

Tennessee Comprehensive Assessment Program

TCAP

TNReady—Science Grade 8 Item Release





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Metadata Interpretation Guide – Science

Item Information

Item Code: TNS10220	Passage Title:
Standard Code: 0307.1.1	Passage Code:
Standard Text: Identify specific parts of a plant and describe their function.	
Reporting Category: Cells, Flow of Matter & Energy, Heredity	
Correct Answer: B	DOK Level: 2

Item Code: Unique letter/number code used to identify the item.	Passage Title: (if listed): Title of the passage(s) associated with this item.
Standard Code: Primary educational standard assessed.	Passage Code: (if listed): Unique letter/number code used to identify the passage(s) that go with this item.
Standard Text: Text of the educational standard assessed.	
Reporting Category: Text of the Reporting Category the standard assesses.	
Correct Answer: Correct answer. This may be blank for constructed response items where students write or type their responses.	DOK Level (if listed): Depth of Knowledge (cognitive complexity) is measured on a four-point scale. 1= Recall; 2= Skill/Concepts; 3= Strategic Thinking; 3-4 = Strategic/Extended Thinking

Science Grade 8

Item Information

Item Code: TNS00131

Passage Title:

Standard Code: 0807.12.1

Passage Code:

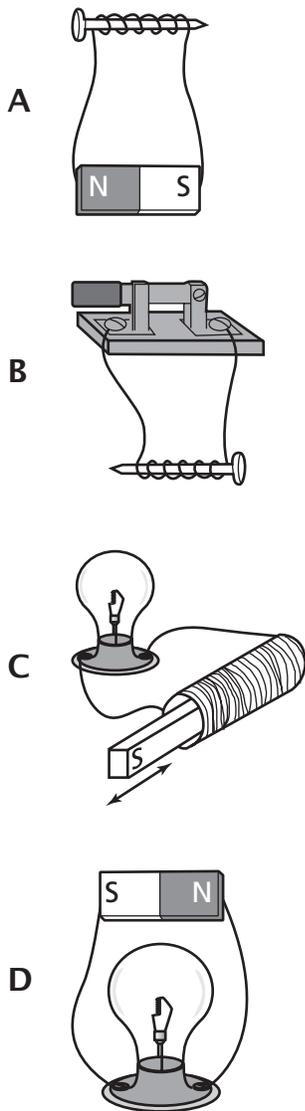
Standard Text: Recognize that electricity can be produced using a magnet and wire coil.

Reporting Category: Forces of Nature

Correct Answer: C

DOK Level: 2

Which diagram shows an example of how to produce electricity?



Item Information

Item Code: TNS20867	Passage Title:
Standard Code: 0807.12.2	Passage Code:
Standard Text: Describe the basic principles of an electromagnet.	
Reporting Category: Forces of Nature	
Correct Answer: C	DOK Level: 2

A student wants to make an electromagnet. Which items are needed?

- A** battery, heat source, copper wire
- B** magnet, copper wire, metal nail
- C** copper wire, metal nail, battery
- D** magnet, battery, heat source

Item Information

Item Code: TNS02153

Passage Title:

Standard Code: 0807.12.5

Passage Code:

Standard Text: Determine the relationship among the mass of objects, the distance between these objects, and the amount of gravitational attraction.

Reporting Category: Forces of Nature

Correct Answer: B

DOK Level: 2

The force of gravity pulls down on Carol's house with a total force of 300,000 newtons.

The force of gravity on Carol's house would be exactly twice as much if the house

- A** were twice as tall
- B** had twice as much mass
- C** had twice as much volume
- D** covered twice as much area

Item Information

Item Code: TNS02890

Passage Title:

Standard Code: 0807.12.5

Passage Code:

Standard Text: Determine the relationship among the mass of objects, the distance between these objects, and the amount of gravitational attraction.

Reporting Category: Forces of Nature

Correct Answer: B

DOK Level: 2

The sun's mass is about 30 million times greater than the moon.

Why does the gravitational pull between Earth and the moon affect Earth's tides more than the gravitational pull between Earth and the sun?

- A** The moon is more dense than the sun.
- B** The moon is closer to Earth than the sun.
- C** The moon has phases, but the sun does not.
- D** The moon orbits Earth, but the sun does not.

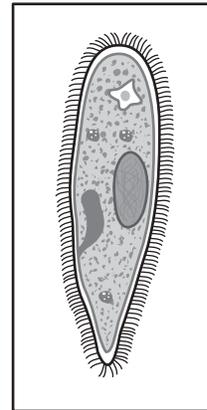
Item Information

Item Code: TNS20808	Passage Title:
Standard Code: 0807.5.1	Passage Code:
Standard Text: Use a simple classification key to identify an unknown organism.	
Reporting Category: Biodiversity & Change	
Correct Answer: B	DOK Level: 2

A classification key and a diagram of an organism are shown below.

Classification Key

1A. Only 1 cell	go to 2
1B. More than 1 cell	go to 3
2A. No nucleus	Eubacteria
2B. Has a nucleus	Protista
3A. Autotrophic	Plantae
3B. Heterotrophic	go to 4
4A. Mobile	Animalia
4B. Immobile	Fungi



The organism shown on the right belongs to what kingdom?

- A Eubacteria
- B Protista
- C Plantae
- D Animalia

Item Information

Item Code: TNS20894
Standard Code: 0807.5.1
Standard Text: Use a simple classification key to identify an unknown organism.
Reporting Category: Biodiversity & Change
Correct Answer: D

Passage Title:
Passage Code:
DOK Level: 2

A picture of an organism and a classification key are shown below.

Classification Key



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- 1a. The organism has feathers Class Aves
- 1b. The organism has no feathers..... Go to 2

- 2a. The organism has scales..... Go to 3
- 2b. The organism has no scales Go to 4

- 3a. The organism has gills....Class Chondrichthyes
- 3b. The organism has lungs..... Class Reptilia

- 4a. The organism has fur Class Mammalia
- 4b. The organism has no fur..... Class Insecta

Using the classification key above, identify the class of the organism.

- A Class Aves
- B Class Reptilia
- C Class Chondrichthyes
- D Class Mammalia

Item Information

Item Code: TNS10495

Passage Title:

Standard Code: 0807.5.2

Passage Code:

Standard Text: Analyze structural, behavioral, and physiological adaptations to predict which populations are likely to survive in a particular environment.

Reporting Category: Biodiversity & Change

Correct Answer: C

DOK Level: 2

The most available food source for birds on an island is hard-shelled nuts. Which birds have beaks designed to best survive on a diet of hard-shelled nuts?



Item Information

Item Code: TNS10676
Standard Code: 0807.5.3
Standard Text: Analyze data on levels of variation within a population to make predictions about survival under particular environmental conditions.
Reporting Category: Biodiversity & Change
Correct Answer: A

Passage Title:
Passage Code:
DOK Level: 2

The table below shows four different populations of bacteria and the percentage of each that is resistant to different antibiotics.

Percent of Bacterial Population Resistant to Antibiotic

Population	Antibiotic Q	Antibiotic R	Antibiotic S	Antibiotic T
1	9.3%	17.1%	19.0%	30.1%
2	18.1%	46.9%	18.4%	0%
3	0%	95.1%	1.6%	82.0%
4	0%	3.3%	6.6%	4.1%

Which population of bacteria would have the greatest number of survivors if treated with Antibiotic S?

- A 1
- B 2
- C 3
- D 4

Item Information

Item Code: TNS00103

Passage Title:

Standard Code: 0807.5.5

Passage Code:

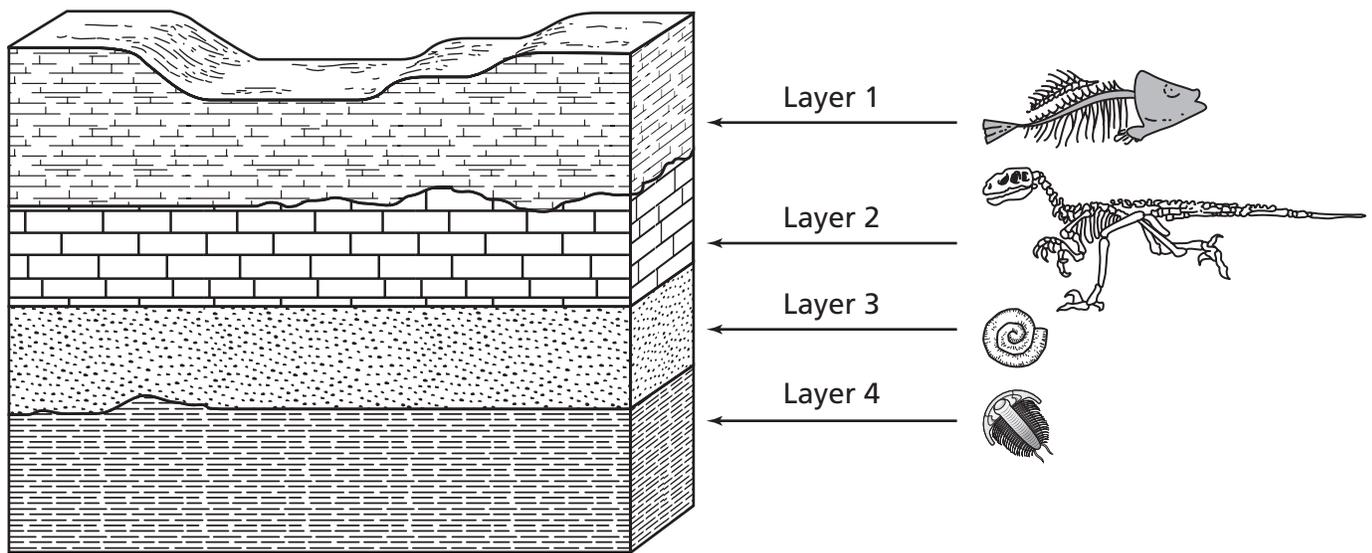
Standard Text: Compare fossils found in sedimentary rock to determine their relative age.

Reporting Category: Biodiversity & Change

Correct Answer: D

DOK Level: 2

The diagram below shows layers of sedimentary rock and the types of fossils found in each layer.



What layer contains the oldest fossil?

- A Layer 1
- B Layer 2
- C Layer 3
- D Layer 4

Item Information

Item Code: TNS20907	Passage Title:
Standard Code: 0807.9.1	Passage Code:
Standard Text: Recognize that all matter consists of atoms.	
Reporting Category: Properties of Matter	
Correct Answer: B	DOK Level: 1

Which represents the smallest part of an element that retains all the properties of that element?

- A molecule
- B atom
- C nucleus
- D proton

Item Information

Item Code: TNS20782

Passage Title:

Standard Code: 0807.9.10

Passage Code:

Standard Text: Identify the reactants and products of a chemical reaction.

Reporting Category: Chemical Reactions

Correct Answer: D

DOK Level: 2

A table of chemical equations is shown below.

Equations Table

$\text{NaOH} + \text{KNO}_3 \rightarrow \text{NaNO}_3 + \text{KOH}$
$\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
$2\text{Fe} + 6\text{NaBr} \rightarrow 2\text{FeBr}_3 + 6\text{Na}$
$\text{Pb} + \text{O}_2 \rightarrow \text{PbO}_2$

Which is a reactant in one of the equations?

- A NaNO_3
- B CO_2
- C PbO_2
- D NaBr

Item Information

Item Code: TNS20924

Passage Title:

Standard Code: 0807.9.11

Passage Code:

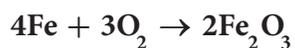
Standard Text: Recognize that in a chemical reaction the mass of the reactants is equal to the mass of the products (Law of Conservation of Mass).

Reporting Category: Chemical Reactions

Correct Answer: A

DOK Level: 2

A chemical equation is shown below.



The mass of $2\text{Fe}_2\text{O}_3$ produced must be equal to

- A the total mass of 4Fe and 3O_2 .
- B twice the total mass of 4Fe and 3O_2 .
- C one-half the mass of 4Fe and 3O_2 .
- D the mass of 4Fe less the mass of 3O_2 .

Item Information

Item Code: TNS20865
Standard Code: 0807.9.12
Standard Text: Identify the basic properties of acids and bases.
Reporting Category: Chemical Reactions
Correct Answer: C

Passage Title:
Passage Code:
DOK Level: 2

The table below shows the pH values of some different foods.

pH of Foods

Substance	Approximate pH
Egg whites	7.96
Graham crackers	7.92
Cranberry juice	2.30
Conch snails	8.40

Based on its pH level, which kind of food is most likely to have a sour taste?

- A Egg whites
- B Graham crackers
- C Cranberry juice
- D Conch snails

Item Information

Item Code: TNS20925

Passage Title:

Standard Code: 0807.9.12

Passage Code:

Standard Text: Identify the basic properties of acids and bases.

Reporting Category: Chemical Reactions

Correct Answer: D

DOK Level: 1

A strip of litmus paper turns blue when placed in a liquid. This observation indicates that the liquid has the properties of

- A** citrus juice.
- B** pure water.
- C** an acid.
- D** a base.

Item Information

Item Code: TNS20811

Passage Title:

Standard Code: 0807.9.2

Passage Code:

Standard Text: Identify the common outcome of all chemical changes.

Reporting Category: Chemical Reactions

Correct Answer: C

DOK Level: 2

After time, a copper penny will turn a green color and have a higher mass due to a chemical process. Which is the most likely reason for the changes to the copper penny?

- A** Dirt is clinging to the copper penny.
- B** The copper penny was painted.
- C** Metal in the copper penny oxidizes.
- D** The copper penny absorbed water.

Item Information

Item Code: TNS20832

Passage Title:

Standard Code: 0807.9.3

Passage Code:

Standard Text: Classify common substances as elements or compounds based on their symbols or formulas.

Reporting Category: Chemical Reactions

Correct Answer: C

DOK Level: 1

Which is a compound?

- A lead (Pb)
- B sulfur (S)
- C hydrogen peroxide (H_2O_2)
- D oxygen gas (O_2)

Item Information

Item Code: TNS10500

Passage Title:

Standard Code: 0807.9.4

Passage Code:

Standard Text: Differentiate between a mixture and a compound.

Reporting Category: Chemical Reactions

Correct Answer: B

DOK Level: 2

A student examines a powder. He notices most of the powder is made of white grains, but black grains are also present. The powder should be classified as

- A** an atom.
- B** a mixture.
- C** an element.
- D** a compound.

Item Information

Item Code: TNS20835

Passage Title:

Standard Code: 0807.9.6

Passage Code:

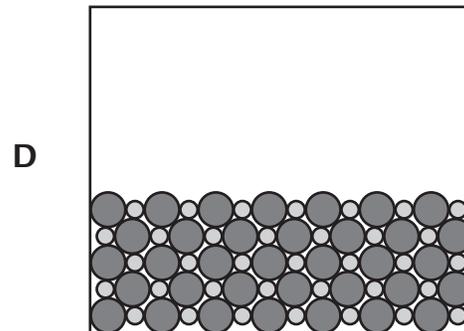
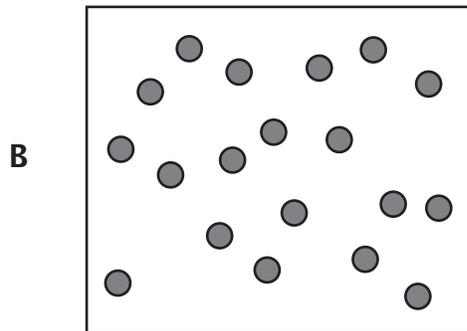
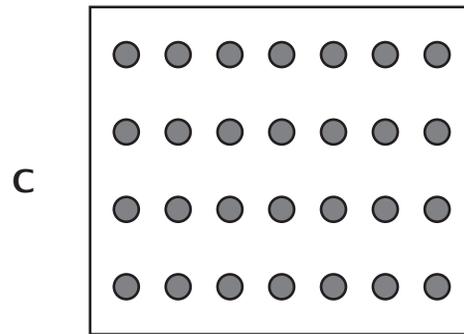
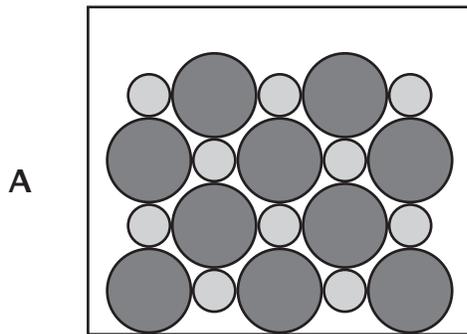
Standard Text: Compare the particle arrangement and type of particle motion associated with different states of matter.

Reporting Category: Properties of Matter

Correct Answer: B

DOK Level: 2

Which of these particle arrangements best represents a gas?



Item Information

Item Code: TNS20860

Passage Title:

Standard Code: 0807.9.7

Passage Code:

Standard Text: Apply an equation to determine the density of an object based on its mass and volume.

Reporting Category: Properties of Matter

Correct Answer: B

DOK Level: 2

The formula for density is shown below.

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$D = \frac{m}{v}$$

A substance has a mass of 12 grams and a volume of 6.0 cubic centimeters. What is the density of the substance?

- A 0.5 gram/cubic centimeter
- B 2.0 grams/cubic centimeter
- C 18 grams/cubic centimeter
- D 72 grams/cubic centimeter

Item Information

Item Code: TNS20837	Passage Title:
Standard Code: 0807.9.8	Passage Code:
Standard Text: Interpret the results of an investigation to determine whether a physical or chemical change has occurred.	
Reporting Category: Chemical Reactions	
Correct Answer: C	DOK Level: 3-4

A teacher put five grams of each of the four different substances into individual test tubes and then heated each test tube over a flame. The teacher asked the students to note the appearance of each substance after heating. The results were as follows:

Reaction of Substances Table

Substance	Appearance Before Heating	Observations While Heating	Appearance After Cooling
Potassium permanganate	Purple crystalline solid	Crackling, black smoke	Black powder
Copper carbonate	Blue-green powder	Begins to turn black	Black solid
Zinc oxide	White powder	Turns yellow	White powder
Sulfur	Yellow crystalline solid	Yellow-brown liquid, smells like rotten eggs	Yellow-brown liquid with large, fiber-like crystals

According to the data, which substance underwent a physical change?

- A Potassium permanganate
- B Copper carbonate
- C Zinc oxide
- D Sulfur

Item Information

Item Code: TNS20716

Passage Title:

Standard Code: 0807.9.9

Passage Code:

Standard Text: Use the periodic table to determine the properties of an element.

Reporting Category: Properties of Matter

Correct Answer: A

DOK Level: 2

The diagram below shows the periodic table.

H																				He
Li	Be											B	C	N	O	F	Ne			
Na	Mg											Al	Si	P	S	Cl	Ar			
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr			
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe			
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn			
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt												

Which shaded element will chemically combine most easily with hydrogen (H)?

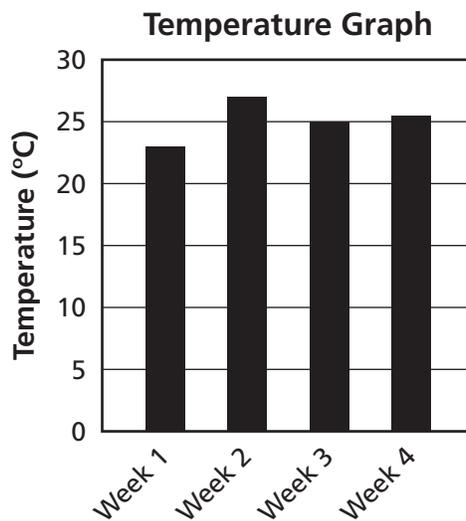
- A fluorine (F)
- B sulfur (S)
- C krypton (Kr)
- D tin (Sn)

Item Information

Item Code: TNS20701
Standard Code: 0807.Inq.1
Standard Text: Design a simple experimental procedure with an identified control and appropriate variables.
Reporting Category: Inquiry and Technology & Engineering
Correct Answer: A

Passage Title:
Passage Code:
DOK Level: 2

The graph below was created as part of a classroom investigation to show how the average weekly temperature changed during a one-month period.



Which variable, if not controlled, will make this graph most unreliable?

- A The temperatures were measured at different times of the day.
- B A digital thermometer was used to collect data.
- C The temperatures are an average.
- D A cold front changed the weather.

Item Information

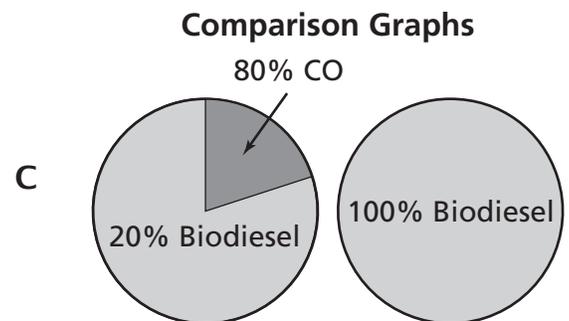
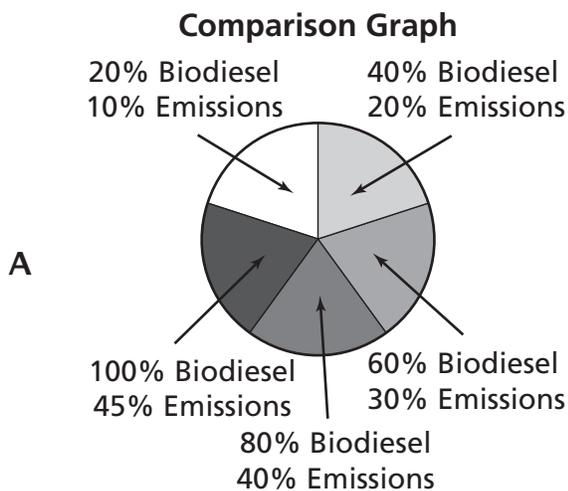
Item Code: TNS21018	Passage Title:
Standard Code: 0807.Inq.3	Passage Code:
Standard Text: Interpret and translate data into a table, graph, or diagram.	
Reporting Category: Inquiry and Technology & Engineering	
Correct Answer: D	DOK Level: 2

The table shows the relationship between the percent of biodiesel used to operate machines and the reduction in carbon monoxide (CO) emissions.

Reduction in Carbon Monoxide Emissions

Percent of Biodiesel	Percent Reduction of CO Emissions
20	10
40	20
60	30
80	40
100	45

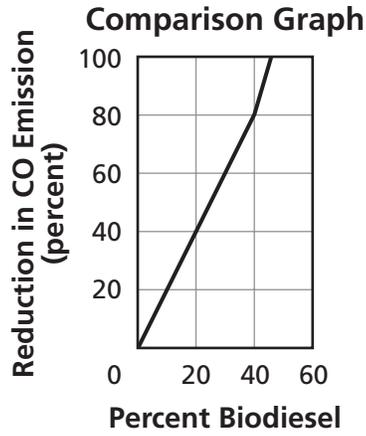
Which graph best shows the information from the table?



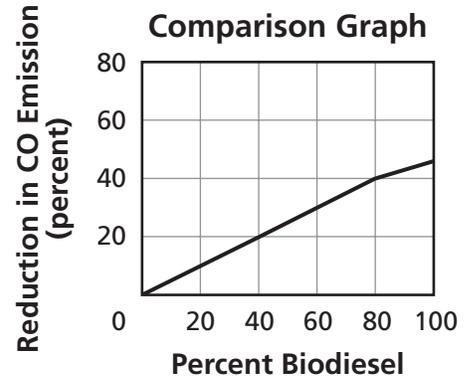
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(Item 23, continued from the previous page)

B



D



Item Information

Item Code: TNS20795	Passage Title:
Standard Code: 0807.Inq.4	Passage Code:
Standard Text: Draw a conclusion that establishes a cause and effect relationship supported by evidence.	
Reporting Category: Inquiry and Technology & Engineering	
Correct Answer: A	DOK Level: 2

A small plant was added to a closed jar where a cricket was kept. The table shows the oxygen (O₂) and carbon dioxide (CO₂) levels in the jar.

Comparison of Gas Levels

Time (minutes)	CO ₂	O ₂
0	0.04%	21.00%
2	0.02%	21.05%
4	0.03%	21.03%
6	0.04%	21.00%

Which statement is best supported by data in the table?

- A The plant was added between the times of 2 and 4 minutes.
- B The plant was added between the times of 4 and 6 minutes.
- C The plant absorbed O₂ in the jar faster than the cricket breathed.
- D The cricket used CO₂ at the same rate that the plant released it.

Item Information

Item Code: TNS00086	Passage Title:
Standard Code: 0807.TE.1	Passage Code:
Standard Text: Identify the tools and procedures needed to test the design features of a prototype.	
Reporting Category: Inquiry and Technology & Engineering	
Correct Answer: D	DOK Level: 2

A train that is powered by magnetism and electricity is currently being tested in Japan. A student wants to build a model of this train.

Which test will best determine if the model train works?

- A** attach the model train to an electric fan
- B** connect the model train to a solar panel
- C** attach the model train to a bottle rocket
- D** connect the model train to an electromagnet

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