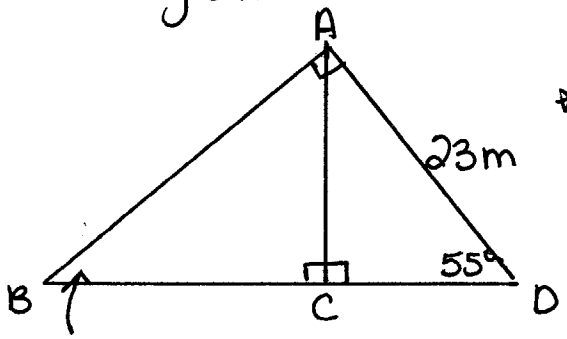
MBF 3C1 - Double Triangles & Word Problems

Eg1 Determine the length of side BC in the following diagram:



$\angle B = 180 - 90 - 55$
$= 35°$

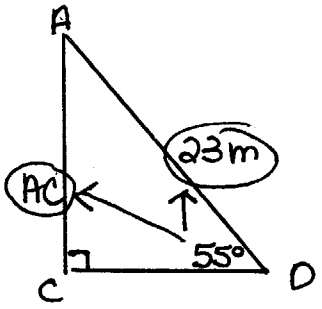
In ΔACD,

*solve for common side AC first

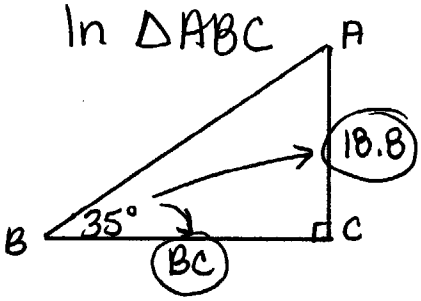
$\sin 55° = \frac{AC}{23}$

$23(\sin 55°) = AC$

$AC \doteq 18.8\text{ m}$



In ΔABC

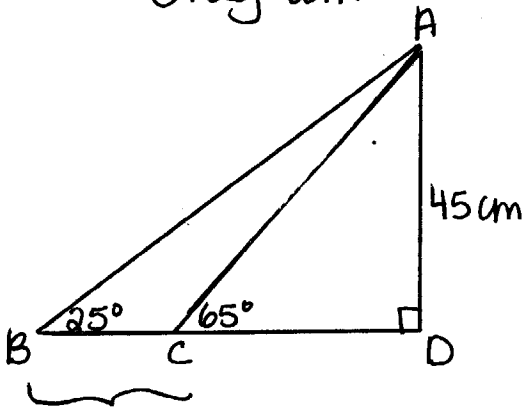


$\tan 35° = \frac{18.8}{BC}$

$BC = \frac{18.8}{\tan 35°}$

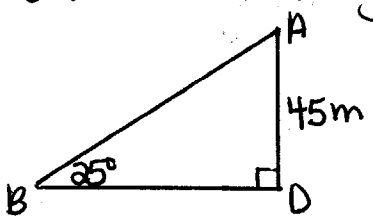
$\boxed{BC \doteq 26.8\text{m}}$

Eg2 Determine the length of side BC in the following diagram:



$BC = BD - CD$
$= 96.5 - 21.0$
$\boxed{BC = 75.5\text{cm}}$

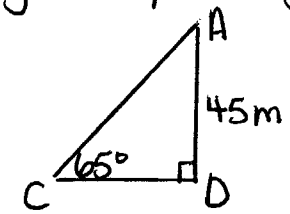
Draw the two right triangles separately:



$\tan 25° = \frac{45}{BD}$

$BD = \frac{45}{\tan 25°}$

$BD \doteq 96.5$



$\tan 65° = \frac{45}{CD}$

$CD = \frac{45}{\tan 65°}$

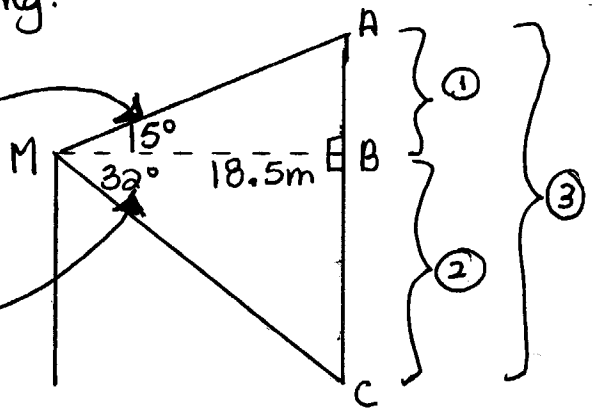
$CD \doteq 21.0$

Eg3 From his apartment window, Matt determines the angle of elevation to the top of the next building is 15°, and the angle of depression to the base of the next building is 32°.
If the buildings are 18.5m apart, determine the height of the next building.

First, draw a diagram:

*Note: angle of elevation = angle from horizontal up to line of sight

angle of depression = angle from horizontal down to line of sight



① In ΔABM

$$\tan 15° = \frac{AB}{18.5}$$

$$18.5(\tan 15°) = AB$$

$$AB \doteq 5.0$$

② In ΔBCM

$$\tan 32° = \frac{BC}{18.5}$$

$$18.5(\tan 32°) = BC$$

$$BC \doteq 11.6$$

③ Height of building:

$$AC = AB + BC$$
$$= 5.0 + 11.6$$
$$= 16.6$$

∴ The other building is approx. 16.6 m tall.