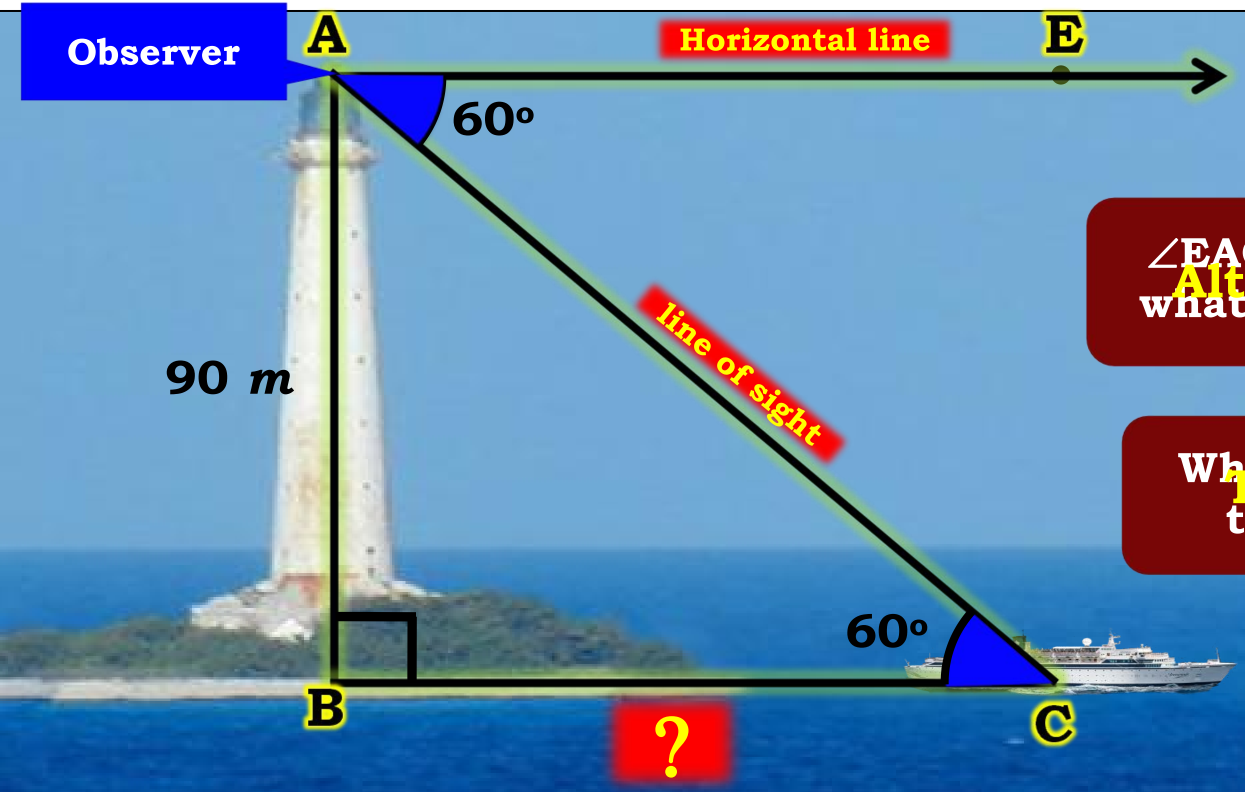
TOPIC

Solved Example 7

Solved Example 6

Q. From the top of a light house, an observer looks at a ship and finds the angle of depression to be 60°. If the height of the light house is 90 m then find how far is that ship from the light house.

$(\sqrt{3} = 1.73)$



∠EAC and ∠ACB are what type of angles?

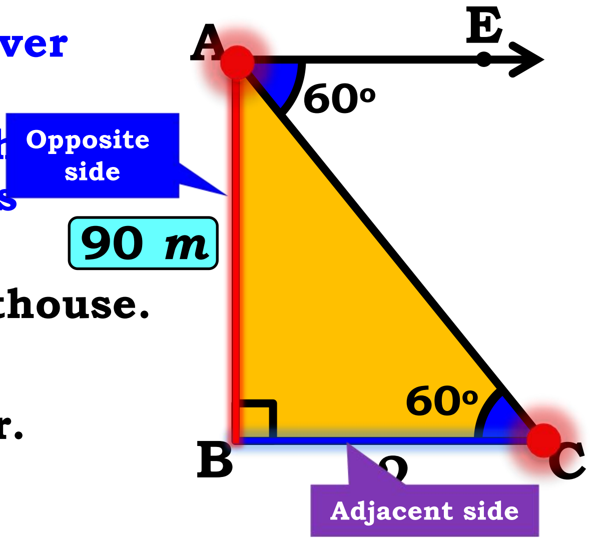
Alternate angles

What can we say about these two angles ?

They are equal

Q. From the ... observer looki... e of dep... t of th ligh... far is that ship from the light house.

Ratio of opposite side and Adjacent side reminds us of **'tan'**



Sol. AB represents the height of the lighthouse.

C represents the position of ship.

A represents the position of observer.

$\angle EAC = 60^\circ$

$\angle EAC = \angle ACB$ [Alternate angles]

$\therefore \angle A$...

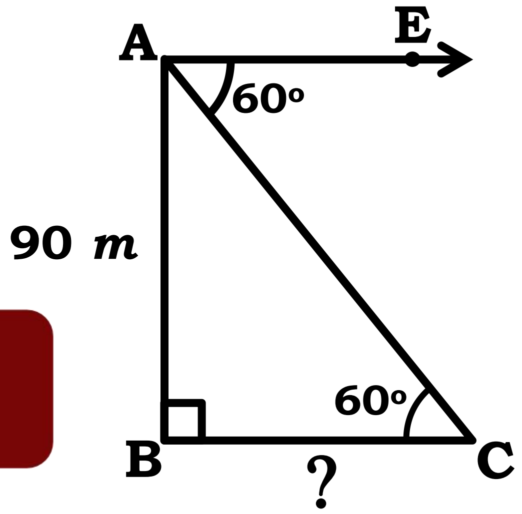
$\tan 60^\circ = \sqrt{3}$

In right angled ΔABC,

$$\tan 60^\circ = \frac{AB}{BC}$$

$$\therefore \sqrt{3} = \frac{90}{BC}$$

Q. From the top of a light house, an observer looks at a ship and finds the angle of depression to be 60°. If the height of the light house is 90 m then find how far is that ship from the light house.



Sol.

$$\sqrt{3} = \frac{90}{BC}$$

$$\therefore \quad BC = \frac{90}{\sqrt{3}}$$

Now, let us rationalise the denominator

$$\therefore \quad BC = \frac{90}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$\therefore \quad$ BC

$\sqrt{3} = 1.73$

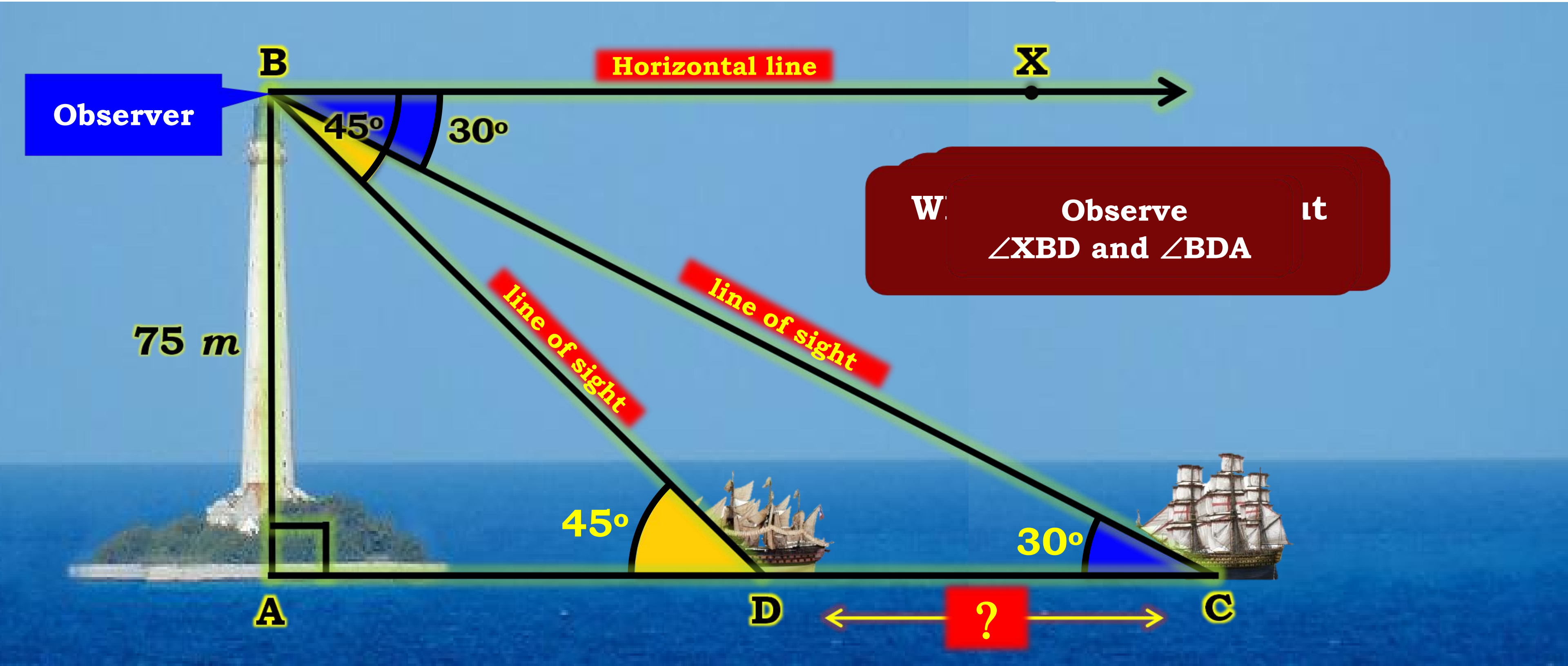
$$\therefore \quad BC = 30\sqrt{3}$$

$$\therefore \quad BC = 30 \times 1.73$$

$$\therefore \quad BC = 51.9 \; m$$

The ship is 51.9 *m* far from the lighthouse.

Q. As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.

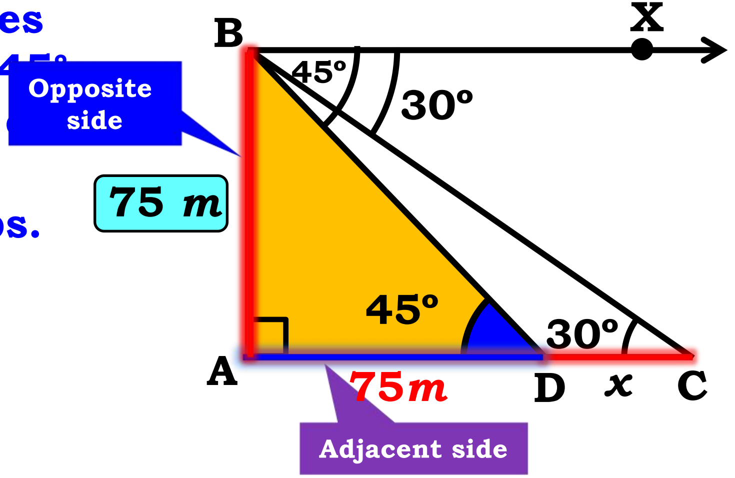


Q. As observed from the top of a 75 m high
lighth... angles
of de... and 45°
If one ... her
the s...
find the distance between the two ships.

I ... de and
A ... ds us of

Consider ΔBAD

tan



Sol. Height of light house (AB) = 75 m

AD is the distance of one ship from the foot of light house (AB)

Let the distance between two ... m

In ...

$\tan 45° = P$

$$\tan 45° = \frac{AB}{AD}$$

$$\therefore \quad 1 = \frac{75}{AD}$$

$$\therefore \quad AD = 75m \quad ...(i)$$

Q. As observed from the top of a 75 m high lig... e angles of ... nd ... and 45° If ... s of ... other th... fin... the two ships.

Ratio ... Adjace...

Observe ∠C

tan

$\sqrt{3}$

Sol. In ri...

$$\tan 30^\circ = \frac{AB}{AC}$$

$$\therefore \quad \frac{1}{\sqrt{3}} = \frac{75}{x + 75}$$

$$\therefore \quad x + 75 = 75\sqrt{3}$$

$$\therefore \quad x = 75\sqrt{3} - 75$$

$$\therefore \quad x = 75(\sqrt{3} - 1)$$

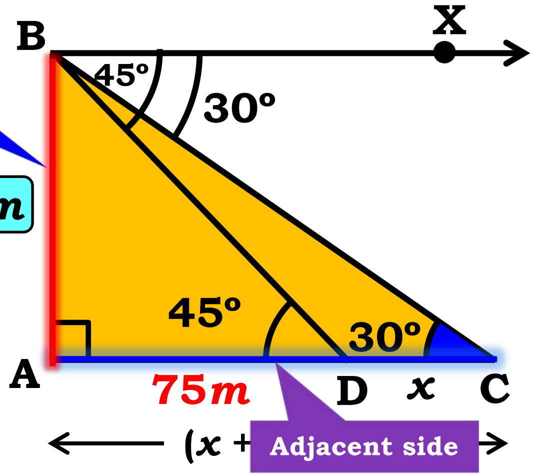
$$\sqrt{3} = 1.73$$

$$\therefore \quad x = 75(1.73 - 1)$$

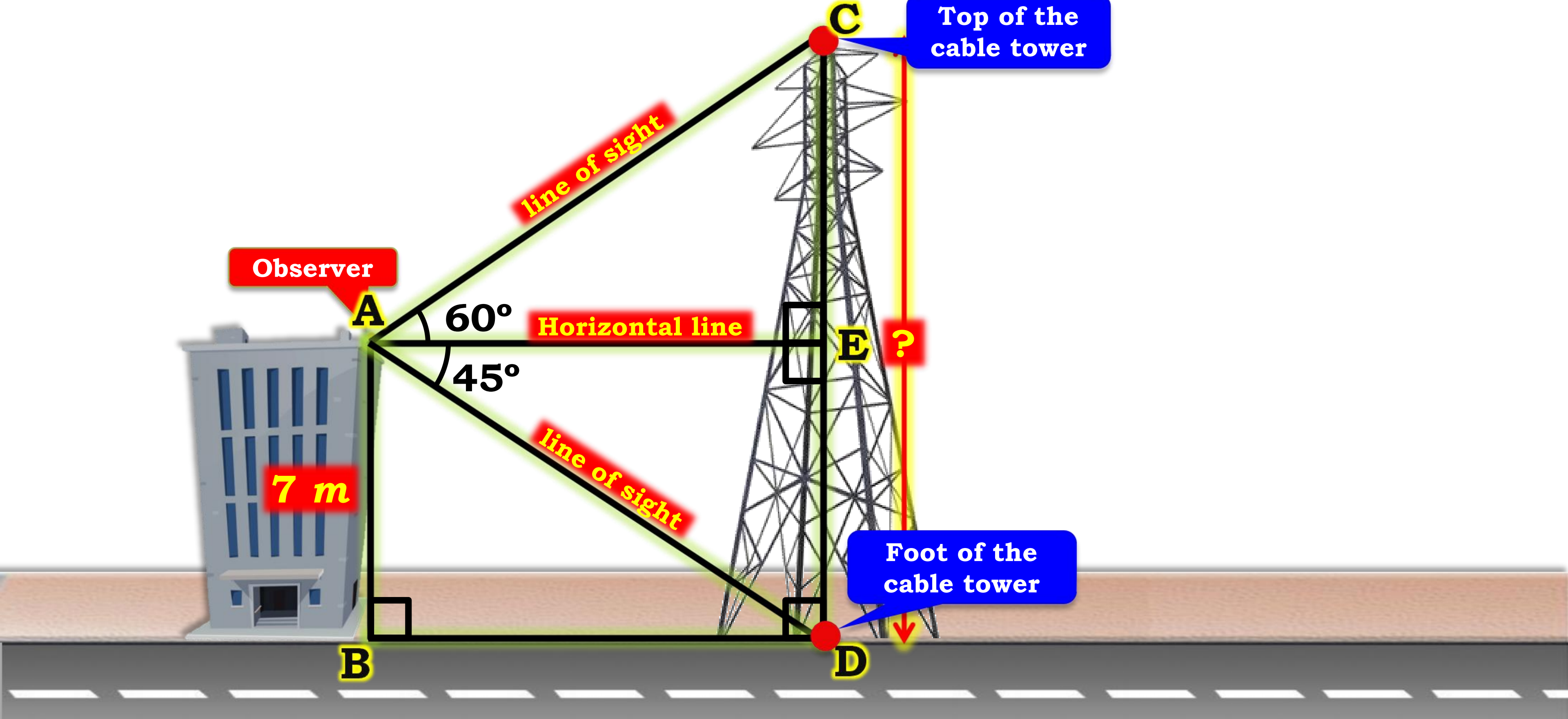
$$\therefore \quad x = 75 \times 0.73$$

$$\therefore \quad x = 54.75$$

$\therefore$ **Distance between the two ships is 54.75 *m***



Q. **From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45°. Determine the height of the tower.**



Q. From the top of a 7 m high building,
the angle of elevation of the top of a cable
to ... ession of
it...
D... .

Ratio of opposite side and Adjacent side reminds us of 'tan'

Sol. ... (CD) be 'h' m

Height of the building (AB) = 7 m

□ABDE is rectangle [By definition]

$\therefore$ AB = ED = 7 m

CE + ED = CD

$\therefore$ CE ...

$\therefore$ CE ...

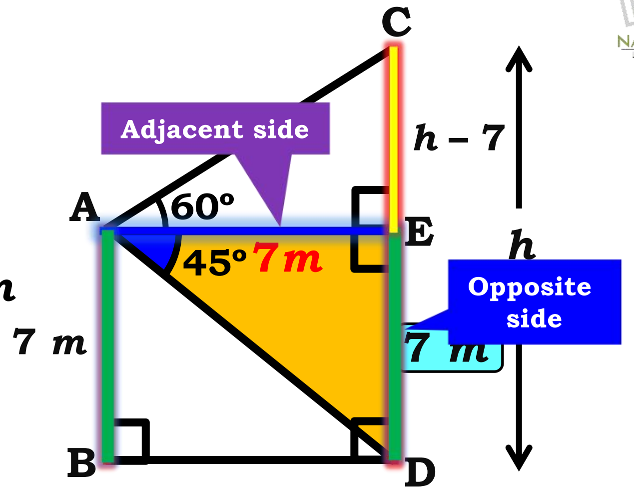
In rig... AED,

tan 45° = ?

$$\tan 45^\circ = \frac{ED}{AE}$$

$$\therefore \quad 1 = \frac{7}{AE}$$

$$\therefore \quad AE = 7m$$



Q. **From the top of a 7 m high building,**
the a... ...f a cable
towe... ...d ...ssion of
its f... ...of
Det...

Ratio ... d
Adjace... of

Observe ∠A

n'

Sol. In ... ΔAEC,

$$\tan 60^\circ = \frac{CE}{AE}$$

$$\therefore \quad \sqrt{3} = \frac{h-7}{7}$$

$$\therefore \quad 7\sqrt{3}$$

$$\therefore \quad 7\sqrt{3} + 7 \ldots$$

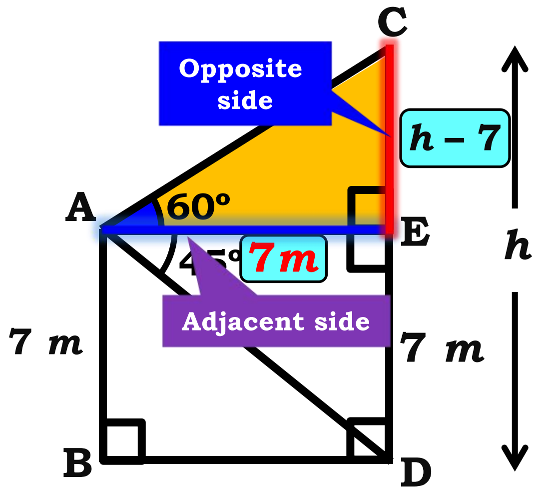
$\sqrt{3} = 1.73$

$$\therefore \quad h = 7(\sqrt{3} + 1)$$

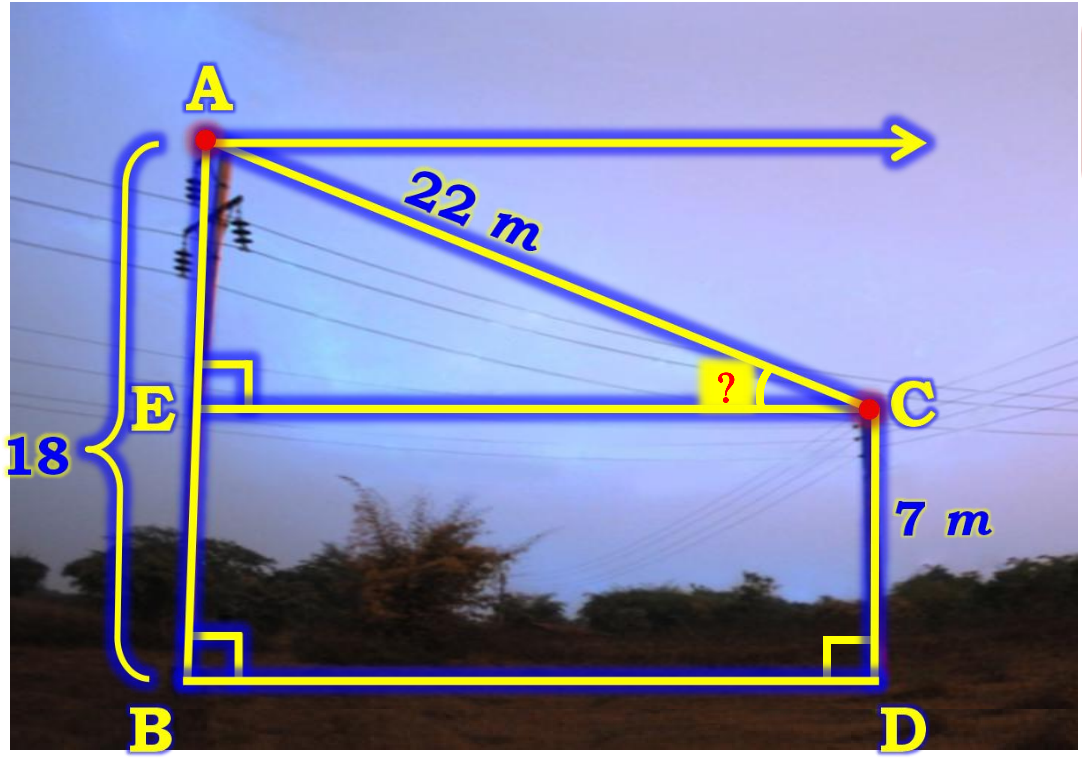
$$\therefore \quad h = 7(1.73 + 1)$$

$$\therefore \quad h = 7 \times 2.73 = 19.11$$

∴ **Height of the cable tower is 19.11 m**



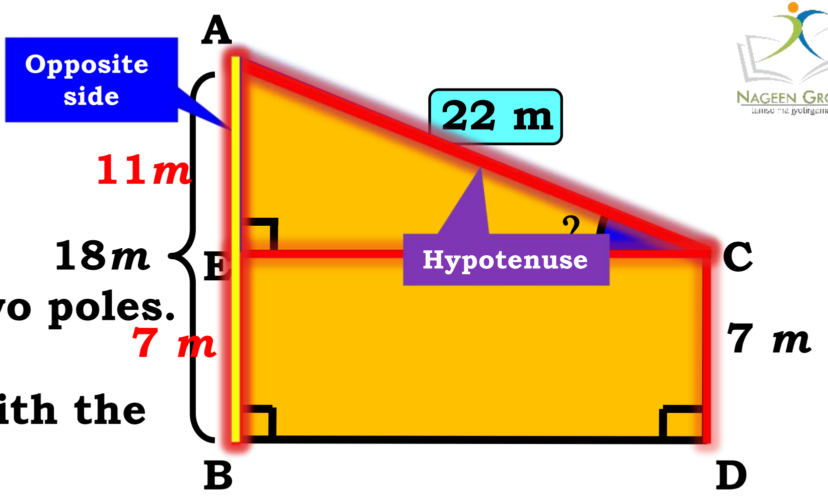
Q. Two poles of height 18 metres and 7 metres are erected on the ground. A wire of length 22 metres is tied to the top of the poles. Find angle made by wire with the horizontal.



Consider CE ⊥ AB

Q. Two pole... d
7 m ... d.
A wi... to
the ... ade
by w...

Ratio
H...
But we know that,
Observe AB



Sol. AB and CD represent the heights of two poles.
AC represents the length of wire.
∠ACE is the angle made by the wire with the horizontal.

□EBDC is a rectangle

CD = EB = 7 m

AE + EB = AB

∴ AE + 7 = 18

∴ AE = 11 m

In right angled Δ AEC,

$$\sin C = \frac{AE}{AC}$$

$$\therefore \sin C = \frac{11}{22}$$

$$\therefore \sin C = \frac{1}{2}$$

But, $\sin 30^\circ = \frac{1}{2}$

$\sin C = \sin 30^\circ$

$\therefore \angle C = 30^\circ$

The angle made by wire with the horizontal is 30°

Thank You