

Name _____

Minnesota Comprehensive Assessments-Series III

Science Item Sampler
Grade HS



**ITEM SAMPLERS ARE NOT SECURE TEST MATERIALS.
THIS ITEM SAMPLER TEST BOOK MAY BE COPIED
OR DUPLICATED.**

Science Test General Directions

- This test contains two segments.
- You may write in this test book or use scratch paper.
- All answers must be marked in this test book.
- This test has four kinds of questions.
- Answer each multiple-choice question by circling your answer. The sample below shows how to do this.

Sample Question Answered in Test Book:

What should a farmer do to prevent too much fertilizer from being put on a field?

- A.** Apply fertilizer right before planting
- B.** Apply fertilizer and water at the same time
- C.** Measure the amount of minerals the soil needs
- D.** Measure the amount of water in the soil

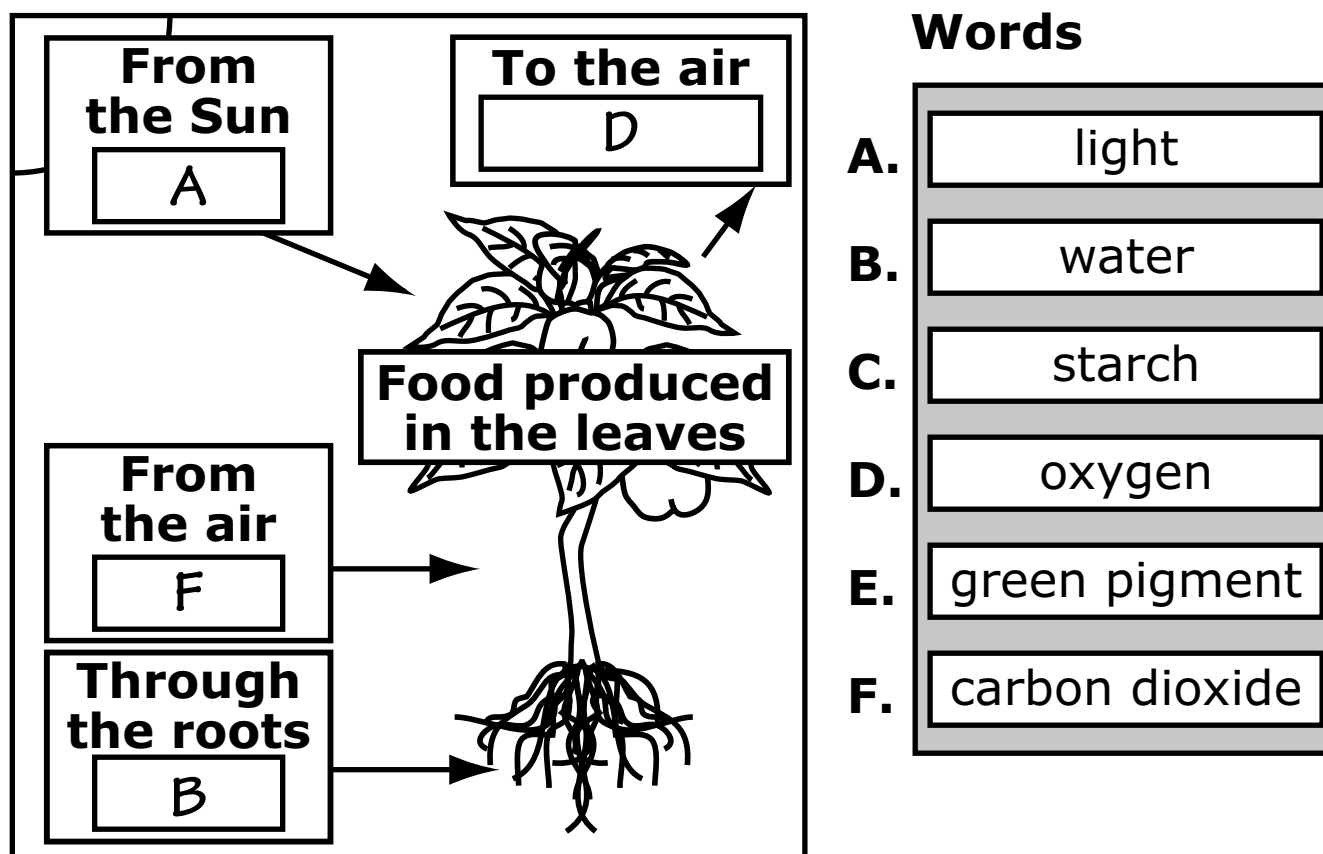
Go on to the next page.

- For some diagram questions, you will need to write the label letters (A, B, C, etc.) in the boxes. The sample below shows how to do this.

Sample Question Answered in Test Book:

This diagram shows the process of photosynthesis. Identify the parts of the photosynthesis process involved in this ecosystem.

Each word is labeled A, B, C, D, E, or F. Write the letter of the correct word in each empty box. Four of the words will be used.



Go on to the next page.

There is no test material on this page.

Go on to the next page.

- For some diagram questions, you will need to circle the word you want to select as your answer. The samples below show how to do this.

Sample Question Answered in Test Book:

Two characteristics of pintail ducks are listed. Identify the characteristics that are the same and different in pintail ducks.

On the diagram, circle the word you want to select. You may only circle 1 word for Same and 1 word for Different.

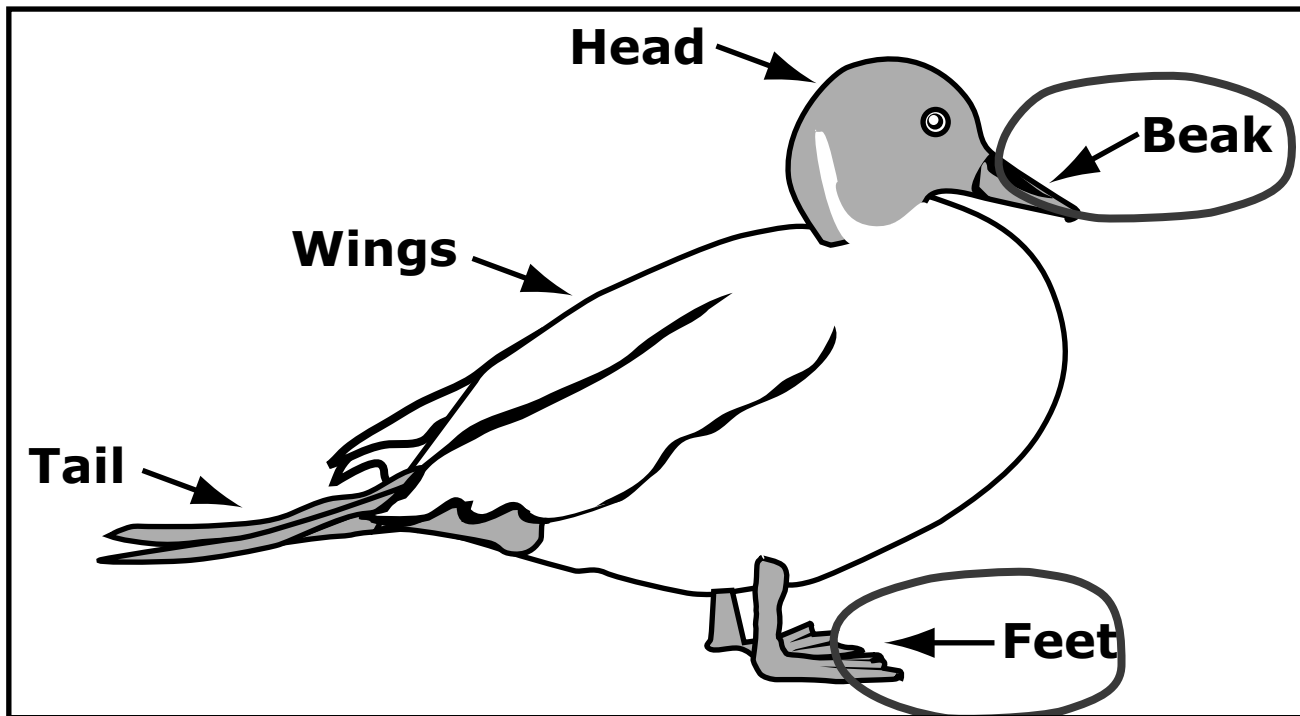
Same	Different
Body size	Body size
Number of legs	Number of legs

Go on to the next page.

Sample Question Answered in Test Book:

Choose 2 different adaptations that make this duck more suited to feed on water plants than other kinds of birds.

On the diagram, circle the 2 adaptations. You may only circle 2 adaptations.

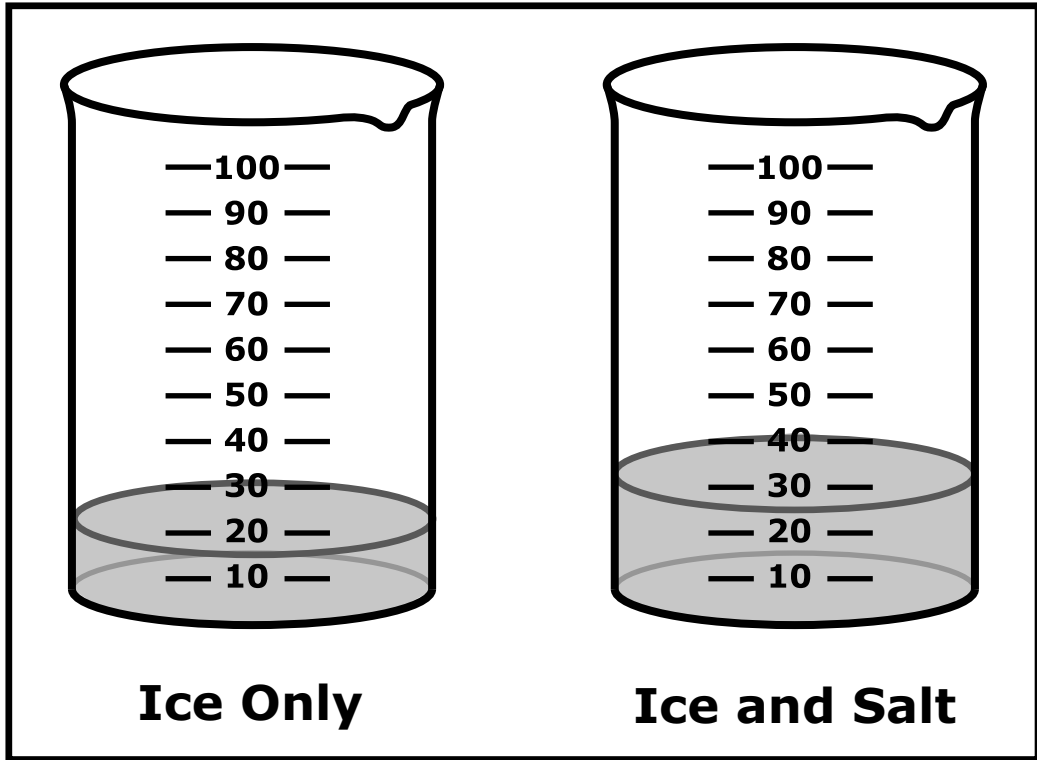


Go on to the next page.

- For some graphing questions, you will need to write a “+” above each bar, where the top of the bar should be. The sample below shows how to do this.

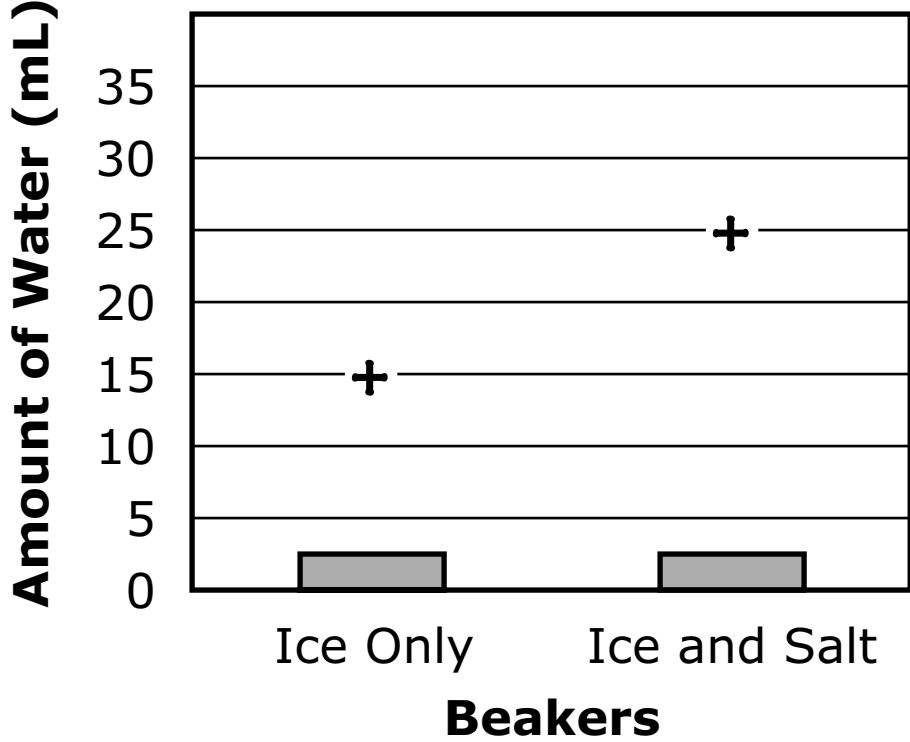
Sample Question Answered in Test Book:

Read the water level in the beakers. Make a graph of this data.



The image shows two beakers with graduated scales from 0 to 100 mL. The first beaker, labeled 'Ice Only', has a water level at the 20 mL mark. The second beaker, labeled 'Ice and Salt', has a water level at the 40 mL mark.

Write a “+” above each bar where the top of the bar should be.

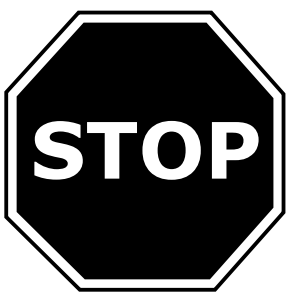


The bar graph displays the water levels from the beakers. The y-axis is labeled 'Amount of Water (mL)' and has major grid lines every 5 units from 0 to 35. The x-axis is labeled 'Beakers' and has two categories: 'Ice Only' and 'Ice and Salt'. The bar for 'Ice Only' reaches the 20 mL mark, and the bar for 'Ice and Salt' reaches the 40 mL mark. Plus signs are placed above each bar to indicate the top of the bar.

Beaker	Amount of Water (mL)
Ice Only	20
Ice and Salt	40

Go on to the next page.

- When you finish a segment of the test, stop and check your answers. Then use the sticker given to you to seal it. Once you seal a segment, you cannot go back to it. Each segment must be sealed before you move on to the next segment.



Segment 1

You will be told when to begin this segment.

There is no test material on this page.

Go on to the next page.

Science Test – Segment 1

Pea Plant Genetics

ITEM SAMPLER MAY BE
DUPLICATED.

Go on to the next page. 

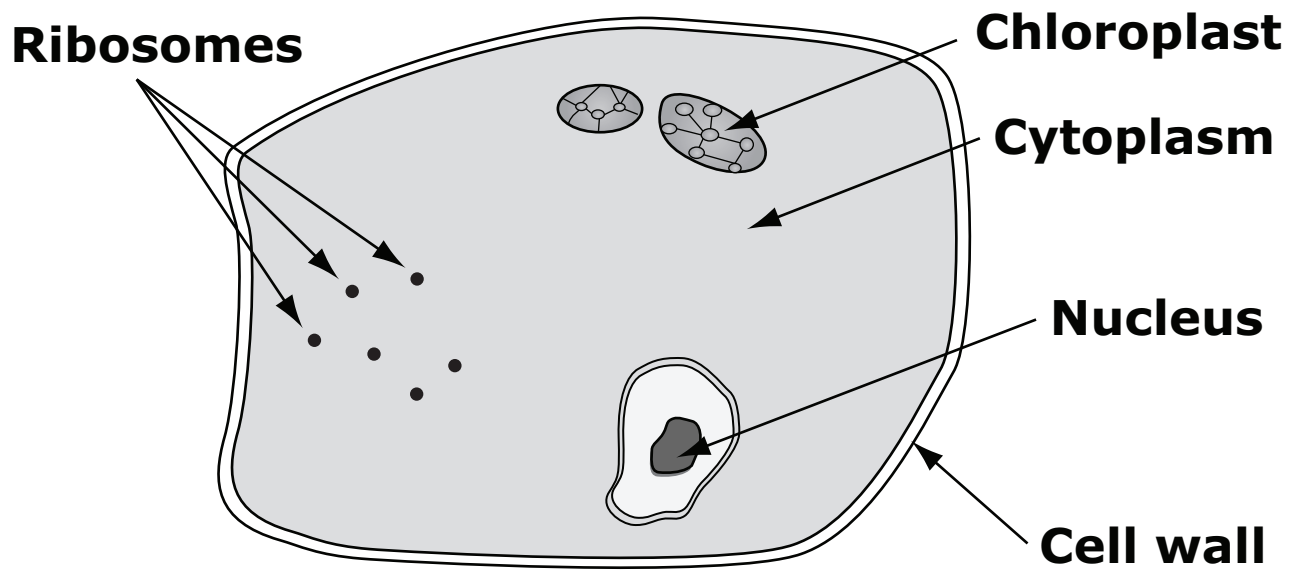
A scientist prepared a slide of cells from the pea plant leaf.



- 1.** The scientist saw this plant cell when she looked through the microscope. Choose the part of the cell containing the genes that help determine most of a plant's phenotype, such as flower color, seed color, and height.

On the diagram, circle the cell part you want to select. You may only circle 1.

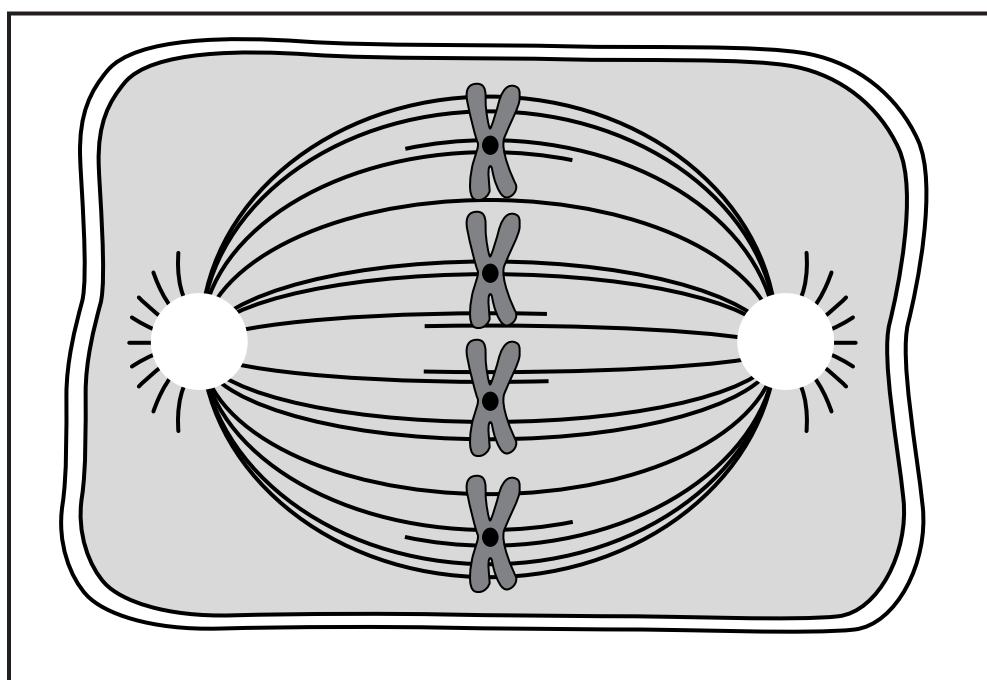
Plant Cell



**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

This is a plant cell during one stage of mitosis.



2. What is the expected result when mitosis is complete?
- A. Genetically identical cells with half the chromosomes of the parent
 - B. Genetically different cells with half the chromosomes of the parent
 - C. Genetically identical cells with the same number of chromosomes as the parent
 - D. Genetically different cells with the same number of chromosomes as the parent


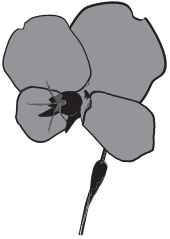

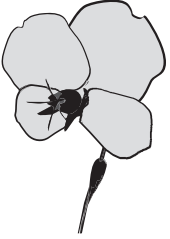
**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

The scientist crossed two pea plants with purple flowers to determine how flower color is inherited. Seeds from the cross were planted and the number of offspring having each flower color was determined. Her results are shown in the table.



Pea Cross

Parents		Offspring	
Purple	Purple	71%	29%
			

**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

3. In this cross, the scientist predicted that the offspring would be 75% purple and 25% white. She controlled all the variables that she could to get this result. Which is the best explanation of the source of error in the result?
- A. Technique used to count the offspring
 - B. Chance during fertilization of the ovules
 - C. Growing conditions for the offspring
 - D. Parents used in the crosses
4. Which process best shows how the information in the flower-color genes leads to flower color?
- A. DNA → RNA → protein
 - B. RNA → DNA → protein
 - C. DNA → protein → RNA
 - D. Protein → RNA → DNA
5. A heterozygous parent and a homozygous recessive parent have offspring. Which question about the offspring is **not** answered by Mendel's laws?
- A. What is the probability that an individual offspring will be heterozygous?
 - B. What will be the phenotype of any individual offspring?
 - C. Approximately what fraction of a large number of offspring will display the dominant trait?
 - D. Approximately what fraction of a large number of offspring will display the recessive trait?


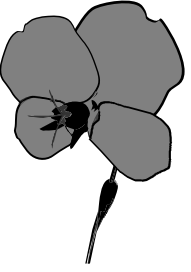

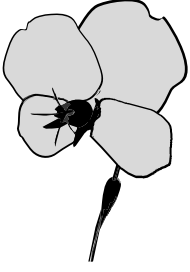
**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

The capital letter F represents the dominant gene for flower color and the lower-case f represents the recessive gene.

6. Use the data in the table to determine the most likely genotypes of the parents.

Pea Cross

Parents		Offspring	
Purple	Purple	71%	29%
			

On the diagram, circle the genotypes you want to select. You may only circle 1 genotype for each parent.

Parent 1		Parent 2
<input type="text"/>	x	<input type="text"/>
<input type="text" value="FF"/>		<input type="text" value="FF"/>
<input type="text" value="Ff"/>		<input type="text" value="Ff"/>
<input type="text" value="ff"/>		<input type="text" value="ff"/>

ITEM SAMPLER MAY BE
DUPLICATED.

Go on to the next page.

7. What is the probability that the first offspring of a cross between two parents with the genotypes FF and ff will display the dominant trait?

Write your answer in the box. You may use up to 5 numbers.

%

**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

Put sticker
here

This is the end of Segment 1.



Segment 2

You will be told when to begin this segment.

Put sticker
here

There is no test material on this page.

2

Go on to the next page.

Science Test – Segment 2

2

Photosynthesis Investigation

ITEM SAMPLER MAY BE
DUPLICATED.

Go on to the next page.

Two students prepare an experiment to investigate how the intensity of light affects the rate of photosynthesis in elodea, a plant that grows underwater. They will conduct the experiment in a room without windows.



2

**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

- 8.** Which statement is an appropriate hypothesis for this experiment?
- A.** The distance from the light source to the elodea should remain the same.
 - B.** As the light intensity increases, the rate of photosynthesis will increase.
 - C.** The students will measure the rate of photosynthesis by counting bubbles.
 - D.** Experimenting in a room without windows helps control the amount of light reaching the elodea.

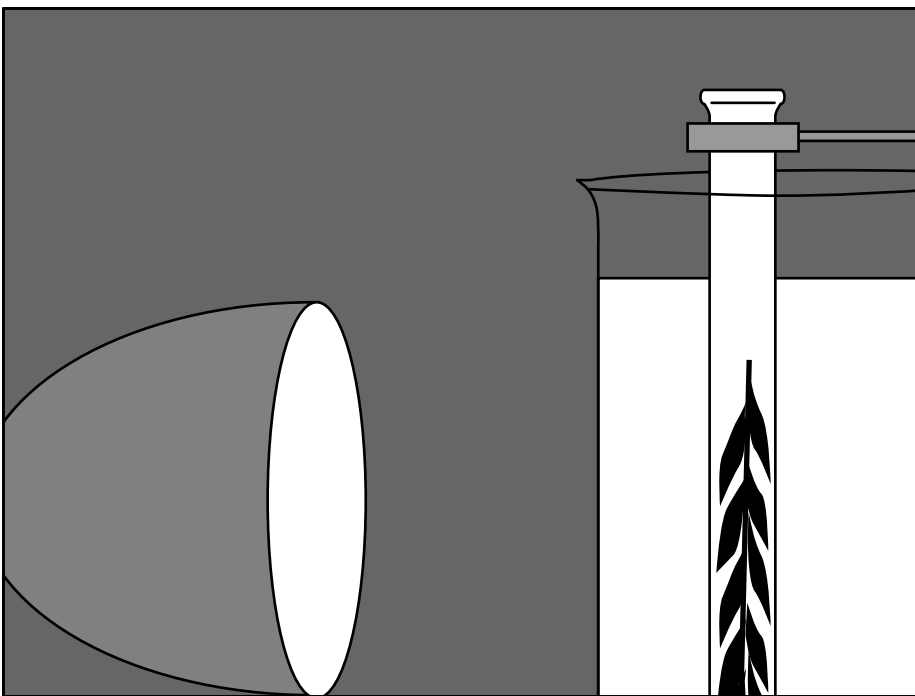
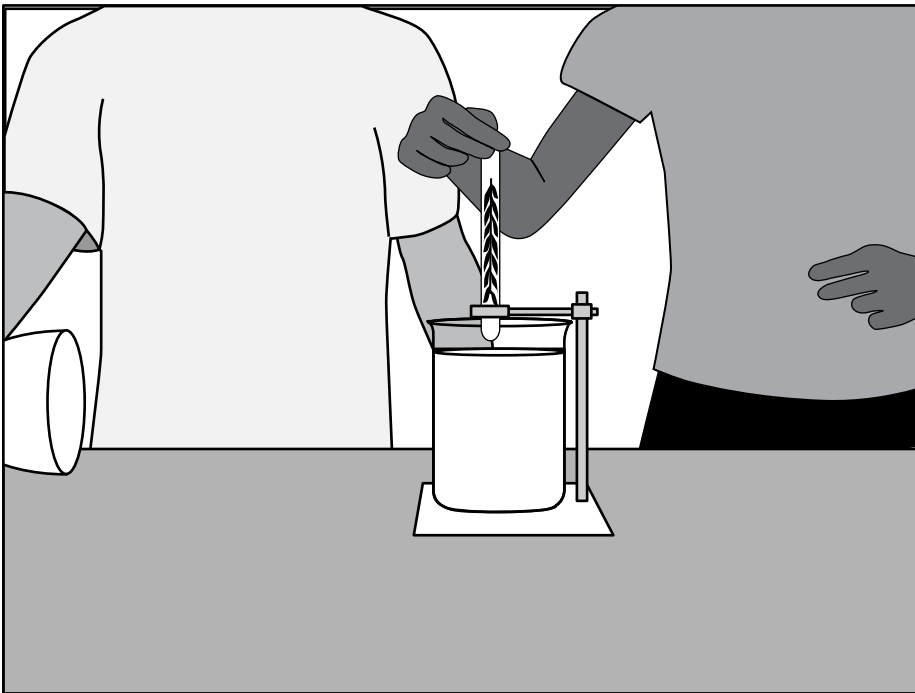
**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

A sprig of elodea is placed upside down in a test tube filled with a solution. The test tube is placed in a large beaker full of water, which serves as a water bath. Photosynthesis will produce bubbles of gas. The bubbles will eventually come out of the stem and rise to the top of the test tube.

The students will use a light source during their experiment. The light source will be moved closer to and farther away from the plant to change the intensity of light it receives. The rate of photosynthesis will be measured by counting how many bubbles come out of the stem in 1 minute.

2



**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

- 9.** Which of these variables would be most important to keep constant during the experiment?
- A.** Number of bubbles produced by the elodea
 - B.** Distance of the light from the test tube
 - C.** Temperature of the solution in the test tube
 - D.** Time of day the experiment is conducted

**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

Each trial was replicated 3 times and the average of the results was calculated. The results of the experiment are shown in the table.

Bubble Production at Various Distances

Distance of Light from Plant (cm)	Bubbles Produced per Minute (Average Number)
15	60
20	50
25	40
30	30

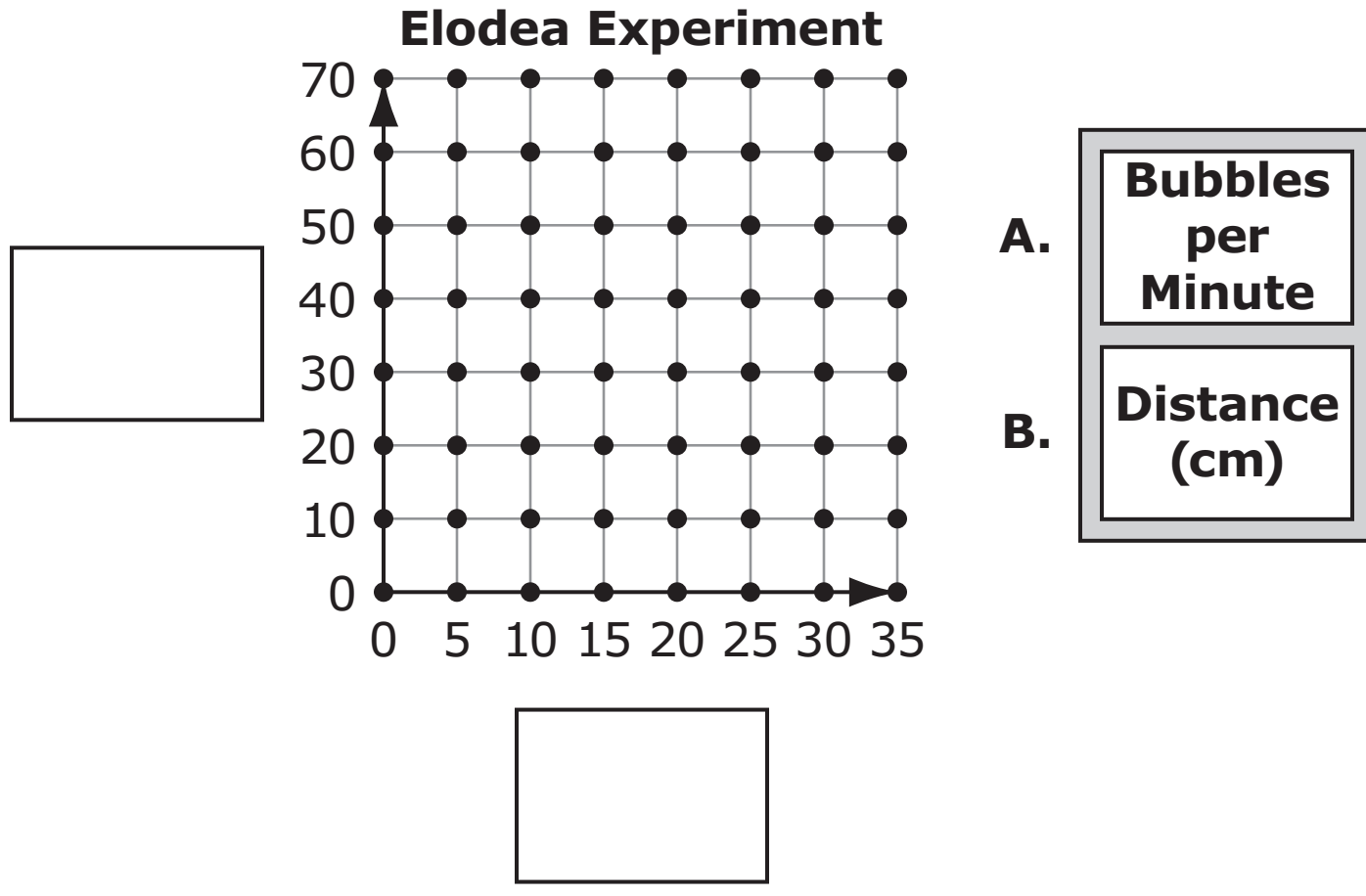
2

**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

10. Complete the graph to show the results of the experiment.

Each axis label is labeled A or B. Write the letter of the label in the correct box. On the graph, circle the points to show the results of the experiment.



ITEM SAMPLER MAY BE DUPLICATED.

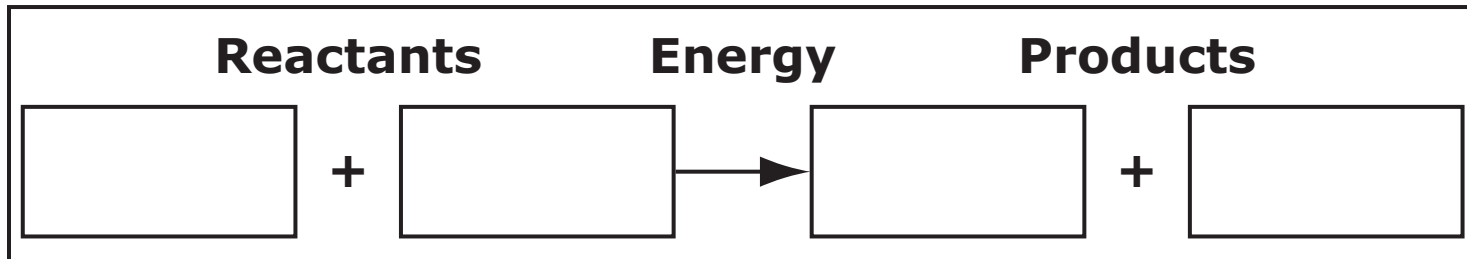
Go on to the next page.

- 11.** The students want to know what is in the bubbles coming from the plant during photosynthesis.

Complete the formula for photosynthesis.

Each substance is labeled A, B, C, D, E, or F. Write the letter of the substance in the correct box. You may only use each letter 1 time.

Photosynthesis



A.	B.	C.
carbon dioxide	oxygen	iron
glucose	nitrogen	water
D.	E.	F.

2

ITEM SAMPLER MAY BE DUPLICATED.

Go on to the next page.

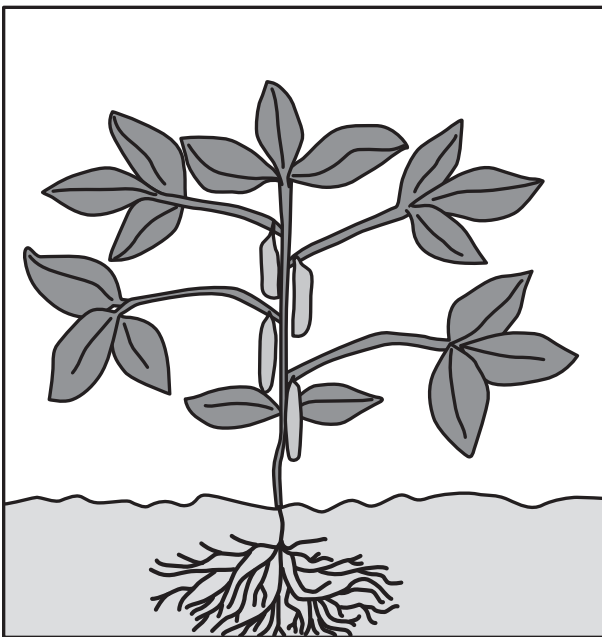
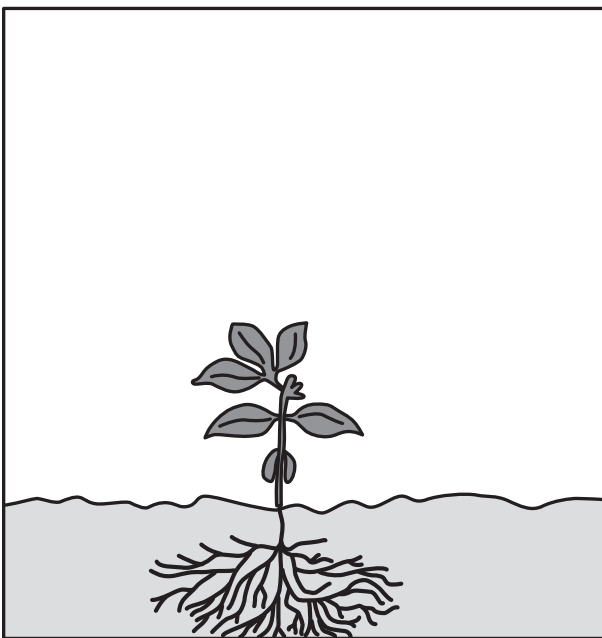
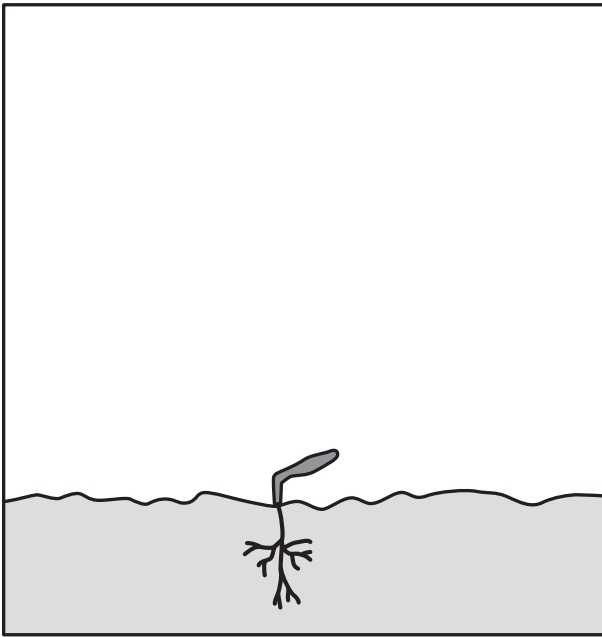
Plant Growth

**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

Many plants grow from seeds. As a plant grows, it requires energy for cell division. Eventually, the plant produces flowers and seeds.

2



**ITEM SAMPLER MAY BE
DUPLICATED.**

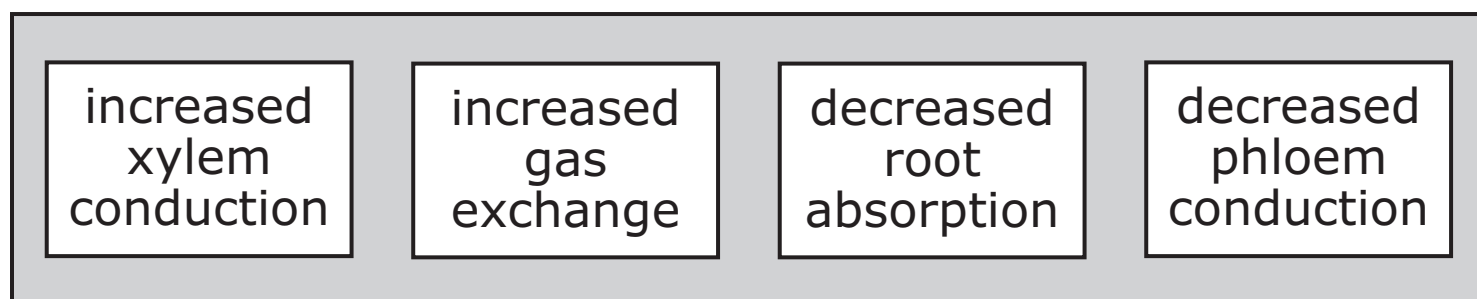
Go on to the next page.

- 12.** Which cell material is replicated before bean plant cells divide?
- A.** DNA
 - B.** RNA
 - C.** Fatty acids
 - D.** Amino acids

- 13.** Identify each plant system response that must occur for the bean plant to maintain homeostasis when it is growing.

On the diagram, circle each of the system responses you want to select.

Plant System Responses



ITEM SAMPLER MAY BE DUPLICATED.

Go on to the next page.

- 14.** Identify which cell part is associated with each cell process that occurs in a bean plant.

On the diagram, circle the cell parts you want to select. You may circle only 1 cell part for each cell process.

Cellular Respiration	Photosynthesis	Protein Synthesis
<input type="text"/>	<input type="text"/>	<input type="text"/>
chloroplast	chloroplast	chloroplast
mitochondrion	mitochondrion	mitochondrion
ribosome	ribosome	ribosome

2

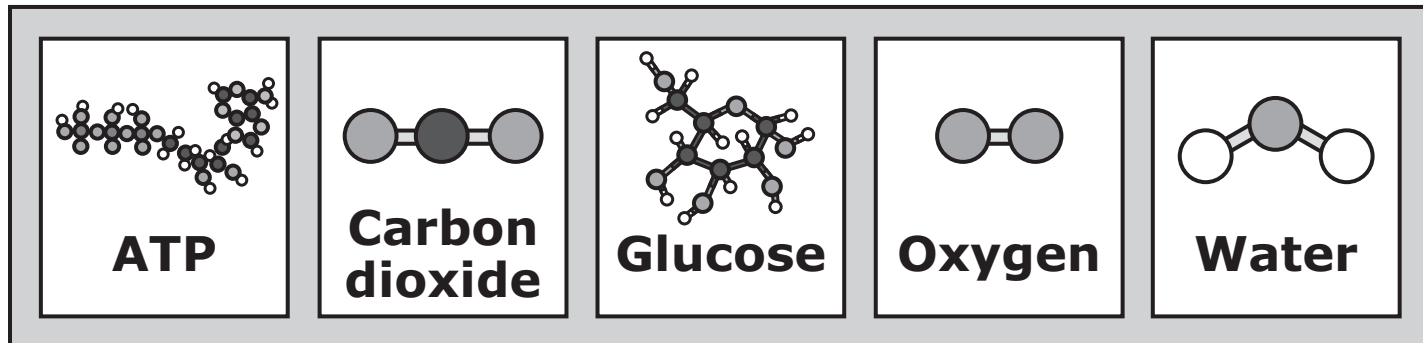
**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

- 15.** From the compounds, identify each reactant of cellular respiration in the cells of this growing bean plant.

On the diagram, circle each of the reactants you want to select.

Compounds of Cellular Respiration



- 16.** What role does a bean plant play in the food web of an ecosystem?
- A.** Producer
 - B.** Decomposer
 - C.** Primary consumer
 - D.** Secondary consumer

**ITEM SAMPLER MAY BE
DUPLICATED.**

Go on to the next page.

This is the end of Segment 2.

Put sticker
here



**ITEM SAMPLERS ARE NOT SECURE TEST MATERIALS.
THIS ITEM SAMPLER TEST BOOK MAY BE COPIED
OR DUPLICATED.**

**Grade HS
Science Item Sampler
18pt**