Science Data Representation Questions: Strategies and Sample Questions

- Focus on understanding what information is given. Review any additional information given (descriptive paragraphs, headings, scale factors, legends, and so forth).
- Don't memorize the information; refer back to the tables or figures.
- Perform basic calculations, when needed, using the information.
- Reason from the information given.
- Look for obvious large changes (high points, low points, trends, large numbers, small numbers, and so forth).
- Work with the information given.
- Draw conclusions, form hypotheses, and make predictions.

Sample passage:

Recent research indicates that Precambrian Time started about 4.5 billion years ago and was composed of three eras—Azoic, Archeozoic, and Proterozoic. Following the Precambrian Time came the Paleozoic Era (beginning 600 million years ago), the Mesozoic Era (beginning 225 million years ago), and the Cenozoic Era (beginning 65 million years ago). Figure 1 and Tables 1 though 3 give information about these periods.

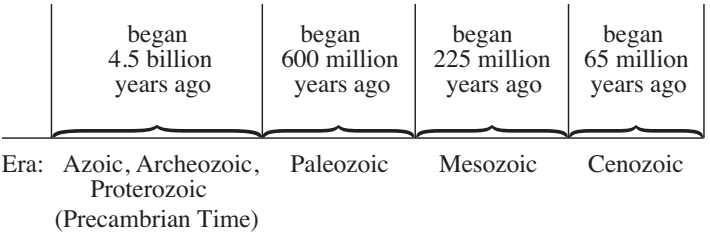

Figure 1

Table 1		
Paleozoic Era		
Period (from earliest)	Length of time (in millions of years)	Development of life (examples)
Cambrian	120	trilobites
Ordovician	45	mollusks
Silurian	30	eurypterids
Devonian	60	fish
Mississippian	35	amphibians, insects
Pennsylvanian	35	early reptiles
Permian	50	seed plants

Table 2		
Mesozoic Era		
Period (from earliest)	Length of time (in millions of years)	Development of life (examples)
Triassic	45	dinosaurs
Jurassic	50	birds
Cretaceous	65	flowering plants

Table 3		
Cenozoic Era		
Period or epoch (from earliest)	Length of time (in years)	Development of life (examples)
Tertiary Period	63,000,000	
Paleocene Epoch	10,000,000	small mammals
Eocene Epoch	15,000,000	fruits, grasses, monkeys
Oligocene Epoch	14,000,000	early elephants, horses
Miocene Epoch	12,000,000	apes
Pliocene Epoch	12,000,000	primitive human beings
Quaternary Period	2,010,000	
Pleistocene Epoch	2,000,000	modern humans
Holocene Epoch	10,000	cultivated plants, tamed animals

Focus on understanding what information is given. Review any additional information given (descriptive paragraphs, headings, scale factors, legends, and so forth). Examining the table or figure to see how it organizes the information is the key to understanding what information is given.

Sample:

1. On the basis of the information in Figure 1, which of the following must be true?

A. The Paleozoic Era was longer than the Azoic and Archeozoic Eras combined.

B. The Proterozoic Era was shorter than the Azoic Era.

C. The Mesozoic Era was shorter than the Proterozoic Era.

D. The Paleozoic Era was longer than the Mesozoic Era.

Figure 1 shows that the Paleozoic Era began 600 million years ago and lasted until the Mesozoic Era, which began 225 million years ago. So the Paleozoic Era was 375 million years long (600 – 225). The Mesozoic Era lasted until the Cenozoic Era, which began 65 million years ago. So the Mesozoic Era lasted 160 million years (225 – 65). Therefore the Paleozoic Era must have been longer than the Mesozoic Era, and choice **D** is the correct answer. Note that you're not given enough information about the Azoic, Archeozoic, or Proterozoic Eras to make any comparisons between or determinations concerning their lengths.

Don't memorize the information; refer back to the tables or figures. Since you're allowed to look back at the information given, don't attempt to memorize the information. Instead, notice how many tables or figures there are, what each one refers to, and which one you should focus on for a particular question.

Sample:

2. The Mesozoic Era was known as the Age of Reptiles. Based on the information in Table 1 and Table 2, all of the following could be true about this era EXCEPT:

F. during the Jurassic Period, dinosaurs reached their largest size.
G. dinosaurs first appeared in the Triassic Period.
H. dinosaurs died at the end of the Cretaceous Period.
J. reptiles first appeared at the beginning of the Triassic Period.

First notice that you should focus on Table 1 and Table 2. Don't memorize the information in the tables, simply refer to it. Also, be sure to underline or circle the word *EXCEPT* to make sure that you answer the right question. Table 2, which gives information on the Mesozoic Era, doesn't mention reptiles as a group (only the dinosaurs). Table 1, however, does tell you that early reptiles first appeared toward the latter part of the Paleozoic Era. So they couldn't have first appeared in the Mesozoic Era. Choice **J** is the correct answer.

Perform basic calculations, when needed, using the information. Although you may not use a calculator on this section, you will sometimes need to do basic calculations. Such calculations shouldn't be extensive.

Sample:

3. Based on the information in Table 1, oysters could have appeared approximately how many millions of years before snakes?

A. 35
B. 65
C. 135
D. 255

The total number of years between mollusks (oysters) and early reptiles (snakes) was approximately 135 million years (30 + 60 + 35 = 125). The number 125 is only a possibility rather than a certainty because the oysters could have developed up to 45 million years earlier, and the snakes could have developed up to 35 million years later. But the only answer in the range of 125 million to 205 million is choice **C,** 135 million.

Reason from the information given. Since this is a test of science reasoning ability, you should be able to make logical connections and deductions from the information.

Sample:

4. The Mississippian and Pennsylvanian Periods are often called the Carboniferous Period. Using the information given, which one of the following could be a possible reason for the name "Carboniferous"?

F. Great coal deposits were formed.
G. Fruits and grasses developed.
H. Seed plants produced carbon as they died.
J. Dinosaurs gave off carbon dioxide.

By a process of elimination you could reason that the period was named the Carboniferous Period because great coal deposits were formed. Choice **F** is the correct answer. Choices **G, H,** and **J** all refer to developments of life *after* the Mississippian and Pennsylvanian Periods.

Look for obvious large changes (high points, low points, trends, large numbers, small numbers, and so forth). Usually "obvious" items are easy to spot, but sometimes they take a more careful second look before they become apparent.

Sample:

5. Prior to the Quaternary Period, the period of the shortest duration produced the first air-breathing animal. According to the information given, which of the following could be the name of this animal?

A. Turtle
B. Frog
C. Trilobite
D. Eurypterid

First, look for the shortest period prior to the Quaternary Period. To find it will take a second look through all three tables, which will identify the period as the Silurian (Table 1). Only eurypterids, choice **D,** are listed as developing at this time and are therefore the only possible choice as the first air-breathing animals.

Work with the information given. Sometimes, approximating can make the work easier, especially if the question asks for an approximation or if the answers are far apart.

Sample:

6. Modern humans appeared about how many millions of years after the first dinosaurs appeared?

F. 115
G. 170
H. 220
J. 260

The question asks "*about* how many millions of years." Noticing how much room you have between the choices will help you determine how accurate you should be. Since dinosaurs first developed in the Triassic Period, which was followed by the Jurassic, Cretaceous, and Tertiary Periods, all came before modern humans first appeared, which was about 200 million years (choice **H**) (45 + 50 + 65 + 63 = 223).

Draw conclusions, form hypotheses, and make predictions. Focusing on the question and any new information given will help you use your reasoning ability.

Sample:

7. Near the end of the Pleistocene Epoch, mammoths and woolly rhinos became extinct, yet other large mammals of the time, such as whales and elephants, are living today. Which of the following is the most logical reason that mammoths and woolly rhinos became extinct nearly 2 million years ago?

A. Shortage of food for larger animals
B. Inability to adapt to changing conditions
C. Inability to withstand cold temperatures
D. Aggression of natural enemies

Given the choices, the most logical is the inability to adapt to changing conditions. Choice **B** is the correct answer. Since other large animals, some that are known to have survived, would also have been subject to shortage of food, choice **A,** and cold temperatures, choice **C,** those two answers are not logical. There is no information on which to evaluate the aggression of natural enemies, choice **D.**