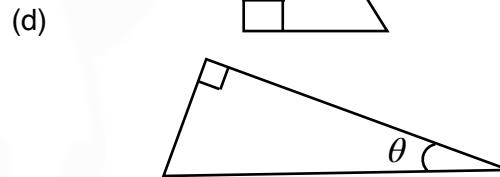
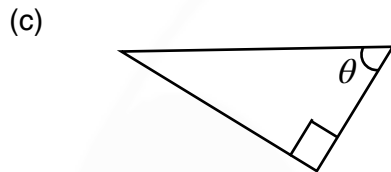
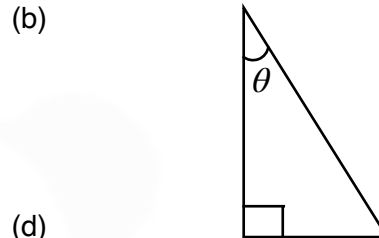
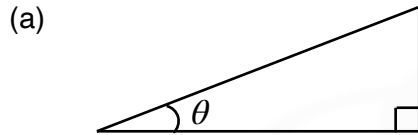


Finding lengths using trigonometry

Starter

N.B. The Greek letter theta, θ , is often used for unknown angles.

1. Label the sides of these right-angled triangles with **opposite**, **adjacent** and **hypotenuse** according to the marked angle, θ ("theta"):



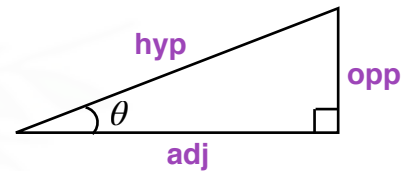
Notes

The formulae for the three trigonometric ratios are:

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$



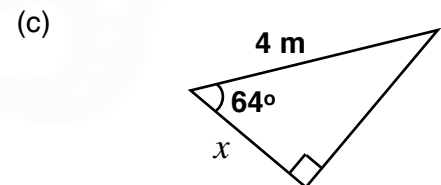
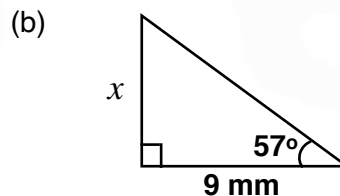
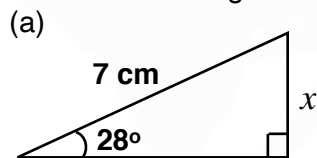
To help us remember, we use the Japanese word for trigonometry:

SOHCAHTOA

Success criteria – finding lengths using trigonometry

1. Label the relevant sides but **ignore the unmarked side**.
2. Choose whether to use sin, cos or tan using **SOHCAHTOA**.
3. Write out the formula.
4. Substitute the numbers into the formula.
5. Solve the equation.
6. When doing the calculation on your calculator, do not round off half-way through.

E.g. 1 Calculate the length of the marked side to 3 s.f..

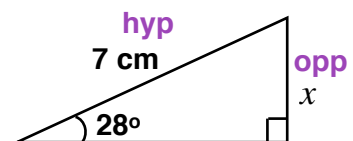


Working: (a) opp and hyp
 $\sin \theta = \frac{\text{opp}}{\text{hyp}}$:

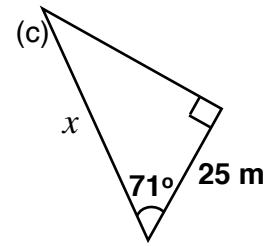
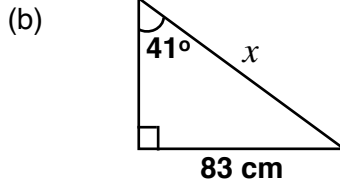
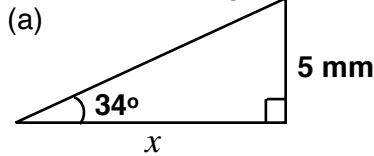
$$\Rightarrow \sin 28 = \frac{x}{7}$$

$$7 \sin 28 = x$$

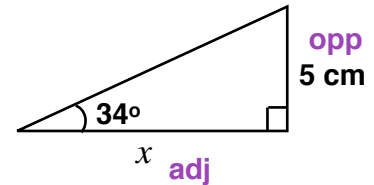
$$x = 3.29 \text{ cm (3 s.f.)}$$



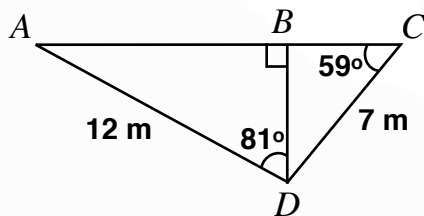
E.g. 2 Calculate the length of the marked side to 3 s.f.



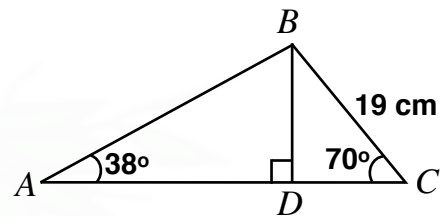
Working: (a) opp and adj \Rightarrow tan
 $\tan \theta = \frac{\text{opp}}{\text{adj}}$: $\tan 34 = \frac{5}{x}$
 $x = \frac{5}{\tan 34}$
 $x = 7.41 \text{ cm (3 s.f.)}$



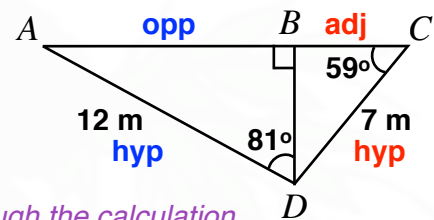
E.g. 3 (a) Calculate the length of AC.



(b) Calculate the length of AD.



Working: (a) **Finding AB:**
 opp and hyp \Rightarrow sin
 $\sin \theta = \frac{\text{opp}}{\text{hyp}}$: $\sin 81 = \frac{AB}{12}$
 $12 \sin 81 = AB$



N.B. Do not round half-way through the calculation.

Finding BC:
 adj and hyp \Rightarrow cos
 $\cos \theta = \frac{\text{adj}}{\text{hyp}}$: $\cos 59 = \frac{BC}{7}$
 $7 \cos 59 = BC$

N.B. Do not round half-way through the calculation.

$$AC = AB + BC = 12 \sin 81 + 7 \cos 59 = 15.5 \text{ m (3 s.f.)}$$

Video: [Trigonometry - finding sides](#)

[Solutions to Starter and E.g.s](#)

Exercise

9-1 class textbook:

p322 M10.8 Qu 1-15 Draw all diagrams

A*-G class textbook:

p286 M10.8 Qu 1-22 odd Draw all diagrams

9-1 homework book:

p110 M10.8 Qu 1-16 Draw all diagrams

A*-G homework book:

p81 M10.8 Qu 1-16 Draw all diagrams

Summary

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \quad \cos \theta = \frac{\text{adj}}{\text{hyp}} \quad \tan \theta = \frac{\text{opp}}{\text{adj}}$$

SOHCAHTOA

The Greek letter theta, θ , is often used for unknown angles.

Success criteria — finding lengths using trigonometry:

1. Label the relevant sides but *ignore the unmarked side*.
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