



# Trigonometry





**BELGIUM**



# BELGIUM ON A MAP



# BRUSSELS

- capital city
- amazing and beautiful by night
- every year flower market in Brussels' big market



# ANTWERP

- the port of Antwerp
- Sportpaleis/Lotto Arena
- 'De Meir'





# GENT

- Gravensteen
- Graslei/Korenlei
- Gentse Feesten



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## FAMOUS BELGIAN FOOD

- Fries
- (Brussels and Liège) waffles
- Chocolate and especially pralines
- Carbonade flamande
- Cuberdon
- Vol au vent
- Beer





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## THE BELGIAN COAST

- It's an attractive place
- A lot of people have a second house or apartment here
- It's the holiday place in Belgium





## BELGIAN INVENTIONS

- Saxophone
- internet, Robert Cailliau was from Belgium
- Candy
- Praline
- Deodorant





## FAMOUS BELGIAN PEOPLE

- Angèle
- Stromae
- Romelu Lukaku
- Kevin De Bruyne
- Eden Hazard
- Thibaut Courtois
- Wout Van Aert
- Max Verstappen (his mother)
- Kim Clijsters
- Nafi Thiam
- Nina Derwael



 **this was**

**BELGIUM**





## Some mathematical terms in English

Teorema de pitágoras	Pythagorean theorem
distancia	distance
ángulo	angle
triángulo rectángulo	right-angled triangle
suma de ángulos	angle sum
proporción	ratio



# Why do we need trigonometry?

## Trigonometry

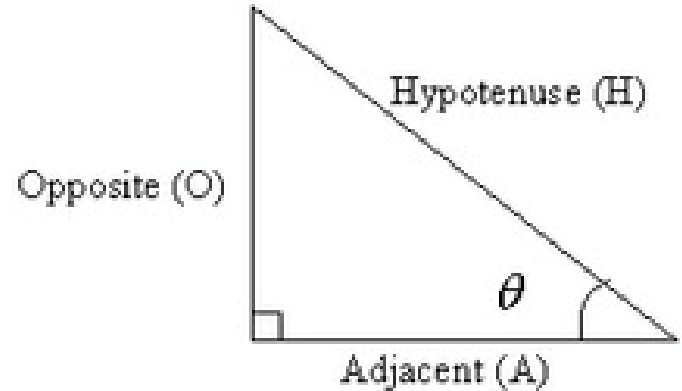
- to obtain unknown angles/ distances

## Pythagorean theorem

- to obtain unknown distances

## What do we need?

- right-angled triangle
  - opposite side (= lado opuesto)
  - hypotenuse (= hipotenusa)
  - adjacent side (= lado adyacente)
- 2 known values
  - 2 distances
  - 1 distance and 1 angle



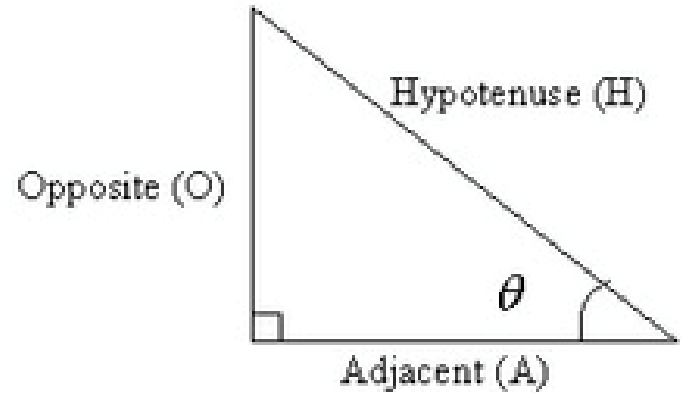
## The basics

**Pythagorean theorem:**  $a^2+b^2=c^2$

**Sine**  $\alpha =$  opposite side / hypotenuse (SOH)

**Cosine**  $\alpha =$  adjacent side / hypotenuse (CAH)

**Tangent**  $\alpha =$  opposite side / adjacent side (TOA)





## Now it's your turn...

- a right-angled triangle

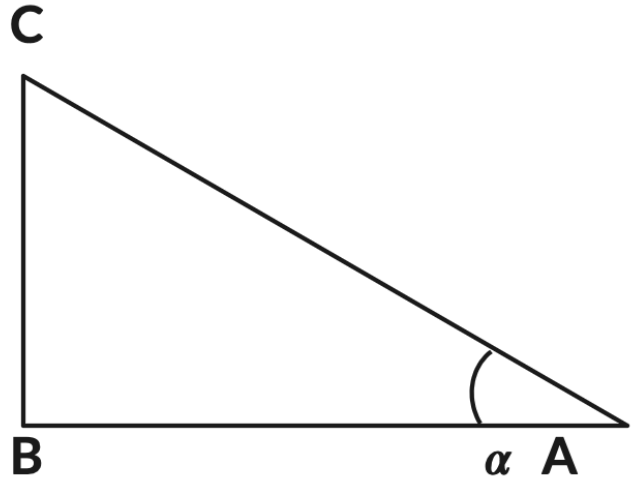
What do we know?

opposite side= 10 cm

adjacent side= 15 cm

$$\tan^{-1}(O / A) = \tan^{-1}(10 / 15)$$

$$\alpha = 33,7^\circ$$



## Now it's your turn...

- a right-angled triangle

What do we know?

opposite side= 8cm

$\alpha = 50^\circ$

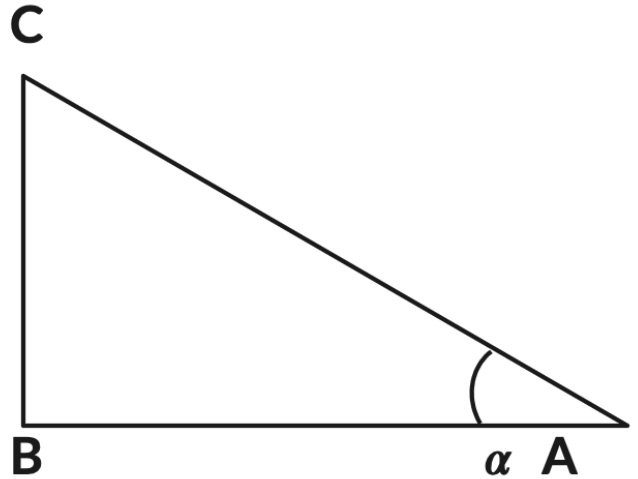
$$\tan \alpha = O/A$$

$$A = O / \tan \alpha$$

$$A = 8 / \tan(50^\circ)$$

=>

$$A = 6,7 \text{ cm}$$





## Values to remember

$\alpha$	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
sine	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
cosine	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	0
tangent	?	?	?	?	?



## What is tan (0) ?

$$\Rightarrow \tan \alpha = \sin \alpha / \cos \alpha$$

$$\Rightarrow \tan 0^\circ = \sin 0^\circ / \cos$$

$$0^\circ$$
$$\Rightarrow \tan 0^\circ = 0 / 1$$

$$\Rightarrow \tan 0^\circ = 0$$

$\alpha$	$0^\circ$
sine	0
cosine	1





## What is $\tan(30)$ ?

$$\Rightarrow \tan \alpha = \sin \alpha / \cos \alpha$$

$$\Rightarrow \tan 30^\circ = \sin 30^\circ / \cos 30^\circ$$

$$\Rightarrow \tan 30^\circ = (1/2) / (\sqrt{3}/2)$$

$$= (1/2) \cdot (2/\sqrt{3})$$

$$\Rightarrow \tan 30^\circ = 1/\sqrt{3}$$

$\alpha$	$0^\circ$
sine	1/2
cosine	$\sqrt{3}/2$



## What is tan (45) ?

$$\Rightarrow \tan \alpha = \sin \alpha / \cos \alpha$$

$$\Rightarrow \tan 45^\circ = \sin 45^\circ / \cos 45^\circ$$

$$\Rightarrow \tan 45^\circ = (\sqrt{2}/2) / (\sqrt{2}/2)$$

$$\Rightarrow \tan 45^\circ = 1$$

$\alpha$	$45^\circ$
sine	$\sqrt{2}/2$
cosine	$\sqrt{2}/2$



## What is tan (60) ?

$$\Rightarrow \tan \alpha = \sin \alpha / \cos \alpha$$

$$\Rightarrow \tan 60^\circ = \sin 60^\circ / \cos 60^\circ$$

$$\Rightarrow \tan 60^\circ = (\sqrt{3}/2) / (1/2)$$

$$= (\sqrt{3}/2) \cdot (2)$$

$$\Rightarrow \tan 60^\circ = \sqrt{3}$$

$\alpha$	$60^\circ$
sine	$\sqrt{3}/2$
cosine	$1/2$



## What is $\tan(90^\circ)$ ?

$$\Rightarrow \tan \alpha = \sin \alpha / \cos \alpha$$

$$\Rightarrow \tan 90^\circ = \sin 90^\circ / \cos 90^\circ$$

$$\Rightarrow \tan 90^\circ = 1 / 0$$

$$\Rightarrow \tan 90^\circ = /$$

$\alpha$	$90^\circ$
sine	1
cosine	0





**Thank you for your attention!**