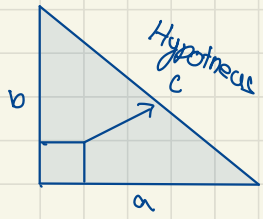
Basic Trignometry

90° Triangle

→ Pythagorous Theorum

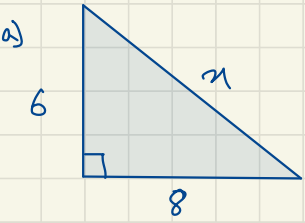


$a^2 + b^2 = c^2$

↳ Hypotneus

examples

(a)



$6^2 + 8^2 = x^2$

$36 + 64 = x^2$

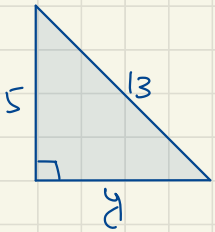
$100 = x^2$

$\sqrt{100} = x$

$10 = x$

$10cm = x$

(b)



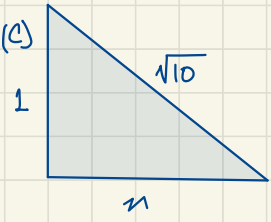
$5^2 + y^2 = 13^2$

$y = 169 - 25$

$y^2 = 144$

$y = 12cm$

(c)



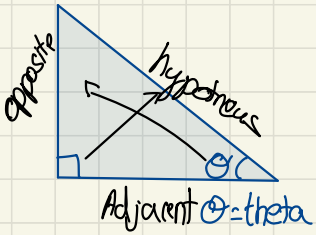
$1^2 + x^2 = (\sqrt{10})^2$

$1 + x^2 = 10$

$x^2 = 9$

$n = 3cm$

Basic Trigonometric Ratios

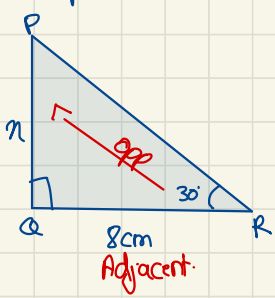


$\sin\theta = \frac{Opp}{Hyp}$ SOH

$\cos\theta = \frac{Adj.}{Hyp}$ CAH

$\tan\theta = \frac{Opp}{Adj}$ TOA

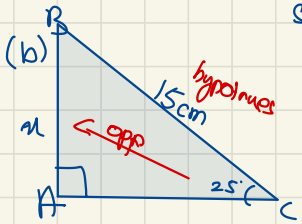
examples



$\tan(30) = \frac{x}{8}$

$\frac{\sqrt{3}}{3} \times 8 = x$

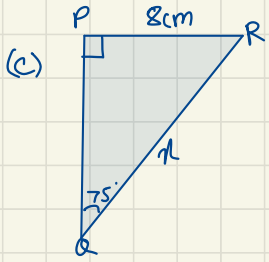
$4.62\text{cm} = x$



$\sin 25 = \frac{x}{15}$

$\sin 25 \times 15 = x$

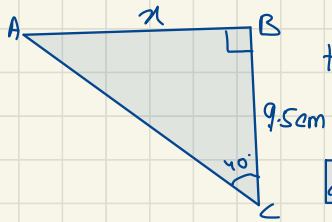
$x = 6.34\text{cm}$



$\sin 75 = \frac{8}{x}$

$x = \frac{8}{\sin 75}$

$x = 8.28\text{cm}$

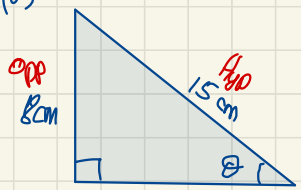


$\tan 40 = \frac{x}{9.5}$

$x = 7.97\text{cm}$

Finding θ → All angles correct to 1 d.p

(a)

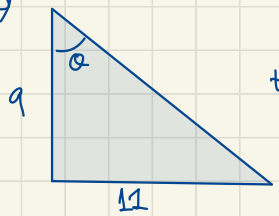


$\sin\theta = \frac{8}{15}$

$\theta = \sin^{-1}\left(\frac{8}{15}\right)$

$\theta = 32.2°$

(b)

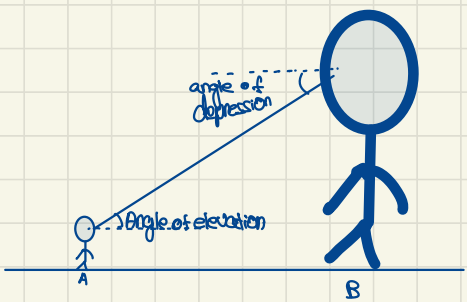


$\tan\theta = \frac{11}{9}$

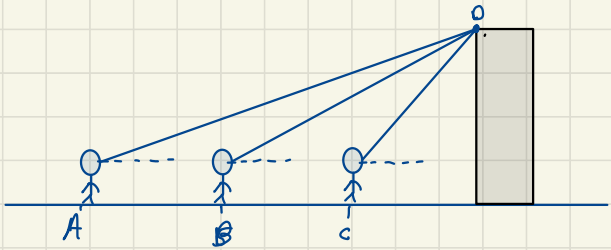
$\theta = \tan^{-1}\left(\frac{11}{9}\right)$

$\theta = 50.7°$

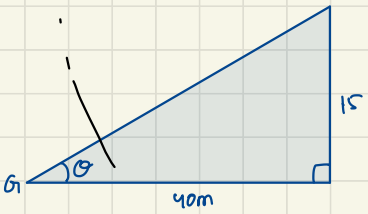
→ Angle of elevation/depression



1. Angle of elevation & depression both are measured from horizontal lines
2. Angle of " " both are equal.
3. The lesser the distance the greater the angle of depression and elevation



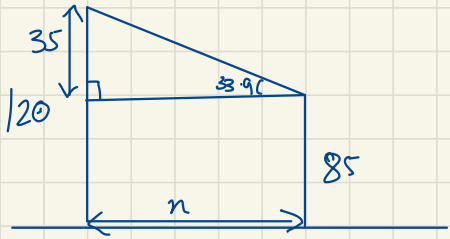
Q4) A point G is 40 meters away from a building which is 15 m high. What is the angle of elevation to the top of the building G.



$\tan\theta = \frac{15}{40}$

$\theta = 20.6$

Two building are on level ground are 120 m and 85 m tall respectively. Given that the angle of elevation of the top of the taller building from the top of the shorter building is 33.9°. Find the distance b/w the two building.

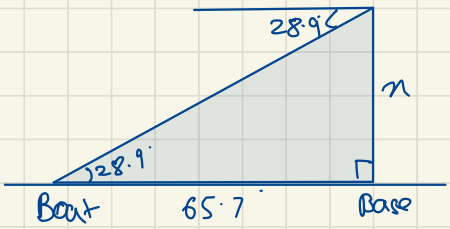


$\tan 33.9 = \frac{35}{x}$

$x = \frac{35}{\tan 33.9}$

$x = 52.1\text{m}$

5. A boat is 65.7 m away from the base of the cliff. Given that the angle of depression of the boat from the top of the cliff is 28.9°, find the height of the cliff.



$\tan 28.9 = \frac{x}{65.7}$

$\tan 28.9 \times 65.7 = x$

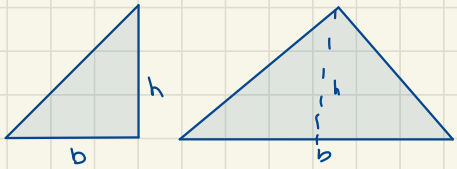
$x = 36.3\text{m}$

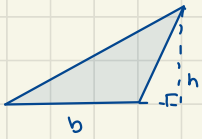
Further Trigonometry

- → Supplementary Angle Identities
- → Area of a triangle
- → Sine Rule
- → Cosine Rule
- → 3-D Trigonometry
- → Bearing

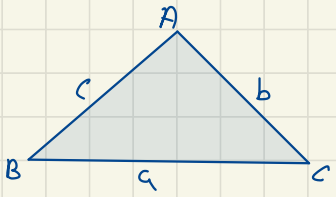
→ Area of a triangle

$A = \frac{1}{2} \times b \times h$





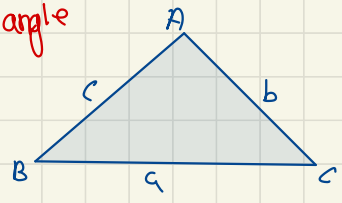
$A = \frac{1}{2} \times a \times b \times \sin C$



used when ① Two sides
② Included angle (Angle b/w the two given sides)

→ Sine Rule

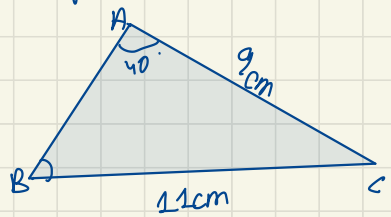
1. Two sides & a non included angle
2. Two angles & one single



$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Example 1



$$\frac{\sin A}{a} = \frac{\sin B}{b}$$

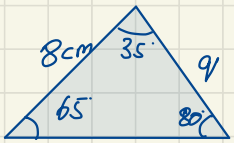
$$\frac{\sin 40}{11} = \frac{\sin B}{9}$$

$$\frac{\sin 40 \times 9}{11} = \sin B$$

$$\sin B = 0.5259\ldots$$

$$B = \sin^{-1}(0.5259\ldots)$$

$$\boxed{B = 31.7^\circ}$$



$$\frac{p}{\sin 35} = \frac{8}{\sin 80}$$

$$\boxed{p = 4.66\text{cm}}$$

Cosine Rule

$a^2 = b^2 + c^2 - 2bc\cos A$ → find length

OR

$\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$ → find angle

1. Two lengths & an included angle → Third length
2. All three lengths → Any angle