

AMC 12A 2012 Practice Problems

7. Mary divides a circle into 12 sectors. The central angles of these sectors, measured in degrees, are all integers and they form an arithmetic sequence. What is the degree measure of the smallest possible sector angle?

(A) 5 (B) 6 (C) 8 (D) 10 (E) 12

8. An *iterative average* of the numbers 1, 2, 3, 4, and 5 is computed in the following way. Arrange the five numbers in some order. Find the mean of the first two numbers, then find the mean of that with the third number, then the mean of that with the fourth number, and finally the mean of that with the fifth number. What is the difference between the largest and smallest possible values that can be obtained using this procedure?

(A) $\frac{31}{16}$ (B) 2 (C) $\frac{17}{8}$ (D) 3 (E) $\frac{65}{16}$

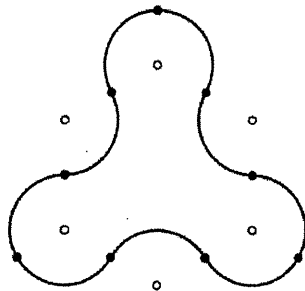
12. A square region $ABCD$ is externally tangent to the circle with equation $x^2 + y^2 = 1$ at the point $(0, 1)$ on the side CD . Vertices A and B are on the circle with equation $x^2 + y^2 = 4$. What is the side length of this square?

(A) $\frac{\sqrt{10} + 5}{10}$ (B) $\frac{2\sqrt{5}}{5}$ (C) $\frac{2\sqrt{2}}{3}$ (D) $\frac{2\sqrt{19} - 4}{5}$ (E) $\frac{9 - \sqrt{17}}{5}$

13. Paula the painter and her two helpers each paint at constant, but different, rates. They always start at 8:00 AM and all three always take the same amount of time to eat lunch. On Monday the three of them painted 50% of a house, quitting at 4:00 PM. On Tuesday, when Paula wasn't there, the two helpers painted only 24% of the house and quit at 2:12 PM. On Wednesday Paula worked by herself and finished the house by working until 7:12 PM. How long, in minutes, was each day's lunch break?

- (A) 30 (B) 36 (C) 42 (D) 48 (E) 60

14. The closed curve in the figure is made up of 9 congruent circular arcs each of length $\frac{2\pi}{3}$, where each of the centers of the corresponding circles is among the vertices of a regular hexagon of side 2. What is the area enclosed by the curve?



- (A) $2\pi + 6$ (B) $2\pi + 4\sqrt{3}$ (C) $3\pi + 4$ (D) $2\pi + 3\sqrt{3} + 2$
 (E) $\pi + 6\sqrt{3}$

15. A 3×3 square is partitioned into 9 unit squares. Each unit square is painted either white or black with each color being equally likely, chosen independently and at random. The square is then rotated 90° clockwise about its center, and every white square in a position formerly occupied by a black square is painted black. The colors of all other squares are left unchanged. What is the probability that the grid is now entirely black?

- (A) $\frac{49}{512}$ (B) $\frac{7}{64}$ (C) $\frac{121}{1024}$ (D) $\frac{81}{512}$ (E) $\frac{9}{32}$