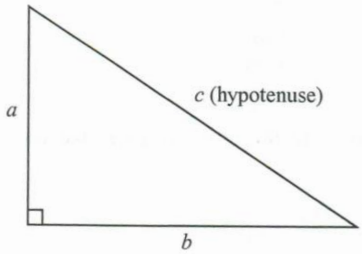
CHAPTER 8

Pythagoras' Theorem and Trigonometric Ratios

Key Notes

8.1 Pythagoras' Theorem

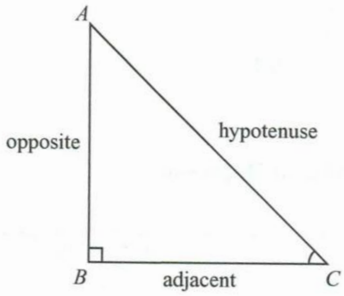
In any right-angled triangle, the longest side, opposite the right angle, is called the **hypotenuse**.



According to the Pythagoras' Theorem, in any right-angled triangle, $a^2 + b^2 = c^2$.

8.2 Trigonometric Ratios

Trigonometric ratios only apply to the acute angles in a right-angled triangle.



Relative to $\angle ACB$, BC is the **adjacent** side and AB is the **opposite** side. The **hypotenuse** is always the side opposite the right angle.

$\sin \angle ACB = \dfrac{\text{opposite}}{\text{hypotenuse}}$

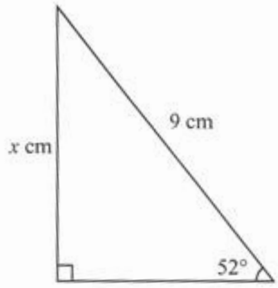
$\cos \angle ACB = \dfrac{\text{adjacent}}{\text{hypotenuse}}$

$\tan \angle ACB = \dfrac{\text{opposite}}{\text{adjacent}}$

Trigonometric ratios have no units.

Note:
To remember the ratios, use <u>'TOA CAH SOH'</u>.
- TOA: $\tan \angle ACB = \dfrac{\text{opposite}}{\text{adjacent}}$
- CAH: $\cos \angle ACB = \dfrac{\text{adjacent}}{\text{hypotenuse}}$
- SOH: $\sin \angle ACB = \dfrac{\text{opposite}}{\text{hypotenuse}}$

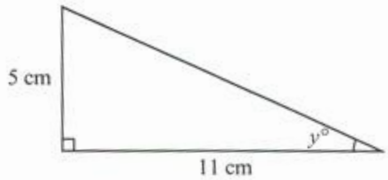
8.3 Applications of Trigonometric Ratios



To find the value of x, $\sin 52° = \frac{x}{9}$

$$x = 9 \sin 52°$$
$$= 7.09 \text{ (3 s.f.)}$$

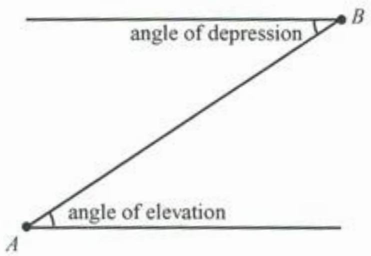
To find unknown angles in right-angled triangles, we use the inverse trigonometric ratios, $\sin^{-1}$, $\cos^{-1}$ and $\tan^{-1}$.



To find $\angle y$, $\tan \angle y = \frac{5}{11}$

$$\angle y = \tan^{-1}\frac{5}{11}$$
$$= 24.4° \text{ (1 d.p.)}$$

8.4 Angle of Elevation and Angle of Depression



If a person stands at point A and looks up to point B, the angle between the horizontal and the line of sight is known as the **angle of elevation**.

If a person stands at point B and looks down to point A, the angle between the horizontal and the line of sight is known as the **angle of depression**.