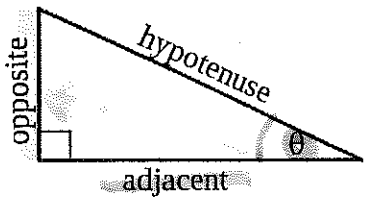
Chapter 8: Relationships in Right Triangles Name:

Sine Ratio

Trigonometry

Trigonometry is one of the most important topics in mathematics. Trigonometry is used in many fields including engineering, architecture, surveying, aviation, navigation, carpentry, forestry, and computer graphics. Also, until satellites, the most accurate maps were constructed using trigonometry.
The word trigonometry means triangle measurements.

In trigonometry, the other two, non-hypotenuse, sides (or legs) of the triangle are referred to as the **opposite** and **adjacent** sides, depending on their relationship to the angle of interest in the triangle.
"reference angle"
The angle of interest in a triangle is usually marked with the greek symbol *theta*: θ

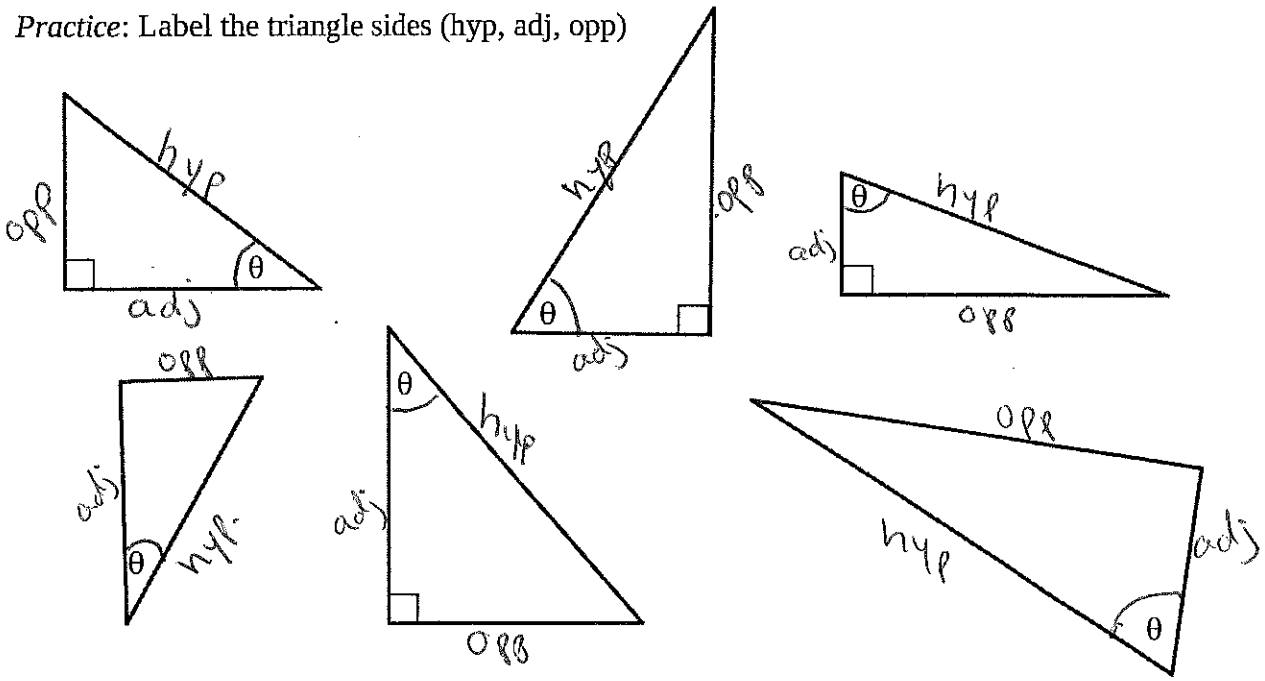


Hypotenuse (hyp): The leg opposite the 90° angle

Adjacent (adj): The leg next to <θ

Opposite (opp): The leg across from <θ

Practice: Label the triangle sides (hyp, adj, opp)



Calculator Check:

For trigonometry in grade 10 you must have your calculator in DEGREE mode.
(Not RAD or GRAD)

Sine Ratio

When the angles of different triangles are the same, the ratio of the sides within the triangle will always be the same. They depend only on the **measure of the angle of interest,** not the size of the triangle. These ratios are the trigonometric ratios: Sine, Cosine, Tangent

Sine of an angle is equal to the ratio of the length of the opposite side to the hypotenuse $\frac{opp}{hyp}$ (fraction)

Practice: Find these values with your calculator (record to the nearest thousandth if necessary)

a) Sin 45° = 0.707

b) Sin 25° = 0.423

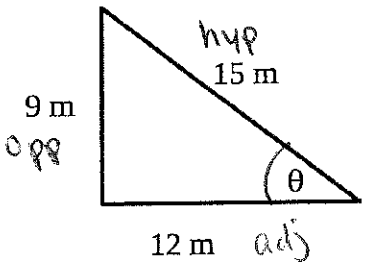
c) Sin 68° = 0.927

d) Sin 80° = 0.985

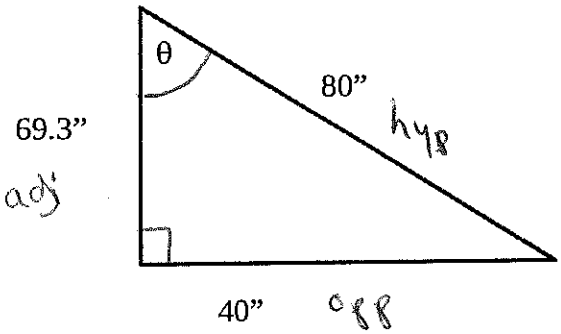
e) Sin 12° = 0.208

f) Sin 30° = 0.5

Practice: Find the ratio of the opposite side to the hypotenuse. Express as a fraction and decimal.



$\frac{opp}{hyp} = \frac{9}{15} = 0.6$



$\frac{opp}{hyp} = \frac{40}{80} = 0.5$

What do you notice about the ratio of opposite to hypotenuse and the calculated values of Sin θ above?

Ratio was 0.5, same as sin 30°

Does this give us information about the measure of θ?

θ is 30°

∴ ∠'s in △ are supplementary ∴ other angle must be 60°

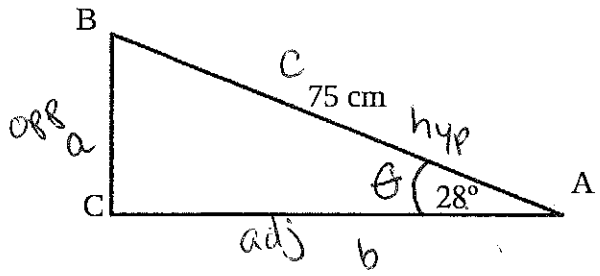
SOH CAH TOA

Using Sine Ratios to Find the Length of Missing Sides

The formula using the sine ratio: (SOH)

$$\sin\theta = \frac{opposite}{hypotenuse}$$

Find side *a:*



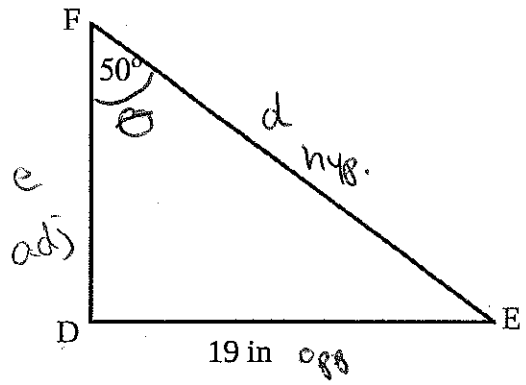
$$\sin\theta = \frac{opposite}{hypotenuse}$$

$$75 \times \sin 28^\circ = \frac{a}{75} \times 75$$

$$a = 75 \times \sin 28$$

$$a = 35.2 \text{ cm}$$

Find side *d*



$$\sin\theta = \frac{opposite}{hypotenuse}$$

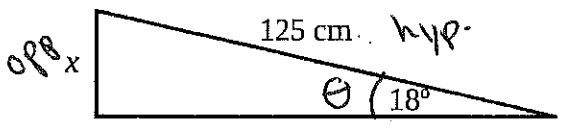
$$d \times \sin 50^\circ = \frac{19}{d} \times d$$

$$\frac{d \times \sin 50}{\sin 50} = \frac{19}{\sin 50}$$

$$d = \frac{19}{\sin 50^\circ}$$

$$d = 24.8 \text{ in}$$

Practice: Find the missing side

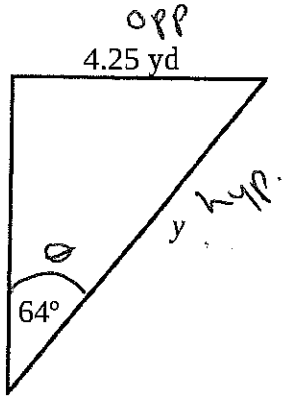


$$\sin\theta = \frac{o}{h}$$

$$\sin 18 = \frac{x}{125}$$

$$x = 125 \times \sin 18$$

$$x = 38.63 \text{ cm}$$



$$\sin 64 = \frac{4.25}{y}$$

$$y = \frac{4.25}{\sin 64}$$

$$y = 4.73 \text{ yd}$$

hello

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