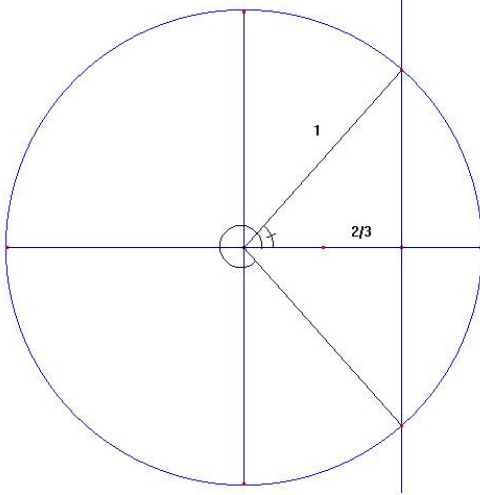


**TRIGONOMETRY 2**

1. Draw two angles whose cosine is  $\frac{2}{3}$
2. Use your calculator to determine the following, correct to 4 decimal places:  
a)  $\sin 72^\circ$       b)  $\cos 38^\circ$       c)  $\tan 127^\circ$       d)  $\sin 12^\circ 23'$   
e)  $\tan 23^\circ 5'$       f)  $\cos 94^\circ$       g)  $\sin 56^\circ 55'$       h)  $\tan 9^\circ 9'$
3. Use your calculator to determine the angle  $\alpha$  (degrees and minutes):  
a)  $\sin \alpha = 0.37$       b)  $\cos \alpha = -0.23$       c)  $\tan \alpha = 1.27$       d)  $\sin \alpha = -0.83$   
e)  $\tan \alpha = 23$       f)  $\cos \alpha = 0.87$       g)  $\sin \alpha = 0.55$       h)  $\tan \alpha = 1.8$
4. A ladder of length 6 m leans against a vertical wall. The angle between the ladder and the horizontal is  $70^\circ$ . Calculate the height of the top of the ladder.
5. A right triangle has sides of length 5, 12 and 13 cm. Calculate (degrees and minutes) the sizes of the angles in this triangle.
6. A isosceles triangle has two sides of length 6 cm and the angle between these sides is  $42^\circ$ . Calculate the length of the unequal side.
7. A little boy is flying a kite. The string of the kite makes an angle of  $30^\circ$  with the ground. If the height of the kite is  $h = 21$  m, find the length of the string that the boy has used.
8. Two men on opposite sides of a TV tower of height 24 m notice the angle of elevation of the top of this tower to be  $45^\circ$  and  $60^\circ$  respectively. Find the distance between the two men.
9. Two men on the same side of a tall building notice the angle of elevation to the top of the building to be  $30^\circ$  and  $60^\circ$  respectively. If the height of the building is known to be  $h = 50$  m, find the distance between the two men.
10. A rectangle has sides of length 12 cm and  $x$  cm. The acute angle between the diagonal of the rectangle is  $40^\circ$ . Determine  $x$ .

## SOLUTION

1. Draw two angles whose cosine is  $\frac{2}{3}$



2. Use your calculator to determine the following, correct to 4 decimal places:

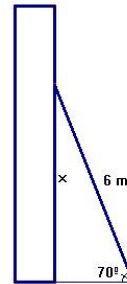
- a)  $\sin 72^\circ = 0.9511$       b)  $\cos 38^\circ = 0.7880$       c)  $\tan 127^\circ = -1.3270$   
 d)  $\sin 12^\circ 23' = 0.2145$       e)  $\tan 23^\circ 5' = 0.4262$       f)  $\cos 94^\circ = -0.0698$   
 g)  $\sin 56^\circ 55' = 0.8379$       h)  $\tan 9^\circ 9' = 0.1611$

3. Use your calculator to determine the angle  $\alpha$  (degrees and minutes):

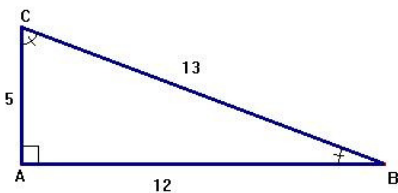
- a)  $\sin \alpha = 0.37 \rightarrow \alpha = 21^\circ 43'$       b)  $\cos \alpha = -0.23 \rightarrow \alpha = 103^\circ 18'$   
 c)  $\tan \alpha = 1.27 \rightarrow \alpha = 51^\circ 47'$       d)  $\sin \alpha = -0.83 \rightarrow \alpha = 303^\circ 54'$   
 e)  $\tan \alpha = 23 \rightarrow \alpha = 87^\circ 31'$       f)  $\cos \alpha = 0.87 \rightarrow \alpha = 29^\circ 32'$   
 g)  $\sin \alpha = 0.55 \rightarrow \alpha = 33^\circ 22'$       h)  $\tan \alpha = 1.8 \rightarrow \alpha = 60^\circ 57'$

4. A ladder of length 6 m leans against a vertical wall. The angle between the ladder and the horizontal is  $70^\circ$ . Calculate the height of the top of the ladder.

$$\sin 70^\circ = \frac{x}{6} \Rightarrow x = 6 \times \sin 70^\circ = 5.64 \text{ metres}$$



5. A right triangle has sides of length 5, 12 and 13 cm. Calculate (degrees and minutes) the sizes of the angles in this triangle.



$$\hat{A} = 90^\circ$$

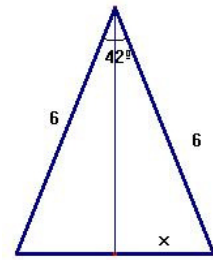
$$\sin \hat{B} = \frac{5}{13} \Rightarrow \hat{B} = 22^\circ 37'$$

$$\sin \hat{C} = \frac{12}{13} \Rightarrow \hat{C} = 67^\circ 23'$$

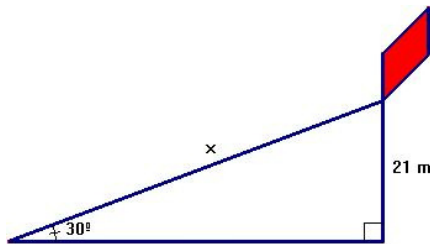
6. An isosceles triangle has two sides of length 6 cm and the angle between these sides is  $42^\circ$ . Calculate the length of the unequal side.

$$\sin 21^\circ = \frac{x}{6} \Rightarrow x = 6 \times \sin 21^\circ = 2.15 \text{ cm}$$

The unequal side is 4.30 cm long



7. A little boy is flying a kite. The string of the kite makes an angle of  $30^\circ$  with the ground. If the height of the kite is  $h = 21$  m, find the length of the string that the boy has used.



$$\sin 30^\circ = \frac{21}{x} \Rightarrow x \sin 30^\circ = 21$$

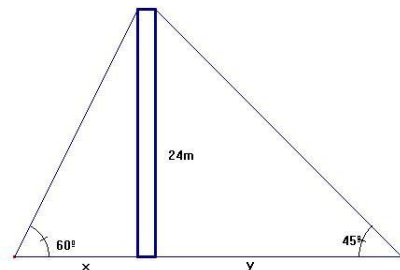
$$x = \frac{21}{\sin 30^\circ} = 42 \text{ metres}$$

8. Two men on opposite sides of a TV tower of height 24 m notice the angle of elevation of the top of this tower to be  $45^\circ$  and  $60^\circ$  respectively. Find the distance between the two men.

$$\tan 60^\circ = \frac{24}{x} \Rightarrow x = \frac{24}{\tan 60^\circ} = 13.86 \text{ m}$$

$$\tan 45^\circ = \frac{24}{y} \Rightarrow y = \frac{24}{\tan 45^\circ} = 24 \text{ m}$$

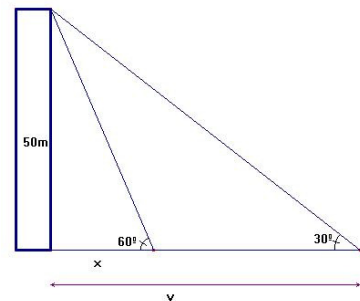
The distance between the two men is:  
 $13.86 + 24 = 37.86$  metres



9. Two men on the same side of a tall building notice the angle of elevation to the top of the building to be  $30^\circ$  and  $60^\circ$  respectively. If the height of the building is known to be  $h = 50$  m, find the distance between the two men.

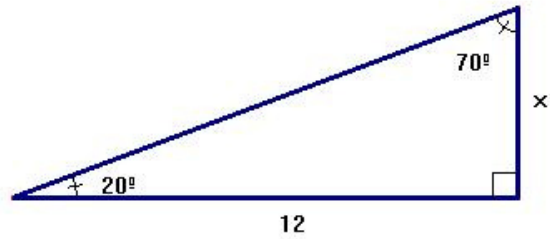
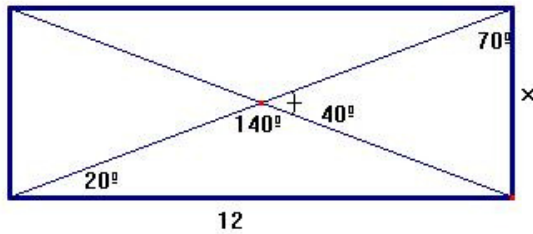
$$\tan 30^\circ = \frac{50}{y} \Rightarrow y = \frac{50}{\tan 30^\circ} = 86.60 \text{ m}$$

$$\tan 60^\circ = \frac{50}{x} \Rightarrow x = \frac{50}{\tan 60^\circ} = 28.87 \text{ m}$$



The distance between the two men is  $86.60 - 28.87 = 57.73$  metres

10. A rectangle has sides of length 12 cm and  $x$  cm. The acute angle between the diagonal of the rectangle is  $40^\circ$ . Determine  $x$ .



$$\tan 20^\circ = \frac{x}{12} \Rightarrow x = 12 \times \tan 20^\circ = 4.37 \text{ cm}$$