

HW 9

1. Prove the Pythagorean Theorem.
2. In the ancient Chinese text “Arithmetic in Nine Sections” as quoted in *The Development of Mathematics in China and Japan* 2nd ed. by Yoshio Mikami, we find the following instructions for reducing fractions. “When capable of halving, halve it. When not capable of halving, set down the denominator and the numerator, and from the greater subtract the smaller. Repeat the process and finally one finds the ... common divisor. Simplify with this common divisor.”

Follow this procedure to simplify the fractions $\frac{56}{24}, \frac{57}{190}, \frac{46}{49}$.

3. Verify the following formula, which is found in the same source as above.

$$\left(a + \frac{c}{b}\right)\left(a' + \frac{c'}{b'}\right) = \frac{(ab + c)(a'b' + c')}{bb'}$$
4. Try to make sense of the following, which is found in the same source as above. “When the equi-named (or equally signed) quantities are to be subtracted and the different named are to be added (in their absolute values), if a positive quantity has no opponent, make it positive. When the different named are to be subtracted and the same named are to be added (in absolute values), if a positive quantity has no opponent, make it positive; and if a negative has no opponent, make it negative.”
5. The following way to determine the gender of an unborn baby is found in “Arithmetical Classic” of Sun-Tsu as quoted in *The Development of Mathematics in China and Japan* 2nd ed. by Yoshio Mikami. “Take 49; add the month of her child-bearing; subtract her age. From what now remains, subtract the heaven 1, subtract the earth 2, subtract the man 3, subtract the 4 seasons 4, subtract the 5 elements 5, subtract the 6 laws 6, subtract the 7 stars 7, subtract the 8 winds 8, subtract the 9 provinces 9. If then the remainder be odd, the child shall be a son and if even, a daughter.”
Use this to solve the following.
“A pregnant woman, who is 29 years of age, is expected to give birth to a child in the 9th month of the year. Which should be her child, a son or a daughter?”
Why couldn't you use the procedure to predict an American baby's gender today?
6. The following three problems were taken from the “Arithmetical Classic of Chang ch'iu-chien” (500-600AD) as quoted in *The Development of Mathematics in China and Japan* 2nd ed. by Yoshio Mikami. “If 7 men construct 12 $\frac{1}{2}$ bows in 9 days, how many days will be required for 17 men to construct 15 bows?”
7. “There is a Buddhistic work consisting of 29 stanzas, each of which contains 63 ideographs. It is required to find how many ideographs will be contained in all?”
8. “A horse, halving its speed every day, runs 700 miles in 7 days. What are his daily journeys?”
9. Give the first 9 rows of Pascal's triangle. How is Pascal's triangle used? (There are several ways) Make your own triangle.