

Learning Critical Thinking Through Astronomy:
Taking Your First Steps

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STUDENT NOTE

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Questions

Someone says to you, “I believe that two plus two equals five. I will sue you unless you adopt my belief. ” How would you respond?

Materials Needed

For this activity, you will need the following materials:

- a document to analyze, provided by your instructor
- a pencil (do not use ink)
- the ability to read and follow directions

Points To Remember

Unless otherwise explicitly instructed, your responses must not contain personal opinions. All of your responses must be in the form of complete sentences; the fewer sentences the better. Spelling and grammar must be correct. Effective communication is essential for both learning and doing science.

Don't ask instructors for answers to questions posed in activities; you won't get them. You may ask questions regarding the clarity of the instructions or the soundness of your reasoning. If you encounter a word you are not familiar with, don't ask the instructor about it. Look it up first in your glossary and then a dictionary or some other source if necessary. Ensure that all definitions are unanimously agreed upon before proceeding. There are, of course, sound reasons for these policies. See the instructor if you have questions, but do not complain about these policies. They are not negotiable.

1 How To Detect Arguments

Here is a general strategy for determining whether a written passage contains arguments or something else trying to pass for arguments.

- underline the premise and conclusion indicator words (your instructor will fill you in about these)
- number the statements, and only the statements (again, your instructor will provide details)
- circle the sentence containing the conclusion
- strike through unneeded information
- if the passage contains an argument, you should be left with a conclusion and all of its supporting premises
- if the passage does not contain an argument, you should have nothing left

1.1 Practice

Here is a passage on which to practice this strategy. Try it now within your groups.

“There is no question in my mind. I therefore maintain that Colonel Mustard is the murderer. Because if he did it, he would probably have blood stains on the sleeve of his shirt. The blood stains are tiny, but they are there. Any observant person could see them. Also the murder weapon was within the colonel’s reach for quite a while before the crime was committed. And since of all the people in the house at the time he alone does not have an airtight alibi, he must be the killer.”

1. If this passage contains an argument, list the argument’s premises and conclusion (in that order).
2. If this passage does not contain an argument, discuss the author’s motive for writing it.

1.2 More Practice

Here is a longer passage on which to practice.

“The famous trial lawyer Clarence Darrow (1857-1938) made a name for himself by using the “determinism defense” to get his clients acquitted of serious crimes. The crux of this approach is the idea that humans are not really responsible for anything they do because they cannot choose freely – they are “determined,” predestined, if you will, by nature (or God) to be the way they are. So in a sense, Darrow says, humans are like wind-up toys with no control over any action or decision. They have no free will. Remember that Darrow was a renowned agnostic who was skeptical of all religious claims. But Darrow is wrong about human free will for two reasons. First, in our moral life, our own commonsense experience suggests that sometimes people are free to make moral decisions. We should not abandon what our commonsense experience tells us without good reason – and Darrow has given us no good reason. Second, Darrow’s determinism is not confirmed by science, as he claims – but actually conflicts with science. Modern science says that there are many things (at the subatomic level of matter) that are not determined at all: They just happen.”

3. If this passage contains an argument, list the argument's premises and conclusion (in that order).

4. If this passage does not contain an argument, discuss the author's motive for writing it.

1.3 Even More Practice

Here is yet another passage on which to perfect the strategy.

"[Is] there scientific evidence that prayer really works? ... The problem with ... any so-called controlled experiment regarding prayer is that there can be no such thing as a controlled experiment concerning prayer. You can never divide people into groups that received prayer and those that did not. The main reason is that there is no way to know that someone did not receive prayer. How would anyone know that some distant relative was not praying for a member of the group ... identified as having received no prayer?" [Free Inquiry, Summer 1997]

5. If this passage contains an argument, list the argument's premises and conclusion (in that order).

6. If this passage does not contain an argument, discuss the author's motive for writing it.

1.4 Still More Practice

Here is one more passage on which to practice.

“My family and friends have season tickets for the Hickory Lobsters. The disrespect that is shown to America by this team is appalling, particularly in this time of war. As the national anthem is sung before each game, members of the team are hopping around, tugging at their uniforms, talking and carrying on amongst themselves. The players can’t even wait for the national anthem to finish before they run off to their respective field positions. Whether one is for or against the war is irrelevant. Have some respect for America and what it stands for.”
[Fictional letter to the editor, based on one from the Buffalo News website]

7. If this passage contains an argument, list the argument’s premises and conclusion (in that order).

8. If this passage does not contain an argument, discuss the author’s motive for writing it.

1.5 Application

9. Now that you’ve practiced, apply this same strategy to the document with which you began this activity. Record any argument, along with its premises and conclusion, in the space provided.

———— CHECKPOINT ————

2 Analyzing A Document

You do not know who authored the document you have. It could have been an individual or it could have been a group of individuals. For the purposes of this activity, these instructions will refer to a single author despite what you may eventually discover about the document's origins.

2.1 The Logic Of This Document

10. Read the entire document and map the document into the elements of purpose, point of view, implications, and assumptions.

2.2 Inquiry

11. The author makes numerous references to *design theory* and *intelligent design*. Assume that these two terms are synonymous. What **evidence** does the document provide that intelligent design is actually correct? Cite as many specific examples as you can find.
12. Read through relevant parts of the document again, but replace every occurrence of any mention of either *design* or *intelligent design* with *astrology*. Would you take the resulting document seriously? Defend your response.
13. Read through relevant parts of the document again, but replace every occurrence of any mention of either *design* or *intelligent design* with *the idea that two plus two equals five*. Would you take the resulting document seriously? Defend your response.
14. Read through relevant parts of the document again, but replace every occurrence of any mention of either *design* or *intelligent design* with *mathematics*. Would you take the resulting document seriously? Defend your response.

15. Read through relevant parts of the document again, but replace every occurrence of any mention of either *design* or *intelligent design* with *quantum mechanics*. Would you take the resulting document seriously? Defend your response.
16. Read through relevant parts of the document again, but replace every occurrence of any mention of either *design* or *intelligent design* with *extracalitrism*. Would you take the resulting document seriously? Defend your response.
17. A mathematics colleague invites you to participate in a debate. The topic to be debated is *two plus two equals five*. Would you participate? Defend your decision. Another way to think of this question is to ask yourself whether or not you could be persuaded that *two plus two equals five* given what you already know.
18. A mathematics colleague invites you to participate in a debate. The topic to be debated is *two plus two equals four*. Would you participate? Defend your decision. Another way to think of this question is to ask yourself whether or not you could be persuaded that *two plus two equals four* given what you already know.

19. Now suppose you are a *propagandist*. Your superiors have charged you with convincing the public that two plus two equals five. How would you go about promoting the idea that two plus two equals five? Cite any helpful tips found in this document.
20. Describe your thoughts and actions if you were to register for an astronomy course and on the first day, you discover the instructor is a lawyer, rather than an astronomer or physicist, with little or no science background.
21. Someone says to you, “I believe that two plus two equals five. I will sue you unless you adopt my belief.” How would you respond?

———— CHECKPOINT ————

22. Every activity will have at least one standard associated with it.

STANDARD

I can analyze a concept, passage, document, or any other conceptual unit by mapping it into the elements of thought.

3 Feedback

What could be done to make this activity more interesting? Please be honest.