

Math 123
 Fall 2022
 Dr. Lily Yen

Quiz 1

Show all your work

Name: _____
 Number: _____
 Signature: _____
 Score: ____/19

Problem 1: Write 65432 as a Babylonian numeral.

The Babylonian number 65432 is greater than 3600, so we divide by 3600 first.

$$65432 = 18 \times 3600 + 632$$

Then we take $632 = 10 \times 60 + 32$ to get the following.



Score: /2

Problem 2: Translate the subtraction problem in the Hindu-Arabic numeral $447 - 124$ to a subtraction problem in Mayan numeral, and find the answer in Mayan numeral.

0	1	2	3	4	5	6	7	8	9
	•	• •	• • •	• • • •	_____	•	• •	• • •	• • • •
10	11	12	13	14	15	16	17	18	19
=====	•	• •	• • •	• • • •	=====	•	• •	• • •	• • • •

$447 = 1 \times (18 \times 20) + 4 \times 20 + 7$ and $124 = 6 \times 20 + 4$, so in Mayan numerals,

Score: /3

Problem 3: Given the following, find the second largest. Each part correctly converted receives one mark.

a. $\text{III} \llcorner \text{IIII} \llcorner \text{II}$

b.

c. $C25A_{16}$, a hexadecimal numeral.

d. MMCDXLVII

$\text{III} \llcorner \text{IIII} \llcorner \text{II} = 3 \times 60^2 + 25 \times 60 + 21 = 12321$, and $= 1 \times (18 \times 20) + 0 + 1 = 361$, and $C25A_{16} = 12 \times 16^3 + 2 \times 16^2 + 5 \times 16 + 10 = 49754$, and MMCDXLVII is 2447. Therefore the second largest is $\text{III} \llcorner \text{IIII} \llcorner \text{II}$.

Score: /4

Problem 4: Write the Egyptian numeral $\overline{\text{𓆎𓆎𓆎𓆏𓆏𓆏𓆏𓆏𓆏𓆏𓆏𓆏}}$ using a Hindu-Arabic numeral.

3 211 252

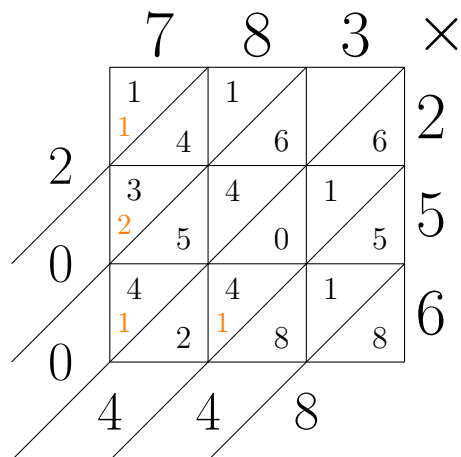
1	10	100	1000	10 000	100 000	1 000 000
	𐀀	𐀁	𐀂	𐀃	𐀄	𐀅

Using the table, we translate
 $3 \times 1\,000\,000 + 2 \times 100\,000 + 1 \times 10\,000 + 1 \times 1\,000 + 2 \times 100 + 5 \times 10 + 1 = 3\,211\,252$

Score: /2

Problem 5: Multiply 783×256 using the galley method.

200 448



Score: /2

Problem 6: Compute $1021001_3 - 220112_3$ using the two-line algorithm, then check your answer by converting the problem including its answer to base 10.

100112₃

Line up vertically

$$\begin{array}{r} 1021001_3 \\ -220112_3 \\ \hline 100112_3 \end{array}$$

Check (in base 10 except as indicated): $1021001_3 = 3^6 + 2 \times 3^4 + 3^3 + 1 = 919$ and $220112_3 = 2 \times 3^5 + 2 \times 3^4 + 3^2 + 3^1 + 2 = 662$. Now $919 - 662 = 257 = 3^5 + 3^2 + 3^1 + 2 = 100112_3$.

Score: /3

Problem 7: Fire Horse has a bag of jellybeans. When she lines them up 6 in a row or 8 in a row, she has 3 left over in each case. If she lines them up 11 in a row, she has 5 left over.

27

Find the smallest number of jellybeans that Fire Horse may have.

If we put 3 jellybeans aside, the remainder is a multiple of both 6 and 8, so a multiple of $\text{lcm}(6, 8) = 24$. Therefore the total number of jellybeans is one of 27, 51, 75, 99, 123, 147, 171, 195, 219, 243, ...

The number of beans is also 5 more than a multiple of 11, so

16, 27, 38, 49, 60, 71, 82, 93, 104, 115, ...

The first number common between the two lists is 27 and the next is 291.

Score: /3