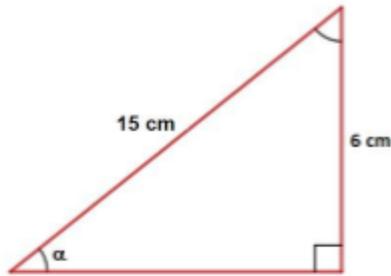


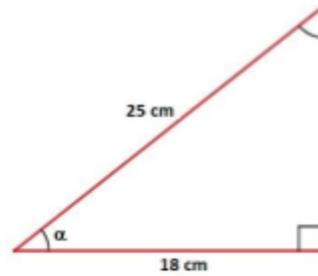
## UNIT 6: TRIGONOMETRY

**Exercise 1:** Find all six trigonometric functions of the angle  $\alpha$  if

a)

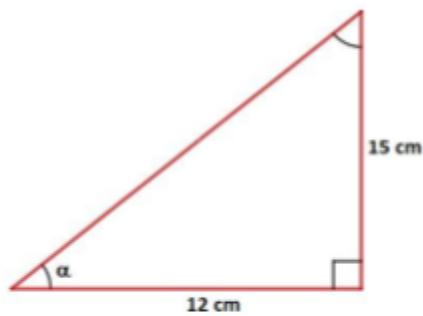


b)

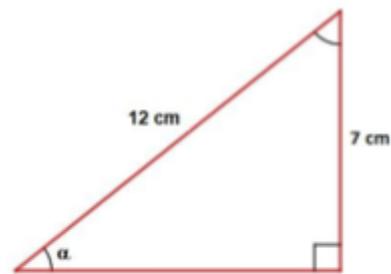


**Exercise 2:** Find all six trigonometric functions of the angle  $\alpha$  if

a)

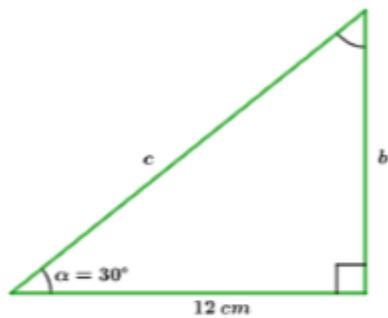


b)

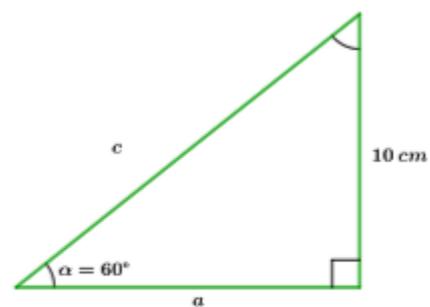


**Exercise 3:** Find the lengths of the missing sides:

a)

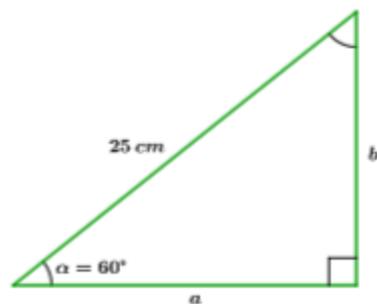


b)

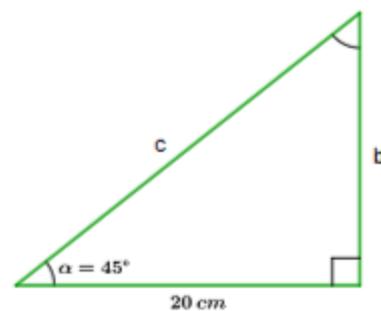


**Exercise 4:** Find the lengths of the missing sides:

a)



b)



**Exercise 5:** If  $\sin \alpha = 0.85$ , find the value of the other five trigonometric functions

**Exercise 6:** If  $\tan \alpha = 1.5$ , find the value of the other five trigonometric functions

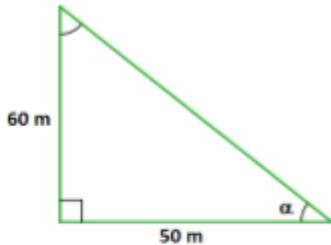
**Exercise 7:** If  $\sin \alpha = \frac{3}{5}$ , find the values of  $\cos \alpha$  and  $\tan \alpha$  without using a calculator

**Exercise 8:** If  $\cos \alpha = \frac{1}{5}$ , find the value of  $\sin \alpha$  and  $\tan \alpha$

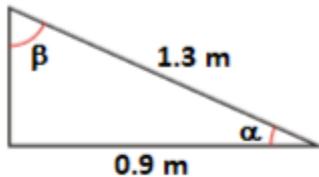
**Exercise 9:** Fill in the gaps:

$\sin \alpha$			$5/3$
$\cos \alpha$	0.25		
$\tan \alpha$		0.6	

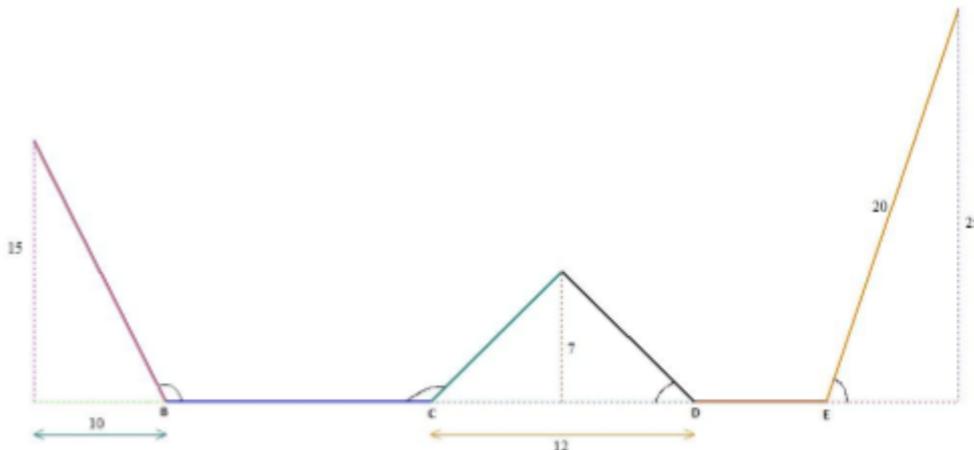
**Exercise 10:** Find the value of the three trigonometric functions of the angle  $\alpha$  without finding the value of the hypotenuse:



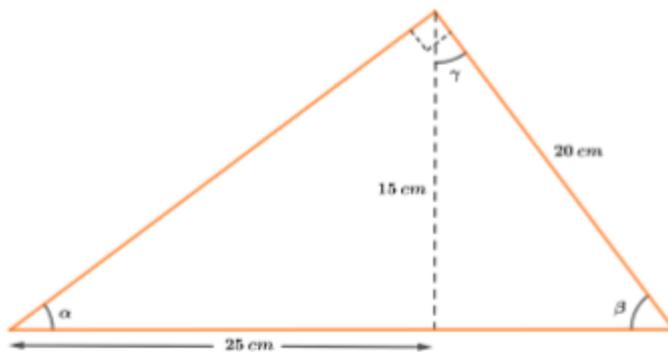
**Exercise 11:** Find the three principal trigonometric functions of the angles  $\alpha$  and  $\beta$  in this triangle



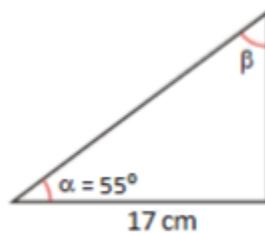
**Exercise 12:** Last night I was at home, bored, and I decided to design some kind of psychedelic shelves for my room. Yes, I know that I should get back to teaching but, could you help me find the missing angles so I can sleep tonight?



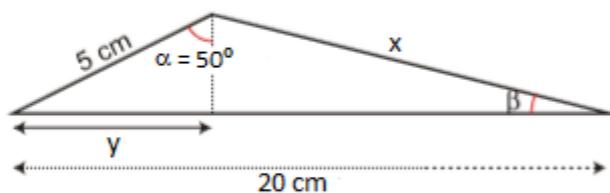
**Exercise 13:** Find the trigonometric functions of the angles  $\alpha$ ,  $\beta$  and  $\gamma$ . Find also the values of the three angles and the missing sides of the triangle, without using Pythagoras theorem.



**Exercise 14:** Find the missing sides of this triangle:

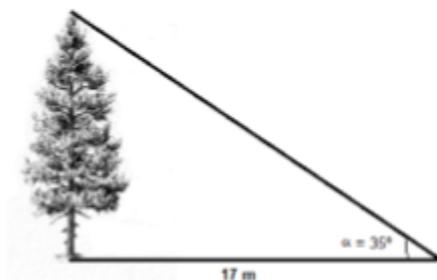


**Exercise 15:** Find the values of  $x$  and  $y$



**Exercise 16:** I am standing 17 m from the base of a tree. If the angle of elevation to the top of a tree is  $35^\circ$ , what's the height of the tree?

Note: The angle of elevation is the angle your eyes look up.



**Exercise 17:** A ladder is leaning against a wall and its foot stays 2 m from the wall. If the ladder reaches a height of 4.2 m, find to the nearest degree, the angle that the ladder forms with the wall.

**Exercise 18:** Henry observes a boat from the cabin of a lighthouse. The top of the lighthouse is standing 53 m above the sea. If the angle of depression to the boat is  $19^\circ$ , how far is Henry from the boat? How far is the boat from the base of the lighthouse?

Note: The angle of depression is the angle your eyes look down. It is always outside the triangle.

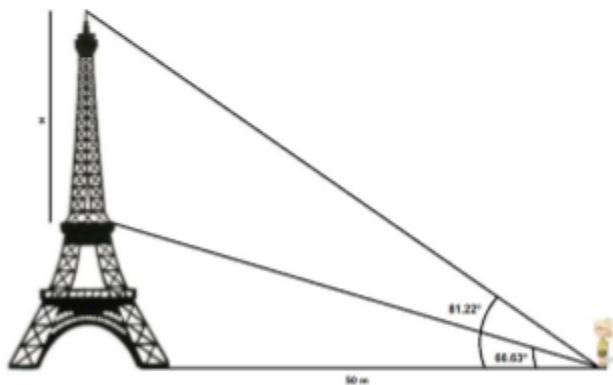
**Exercise 19:** It's scorching hot and little squirrel is lost. She sees a palm tree in the distance and decides to make a run for it and take cover under its leaves. But she's oh so tired. With her super powers she calculates that the palm tree is 3.2m high and the angle of elevation is  $6^\circ$ . How far is she from dehydration?



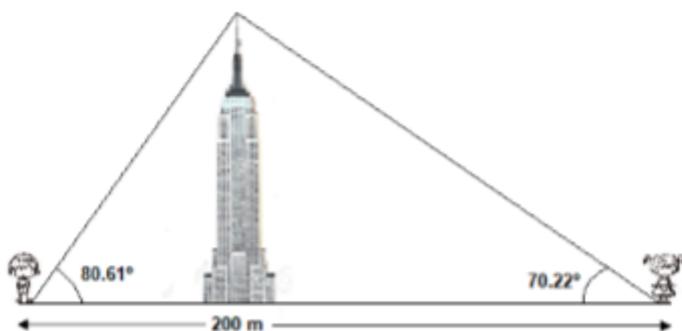
**Exercise 20:** From the top of a fire tower, a forest ranger sees his partner on the ground at an angle of depression of  $50^\circ$ . If the partner is 27 m away from the base of the tower, what's the height of the tower?

**Exercise 21:** Find the angle of elevation of the sun if the shadow cast by a lamp post 3 m high has a length of 1.87 m.

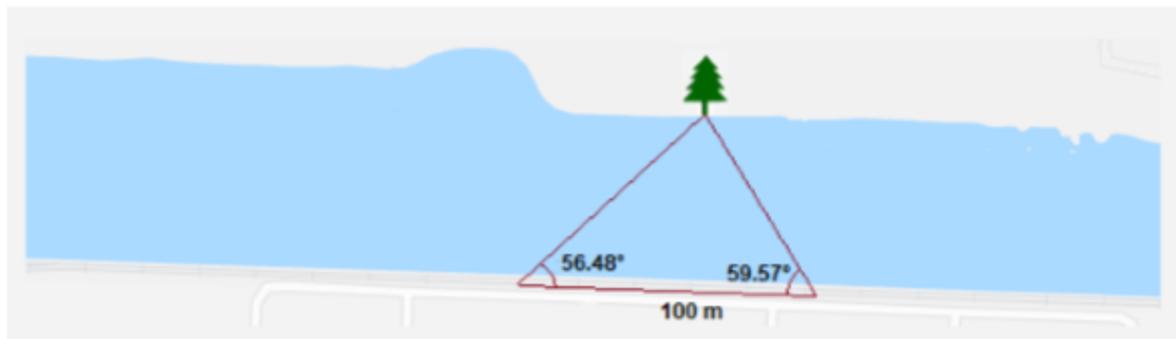
**Exercise 22:** Joan is standing 50 m away from the Eiffel Tower. From her position, the angle of elevation to the second platform is  $66.63^\circ$ , while the angle of elevation to the top of the tower is  $81.22^\circ$ . What's the distance from the second platform to the top of the tower?



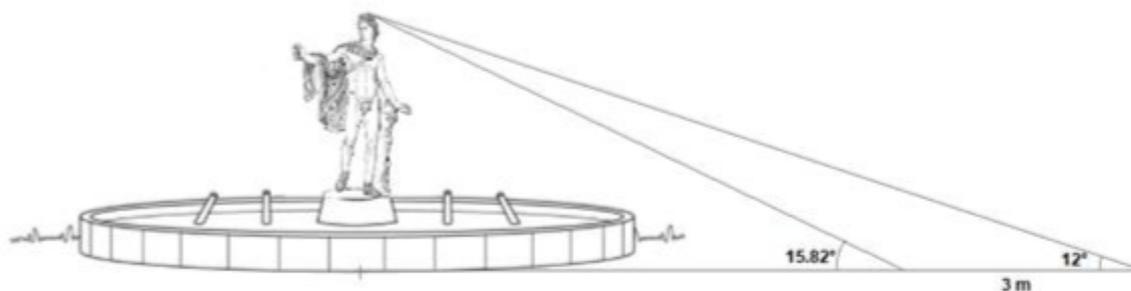
**Exercise 23:** Find the height of the Empire State Building knowing that Chris and Terri are standing 200 m apart.



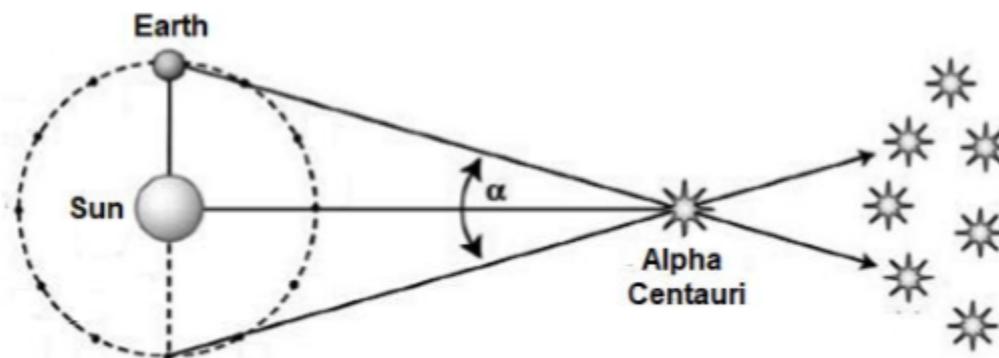
**Exercise 24:** Find the width of the canal of the Guadalquivir River as it passes through Seville:



**Exercise 25:** John measures the angle to the top of the statue and finds a value of  $12^\circ$ , then he gets 3 meters closer and measures the angle again, obtaining a value of  $15.82^\circ$ . Find the height of the statue knowing that the pedestal is 0.75 m high



**Exercise 26:** The parallax is a method used by astronomers to determine the distance to a star. They measure the angle the Sun forms with the star when the Earth is on both ends of its orbit. Find the distance from the Sun to Alpha Centauri knowing that the radius of the orbit of the Earth around the Sun is 150 millions of kilometers, and that  $\alpha = 1.52''$ . Express the answer in light-years: 1 light-year =  $9.46 \cdot 10^{15}$  m



**Exercise 27:** The base of an isosceles triangle is 30 cm long and the angle between the two equal sides is  $50^\circ$ . Find the area of the triangle.

**Exercise 28:** Actually, I have been lying to you since you know me. You cannot construct a regular polygon with whatever measures you want. There's only one value that you can set, and the rest of them are given by the angles in the polygon. So let's do it right this time. Find the area of a regular pentagon if its side has a length of 12 cm.

**Exercise 29:** Find the area of a regular hexagon if its radius has a length of 9 cm.

**Exercise 30:** Find the trigonometric functions of the angle  $135^\circ$

**Exercise 31:** Find the trigonometric functions of the angle  $300^\circ$

**Exercise 32:** Find the trigonometric functions of the angle  $240^\circ$

**Exercise 33:** If  $\sin \alpha = 0.36$  and  $90^\circ < \alpha < 180^\circ$ , find the other five trigonometric functions and the value of the angle  $\alpha$

**Exercise 34:** If  $\cos \alpha = -\frac{2}{7}$  and  $180^\circ < \alpha < 270^\circ$ , find the other five trigonometric functions and the value of the angle  $\alpha$

**Exercise 35:** If  $\tan \alpha = \sqrt{5}$  and  $180^\circ < \alpha < 270^\circ$ , find the other five trigonometric functions and the value of the angle  $\alpha$

**Exercise 36:** If  $\sec \alpha = \frac{5}{4}$  and  $270^\circ < \alpha < 360^\circ$ , find the other five trigonometric functions and the value of the angle  $\alpha$

**Exercise 37:** If  $\cot \alpha = 2$  and  $180^\circ < \alpha < 270^\circ$ , find the values of  $\sin \alpha$  and  $\tan \alpha$

**Exercise 38:** If  $\sin \alpha = \frac{13}{17}$  and  $90^\circ < \alpha < 180^\circ$ , find the values of  $\cos \alpha$  and  $\tan \alpha$

**Exercise 39:** Transform the following angles into radians:

- |                |                |
|----------------|----------------|
| a) $225^\circ$ | b) $330^\circ$ |
| c) $270^\circ$ | d) $135^\circ$ |

**Exercise 40:** Transform the following angles into degrees:

- |                       |                       |
|-----------------------|-----------------------|
| a) $\frac{4\pi}{3}$   | b) $\frac{11\pi}{12}$ |
| c) $\frac{13\pi}{12}$ | d) $\frac{10\pi}{9}$  |

**Exercise 41:** Find the trigonometric functions ( $\sin$ ,  $\cos$ ,  $\tan$ ) of the angle  $\frac{7\pi}{6}$