Special Triangles

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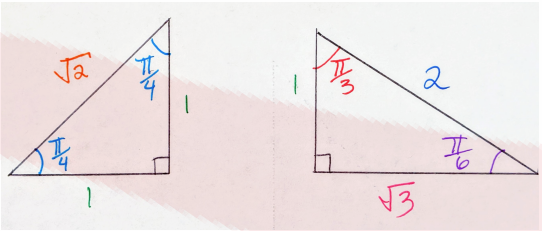
Special Triangles

The trigonometric ratios are based on a general right angled triangle with general angles. Now, if we consider specific angles, now we are dealing with specific right angles triangles, or **special triangles**. There are two **special triangles** based on three special angles. The three specific angles are $\pi/4$ and $\pi/6, \pi/3$. Let's have a look at these two special triangles.



The first special triangle is a right angled triangle with internal angles $45° = \pi/4$ and sides $1, 1$ and hypotenuse $\sqrt{2}$. We have the following trigonometric values for the angles $45° = \pi/4$,

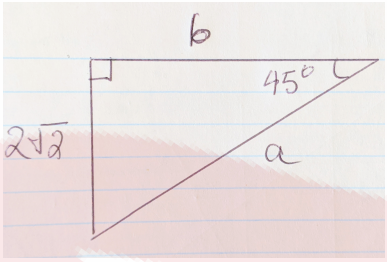
$$\begin{aligned} \sin 45° &= \frac{1}{\sqrt{2}} \\ \cos 45° &= \frac{1}{\sqrt{2}} \\ \tan 45° &= 1 \end{aligned}$$

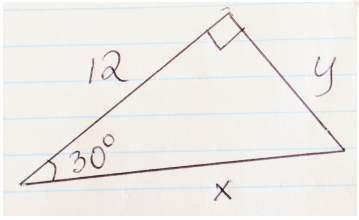
The second special triangle has angles $60° = \pi/3$ and $30° = \pi 6$ with sides of length $\sqrt{3}$ and 1 and hypotenuse length 2. From this triangle we have the following trigonometric values:

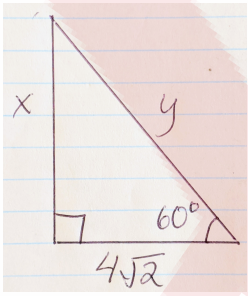
$$\begin{aligned} \sin 60° &= \frac{\sqrt{3}}{2}, \quad \sin 30° = \frac{1}{2} \\ \cos 60° &= \frac{1}{2}, \quad \cos 30° = \frac{\sqrt{3}}{2} \\ \tan 60° &= \sqrt{3}, \quad \tan 30° = \frac{1}{\sqrt{3}} \end{aligned}$$

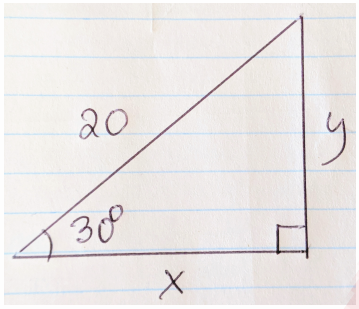
Exercises

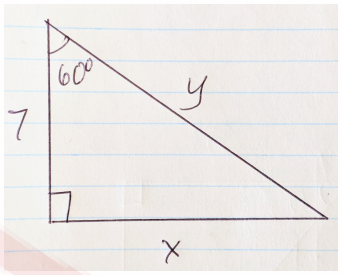
1. Find the unknowns in the following triangles,

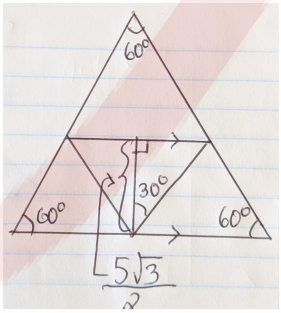
a) 

d) 

b) 

e) 

c) 

f) 

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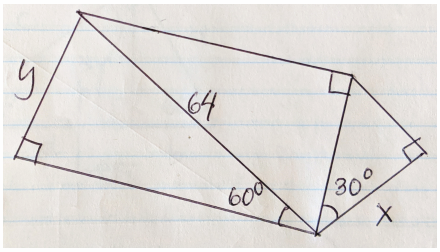

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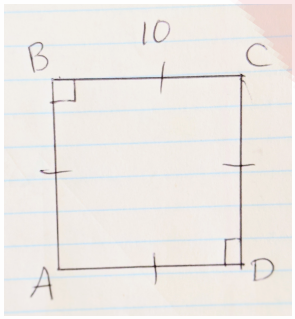

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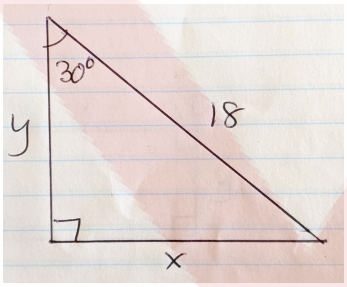
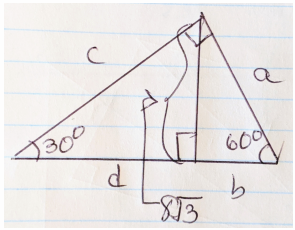
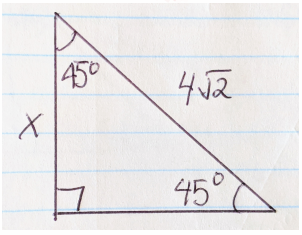


k)



i)



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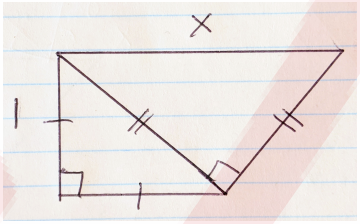
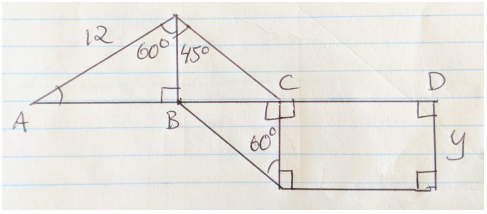
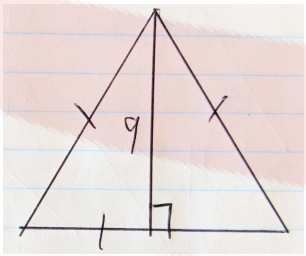


m)

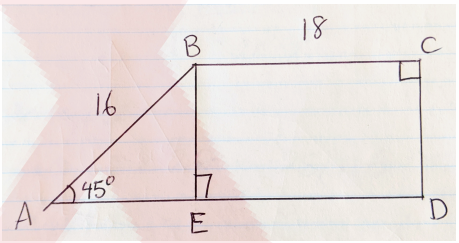


2. The altitude of the equilateral triangle below is 9. Find the perimeter.



3. The area of the following figure is given by,

$$\text{Area } = \frac{1}{2}h(b_1 + b_2)$$



Find h, b_1 and b_2 and then find the area of the figure.

4. For the following paralellograph, find $\overline{BD}$.