Name_____

							TOTAL
C1 (methods and steps):	0	8	16	24	32	40	
C2 (calculations):	0	8	16	24	32	40	
C3 & 4 (validation, clarity, and completeness):	0	4	8	12	16	20	

MSC506 – Grade 11 Science Math
Situational Problem – Math Memorabilia!

After a long year, you decide to treat yourself to a true luxury – collectible cards of your favorite mathematicians! There are four cards in particular you have had your eyes on for some time, and you think that now is the time to make some purchases. Since you would like to buy multiple copies of each card to share with your friends, you need to determine the price of each card and then determine how many of each card you would be able to afford given your spending limits.

You must determine one possible combination of amounts of Card 3 and Card 4 you could purchase while staying within your spending limits.

MONEY AVAILABLE
The amount of money available to spend comes from an investment during which $400 was invested at an annual interest rate of 9.0%, which was compounded monthly. The investment grew to its current value over the course of 6 years. Round this answer to the nearest dollar.

CARD 1: JAMSHID AL-KASHI
Al-Kashi (1380-1429) was an astronomer and mathematician from Iran. Among other important mathematical contributions, al-Kashi provided an explicit statement for the law of cosines.

The price of Card 1, in dollars, is equal to the solution to the following square root equation:

$$2\sqrt{4x-1} = 2x - 11$$

In the event that there are two solutions to the equation, the price of each Card 1 is equal to the positive difference between the two solutions.

CARD 2: SRINIVASA RAMANUJAN

Ramanujan (1887-1920) was a mathematician from India. Among many significant contributions to the fields of mathematical analysis, number theory, infinite series and continued fractions, he formulated an equation to solve the infinitely nested radicals problem.

The price of Card 2, in dollars, is equal to the solution to the following absolute value equation:

$$\frac{3}{2}|2x - 23| - 6 = 15$$

In the event that there are two solutions to the equation, the price of each Card 2 is equal to the positive difference between the two solutions.

CARD 3: KATHERINE JOHNSON

Katherine Johnson (1918-2020) was an American mathematician whose work with NASA, including calculating trajectories, launch windows, and emergency return paths, was critical to the success of crewed spaceflight.

The price of each Card 3, in dollars, is equal to the solution to the following rational function equation:

$$\frac{-1}{x - 8} + 1 = \frac{6}{x - 5} - 1$$

In the event that there are two solutions to the equation, the price of each Card 3 is equal to the positive difference between the two solutions.

CARD 4: LIU XIN

Liu Xin (50 BCE-30 CE) Liu was an imperial librarian and was the first to establish a library classification system. Prior to Liu's contribution, the Chinese had estimated the value of pi at 3. Liu improved this estimation significantly.

The price of each Card 4, in dollars, is equal to the solution to the following exponential equation:

$$3\left(\frac{1}{2}\right)^{(16-x)} = 3(6)^{(-x+14.613)}$$

In the event that there are two solutions to the equation, the price of each Card 4 is equal to the positive difference between the two solutions.

WHAT ARE YOU BUYING?
You will buy exactly 8 of Card 1, exactly 12 of Card 2 and you will buy at least 10 of Card 3 and at least 10 of Card 4. You must determine one possible combination of how many of Card 3 and how many of Card 4 you could buy while staying within your spending limits.

SPENDING LIMITS
The total amount you will spend on all of your cards falls within 97% to 100% of the money that you have available.

Determine one possible combination of quantities of Cards 3 and 4 that you could buy while staying within your spending limits.

Note: Round any card price to the nearest cent, if necessary.

Total number of Card 3 purchased:_____

Total number of Card 4 purchased:_____