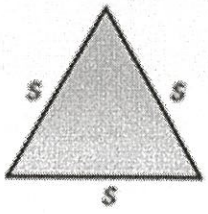
Section 11.2A
Areas of Regular Polygons

THEOREM

THEOREM 11.3 ***Area of an Equilateral Triangle***

The area of an equilateral triangle is one fourth the square of the length of the side times $\sqrt{3}$.

$$A = \frac{1}{4}\sqrt{3}s^2$$

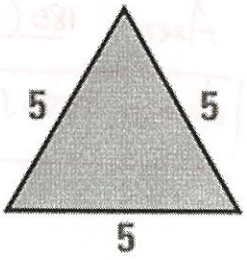


$A = \frac{s^2\sqrt{3}}{4}$

Examples

Find the area of the triangle.

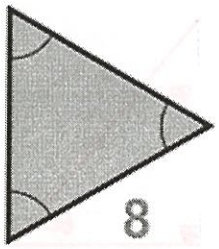
1.



$A = \frac{5^2\sqrt{3}}{4}$

$A = \frac{25\sqrt{3}}{4}$ UNITS^2

2.

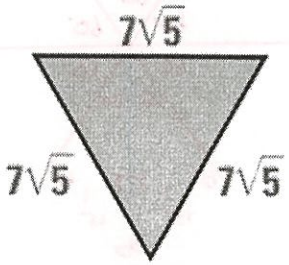


$A = \frac{8^2\sqrt{3}}{4}$

$A = \frac{64\sqrt{3}}{4}$

$A = 16\sqrt{3}$ UNITS^2

3.

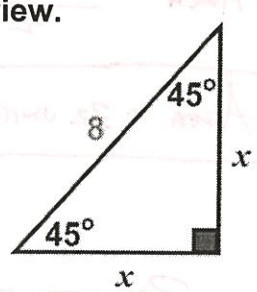


$A = \frac{(7\sqrt{5})^2\sqrt{3}}{4}$

$A = \frac{245\sqrt{3}}{4}$ UNITS^2

Review.

4.



$45°-45°-90°\ \Delta$

Hyp = Leg · $\sqrt{2}$

$8 = x\sqrt{2}$

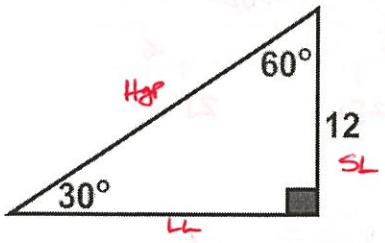
$\frac{8}{\sqrt{2}} = x$

$\frac{\sqrt{2}}{\sqrt{2}} \cdot \frac{8}{\sqrt{2}} = x$

$\frac{8\sqrt{2}}{2} = x$

$4\sqrt{2} = x$

5.



$30°-60°-90°\ \Delta$

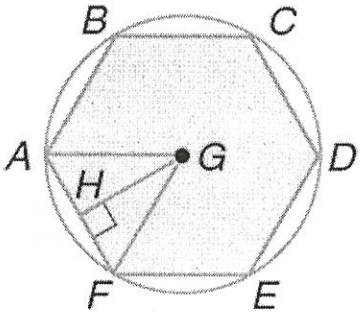
Hyp = SL · 2

Hyp = 12 · 2

Hyp = 24

LL = SL · $\sqrt{3}$

$LL = 12\sqrt{3}$



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

Example

$\overline{GH}$ is an apothem to polygon *ABCDEF*.

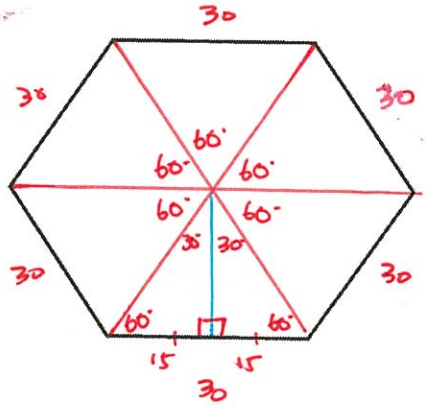
Area of a Regular Polygon

$$Area\ of\ a\ Regular\ Polygon = \frac{Perimeter\ of\ polygon \bullet Apothem}{2}$$

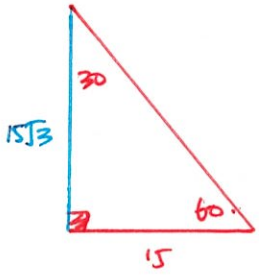
Examples

Find the area of a regular polygons.

6.



$\frac{360°}{6} = 60°$



30°-60°-90° Δ

LL = SL · √3

LL = 15√3

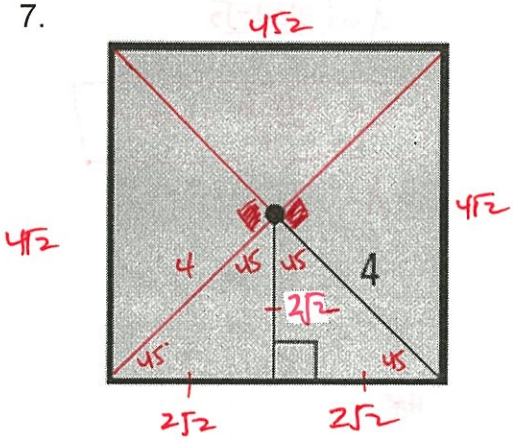
PERIMETER = 30(6)

PERIMETER = 180 UNITS

AREA = $\frac{180(15\sqrt{3})}{2}$

AREA = 1350√3 UNITS²

7.



$\frac{360°}{4} = 90°$

45°-45°-90° Δ

HYP = LEG · √2

4 = LEG · √2

$\frac{4}{\sqrt{2}}$ = LEG

$\frac{4\sqrt{2}}{2}$ = LEG

2√2 = LEG

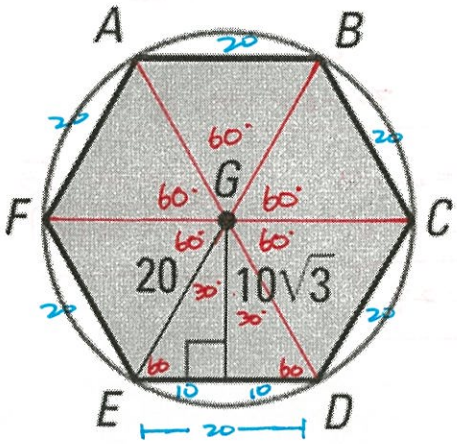
PERIMETER = 4√2(4)

PERIMETER = 16√2 UNITS

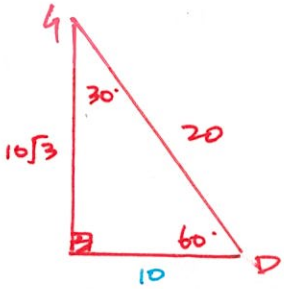
AREA = $\frac{16\sqrt{2}(2\sqrt{2})}{2}$

AREA = 32 UNITS²

8.



$\frac{360°}{6} = 60°$



30°-60°-90° Δ

HYP = SL · 2

20 = SL · 2

10 = SL

PERIMETER = 20(6)

PERIMETER = 120 UNITS

AREA = $\frac{120(10\sqrt{3})}{2}$

AREA = 600√3 UNITS²