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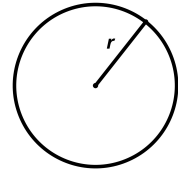
THE AREA OF A CIRCLE COMMON CORE GEOMETRY



The area formulas for rectangles, parallelograms, and triangles should all make sense simply from the perspective of multiplication. But, the area formula for a circle, like its circumference, is more of a mystery. First, we simply review the formula.

THE AREA OF A CIRCLE

The area of a circle whose radius is r is: $A = \pi r^2$



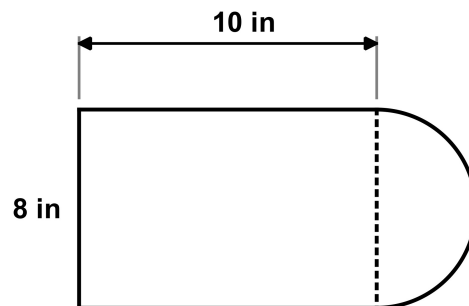
Exercise #1: For the circle whose equation is $(x-2)^2 + (y+5)^2 = 36$, which of the following is closest to its area?

- (1) 19 (3) 56
(2) 38 (4) 113

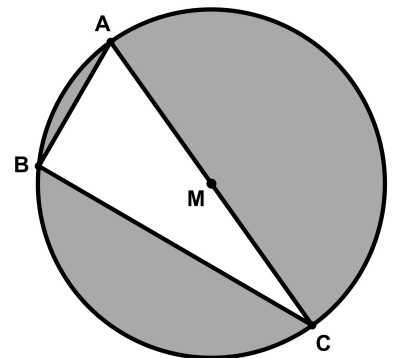
Circular objects are often added onto other shapes and then areas are found.

Exercise #2: A shape is constructed from a rectangle whose length is 10 inches and whose width is 8 inches along with a semicircle attached at the end. What is the total area of this shape?

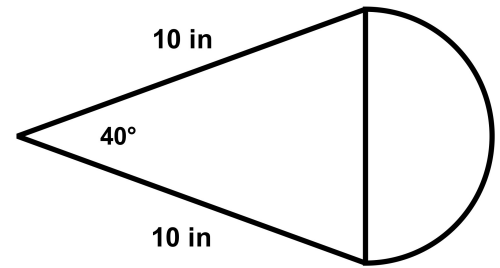
- (1) $80 + 32\pi$ (3) $80 + 8\pi$
(2) 88π (4) 96π



Exercise #3: In the diagram below, $\triangle ABC$ is inscribed in circle M such that \overline{AMC} is a diameter. The radius of circle M is 13 and the length of \overline{BC} is 24, then determine the shaded area to the nearest whole number.

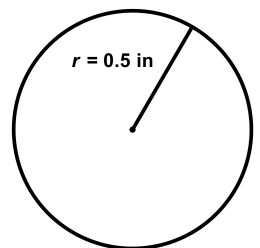


Exercise #4: A shape is being designed such that it is a combination of an isosceles triangle with a semicircle whose diameter is the base of the triangle. The isosceles triangle has legs that are 10 inches in length and a vertex angle that measures 40° . Determine the area of the semicircle to the nearest tenth of a square inch. Show how you arrived at your answer.



In our last set of exercises, we will make an informal argument for why the area of a circle has the formula that it does. This is all based, though, on the circumference formula for a circle.

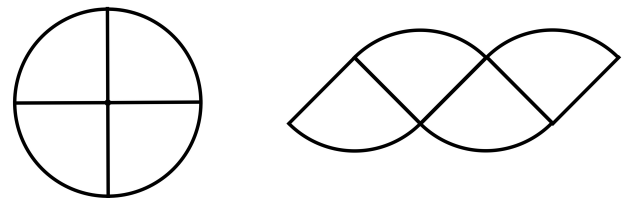
Exercise #5: Consider a circle whose radius is 0.5 inches as shown below. Determine its circumference, half its circumference, and area to the nearest three decimal places.



$C =$ _____ $\frac{C}{2} =$ _____ $A =$ _____

Exercise #6: Now, examine the additional handout on **Circle Dissection Diagrams**. On the sheet, the same circle has been sliced repeatedly and rearranged. The first such is shown below as well.

(a) What must be true about the area of the rearranged circle portions compared to the original area of the circle?



(b) As the number of slices (sectors) increases, what does the shape of the rearrangement start to resemble?

(e) If the radius is r instead of 0.5, fill in the diagram below for the height, the base and the area.

(c) What value does the height of the rearrangement continue to get closer to? What does the base length get closer to? (See #5 above)



(d) What does the value of the area of this new shape approach?

$A =$ _____



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THE AREA OF A CIRCLE

COMMON CORE GEOMETRY HOMEWORK

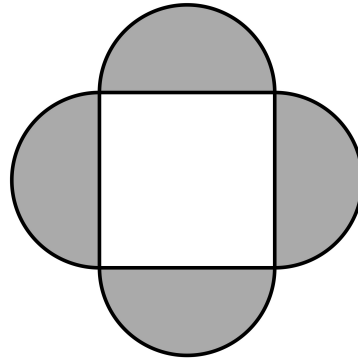
PROBLEM SOLVING

1. If a circle has a circumference of 10π inches, then which of the following represents the area of the same circle in square inches?

- (1) 5π (3) 25π
 (2) 20π (4) 100π

2. In the design shown below, four semicircles are attached to a square whose area is 36 square centimeters. Which of the following is closest to the total area of the shaded semicircles, measured in square centimeters?

- (1) 57
 (2) 82
 (3) 113
 (4) 158

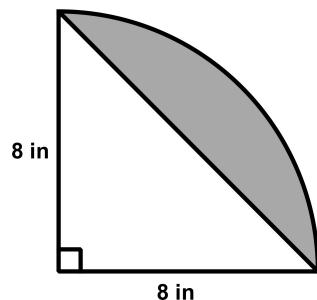


3. Which of the following formulas gives the area of a circle in terms of the circle's radius, r , and its circumference, C ?

- (1) $A = \pi \cdot C \cdot r$ (3) $A = C \cdot r$
 (2) $A = \frac{\pi}{2} \cdot C \cdot r$ (4) $A = \frac{1}{2} C \cdot r$

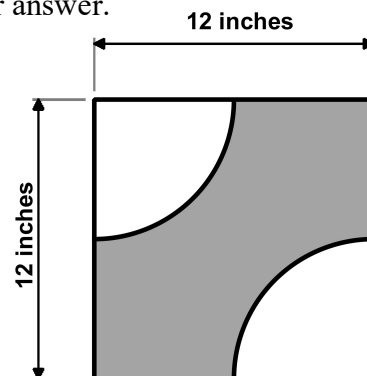
4. In the following diagram, a quarter circle has been constructed using an isosceles right triangle whose legs measure 8 inches. Which of the following represents the area of the shaded region, rounded to the nearest tenth of a square inch?

- (1) 12.5
 (2) 18.3
 (3) 21.7
 (4) 28.6

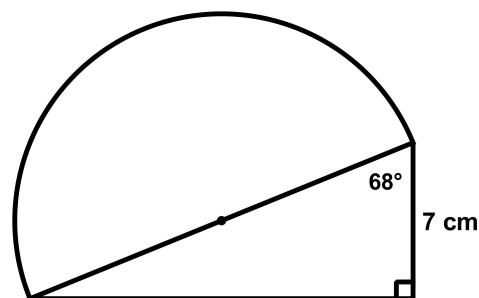




5. In the diagram below, a square whose sides are 12 inches long has been shaded and then overlaid with two quarter circles, each of which having a radius of 6 inches. What percent of the total area is shaded? Round your answer to the nearest whole percent and show the work that leads to your answer.



6. A semicircle has as its diameter the hypotenuse of a right triangle shown below. Determine the area of the semicircle to the nearest tenth of a square centimeter. Show how you arrived at your answer.



7. A circle has the equation $x^2 + 2x + y^2 - 4y = 12$.

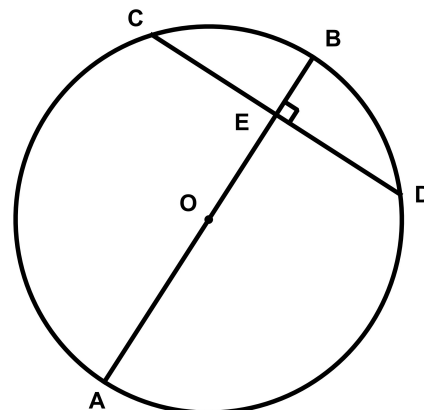
(a) Determine the coordinates of the center of this circle.

(b) Determine the exact area of this circle in terms of pi.

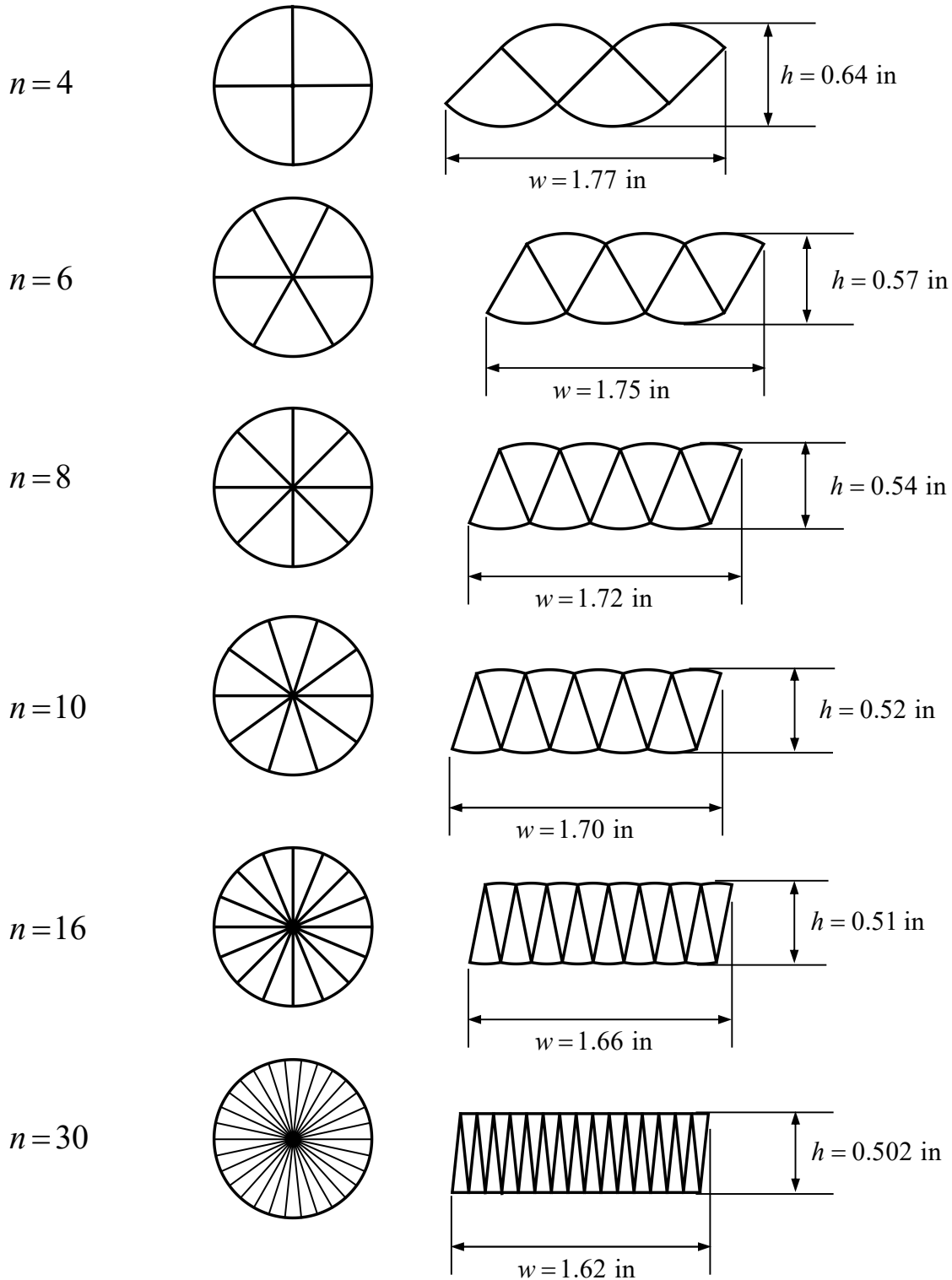
8. In circle O shown, diameter \overline{AOB} is perpendicular to chord \overline{CD} . If $CD = 8$ and $BE = 2$ then

(a) Find the length of \overline{AE} .

(b) Find the exact area of circle O in terms of pi.



CIRCLE DISSECTION DIAGRAMS



n	100	200	500	1000	10,000
w	1.5862	1.5786	1.5739	1.5724	1.57096
h	0.5003	0.50006	0.50001	0.500002	0.50000002



