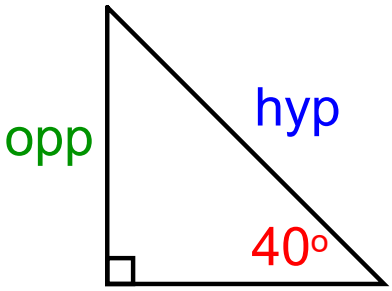
Warm Up

$\sin\theta=0.6428$. What could the triangle look like?



$\sin^{-1}(0.6428) = 40^{\circ}$

The ratio $\frac{\text{opp}}{\text{hyp}}$ needs to = 0.6428

Determining Special Angles

Lesson objectives

- I know how to draw the special triangle for 45° angles
- I know how to draw the special triangle for 30° and 60° angles
- I know how to state the exact values for the three trigonometric ratios for 30°, 45°, and 60° angles

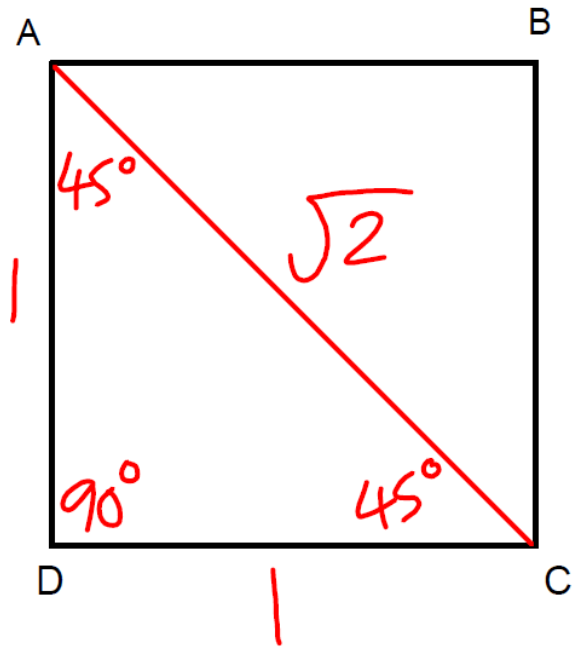
1.1

Lesson objectives | Teachers' notes | Lesson notes

Nelson Page 287 #s 4 - 8 & 11

Special Triangle # 1

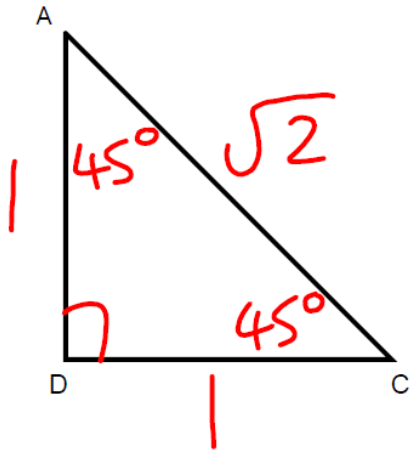
Our first special triangle come from a square with side length = 1.



We can cut this square into two congruent right angle triangles. Because the triangles are congruent angle A and C are split exactly in half.

Special Triangle # 1

If we look at one triangle that we created we will get 3 exact values:



Special Angles:

$\sin 45^\circ = \frac{1}{\sqrt{2}}$

$\cos 45^\circ = \frac{1}{\sqrt{2}}$

$\tan 45^\circ = 1$

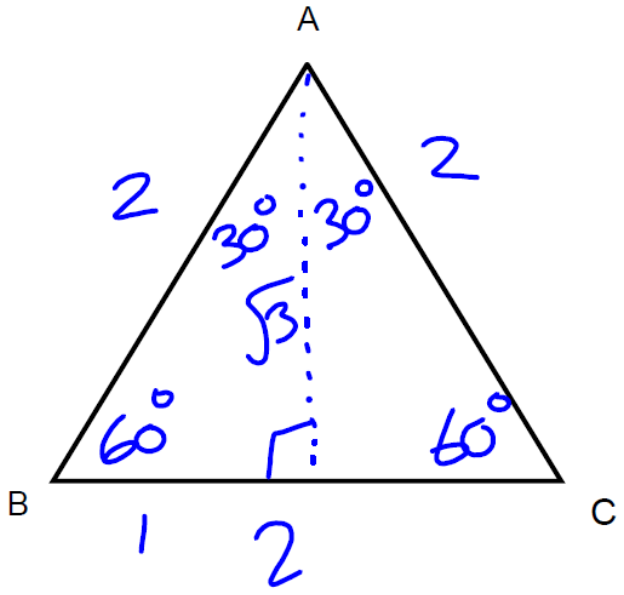
Technical Point

Mathematically, we don't like to see roots in the denominator of a fraction so we **RATIONALIZE** the denominator by writing $\frac{1}{\sqrt{2}}$ as follows:

$$\frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

Special Triangle # 2

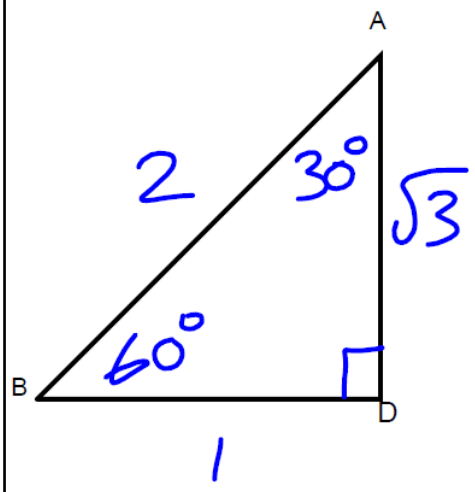
Our second special triangle come from an equilateral triangle with side length = 2.



We can cut this triangle into two congruent right angle triangles. Because the triangles are congruent angle A is split exactly in half.

Special Triangle # 2

If we look at one triangle we will get 2 sets of exact values.



Special Angles:

$\sin 30^\circ = \frac{1}{2}$ $\sin 60^\circ = \frac{\sqrt{3}}{2}$

$\cos 30^\circ = \frac{\sqrt{3}}{2}$ $\cos 60^\circ = \frac{1}{2}$

$\tan 30^\circ = \frac{1}{\sqrt{3}}$ $\tan 60^\circ = \sqrt{3}$

$\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

Example

State the exact value of each expression.

a) $\sin 30^\circ + \tan 45^\circ$

$= \frac{1}{2} + 1$

$= 1.5$

b) $\sin^2 45^\circ + \cos 60^\circ$

$= \left(\frac{\sqrt{2}}{2}\right)^2 + \frac{1}{2}$

$= \frac{2}{4} + \frac{1}{2} = 1$

c) $\sin^2 60^\circ + \sin^2 45^\circ$

$= \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{\sqrt{2}}{2}\right)^2$

$= \frac{3}{4} + \frac{2}{4}$

$= \frac{5}{4}$

d) $\cos^2 30^\circ + \tan^2 60^\circ$

$= \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\sqrt{3}\right)^2$

$= \frac{3}{4} + 3$

$= 3\frac{3}{4}$

Show the following:

$$\tan 30° + \frac{1}{\tan 30°} = \frac{1}{\sin 30° \cos 30°}$$

$$\frac{1}{\sqrt{3}} + \frac{1}{(1/\sqrt{3})} = \frac{1}{\left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right)}$$

$$\frac{1}{\sqrt{3}} + \sqrt{3} = \frac{1}{\frac{\sqrt{3}}{4}}$$

$$\frac{1}{\sqrt{3}} + \frac{\sqrt{3}(\sqrt{3})}{\sqrt{3}} = \frac{4}{\sqrt{3}}$$

$$\frac{4}{\sqrt{3}} =$$

$$LS = RS$$

Homework

Nelson Page 287 #s 4 - 8 & 11

Note:
Every time you are asked to evaluate a trig ratio at 30°, 45°, or 60° you are expected to give an exact value.