Paideia Seminar Lesson Plan

Text: **from *The Meno* by Plato**

Grade/Subject HS / Math

Ideas, Values: Learning, Questioning, Thinking, Truth, Wisdom

Pre-Seminar Content

Launch Activity:

Display the following definition (from dictionary.com) of *Square Root* and have the students generate as many practical uses of the formula for Square Root as they can think of while a volunteer lists them on the board.

Square Root: A number that, when multiplied by itself, will result in a given number. The square root of four is two; the square root of one hundred is ten. Note: The square roots of many numbers, such as three, are irrational numbers.

Inspectional Read:

Distribute the text and have students examine it without reading it. Discuss with the class what sort of text this appears to be (dramatic, dialogic, etc.) and what they might expect to find in reading it. Stage a dramatic reading of the text (aloud) while all participants highlight unfamiliar words or phrases in their copies of the text.
Finally, have the participants number the actual exchanges in the text (1 – 73).

✦ Background Information:

Share as appropriate: Plato (428/427 B.C. – 348/347 B.C.) was a philosopher and mathematician in Classical Greece, and the founder of the Academy in Athens, the first institution of higher learning in the Western world. He is widely considered the most pivotal figure in the development of philosophy, especially the Western tradition. Unlike nearly all of his philosophical contemporaries, Plato's entire œuvre is believed to have survived intact for over 2,400 years.

Plato was the innovator of the dialogic and dialectic forms in philosophy, which originate with him.

✦ Vocabulary:

Have students identify the unfamiliar words or phrases that they highlighted during the *Inspectional Reading* of the text. List those words on the (interactive) white board. Add to the list any math vocabulary (such as *Square Root*) that you would like students to study and apply during this literacy cycle.

Ask students to work in small groups to define the terms clearly and concisely. Compile the definitions into a glossary for use during the seminar discussion and the writing process to follow.

✦ Analytical Read:

Have the participants read the dialogue again in groups of three. Direct them to choose roles and read the entire dialogue aloud in their groups. Then discuss with the entire class the dramatic roles of the three characters in the dialogue.

On the day of the seminar, provide the following diagram on the board for ready reference during the discussion. Also make markers, etc. available to students so that they can represent their thoughts graphically for the entire group if need be.
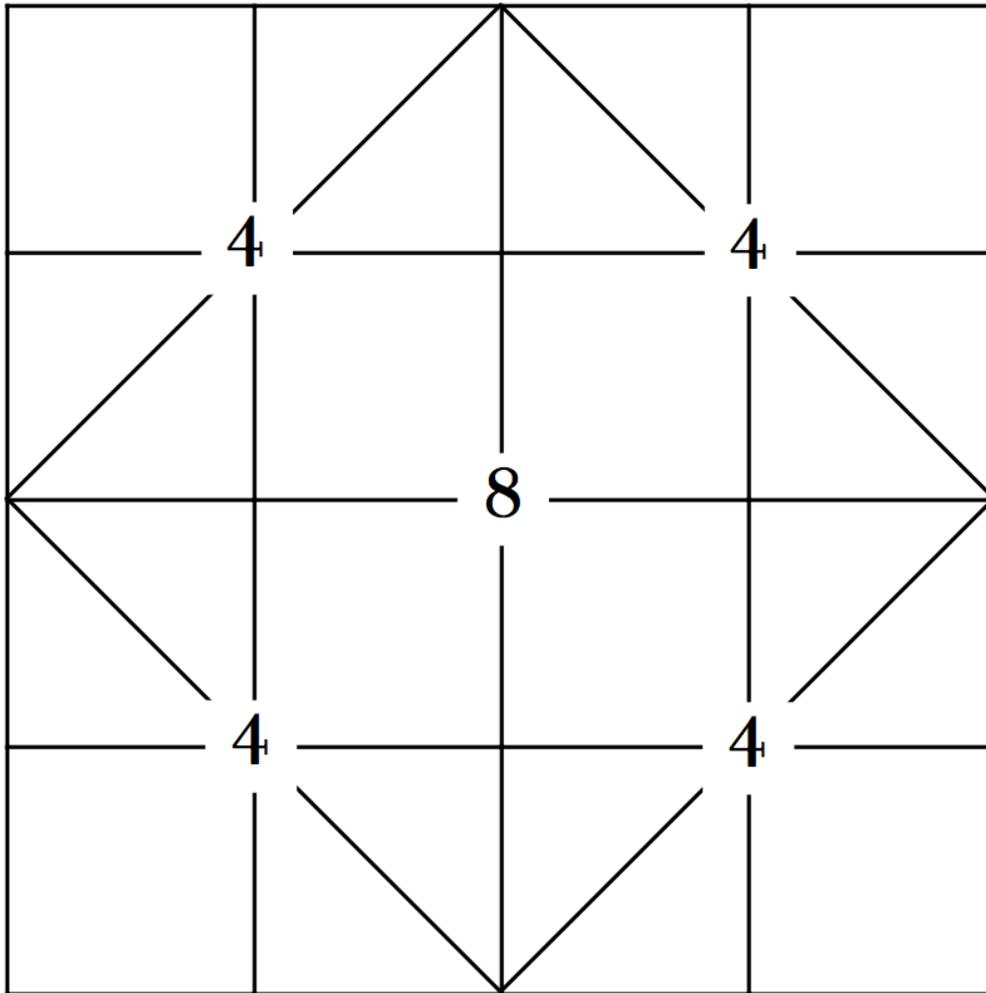
Pre-Seminar Process

◎ Define and state purpose for Paideia Seminar.

◎ Describe the responsibilities of facilitator and participants.

◎ Have participants set a Personal Goal.

⊚ Agree on a Group Goal.

Seminar Questions

Opening (Identify main ideas from the text.):

- ❖ What line in the dialogue holds the key to solving the problem presented by Socrates to the Boy? (discuss in pairs; round-robin reply from each pair)

- ❖ Why? (spontaneous discussion)

Core (Analyze textual details.):

- ❖ If you were the Boy in this dialogue, how would you respond to Socrates' last question? (Work with your partner to draft an initial answer.) Explain your strategy.

- ❖ Based on the text, do you think Socrates is interested in your thinking or only in your answer? Why?

- ❖ What section in this dialogue most clearly illustrates the relationship between numbers and shapes? How?

- ❖ Early in this exchange, Socrates to Meno and says of the Boy that "now he fancies that he knows how long a line is necessary in order to produce a figure of eight square feet; does he not?" Meno replies that he does but that he is mistaken. What does this passage suggest about learning math? About learning any subject?

- ❖ You and your partner are Boy in the dialogue: what is the answer to the problem? "Tell me exactly … and show me the line."

Closing (Personalize and apply the ideas.):

- ❖ Is discussion (like the one between Socrates and the Boy) a valuable way to learn something complex? Why or why not? Refer to the text.

Post-Seminar Process

⭐ Have participants do a written self-assessment of their personal participation goal.

⭐ Do a group assessment of the social and intellectual goals of seminar.

⭐ Note reminders for next seminar.

Post-Seminar Content

⭐ Transition to Writing:

Ask participants to write down everything they said, heard, and thought during the seminar about the nature of solving math problems. Then, before posting the writing task, explain that students are going to work in pairs to construct their responses.

⭐ Writing Task:

Is it more important that you understand a math problem or that you can find the correct answer? After reading and discussing this excerpt from *The Meno*, write a dialogue between two students or a teacher and a student in which you discuss which skill is more important and evaluate the two arguments. Base your dialogue on the excerpt from *The Meno*. (Argumentation/Evaluation)

(LDC Task#: 6)

⭐ Brainstorm:

Invite participants to talk in pairs for two minutes to share thoughts about what the writing task is asking. Discuss with them the complex nature of this task: that involves articulating both arguments in response to the original question—and then deciding on which answer they are most committed to—all in the form of a dialogue between two individuals.

Have the students vote by show of hands whether they think understanding the problem or finding the answer is more important. Create pairs out of the two groups of responses—pairing one student from group A with one from group B—and explain that the pairs will work together to write their dialogues.

⭐ Structure the Writing:

Distribute a simple T-Chart graphic organizer with the two columns labeled "Understand the Problem" and "Find the Answer." Then have each pair list as many arguments in support of both claims as they can. Encourage them to use all of these arguments in writing their dialogues.

⭐ First Draft:

Challenge all to draft their definition essays by listing key points about their effort to balance truth with tact. Refer to the original text in order to illustrate key points.

⭐ Collaborative Revision:

Have participants work in pairs to read their first drafts aloud to each other with emphasis on reader as creator and editor. Listener says back one point they heard clearly and asks one question for clarification. Switch roles. Give time for full revisions resulting in a second draft.

⭐ Edit:

Once the second draft is complete, have participants work in groups of three-four and this time take turns reading each other's second drafts slowly and silently, marking any spelling or grammar errors they find. (Have dictionaries and grammar handbooks available for reference.) Take this opportunity to clarify/reteach any specific grammar strategies you have identified your students needing. Give time for full revisions resulting in a third and final draft.

✦ Publish:

Schedule a Math Theater Festival, scheduled one evening when parents, teachers, and other students can attend. Have your students perform their dialogues as Readers' Theater in several rooms so that the audience has the chance to hear several different dialogues regardless of what room they are in. Then assemble the entire group, audience as well as student writers, to vote on which is more important: understanding or solution.

This Paideia Lesson Plan was created by:

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from *The Meno*

Based on the original translation of Benjamin Jowett, Oxford University Press

Socrates: Tell me, boy, do you know that a figure like this is a square?

Boy: I do.

Socrates: And you know that a square figure has these four lines equal?

Boy: Certainly.

Socrates: And these lines that I have drawn through the middle of the square are also equal?

Boy: Yes.

Socrates: A square may be of any size?

Boy: Certainly.

Socrates: And if one side of the figure be of two feet, and the other side be of two feet, how much will the whole be? Let me explain: if in one direction the space was of two feet, and in the other direction of one foot, the whole would be of two feet taken twice?

Boy: Yes.

Socrates: But since this side is also of two feet there are twice two feet?

Boy: There are.

Socrates: Then the square is twice two feet?

Boy: Yes.

Socrates: And how many are twice two feet? Count and tell me.
Boy: Four, Socrates.

Socrates: And might there not be another square twice as large as this, and having like this the lines equal?

Boy: Yes.

Socrates: And of how many feet will that be?

Boy: Of eight feet.

Socrates: And now try and tell me the length of the line that forms the side of that double square: this is two feet—what will that be?

Boy: Clearly, Socrates, it will be double.

Socrates: Do you observe, Meno, that I am not teaching the boy anything, but only asking him questions; and now he fancies that he knows how long a line is necessary in order to produce a figure of eight square feet; does he not?

Meno: Yes.

Socrates: And does he really know?

Meno: Certainly not.

Socrates: He only guesses that because the square is double, the line is double.

Meno: True.

Socrates: Observe him while he recalls the steps in regular order. Boy, tell me: do you assert that a double space comes from a double line? Remember that I am not speaking of an oblong, but of a figure equal every way, and twice the size of this— that is to say of eight feet; and I want to know whether you will say that a double square comes from a double line?

Boy: Yes.

Socrates: But does not this line become doubled if we add another such line here?

Boy: Yes.

Socrates: And four such lines will make a space containing eight feet?

Boy: Yes.

Socrates: Let us describe such a figure. Would you not say that this is the figure of eight feet?

Boy: Yes.

Socrates: And are there not these four divisions in the figure, each of which is equal to the figure of four feet?

Boy: True.

Socrates: And is not that four times four?

Boy: Certainly.

Socrates: And four times is not double?

Boy: No, indeed.

Socrates: But how much?

Boy: Four times as much.

Socrates: Therefore the double line, boy, has given a space, not twice, but four times as much.

Boy: True.

Socrates: Four times four are sixteen—are they not?
Boy: Yes.

Socrates: What line would give you a space of eight feet, as this gives one of sixteen feet—do you understand the question?

Boy: Yes.

Socrates: And the space of four feet is made from this half line?

Boy: Yes.

Socrates Good. And is not a space of eight feet twice the size of this, and half the size of the other?

Boy: Certainly.

Socrates: Such a space, then will be made out of a line greater than this one, and less than that one?

Boy: Yes, I think so.

Socrates: Very good: I like to hear you say what you think. And now tell me, is not this a line of two feet and that of four?

Boy: Yes.

Socrates: Then the line which forms the side of eight feet should be more than this line of two feet, and less than the other of four feet?

Boy: It should.

Socrates: Try and see if you can tell me how much it will be.

Boy: Three feet.

Socrates: Then if we add a half to this line of two, that will be the line of three. Here are two and there is one; and on the other side, here are two also and there is one; and that makes the figure of which you speak?

Boy: Yes.

Socrates: But if there are three feet this way and three feet that way, the whole space will be three times three feet?

Boy: That is evident.

Socrates: And how much is three times three?

Boy: Nine.

Socrates: And how much is the double of four?
Boy: Eight.

Socrates: Then the figure of eight is not made out of a line of three?

Boy: No.

Socrates: But from what line then? Tell me exactly; and if you would rather not estimate, try and show me the line.