Write your answers in the Blue Book. Print your names & write the number of students taking this test in the upper right corner of the Blue Book. Put this test & the Blue Book in the provided envelope.

1. KenKen is a popular new puzzle type. Here is one for you to solve. The rules are as follows:

   - Each square in the puzzle below is filled in with one of the digits $1, 2, 3, 4, 5, 6$.
   - Each digit occurs exactly once in each row and exactly once in each column.
   - The numbers in each heavily outlined set of squares, called "cages," must combine (in any order) to produce the number in the top corner, using the mathematical operation indicated.
   - Cages with just one square should be filled in with the target number in the top corner.
   - A number can be repeated within a cage as long as it is not in the same row or column.
   - At the back of the test, another copy of the puzzle appears. Use that copy to do your work, use the copy below just for your answer, but submit everything.

2×		**1−**		**15+**	
	8+		**11+**		
13+				**15×**	
	600×	**11+**		**4×**	
		4	**36×**		
	3÷				

Figure 1: Do your work on the other copy, use the above just for your answer. Submit both pages.

2. There are 750 students at Sosmart High School. Of these, 300 students are taking Spanish, 200 are taking U.S. History, and 150 are taking Physics. 340 students are not taking any of these three courses. There are 110 students who are taking both Spanish and US History and 90 who are taking both Spanish and Physics. There are 40 students who are actually taking all three subjects. How many students are taking both Physics and US History?

3. A square and an equilateral triangle have the same area. What is the ratio of the perimeter of the triangle to the perimeter of the square?

4. If $a + b = 2$ and $a^2 + b^2 = 3$, determine $a^3 + b^3$.

5. Amy can mow her yard in an hour, but it takes her sister Bonnie an hour and a half to mow the same yard.
   (a) How long does it take them to mow the yard if they both work together? (Assume they each still mow at the same rate.)
   (b) If Bonnie mows for 15 minutes before Amy comes to help, how long will Amy and Bonnie have to mow together in order to finish the job?
   (c) In this case, what fraction of the yard will Bonnie have done?

2×		**1**−		**15**+	
	8+		**11**+		
13+				**15**×	
	600×	**11**+		**4**×	
		4	**36**×		
	3÷				

Figure 2: Do your work here, fill in your answer on page 1. Submit both pages.