UNIT 3 EXERCISES 6-10

2D GEO WORD

2011B 6. Two tangents to a circle are drawn from a point A. The points of contact B and C divide the circle into arcs with lengths in the ratio $2 : 3$. What is the degree measure of $\angle BAC$?

(A) 24 **(B)** 30 **(C)** 36 **(D)** 48 **(E)** 60

2017A 6. Joy has 30 thin rods, one each of every integer length from 1 cm through 30 cm. She places the rods with lengths 3 cm, 7 cm, and 15 cm on a table. She then wants to choose a fourth rod that she can put with these three to form a quadrilateral with positive area. How many of the remaining rods can she choose as the fourth rod?

(A) 16 **(B)** 17 **(C)** 18 **(D)** 19 **(E)** 20

1999

7. What is the largest number of acute angles that a convex hexagon can have?

(A) 2 **(B)** 3 **(C)** 4 **(D)** 5 **(E)** 6

2002A

7. If an arc of 45° on circle A has the same length as an arc of 30° on circle B, then the ratio of the area of circle A to the area of circle B is

(A) $\frac{4}{9}$ **(B)** $\frac{2}{3}$ **(C)** $\frac{5}{6}$ **(D)** $\frac{3}{2}$ **(E)** $\frac{9}{4}$

2004B

7. A square has sides of length 10, and a circle centered at one of its vertices has radius 10. What is the area of the union of the regions enclosed by the square and the circle?

(A) $200+25\pi$ **(B)** $100+75\pi$ **(C)** $75+100\pi$ **(D)** $100+100\pi$ **(E)** $100+125\pi$

2007B

7. All sides of the convex pentagon $ABCDE$ are of equal length, and $\angle A = \angle B = 90^\circ$. What is the degree measure of $\angle E$?

(A) 90 **(B)** 108 **(C)** 120 **(D)** 144 **(E)** 150

2015B

7. A regular 15-gon has L lines of symmetry, and the smallest positive angle for which it has rotational symmetry is R degrees. What is $L+R$?

(A) 24 **(B)** 27 **(C)** 32 **(D)** 39 **(E)** 54

2007A 8. A star-polygon is drawn on a clock face by drawing a chord from each number to the fifth number counted clockwise from that number. That is, chords are drawn from 12 to 5, from 5 to 10, from 10 to 3, and so on, ending back at 12. What is the degree measure of the angle at each vertex in the star-polygon?

(A) 20 **(B)** 24 **(C)** 30 **(D)** 36 **(E)** 60

2008B 8. Points B and C lie on $\overline{AD}$. The length of $\overline{AB}$ is 4 times the length of $\overline{BD}$, and the length of $\overline{AC}$ is 9 times the length of $\overline{CD}$. The length of $\overline{BC}$ is what fraction of the length of $\overline{AD}$?

(A) $\frac{1}{36}$ **(B)** $\frac{1}{13}$ **(C)** $\frac{1}{10}$ **(D)** $\frac{5}{36}$ **(E)** $\frac{1}{5}$

2015A 8. The ratio of the length to the width of a rectangle is $4:3$. If the rectangle has diagonal of length d, then the area may be expressed as kd^2 for some constant k. What is k?

(A) $\frac{2}{7}$ **(B)** $\frac{3}{7}$ **(C)** $\frac{12}{25}$ **(D)** $\frac{16}{25}$ **(E)** $\frac{3}{4}$

2017B 8. The ratio of the short side of a certain rectangle to the long side is equal to the ratio of the long side to the diagonal. What is the square of the ratio of the short side to the long side of this rectangle?

(A) $\frac{\sqrt{3}-1}{2}$ **(B)** $\frac{1}{2}$ **(C)** $\frac{\sqrt{5}-1}{2}$ **(D)** $\frac{\sqrt{2}}{2}$ **(E)** $\frac{\sqrt{6}-1}{2}$

2018B 8. Line segment $\overline{AB}$ is a diameter of a circle with $AB = 24$. Point C, not equal to A or B, lies on the circle. As point C moves around the circle, the centroid (center of mass) of $\triangle ABC$ traces out a closed curve missing two points. To the nearest positive integer, what is the area of the region bounded by this curve?

(A) 25 **(B)** 38 **(C)** 50 **(D)** 63 **(E)** 75

2003A 9. A set S of points in the xy-plane is symmetric about the origin, both coordinate axes, and the line $y = x$. If $(2, 3)$ is in S, what is the smallest number of points in S?

(A) 1 **(B)** 2 **(C)** 4 **(D)** 8 **(E)** 16

2004B 9. The point $(-3, 2)$ is rotated $90°$ clockwise around the origin to point B. Point B is then reflected in the line $y = x$ to point C. What are the coordinates of C?

(A) $(-3, -2)$ **(B)** $(-2, -3)$ **(C)** $(2, -3)$ **(D)** $(2, 3)$ **(E)** $(3, 2)$

2008B 9. Points A and B are on a circle of radius 5 and $AB = 6$. Point C is the midpoint of the minor arc AB. What is the length of the line segment AC?

(A) $\sqrt{10}$ **(B)** $\frac{7}{2}$ **(C)** $\sqrt{14}$ **(D)** $\sqrt{15}$ **(E)** 4

2016B 9. Carl decided to fence in his rectangular garden. He bought 20 fence posts, placed one on each of the four corners, and spaced out the rest evenly along the edges of the garden, leaving exactly 4 yards between neighboring posts. The longer side of his garden, including the corners, has twice as many posts as the shorter side, including the corners. What is the area, in square yards, of Carl's garden?

(A) 256 **(B)** 336 **(C)** 384 **(D)** 448 **(E)** 512

2011B 10. Rectangle $ABCD$ has $AB = 6$ and $BC = 3$. Point M is chosen on side AB so that $\angle AMD = \angle CMD$. What is the degree measure of $\angle AMD$?

(A) 15 **(B)** 30 **(C)** 45 **(D)** 60 **(E)** 75

2016B 10. A quadrilateral has vertices $P(a,b)$, $Q(b,a)$, $R(-a,-b)$, and $S(-b,-a)$, where a and b are integers with $a > b > 0$. The area of $PQRS$ is 16. What is $a+b$?

(A) 4 **(B)** 5 **(C)** 6 **(D)** 12 **(E)** 13