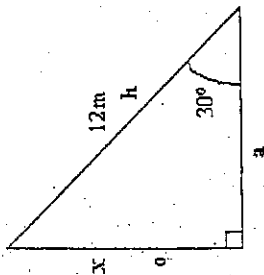


TRIGONOMETRY – FINDING SIDES (1)

Notes:



1. Label sides: o, a, h
2. Choose a suitable ratio:
 $\sin = \frac{o}{h}$ $\cos = \frac{a}{h}$ $\tan = \frac{o}{a}$
3. Calculate side:

$$\sin 30 = \frac{x}{30}$$

$$12 \times \sin 30 = x$$

$$6m = x$$

$$[12 \times \sin 30 =$$

$$\text{or } 12 \times 30 \sin =]$$

Exercises: **A**

1. Calculate the unknown side in each of the following:

a) $\sin 20 = \frac{a}{15}$

d) $\sin 52 = \frac{d}{32}$

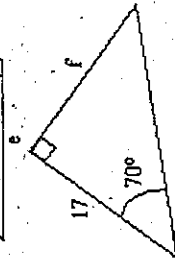
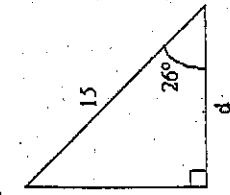
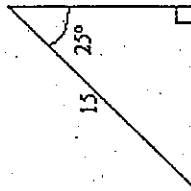
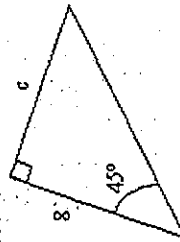
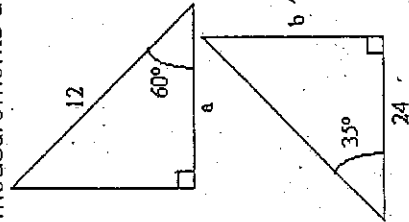
b) $\cos 37 = \frac{b}{30}$

e) $\cos 10 = \frac{e}{18}$

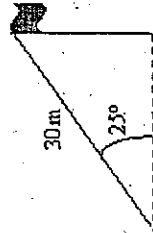
c) $\tan 64 = \frac{c}{5}$

f) $\tan 25 = \frac{f}{22}$

2. Calculate the lengths of the lettered sides in each of the following. All measurements are in meters.

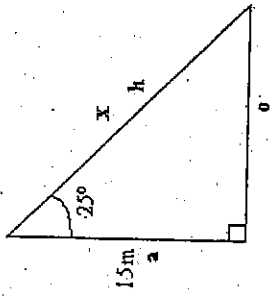


3. A flagpole is held upright by 30m long wires to the ground. If the wires make an angle of 25° to the ground, how high is the flagpole?



TRIGONOMETRY – FINDING SIDES (2)

Notes:



1. Label sides: o, a, h
2. Choose a suitable ratio:
 $\sin = \frac{o}{h}$ $\cos = \frac{a}{h}$ $\tan = \frac{o}{a}$
3. Calculate side:

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

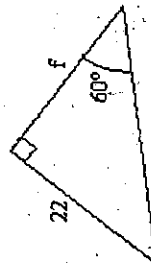
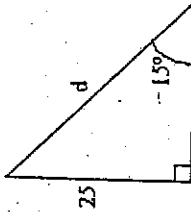
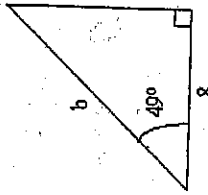
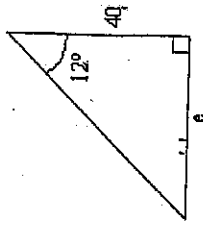
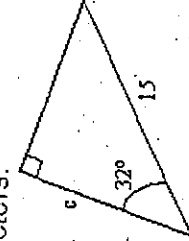
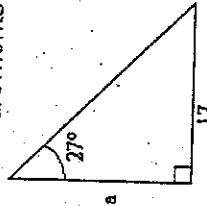
$$x \times \cos 25 = 15$$

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

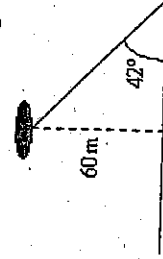
$$x = 17m \quad \text{or } 15 \div \cos 25 =]$$

Exercises: **B**

1. Calculate the lengths of the lettered sides in each of the following. All measurements are in meters.



2. An advertising zeppelin 60m above the ground is tethered with a wire that makes an angle of 42° to the ground. How long is the wire?



3. A surveyor measures the angle of elevation from eye level to the top of a building is 60°. If he is standing 40m away from the building and is 1.6m tall, how high is the building?

TRIGONOMETRY – LABELLING SIDES

Notes:



- h – hypotenuse** : the side opposite the right angle
- o – opposite** : the side opposite the marked angle
- a – adjacent** : the side next to the marked angle

The following trigonometric ratios, sine (sin), cosine (cos) and tangent (tan) apply to right angled triangles.

$$\sin x = \frac{\text{length of opposite side}}{\text{length of hypotenuse}} = \frac{o}{h}$$

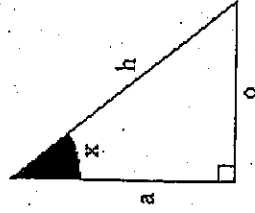
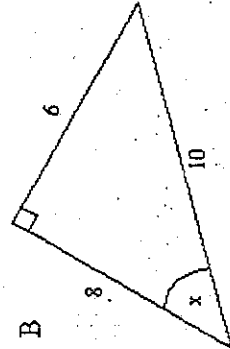
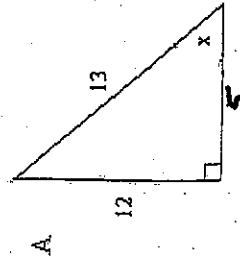
$$\cos x = \frac{\text{length of adjacent side}}{\text{length of hypotenuse}} = \frac{a}{h}$$

$$\tan x = \frac{\text{length of opposite side}}{\text{length of adjacent side}} = \frac{o}{a}$$

Exercises C

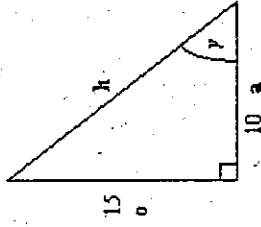
For the triangles below state:

- a) the length of the hypotenuse
- b) the length of the side opposite x
- c) the length of the side adjacent to x
- d) $\sin x$
- e) $\cos x$
- f) $\tan x$



TRIGONOMETRY – FINDING ANGLES

Notes:



1. Label sides : o, a, h
2. Choose a suitable ratio :

$$\sin y = \frac{o}{h} \quad \cos y = \frac{a}{h} \quad \tan y = \frac{o}{a}$$

3. Calculate angle using \sin^{-1} , \cos^{-1} or \tan^{-1} (You will need to use INV, 2NDF or SHIFT on your calculator)

$$\tan y = \frac{15}{10} \quad \text{[INV tan (15 ÷ 10) = } y \text{]} \quad \text{or } 15 \div 10 = \text{INV tan}$$

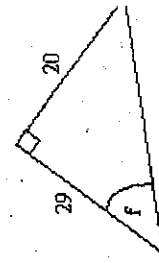
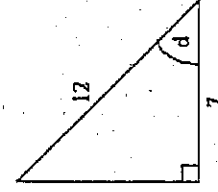
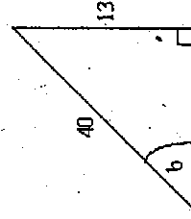
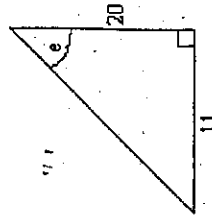
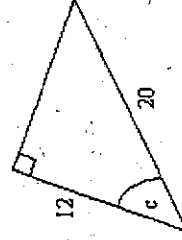
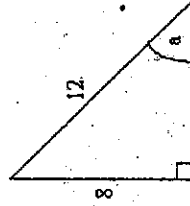
$$y = 56.31^\circ$$

Exercises : D

1. Calculate the angle in each of the following:

- a) $\sin a = 0.34$
- b) $\cos b = 0.5$
- c) $\tan c = 0.466$
- d) $\sin d = 0.951$
- e) $\cos e = 0.574$
- f) $\tan f = 0.268$

2. Calculate the marked angle in each of the following:



3. A ladder 3m long leans against a wall. It reaches 2m up the wall. What angle does the ladder make with the ground?

