

TRIGONOMETRY. ACTIVITIES. MATHEMATICS 4th E.S.O.

- Convert $\frac{\pi}{3}$ radians to degrees.
 - Convert 135° to radians.
 - Convert $\frac{7\pi}{6}$ radians to degrees.
 - Convert 270° to radians.
- If $\sin \alpha = 0.3$, α an acute angle, calculate $\cos \alpha$ and $\tan \alpha$.
- If $\cos \alpha = \frac{3}{5}$, α an angle of the fourth quadrant, calculate $\sin \alpha$ and $\cos \alpha$.
- If $\tan \alpha = 2\sqrt{2}$, $180^\circ < \alpha < 270^\circ$, calculate $\sin \alpha$ and $\cos \alpha$.
- Using the trigonometric ratios of 30° , 45° and 60° , calculate:

- | | | | |
|------------------------|-----------------------|-----------------------|------------------------|
| a) $\sin 120^\circ$ | b) $\cos (-45^\circ)$ | c) $\tan 300^\circ$ | d) $\tan (-150^\circ)$ |
| e) $\sin (780^\circ)$ | f) $\cos 240^\circ$ | g) $\cos (150^\circ)$ | h) $\sin 3030^\circ$ |
| i) $\tan (-315^\circ)$ | j) $\sin 135^\circ$ | k) $\cos 215^\circ$ | l) $\tan 315^\circ$ |

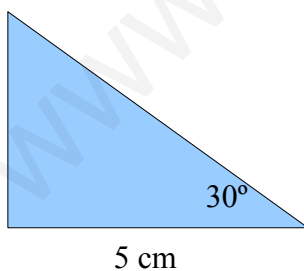
6. If $\sin \alpha = \frac{1}{4}$, α an acute angle, calculate $\sin (90^\circ - \alpha)$ and $\cos (90^\circ - \alpha)$.

7. If $\cos \alpha = \frac{5}{13}$, α an acute angle, calculate:

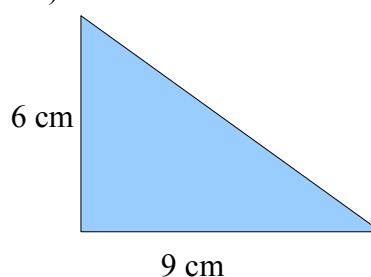
- | | | |
|--------------------------------|--------------------------------|--------------------------------|
| a) $\sin (180^\circ - \alpha)$ | b) $\sin (180^\circ + \alpha)$ | c) $\sin (360^\circ - \alpha)$ |
| d) $\sin (-\alpha)$ | e) $\sin (90^\circ - \alpha)$ | f) $\sin (90^\circ + \alpha)$ |

8. Solve the right-angle triangles below:

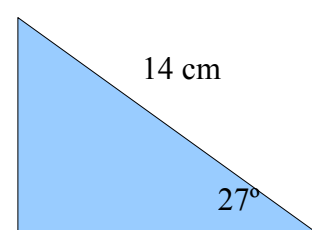
a)



b)

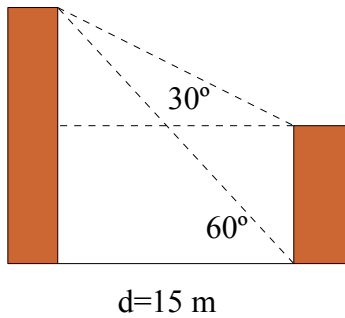


c)

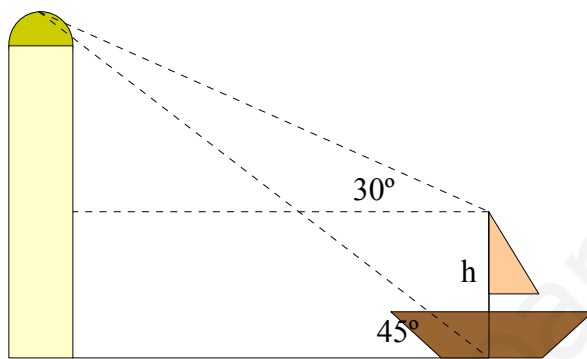


- A man is walking along a straight road. He notices the top of a tower subtending an angle $A=60^\circ$ with the ground at the point where he is standing. If the height of the tower is $h=20$ m, then what is the distance of the man from the tower?
- A little boy is flying a kite. The string of the kite makes an angle of 30° with the ground. If the height of the kite is $h=9$ m, find the length of the string that the boy has used.
- Two towers face each other separated by a distance $d=15$ m. As seen from the top of the first tower, the angle of depression of the second tower is 60° and that of the top is 30° . What is

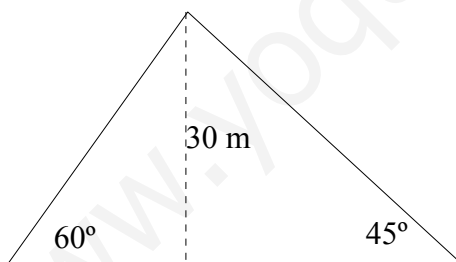
the height of the second tower?



12. A ship of height $h=12\text{ m}$ is sighted from a lighthouse. From the top of the lighthouse, the angle of depression to the top of the mast and the base of the ship equal 30° and 45° respectively. How far is the ship from the lighthouse?



13. Two men on opposite sides of a TV tower of height 30 m notice the angle of elevation of the top tower to be 45° and 60° respectively. Find the distance between the two men.



14. Two men on the same side of a tall building notice the angle of elevation to the top of the building to be 30° and 60° respectively. If the height of the building is known to be $h=90\text{ m}$, find the distance between the two men.

SOLUTIONS:

1. a) 60° b) $\frac{3\pi}{4}$ c) 210° d) $\frac{3\pi}{2}$
2. $\cos \alpha = 0.95$ $\tan \alpha = 0.32$
3. $\sin \alpha = \frac{-4}{5}$ $\tan \alpha = \frac{-4}{3}$
4. $\sin \alpha = \frac{-2\sqrt{2}}{3}$ $\cos \alpha = \frac{-1}{3}$
5. a) $\frac{-\sqrt{3}}{2}$ b) $\frac{\sqrt{2}}{2}$ c) $-\sqrt{3}$ d) $\frac{1}{\sqrt{3}}$ e) $\frac{\sqrt{3}}{2}$ f) $\frac{-1}{2}$
g) $\frac{-\sqrt{3}}{2}$ h) $\frac{1}{2}$ i) 1 j) $\frac{\sqrt{2}}{2}$ k) $\frac{-\sqrt{2}}{2}$ l) -1
6. $\sin (90^\circ - \alpha) = \frac{\sqrt{15}}{4}$ $\cos (90^\circ - \alpha) = \frac{1}{4}$
7. a) $\frac{5}{13}$ b) $\frac{-5}{13}$ c) $\frac{-5}{13}$ d) $\frac{-5}{13}$ e) $\frac{12}{13}$ f) $\frac{12}{13}$
8. a) The unknown angle is 60° , and the unknown sides are $\frac{10\sqrt{3}}{3}$ cm and $\frac{5\sqrt{3}}{3}$ cm.
b) The unknown side is $\sqrt{117} \approx 10,82$ cm and the unknown angles are $56^\circ 18' 35''$ and $33^\circ 41' 25''$.
c) The unknown angle is 63° , and the unknown sides are approximately 6,36 cm and 12,47 cm.
9. $\frac{20}{\sqrt{3}} \text{ m} \approx 11,55 \text{ m}$
10. 18 m
11. $10\sqrt{3} \text{ m} \approx 17,32 \text{ m}$
12. 28,39 m
13. 47,32 m
14. 103,92 m