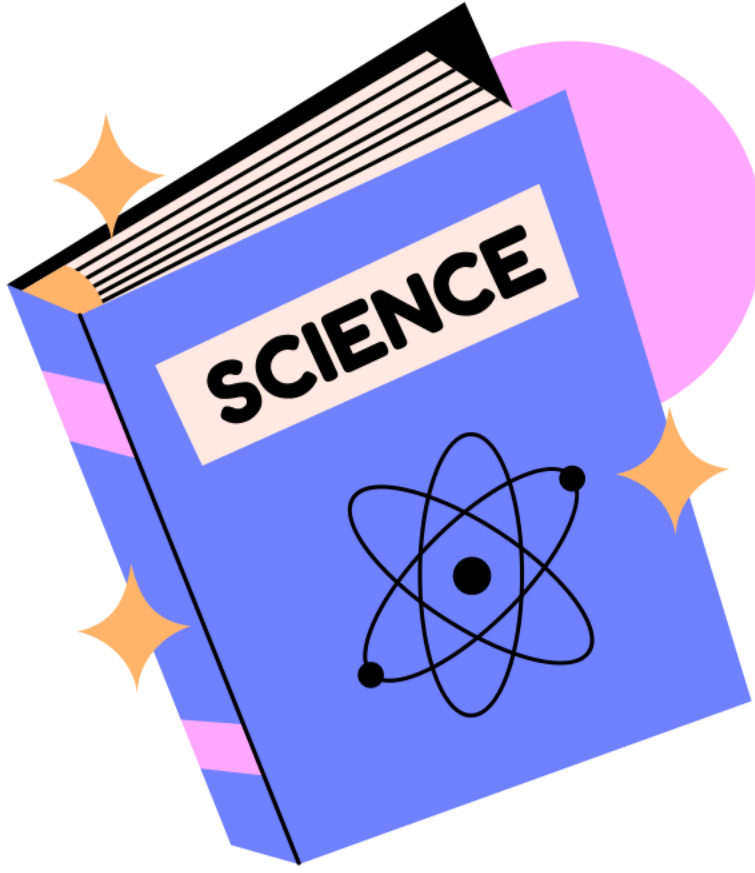
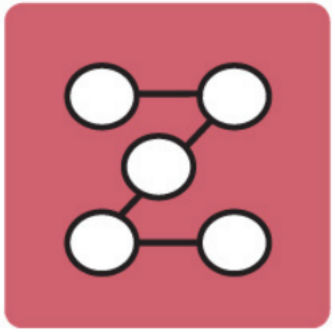
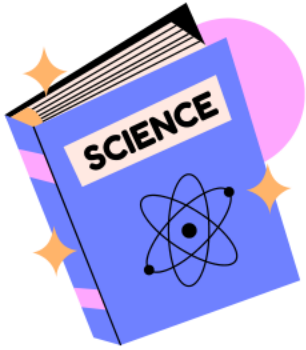
Depth and Complexity



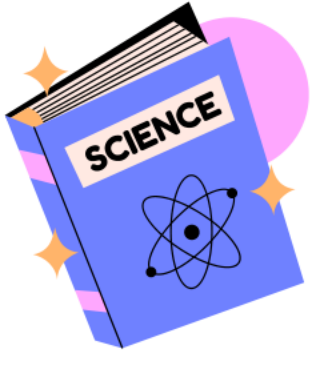
Patterns





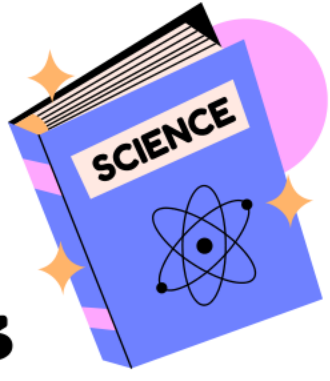
1. Explain any cycles that are present.
2. Identify a cause and effect relationship related and explain its importance.
3. Find a pattern presented. What details are related to this pattern?
4. What experiment could you conduct that would replicate the results or the conclusions?
5. How does a pattern presented compare to a pattern observed in another area of science?
6. How might the information presented lead to future research and/or scientific discovery?
7. How do the patterns observed in this study contribute to our understanding of natural phenomena?
8. In what ways do these patterns help predict future events or behaviors within this scientific field?
9. Can you identify any patterns that seem to contradict common understanding or previous scientific findings? What might this suggest?
10. How do these patterns contribute to the development of new technologies or methodologies within this field?

Big Idea



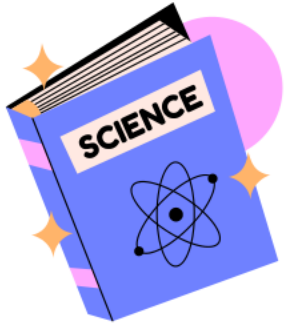
1. Explain a law, theory, or principle that is related.
2. Make a conclusion based on repeating or reoccurring information.
3. What is the “Big Idea” of this topic and what is evidence that supports this?
4. What information helps you understand change? What is the scientific explanation of this change?
5. How did a pattern, trend, or rule inform you of the “Big Idea”?
6. How does this scientific principle or law demonstrate the interconnectedness of various scientific disciplines (e.g., physics, chemistry, biology)?
7. What opposing viewpoints or controversies exist around this "Big Idea," and how do they contribute to its development or understanding?
8. How does the "Big Idea" you've identified help solve a real-world problem or address a global challenge?
9. Can you propose a future line of inquiry or research question that stems from the "Big Idea" and how it might advance the field?
10. What experiments or observations are crucial for supporting the "Big Idea," and why are they considered so pivotal?

Details



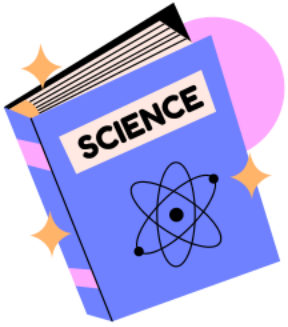
1. What details are more important than others? Justify your choices.
2. What details do you think are missing and why?
3. Find two important details and explain how they relate to each other.
4. What details are unclear or do not make sense? Explain what confuses you about them.
5. What details could be omitted without affecting the “Big Idea?” Explain your choices?
6. How do specific details support or contradict the main hypothesis or theory being investigated?
7. Identify a detail that has a significant impact on the outcome of an experiment. Why is this detail critical?
8. How does the omission of certain details affect the replicability of an experiment or the validity of a study's conclusions?
9. How do details related to sample size, control variables, or experimental conditions influence the interpretation of data?
10. Discuss a detail that might seem minor but has far-reaching implications for understanding a complex scientific concept.

Across Disciplines



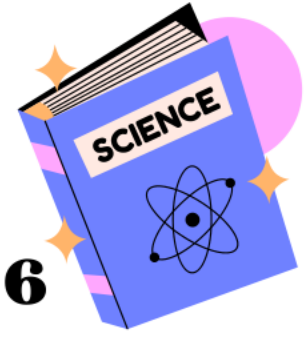
1. How does an element/idea relate or connect to Math/Social Studies/ELA/Music/Art? Provide an example.
2. How might information benefit other disciplinarians (writers, historians, mathematicians, etc.)?
3. If you conducted an experiment based on a concept from this reading selection, how could you communicate your findings? Be specific.
4. How can these principles of physics be applied to understand the structural integrity in architecture and engineering design?
5. Explore how this biological concept can provide insights into character development or thematic elements in literature.
6. Can you identify a scientific concept that has been used to solve a complex problem in computer science or technology? Provide details.
7. How does the scientific method parallel the process of critical analysis used in literary studies or historical research?
8. How could a scientist effectively use storytelling or narrative techniques to communicate this complex scientific ideas to a non-scientific audience?
9. Discuss how the concept of cause and effect, fundamental to scientific reasoning, can be applied to understanding historical events and their impacts in social studies.
10. How could the ethical considerations in scientific research inform discussions about morality and ethics in philosophy or religious studies?

Trends



1. How could one of these concept influence your peer group?
2. How does this remind you of a current event?
3. Identify a trend and explain how it originated.
4. How could these findings influence future scientific research?
5. How does this connect to a technological or medical advancement?
6. Discuss how a societal trend might influence the direction or focus of scientific research in this topic and funding priorities.
7. Identify a trend in the application of artificial intelligence and what implications does this have for future research in this field?
8. Identify a trend within the topic you're studying. How has this trend evolved over time, and what factors have contributed to its development?
9. Based on what you've learned, what do you predict could be the next major shift or trend in this area? What evidence supports your prediction?
10. How do international or cross-cultural perspectives contribute to trends in this area of science?

Ethics

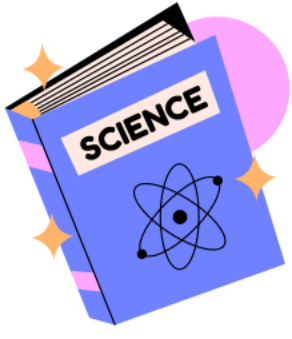


1. What are current or previous controversial issues related to this topic?
2. How might two scientists differ about this topic or findings?
3. If you were to conduct an experiment based on this topic, what biases would you need to avoid to prevent flawed data?
4. What dilemmas do you think scientists had to face when studying this topic?
5. What information could affect your decision-making abilities regarding ethical issues?
6. How could the scientific findings be used in a negative, dangerous, or damaging way?
7. Imagine planning a study in this field. What ethical guidelines would you establish to ensure the integrity and fairness of your research?
8. Reflect on historical experiments or studies in this area. What ethical issues were overlooked, and what lessons have been learned since then?
9. How do personal values and societal norms potentially conflict with scientific inquiry in this area? Provide examples where this might occur.
10. How might advancements in this area challenge existing ethical frameworks or laws? Consider both current and future scenarios.

Over Time

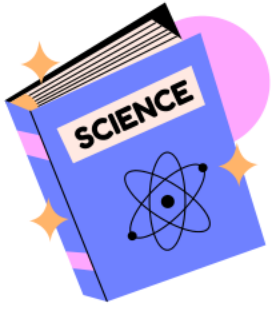
1. Find evidence from this reading selection that differentiates between fact and opinion?
2. What impact might a concept or idea in this topic have on the future?
3. Describe the effect that time might have on this topic or data?
4. Investigate and discuss historical models or explanations that were once accepted in this field but have since been revised or replaced. What led to their obsolescence?
5. How have “tools” that scientists use for this science domain changed over time?
6. Reflect on how perceptions or understandings of this topic might shift with time. What factors could contribute to such changes?
7. Analyze how the introduction of new materials or techniques has transformed experimental approaches in this field throughout history.
8. Consider the role of archival data or historical experiments in shaping current understanding in this area. How do scientists build upon or reinterpret past findings?
9. Explore the long-term implications of a current theory or discovery in this field. How might it shape future scientific inquiry or societal changes?
10. What potential future developments or changes can be anticipated in this field based on current trends and past advancements?

Unanswered Questions



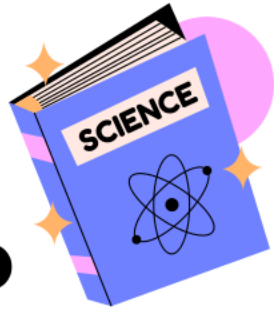
1. What experiment would you like to conduct relating to this topic? What would you expect to learn from it?
2. What evidence or data is used to prove validity? If there is an absence of evidence presented, what should have been included?
3. What areas related to the information need further exploration?
4. What unintended outcomes or discoveries result from scientists researching this topic?
5. Propose an experiment you would undertake to explore an aspect of this topic not fully covered in your current studies. What hypothesis would you test, and what outcomes would you predict?
6. Critically evaluate the evidence provided to support the claims or findings discussed. If evidence is lacking, what type of data would strengthen the argument or conclusion?
7. Identify a piece of information or data point you feel is missing from the discussion. Why is this piece critical, and how could its inclusion alter your understanding of the topic?
8. Discuss areas within this topic that require deeper investigation. What specific questions remain unanswered, and why are they significant?
9. How do existing theories or models fail to fully explain observations or phenomena related to this topic? What are the gaps or inconsistencies that need to be addressed?
10. What are the limitations of current research methods in fully exploring this topic, and how might future innovations overcome these challenges?

Multiple Perspectives



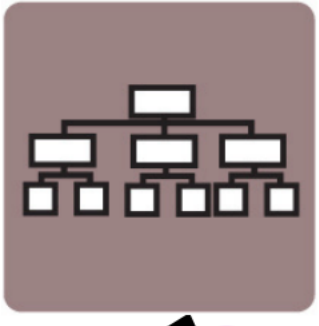
1. How could an idea, concept, or data, event from this topic be interpreted in two different ways?
2. Consider a set of data related to this topic. What are some alternative ways it could be visualized (e.g., graphs, charts, infographics), and how might each visualization highlight different aspects of the data?
3. How might two experts' perspective regarding this information differ from each other? Specify what type of experts they are.
4. Contrast your opinion of this topic with the opinion of a classmate, teacher, parent or scientist. Make sure to state their opinion as well.
5. Identify a controversial aspect of this topic. How might it be viewed differently by a scientist in the field versus a layperson with a general interest?
6. In what ways can data from an experiment be presented to highlight different conclusions or aspects of the research? Discuss at least two methods of presentation.
7. Imagine two experts in different fields looking at the same set of data or information. How could their interpretations differ based on their expertise?
8. How could cultural or societal perspectives influence the interpretation of scientific findings? Provide a hypothetical example.
9. How could the presentation of scientific information (e.g., through media, academic papers, educational materials) affect the understanding or reception of that information by different audiences?
10. What role do personal biases play in interpreting scientific data? Discuss how two individuals might view the same data through different bias lenses.

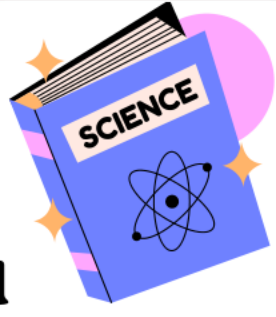
Language of Discipline



1. What words or phrases in this reading stand out to you? Explain your reasoning.
2. Identify and define three key terms that are essential to understanding the current topic you're studying. How do these terms specifically contribute to your comprehension of the subject?
3. How does the specialized vocabulary of this scientific field differ from everyday language, and why is this precision necessary?
4. Choose a complex concept from your studies. Can you explain it using both the technical language of the discipline and in layman's terms?
5. What role do symbols, formulas, or diagrams play in communicating concepts within this scientific discipline? Provide an example of how one of these is used.
6. Reflect on a misunderstanding or misconception you had about this topic. How did a deeper understanding of the discipline's language help clarify this confusion?
7. How might the language and terminology used in this field of science evolve over time? Consider the impact of new discoveries or technologies.
8. Discuss the importance of precision and accuracy in the language of science. Can you give an example where a lack of precision could lead to misunderstanding or error?
9. In what ways do experts in this field ensure that their use of language remains consistent, and why is this consistency important for the advancement of knowledge?
10. Consider the challenges of translating scientific terminology into different languages or for different cultural contexts. What strategies might be employed to overcome these challenges?

Rules





1. What evidence can you find that supports or refutes the information presented within this reading selection? How do you know if this evidence is reliable?
2. How do you think that the scientists that researched thus collected and organized data?
3. What fundamental rules or laws underpin the scientific topic you are currently studying, and how do these rules shape our understanding of the topic?
4. How do the established rules of this scientific discipline help predict outcomes or behaviors within its realm of study?
5. Identify a rule within your current area of science. Discuss an instance where this rule might not apply, and explore why that is the case.
6. In what ways do the rules of this field of science intersect with or differ from those in another field? Provide examples to illustrate these intersections or differences.
7. Consider how the development of new technologies or methodologies might challenge existing rules or laws in this discipline. Can you think of any recent examples?
8. Explore the historical context in which a key rule or law of this discipline was discovered. What impact did this discovery have on the field?
9. How might understanding the rules of this scientific discipline empower individuals or societies to make informed decisions or innovations?
10. Reflect on the ethical implications of the rules in your area of study. How do these rules guide ethical conduct in research and application?