2003 Q21

21. The area of trapezoid $ABCD$ is 164 cm^2. The altitude is 8 cm, AB is 10 cm, and CD is 17 cm. What is BC, in centimeters?
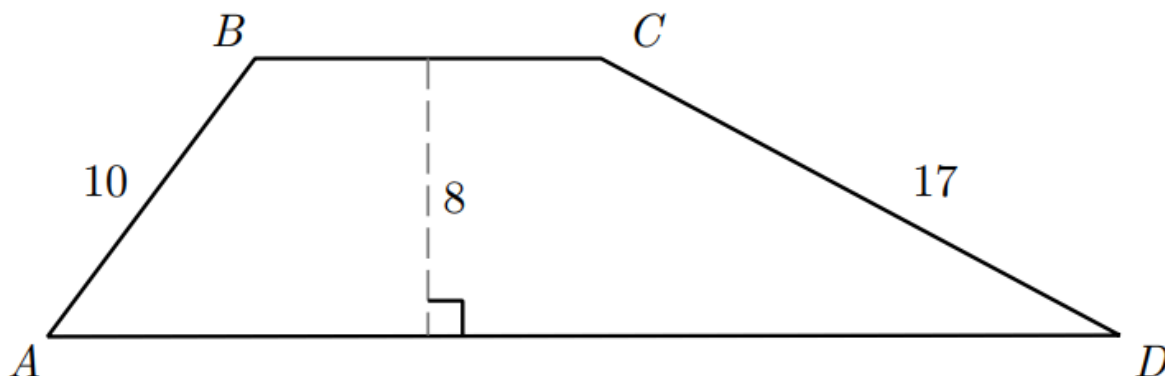
(A) 9   (B) 10   (C) 12   (D) 15   (E) 20

2006 Q21

21. An aquarium has a rectangular base that measures 100 cm by 40 cm and has a height of 50 cm. The aquarium is filled with water to a depth of 37 cm. A rock with volume 1000 cm^3 is then placed in the aquarium and completely submerged. By how many centimeters does the water level rise?
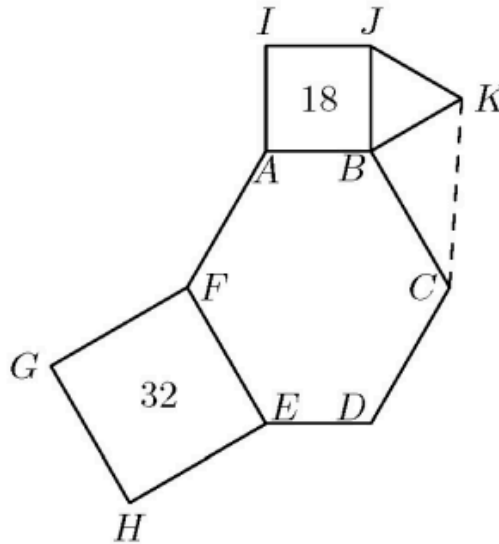
(A) 0.25   (B) 0.5   (C) 1   (D) 1.25   (E) 2.5

1

2015 Q21

21. In the given figure hexagon $ABCDEF$ is equiangular, $ABJI$ and $FEHG$ are squares with areas 18 and 32 respectively, $\triangle JBK$ is equilateral and $FE = BC$. What is the area of $\triangle KBC$?

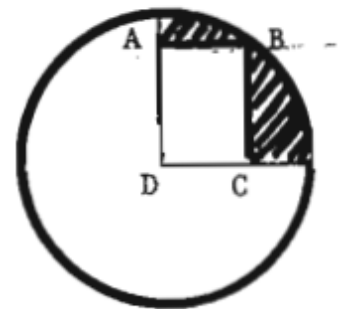(A) $6\sqrt{2}$ (B) 9   (C) 12   (D) $9\sqrt{2}$ (E) 32

1987 Q22

22. ABCD is a rectangle, D is the center of the circle, and B is on the circle. If AD = 4 and CD = 3, then the area of the shaded region is between
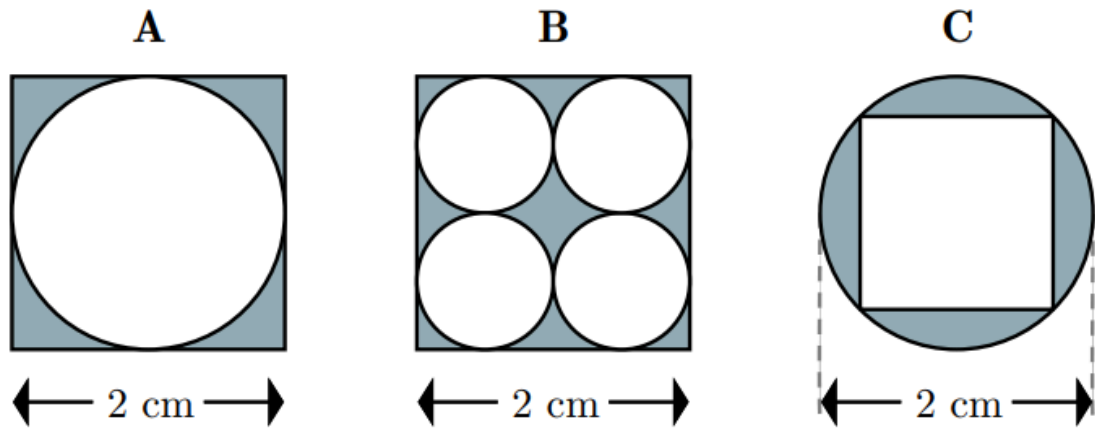

A) 4 and 5   B) 5 and 6   C) 6 and 7

D) 7 and 8   E) 8 and 9

2

2003 Q22

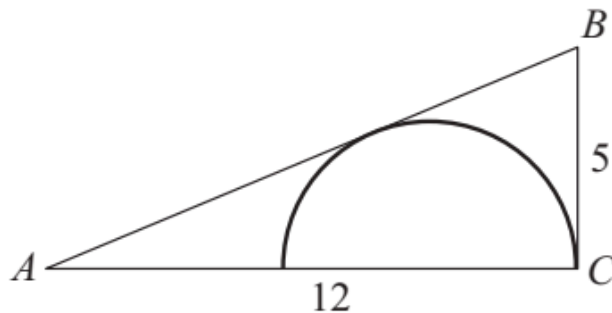22. The following figures are composed of squares and circles. Which figure has a shaded region with largest area?

(A) A only (B) B only (C) C only (D) both A and B (E) all are equal

2017 Q22

22. In the right triangle ABC, $AC = 12$, $BC = 5$, and angle C is a right angle. A semicircle is inscribed in the triangle as shown. What is the radius of the semicircle?
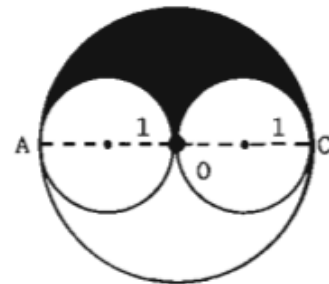

(A) $\dfrac{7}{6}$ (B) $\dfrac{13}{5}$ (C) $\dfrac{59}{18}$ (D) $\dfrac{10}{3}$ (E) $\dfrac{60}{13}$

3

1986 Q23

23. The large circle has diameter AC. The two small circles have their centers on AC and just touch at O, the center of the large circle. If each small circle has radius 1, what is the value of the ratio of the area of the shaded region to the area of one of the small circles?
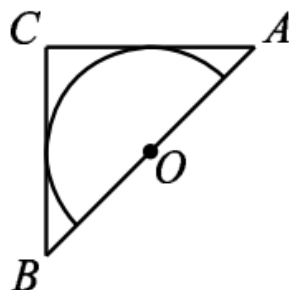
A) between $\frac{1}{2}$ and 1   B) 1   C) between 1 and $\frac{3}{2}$

D) between $\frac{3}{2}$ and 2   E) cannot be determined from the information given

2005 Q23

23. Isosceles right triangle ABC encloses a semicircle of area 2π. The circle has its center O on hypotenuse $\overline{AB}$ and is tangent to sides $\overline{AC}$ and $\overline{BC}$. What is the area of triangle ABC?
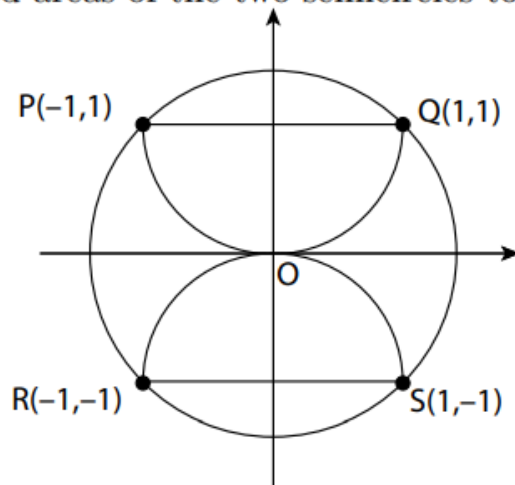
(A) 6   (B) 8   (C) 3π (D) 10   (E) 4π

2010 Q23

23. Semicircles POQ and ROS pass through the center of circle O. What is the ratio of the combined areas of the two semicircles to the area of the circle O?

P(−1,1)   Q(1,1)

O

R(−1,−1)   S(1,−1)

(A) $\dfrac{\sqrt{2}}{4}$ (B) $\dfrac{1}{2}$ (C) $\dfrac{2}{\pi}$ (D) $\dfrac{2}{3}$ (E) $\dfrac{\sqrt{2}}{2}$

2012 Q23

23. An equilateral triangle and a regular hexagon have equal perimeters. If the area of the triangle is 4, what is the area of the hexagon?

(A) 4   (B) 5   (C) 6   (D) $4\sqrt{3}$ (E) $6\sqrt{3}$

2013 Q23

23. Angle ABC of $\triangle ABC$ is a right angle. The sides of $\triangle ABC$ are the diameters of semicircles as shown. The area of the semicircle on $\overline{AB}$ equals 8π, and the arc of the semicircle on $\overline{AC}$ has length 8.5π. What is the radius of the semicircle on $\overline{BC}$?
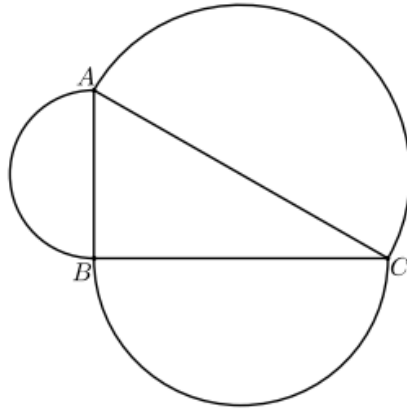
(A) 7   (B) 7.5   (C) 8   (D) 8.5   (E) 9

2016 Q23

23. Two congruent circles centered at points A and B each pass through the other's center. The line containing both A and B is extended to intersect the circles at points C and D. The two circles intersect at two points, one of which is E. What is the degree measure of $\angle CED$?
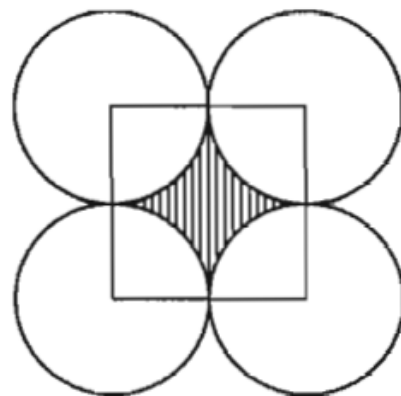
(A) 90   (B) 105   (C) 120   (D) 135   (E) 150

6

1992 Q24

24. Four circles of radius 3 are arranged as shown. Their centers are the vertices of a square. The area of the shaded region is closest to
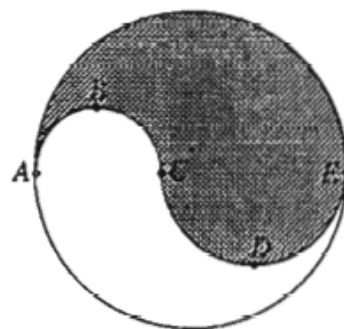
(A) 7.7   (B) 12.1   (C) 17.2
(D) 18   (E) 27

1997 Q24

24. Diameter ACE is divided at C in the ratio 2:3. The two semicircles, ABC and CDE, divide the circular region into an upper (shaded) region and a lower region. The ratio of the area of the upper region to that of the lower region is

(A) 2:3 (B) 1:1 (C) 3:2 (D) 9:4 (E) 5:2
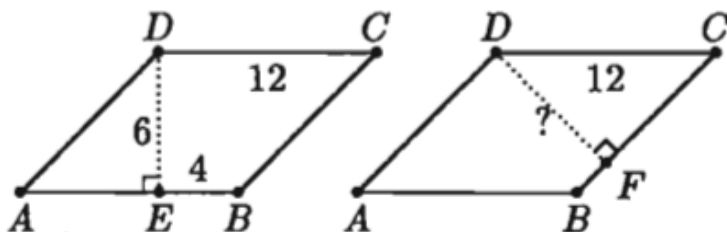
1995 Q24

24. In parallelogram $ABCD$, $\overline{DE}$ is the altitude to the base $\overline{AB}$ and $\overline{DF}$ is the altitude to the base $\overline{BC}$. [**Note:** *Both pictures represent the same parallelogram.*] If $DC = 12$, $EB = 4$ and $DE = 6$, then $DF =$
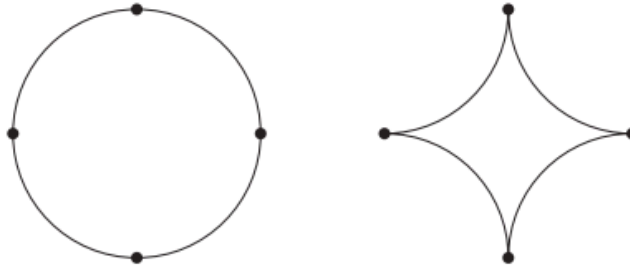
(A) 6.4   (B) 7   (C) 7.2
(D) 8   (E) 10

7

24. A circle of radius 2 is cut into four congruent arcs. The four arcs are joined to form the star figure shown. What is the ratio of the area of the star figure to the area of the original circle?

(A) $\dfrac{4-\pi}{\pi}$ (B) $\dfrac{1}{\pi}$ (C) $\dfrac{\sqrt{2}}{\pi}$ (D) $\dfrac{\pi-1}{\pi}$ (E) $\dfrac{3}{\pi}$

8