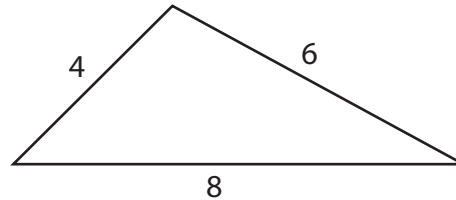
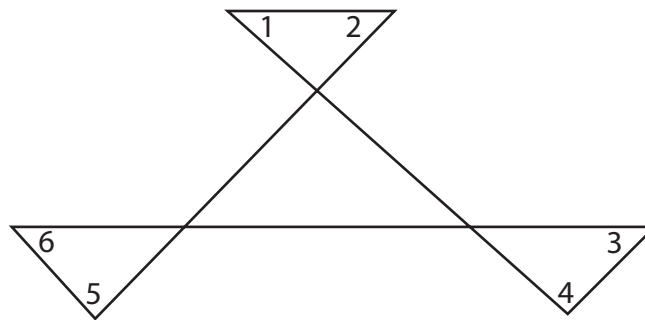


Part I. No calculators are allowed. Please do not show your work for Part I. Just write down the final answer on the white paper provided. Each problem is worth 5 points.

1. Find the area of the triangle below.



2. What is the sum of the marked angles 1, 2, 3, 4, 5, 6?



3. If a and b are the roots of the equation $x^2 - px + q = 0$, find the quadratic equation whose roots are $a + 1/b$ and $b + 1/a$.
4. If $f(x) = \frac{x+1}{x+c}$ and if $f(f(x)) = x$ for all x , what is c ?
5. How many pairs of integers (m, n) are there such that $m^2 - n^2 = 101$?
6. A bug starts at the origin and crawls 1 unit east, then $1/2$ unit north, then $1/4$ unit west, then $1/8$ unit south, then $1/16$ unit east, and so on forever. What are the coordinates of the bug's ultimate destination?
7. Suppose that n tennis players want to play a single-elimination tournament. In each round the remaining players pair up at random; if the number of surviving players is odd, then one person (chosen at random) gets a bye into the next round. The winners (and possibly one person with a bye) go on into the next round. This continues until there is only one person remaining—the champion. How many matches will be played altogether (in all rounds of the tournament)?
8. If the angle θ satisfies $\tan \theta + \sec \theta = 2$, what is the value of $\cos \theta$?

