

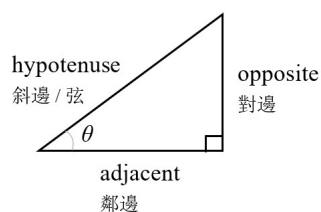
Geometry - Trigonometry

9/16/2023

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Geometry - Trigonometry



直角三角形的短邊稱之為「勾」，長邊稱之為「股」，斜邊稱之為「弦」。

Mnemonic: 「勾三股四弦五」

Pythagoras's theorem (畢氏定理) is also known as 「勾股定理」 or 「勾股弦定理」.

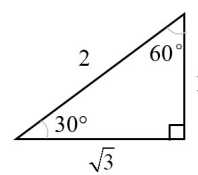
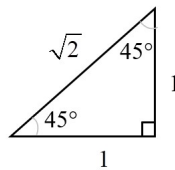
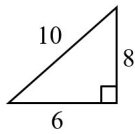
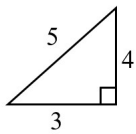
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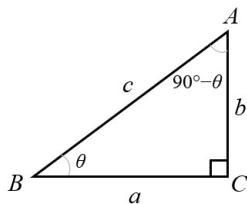
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Geometry - Trigonometry

Useful triangles:



Geometry - Trigonometry



$$\cos \theta = \frac{a}{c} = \sin(90^\circ - \theta)$$

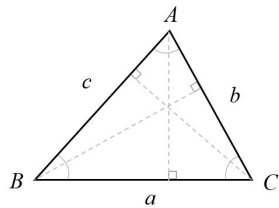
$$\sin \theta = \frac{b}{c} = \cos(90^\circ - \theta)$$

Hence, we have

$$\cos(90^\circ - \theta) = \sin \theta$$

$$\sin(90^\circ - \theta) = \cos \theta$$

Geometry - Trigonometry



Sine rule:

$$\therefore \begin{cases} a \sin B = b \sin A \\ a \sin C = c \sin A \\ b \sin C = c \sin B \end{cases} \Rightarrow \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine rule:

$$c^2 = (a \sin C)^2 + (b - a \cos C)^2$$

$$\Rightarrow c^2 = a^2 + b^2 - 2ab \cos C$$

Area:

$$\text{Area of } \triangle ABC = \frac{1}{2} ab \sin C$$