

ACT: Science

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MISSISSIPPI
DEPARTMENT OF
EDUCATION



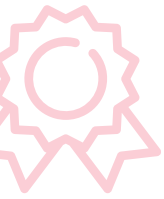
VISION

To create a world-class educational system that gives students the knowledge and skills to be successful in college and the workforce, and to flourish as parents and citizens



MISSION

To provide leadership through the development of policy and accountability systems so that all students are prepared to compete in the global community



1

ALL Students Proficient and Showing Growth in All Assessed Areas



2

EVERY Student Graduates from High School and is Ready for College and Career



3

EVERY Child Has Access to a High-Quality Early Childhood Program

EVERY School Has Effective Teachers and Leaders

4



EVERY Community Effectively Uses a World-Class Data System to Improve Student Outcomes

5



EVERY School and District is Rated “C” or Higher

6



About the Test

Numbers & Timing

Content

Passage & Question Types



- 40 questions total
- 6-7 passages
- 35 minutes to read passages and answer questions
- ACT recommends 2 minutes per passage and 30 seconds per question.



- Science content of the passages comes from Biology, Earth & Space Science, Chemistry, and Physics.
- The section is designed to test student ability to reason from data rather than draw from preexisting knowledge.
- The most important factor for success is ability to recognize patterns of data presented in graphic format and to interpret questions logically from the patterns you see in those instruments.

Presents information in three formats:

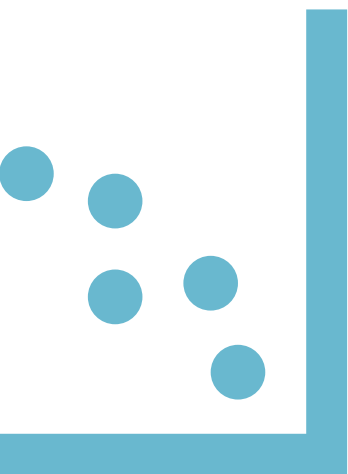
- Data Representation
- Research Summaries
- Conflicting View Points



- Passages do not appear in any particular order.
- All of the passages will contain data either represented through charts/graphs or through a paragraph.
- While there is no standard appearance for each type of passage, information is usually presented through data and explication.



- Presents graphic and tabular material similar to that found in science journals and texts.
- Makes up 25-35% of the test
- These questions measure skills such as:
 - Graph reading
 - Interpretation of scatterplots
 - Interpretation of information presented in tables
- **These passages are all about charts & graphs and how to understand and interpret data from them.**





- Provides descriptions/results of one or more related experiments
- Makes up 45-60% of the test
- The questions focus upon the design of experiments and the interpretation of experimental results.
- Think of these types of summaries as data representation placed in the context of an experiment.

- Two or more possible explanations that are inconsistent with one another, because they are based on differing premises or incomplete data
- Makes up 15-20% of the test
- The questions focus upon the understanding, analysis, and comparison of alternative viewpoints or hypotheses.
- In order to effectively answer the questions, test takers must understand the differences between the two theories presented.

Find the Answer/Read the Chart - Easy

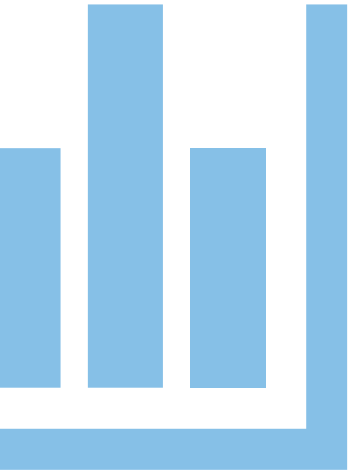
Analysis/Use the Chart - Medium

Generalize/Compare/Handle the Graphs - Hard

Take the Next Step



- These are the easiest questions that ask you to simply find information from the chart/graph/experiment
- These questions can be answered quickly.
- These questions will NOT try to trick you.
- These are like detail questions in the reading section with one big difference: you have a chart.



- These are the medium questions that ask you for one-step analysis utilizing the information from the passage and/or the charts/graphs
- These questions might ask you to use the information on the chart to find or derive some new data not found on the chart.
- These may point you to a graphic or passage information
- Answers will have direct support from the passage



- These are hard questions that ask you to draw general conclusions and draw comparisons between charts/scientists/experiments
- These will most likely appear on the conflicting viewpoints and research summary passages
- These questions often start with “What if.....” or “Compare/contrast...”
- In these questions, you will either have to translate numbers from the graphs into words or words into a chart.



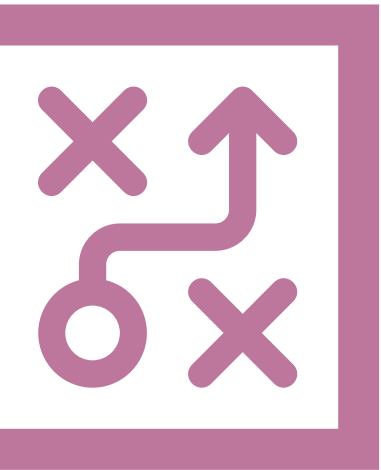
- These questions require that you understand what the next step might be in research.
- You will be provided with a goal for the question or experiment in question.
- You will need to decide what the next step should be.
- These are very much like the main idea/big picture questions from the reading portion; they require that you know what the big picture of the entire passage/experiment is.

Strategies

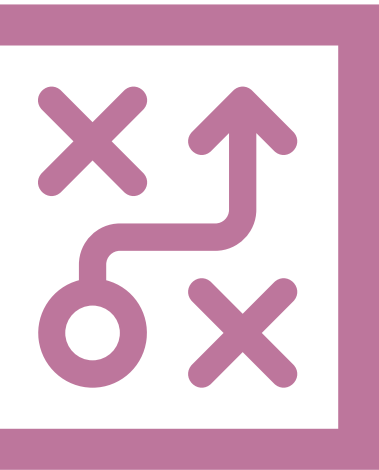
- The Science portion of the ACT is very similar to the Reading section, but with different passage content.
- Because the questions are preceded by passages and charts, many of the same strategies can be used on this test.
- Most of the strategies present here will focus on reading comprehension.



- These questions are considered the easiest passages because they contain the least text and the most graphics.
- Skim these passages and focus on what each graphic represents. You can get an idea about how to reason without knowing what the information means!



1. Read or skim the introductory text.
2. Look at the table, diagram or graph – quickly identify what is being displayed.
3. Look at the columns and rows; focus on what the axes represent and determine how they are related to one another.
4. Note the units of measure.



5. Look for trends in the data, noting any significant shifts.
6. Go to the questions and refer to the appropriate graphic to answer the question.
7. Rule out answers as necessary – use the process of elimination!
8. Answer the questions in the easy to hard order to save time.



- Skim the represented data, then carefully read the question(s) and return to the tables, charts, or graphs to find the necessary information.
- Underline or circle key words and points of information. This makes referencing the graphics easier and quicker when actually answering the question.
- If data is in the form of a graph or chart, pay close attention to the scale, the units of measure, the legend, and any noted information.
- Pay attention to trends in graphs – identify relationships quickly (direct, inverse, etc.) and trends in charts

Technical language used in specific fields of study; typically, jargon is fancy sounding words for simple concepts.

- One of the most difficult aspects of this test is the language. Many students get bogged down and focus too much on the terms they *don't* know.
- There are two ways to get around jargon:
 - Simply understand that it is just fluffy language and move past it
 - Take as many practice tests, read scientific articles, and practice





- Similar to skimming; you should read through the passage quickly and gain a general understanding of what is going on in the passage.
- For Data Representations and Research Summaries, start with the charts and the graphs and define what the variables and factors are in the study.
- Remember: this is timed, so you cannot spend too much time on reading the passages.
- If you get too bogged down in reading, you won't have enough time answer questions.

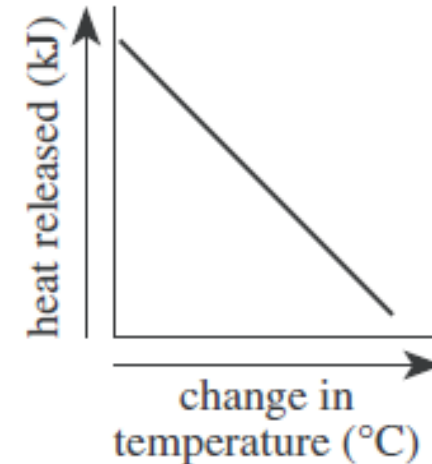
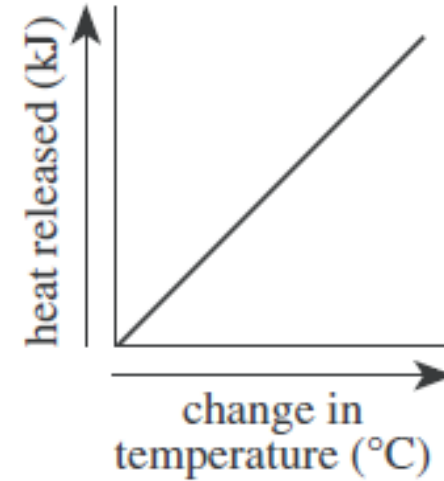


- As you read through, take notes and ask yourself questions to better understand the information.
- Very similar to mapping the passage from Reading section
- Questions you should be asking yourself:
 - What is being tested?
 - Why is it being tested?
 - What are the variables?
 - What are the factors that stay the same?

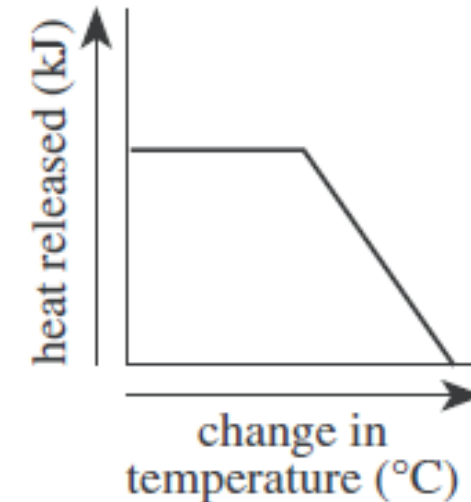
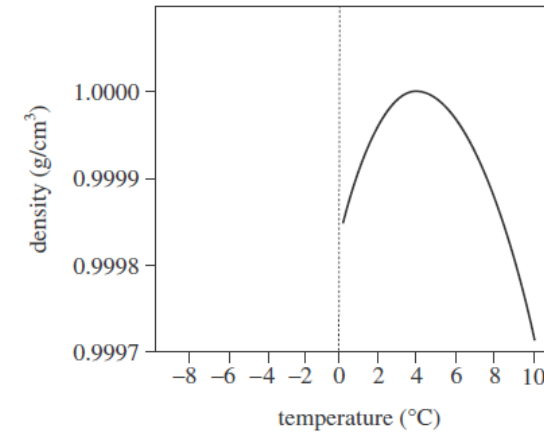
Tips & Tricks

Working with tables, charts, and/or graphs

- Direct – when one variable increases, the other increases (*positive slope*)
- Inverse – when one variable increases, the other decreases (*negative slope*)



- Neither Direct or Indirect No trend can be concluded from this data
- Mixed trends –increase in temperature (heat is constant) then heat decreases when temp reaches a certain point



Scatterplots may look confusing, but there may be a trend present.

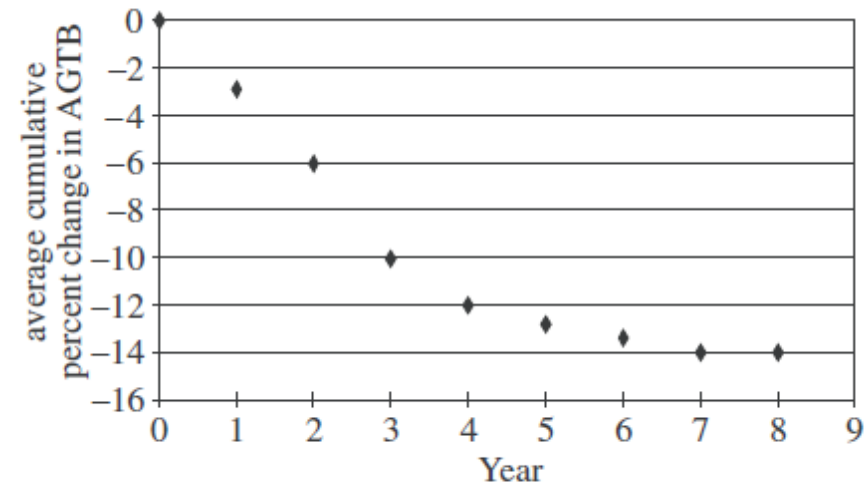
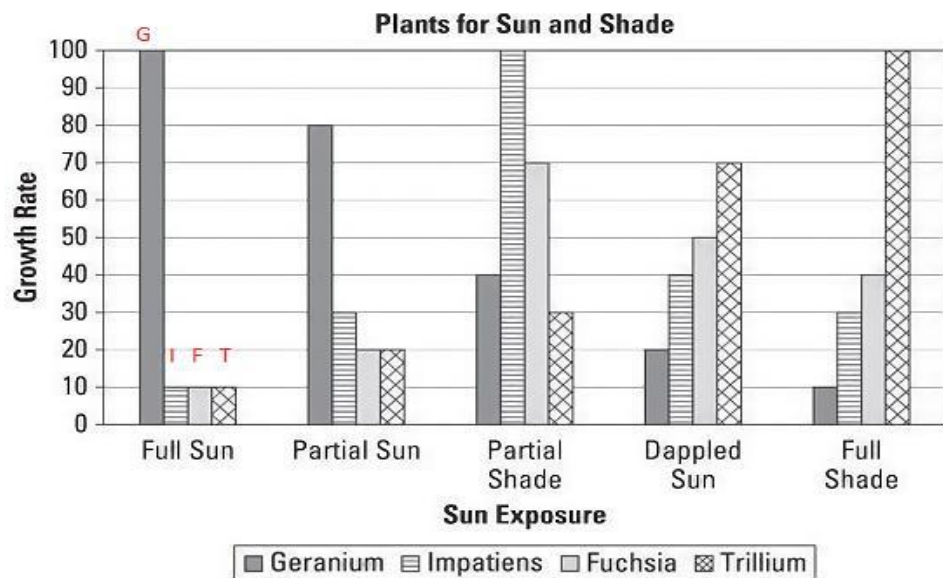


Figure 2

This could be considered an inverse relationship trend from year one to year seven – when in doubt draw a “best fit” line on the graphic to see if there is a trend.

Note: Do not spend time worrying about terms like AGTB (see y axis label) in passages and questions – just analyze data and answer the question.



- Usually the simplest to analyze
- Read carefully and make sure you look at the key to figures!

Note: You can also label the graphics for speedy analysis. See G, I, F, T on bars showing the plants.

Data in tables may be straight forward and easy to analyze, or it may be mixed causing the student to rearrange. See the example below.

Table 1			
Food	Mass (g)	Change in water temperature (°C)	Heat released (kJ)
Bread	1.0	8.3	10.0
Cheese	1.0	14.1	17.0
Egg	1.0	5.6	6.7
Potato	1.0	2.7	3.2

Table 1 adapted from American Chemical Society, *ChemCom: Chemistry in the Community*. ©1993 by American Chemical Society.

Note: This data is not arranged in increasing or decreasing order. This makes this table hard to analyze when answering a question about this table. The student could note this beside this graphic when skimming the passage. If a question is asked about Table 1, the student will know extra work may be needed.

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If the heat released or change in temperature is the only data observed, there is no correct answer due to the way the data is presented. (The data are not listed in order.) This would lead the student to possibly choose the incorrect answer. The student will have to rearrange the data by the increasing change in temperature (potato, egg, bread, cheese). The answer will be B (direct relationship) because as the water temp increases the heat released increases.

21. Which of the following graphs best illustrates the relationship between the heat released by the foods listed in Table 1 and the change in water temperature?

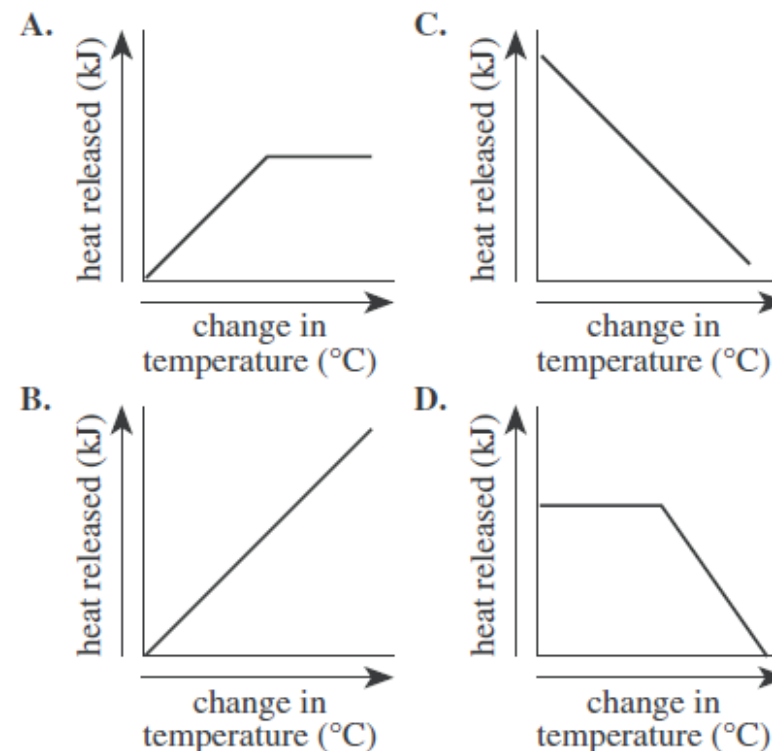


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Potato	1.0	2.7	3.2

Table 2	
Amount of sucrose (g)	Heat released (kJ)
0.1	1.6
0.5	8.0
1.0	16.0
2.0	32.1
4.0	64.0

20. According to Tables 1 and 2, as the mass of successive sucrose samples increased, the change in the water temperature produced when the sample was burned most likely:

- F. increased only.
- G. decreased only.
- H. increased, then decreased.
- J. remained the same.

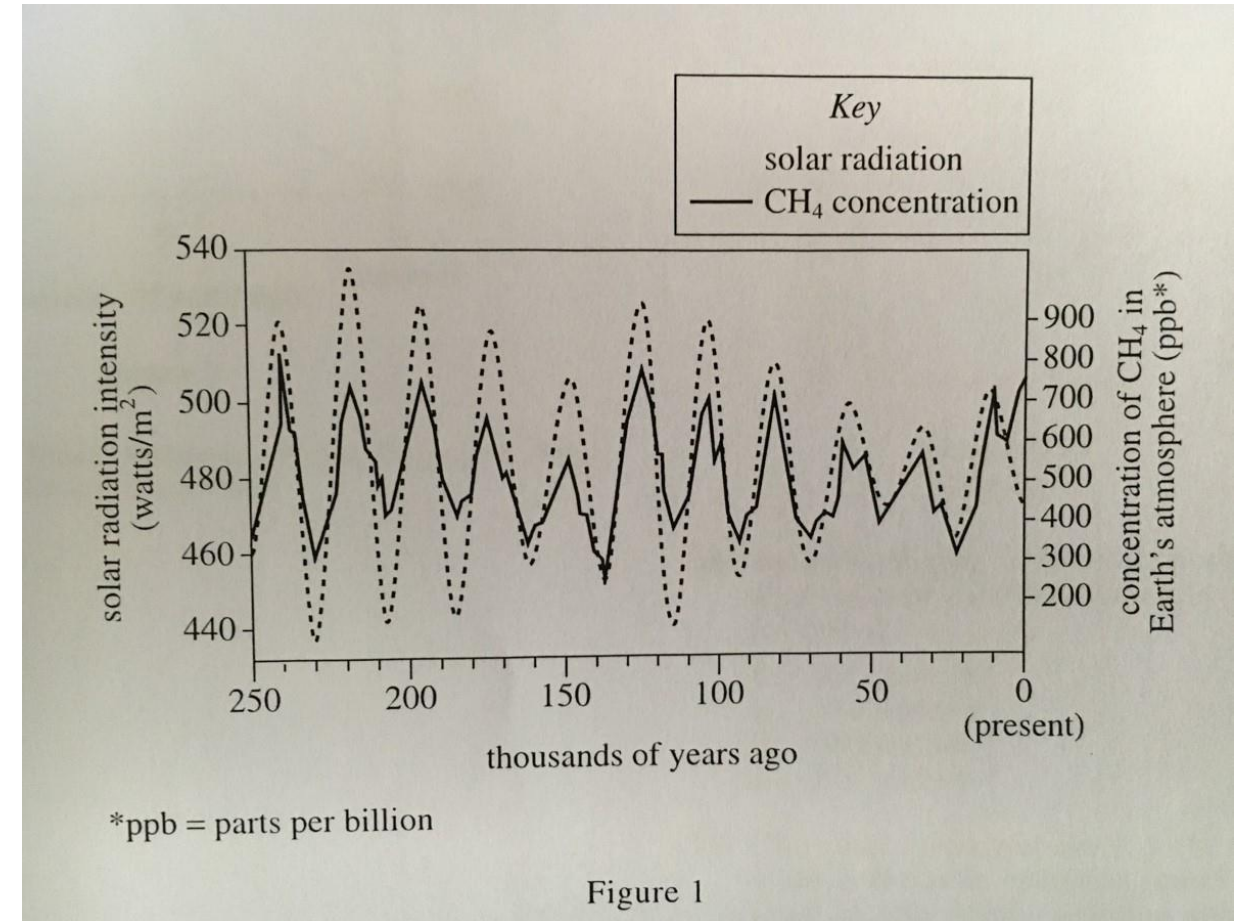
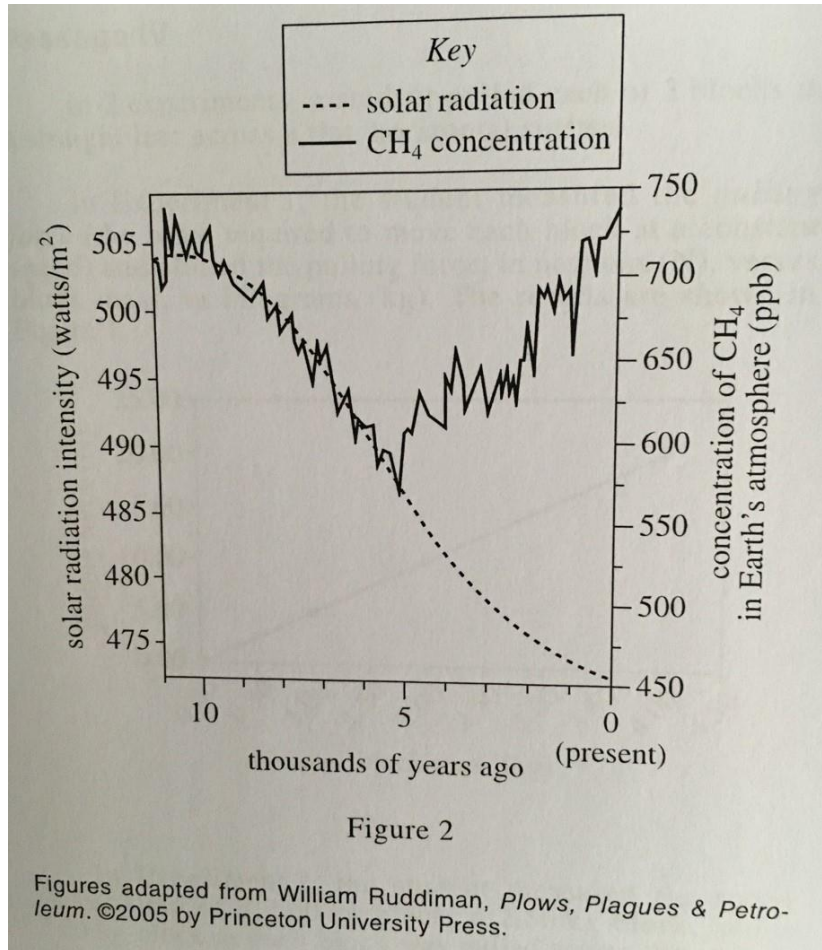
Note the question says “According to Tables 1 and 2...”, but the question asks about sucrose which is NOT found in Table 1. Sometimes questions are asked so the student can demonstrate that they know how to locate information needed to answer the question accurately. Students should not spend time wondering why sucrose is not in Table 1 but focus on Table 2. Table 2 data is arranged “in order” of increasing mass so the increasing trend is easily spotted – Correct answer is A.

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Food	Mass (g)	Change in water temperature (°C)	Heat released (kJ)
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23. Which of the following lists the foods from Tables 1 and 2 in increasing order of the amount of heat released per gram of food?
- A. Potato, egg, bread, sucrose, cheese
 - B. Sucrose, cheese, bread, egg, potato
 - C. Bread, cheese, egg, potato, sucrose
 - D. Sucrose, potato, egg, bread, cheese

This question asks about all of the substances in both Tables 1 and 2 in increasing order of heat released. Sucrose will have to be placed into Table 1 – but which amount? If you notice the mass of all substances in Table 1 is 1.0 g then the third sucrose amount in Table 2 should be added between bread and cheese. By rearranging the order in increasing heat in a previous question, the increasing order of heat is potato, egg, bread, sucrose, cheese. Option A is the correct answer.





- Always make sure you understand what the question is asking and look for the relationships and trends.
- Based on the question information, decide which figure or table should be analyzed. Make sure you are using the right data!
- Make notes or drawings at each step as needed.
- Use process of elimination.
- Double-check your work if you have time.



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