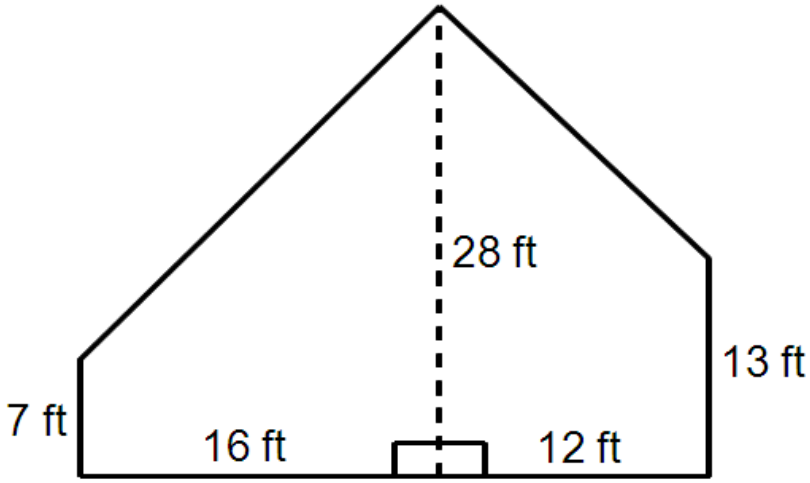
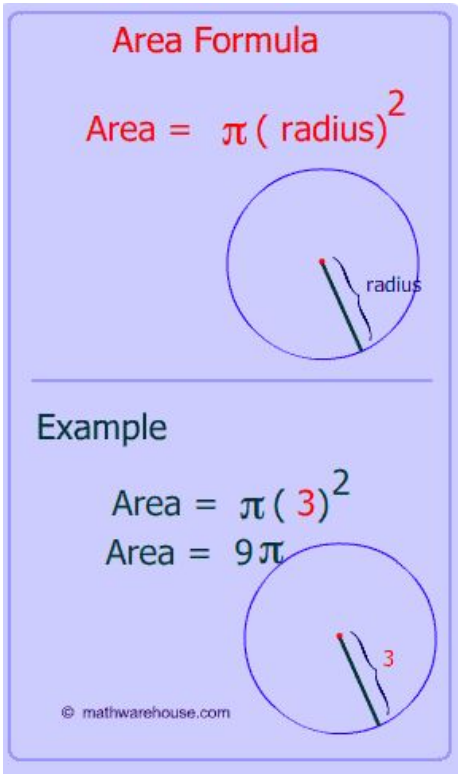
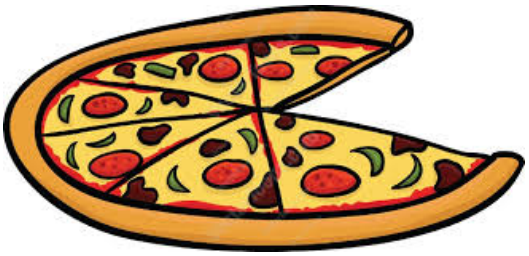
Warm-Up: Find the area of the figure below





You and your friends want to order pizza for dinner. Domino's offers an 18" pizza for $20 while Pizza Hut offers two 12" pizzas for the same price. Which is the better deal?



Domino's

$A = \pi \cdot 9^2$

$A = 81\pi$

Pizza Hut

$A = \pi \cdot 6^2 = 36\pi$

2 Pizzas $A = 36\pi \cdot 2 = 72\pi$

How do you use these new conjectures? Let's look at a few examples.

EXAMPLE A The small apple pie has a diameter of 8 inches, and the large cherry pie has a radius of 5 inches. How much larger is the large pie?

$A = \pi \cdot 4^2$

$A = 16\pi \text{ in}^2$

$A = \pi \cdot 5^2$

$A = 25\pi \text{ in}^2$

Difference: $25\pi - 16\pi = 9\pi \text{ in}^2$

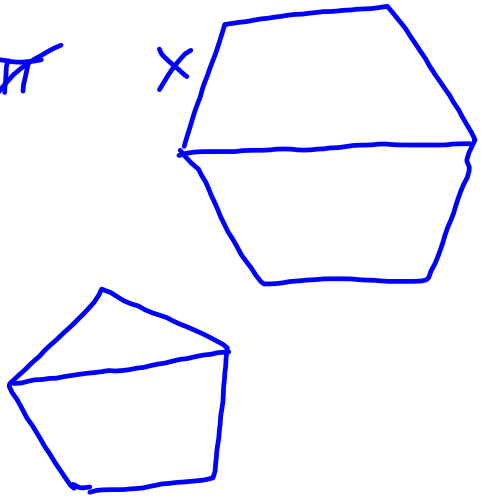
About 28.3 in^2 larger.

$A = 49\pi$

$\pi r^2 = 49\pi$

$r^2 = 49$

$r = 7$



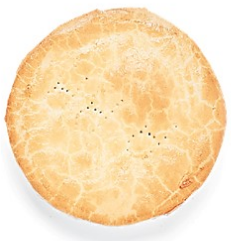
SOLUTION First, find each area.

Small pie

$A = \pi r^2$
$= \pi(4)^2$
$= \pi(16)$
≈ 50.2

Large pie

$A = \pi r^2$
$= \pi(5)^2$
$= \pi(25)$
≈ 78.5



The large pie is 78.5 in^2, and the small pie is 50.2 in^2. The difference in area is about 28.3 square inches. So the large pie is more than 50% larger than the small pie, assuming they have the same thickness. Notice that we used 3.14 as an approximate value for π.

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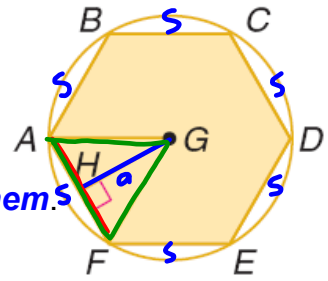
Areas of Regular Polygons and Circles

***APOTHEM*: segment drawn from center perpendicular to the side of a polygon.**



$\overline{GH}$ is an *apothem*.

Area $\Delta AGF = 1/2\ bh$
$1/2\ sa$

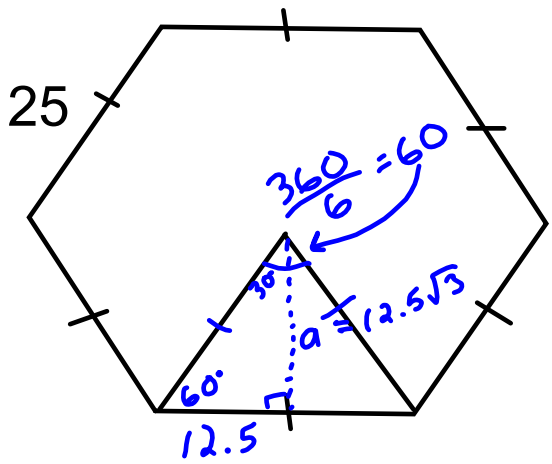
Area of hexagon is 6(1/2sa)
or 1/2Pa

Area of a Regular Polygon

P = perimeter of the polygon
a = length of apothem

$$\frac{1}{2}Pa = \text{Area of a regular polygon}$$

1) Find the area of the regular hexagon with a perimeter of 150 in.



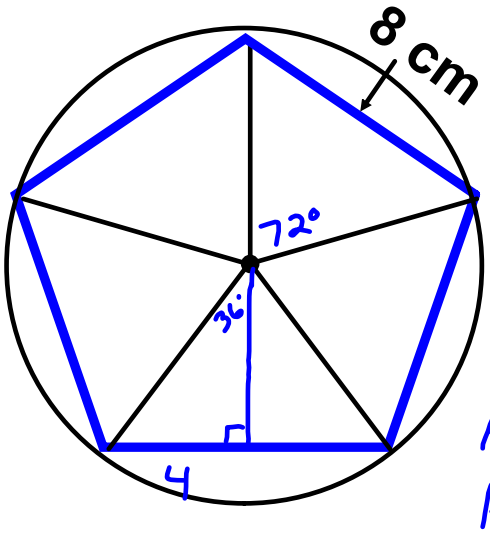
$A = \frac{1}{2}Pa$

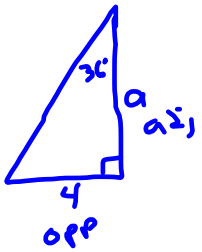
$A = \frac{1}{2} \cdot 150 \cdot 12.5\sqrt{3}$

$A = 937.5\sqrt{3}\ in^2$

2) Find the area of the regular pentagon.

SOH-CAH-TOA $P = 40\text{cm}$





$\tan 36 = \frac{4}{a}$

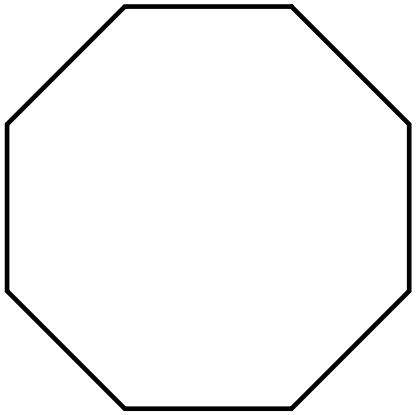
$a\tan 36 = 4$

$a = \frac{4}{\tan 36} \approx 5.5$

$A = \frac{1}{2} \cdot 40 \cdot 5.5$ $A = \frac{1}{2} \cdot 40 \cdot \frac{4}{\tan 36}$

$A = 110\text{cm}^2$ $A \approx 110.1\text{cm}^2$

3) Given the area of 800 m^2 for a regular octagon and its apothem of 10m, find the length of each side.



LESSON 8.3

Areas of Circles and Regular Polygons

Summarize

- How can you remember that the area is πr^2 and the circumference is $2\pi r$?
- In Investigation 2, how close are the polygonal areas to the area of the circumscribed circle?

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LESSON 8.3

Areas of Circles and Regular Polygons

Summarize

- How can you remember that the area is πr^2 and the circumference is $2\pi r$?

  One way is to use dimensional analysis; $2\pi r$ has the same linear units as r, whereas πr^2 has square units.

- In Investigation 2, how close are the polygonal areas to the area of the circumscribed circle?

  For a large number of sides, the apothem is close to the radius and the perimeter is close to the circumference.

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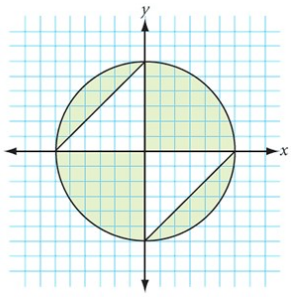
LESSON 8.3

Areas of Circles and Regular Polygons

Extra Example

Find the area of the shaded region.



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LESSON 8.3

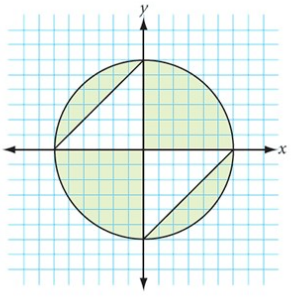
Areas of Circles and Regular Polygons

Extra Example

ANSWER

Find the area of the shaded region.

$36\pi - 36$



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Homework: Workbook Pg. 60-61: 1-19 skip 5 and 6