

BE - Geometry 1 Thursday 3-3-11

① Find the area of a cube
with sides = 4 in.

② $\log_2 16 = x$ $x = ?$

③ $4^{2x+1} = 8^{3x}$ $x = ?$

④ $\log 100 = ?$

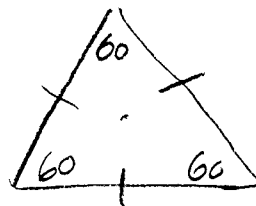
Ch 11-3 Areas of Regular Polygons And Circles

REGULAR POLYGON (Angles less than 180°)
A CONVEX POLYGON WITH
All sides congruent AND
All interior angles congruent

All sides $\cong$ AND All angles $\cong$

EXAMPLES

REGULAR 

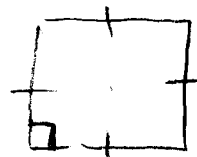


Interior Angle

EQUILATERAL

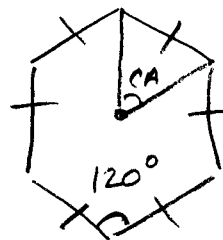
 $180^\circ/3$

REGULAR 



SQUARE
 $360^\circ/4$

REGULAR 

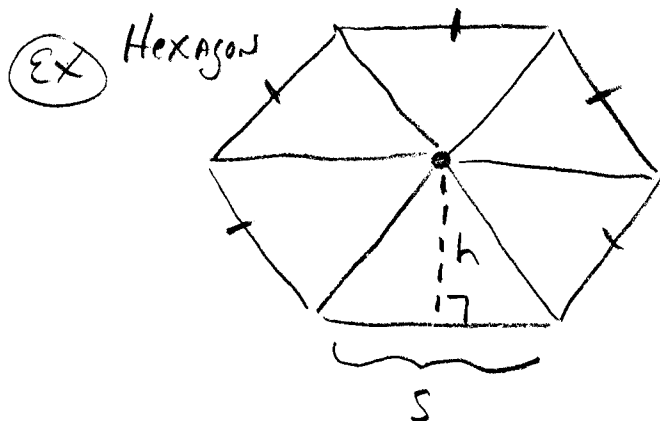


hexAGON
 $720^\circ/6$

Central Angle $\Rightarrow \frac{360}{\text{NUMBER OF SIDES}}$

(EX) hexAGON $\Rightarrow \frac{360}{6} = 60^\circ$

Any regular polygon with N sides
can be split into N congruent
triangles:



The Area of each Δ is $\frac{1}{2}Sh$

So the Area $\square$ is $6 \cdot \frac{1}{2}Sh$

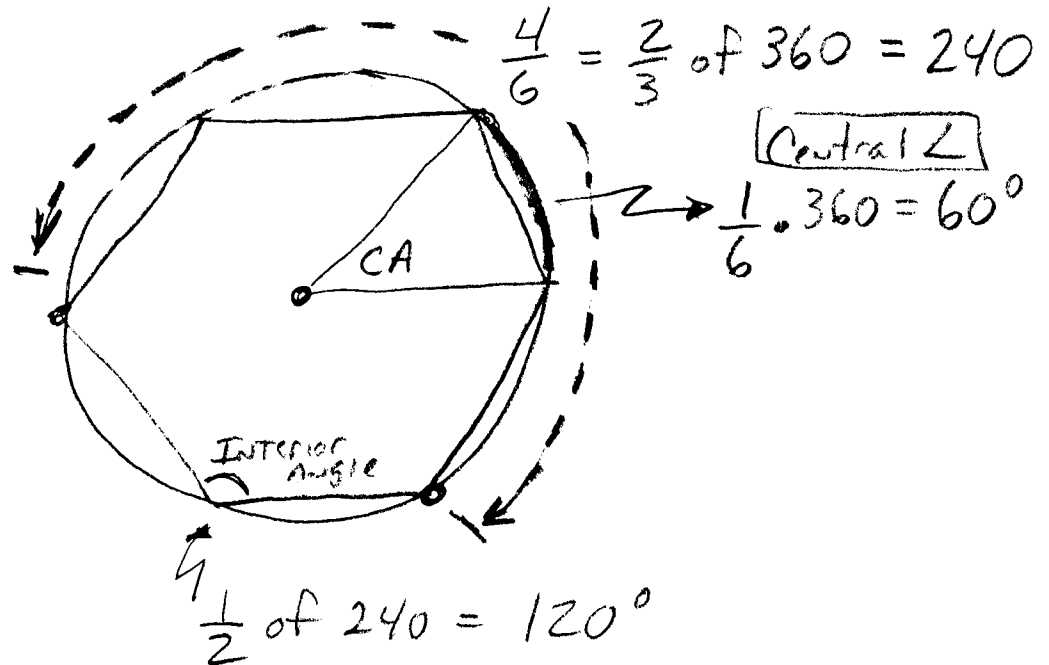
$$\text{OR } \frac{1}{2} \cdot 6sh$$

but the Perimeter, $P = (6s)$

$$\therefore \boxed{A = \frac{1}{2}Ph}$$

h = the perpendicular drawn from the
center of a regular polygon to
a side of the polygon
It is called the apothem, a

A circumscribed circle outside of a regular polygon shows the properties of the interior and central angles.



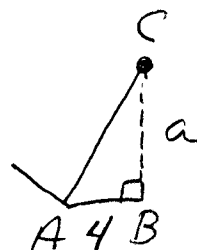
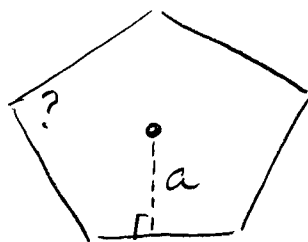
$$\boxed{\text{Central Angle} = \frac{1}{2} \text{ Interior Angle}}$$

$\therefore$ if P is the perimeter
and a is the apothem

$$\boxed{\text{Area of A Regular Polygon} = \frac{1}{2} Pa}$$

Ex 1
pg 611

FIND THE AREA OF A REGULAR
PENTAGON WITH A PERIMETER OF
40 cm. $\Rightarrow$ Each side = $\frac{40}{5} = 8$ cm



MEASURE OF EACH ANGLE

is $\frac{360+180}{5} = \frac{540}{5} = 108^\circ \therefore m\angle A = 54^\circ$

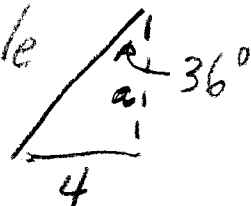
$$\tan A = \frac{a}{4} \therefore a = 4 \tan 54^\circ$$

$$a = 4(1.3764) = 5.5056$$

$$\therefore \text{Area}_{\square} = \frac{1}{2} (40) 5.5056 \approx \boxed{110.1 \text{ cm}^2}$$

BOOK used the central angle

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



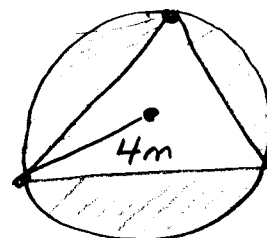
Area of Circle $\Rightarrow$ $A_{\odot} = \pi r^2$

Since $d = 2r \Rightarrow r = \frac{d}{2} \therefore A_{\odot} = \pi \left(\frac{d}{2}\right)^2$

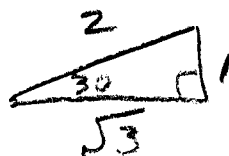
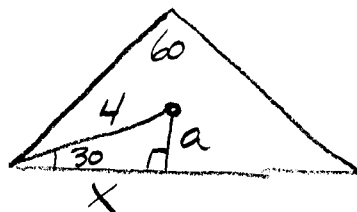
$$A_{\odot} = \frac{\pi d^2}{4}$$

EX3 Pg 612 Equilateral Δ inscribed in circle.
Find Area of SHADED region.

Area $\odot = \pi(4)^2 = 16\pi$
meters²



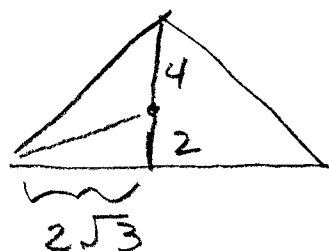
$A_{\Delta} \Rightarrow$



$\therefore a = 2 \therefore x = 2\sqrt{3}$

$\therefore$ 1 side of $\Delta = 2(2\sqrt{3}) = 4\sqrt{3}$

base = $2\sqrt{3}$



$A_{\Delta} = \frac{1}{2}(4\sqrt{3})6 = 12\sqrt{3}$

$\therefore A_{\text{SHADED}} = 16\pi - 12\sqrt{3}$
 $\approx 50.27 - 20.78$

Homework: Pg 613 # 3, 6, 14, 19

$A \approx 29.49 \text{ m}^2$