respiration, interrelated.

Key Points, Examples, and Diagrams:

Key Points:

- The relationship between photosynthesis and cellular respiration is that plants (autotrophs) use BOTH processes where as animals (heterotrophs) only use ONE process; cellular respiration.
- Photosynthesis and Cellular Respiration are interrelated, they both depend on the other to work.
- The products of photosynthesis are the reactants for cellular respiration and the products of cellular respiration are the reactants for photosynthesis
- Photosynthesis captures energy and cellular respiration releases energy.

Vocabulary:

Interrelated- (stem: inter= between) a relationship in which each depends on or is affected by the other or others.

How the Processes are Interrelated

Reason 1: The Equations

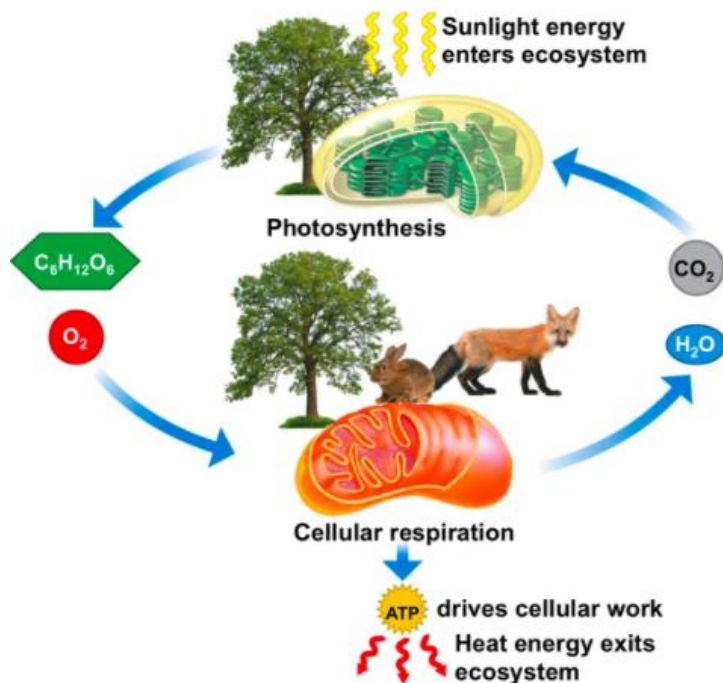
- The cellular respiration equation is $6O_2 + C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O + \text{Energy}$.
- The photosynthesis equation is $6CO_2 + 6H_2O + \text{Energy (sunlight)} \rightarrow 6O_2 + C_6H_{12}O_6$
- The reactants for photosynthesis are the products for cellular respiration.

Reason 2: Energy

- Photosynthesis *captures* the energy from the sun and stores it as glucose (sugar).
- Cellular respiration uses the energy stored in glucose to make ATP which the cell can break apart to *release* energy.

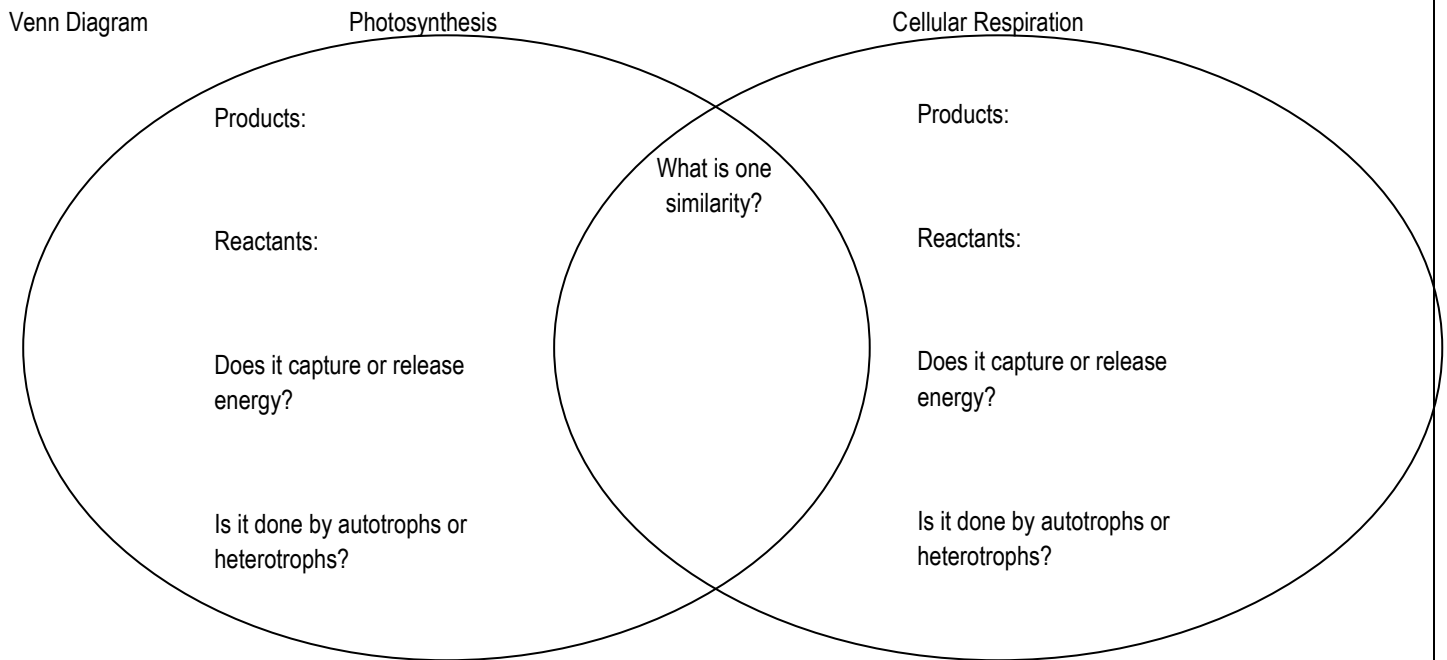
Summary

Photosynthesis and Cellular Respiration are interrelated because neither could happen if the other did not exist! If plants only did photosynthesis they could never use the energy in glucose. If the Earth did not have photosynthesis there would not be any glucose to break down.



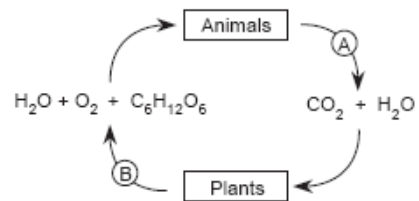
Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.



12. In the cycle shown below, which processes are represented by letters A and B?

- A-excretion, B-respiration (breathing)
- A-transpiration (evaporation), B-excretion
- A-photosynthesis, B-transpiration (evaporation)
- A-respiration (breathing), B-photosynthesis



13. How are cellular respiration and photosynthesis almost opposite processes?

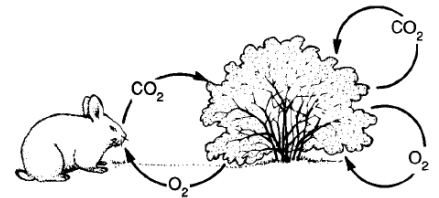
- Photosynthesis releases energy, and cellular respiration stores energy.
- Photosynthesis removes carbon dioxide from the atmosphere, and cellular respiration puts it back.
- Photosynthesis removes oxygen from the atmosphere, and cellular respiration puts it back.
- all of the above

14. Which of the following describes how photosynthesis and cellular respiration work together?

- Photosynthesis adds carbon dioxide from the environment and respiration puts it back
- Photosynthesis removes carbon dioxide from the environment and respiration puts it back
- Photosynthesis and cellular respiration release oxygen into their environment
- Photosynthesis and carbon dioxide both removes carbon dioxide from the environment

15. What is the best explanation for what the circles represent in the figure below?

- The products for respiration are the same as the products for photosynthesis
- The reactants for respiration are the same as the products for photosynthesis
- The products for photosynthesis are the reactants for cellular respiration.
- The circles represent the flow of energy in a food chain



16. How are photosynthesis and Cellular Respiration similar?

- They take place in the same organelle
- They occur in animal cells.
- They involve the conversion of energy
- They produce the same complex carbohydrate

Student Name:

Date:

Period:

Original Mastery:

Reassessed Mastery:

Learning Objectives:

- SWBAT: understand the connection between ADP and ATP.
- SWBAT: describe the structure and function of ATP.

Vocabulary:

Chemical Energy, Mechanical Energy, Photosynthesis, ATP, ADP, phosphorylation.

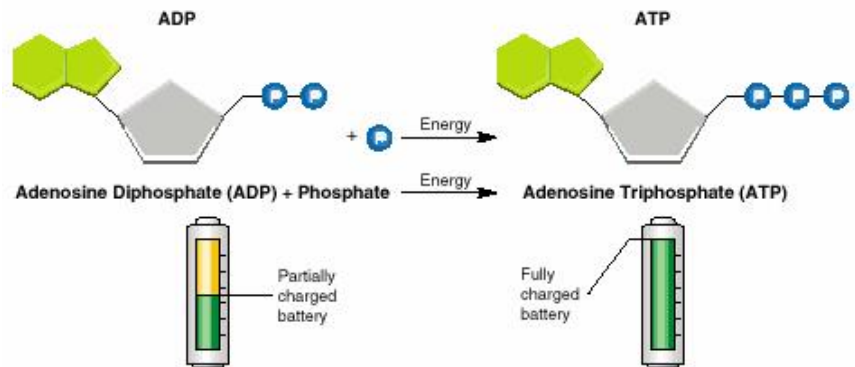
Key Points, Examples, and Diagrams:

Energy is the ability to do work.

- Radiant Energy = energy released via (sun)light.
- Chemical Energy = energy released by a chemical reaction.
- Mechanical Energy = energy in the form of movement.

ATP:

- Energy can be stored in chemical compounds. As chemical reactions take place, high-energy bonds are replaced by low-energy bonds between atoms. When electrons lose bonds, the extra energy is released as heat and light.
- The chemical fuel of living things = ATP=adenosine triphosphate.
 - Adenine
 - Ribose, a 5-carbon sugar
 - 3 phosphate groups => the key to ATP's ability to store and release energy.
- ATP is like a fully charged battery, but energy can also be stored as ADP when it loses one phosphate group.
- By breaking the bond between the 2nd and 3rd phosphate, energy is released; therefore ATP is used as the basic energy source of all cells.
- ATP has many uses: produce light in fireflies, energy to make proteins, etc., but ATP is also vital (important) in that it is produced in the light reaction of photosynthesis.
- ATP and Glucose is where plants get a majority of their energy.



ADP vs. ATP ATP can be compared to a fully charged battery because both contain stored energy, whereas ADP resembles a partially charged battery. **Predicting** What happens when a phosphate group is removed from ATP?

Vocabulary:

Tri= three, Di=two, ATP =Adenosine triphosphate, ADP=Adenosine diphosphate
Phosphylation- When the last phosphate is added to the ADP molecule to make ATP

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Draw and label an ATP molecule. Make sure to include the 3 parts.
2. What is the process called when a phosphate is added to the ADP molecule
 - a. Photosynthesis
 - b. Phosphorylation
 - c. Permeability
 - d. Precipitation
3. The metabolism (breakdown) of _____ in the mitochondria provides the energy for the phosphorylation of ADP.
 - a. ATP
 - b. Phosphate
 - c. Glucose
 - d. Water
4. How is energy released from the ATP molecule? _____

5. What type of energy is stored in the ATP molecule? _____

Unit 7 – Genetic Replication

Learning Objectives:

- SWBAT: Describe that mitosis is a type of asexual reproduction.
- SWBAT: Describe that mitosis produces two identical daughter cells.
- SWBAT: Relate the processes of budding and binary fission to mitosis.
- SWBAT: Describe the cell cycle by identifying the phases of mitosis.
- SWBAT: Interpret a diagram to identify the process of mitosis.
- SWBAT: Explain that mitosis maintains the same number of chromosomes during cell division.

Vocabulary:

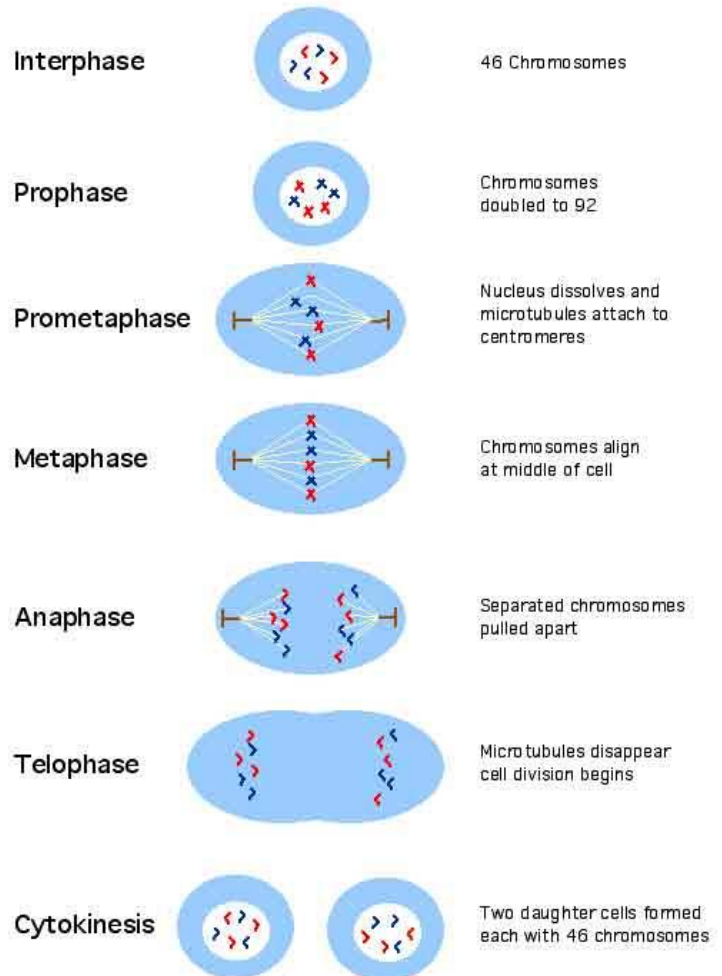
- Mitosis
- Interphase
- Prophase
- Metaphase
- Anaphase
- Telophase
- Cytokinesis
- Asexual reproduction

Key Points, Examples, and Diagrams:

- Mitosis – process by which genetic information are replicated and cells divide
 - Mitosis is a type of asexual reproduction
 - Mitosis creates two IDENTICAL daughter cells (with the same number of chromosomes as the original cell)
- Mitosis occurs in somatic cells.
 - Somatic cells are any cell besides sex cells (sperm and eggs)
- Mitosis is used for reproduction in single cell organisms.
 - Binary Fission – organisms replicate DNA and divide into two EQUAL cells.
 - Budding - organisms replicate DNA and divide into two UNEQUAL cells.

• 5 stages of the cell cycle:

1. Interphase – phase when cell carries out normal cell activity and replicates DNA
 - Cells spend most of their time in this phase
 - THIS IS NOT PART OF MITOSIS!!
2. Prophase – first stage of mitosis
 - Chromatin condense into chromosomes
 - Spindle fibers form
3. Metaphase
 - Chromosomes connect to spindle fiber
 - Chromosomes are pulled to line up in the middle
4. Anaphase
 - Sister chromatids separate and are pulled to opposite ends of the cell
 - *Sister chromatids are exact replicate copies of each DNA. They are made during interphase*
5. Telophase – last stage of mitosis
 - Chromosomes gather and opposite ends
 - Nuclear envelope reforms
6. Cytokinesis - cytoplasm separates and cells split in half. (also not part of mitosis, but is part of the cell cycle)



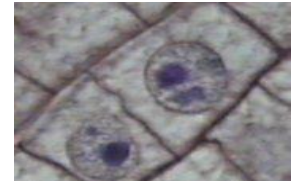
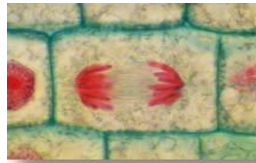
Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

Write which phase of mitosis the following pictures/statements correspond to by writing the appropriate number as indicated below:

1-Interphase 2-Prophase 3-Metaphase 4-Anaphase 5-Telophase 6-Cytokinesis

1. A period of growth for the cell _____
2. Nuclear envelope begins to disappear _____
3. Division of the cytoplasm _____
4. Begins after chromatids reach the opposite poles of the cell _____
5. Chromosomes begin to line up on the equator, or midline, of the spindle _____
6. Distinguished by separation of sister chromatids _____
7. _____

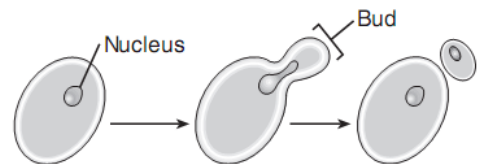


8. Centromeres split apart and chromatid pairs from each duplicated chromosome separate _____
9. Chromosomes become visible _____
10. Chromatids attach to the spindle fibers by centromeres _____
11. Centrioles move to opposite ends of the cell _____
12. Two new cells are separated _____
13. Chromosomes begin to unwind into stringy threads of DNA _____
14. DNA is replicated _____
15. Spindle fibers move between the poles _____
16. Final phase of mitosis _____
17. Chromatids are pulled apart _____
18. Two identical daughter cells are produced _____
19. DNA is in a stringy chromatin form _____
20. Two new nuclei form _____
21. Long, stringy chromatin coils into chromosomes _____
22. 2 identical daughter cells are produced. Which of the following best describes this process?
 - a. Asexual reproduction and mitosis
 - b. Asexual reproduction and meiosis
 - c. Sexual reproduction and mitosis
 - d. Sexual reproduction and meiosis

23. What are chromosomes?

24. The diagram to the right illustrates asexual reproduction in yeast. Yeast produce offspring that usually have:

- a. Genes that are different from those of the parent
- b. Genes that are identical to those of the parent
- c. Half of the genetic information of the parent
- d. Organelles that are not found in the parent



25. Which two processes are involved in mitotic cell division?
- a. Nuclear duplication and cytokinesis.
 - b. Nuclear duplication and oogenesis.
 - c. Spermatogenesis and cytoplasmic duplication
 - d. Oogenesis and cytoplasmic division

Learning Objectives:

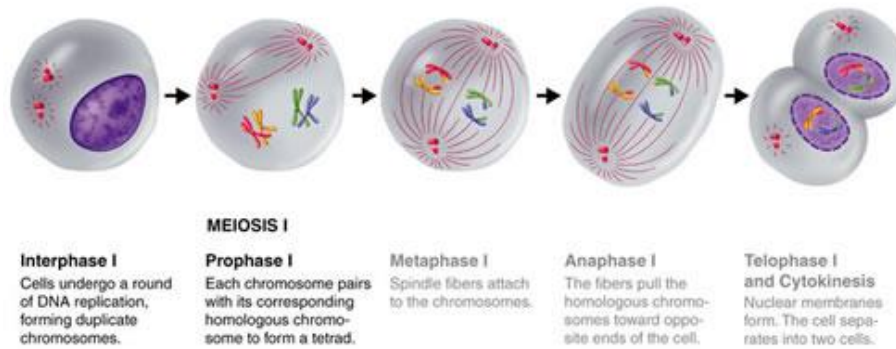
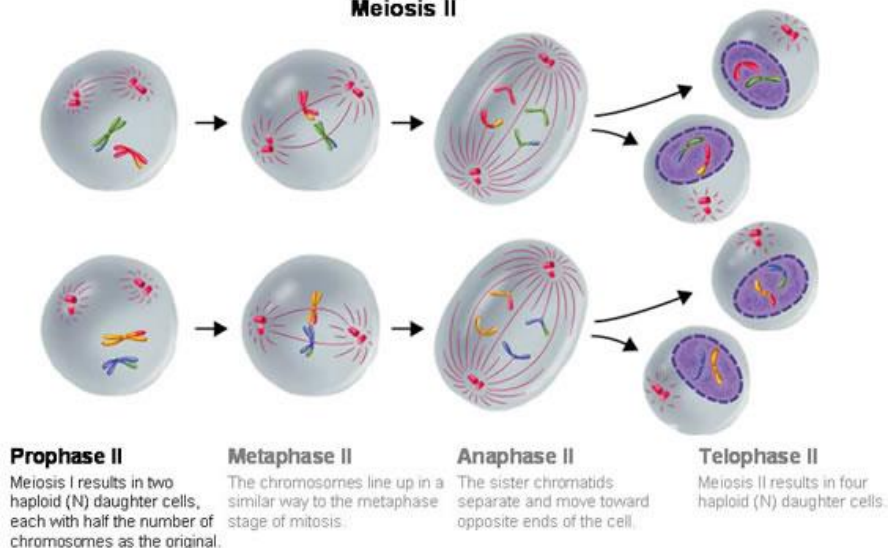
- SWBAT: Differentiate between haploid and diploid chromosome numbers.
- SWBAT: Compare the number of chromosomes in a gamete to a somatic cell.
- SWBAT: Describe that meiosis is necessary for sexual reproduction.
- SWBAT: Define independent assortment and crossing-over.
- SWBAT: Describe that meiosis produces four haploid cells.
- SWBAT: Identify pairs of homologous chromosomes.

Vocabulary:

- Meiosis
- Haploid and Diploid
- Crossing-over
- Homologous chromosomes
- Gamete
- Zygote

Key Points, Examples, and Diagrams:

- Meiosis starts with one parent cell and results in the production of four haploid cells.
- Haploid cells contain half the number of chromosomes as normal cells.
- Chromosomes come in pairs; they are called homologous chromosomes. One comes from the mother, one comes from the father. Each pair contains the same genes, but might contain different alleles (or versions) of the gene. For example, one allele might be for black hair and one might be for blonde hair.
- Somatic cells are diploid cells. All cells except gametes are somatic (and therefore are diploid). Gametes (sex cells) are haploid cells.
- Crossing over happens during meiosis and is when a homologous pair of chromosomes trades genetic information with one another. This increase genetic variation.
- Sexual reproduction is when two nuclei fuse together and form a zygote. A zygote is the first cell of a new organism and has different DNA than its parents (because it got half from the mother and half from the father). This also increases genetic variation.

Meiosis I**Meiosis II**

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

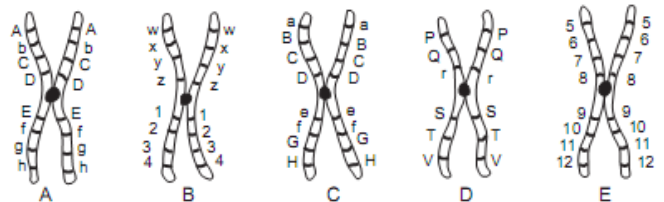
1. What is the difference between asexual and sexual reproduction? _____

2. If the genetic material in two nuclei fuses together to form a zygote is this an example of sexual or asexual reproduction? What types of cells fused together and what process created those cells?

3. Organism X has 40 chromosomes in their somatic cells. How many chromosomes would you find in its sperm cell? _____
4. The somatic cells of humans contain 46 chromosomes. How many chromosomes would a human zygote have? _____
5. A zebra has 21 chromosomes in their sex cells. How many chromosomes would we find in its somatic cells? _____
6. A billy goat has 30 chromosomes in their somatic cells. How many would you find in the egg cell of a billy goat? _____
7. Bacteria X reproduces asexually and has 16 chromosomes. How many chromosomes would the offspring have? _____
8. A diploid cell contains 48 chromosomes. How many chromosomes would be in a gamete of the same species? _____
9. A haploid cell contains 21 chromosomes. How many chromosomes would be in a gamete of the same species? _____
10. A haploid cell contains 16 chromosomes. How many chromosomes would be in a somatic cell of the same species? _____
11. A diploid cell contains 12 chromosomes. How many chromosomes would be in a digestive cell of the same species? _____
12. A haploid cell contains 12 chromosomes. How many chromosomes would be in a muscle cell of the same species? _____
13. You look under a microscope at an unknown organism and you observe 24 homologous pairs of chromosomes. What type of cell are you observing and how do you know? _____

14. You look under a microscope at two samples of an unknown organism and observe that it one sample contains 15 chromosomes and another contains 30 chromosomes. Explain a possible reason why your two samples have different chromosome numbers even though it is the same organism.

15. Are any of the chromosome in the following figure a homologous pair? Explain why or why not.



16. Which of the following statements about DNA of gametes is true?

- A. Gametes are smaller than somatic cells.
- B. Gametes have one-half of the DNA of somatic cells.
- C. Gametes are more difficult to isolate than somatic cells.
- D. Gametes are more difficult to maintain in test tubes than somatic cells.

17. The diagram below represents a change in composition of homologous chromosomes. This change is most likely the result of the process of:



Learning Objectives:

- SWBAT: Compare and contrast the process of mitosis and meiosis.
- SWBAT: Compare and contrast the function of mitosis and meiosis.
- SWBAT: Relate sexual and asexual reproduction to genetic variation.

Vocabulary:

- Mitosis
- Meiosis
- Genetic variation
- Sexual reproduction
- Asexual reproduction

Key Points, Examples, and Diagrams:

- Meiosis produces cells with half the original chromosome numbers while mitosis produces cells with the original chromosome number.
- Sexual reproduction increases genetic variation.
- Mitosis produces 2 daughter cells while meiosis produces 4 daughter cells.
- Mitosis is to grow and repair body cells while meiosis produces gametes for sexual reproduction.
- Meiosis results in gametes that combine to form a zygote. Zygotes reproduce through mitosis.

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

Directions: Write "A" for mitosis, "B" for meiosis, or "C" for both.

1. ____ Produces all body cells except reproductive cells
2. ____ Produces somatic(body) cells
3. ____ Produces gametes
4. ____ Produces sperm cells
5. ____ Produces four cells
6. ____ Produces two cells
7. ____ Produces diploid cells
8. ____ Produces haploid cells
9. ____ New cells have same number of chromosomes as parent cell
10. ____ New cells have half the number of chromosomes as parent cell
11. ____ End cells are genetically identical to the original
12. ____ Starts with 1 cell
13. ____ Sister chromatids separate first
14. ____ Homologous pairs separate first
15. ____ DNA is replicated
16. ____ Cytokinesis is involved
17. ____ Ending human cells have 46 chromosomes
18. ____ Ending human cells have 23 chromosomes
19. ____ Starts with interphase

Matching: For 11-15 find the correct answer from the box below. All answers will be used.

20. ____ Homologous chromosomes
21. ____ Somatic cells
22. ____ Gametes
23. ____ Diploid cells
24. ____ Haploid cells

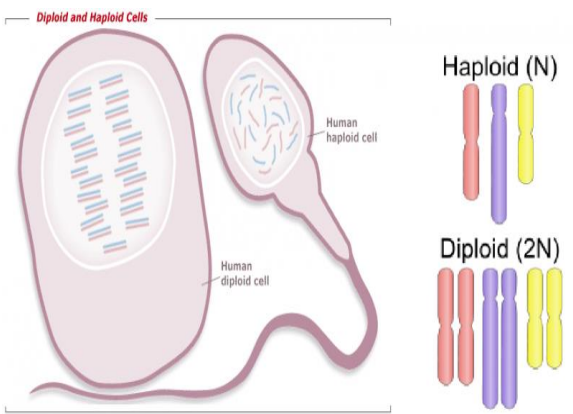
- | | |
|----|---|
| A. | Chromosomes that are paired during meiosis and are the same size. |
| B. | All the body cells except reproductive cells |
| C. | Egg and sperm cells |
| D. | Number of chromosomes in most cells (except gametes) |
| E. | Having half the number of chromosomes found in body cells |

25. Both mitosis and meiosis are needed to grow and repair your somatic (body) cells." Agree or disagree with this statement and write at least two sentences justifying your choice.

Biology Review Packet	SC.912.L.16.8 Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.	Page 67 of 96
Learning Objectives: SC.912.L.16.8 Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.		Vocabulary:
SWBAT: Explain what a mutation is and what causes it. SWBAT: Explain that cancer is the unregulated production of cells. SWBAT: Explain the causes of cancer such a carcinogens and radio activity. SWBAT: Relate the cycle of cancer cells to the normal cell cycle.		<ul style="list-style-type: none"> • Mutation • Carcinogen • Tumor • Benign Tumor • Malignant Tumor

Key Points, Examples, and Diagrams:

- Diploids= a body cell that contains 46 (23 Pairs) chromosomes.
- Haploids= a sex cell which contains half the chromosomes (23).
- DNA=tells the cell when to grow and what to do.
- Mutation= is a change in DNA sequence.
- A DNA mutation affects how **ONE** cell grows and what **ONE** cell does.
- Carcinogens = Radiation, Pollution, and Viruses that can mutate DNA.
- Cancer= starts after one cell with mutated DNA replicates uncontrollably
- Normal growth factors= tells the cell when to perform mitosis.
- Cancer cells with mutated DNA do not follow normal growth factors.
- Tumor= uncontrolled cell growth
- Benign Tumor: A group of mutated cells that do not harm or spread to any other part of the body
- Malignant Tumor: A group of mutated cells that spread to other parts of the body. (CANCER)
- A mutation in a gamete(s): may be passed to the offspring.
 - If it is passed on every cell in the offspring will be mutated



Independent Practice	<p><u>Directions:</u> Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.</p>
<p>1. What is the number of chromosomes in a human body cell? _____</p> <p>2. What is the number of chromosomes in a human sex cell? _____</p> <p>3. What helix shaped structure tells the cell when to grow and what to do? _____</p> <p>For question 4-10 Identify each as True or False. If it is false, correct it and explain why.</p> <p>6. A mutation of a cell does not signify mutated DNA. _____</p> <p>7. Viruses cannot cause cancer. _____</p> <p>8. Cancer will ALWAYS occur after one cell in a person's body becomes mutated. _____</p> <p>9. A mutation in the egg or sperm cell cannot be passed to the parent's offspring. _____</p> <p>10. Joe has been a lifelong sunscreen tester. The radiation in sunlight has been proven to cause certain mutations in cells, often in skin cells. Bob's cells recently began overproducing.</p> <p>17. What will happen to the production of Bob's mutated skin cells? _____</p> <p>18. What are two possible outcomes? _____</p> <p>19. True or False: A mutation in DNA can be passed to the parent's offspring. Explain why. _____</p> <p>20. What is the difference between cancer and mutated DNA? _____</p>	

Learning Objectives:

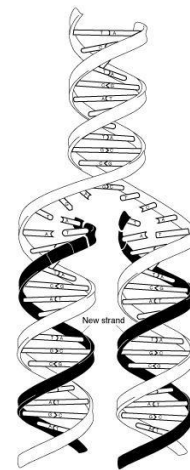
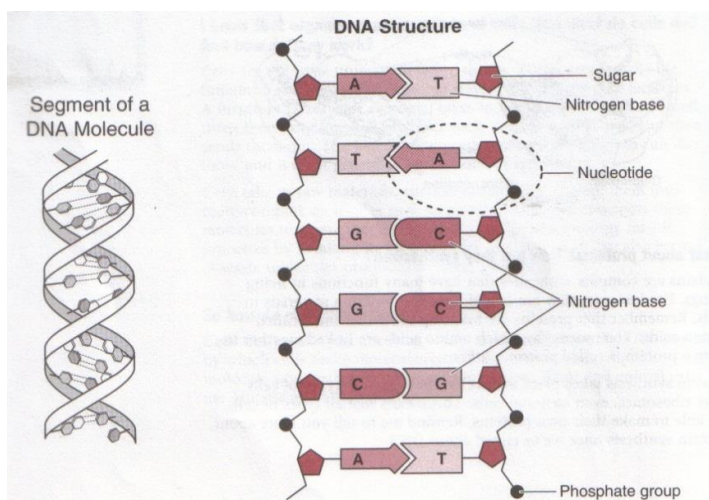
- SWBAT: Describe the structure and function of DNA.
- SWBAT: Describe the process of DNA replication.
- SWBAT: Relate the structure of DNA to its function.

Vocabulary:

- DNA
- Phosphate group
- Deoxyribose
- Nitrogen bases
- Adenine
- Guanine
- Cytosine
- Thymine
- Nucleotide

Key Points, Examples, and Diagrams:

- A. DNA = deoxyribonucleic acid
- B. The function of DNA is to store genetic information AND is the code for creating all proteins in your body.
- C. **Structure of a DNA Molecule:**
- Made of nitrogen base pairs
 - There are four base pairs:
 - Adenine (A)
 - Guanine (G)
 - Cytosine (C)
 - Thymine (G)
 - Each base pairs up with only ONE other base.
 - A goes to T
 - G goes to C
 - Adenine and Guanine are known as purines. Thymine and Cytosine are known as Pyrimidines.
 - Made of a phosphate.
 - Made of a deoxyribose (a type of sugar. All sugars end in the suffix -ose)
 - These three pieces (nitrogen base, phosphate, and deoxyribose) join together to form a nucleotide.
 - DNA is in the shape of a double helix. It has two strands. These strands are connected together by the nitrogen bases. Think of it like a twisted ladder. If you flatten it out the phosphate and deoxyribose make up the sides of the ladder and the nitrogen bases make up the rungs of the ladder. See the diagram below-left for a visual aid.

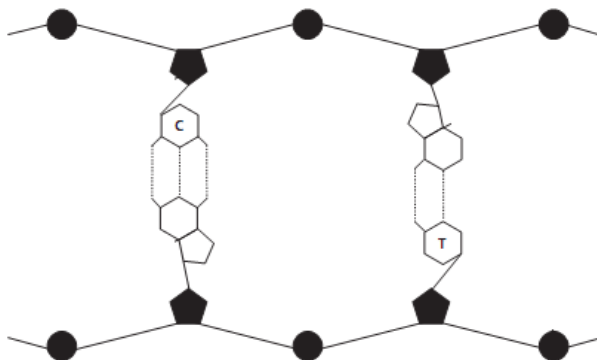


- The sequence of the base pairs is what determines an individual's genetic code. Any two humans have 99.9% of the same sequence of base pairs. The 0.1% that is different is what makes all humans slightly different (hair color, eye color, height, etc).
- For instance, the DNA sequence TCTAAA might code for a protein that produces blue eyes while TCTGGG codes for green eyes.
- DNA replication is when DNA makes a copy of itself inside the nucleus (during interphase, right before mitosis).
- The copy of DNA is identical to that of the parent (see visual aid above-right).

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Label the following diagram with the following words: *ribose, phosphate, nitrogen base, hydrogen bond, adenine, and guanine.*



2. If a DNA molecule is made up of 20% thymine, what percent of it would be guanine? _____
3. If a DNA molecule is made up of 10% guanine, what percent of it would be adenine? _____
4. If a DNA molecule is made up of 35% cytosine, what percent of it would be thymine? _____
5. If a DNA molecule is made up of 40% adenine, what percent of it would be guanine? _____
6. If a DNA molecule is made up of 7% thymine, what percent of it would be cytosine? _____
7. If a DNA molecule is made up of 30% thymine, what percent of it would be guanine? _____
8. If a DNA molecule is made up of 22% thymine, what percent of it would be guanine? _____
9. If a DNA molecule is made up of 14% guanine, what percent of it would be adenine? _____
10. If a DNA molecule is made up of 38% cytosine, what percent of it would be thymine? _____
11. If a DNA molecule is made up of 4% adenine, what percent of it would be guanine? _____
12. If a DNA molecule is made up of 50% thymine, what percent of it would be cytosine? _____
13. If a DNA molecule is made up of 0% thymine, what percent of it would be guanine? _____
14. Put the following structures in order from largest to smallest: *nitrogen base pairs, DNA double helix, chromosome, nucleus.*
 - a. _____
 - b. _____
 - c. _____
 - d. _____
15. What is the difference between DNA & RNA in terms of function? _____

16. What are two differences in structure between DNA & RNA?

a. _____

b. _____

17. During DNA replication two identical DNA molecules are produced from one original molecule. Which statement below explains why the newly formed molecules are identical to the original? During DNA replication

- A. The original DNA molecule breaks down into nucleotides that are reassembled by DNA polymerase into two new molecules.
- B. The nitrogen base adenine can only pair with cytosine and thiamine.
- C. Each strand of the original molecule serves as a template for the two new stands, and new nucleotides are added to the template according to the pairing rule.
- D. The nitrogen base adenine can only pair with guanine and phosphate groups.

18. What enzymes is involved in DNA replication? _____

19. Before a cell can go through mitosis the DNA must replicate during interphase. Why? Be specific! _____

20. Find the complementary DNA strand for each:

a. ACTGCGTGTGCCCTAA _____

b. GGGCTCGATCGATTCA _____

c. GTGTGACCTATAGAAA _____

d. AATCCGTCATATCGCC _____

21. What are the three parts of a DNA nucleotide?

a. _____

b. _____

c. _____

22. Why is it advantageous to have a weak hydrogen bond instead of a strong covalent bond between the nitrogen base pairs?

Learning Objectives:

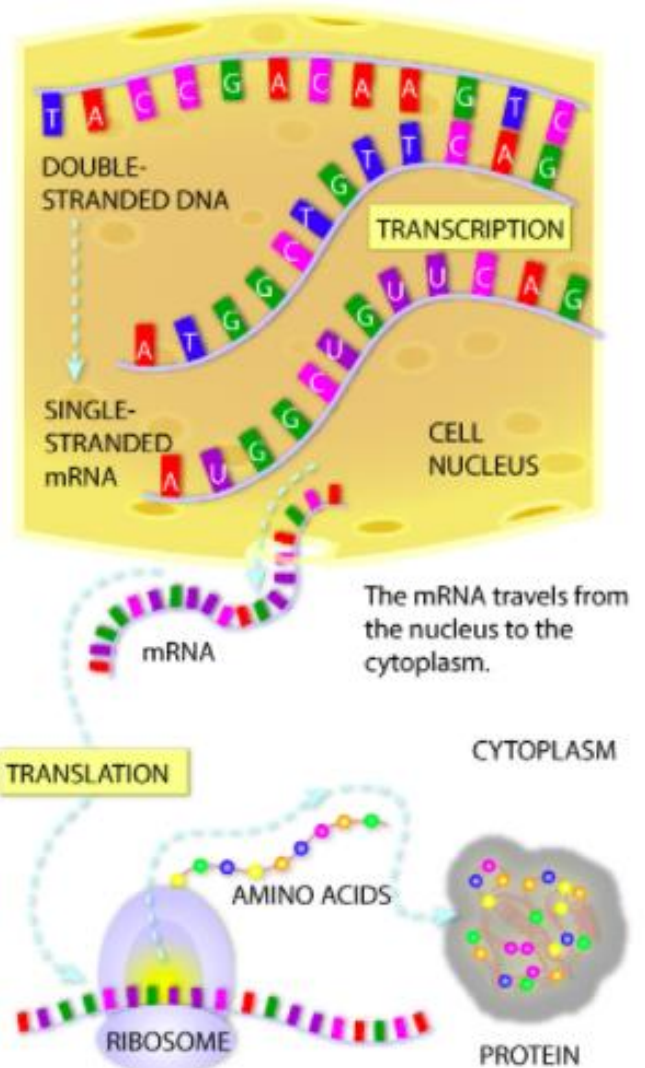
- SWBAT: Describe the structure and function of DNA and RNA.
- SWBAT: Explain the process and purpose of transcription and translation.
- SWBAT: Predict the polypeptide that will be created from a DNA molecule.
- SWBAT: Decode a strand of mRNA using a codon chart.

Vocabulary:

- Ribonucleic acid
- Transcription
- Translation
- Polypeptide
- Amino Acid
- Codon

Key Points, Examples, and Diagrams:

- A. DNA = deoxyribonucleic acid RNA = ribonucleic acid
- B. Remember to go back and look at/review the structure of a DNA molecule to better understand the process of transcription and translation.
- C. DNA is made up four base pairs (A, T, C, and G) and the sequence/order of those pairs determines our genetics. The different patterns code for different proteins.
- D. All individuals have different variations or sequences of base pairs. This results in our genetic variation.
- E. The function of DNA is to tell your body what proteins to make. Proteins are created in the ribosomes. However, DNA is in the nucleus and cannot leave. This is a problem because the DNA can't tell the ribosomes what proteins to make.
- F. mRNA is the solution! mRNA = messenger RNA
- G. mRNA can leave the nucleus, so it brings the "message" from the DNA to the ribosomes about which proteins to make.
- H. This process is called transcription (DNA to mRNA is transcription).
- I. Here is how you would transcribe a DNA molecule onto mRNA:
- RNA does not contain thymine; instead it has uracil (U).
 - So a strand of DNA will match up like this: A goes to U. C goes to G
 - Example: DNA= ACGTAG the mRNA=UGCAUC
 - That's transcription; you're done!
- J. If you were asked to find the amino acid sequence that the mRNA codes for here is how you would do it (also known as finding the polypeptide) – THIS IS TRANSLATION:
- In your mRNA strand, break it up into codons. A codon is a group of 3 letters. In the example above your first codon would be UGC, the second would be AUC (and then there are no more codons in that example).
 - Go to your codon chart and find the amino acid that that particular codon will create. Write that amino acid down. Now find the second amino acid for the second codon. Write that one down next to it and put a dash in between them. This would be your amino acid sequence or your polypeptide chain. Do this for as many codons as you have.
 - Voila, you have just found what the process of translation would create.
- K. How does translation work?
- The ribosome is the "factory" where amino acids are assembled into proteins.
 - tRNA (transfer RNA) is used to bring the amino acids into the ribosome.
 - tRNA is complementary to mRNA.
 - For example, if the mRNA=UGCAUC then the tRNA=ACGUAC (we just found the base pair that would go with it keeping in mind that RNA molecules do not have thymine).
 - This means that every codon has an anticodon. The first codon in the mRNA was UGC. The anticodon from the tRNA is ACG (they match up).



Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Transcribe the following DNA strands:

- a. ACT TTT TGG GCA AAT ACG _____
- b. CTT AAG GCG GAT CAT AAT _____
- c. TTA GGA CCC GGG TTA AAA _____
- d. ATA GTG GGA GAG GAG AGC _____
- e. TAG GAT TTA CCC CCC CCG _____

2. For each of the following use the codon chart to the right to translate the mRNA into its amino acid sequence.

- a. UCA GUA GGG CGU GAA

Amino acid sequence _____

- b. GUU AAU AGG GAG UAU

Amino acid sequence _____

- c. CAG CAA GAA UGC UUC

Amino acid sequence _____

- d. CGG UAG UAA GUC CCC

Amino acid sequence _____

- e. CGA AAA UUU GUA UGC

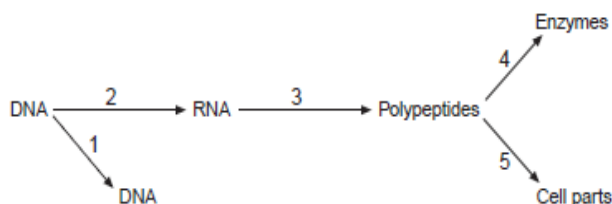
Amino acid sequence _____

Codons Found in Messenger RNA

		Second Base				
		U	C	A	G	
First Base	U	Phe Phe Leu Leu	Ser Ser Ser Ser	Tyr Tyr Stop Stop	Cys Cys Stop Trp	U C A G
	C	Leu Leu Leu Leu	Pro Pro Pro Pro	His His Gln Gln	Arg Arg Arg Arg	U C A G
	A	Ile Ile Ile Met	Thr Thr Thr Thr	Asn Asn Lys Lys	Ser Ser Arg Arg	U C A G
	G	Val Val Val Val	Ala Ala Ala Ala	Asp Asp Glu Glu	Gly Gly Gly Gly	U C A G
						Third Base

3. Use the diagram below to answer the following questions:

- a. What is process 1 known as? _____
- b. What is process 2 known as? _____
- c. What is process 3 known as? _____
- d. Which two processes occur in the nucleus? _____
- e. What is the product of process 3 (don't use the word polypeptide)? _____



4. Below are several polypeptides (chains of amino acids). Find a possible DNA strand that coded for them and the corresponding mRNA strand that transcribed it from the DNA.

a. Val – Asp – Gly – Lys – Arg

i. Possible DNA strand: _____

ii. Corresponding mRNA: _____

b. Leu – Thr – Asn – Gln – Met

i. Possible DNA strand: _____

ii. Corresponding mRNA: _____

c. Phe – Cys – Trp – Pro – His

i. Possible DNA strand: _____

ii. Corresponding mRNA: _____

5. What are the three codons that would tell the ribosome to stop producing the amino acid chain?

a. _____

b. _____

c. _____

6. Transcribe and translate the following DNA strand AND identify which process is transcription and which process is translation:

DNA: GGC TTA AAC GCT AAA AGT

mRNA:

amino acid chain:

7. What process must occur before DNA information can be moved out of the nucleus? _____

8. Why do we need to transcribe DNA? _____

9. Transcription results in complementary strands of RNA where as translation results in

- A. Protein
- B. mRNA
- C. DNA
- D. Polypeptide chain

10. Based on structure, in what way do DNA molecules differ from RNA molecules?

- A. DNA is composed of two chains of nucleotides but RNA is composed of three chains of nucleotides.
- B. RNA is helical but DNA is branched.
- C. DNA is composed of four different bases and RNA is composed of three different bases.
- D. RNA contains the base uracil but DNA does not contain thymine.

Student Name:

Date:

Period:

Original
Mastery:Reassessed
Mastery:**Learning Objectives:**

- SWBAT: Explain what a genetic code is.
- SWBAT: Explain that DNA is found in almost all living organisms.
- SWBAT: Explain why it is possible to combine the DNA from different organisms.

Vocabulary:

- DNA
- Genetics
- Universal Code

Key Points, Examples, and Diagrams:

- L. DNA is made up of four base pairs (adenine, thymine, guanine, and cytosine).
- M. The order or sequence of these base pairs is what determines an organisms genetic code.
a. Example – ATTGCC might code for blue eyes while ATTGGG might code for brown eyes.
- N. Almost all organisms on Earth contain DNA (and therefore have the same base pairs)
- O. The only difference between species is the sequence of their base pairs inside the DNA.
- P. Any species that reproduces sexually will have individuals with slightly different DNA sequences (this is what creates genetic variation).
- Q. This allows scientists to combine the genes from one organisms with another (called gene splicing) because all organisms are made up of the same structure (just the sequence is different).

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Explain how a scientist could use genetic information to identify someone. _____

2. A scientist observes that the base pairs in an elephant are the same as a mouse. The scientist concludes that this is evidence that the genetic code is universal. Do you agree or disagree? Justify your answer!

3. Why would you be able to take the DNA from a glowing jellyfish and insert it into a mouse? _____

4. What would be the correct DNA parings in the DNA of an alligator?
 - a. Cytosine-adenine; guanine-thymine
 - b. Adenine-guanine; cytosine-thymine
 - c. Adenine-thymine; cytosine-guanine
 - d. Cytosine-thymine; guanine-adenine
5. Genes for medically important human proteins can be cloned and inserted into bacteria. Why can bacteria recognize a human gene and then produce a human protein?
 - a. Bacterial cells contain the same organelles as human cells.
 - b. DNA replication in bacteria and humans is the same.
 - c. The basic components of DNA are the same in humans and bacteria.
 - d. Bacterial cells and human cells contain the same kind of chromosomes.
6. Species A and Species B share 80% of the same nucleotide sequences. Species A and Species C share 70%. Is Species A more closely related to Species B or C? How do you know? _____

Unit 8 – Inheritance

Student Name:

Date:

Period:

Original Mastery:

Reassessed Mastery:

Learning Objectives:

- SWBAT describe the difference between recessive and dominant alleles.
- SWBAT describe the difference between heterozygous genotype and homozygous genotype.
- SWBAT create and analyze a Punnett Square for all types of inheritance patterns.
- SWBAT predict the probabilities of genotypes and phenotypes of offspring based on Punnett Squares.
- SWBAT complete and analyze a sex-linked Punnett Square.
- SWBAT explain the concepts of co-dominance and incomplete dominance.

Vocabulary:

- Genotype / phenotype
- Punnett Square
- Heterozygous / homozygous
- Alleles
- Incomplete dominance
- Co-dominance

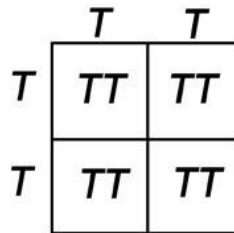
Key Points, Examples, and Diagrams:

- R. Alleles = one form of a gene (each person can have two alleles for every gene)
- S. Dominance = the principle of dominance states that some alleles are dominant and some are recessive. An organism with a dominant allele for a particular form of a trait will always exhibit that form of the trait. (for example, if black hair is dominant, someone with an allele for black hair will always have black hair). An organism with a recessive allele for a particular trait will only exhibit that trait if it has TWO recessive alleles. A capitol letter represents the dominant gene.
- T. Genotype = genetic makeup and phenotype = physical characteristics
- U. Homozygous = organism that have two of the same alleles (for example, TT, or tt – but not Tt)
- V. Heterozygous = organism that has two different alleles (for example, Rr or Ss are both heterozygous)
- W. See the diagram to the right to see how to complete a Punnett Square correctly. You will use Punnett squares to determine the percent of offspring that are statistically likely to have that trait.
- X. REMEMBER... Punnett squares are the probability of what the offspring will look like; you're not producing 4 offspring. Each box represents a probability.
- Y. Incomplete dominance is when neither allele is dominant. For example, a red allele and a white allele might create a flower that appears pink (both alleles are showing through).
- Z. Codominance is when both alleles contribute to the phenotype. For example, the allele for black feathers in chickens and the allele for white feathers are codominant and result in a chicken with both black and white feathers.
- AA. Many genes have multiple alleles. This does not mean an individual can have more than two alleles, it just means there are more than two options. For example, humans can have blue eyes, brown eyes, green eyes, etc, but you can only have two of those alleles.
- BB. Traits that are controlled by two or more genes are known as polygenic traits.
- CC. Sex-linked genes – alleles that are found on the sex chromosomes (X or Y). Diseases that are carried on the X chromosome means that men are more likely express them because we only have one X chromosome. Women have two X chromosomes

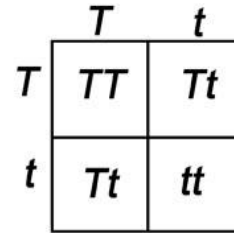
Punnett's Squares

These show the 2 alleles of each parent plant crossed with each other and the resulting 4 possible offspring with T = tall, t = short.
 TT = dominant tall, tt = recessive short, Tt = mixed hybrid

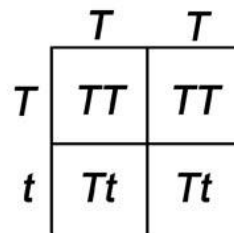
TT = dominant tall (genotype tall, phenotype tall)
 Tt = mixed hybrid (genotype hybrid, phenotype tall)
 tt = recessive short (genotype short, phenotype short)



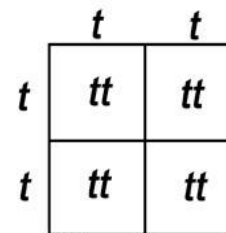
Both parents are dominant tall so all offspring are tall.



Both parents are mixed hybrids so offspring are a 3:1 ratio.



One parent is dominant tall and one is mixed hybrid so all offspring are tall.



Both parents are recessive short so all offspring are short.

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

For the trait of wiggling your ears W = can wiggle and w = cannot wiggle.

1. Which gene is dominant? _____ Which gene is recessive? _____
2. What would be the heterozygous genotype? _____
3. What would be the homozygous dominant genotype? _____ Homozygous recessive genotype? _____
4. What would be one genotype of someone who could wiggle their ears? _____
5. What would be the genotype of someone who cannot wiggle their ears? _____

Complete the following Punnett Square and then answer the questions about it. D =dimples and d =no dimples

	D	d
D		
d		

6. What percentage of these offspring are heterozygous for dimples? _____
7. What percentage of offspring are homozygous dominant for dimples? _____
8. What percentage of offspring are homozygous recessive for dimples? _____
9. Which genotypes will have dimples? _____
10. What percentage of offspring will have dimples? _____
11. What percentage of offspring will not have dimples? _____

Complete the following Punnett Square and then answer the questions about it. R =rolls tongue and r =cannot roll tongue

	R	R
r		
r		

12. What percentage of these offspring are heterozygous for tongue rolling? _____
13. What percentage of offspring are homozygous dominant for tongue rolling? _____
14. What percentage of offspring are homozygous recessive for tongue rolling? _____
15. Which genotypes will not be able to roll their tongue? _____
16. What percentage of offspring will be able to roll their tongue? _____

17. What percentage of offspring will be able to roll their tongue? _____
18. Which mode of inheritance explains why a mother with a particular recessive trait will always pass it on to her son?
- m. Co-dominance
 - n. Sex-linkage
 - o. Multiple alleles
 - p. Incomplete dominance
19. Hemophilia in humans is due to an X-chromosome mutation. What will be the results of mating between a normal (non-carrier) female and a hemophilic male?
- a. Half of the daughters are normal and half of the sons are hemophilic.
 - b. All daughters are normal and all sons are carriers.
 - c. All sons are normal and all daughters are carriers.
 - d. Half of sons are normal and half are hemophilic; all daughters are carriers.
 - e. Half of daughters are hemophilic and half of daughters are carriers; all sons are normal.
20. In pea plants, round (R) seeds are dominant over wrinkled (r) seeds. A heterozygous pea and homozygous recessive pea are crossed. What are the expected phenotypes of the resultant offspring?
- a. 100% round
 - b. 50% round, 50% wrinkled
 - c. 75% round, 25% wrinkled
 - d. 25% round, 75% wrinkled
21. In humans, dwarfism (D) is dominant over normal (d). A heterozygous (Dd) person is dwarfed. A homozygous recessive individual is normal. A heterozygous dwarf man marries a dwarf heterozygous woman. What is the probability of having a child that is a dwarf?
- a. 100%
 - b. 75%
 - c. 50%
 - d. 25%
22. In humans, straight hair and curly hair are both codominant traits that result in hybrids that have wavy hair. Cross a curly hair female with a wavy haired male. What are their chances of having a curly haired child?
- a. 100%
 - b. 75%
 - c. 50%
 - d. 25%
23. In pea plants, the allele for smooth seeds (S) is dominant over the allele for wrinkled seeds (s). In an experiment, when two hybrids (heterozygous individuals) are crossed, what percent of the offspring share the same genotype as the parents?
- a. 100%
 - b. 75%
 - c. 50%
 - d. 25%

Student Name:

Date:

Period:

Original
Mastery:Reassessed
Mastery:**Learning Objectives:**

- SWBAT explain that mutations will only be passed to offspring if they occur in gametes.
- SWBAT explain that mutations will always change the genotype but may or may not change the phenotype.
- SWBAT understand that mutations can occur as a result of addition, deletion, and substitution.
SWBAT explain the difference between silent mutations, frameshift mutations, missense mutations, and nonsense mutations.

Vocabulary:

- Mutation
- Point mutation
- Frameshift mutation
- Substitution
- Missense mutation
- Silent mutation
- Deletion
- Insertion

Key Points, Examples, and Diagrams:

- DD. Mutations are random changes to the genetic sequence that have varying phenotypic effects on an organism
- EE. A point mutation is a change in one nucleotide of a gene sequence.
- FF. A frameshift mutation is the deletion, or insertion of a nucleotide. This changes the reading frame for all following codons.
- GG. A Substitution is exchanging just one nucleotide for another. They can result in a missense mutation or silent mutations.
- HH. A missense mutation causes only one amino acid to change (what you find in the codon chart).
- II. A silent mutation will not change any amino acids (for example, two codons might code for the same amino acid).
- JJ. A nonsense mutation will cause a stop codon to appear where it shouldn't and an amino acid will not properly form.

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Where would a mutation need to occur for it to be passed on to offspring? Why?

2. Use the DNA sequence shown and complete the following:

ATGCTAGGC

a) Rewrite the sequence above demonstrating the following mutations

i) deletion

ii) insertion

iii) substitution

Use the codon chart on the following page to help you answer problems 3 to 4 (remember to transcribe first!)

3. Provide an example of a silent mutation for the DNA sequence AGG _____

Explain why this is a silent mutation:

4. Provide an example of a missense mutation for the DNA sequence TTG _____

Explain why this is a missense mutation:

5. Provide an example of a nonsense mutation for the DNA sequence CGA _____

Explain why this is a nonsense mutation:

6. Provide an example of a frameshift mutation for the DNA sequence GGTGCA _____

Explain why this is a frameshift mutation:

7. Which type of mutations (substitution, deletion, and/or insertion) could result in:

a nonsense mutation? _____

a Missense mutation? _____

a Silent mutation? _____

a Frameshift mutation? _____

8. This mutation does not change the resulting amino acid. Such a mutation is considered a _____ mutation because it _____ cause a phenotypic change

- a) missense / does not
- b) silent / does
- c) frameshift / does
- d) nonsense / does not

9. A chemical known as 5-bromouracil causes a mutation that results in the mismatching of molecular bases in DNA. The offspring of organisms exposed to 5-bromouracil can have mismatched DNA if the mutation occurs in what kind of cell?

Codons Found in Messenger RNA

Second Base

		U	C	A	G		
First Base	U	Phe	Ser	Tyr	Cys	U	
		Phe	Ser	Tyr	Cys		C
		Leu	Ser	Stop	Stop		A
		Leu	Ser	Stop	Trp		G
	C	Leu	Pro	His	Arg	U	
		Leu	Pro	His	Arg		C
		Leu	Pro	Gln	Arg		A
		Leu	Pro	Gln	Arg		G
	A	Ile	Thr	Asn	Ser	U	
		Ile	Thr	Asn	Ser		C
		Ile	Thr	Lys	Arg		A
		Met	Thr	Lys	Arg		G
	G	Val	Ala	Asp	Gly	U	
		Val	Ala	Asp	Gly		C
		Val	Ala	Glu	Gly		A
		Val	Ala	Glu	Gly		G

Third Base

Student Name:

Date:

Period:

Original
Mastery:Reassessed
Mastery:**Learning Objectives:**

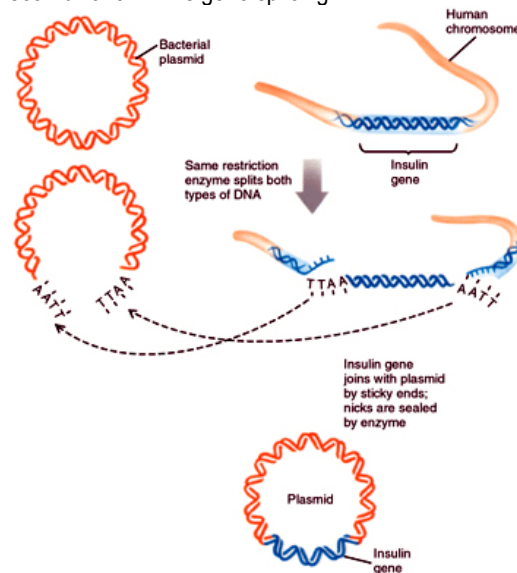
- SWBAT explain the process of gene splicing and its potential applications.
- SWBAT explain the purpose and impacts of genetic engineering for individuals, society, and the environment.

Vocabulary:

- Biotechnology
- Gene Splicing
- Recombinant DNA
- Plasmid
- Genetic Engineering
- Genetically Modified

Key Points, Examples, and Diagrams:

- Biotechnology = using living organisms for advancements in the fields of engineering, technology, medicine, etc.
- Genetic engineering is an area of scientific technology that is being used to change the genetic makeup of cells and move genes across species.
 - Genes are the chemical blueprints that determine an organism's traits. Moving genes from one organism to another transfers those traits. Through genetic engineering, organisms are given new combinations of genes – and therefore new combinations of traits – that do not occur in nature and cannot be developed by natural means. Such an artificial technology is radically different from traditional plant and animal breeding.
- Gene Splicing = the process in which fragments of DNA from one or more different organisms are combined to form recombinant DNA
 - Recombinant DNA refers to a type of DNA that is created by combining two or more sequences that would not normally occur together.
 - The process that makes recombinant DNA is gene splicing.



- The above diagram shows gene splicing in a plasmid.
- A plasmid is a circular piece of DNA that attaches to the gene that is genetically altered to form recombinant DNA.
- Genetically modified foods or GMOs (genetically-modified organisms) are crop plants created for human or animal consumption using the latest molecular biology techniques.
 - Genetic engineers do this to enhance desired traits such as color, increased resistance to herbicides, improved nutritional content, etc.
 - Advantages of GM foods:
 - Pest and disease resistance
 - Herbicide tolerance
 - Weather tolerance
 - Nutrition
 - Pharmaceuticals
 - Criticisms against GM foods:
 - Environmental hazards
 - Allergies
 - Unknown effects to human health

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

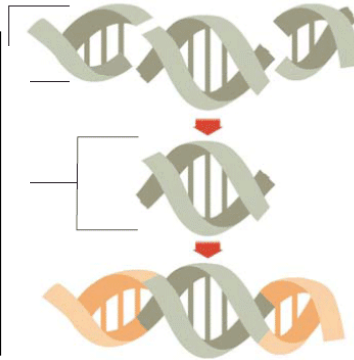
- Plants in species A cannot fight most fungal infections. Plants in species B make a protein that kills many fungi. One possible way for humans to produce species A plants with the ability to synthesize this protein would be to
 - Mutate fungal DNA and introduce the mutated DNA into species B using a virus.
 - Add DNA from species B into the soil around species A.
 - Insert the gene for the protein from species B into a chromosome in species A
 - Cross species A and a fund to stimulate the synthesis of this protein.
- Discuss 3 reasons why genetic engineers might choose to genetically modify a crop, such as corn.
 - _____
 - _____
 - _____

- The following diagram shows the process of gene splicing. To the left of the diagram, explain how genetic splicing works.

Splicing Genes Together

Employing genetic engineering, researchers can take certain genes from a source organism and put them into another plant or animal.

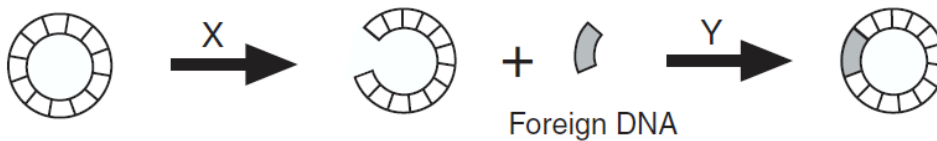
An Example of Genetic Engineering:



- The gene that codes for an enzyme to breakdown lipids in humans was spliced into rapidly dividing mice cells, which are then grown in the laboratory. Explain why scientists would perform this procedure.

- The diagram below represents some steps in a procedure used in biotechnology. Use the diagram to answer question #5.

Bacterial DNA



Letters X and Y represent which of the following?

- Hormones that stimulate the replication of bacterial DNA
 - Biochemical catalysts involved in the insertion of genes into other organisms
 - Hormones that trigger rapid mutation of genetic information
 - Gases needed to produce the energy required for gene manipulation
- Some geneticists are suggesting the possibility of transferring some of the genes that influence photosynthesis from an efficient variety of crop plant to a less efficient crop plant to produce a new variety with improved productivity. To produce this new variety, the project would most likely involve
 - Amniocentesis
 - Genetic engineering
 - Genetic screening
 - Inbreeding

Unit 9 – Evolution & Classification

Origins of Life	Benchmark: SC.912.L.15.8 Describe the scientific explanations of the origin of life on Earth.	
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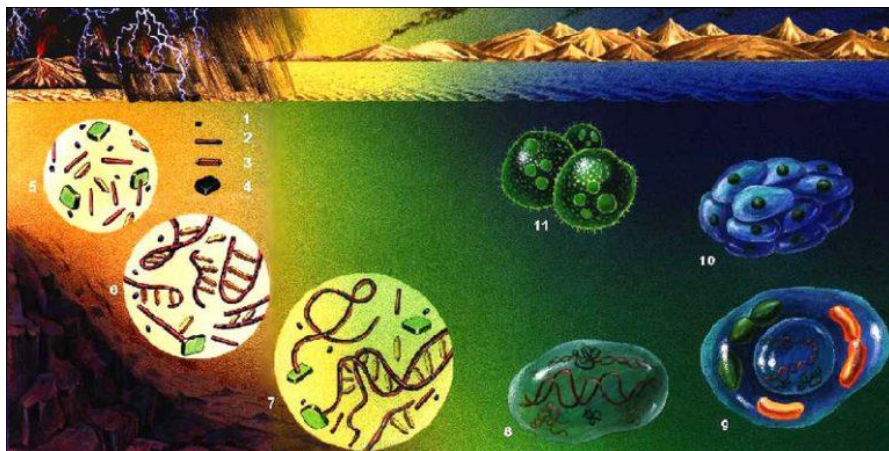
Learning Objectives:	Vocabulary:
<ul style="list-style-type: none"> • SWBAT: Describe scientific explanations of the origin of life on Earth. • SWBAT identify situations or conditions contributing to the origin of life on Earth. 	<ul style="list-style-type: none"> • Spontaneous generation • Organic molecule • Chemical evolution • Endosymbiotic theory

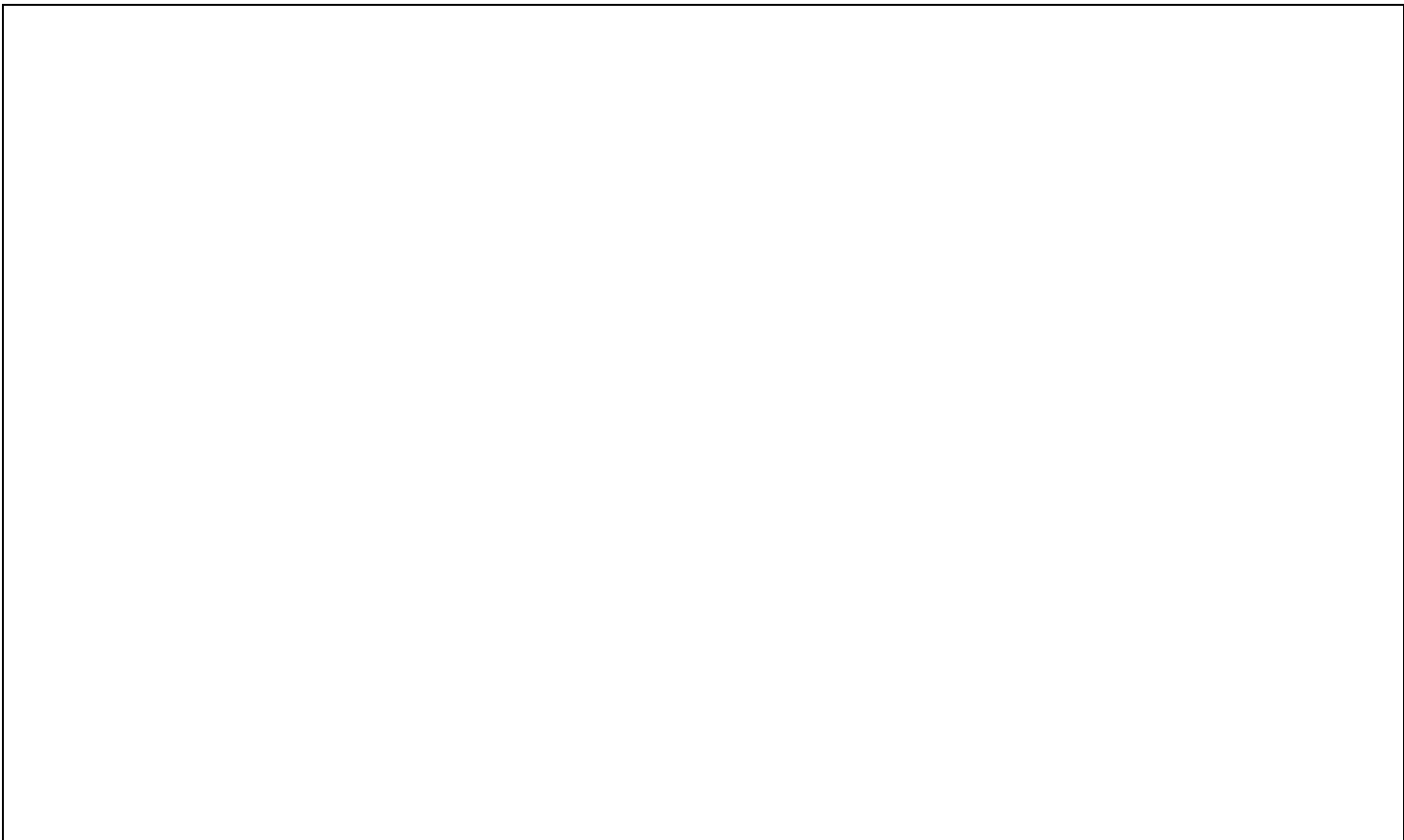
Key Points, Examples, and Diagrams:

Important scientists that have contributed to the theory:

- Oparin
- Miller & Urey
- Fox
- Margulis

- Earth is said to have been formed about 4.8 billion years ago.
- Earliest earth was a hot revolving ball of gas.
- The formation of first cells in planet earth is explained by the theory of chemical evolution proposed by Oparin and Haldane, independently.
- According to this theory, the reducing atmosphere of primitive earth helped in the formation of simple inorganic compounds followed by simple organic compounds. Then complex organic compounds and subsequently their interaction leading to the formation of self duplicating nucleic acids.
- The nucleic acids and other macro molecules became surrounded by membranes to form the protocells.
- The first forms of life were probably prokaryotic chemo-autotrophs.
- Anaerobic chemotrophs probably appeared subsequently followed by evolution of chlorophyll containing anaerobic photo-autotrophs.
- The first aerobic photo-autotrophs (cyanobacteria) are said to have appeared about 3.5 billion years ago.
- Life is said to have originated in water, because of its unique properties.
- The origin of life was followed by organic evolution with the appearance of well adapted newer form of life from the pre-existing simple forms of life.





Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. Using your knowledge of the origins of life...
 - a. Match the letter for each example with the correct "Step" in the process of the Origins of Life
 - b. Identify the scientist(s) that contributed to each step. Each scientist should only be used once.
 - c. Explain the contribution each scientist made to the theory for how life evolved..

Steps involved in the Origins of Life

Steps	Examples	Scientist(s)	Scientific Contribution
Free Atoms			
Inorganic Molecules			
Simple Organic Molecules			
Complex Organic Molecules			
Cell Membranes (Vesicles)			
Prokaryotic Cells			
Eukaryotic Cells			

Letter	Examples
A	Cell Membranes containing Nucleic Acids (DNA/RNA) inside.
B	$\text{CH}_4 + \text{H}_2\text{O} \rightarrow$ Simple Sugars, Fatty Acids, Glycerol $\text{CH}_2 + \text{H}_2\text{O} + \text{NH}_3 \rightarrow$ Amino Acids $\text{CH}_4 + \text{H}_2\text{O} + \text{NH}_3 + \text{HCN} \rightarrow$ Nitrogen Bases (A, T, C, G, U)
C	Simple Prokaryotic Cells merged with other simple prokaryotic cells and maintain a symbiotic relationship.
D	Sugars + Sugars \rightarrow Polysaccharides (Carbohydrates) Fatty Acids + Glycerol \rightarrow Lipids Amino Acids + Amino Acids \rightarrow Proteins Phosphate + Sugar + Nitrogen Base \rightarrow Nucleotides Nucleotides + Nucleotides \rightarrow Nucleic Acids
E	Hydrogen (H_2), Water (H_2O), Carbon Dioxide (CO_2), Methane (CH_4), and Ammonia (NH_3)
F	Hydrogen (H), Oxygen (O), Carbon (C), and Nitrogen (N)
G	Lipids join with other Lipids + Proteins \rightarrow Cell Membranes.

2. The incorrect idea that life could just appear into existence from non-living material is called? _____

2. One of the accepted scientific theories describing the origin of life on Earth is known as chemical evolution. According to this theory, which of the following events would need to occur first for life to evolve?

- A. onset of photosynthesis
- B. origin of genetic material
- C. synthesis of organic molecules
- D. formation of the plasma membrane

3. Who conducted this experiment (shown to the right)? _____

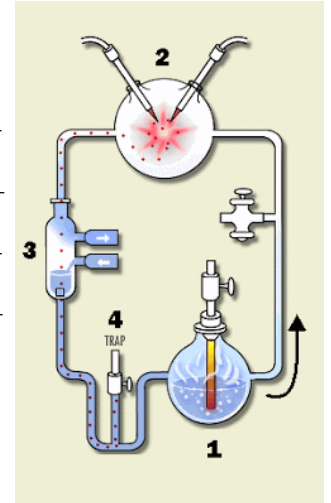
4. What question were the scientists who conducted this experiment trying to answer? _____

5. What was this apparatus used to simulate? _____

6. What was #2 in this experimental set-up supposed to simulate? _____

7. What did the scientist find when they analyzed the liquid in #4 of this experimental set-up? _____

8. What conclusion was made from this experiment? _____



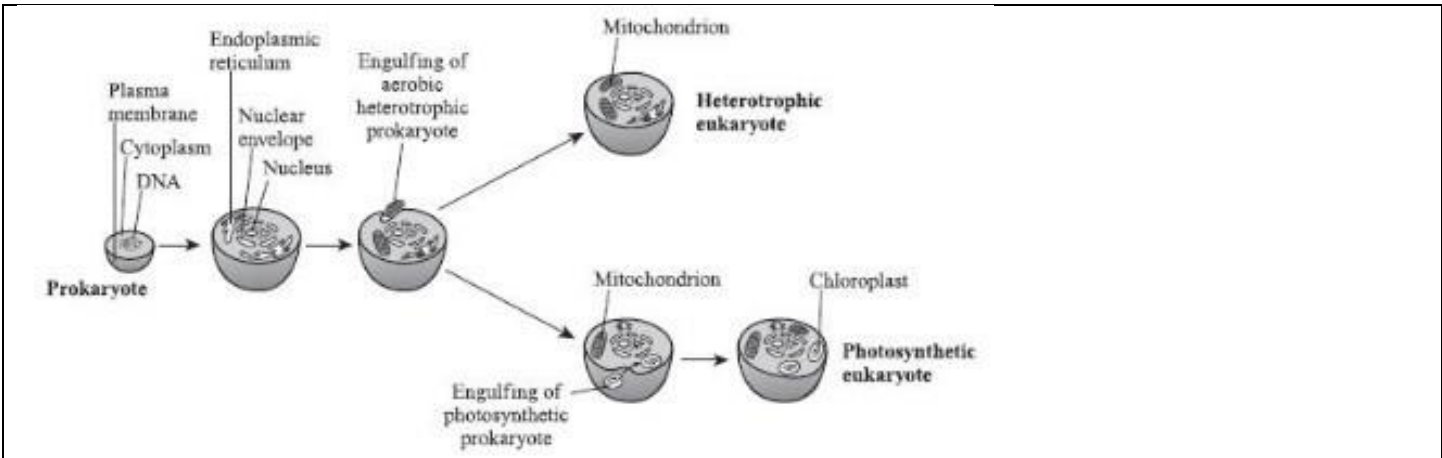
Which types of organisms developed first due to the early environmental conditions on Earth?

- A. prokaryotic and aerobic
- B. prokaryotic and anaerobic
- C. eukaryotic and aerobic
- D. eukaryotic and anaerobic

The Miller-Urey experiment of 1953 was designed to test the hypothesis that lightning supplied the energy needed to turn atmospheric gases into organic molecules such as amino acids. Which of the following describes why the Miller-Urey theory is widely accepted today?

- A. Amino acids spontaneously form from molecules in the atmosphere today.
- B. Organic molecules are present today in extremely high concentrations.
- C. The process of synthesizing organic molecules from a mixture of gases has been successfully modeled in the laboratory.
- D. No other alternative hypotheses have been introduced.

The diagram below shows a proposed theory of the origin of eukaryotic cells, called endosymbiosis.



Which of the following explains why cells that contained mitochondria-like organelles had an evolutionary advantage?

- A. They were able to photosynthesize
- B. They had more DNA
- C. They were able to make more use of available energy
- D. They were immune to bacterial invasion.

Which of the following gases is not believed to have been part of Earth's early atmosphere?

- A. Hydrogen
- B. Methane
- C. Oxygen
- D. Ammonia

The endosymbiotic theory explains....

- A. The origin of Eukaryotic cells
- B. The origin of Prokaryotic cells
- C. How bacteria evolved
- D. Why cells rely on one another

Natural Selection	Benchmark: SC.912.L.15.13 Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.	
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Learning Objectives:	Vocabulary:
<ul style="list-style-type: none"> • SWBAT: Describe the conditions required for natural selection. • SWBAT: Understand that species adapt to changes in their environment. • SWBAT: Explain the concept of struggle for existence and survival of the fittest. • SWBAT: Describe the term adaptation. 	<ul style="list-style-type: none"> • Natural selection • Adaptation • Fitness • Speciation • Genetic Drift • Gene Flow

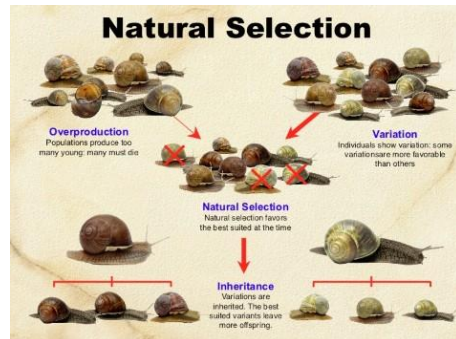
Key Points, Examples, and Diagrams:

Species: group of related organisms that can interbreed

Speciation: formation of a new species through natural selection

Natural selection: process for change in population, occurs when organisms with favorable variations survive, reproduce and pass their variations to the next generation

- Living things that are well adapted to their environment survive and reproduce. Those that are not well adapted don't survive and reproduce. An **adaptation** is any characteristic that increases **fitness**, which is defined as the ability to survive and reproduce. SURVIVAL OF THE FITTEST!
- Evolution by natural selection leads to adaptation within a population. The term evolution by natural selection does not refer to individuals changing, only to changes in the frequency of beneficial characteristics in the population as a whole.

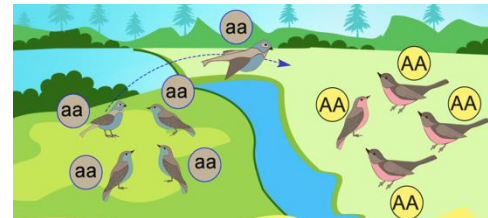


Darwin's Tenets (REQUIREMENTS) for Natural Selection to occur:

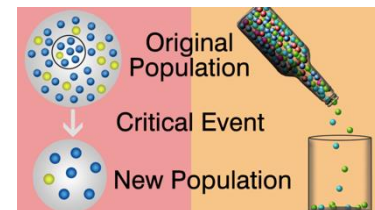
1. Overproduction of Offspring
2. Inherited Genetic Variation
3. Struggle to Survive (Competition)
4. Reproductive Success (Adaptation)

Other Modes of Evolution:

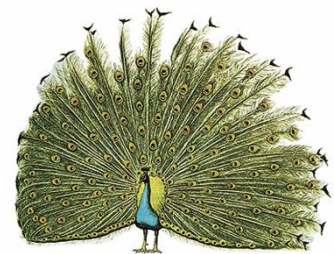
1. **Gene Flow:** The transfer or introduction of alleles from one population to another. It is also known as gene migration.



2. **Genetic Drift:** Describes the random fluctuations in the numbers of **gene** variations in a population. **Genetic drift** takes place when the occurrence of a **gene**, called alleles, increases and decreases by chance over time.



3. **Non-random Mating:** Directional selection occurs when natural selection favors one of the extreme variations of a trait. Example: Elephants use their trunks for preparing food, picking up objects, and fending off other elephants. Therefore, the long-trunked elephants have a selective advantage over elephants with very short or average-sized trunks.



Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. What are the causes of genetic variation?
 - a. Mutation in gametes (sex cells) and sexual reproduction
 - b. Mutation in somatic (body) cells and asexual reproduction
 - c. Natural selection and asexual reproduction
 - d. Natural selection and sexual reproduction
2. What is speciation? _____

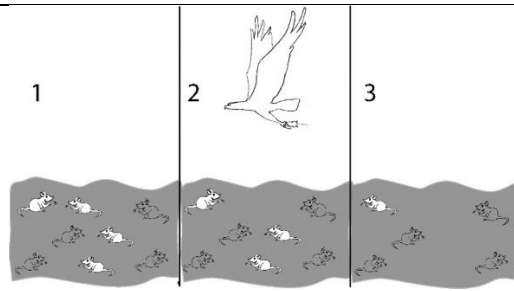
3. In areas of the American Southwest, certain insect species are quickly becoming resistant to continuous applications of chemical insecticides. The increase in the number of insecticide-resistant species is due to:
 - a. Inheritance of acquired traits
 - c. Geographic isolation

- b. Variability through sexual reproduction d. Natural selection

4. A group of students were on a hike in a nature preserve in northern Florida. As the group passed an area that bordered a marsh, they saw many wading birds searching for food in the marsh. Which adaptation would best help the birds survive in this environment?
- a. Small beaks c. White feathers
b. Wide wing span d. Long legs
5. According to the modern theory of evolution, closely related species of organisms share:
- a. Analogous structures c. Identical DNA sequences
b. Recent common ancestry d. One of the same parents
6. A mutation is considered helpful when it:
- a. Decreases the chances for survival or reproduction in an organism
b. Increases the chances for survival or reproduction in an organism
c. Does not harm the organism
d. Only changes the genetic make-up of the organism
7. If natural selection favors the best fit bird species to survive, why are there many different species of bird?
- a. Each bird species is adapted to their particular environment
b. All bird species have equal chances of survival in any niche
c. After about 1 million years, there will only be one bird species
d. They all have mutualistic relationships which keeps them alive
8. An Elephant's ears are its cooling system. If an Elephant has bigger ears, it can cool itself down easier. If the temperature suddenly became extremely hot, how would the Elephant population adapt to this new temperature and environment?
- a. Elephants would grow larger ears immediately
b. Elephants would get larger ears after several generations
c. Elephants would not change and become extinct
d. Natural selection would favor smaller ear elephants
9. An individual is better adapted for its immediate, local environment than another individual and is more likely to survive and reproduce. What is this concept called?
- a. Mutualism c. Adaptation
b. Survival of the Fittest d. Natural Selection
10. What is the process called when the organism that is best fit for their environment is most likely to survive?
- a. Parasitism c. Adaptation
b. Mutualism d. Natural Selection

Read the following and answer questions 11-12: Ridge Lake is filled with seaweed which makes the water look green. There are three types of colored fish in the lake, Red, Green, and Orange. There are also three types of birds with different beaks that prey on these fish. The best predator is a long beak that can reach deep for fish.

11. Which fish will Natural Selection favor?
- a. Red fish c. Orange fish
b. Green fish d. Each fish has an equal chance of survival
12. What would happen to the fish population if the color of the water turned orange?
- a. The Red and Green fish will adapt and change colors to become orange.
b. The Orange fish population will increase because natural selection will favor the Orange fish.
c. The fish population would not change.
d. The Green fish population will be the greatest because seaweed color has no effect.
13. Describe what is happening in figures 1 through 3 (note that each figure represents a different generation).



14. What characteristic of the mice is an adaptation that increased their fitness? _____

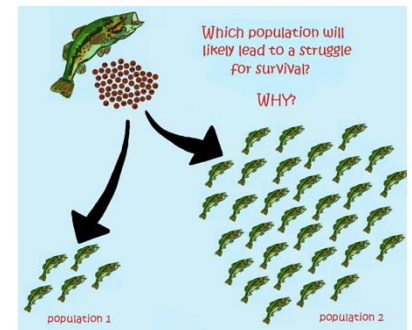
15. A more complete definition of fitness is the ability to survive and produce offspring who **can also survive and reproduce**. Below are descriptions of four male lions.

Name	George	Dwayne	Spot	Tyrone
Age at death	13 years	16 years	12 years	10 years
# cubs fathered	19	25	20	20
# cubs surviving to adulthood	15	14	14	19
Size	10 feet	8.5 feet	9 feet	9 feet

According to this definition of fitness, which lion would biologists consider the "fittest"? Explain why. _____

16. Explain why a characteristic which helps an animal to live longer will generally tend to become more common in the population as a result of evolution by natural selection.

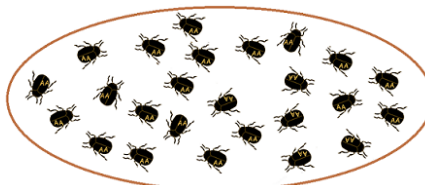
17. Answer the question about the fish in this image: _____



18. Can natural selection occur in both of the beetle populations below? Explain why or why not.



Population A



Population B

Evidence for Evolution	Benchmark: SC.912.L.15.1 Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.	Page
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Learning Objectives:	Vocabulary:
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- SWBAT: Explain what the theory of evolution is.
- SWBAT: Explain how the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change are evidence that support the theory of evolution.

- Evolution
- Fossil record
- Comparative anatomy
- Embryology
- Biogeography

Key Points, Examples, and Diagrams:

- Evolution = change in the genotype and phenotype of species over time.
- Evidence of Evolution:
 - Fossil record – includes a variety of different extinct organisms that are related to one another and to living species. The sizes, shapes, and varieties of organisms preserved in fossils changed over time.
 - Biogeography – Organisms are similar, but distinctly different based on where they are found. For example, the Galapagos islands have finches that all have different beaks from island to island. The environment on each particular island produced finches with adaptations to that environment. The geographic isolation of each environment is what makes each species of bird distinct from one another.
 - Comparative anatomy – (also known as homologous body structures) – the form and function of bones differs from animal to animal but are all constructed from the same bone structure (see diagram below). This is evidence that the animals evolved from common ancestors.
 - Comparative embryology – the early stages of development for many animals with backbones are very similar (see diagram below)
 - Molecular biology – all organisms share the same basic molecular structure (DNA)

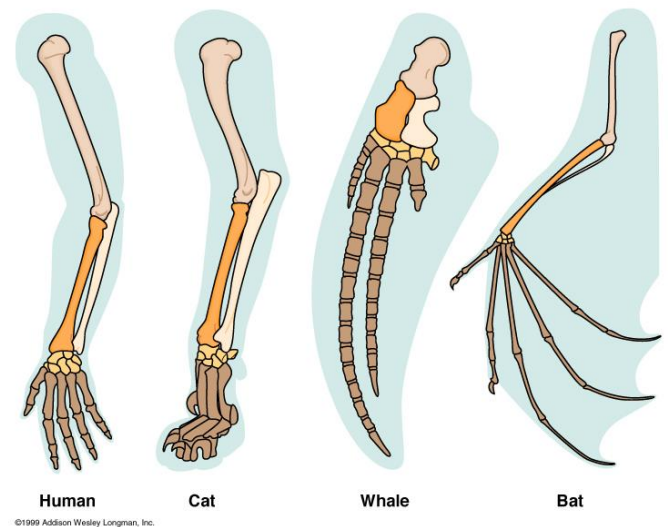
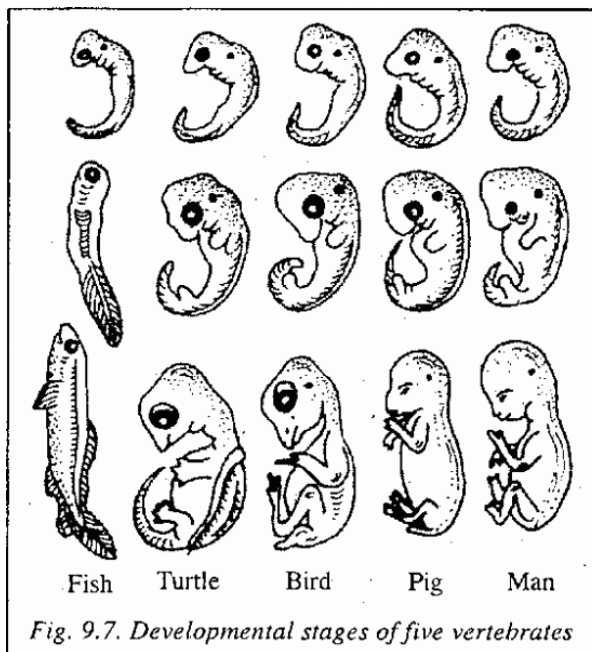


FIGURE 1 – Comparative Anatomy

Independent Practice

Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be required to re-take the exit ticket for this benchmark once you complete these practice questions.

1. What does fossil evidence show about evolution? _____

2. A vestigial organ is an organ that is found in an animal's body but does not have any purpose (such as the appendix in a human). Explain how vestigial organs can be used as evidence to support the theory of evolution. Be specific!

3. Look at "Figure 1 – Comparative Anatomy" on the previous page. Explain how that information can be used as evidence to support the theory of evolution?

4. What do you think the strongest evidence is to support the theory of evolution? Why? Be specific!

5. What do you think the weakest evidence is to support the theory of evolution? Why? Be specific!

6. **Your Task:** You have been asked to give a presentation on evolution to a group of people who know nothing about evolution or the evidence that exists to support it. Your job is to convince them that evolution actually happens. Create an outline of the arguments you would make (you need at least 4 well developed arguments in complete sentences).

	SC.912.L.15.4 Describe how and why organisms are hierarchically classified and classified based on evolutionary relationships. SC.912.L.15.5 Explain the reason for changes in how organisms are classified.	
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Learning Objectives:	Vocabulary:
<ul style="list-style-type: none"> • SWBAT explain characteristics of the domains and kingdoms of living organisms. • SWBAT explain why organisms are classified based on evolutionary relationships. 	<ul style="list-style-type: none"> • Taxonomy • Genus • Taxon • Family • Order • Class • Phylum • Kingdom

Key Points, Examples, and Diagrams:

- **Prokaryotes** – No nucleus
- **Eukaryotes** – Have a nucleus
- Organic compound – A compound that comes from a **living** thing
- **Autotroph** – Produce own food, using energy from light or inorganic chemical reactions (does not involve living things)
- **Heterotroph** – Organisms that depend on organic food sources (organisms or their by-products)

Kingdom	Eubacteria/ Bacteria	Archaeobacteria/ Archaea	Protist	Fungi	Plant	Animal
Unicellular or multicellular?	Uni	Uni	Uni or Multi	Multi	Multi	Multi
Prokaryotes or Eukaryotes?	Prokaryote	Prokaryote	Simple Eukaryote	Eukaryote	Eukaryote	Eukaryote
Autotroph or Heterotroph?	Autotroph or Heterotroph	Autotroph or Heterotroph	Autotroph or Heterotroph	Heterotroph	Autotroph	Heterotroph
Distinguishing traits	Includes 5000 species of bacteria Some species are photosynthetic	Most live in extreme environments (oxygen-free environments, hot springs, human and cow intestines)	Includes eukaryotes that cannot be classified as fungi, plants, or animals such as green and red algae	Includes yeast, mold, and mushrooms Cannot move from place to place Absorbs nutrients from organic materials in the environment	Photosynthetic Cells contain cell wall, water vacuole, and chloroplast Cannot move from place to place Includes flowers, trees, grass, etc.	Able to move from place to place Cells do not have cell walls Includes insects, fish, and humans

Independent Practice	Directions: Complete all practice questions by using your background knowledge, notes from class, the biology textbook, and the key points in the box above. You will be
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Use the table to the right for questions 1-14.

Matching. For questions 1-5 match each description to the one kingdom to which it corresponds. Each kingdom will be used only once.

- 1. Multicellular eukaryotes that are generally able to move from place to place _____
- 2. Multicellular, photosynthetic eukaryotes _____
- 3. Multicellular or unicellular eukaryotes that do not move from place to place _____
- 4. Unicellular prokaryotes commonly found anywhere _____
- 5. Unicellular prokaryotes found in extreme environments _____

Kingdom
a. Bacteria
b. Archaea
c. Protist
d. Fungi
e. Plant
f. Animal

For each of the following examples, indicate to which kingdom the organism belongs.

- 6. Tiger shark _____
- 7. Prokaryote found on doorknob of bathroom _____
- 8. Tulip _____
- 9. Mushroom _____
- 10. Prokaryote found in a deep-ocean hydrothermal vent (a very hot environment) _____
- 11. Eukaryote lacking complex organ system _____
- 12. Stegosaurus _____
- 13. Bumblebee _____
- 14. Streptococcus (spherical unicellular organisms that can cause serious diseases) _____
- 15. Number the following classifications from 1 to 4 from least specific to most specific (1 being least specific)?
 - A. Family _____
 - B. Species _____
 - C. Genus _____
 - D. Phylum _____

16. List the 6 kingdoms of life. Put a star next to the four that are eukaryotes.

- _____
- _____
- _____
- _____
- _____
- _____

17. Which three kingdoms have members that are photosynthetic?

- 1) _____
- 2) _____
- 3) _____

18. ___ Some zooplankton belong to the kingdom Protista. Members of this kingdom are characterized as

- A. Having segmented bodies with joined appendages
- B. Containing one or more eukaryotic cells
- C. Laying eggs with a leathery protective shell
- D. Having a four-chambered heart

19. ___ The kingdom Animalia includes all of these except

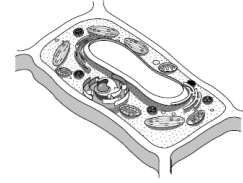
- A. Jellyfish
- B. Sponges
- C. Amoebas
- D. Roundworms

20. ____ A laboratory investigation included examining prepared slides of pond water. Singled-celled organisms with a nucleus and either cilia or flagella were visible. These organisms probably belong to the kingdom

- A. Animalia
- B. Fungi
- C. Plantae
- D. Protista

21. Multicellular eukaryotes that are usually mobile and obtain food from other organisms probably belong to the kingdom _____.

22. The cell to the right most likely belongs to an organism of the kingdom _____.



23. ____ Which is a characteristic of members of the plant kingdom that distinguishes them from members of the animal kingdom

- A. Storage of energy in chemical bonds
- B. Exchange of H₂O with the environment
- C. Use of mRNA during protein production
- D. Use of chlorophyll for solar-energy transformation

24. ____ Knowledge of which of these is most important in classifying this new organism into a kingdom?

- A. The color of light absorbed by the organism
- B. The type of radiation emitted
- C. The use of photosynthesis
- D. The color of the organism

Characteristics of a Newly Discovered Organism

- Absorbs blue light
- Emits infrared radiation
- Contains RNA in nucleus
- Appears as a red organism in full daylight
- Can obtain nutrition through photosynthesis

25. The table to the right lists several birds commonly found in Texas. Circle or highlight the two that are most closely related.

26. What is binomial nomenclature? What two taxa are used in it?

Common Name	Scientific Name
Northern mockingbird	<i>Mimus polyglottos</i>
Green-winged teal	<i>Anas crecca</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
White-tailed hawk	<i>Buteo albicaudatus</i>
Mallard	<i>Anas platyrhynchos</i>

Look at the classification hierarchy for the following 3 animals.

	Animal #1	Animal #2	Animal #3
Kingdom	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata
Class	Mammalia	Mammalia	Mammalia
Order	Carnivora	Carnivora	Carnivora
Family	Felidae	Felidae	Canidae
Genus	Felis	Panthera	Canis
Species	domesticus	pardus	lupus

27. Which two animals are most closely related? How do you know?

Directions: Use the text box to the right to write in the words that match their corresponding definitions. Some words will NOT be used.

- A method of naming organisms. Consists of 2 parts: The Genus and Species.

- A unicellular, prokaryotic Kingdom that consists of organisms that can only live in places that do not consist of extreme environments.

- A group of organisms that are able to produce their own food foods using sunlight and other inorganic reactions.

- The grouping of objects or information based on similarities.

- A taxon of similar classes.

- A unicellular or multicellular Kingdom that consists of simple Eukaryotic organism.

- A cell that lacks a true nucleus

- A compound that comes from a living thing. Can also describe living organisms.

- A branch of Biology that groups and names organisms based on studies of their different characteristics and evolutionary history.

- A Multicellular, Eukaryotic Kingdom that is Heterotrophic and consists of organisms that cannot move from place to place

Word Bank

Prokaryote

Eukaryote

Autotroph

Heterotroph

Eubacteria

Archaeobacteria

Fungi

Classification

Taxonomy

Binomial Nomenclature

Organic

Phylum

Protist