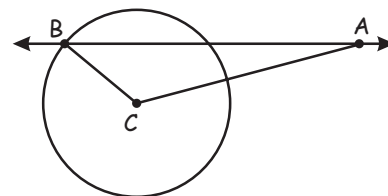




# Warm-Up 15

1. \_\_\_\_\_ % A positive six-digit integer uses each of the digits 1, 2, 3, 4, 5 and 9 only once, and they are arranged randomly. What percent of the possible integers are divisible by 33?

2. \_\_\_\_\_ units Point A lies outside of circle C and is 10 units from its center (point C). The radius of circle C is 4 units. A secant of a circle is a line that intersects the circle twice. A secant of circle C is drawn, as shown, from point A, such that, it intersects the circle at point B. If, at its closest point, the secant is 2 units from the center of circle C, what is the length of segment AB? Express your answer in simplest radical form.



3. \_\_\_\_\_ % Joy measured the length, width and height of a right, rectangular prism. Each measurement was off by at most 1%. She used these measurements to compute the volume of the solid. What is the greatest percentage by which her volume computation could be off? Express your answer to the nearest hundredth.

4. \_\_\_\_\_ meters A right pyramid whose altitude is 11 meters has a regular hexagon as its base. What is the length of a side of the base, if the volume of the pyramid is  $352\sqrt{3}$  cubic meters?

5. \_\_\_\_\_ What is the value of  $\frac{1}{x} + 4x + b - bx - 1$  if  $x = \frac{1}{4-b}$  and  $b \neq 4$ ?

6. \_\_\_\_\_ descendants George has three sons. Two of the three sons each have three sons of their own while the third son does not produce any children. In each of these families of three sons (consisting of George's grandsons), the same is true; that is, two out of three have three sons while the other has no children. This continues for each generation. Including descendants through the 15th generation after George, but not including George's generation, how many descendants does George have?



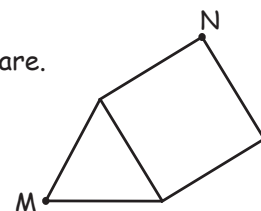
7. \_\_\_\_\_ ordered pairs If  $1 \leq a \leq 10$  and  $1 \leq b \leq 36$ , for how many ordered pairs of integers (a, b) is  $\sqrt{a + \sqrt{b}}$  an integer?

8. \_\_\_\_\_ sq cm The region shown in the figure is bounded by two 60-degree arcs of concentric circles and two segments that are parts of radii of the larger circle. The two arcs have lengths of  $12\pi$  cm and  $6\pi$  cm. What is the area, in square centimeters, of the region? Express your answer in terms of  $\pi$ .



9. \$ \_\_\_\_\_ Denelle, Eden and Frank played a certain game of cards for money. Each person starts and ends the game with a positive whole number of dollars, and the sum of the three players' money is the same at the beginning of the game as it is at the end of the game. At the beginning of the game, Denelle had \$4 for every \$5 Eden had. At the end of the game, Denelle had twice as much money as Eden. Frank started with the same amount of money as Denelle, and ended with the same amount of money as Eden. What is the least amount of money that Frank could have lost?

10. \_\_\_\_\_ The figure shown consists of a coplanar equilateral triangle and square. If all the segments are 12 units long, the distance from M to N can be written in the form  $A(\sqrt{B} + \sqrt{C})$  with simplified radicals. What is the value of  $A + B + C$ ?



\*Problem 7 is from the 2009 State Competition Team Round.