Area of Polygons

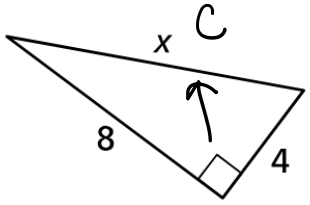
$A = \frac{b \times h}{2}$ $b \perp h$

SOH CAH TOA

Adjacent

Find the value of *x* in the right triangle.

1.



P-thag's 2 out of 3

$a^2 + b^2 = c^2$

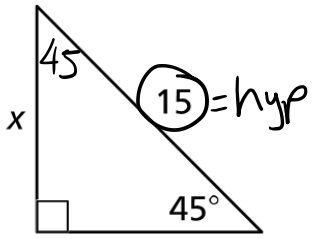
$4^2 + 8^2 = c^2$

or $8^2 + 4^2 = c^2$

$16 + 64 = c^2$

$80 = c^2$ $c = 8.9$

2.



45-45-90

$h = \text{leg}\sqrt{2}$

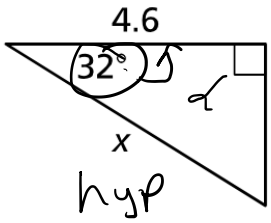
$15 = x\sqrt{2}$

$\frac{15}{\sqrt{2}} = \frac{x\sqrt{2}}{\sqrt{2}}$

$x = 15/\sqrt{2}$

$x = 10.6$

3.



$\cos 32° = \frac{4.6}{x}$

$\frac{4.6}{\cos(32)^\circ} = x \cdot \frac{\cos(32)^\circ}{\cos(32)^\circ}$

$x = \frac{4.6}{\cos(32)^\circ}$

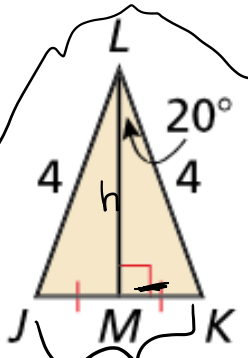
$x = 5.4$

Ex 1

Find the area of the triangle

You Try

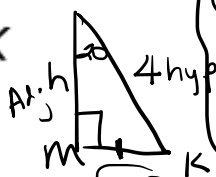
(Note: The base and height of a triangle are perpendicular)



$b \perp h$ $A = 5.14$

$A = \frac{b \times h}{2} = \frac{2.73616 \times 3.75877}{2}$

SOH CAH TOA



$\cos(20) = \frac{h}{4}$

$h = 4 \times \cos(20)$

$h = 3.75877$

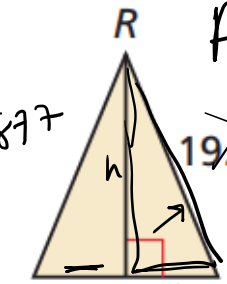
$\sin(20) = \frac{Opp}{4}$

$Opp = 4 \cdot \sin(20)$

$Opp = 1.36809$

$b = 2 \times 1.36809$

$b = 2.73616$



$A = \frac{b \times h}{2}$

$A = \frac{15 \times 18.1}{2} = 135.75$ in^2

$a^2 + b^2 = c^2$

$(7.5)^2 + h^2 = (19.6)^2$

$56.25 + h^2 = 384.16$

$h^2 = 384.16 - 56.25$

$\sqrt{h^2} = \sqrt{327.91}$

$h = 18.1$

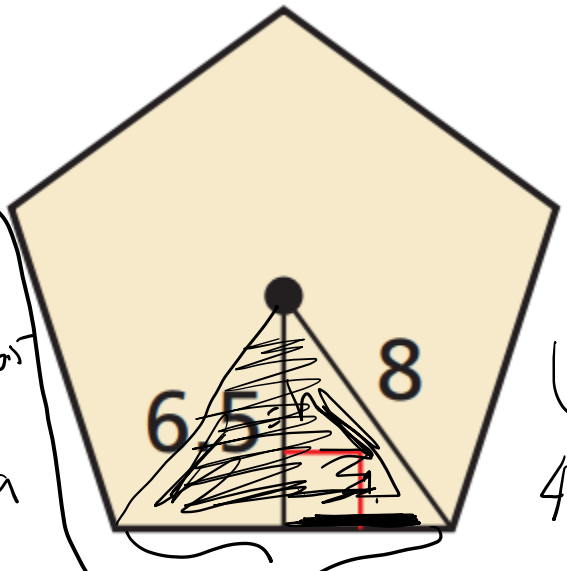
Ex 2

$A = \frac{b \times h}{2}$

Pentagon 5-sides

5 Triangles

$\triangle \times 5$



$a^2 + b^2 = c^2$

$(6.5)^2 + ?^2 = 8^2$

$42.25 + ?^2 = 64$

$?^2 = 64 - 42.25$

$\sqrt{?^2} = \sqrt{21.75}$

$? = 4.66369$

$b = 2 \times 4.66369$

$b = 9.3273$

$A = \frac{\times 6.5}{2}$

$A = \frac{9.3273 \times 6.5}{2}$

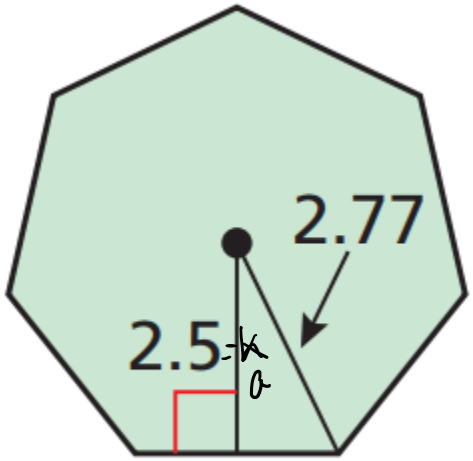
$A = 30.3139$

A of pentagon

30.3139×5

$A_{pent.} = 151.6 \text{ units}^2$

You Try



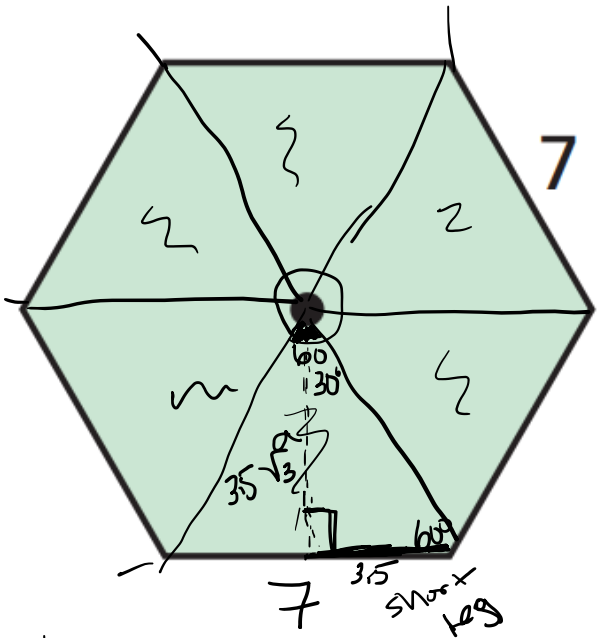
2D → 3D

h → apothem

3D → height is the segment that connects the bases

Ex 3

a = apothem b = base



Steps:

1. 360/#of sides (central angle) $360/6 = 60^\circ$
2. central/2 $60/2 = 30^\circ$
3. Use the rules 30°-60°-90° to find the a or b
4. Area of one triangle = $\frac{7 \times 3.5\sqrt{3}}{2}$
5. Δ x #of sides

$A = \frac{b \times a}{2}$

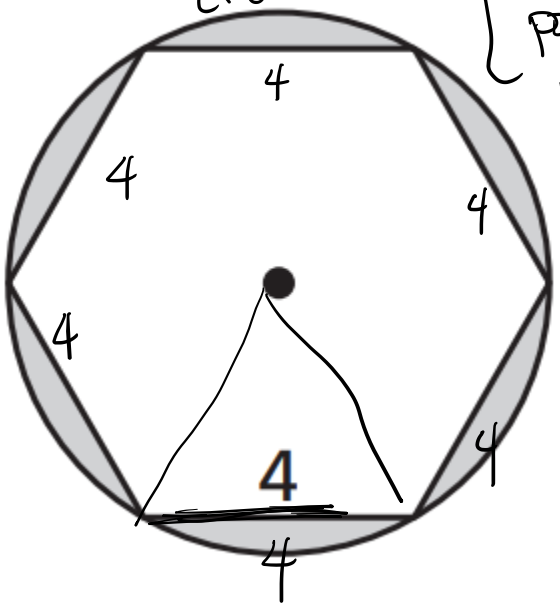
$A = \frac{7 \times [\;]}{2} = 21.2176$

$a(3.5\sqrt{3})$

$\{21.2176\} \times 6$

$A = 127.3 \text{ units}^2$

Ex 3



πr^2 Area of Circle $-$ [Area of polygon] $=$ The shaded region

[Area of polygon] = # of sides

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

a = apothem

P = perimeter

Ex 4

You are decorating the top of a table by covering it with small ceramic tiles. The tabletop is a regular octagon with 15-inch sides and a radius of about 19.6 inches. What is the area you are covering?