Where in the cell does photosynthesis take place?

Chloroplast

What process allows organisms to release energy from sugar without oxygen?

Anaerobic Cellular Respiration 2ATP

Stamp Study Guide and MISA Homework

What are the 2 parts of photosynthesis and what is produced in each?

Light: Splits H_2O ↑ O_2

Calvin: Sugar

How is energy transformed in photosynthesis?

Light → Chemical energy

C-C bonds
C-H bonds
glucose

Cellular respiration converts energy in sugar into what molecule?

ATP

What parts of a plant transport water and sugar?

Xylem + Phloem

Fill in on Friday's warm up

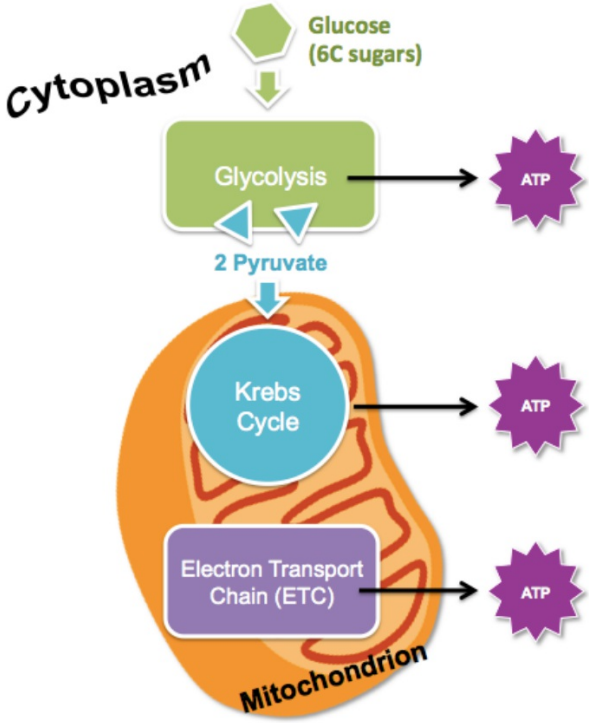
What organism converts nitrogen gas into a form that is usable by plants?

Bacteria (biotic)

Transpiration is an important part of what cycle?

Water

Aerobic Cellular Respiration



$$C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{Cellular respiration}} 6CO_2 + 6H_2O + ATP$$

Aerobic and Anaerobic Respiration, Photosynthesis and Cycles Test Review

Name:_____ Period:_____

Aerobic Cellular Respiration:

1. Write out the balanced formula for aerobic cellular respiration:

2. Where in the cell does aerobic cellular respiration take place?

mitochondria

3. Where in the cell does glycolysis take place? Does it require oxygen?

cytoplasm No

4. What molecule is made that is used for immediate energy by the cell?

ATP

5. What gas is produced as a product of aerobic cellular respiration?

CO_2

6. What types of organisms do aerobic cellular respiration?

Animals and Plants

7. Does aerobic cellular respiration add or remove carbon from the atmosphere?

Adds

8. Where in a plant would aerobic cellular respiration take place (leaves, stem, roots, or all cells)

All cells

9. How is energy transformed in aerobic cellular respiration? (Where is it in the reactants? Where is it in the products?)

Sugar (organic) → ATP

Anaerobic Cellular Respiration/Fermentation

10. What reactant is MISSING in anaerobic respiration?

Oxygen

11. Which process produces more ATP- aerobic or anaerobic respiration?

Aerboic= 36 ATP Anaerobic = 2ATP

12. What type of fermentation takes place in animals?

Lactic Acid

13. What is a symptom of lactic acid fermentation?

Cramps

14. What type of fermentation takes place in bacteria/yeast?

Alcoholic

15. What step is the same in both aerobic and anaerobic respiration?

Glycolysis

Photosynthesis:

16. Write out the balanced equation for photosynthesis:

$6CO_2 + 6H_2O + \text{Light} \rightarrow C_6H_{12}O_6 + 6O_2$

17. Where in the cell does photosynthesis take place?

Chloroplast

18. What types of organisms can do photosynthesis?

Producers/Autotrophs

19. What is the energy source for photosynthesis? How is energy transformed in photosynthesis?

Light → Chemical

20. What are the 2 stages of photosynthesis?

Light Reactions, Calvin Cycle

21. What is the reactant of the light reactions and what is produced?

$H_2O \rightarrow O_2$

22. Where in the chloroplast does the light reactions take place?

Grana

23. What is the reactant of the Calvin cycle and what is produced?

$CO_2 \rightarrow$ Sugar

24. Where in the chloroplast does the Calvin cycle take place?

Stroma

25. What gas does photosynthesis produce?

O_2

26. Where in the plant does photosynthesis take place? (leaves, stem, roots)

Leaves

27. Does photosynthesis add or remove carbon from the atmosphere?

Remove

28. Identify 2 uses for the sugar that is produced in photosynthesis in plants and animals

Cellular Respiration

Biosynthesis

Plants:

29. What is the name of the hole in the leaves where plants exchange gases and release water?

Stomata

30. Where in the plant does water enter? How does it travel through the plant?

Roots → Xylem

31. What 2 tissues are used for transporting water and sugar in a plant?

Xylem + Phloem

32. What process do plants do to release energy from sugar?

Cellular Respiration

33. What process do plants do to build up larger molecules to build the plant biomass?

Biosynthesis: Makes bigger molecules from smaller molecules

34. How do plants take in carbon dioxide?

Stomata in the leaves

35. How do plants take in nitrogen?

Roots

36. What gas does plants release the most during the daylight hours?

O_2 from photosynthesis

37. What gas does plants release the most during night hours (when it is focused on releasing energy)?

CO_2 from cellular respiration

Animals

38. How do animals take in sugar (carbon), water, and nitrogen?

Consumption

39. What process do animals do to build up bigger molecules from the sugar and other atoms that they consume? **Biosynthesis**

40. What process do animals do to release energy from sugar?

Cellular Respiration

41. What system in the body transports water, sugars, gases and waste to and from cells in the arteries and veins? **Circulatory**

42. What system in the body breaks down large food molecules into smaller ones that can be used for energy or for biosynthesis? (includes the stomach and intestines)

Digestive

Cycles

43. What is the name of the process in the water cycle where water evaporates from the leaves of plants?

Transpiration

44. What process removes carbon dioxide from the atmosphere?

Photosynthesis

45. What processes add carbon dioxide to the atmosphere?

Cellular Repsiration, Decompostion, Burning Fossil Fuels

46. What is the concern about adding carbon dioxide that was contained in the geosphere into the atmosphere?

Greenhouse effect/ Global Warming

47. What type of organism does nitrogen fixation and lives in the root nodules of legumes?

Bacteria

48. Are carbon dioxide gas, nitrogen gas, and oxygen biotic or abiotic?

Abiotic

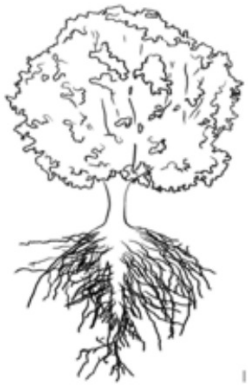
49. Which process stores carbon- biosynthesis or cellular respiration?

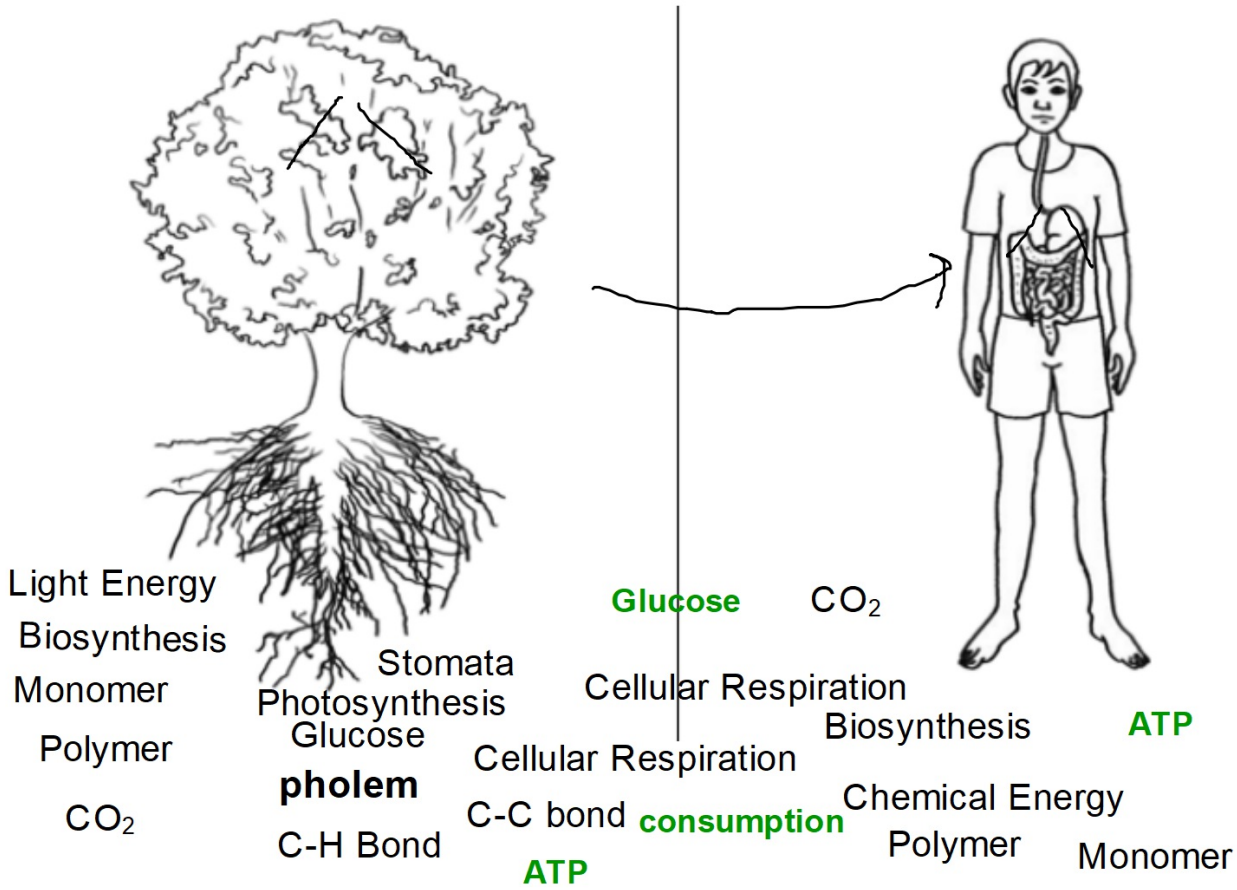
Biosynthesis

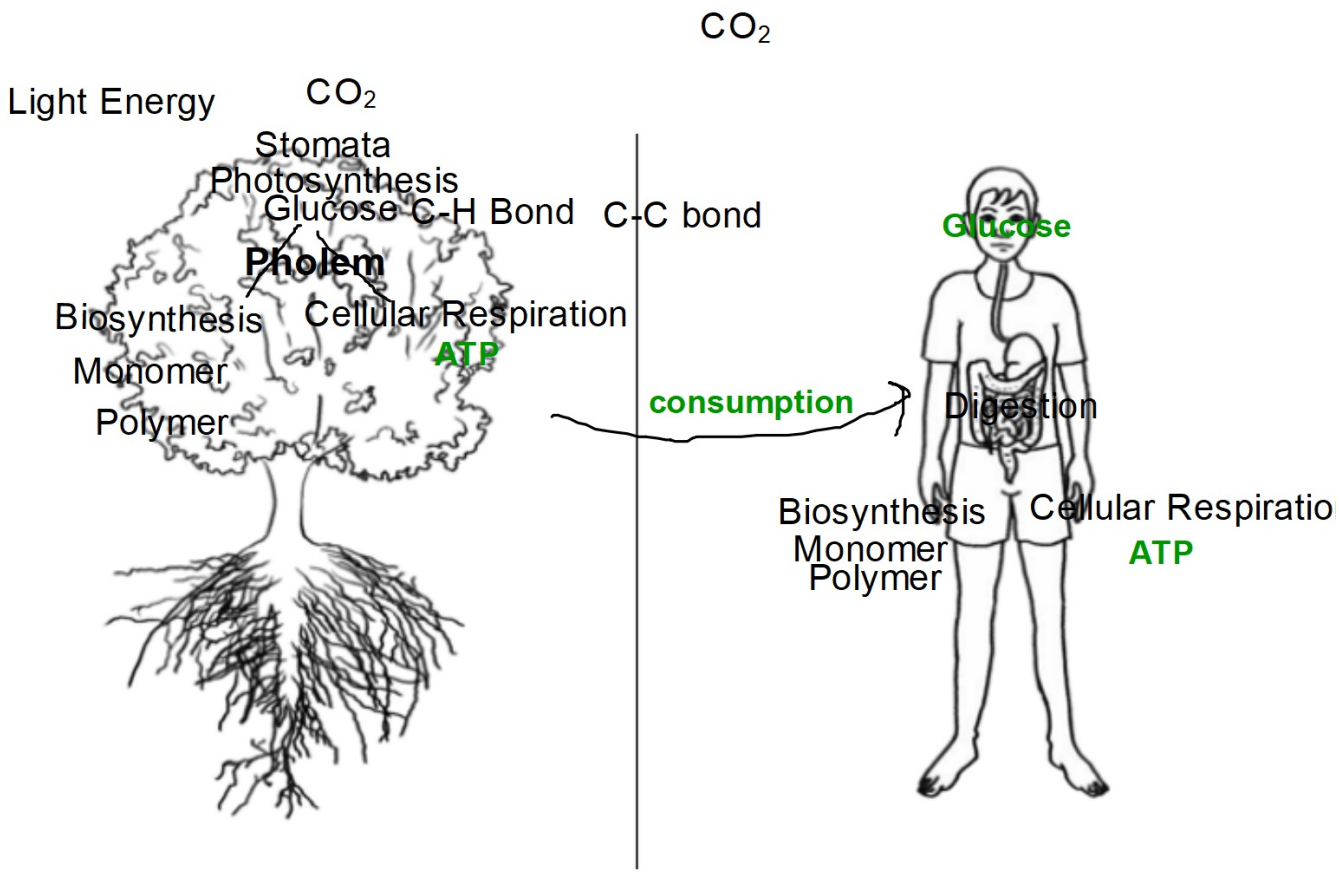
50. What is the role of decomposers in the carbon and nitrogen cycle?

Recycle atoms to be used again

Trace 2 different carbon atom from when they enter a plant. Take both carbon atoms through photosynthesis and then one will go into cellular respiration in the plant and the other will be a part of biosynthesis. Explain how the carbon atom that is in the plant can end up in the animal. Explain how that carbon atom can be used for either cellular respiration or biosynthesis in the animal. Explain how the carbon atom could end up back in the atmosphere from the animal and be available to the plant again.




Light Energy
Biosynthesis
Monomer
Polymer
CO_2
Stomata
Photosynthesis
Glucose
pholem
C-H Bond
Glucose
CO_2
Cellular Respiration
Cellular Respiration
C-C bond
consumption
ATP
Biosynthesis
ATP
Chemical Energy
Polymer
Monomer


CO_2
Light Energy
CO_2
Stomata
Photosynthesis
Glucose
C-H Bond
C-C bond
Pholem
Biosynthesis
Cellular Respiration
ATP
Monomer
Polymer
consumption
Glucose
Digestion
Biosynthesis
Monomer
Polymer
Cellular Respiratio
ATP

Trees in Urban Parks

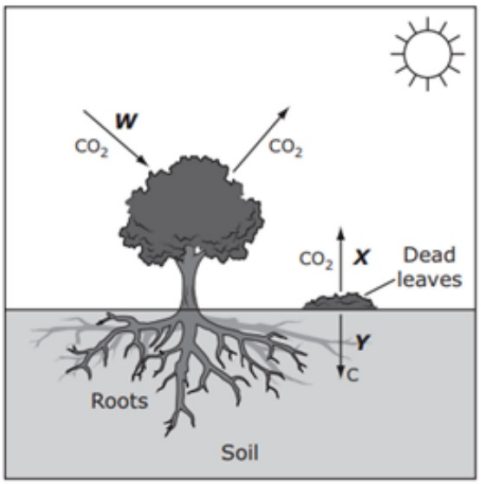
The Baltimore City Parks and Recreation Department plans to remove a group of trees in an urban park to expand a parking lot. Before the trees can be removed a study needs to be completed to determine the possible effect of tree removal on the park's ecosystem. Trees in urban parks in Baltimore store about 43 tons of carbon per acre, and 1.2 tons of carbon per acre is lost each year from the removal of trees. A tree scientist calculated the amount of carbon stored by the trees scheduled to be removed in the park. First, the scientist measured the circumference of the trunk of five trees. Then, the scientist used a tool called a clinometer to calculate the height of each tree. The scientist entered these measurements into a formula to estimate the amount of carbon stored in each tree. The results are shown in the table.

The scientist also recorded observations from around the park. For example, there were leaves and small branches on the ground beneath the trees. The scientist used the data and observations from the urban trees to make a partial model of the carbon cycle.

Carbon Stored in Urban Trees

Tree Number	Circumference (m)	Tree Height (m)	Estimated Carbon Stored (kg)
1	0.25	10	15
2	1.25	40	539
3	0.50	16	43
4	0.75	18	95
5	1.00	36	315
Total			1007

Trees and the Global Carbon Cycle



The data show the total carbon stored in trees, while the model shows how carbon moves through the carbon cycle. The scientist wants to compare the locally collected data and model with global carbon data and carbon cycle models to predict the potential impact of tree removal from the park.

Global Carbon Stored Each Year from 1990–1999

Location	Carbon Stored (gigatons* of C per year)
atmosphere	3.2
ocean	2.2
forests	2.5
total	7.9

*1 gigaton = 1 billion tons

The total amount of carbon stored in forests changes each year as carbon moves through the hydrosphere, atmosphere, geosphere, and biosphere. First, the scientist gathered historical data from 1990–1999. Global carbon (C) estimates are shown in the tables.

After 1999, fossil fuel burning increased and deforestation decreased. The scientist estimated that compared to the time frame of 1990–1999, during 2000–2007 the atmosphere stored an average of 0.9 more gigatons of carbon per year; the oceans, 0.1 more gigatons per year; and the forests, 0.2 fewer gigatons per year.

Global Carbon Lost Each Year from 1990–1999

Process	Carbon Loss (gigatons* of C per year)
fossil fuel burning	6.5
deforestation	1.5
total	8.0

*1 gigaton = 1 billion tons

Question

1. Which statement describes a relationship shown between the Carbon Stored in Urban Trees data and the partial model of the carbon cycle?

A. The amount of carbon from the atmosphere stored by trees in the urban park is based on the size of the trunk and tree height.

B. The amount of carbon stored by trees in the urban park is small because the trees constantly release carbon to the atmosphere.

C. Carbon is stored and lost in equal amounts because the dead leaves release the carbon originally stored by trees.

D. Carbon is stored in the trees because the carbon from the soil is used to build the trunk of the tree.

2. Which equation shows the process in the model by which carbon dioxide is stored in the tree?

A $\text{energy} + 6O_2 \rightarrow C_6H_{12}O_6 + H_2O$

B $C_6H_{12}O_6 + 6H_2O \rightarrow 6CO_2 + 6O_2$

C $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

D $6O_2 + C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O + \text{energy}$

3. Which statement best describes a carbon exchange process that occurs in the carbon cycle model?

A. Carbon is stored in the biosphere in part Y and moves to the atmosphere in part W.

B. Carbon is stored in the biosphere in part W and moves to the geosphere in part Y.

C. Carbon moves from the biosphere to the atmosphere in parts W and Y.

D. Carbon moves from the biosphere to the geosphere in parts X and Y

4. Which statement best describes how the Carbon Stored in Urban Trees data table should be improved to better support the model and represent the cycling of carbon?

A. It should include the amount of carbon lost to the atmosphere due to respiration by the trees.

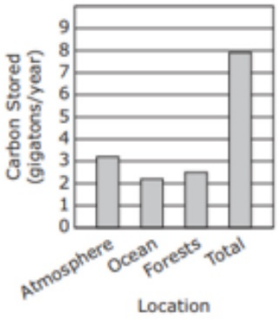
B. It should include the amount of carbon stored in the soil due to photosynthesis by the trees.

C. It should include the amount of oxygen released by the trees due to photosynthesis.

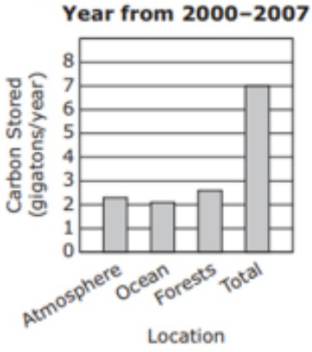
D. It should include the amount of oxygen consumed by the trees due to respiration.

5. Use the data from Global Carbon Stored Each Year from 1990–1999 and the change in global carbon storage to calculate the global carbon stored in each location, each year, from 2000–2007. Then, choose the graph that represents the amount of global carbon stored in each location from 2000–2007.

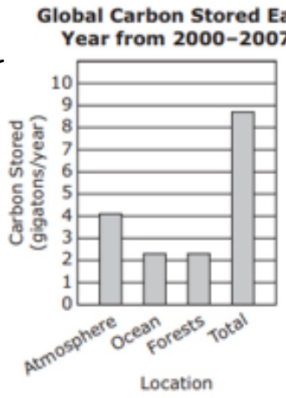
A



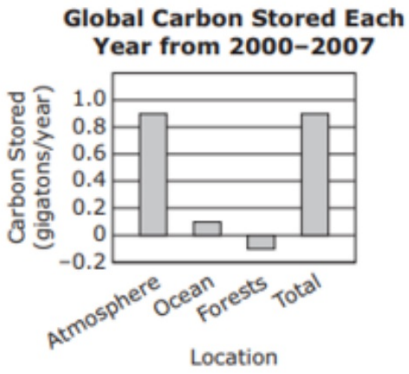
B



C



D



Describe how the removal of the trees from the urban park will impact the cycling of carbon among the atmosphere, geosphere, and biosphere, as shown in the carbon cycle model. Identify the limitations of the model in accounting for all of Earth's carbon.

Impact on atmosphere: ↑ CO_2

Impact on geosphere:

Impact on Biosphere: Less CO_2

Limitations of the model: