


Trigonometreg Rhan I

Trigonometry Part I



 @mathemateg

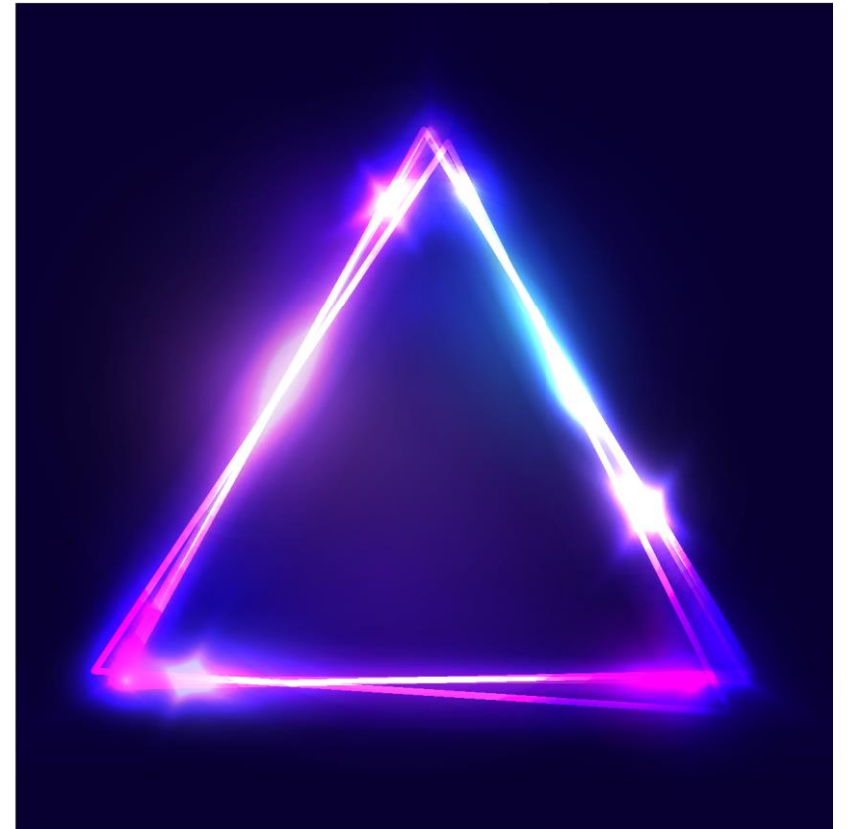
 /adolygumathemateg

Trigonometreg

Trigonometry

Trigonometreg yw'r rhan o fathemateg sy'n astudio'r perthnasau rhwng ochrau ag onglau mewn triongl. Mae'r gair yn deillio o'r Groegaidd am "triongl" a "mesur".

Trigonometry is the branch of mathematics that studies the relationships between lengths and angles in a triangle. The word derives from the Greek for "triangle" and "measure".



Trigonometreg Triongl Ongl Sgwâr

Trigonometry of a Right-Angled Triangle

Dyma'r cymarebau
trigonometrig.

*Here are the
trigonometric ratios.*

$$\sin \theta = \frac{\text{cyferbyn}}{\text{hypotenws}}$$

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

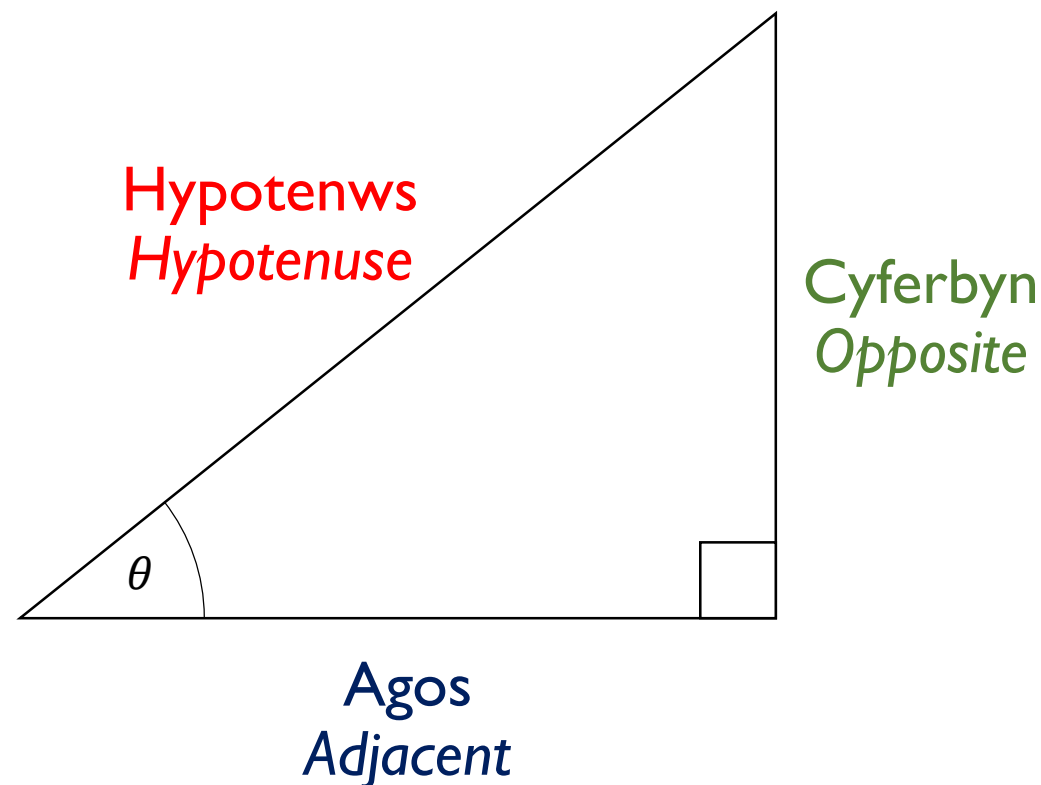
$$\cos \theta = \frac{\text{agos}}{\text{hypotenws}}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{cyferbyn}}{\text{agos}}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

“SOHCAHTOA”



Y Cylch Unedol

The Unit Circle

Ystyriwch y cylch unedol a ddangosir yn y ffeil GeoGebra yma:

Consider the unit circle shown in this GeoGebra file:

<https://ggbm.at/fGsz9sfN>

Gan fod yr hypotenws o hyd yn un uned / *Because the hypotenuse is always one unit*

- Uchder y triongl yw **sine** yr ongl. / *The height of the triangle is the **sine** of the angle.*
- Sail y triongl yw **cosine** yr ongl. / *The base of the triangle is the **cosine** of the angle.*

Y Cylch Unedol

The Unit Circle

Ystyriwch y cylch unedol a ddangosir yn y ffeil GeoGebra yma:

Consider the unit circle shown in this GeoGebra file:

<https://ggbm.at/fGsz9sfN>

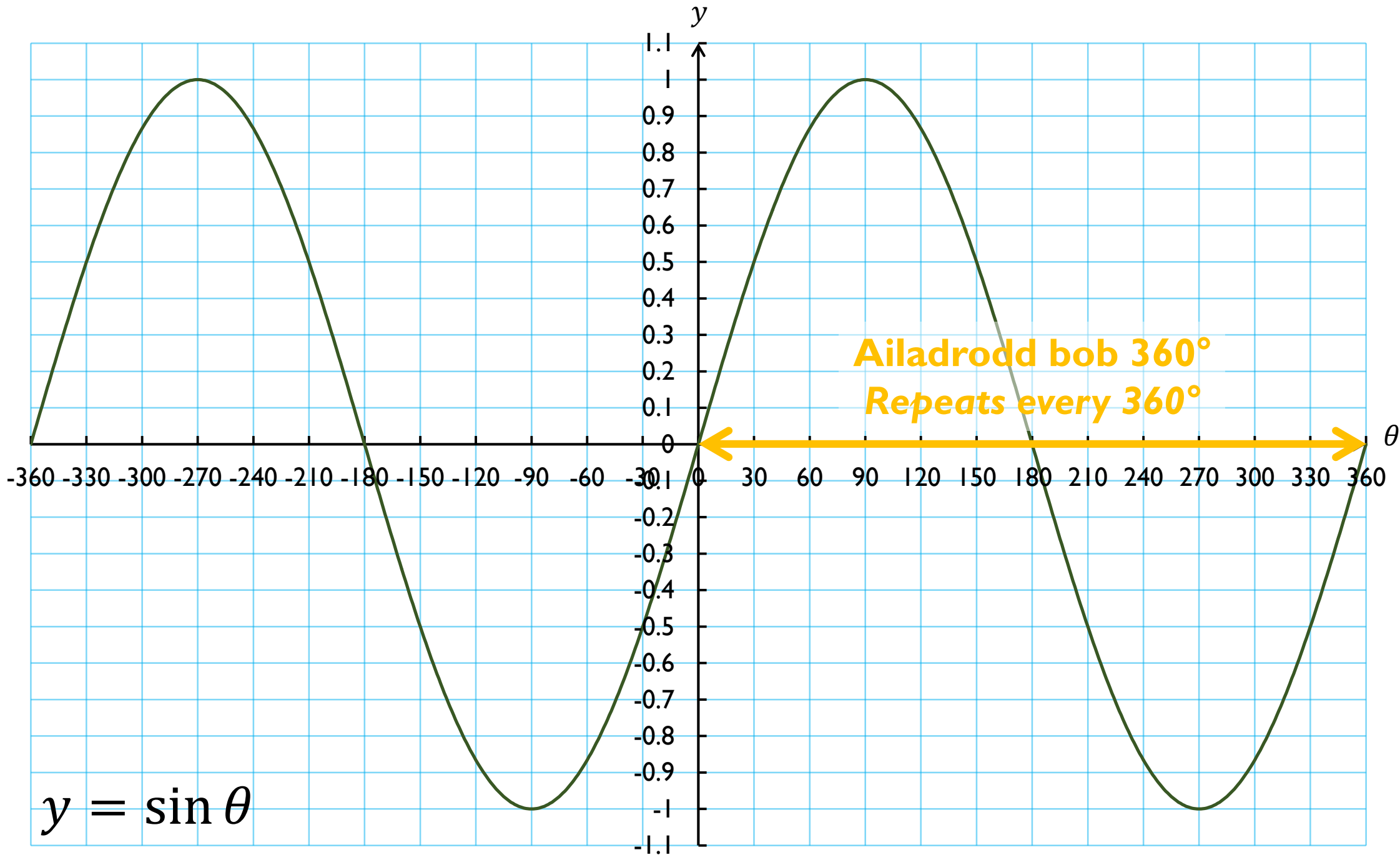
Mae'n dilyn fod / *It follows that* $\tan \theta = \frac{\sin \theta}{\cos \theta}$.

Tangiad yr ongl yw hefyd / *The **tangent** of the angle is also*

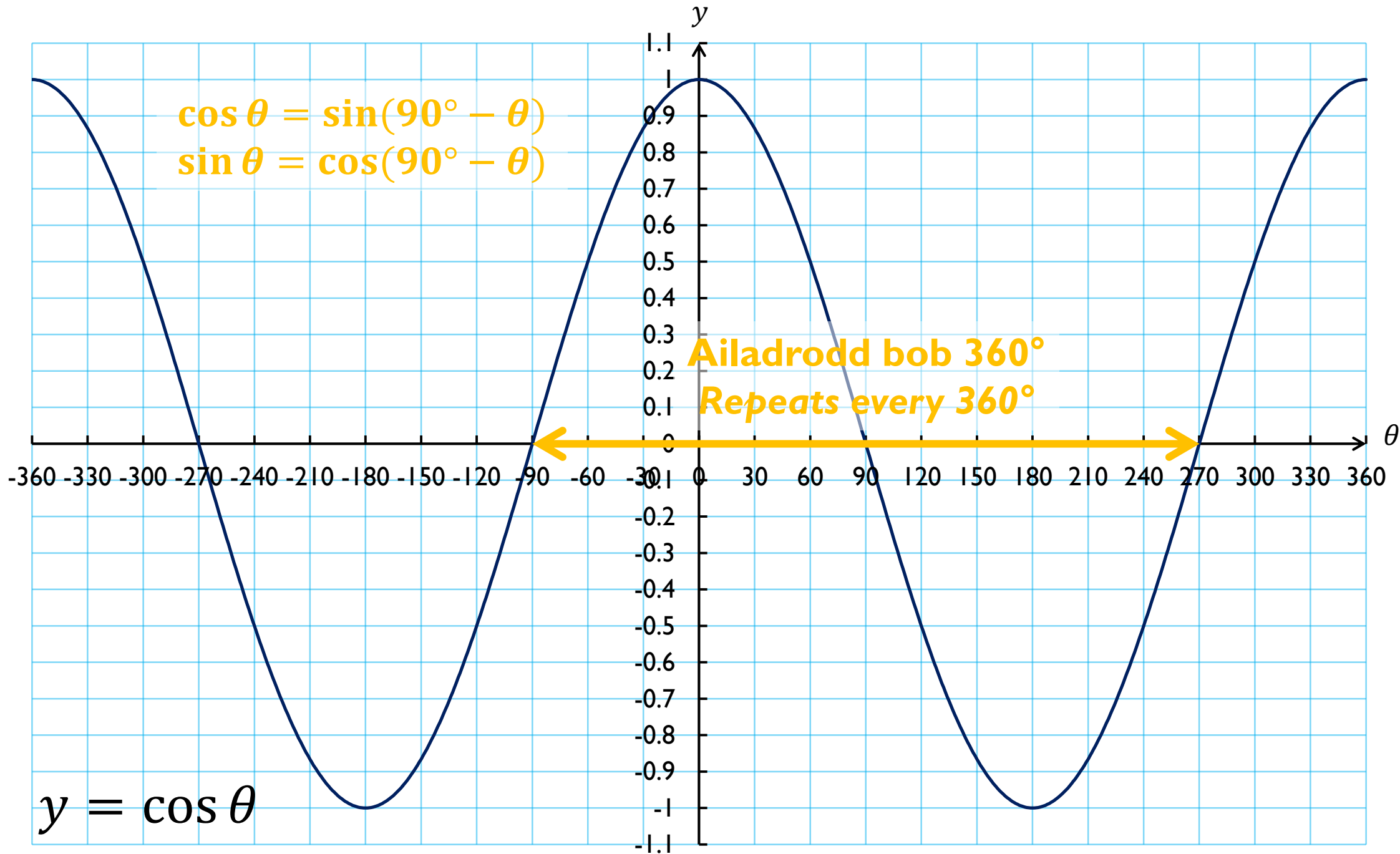
- Graddiant yr hypotenws / *The gradient of the hypotenuse.*
- Y pellter o'r pwynt A i'r echelin- x . / *The distance from the point A to the x -axis.*

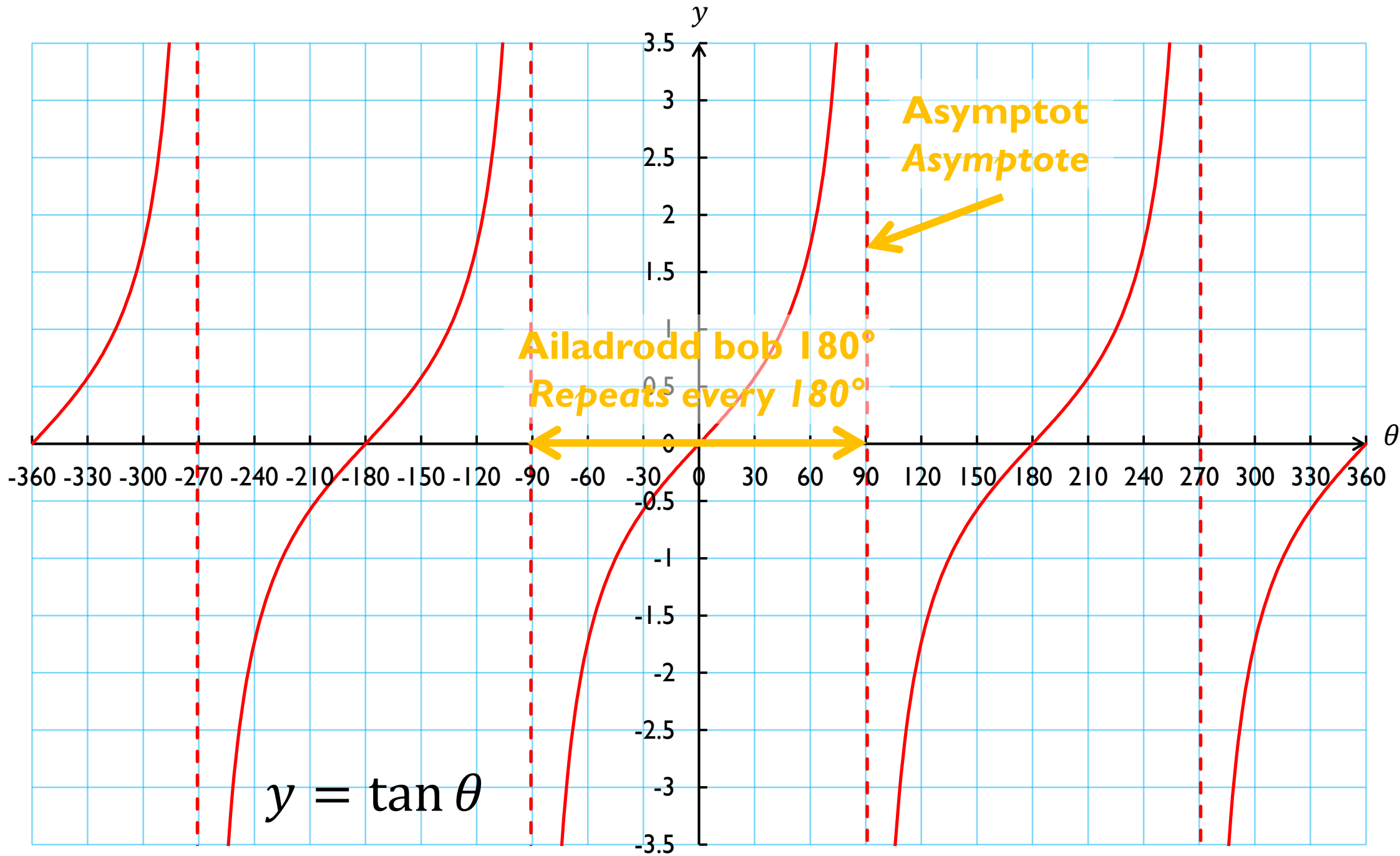
Trwy ddefnyddio Theorem Pythagoras / *Through the use of Pythagoras' Theorem*

$$\sin^2 \theta + \cos^2 \theta = 1$$



$y = \sin \theta$





Datrys Hafaliadau Trigonometrigrig

Solving Trigonometric Equations

Datryswch $3 \sin \theta = 1$ rhwng 0° a 360° .
Solve $3 \sin \theta = 1$ between 0° and 360° .

$$3 \sin \theta = 1$$

$$\sin \theta = \frac{1}{3}$$

$$\theta = \sin^{-1} \left(\frac{1}{3} \right)$$

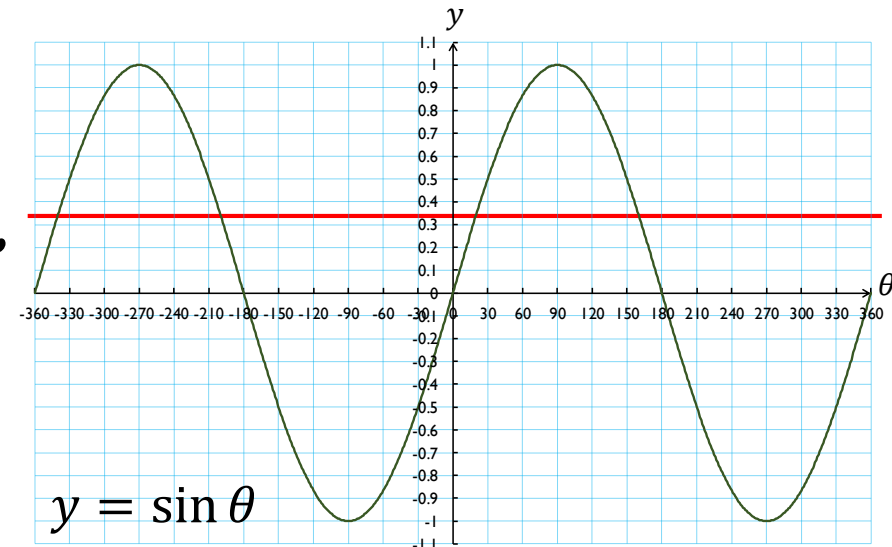
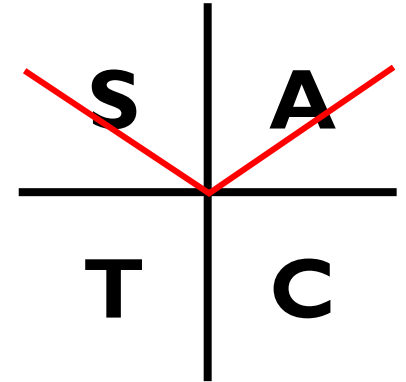
$\theta = \underline{19.47^\circ}$ i 2 le degol / to 2 decimal places.

Hefyd, o ystyried graff $\sin \theta$ neu'r diagram CAST,
Also, by considering the graph of $\sin \theta$ or the CAST diagram,

$$\theta = 180^\circ - 19.47^\circ$$

$\theta = \underline{160.53^\circ}$ i 2 le degol / to two decimal places.

Mae'r cyfrifiannell o hyd yn rhoi'r ongl efo'r modwlws lleiaf.
The calculator will always give the angle with the smallest modulus.



Datrys Hafaliadau Trigonometrigrig

Solving Trigonometric Equations

Datrysych $3 \cos 2\theta = -1$ rhwng -180° a 180° .
Solve $3 \cos 2\theta = -1$ between -180° and 180° .

$$\cos 2\theta = -\frac{1}{3}$$

$$2\theta = \cos^{-1}\left(-\frac{1}{3}\right)$$

$$2\theta = 109.47^\circ \text{ or cyfrifiannell, i 2 le degol.}$$

from the calculator, to 2 decimal places.

O ystyried graff $\cos \theta$ neu'r diagram CAST,

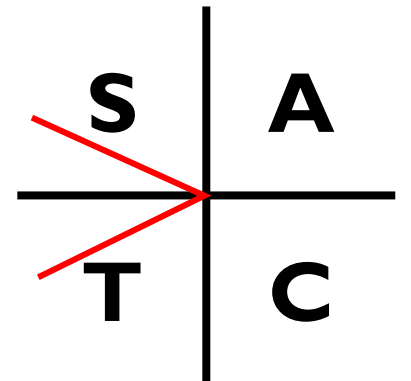
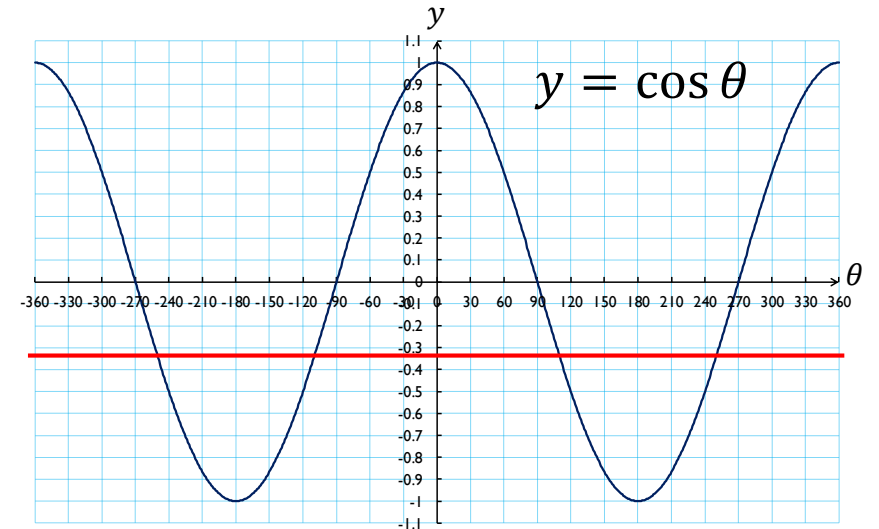
By considering the graph of $\cos \theta$ or the CAST diagram,

$$2\theta = -250.53, -109.47^\circ, 109.47^\circ, 250.53^\circ$$

(i 2 le degol / to two decimal places).

$$\theta = \underline{-125.26^\circ}, \underline{-54.74^\circ}, \underline{54.74^\circ}, \underline{125.26^\circ}$$

(i 2 le degol / to two decimal places).



Datrys Hafaliadau Trigonometrïg

Solving Trigonometric Equations

Datrysych $2\cos^2\theta + \sin\theta - 1 = 0$ rhwng 0° a 360° .
Solve $2\cos^2\theta + \sin\theta - 1 = 0$ between 0° and 360° .

$$2\cos^2\theta + \sin\theta - 1 = 0$$

$$2(1 - \sin^2\theta) + \sin\theta - 1 = 0$$

$$2 - 2\sin^2\theta + \sin\theta - 1 = 0$$

$$-2\sin^2\theta + \sin\theta + 1 = 0$$

$$2\sin^2\theta - \sin\theta - 1 = 0$$

$$(2\sin\theta + 1)(\sin\theta - 1) = 0$$

Naill ai $2\sin\theta + 1 = 0$ neu $\sin\theta - 1 = 0$

Either $2\sin\theta = -1$ or $\sin\theta = 1$

$$\sin\theta = -\frac{1}{2} \quad \theta = \sin^{-1}(1)$$

$$\theta = \sin^{-1}\left(-\frac{1}{2}\right) \quad \theta = \underline{90^\circ}$$

$$\theta = \underline{-150^\circ}, \underline{-30^\circ},$$

$$\underline{210^\circ}, \underline{330^\circ}$$

