MSP Carbon Assessment [Form A]

Please answer these questions as carefully and completely as you can. If you are not sure of the answer, write about any ideas that you have. If you can help us to understand how you think about these questions, then we can do a better job of explaining science in ways that make sense to you.

Please put your initials (not your full name) in the boxes

First	Middle	Last

Date _____

Class _____ Teacher _____

1. A small oak tree was planted in a meadow. After 20 years, it has grown into a big tree, weighing 500 kg more than when it was planted.

Do you think the tree needs any of the following things to grow and gain weight? Choose either YES or NO and explain your choice.

Things	Does the tree need it to grow bigger?	If you chose YES, explain how the tree uses it. What happens to it inside the tree?
Sunlight	☐ YES ☐ NO	
Soil	☐ YES ☐ NO	
Water	☐ YES ☐ NO	
Air	☐ YES ☐ NO	

2. Which of the following is (are) the energy source(s) for plants? Choose either YES or NO for each of the following.

a.	Water	☐ YES ☐ NO
b.	Sunlight	☐ YES ☐ NO
c.	Air	☐ YES ☐ NO
d.	Nutrients in soil	☐ YES ☐ NO
e.	Plants make their own energy.	☐ YES ☐ NO

Explain ALL your answers, including why the things you have chosen NO for are NOT sources of energy for plants.

3. What happens to energy from the sun after it enters a plant and goes through photosynthesis? Choose either YES or NO for each of the following.

The energy…

a.	will not exist because it is used up in the process.	☐ YES ☐ NO
b.	will leave the plant's body as energy	☐ YES ☐ NO
c.	will change into a material or materials during photosynthesis and be stored in the plant's body.	☐ YES ☐ NO
d.	will change into another form of energy during photosynthesis and be stored in the plant's body.	☐ YES ☐ NO

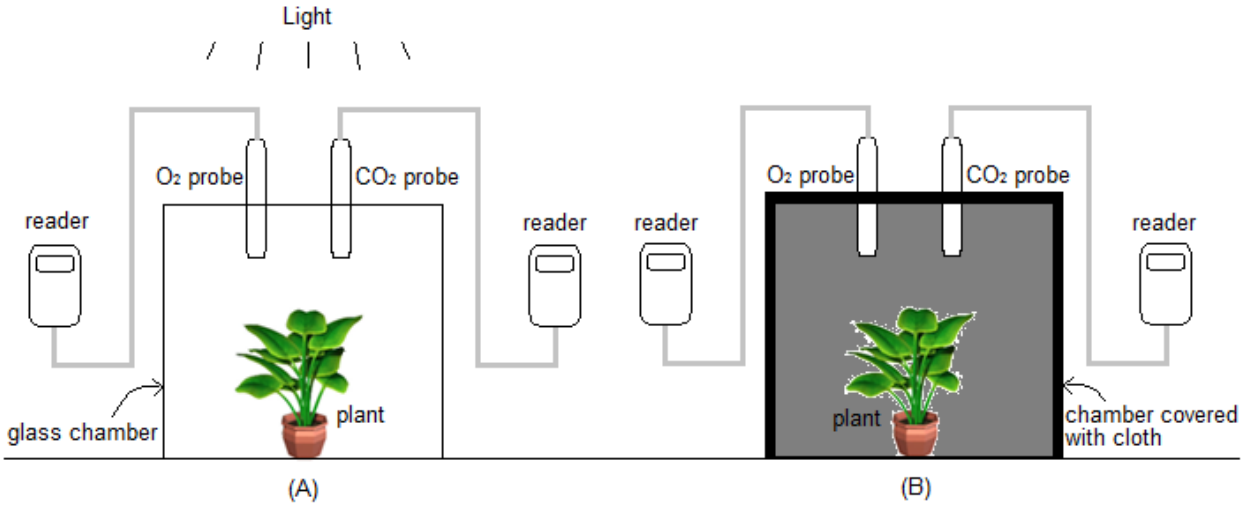
If you think none of the above is true, provide your own answer:
The energy…

_____

_____

Explain why you chose either YES or NO for each option. In your explanation, you could include additional information such as the name of material or the form of energy.

4. To study the effect of light on plant growth, Kaitlin set up an experiment as follows. She placed a plant in a transparent glass chamber under the light source (Chamber A) and another plant in a chamber covered with cloth to block light from the outside (Chamber B). Then she installed an oxygen (O_2) probe and a carbon dioxide (CO_2) probe in each chamber to measure the amount of the two gases over time. Answer the following questions.



A. What do you predict will happen to the amount of oxygen (O_2) and carbon dioxide (CO_2) in each chamber? (Choose one of the three options for each sentence below.)

	(A)	(B)
The amount of oxygen (O_2) will…	☐ increase. ☐ be the same. ☐ decrease.	☐ increase. ☐ be the same. ☐ decrease.
The amount of carbon dioxide (CO_2) will…	☐ increase. ☐ be the same. ☐ decrease.	☐ increase. ☐ be the same. ☐ decrease.
The mass (how much the plant weighs) of the plant (not including water) will…	☐ increase. ☐ be the same. ☐ decrease.	☐ increase. ☐ be the same. ☐ decrease.

B. Explain your choice. What do you think each plant is doing with oxygen (O_2) and carbon dioxide (CO_2) in each chamber?

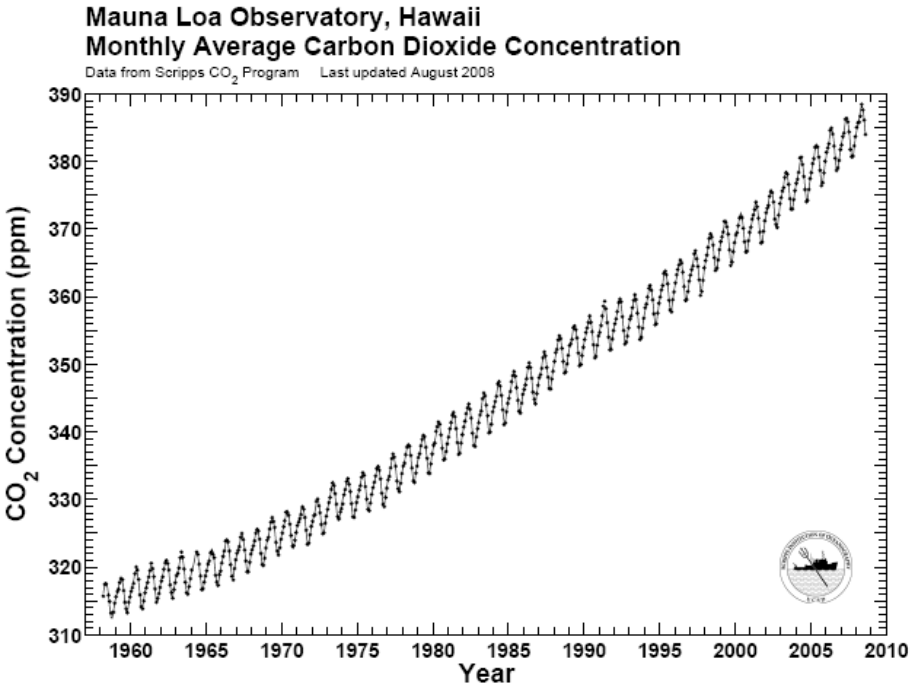
(A)	(B)

(This item continues on the next page.)

C. Do you think that the changes in oxygen (O_2) and carbon dioxide (CO_2) in each chamber are connected to changes in the plant's mass? ☐ YES ☐ NO

Explain your thinking about this.

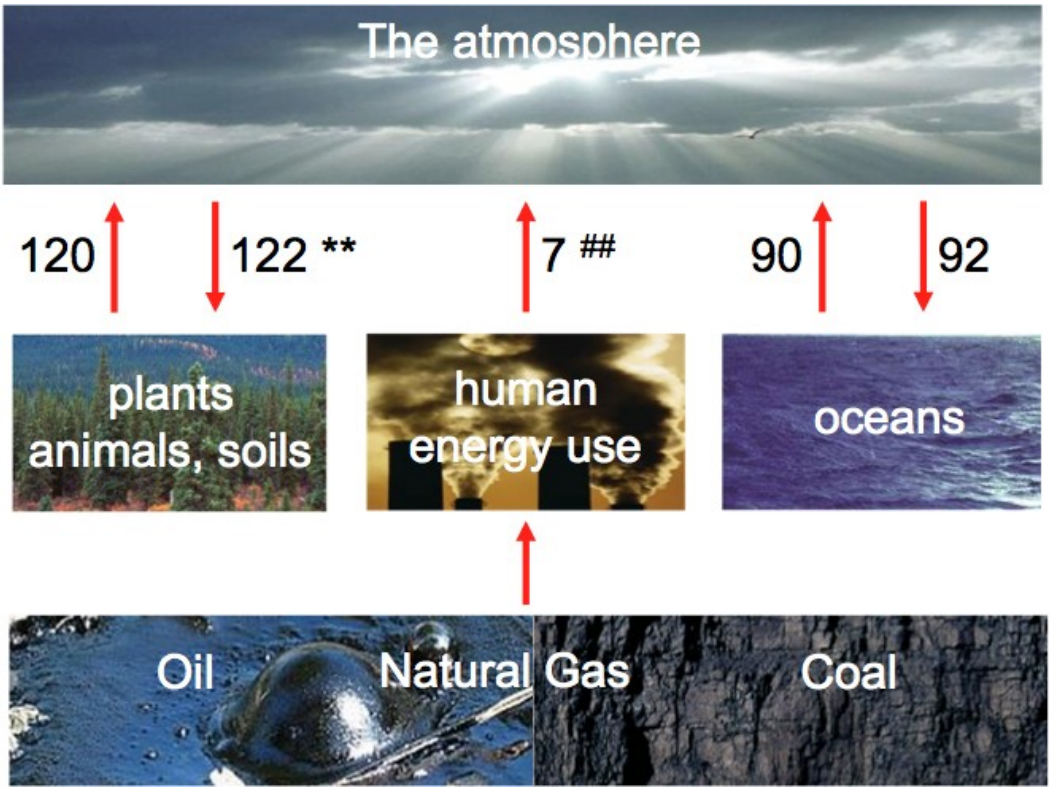
5. The graph below shows carbon dioxide concentrations in the atmosphere in parts per million (ppm) from 1958 until the present.



A. Is there anything worrisome about increasing levels of carbon dioxide in the atmosphere? Choose one. ☐ YES ☐ NO

B. If you chose YES, explain why you think higher carbon dioxide levels are worrisome. If you chose NO, explain why you would not be worried.

6. Please use the diagram below to answer the following questions:



This diagram shows how carbon moved on Earth over the last year. The boxes show places where carbon was located, and the arrows show how carbon moved from one place to another. The numbers show how much carbon moved in gigatons per year. (1 gigaton = 1,000,000,000 tons)

a) Can you tell from this diagram which of the locations listed contains more carbon than others?

☐ YES ☐ NO If YES, how can you tell? If NO, why can't you tell?

b) Can you tell from this diagram whether the amount of carbon in the atmosphere is changing?

☐ YES ☐ NO If YES, how can you tell? If NO, why can't you tell?

c) How is the carbon in plants and animals different from carbon in the atmosphere?

d) Which biological process is responsible for moving carbon in the arrow marked with **?

Is the ** - marked process one that humans can change substantially? ☐ YES ☐ NO
If YES, how can we change it? If NO, are there any arrows that we can change substantially?

e) Which chemical process is responsible for moving carbon in the arrow marked with ##?

Is the ## - marked process one that humans can change substantially? ☐ YES ☐ NO

If YES, how can we change it? If NO, why do you think so?

Use the table below to explain where you think that carbon is found inside a tree and how it gets there.

Location	Choose either YES or NO	If you chose YES, explain how the carbon gets to that location. Include molecules in your explanation if you can.
Does a tree have carbon in its **leaves**?	☐ YES ☐ NO	
Does a tree have carbon in its **wood**?	☐ YES ☐ NO	
Does a tree have carbon in its **roots**?	☐ YES ☐ NO	

8. When a baby was five months old, she weighed 15 lbs. After 7 years, the baby has grown into a girl weighing 50 lbs.

The baby weighed 15 lb when she was 5 months old.

The baby has grown into a big girl, weighing 50 lb.

Do you think the baby girl will need any of the following things to gain weight and grow? Please choose either YES or NO and explain your choice.

Things	Does the girl need it to grow?	If you chose YES, explain how the girl's body uses it. What happens to it inside the girl's body to help the girl gain weight?
Sunlight	☐ YES ☐ NO	

(The table continues on the next page.)

Water	☐ YES ☐ NO	
Air	☐ YES ☐ NO	
Food	☐ YES ☐ NO	

9. An apple is eaten by a boy and digested in his body.

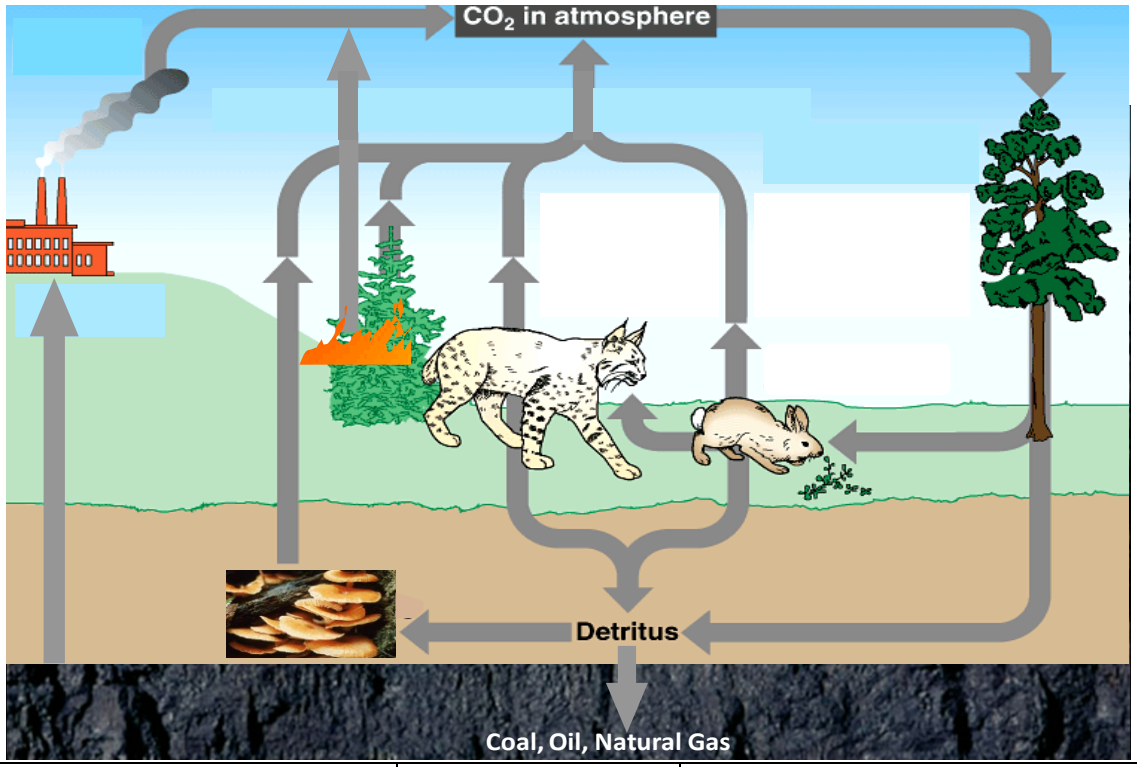
   A. What happens to the apple when it is digested?

   B. Do you think the apple the boy ate can help all parts of his body (like his fingers) to gain weight and grow?

      Choose one: ☐ YES ☐ NO

      If you chose YES, explain how an apple that goes to the boy's stomach can help his fingers to gain weight and grow. If you answered NO, please explain how the boy's body makes his fingers gain weight and grow.

10. Look at the picture of a simple carbon cycle below. Using the diagram, decide which of the following are good explanations for why carbon dioxide (CO_2) is increasing in the atmosphere.



Explanation	Is this a good explanation for why CO_2 is increasing in the atmosphere?	If you answered YES, please say why you think this is a good explanation. If you answered NO, please say why it is not a good explanation.
There are more arrows pointing to the atmosphere than there are pointing away from the atmosphere.	☐ YES ☐ NO	
The carbon being taken up by trees does not balance the loss of carbon from humans cutting and burning trees.	☐ YES ☐ NO	
The carbon being stored through natural processes as fossil fuels (coal, oil and natural gas) cannot balance the carbon being added to the atmosphere from burning these fossil fuels.	☐ YES ☐ NO	
There are arrows from humans to the atmosphere that are missing from this picture, such as humans breathing out CO_2.	☐ YES ☐ NO	

11. Below are some general questions about climate change. For each question, choose an option that best describes what you think.

    A. My current understanding of climate change and global warming is…
        a. Excellent
        b. Good
        c. Average
        d. Fair
        e. Poor

    B. I believe climate change is related to the global carbon cycle.
        a. Strongly agree
        b. Agree
        c. Neutral
        d. Disagree
        e. Strongly disagree

    C. I am optimistic about the future and my ability to have a positive impact on the environment.
        a. Strongly agree
        b. Agree
        c. Neutral
        d. Disagree
        e. Strongly disagree

    D. The environment is irreversibly damaged regardless of my personal actions or the actions of society.
        a. Strongly agree
        b. Agree
        c. Neutral
        d. Disagree
        e. Strongly disagree

    E. I believe the information the media is providing about climate change and global warming to be accurate.
        a. Strongly agree
        b. Agree
        c. Neutral
        d. Disagree
        e. Strongly disagree

<The End. Thank You.>