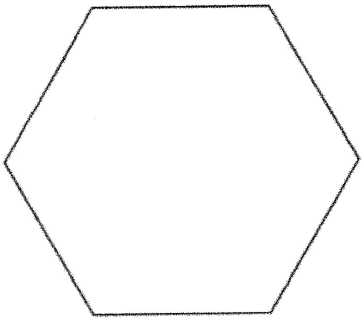
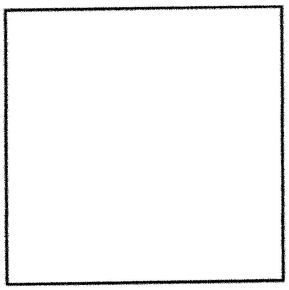
Practice #13 Geo Exact area of Regular Polygons Wednesday, April 1, 2020

Find the EXACT area of each regular polygon. Give answers in simplified radical form with rationalized denominators.

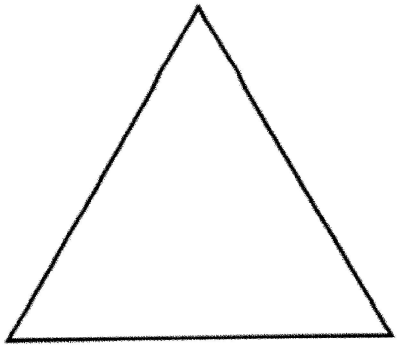
1. A regular hexagon with of radius 20.



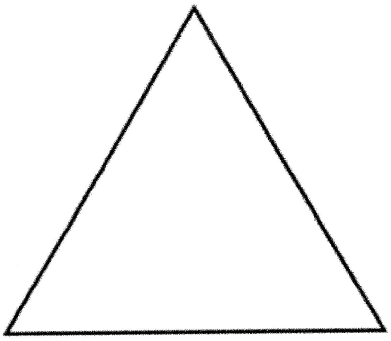
2. A square whose apothem is 7.



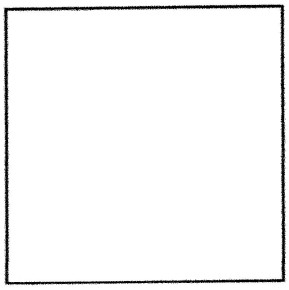
3. An equilateral triangle whose sides are 8 each.



4. An equilateral triangle with a radius of 24.



5. A square with a radius of 13.



Practice #13 Geo Exact area of Regular Polygons Wednesday, April 1, 2020

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ANSWERS

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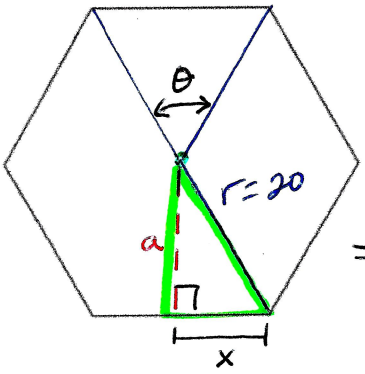
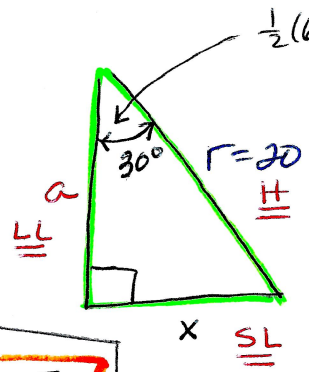


central ∠ $\theta = \frac{360°}{6} = 60°$



30-60-90 Δ

$SL = \frac{1}{2}HYP = \frac{1}{2}(20) = 10$

$x = 10$

therefore 1 side = 2(10) = 20

perimeter = 6(20)

$P = 120$

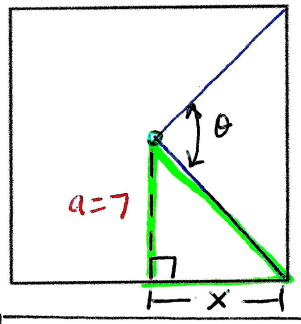
$LL = SL \cdot \sqrt{3} = 10\sqrt{3}$

$a = 10\sqrt{3}$

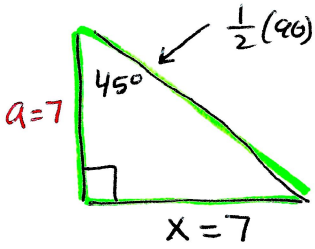
$A = \frac{1}{2}a \cdot p$

$= \frac{1}{2}(10\sqrt{3})(120) = \boxed{600\sqrt{3}}$

2. A square whose apothem is 7.



central ∠ $\theta = \frac{360}{4} = 90°$



45-45-90 Δ

Legs are ≅

$x = a = 7$

1 side = 2x = 2(7) = 14

perimeter = 4(14) = 56

$P = 56$

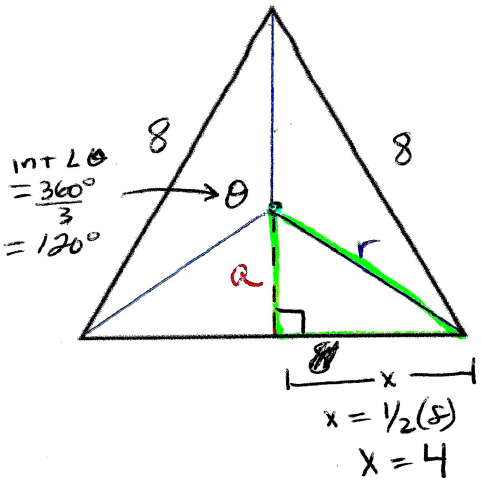
$A = \frac{1}{2}ap = \frac{1}{2}(7)(56)$

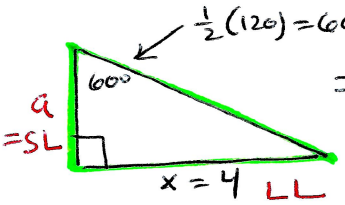
$\boxed{A = 196}$

3. An equilateral triangle whose sides are 8 each.

perimeter = 3(8) = 24

$P = 24$





30-60-90 Δ

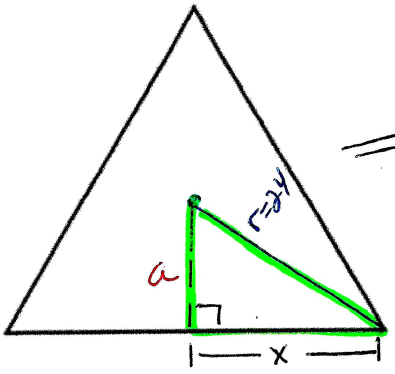
$SL = \frac{LL}{\sqrt{3}} = \frac{4}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$SL = \frac{4\sqrt{3}}{3}$

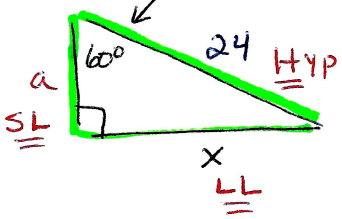
$a = SL = \frac{4\sqrt{3}}{3}$

$A = \frac{1}{2}ap = \frac{1}{2}\left(\frac{4\sqrt{3}}{3}\right)(24) = \boxed{16\sqrt{3}}$

4. An equilateral triangle with a radius of 24.



same as from previous problem



30°-60°-90° Δ

$SL = \frac{1}{2} \cdot Hyp = \frac{1}{2}(24)$

$SL = 12 = a$

$a = 12$

$LL = SL \cdot \sqrt{3} = 12\sqrt{3}$

$x = LL = 12\sqrt{3}$

$1 \text{ side} = 2x = 2(12\sqrt{3}) = 24\sqrt{3}$

- $\text{perimeter} = 3 \cdot \text{side} = 3(24\sqrt{3})$

$P = 72\sqrt{3}$

$A = \frac{1}{2} a P$

$= \frac{1}{2}(12)(72\sqrt{3})$

$A = 432\sqrt{3}$

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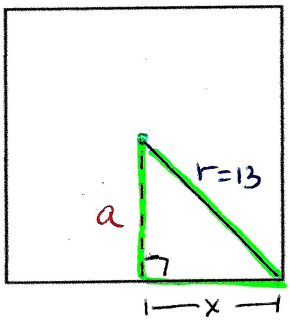
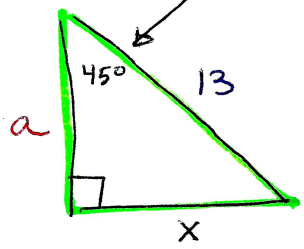
5. A square with a radius of 13.



same as from prob #2



45°-45°-90° Δ

Legs are $\cong$

$Leg = \frac{Hyp}{\sqrt{2}} = \frac{13}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$a = x = \frac{13\sqrt{2}}{2}$

$a = \frac{13\sqrt{2}}{2}$

$1 \text{ side} = 2x = 2\left(\frac{13\sqrt{2}}{2}\right) = 13\sqrt{2}$

$\text{perimeter} = 4 \cdot \text{side} = 4(13\sqrt{2})$

$P = 52\sqrt{2}$

$A = \frac{1}{2} a p$

$= \frac{1}{2}\left(\frac{13\sqrt{2}}{2}\right)(52\sqrt{2})$

$A = 338$