NAME:

Part I

DIRECTIONS: This part has seven questions worth a total of 28 out of 100 points. It is closed-book and closed-note. You should spend at most 30 minutes on this part. You must turn this part in before working on Part II. Once you have turned in Part I, you cannot work on it any further.

For each person, theorem, or object, describe its significance in the history of mathematics. Include details such as approximate dates and locations, if known. Complete sentences are required. Length is not important. Specificity is important. Each item is worth 4 points.

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1. Rhind and Moscow papyri

2. Pythagoras

3. Claudius Ptolemy

4. Euclid

5. Archimedes

6. Mahavira

7. Eudoxus

Part II

DIRECTIONS: This part has 4 questions worth a total of 72 out of 100 points. You may use your text, your notes, and a calculator. You may not use a cell phone for any reason.

For each problem, read the directions carefully.

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1. (8 points) Give a geometric argument that $\sqrt{3}$ is irrational.

2. (8 points) The figure below suggests a congruency-by-addition proof of the Pythagorean Theorem. Fill in the details of the proof. *You must carefully state the geometric facts you are using.* I would suggesting beginning by labelling the figure.

3. (8 points each)

   (a) Find, in the Egyptian fashion, the quotient $184\,\overline{2} \div 15$. [Note that while you may choose to reverse-engineer your answer, your official work and answer should look Egyptian.]

   (b) An ancient Babylonian tablet solves the division problem

   $$1,\ 10 \div 45$$

   in the following manner:

   $$(1,\ 10) \times (1,\ 20) = 1,\ 33,\ 20.$$

   Show that this answer is in fact correct and explain the reasoning behind the approach.

4. (8 points each) Answer each question below. All answers should consist of at least one full coherent sentence. Be specific.

   (a) What is the difference between experimental geometry and deductive geometry?

   (b) What is the difference between a proof using commensurables and one using the Eudoxian method?

(c) Discuss the significance and impact of Euclid's *Elements.*

(d) Discuss the evolution of the Hindu-Arabic base 10 positional system.

(e) What originally motivated what we now call the sine function and how was the original concept different from our present one?