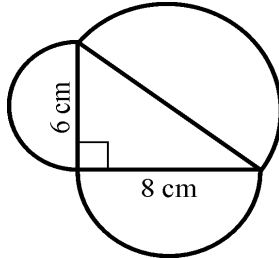


1. Using the sides of this right triangle as diameters, three semicircles are constructed. How many square centimeters are in the sum of the areas of the three semicircles? Express your answer in terms of  $\pi$ .



1. \_\_\_\_\_

2. The product of four consecutive positive integers is 1 less than  $461^2$ . What is the least of these four numbers?

2. \_\_\_\_\_

3. According to the U.S. Census Bureau, the world's population passed 6 billion people on July 18, 1999. Further, an average of 4.2 births and 1.7 deaths occur every second. If these rates were to remain constant, in what year will the population reach 7 billion?

3. \_\_\_\_\_

4. Suppose that  $S$  is a set of three positive integers. At most, how many of the following four properties could the set  $S$  have?

4. \_\_\_\_\_

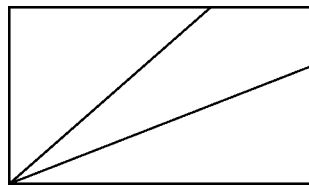
- I.  $S$  has mean 10
- II.  $S$  has median 8
- III.  $S$  has sum 45
- IV.  $S$  contains the number 35

5. For how many integers  $n$  between 1 and 100 is the greatest common divisor of 15 and  $n$  equal to 3?

5. \_\_\_\_\_

6. Three students decide to cut a 6-inch by 9-inch rectangular cake into three portions of equal area, as shown below. What is the number of inches in the perimeter of the portion with the greatest perimeter? Express your answer as a decimal to the nearest tenth.

6. \_\_\_\_\_



7. Grandview High School is a four-year high school. Among the 560 upperclassmen (sophomores, juniors and seniors) at Grandview H.S., the ratio of boys to girls is 3 to 4. Among the freshmen, there are 110 boys and 90 girls. Overall, what percent of the students are boys? Express your answer to the nearest whole number.

7. \_\_\_\_\_

8. Debbie has an ample supply of the square ceramic tiles with the patterns shown below. She intends to create a horizontal, rectangular wall decoration by cementing three of the squares to the wall in a row. How many different designs can she create in this way that have at least one line of symmetry?

8. \_\_\_\_\_

