

Instructions:

- Place your name on all of the pages.
- Do all of your work in this booklet. Do not tear off any sheets.
- Be clear and neat in your work. Any illegible work, or scribbling in the margins, will not be graded.
- All short answers and essays should be responded to with full sentences conveying thoughtful responses.
- If you need more space, you may use the **back of a page** and write *On back of page #* in the problem space or the **extra page**. **No other paper is allowed.**

Try to answer as many problems as possible. Provide as much information as possible. Show sufficient rationale for full credit.

Pay attention to the point distribution. Not all problems have the same weight. Pace yourself!

Page	Pts	Score
1	34	
2	15	
3	10	
4	16	
5	25	
Total	100	

Bonus: Let $x = 1 + \frac{1}{1 + \frac{1}{1 + \dots}}$. What is x ?

1. (8 pts) Match the Mathematician with where they were from.

Archimedes _____ Khayyam _____ Mersenne _____ Eratosthenes _____
 Apollonius _____ Fibonacci _____ Pappas _____ Hippasus _____

a. Metapontum b. Perga. c. Alexandria d. Cyrene e. Pisa. f. Persia g. Syracuse h. France

2. (12 pts) Select the approximate era for each mathematician/object.

Aryabhata _____ Archimedes _____ Tartaglia _____ Pythagoras _____
 Mersenne _____ Rhind Papyrus _____ Al-Khwarizmi _____ Fibonacci _____
 Seki _____ Euclid _____ Hippocrates _____ Hypatia _____

a. 1650 BCE b. 600-500 BCE c. 500-400 BCE d. 300-200 BCE e. 300-400
 f. 400-600 g. 700-900 h. 1100-1300 i. 1500-1600 j. 1600-1700.

3. (10 pts) Can you name that mathematician? [Hint: The names have been used above.]



A. _____ E. _____ I. _____
 B. _____ F. _____ J. _____
 C. _____ G. _____
 D. _____ H. _____

4. (4 pts) Consider the Babylonian number below (spaces are not zeros).



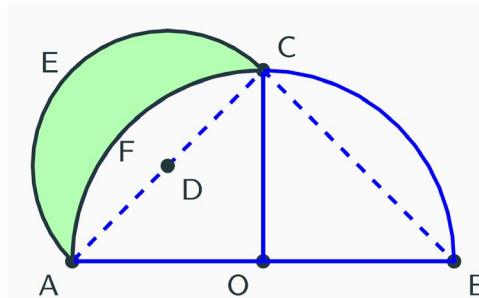
a. Write this as a sexagesimal number using slash (/) notation. _____
 b. Write it in the decimal (base 10) system. _____

5. (8 pts) Answer the following by filling in the blank.
- a. Who is said to be the father of accounting? _____
 - b. What is the golden ratio? _____
 - c. Who measured the Earth's circumference: _____
 - d. What are the numbers 1,3,6,10, ... called? _____
 - e. Who wrote extensively on conics? _____
 - f. What is the GouGu Rule? _____
 - g. Who was the first known Greek mathematician? _____
 - h. Who was the first to classify cubic curves? _____
6. (2 pts) Write 11043 as a sexagesimal number.
7. (5 pts) Consider the numbers 234 and 42.
- a. Use the Euclidean algorithm to find the greatest common divisor of 234 and 42.

 - b. Use the equations in part a. to find integers n and m such that $234m + 42n = 6$.

8. (4 pts) Consider the number 496.
- Show it is of the form $(2^n - 1)2^{n-1}$ for some integer n .
 - Show that 496 is a perfect number.

9. (4 pts) The figure below is the construction for squaring a lune.



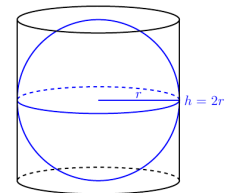
- What does it mean to square a lune?
 - Explain how this accomplishes that goal by first showing that the area of triangle AOC is the same as that of the lune.
10. (2 pts) Can one construct a regular 17-gon using a compass and straight edge? _____
- Who was the first to answer this question? _____

11. (11 pts) Name the most important contribution to mathematics by these people in a couple of words:

- a. Apollonius _____
- b. Aryabhata _____
- c. Khayyam _____
- d. Cardano _____
- e. Brahmagupta _____
- f. Ptolemy _____
- g. Eudoxus _____
- h. Madhava _____
- i. Al-Kwarizmi _____
- j. Xian _____
- k. Seki _____

12. (3 pts) Show that $x = 3, y = 2$, is a solution of $x^2 - 2y^2 = 1$. Use this solution to find a second solution.

13. (2 pts) Who studied the figure to the right? _____



What is the common ratio of the surface area and volume of the cylinder to that of the sphere? _____

14. (12 pts) Describe each person's role in the story of finding solutions to a cubic.

Cardano, _____

del Ferro, _____

Ferrari, _____

Florio, _____

da Coi, and _____

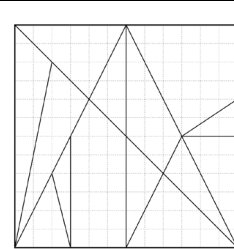
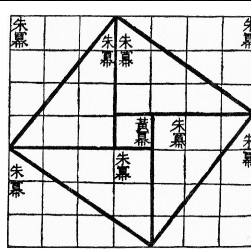
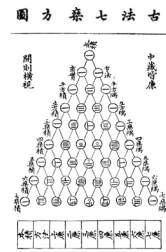
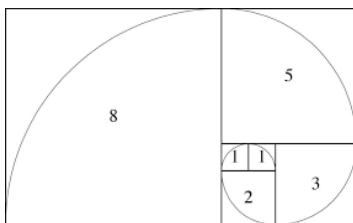
Tartaglia _____

15. (7 pts) Identify the culture associated with these writings:

[Egyptian, Babylonian, Greek, Chinese, Indian, Arabic, Italian, etc.]

- a. *The Nine Chapters on the Mathematical Art* _____
- b. Sine Tables _____
- c. Clay tablets _____
- d. *Ars Magna* _____
- e. *Conics* _____
- f. Moscow Papyrus _____
- g. *Treatise on Demonstration of Problems of Algebra* _____

16. (6 pts) Identify the objects below.



Extra Page