

**Unit 18 - Classwork 7: Plato's *Meno* Dialogue (4)**

~\*~\*~\*~

In order to answer the following questions, read pages 11–27 in Unit 18.

1. Socrates and the slave-boy examined the areas of different squares. (See pages 16–19.)

- (i) The area of a square is a function of its side-length. Accordingly, let the function “ $A(s)$ ” stand for the area of a square, and let “ $s$ ” stand for the length of the square’s side. Therefore, what is the area of a square?

$$A(s) = \underline{\hspace{2cm}}.$$

- (ii) Using the formula for the area of a square, if a square’s sides are each 2 units-long, then what is the square’s area?

$$A(2) = \underline{\hspace{2cm}}.$$

- (iii) Using the formula for the area of a square, if a square’s sides are each 3 units-long, then what is the square’s area?

$$A(3) = \underline{\hspace{2cm}}.$$

- (iv) Using the formula for the area of a square, if a square’s sides are each 4 units-long, then what is the square’s area?

$$A(4) = \underline{\hspace{2cm}}.$$

- (v) Socrates helped the boy realize what it means for one square to be twice the size of another square.

- (a) If a square’s area is  $A(s)$  units-squared, then a square with *twice* that area has an area of  $2A(s)$  units-squared. Accordingly, if a square has an area of  $A(2)$  units-squared (such that  $s = 2$ ), then what is the area of a square with *twice* that area?

- (b) If a square’s area is  $A(s)$  units-squared, then a square with sides that are twice as long has an area of  $A(2s)$  units-squared. Accordingly, if a square has an area of  $A(2)$  units-squared (such that  $s = 2$ ), then what is the area of a square with sides that are *twice* as long?

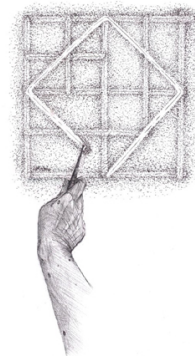
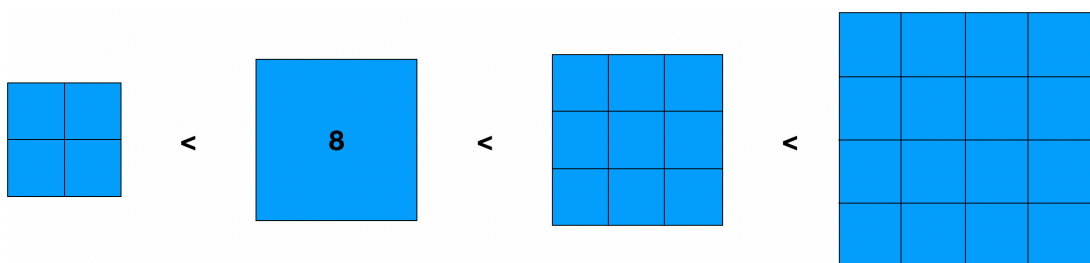
2. Socrates guided the slave-boy through the following syllogism. (Pages 16–19)

Premise 1: If  $2A(s) = A(2s)$ , then  $2A(2) = A(4)$ .

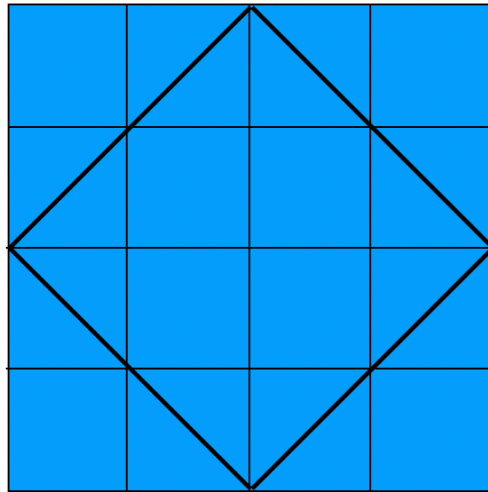
Premise 2:  $2A(2) \neq A(4)$ .

Conclusion:  $2A(s) \neq A(2s)$ .

- (i) What kind of syllogism is that?
- (ii) Socrates helped the slave-boy to understand why the second premise is true. Yet, *why* is the second premise true? In three steps, explain why it's true. Hint: Your first two steps should be to show what  $A(4)$  and  $2A(2)$  each equal.



3. Socrates had the slave-boy draw the following image. (See pages 20–21.)



- (i) Look at the *largest* square.
  - (a) In units-squared, what is the area of the largest square?
  - (b) What is the length of the largest square's sides?
- (ii) Look at the *smallest* squares.
  - (a) In units-squared, what is the area of each smallest square?
  - (b) What is the length of each smallest square's sides?
- (iii) Look at the *second-smallest* squares.
  - (a) In units-squared, what is the area of each second-smallest square?
  - (b) What is the length of each second-smallest square's sides?
- (iv) Look at the *second-largest* square. What is the area of the *second-largest* square?
- (v) What was Socrates trying to help the slave-boy remember?

4. In general,  $n = \sqrt{n^2}$ . Hence, if  $A(s) = s^2$ , then  $s = \sqrt{A(s)}$ . Keeping all of that in mind, answer the following questions, and show *all* of your work.

(i) If  $A(s) = 4$ , then  $s = 2$ , but why?

(ii) If  $A(s) = 9$ , then  $s = 3$ , but why?

(iii) If  $A(s) = 16$ , then  $s = 4$ , but why?

(iv) In general,  $\sqrt{n \times m} = \sqrt{n} \times \sqrt{m}$ . Hence, if  $A(\delta) = 8$ , then  $\delta = 2\sqrt{2}$ , but why?

(v) In general,  $\sqrt{n} \times \sqrt{m} = \sqrt{n \times m}$ . Hence, if  $\delta = 2\sqrt{2}$ , then  $\delta^2 = 8$ , but why?