



CMT Prep Grade 8 Science

by Dr. Jean Brainard

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Dr. Jean M. Brainard received a master's degree from the Harvard School of Public Health and a doctorate in biomedical anthropology from the State University of New York at Binghamton. A former university professor, Dr. Brainard has written hundreds of text-book chapters and encyclopedia articles on a diversity of subjects, as well as numerous professional publications based on her own research.

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Expected Performances Assessed on CMT Science Tests

Grade 6	Problem #'s
C1: Describe the properties of common elements, such as oxygen, hydrogen, carbon, iron and aluminum.	1, 2, 5, 8, 10, 12, 16
C2: Describe how the properties of simple compounds, such as water and table salt, are different from the properties of the elements of which they are made.	3, 6, 9, 11, 13
C3: Explain how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.	4, 7, 14, 15
C4: Describe how abiotic factors, such as temperature, water, and sunlight, affect the ability of plants to create their own food through photosynthesis.	17, 18, 22, 23, 30–32, 36–39
C5: Explain how populations are affected by predator-prey relationships.	19, 20, 24, 26, 27, 34, 40–42
C6: Describe common food webs in different Connecticut ecosystems.	21, 25, 28, 29, 33, 35, 41
C7: Describe the effect of heating on the movement of molecules in solids, liquids, and gases.	43, 44, 48, 51, 55, 56, 61, 62
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C11: Explain how human activity may impact water resources in Connecticut, such as ponds, rivers and the Long Island Sound ecosystem.	69, 70, 73–75, 78–80

Grade 7	Problem #'s
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C13: Explain how simple machines, such as inclined planes, pulleys and levers, are used to create mechanical advantage.	85, 88, 92, 95, 97–99, 128, 191
C14: Describe how different types of stored (potential) energy can be used to make objects move.	86, 87, 89, 93, 96
C15: Describe the basic structures of an animal cell, including the nucleus, cytoplasm, mitochondria and cell membrane, and how they function to support life.	100–102, 108, 114, 115, 120, 122
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Grade 8	Problem #'s
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C28: Explain the effect of gravity on the orbital movements of planets in the solar system.	242, 319–321, 333, 334, 336–339, 348–350, 360, 361, 363–365, 374, 376

C29: Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, phases of the moon and eclipses.	322–332, 335, 340–347, 351–359, 362, 366–373, 375, 377–382
C30: Explain how beam, truss, and suspension bridges are designed to withstand the forces that act on them.	383–402

Grades 6–8 Core Standards for Scientific Inquiry, Literacy and Numeracy

Content Standards:

Scientific Inquiry:

- Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena.
- Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation.
- Scientific inquiry requires the sharing of finding and ideas for critical review by colleagues and other scientists.

Scientific Literacy:

- Scientific literacy includes speaking, listening, presenting, interpreting, reading and writing about science.
- Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media.

Scientific Numeracy:

- Mathematics provides useful tools for the description, analysis and presentation of scientific data and ideas.

Expected Performances:

C INQ.1: Identify questions that can be answered through scientific investigation.

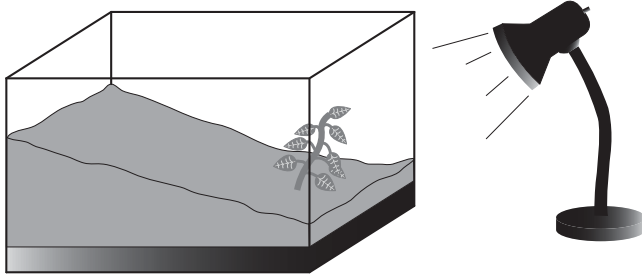
C INQ.2: Read, interpret, and examine the credibility of scientific claims in different sources of information.

C INQ.3: Design and conduct appropriate types of scientific investigations to answer different questions.

C INQ.4:	Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.
C INQ.5:	Use appropriate tools and techniques to make observations and gather data.
C INQ.6:	Use mathematical operations to analyze and interpret data.
C INQ.7:	Identify and present relationships between variables in appropriate graphs.
C INQ.8:	Draw conclusions and identify sources of error.
C INQ.9:	Provide explanations to investigated problems or questions.
C INQ.10:	Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

6.2: Matter and Energy in Ecosystems

17. A student grew the plant shown below.



The student was trying to test how light affects the growth of the plant. The student concluded that the plant grows in the direction of the light. The conclusion would be stronger if

- A. the soil was level.
 - B. the light was closer.
 - C. the plant was bigger.
 - D. the light was brighter.
18. When plants make food through photosynthesis, which energy transformation occurs?
- A. heat energy → chemical energy
 - B. light energy → chemical energy
 - C. chemical energy → light energy
 - D. mechanical energy → chemical energy

19. Which question about a predator species and its prey could be answered with certainty by gathering data in a scientific investigation?

- A. How many predators and prey are there right now?
- B. How many predators and prey will there be in 10 years?
- C. Why do the predators hunt this particular prey species?
- D. What is the chance that the prey species will go extinct?

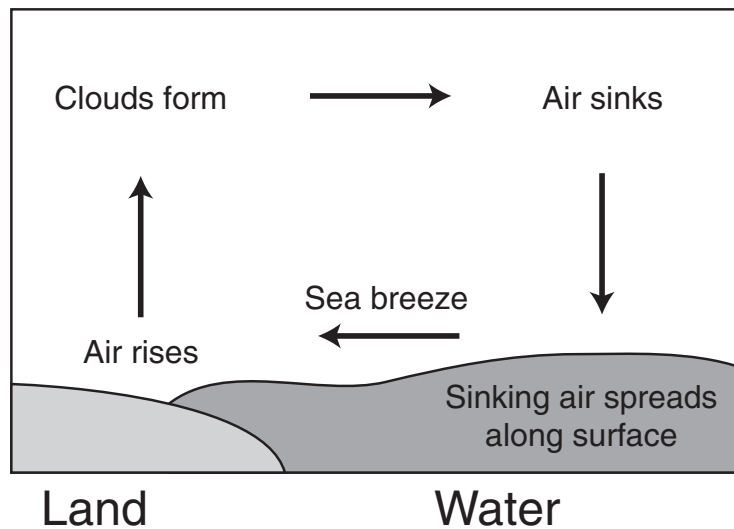
20. This table lists the numbers of rabbits and foxes in a rural area of Connecticut over a five-year period. The foxes in this area prey mainly on rabbits.

Rabbit and Fox Population		
Year	Rabbits	Foxes
1	200	10
2	550	15
3	650	55
4	950	60
5	550	?

Which number is most likely the correct choice for the question mark (?) in the table?

- A. 80
- B. 75
- C. 65
- D. 20

The diagram below shows how a sea breeze forms. Use the diagram to answer questions 65 and 66.



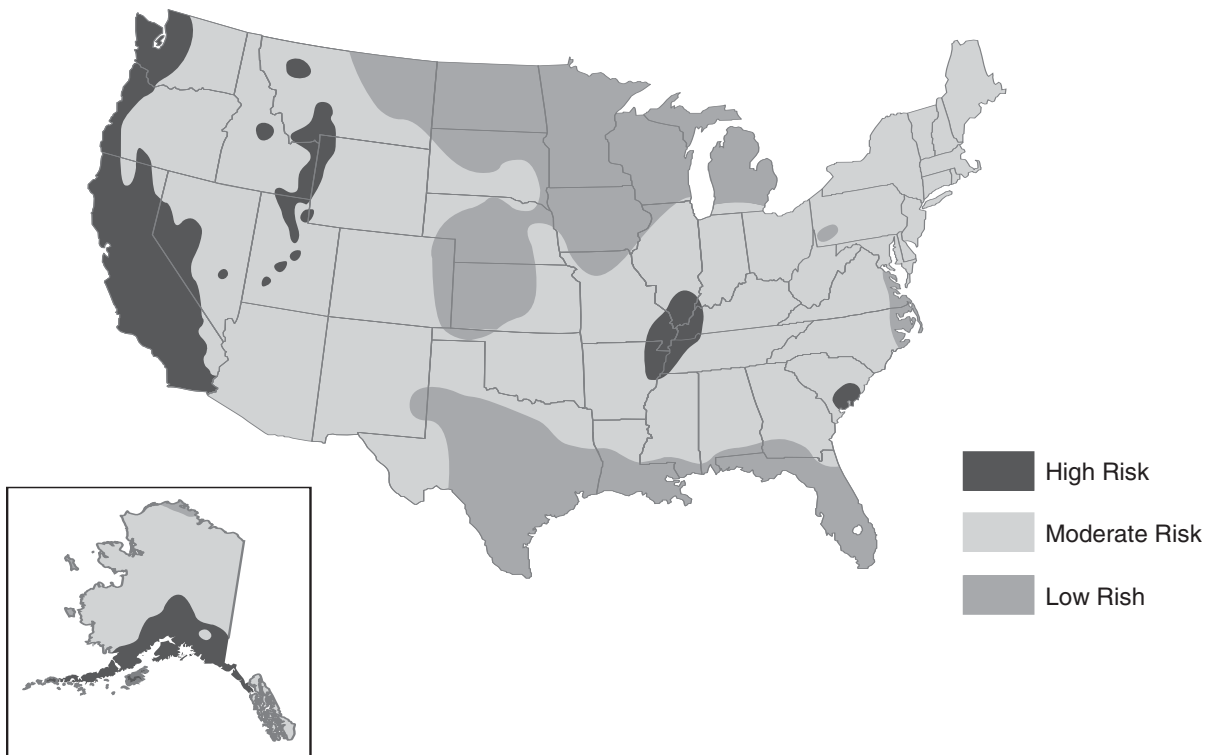
65. The breeze blows from the water to the land because the air over the water

- A. moves in to take the place of the rising air over the land.
- B. is pushed in toward the land by strong ocean currents.
- C. has greater humidity than the air over the land.
- D. is not moving as fast as the air over the land.

66. What time of day could this diagram represent?

- A. 5:00 AM
- B. 3:00 PM
- C. 3:00 AM
- D. midnight

The map below shows the relative risk of earthquakes in different parts of the United States. Use the map to answer questions 137 and 138.



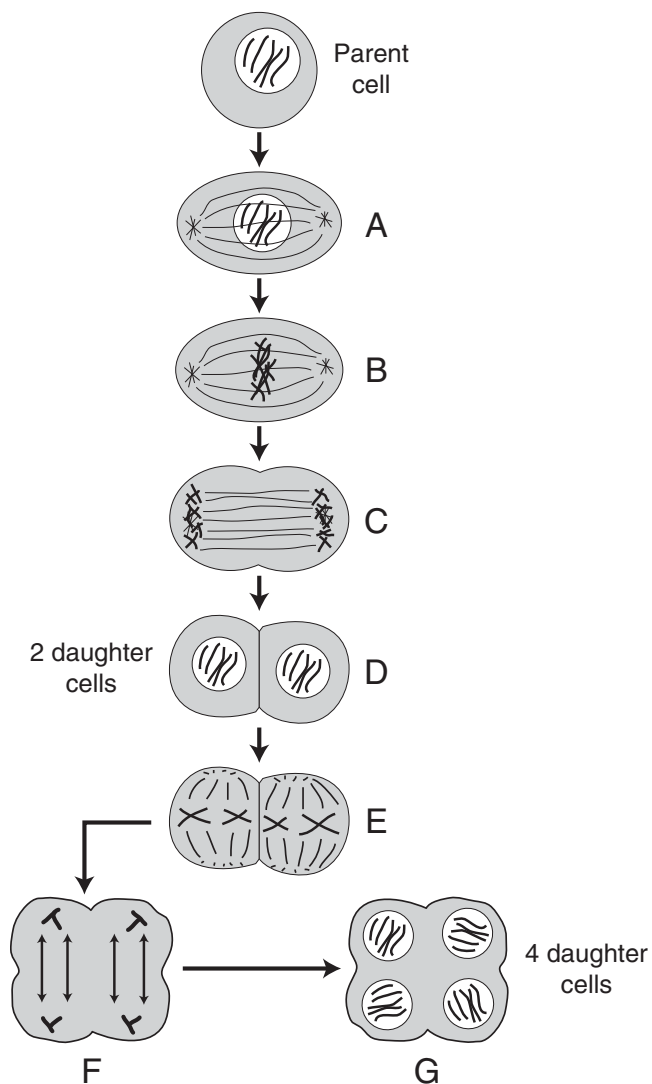
137. Based on the map, where would you expect to find a boundary between two tectonic plates?

- A. along the West Coast
- B. along the East Coast
- C. in the Gulf of Mexico
- D. under the Great Lakes

138. Which sentence best explains the answer to question 79?

- A. Plate boundaries are far from fault zones, making earthquakes less likely near plate boundaries.
- B. Plate boundaries cause volcanoes, and earthquakes rarely occur where there are volcanoes.
- C. Movement at plate boundaries releases stress from rocks and reduces the risk of earthquakes.
- D. Movement at plate boundaries puts rocks under stress, which causes earthquakes when the rocks move and release energy.

This diagram represents a process that occurs in some cells. Use the diagram to answer questions 294–297.



294. What is the name of this process?

- A. mitosis
- B. meiosis
- C. photosynthesis
- D. metamorphosis

295. Which drawing in the diagram shows a stage in which sister chromatids separate and move toward opposite ends of the cell?

- A. drawing B
- B. drawing D
- C. drawing E
- D. drawing F

296. Which drawing represents prophase I?

- A. drawing A
- B. drawing B
- C. drawing C
- D. drawing D

297. If the diagram represents a human cell, how many chromosomes are there in each of the four daughter cells in phase G?

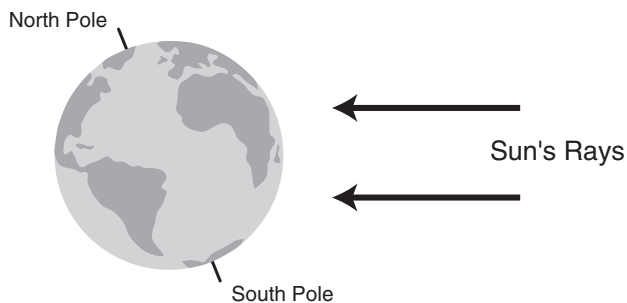
- A. 92
- B. 46
- C. 23
- D. 2

8.3: The Earth in the Solar System

- 319.** What explains why Earth keeps moving in its orbit around the sun?
- A. gravity between the moon and Earth and Earth's mass
 - B. gravity between the sun and Earth and Earth's inertia
 - C. the sun's mass and the velocity of Earth in its orbit
 - D. the velocity of Earth in its orbit and Earth's inertia
- 320.** It takes Saturn almost 30 Earth years to orbit the sun. Why does it take so long?
- A. Gravity is greater between Saturn and the sun, so it orbits more slowly.
 - B. Saturn is larger than Earth, so it cannot revolve as quickly.
 - C. Saturn is farther from the sun, so it has a longer orbit.
 - D. none of the above
- 321.** What would happen to Earth if there were no gravity?
- A. It would travel in a straight line.
 - B. It would come to a complete stop.
 - C. It would have a smaller orbit.
 - D. It would have a more elliptical orbit.
- 322.** The greatest effect of the moon on Earth is on the
- A. tides.
 - B. seasons.
 - C. length of day.
 - D. length of year.
- 323.** The North Pole is tilted farthest toward the sun when the Northern Hemisphere is experiencing a
- A. spring equinox.
 - B. summer solstice.
 - C. fall equinox.
 - D. winter solstice.
- 324.** What would happen if Earth rotated on its axis once every 20 hours?
- A. Earth's years would be shorter.
 - B. The moon's phases would be shorter.
 - C. Earth's days would be shorter.
 - D. none of the above

340. The length of a year is determined by the time it takes
- A. the moon to revolve around Earth.
 - B. Earth to rotate on its axis.
 - C. the sun to rotate on its axis.
 - D. Earth to orbit the sun.

341. This diagram shows Earth's position relative to the sun's rays at a certain time of year.



Which season is it in Connecticut when Earth is in this position?

- A. spring
 - B. summer
 - C. fall
 - D. winter
342. When it is summer in Connecticut, it is winter in Australia. What explains this difference in seasons?
- A. the rotation of Earth on its axis
 - B. the tilt of Earth's axis
 - C. Earth's distance from the sun
 - D. the speed of Earth's rotation

The table below lists the degrees by which several planets in the solar system tilt on their axis. Questions 343 and 344 refer to the table.

Axial Tilt of Several Planets	
Planet	Axial Tilt (°)
Mercury	0.01
Earth	23.44
Mars	25.19
Jupiter	3.13
Uranus	97.77

343. Which planet would you expect to have the most extreme seasonal differences in temperature?
- A. Mercury
 - B. Earth
 - C. Jupiter
 - D. Uranus
344. Which planet would you expect to have seasonal differences most like Earth?
- A. Uranus
 - B. Jupiter
 - C. Mars
 - D. Mercury