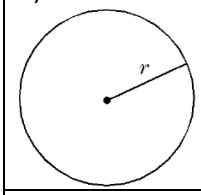
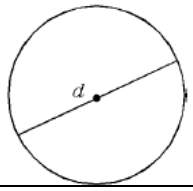
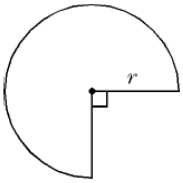
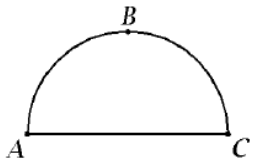
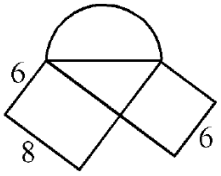
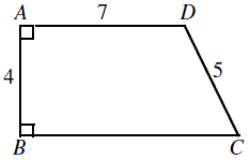
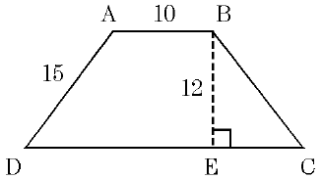
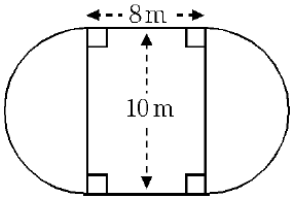
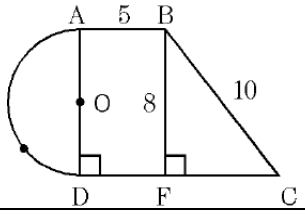
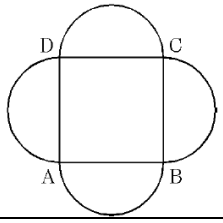
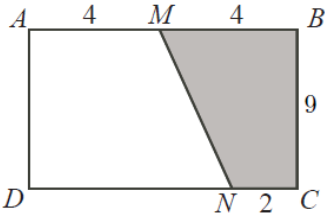
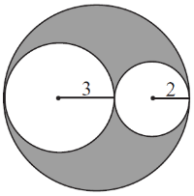
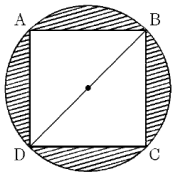
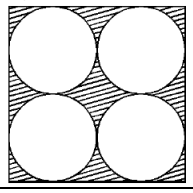
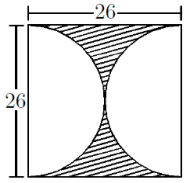
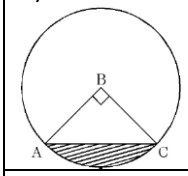
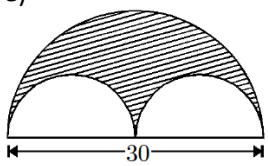
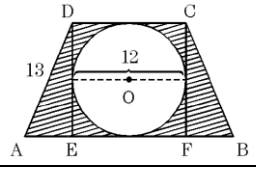
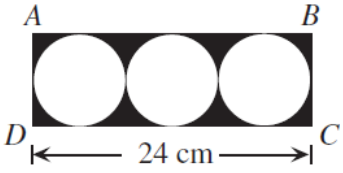
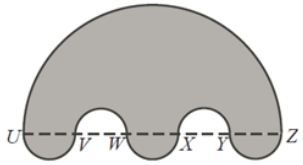
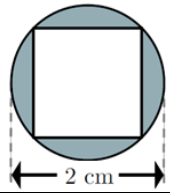
Name:_____ **Date:**_____

Math 8 Enriched: Section 5.2 Areas of Circles and Quadrilateral

1. Find the area of each of the following circles or trapezoid:

a) r = 20cm 	b) d = 16cm 	c) r = 9 cm 
d) Given AC = 12 	e) 	f) 
g) 	h) 	i) 
j) AD = AB = 10cm 	k) Find Area of MBCN 	L) 

2. Find the area of the shaded region:

a) 	b) Each side is 10cm 	c) 
d) AB = 5cm 	e) 	f) 
g) 	h) UV=VW=WX=XY=YZ=10cm 	i) 

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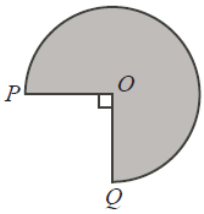
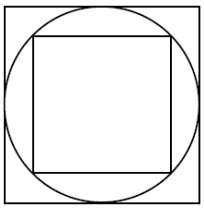
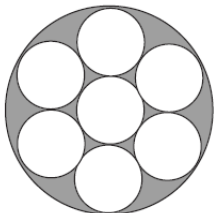
3. In the diagram, O is the center of the circle with radii OP=OQ=5. What is the perimeter of the objec



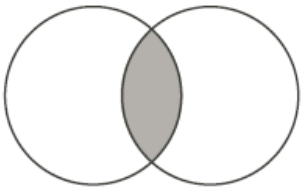
4. In the diagram, a circle is inscribed in a large square and a smaller square is inscribed in the circle. If the area of the large square is 36, what is the area of the smaller square?



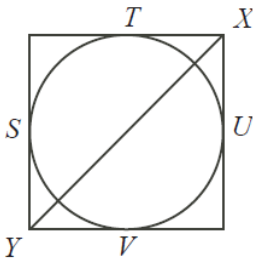
5. Each of the small circles in the figure has radius one. The innermost circle is tangent to the six circles that surround it, and each of those circles is tangent to the larger circle and to its small-circle neighbors. Find the area of the shaded region:



6. Two circles each of radius 10cm, overlap so that each contains exactly 25% of the other's circumference. What is the are of the shaded region?



7. In the diagram, the circle is inscribed in the square. This means that the circle and the square share points S, T, U, and V, and the width of the square is exactly equal to the diameter of the circle. What percentage of the line segment XY is outside the circle?



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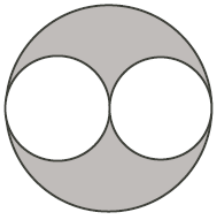
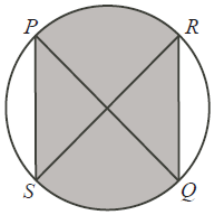
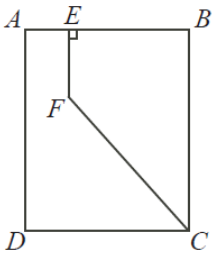
8. In the diagram, the smaller circles touch the larger circle and touch each other at the center of the larger circle. If the area of one of the smaller circles is $9\pi\ cm^2$ what is the area of the shaded region?



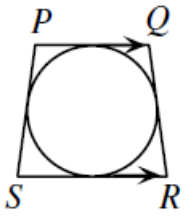
9. In the diagram, PQ and RS are diameters of a circle with radius 4cm. Given that PQ and RS are pendicular to each other and intersect and the center of the circle, find the area of the shaded region in terms of π.



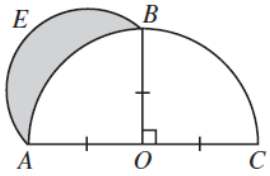
10. In the diagram, rectangle ABCD is divided into two regions, AEFCD and EBCF, of equal area. If *EB=40, AD=80* and EF=30, what is the length of AE?



11. A circle is inscribed in trapezoid PQRS. If PS=QR=25cm, PQ=18cm, and SR=32cm, what is the length of the diameter of the circle?



12. In the diagram, ABC is a semi-circle with diameter AC, center O and radius 1. Also OB is perpendicular to AC. Using AB as a diameter, a second semi-circle AEB is drawn. The region inside this second semi-circle that lies outside the original semi-circle is shaded as shown. What is the area of the shaded region?



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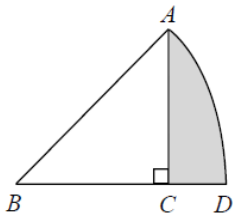
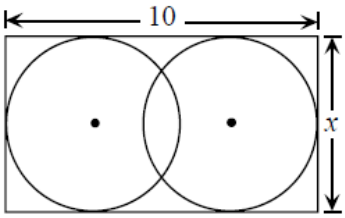
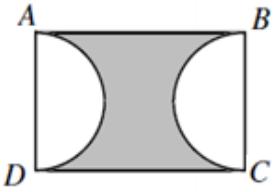
13. In the diagram, AB and BD are radii of a circle with center B. The area of sector ABD is 2π, which is one-eighth of the area of the circle. What is the area of the shaded region?



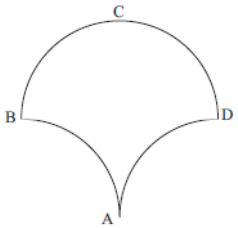
14. Two circles with equal radii are enclosed by a rectangle, as shown. The distance bewteen their centeres is $\frac{2x}{3}$. What is the value of "x".



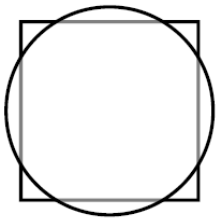
15. ABCD is a rectangle with AD=10. If the shaded area is 100 units^2, then what is the shortest distance between the two semicircles?



16. Three circular arcs of radius 5units bound the region shown. Arcs AB and AD are quarter circles, and arc BCD is a semi=circle. What is the area of the region?



17. A square with side length 2 and a circle share the same center. The total area of the regions that are inside the circle and outside the square is equal to the total area of the regions that are outside the circle and inside the square. What is the radius of the circle?



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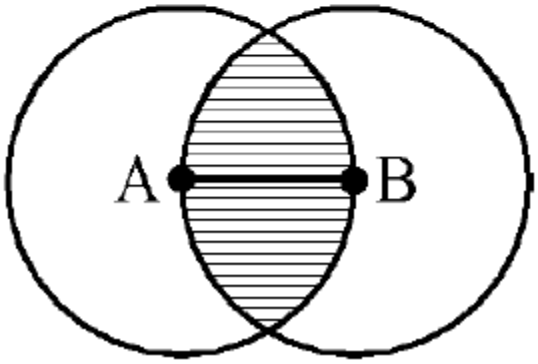
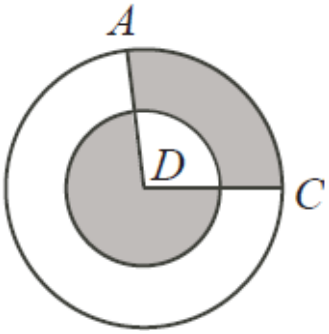
Congruent circles A and B intersect such that $\overline{AB}$ is a radius of each circle. If $AB = 6\,\text{cm}$, what is the number of square centimeters in the area of the shaded region? Use 3.14 as an approximation for π, and express your answer as a decimal to the nearest tenth. 44.2



In the diagram, two circles, each with centre D, have radii of 1 and 2. The total area of the shaded regions is $\frac{5}{12}$ of the area of the larger circle. What is a possible measure of $\angle ADC$?

(A) 108° **(B)** 120° **(C)** 90°

(D) 150° **(E)** 135°



18.

19.

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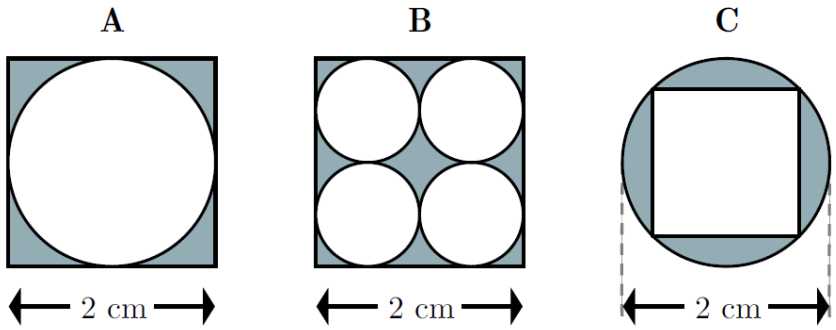
Which of the figures below has a shaded region with the largest area?

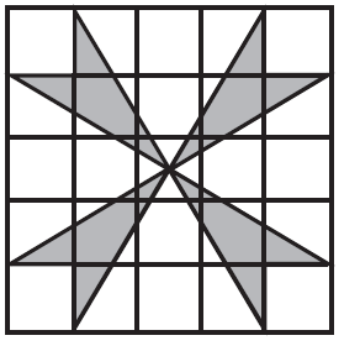


(A) A only **(B)** B only **(C)** C only **(D)** both A and B **(E)** all are equal

How many non-congruent triangles with perimeter 7 have integer side lengths?

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

What is the area of the shaded pinwheel shown in the 5×5 grid?



(A) 4 **(B)** 6 **(C)** 8 **(D)** 10 **(E)** 12

An 8-foot by 10-foot floor is tiled with square tiles of size 1 foot by 1 foot. Each tile has a pattern consisting of four white quarter circles of radius 1/2 foot centered at each corner of the tile. The remaining portion of the tile is shaded. How many square feet of the floor are shaded?

(A) $80 - 20\pi$ **(B)** $60 - 10\pi$ **(C)** $80 - 10\pi$ **(D)** $60 + 10\pi$ **(E)** $80 + 10\pi$

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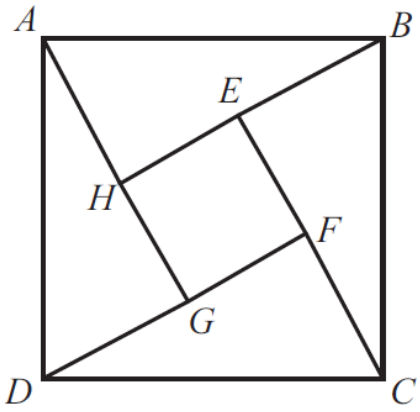
In the figure, the length of side AB of square $ABCD$ is $\sqrt{50}$, E is between B and H, and $BE = 1$. What is the the area of the inner square $EFGH$?

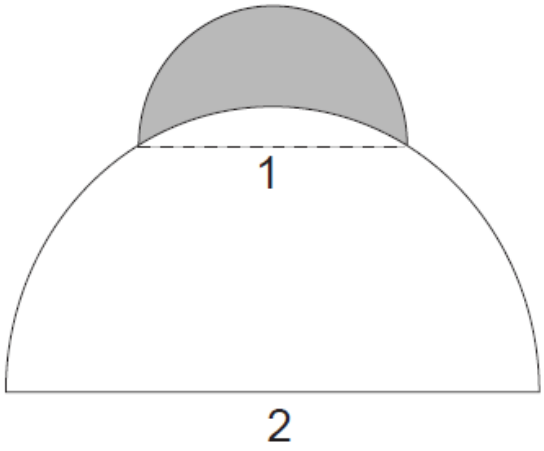


(A) 25 **(B)** 32 **(C)** 36 **(D)** 40 **(E)** 42

A circle passes through the three vertices of an isosceles triangle that has two sides of length 3 and a base of length 2. What is the area of this circle?

(A) 2π **(B)** $\frac{5}{2}\pi$ **(C)** $\frac{81}{32}\pi$ **(D)** 3π **(E)** $\frac{7}{2}\pi$

A semicircle of diameter 1 sits at the top of a semicircle of diameter 2, as shown. The shaded area inside the smaller semicircle and outside the larger semicircle is called a *lune*. Determine the area of this lune.



(A) $\frac{1}{6}\pi - \frac{\sqrt{3}}{4}$ **(B)** $\frac{\sqrt{3}}{4} - \frac{1}{12}\pi$ **(C)** $\frac{\sqrt{3}}{4} - \frac{1}{24}\pi$ **(D)** $\frac{\sqrt{3}}{4} + \frac{1}{24}\pi$

(E) $\frac{\sqrt{3}}{4} + \frac{1}{12}\pi$

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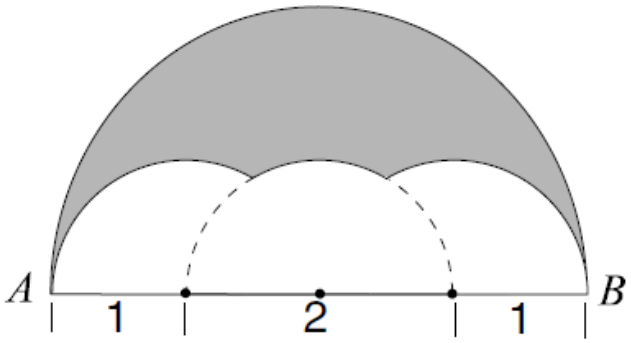
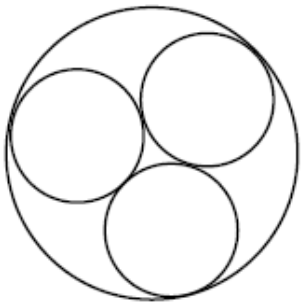
Three semicircles of radius 1 are constructed on diameter $\overline{AB}$ of a semicircle of radius 2. The centers of the small semicircles divide $\overline{AB}$ into four line segments of equal length, as shown. What is the area of the shaded region that lies within the large semicircle but outside the smaller semicircles?



(A) $\pi - \sqrt{3}$ **(B)** $\pi - \sqrt{2}$ **(C)** $\frac{\pi + \sqrt{2}}{2}$ **(D)** $\frac{\pi + \sqrt{3}}{2}$

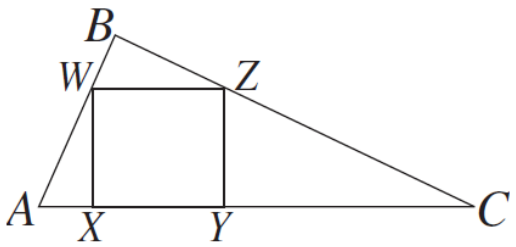
(E) $\frac{7}{6}\pi - \frac{\sqrt{3}}{2}$

Three circles of radius 1 are externally tangent to each other and internally tangent to a larger circle. What is the radius of the large circle?



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

Right $\triangle ABC$ has $AB = 3$, $BC = 4$, and $AC = 5$. Square $XYZW$ is inscribed in $\triangle ABC$ with X and Y on $\overline{AC}$, W on $\overline{AB}$, and Z on $\overline{BC}$. What is the side length of the square?



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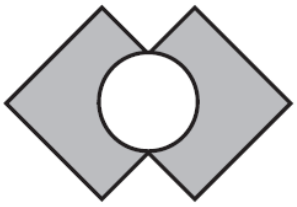
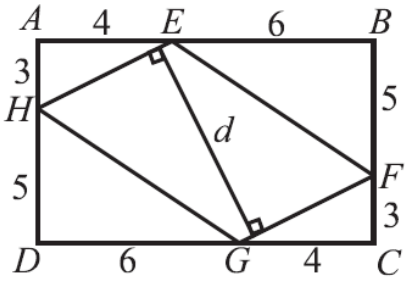
Two 4×4 squares intersect at right angles, bisecting their intersecting sides, as shown. The circle's diameter is the segment between the two points of intersection. What is the area of the shaded region created by removing the circle from the squares?



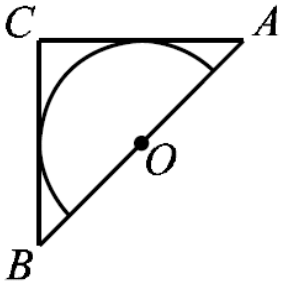
(A) $16 - 4\pi$ **(B)** $16 - 2\pi$ **(C)** $28 - 4\pi$ **(D)** $28 - 2\pi$ **(E)** $32 - 2\pi$

In the figure, $ABCD$ is a rectangle and $EFGH$ is a parallelogram. Using the measurements given in the figure, what is the length d of the segment that is perpendicular to $\overline{HE}$ and $\overline{FG}$?



(A) 6.8 **(B)** 7.1 **(C)** 7.6 **(D)** 7.8 **(E)** 8.1

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

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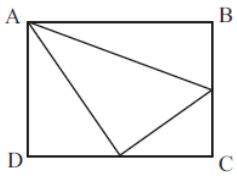
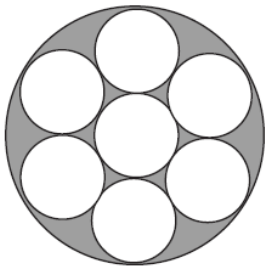
The area of rectangle $ABCD$ is 72. If point A and the midpoints of $\overline{BC}$ and $\overline{CD}$ are joined to form a triangle, the area of that triangle is



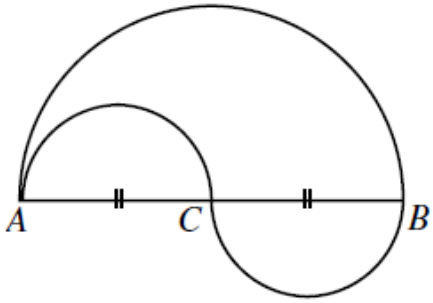
(A) 21 **(B)** 27 **(C)** 30 **(D)** 36 **(E)** 40

Each of the small circles in the figure has radius one. The innermost circle is tangent to the six circles that surround it, and each of those circles is tangent to the large circle and to its small-circle neighbors. Find the area of the shaded region.



(A) π **(B)** 1.5π **(C)** 2π **(D)** 3π **(E)** 3.5π

In the diagram, $AC = CB = 10$ m, where AC and CB are each the diameter of the small equal semi-circles. The diameter of the larger semi-circle is AB. In travelling from A to B, it is possible to take one of two paths. One path goes along the semi-circular arc from A to B. A second path goes along the semi-circular arcs from A to C and then along the semi-circular arc from C to B. The difference in the lengths of these two paths is



(A) 12π **(B)** 6π **(C)** 3π
(D) 2π **(E)** 0

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