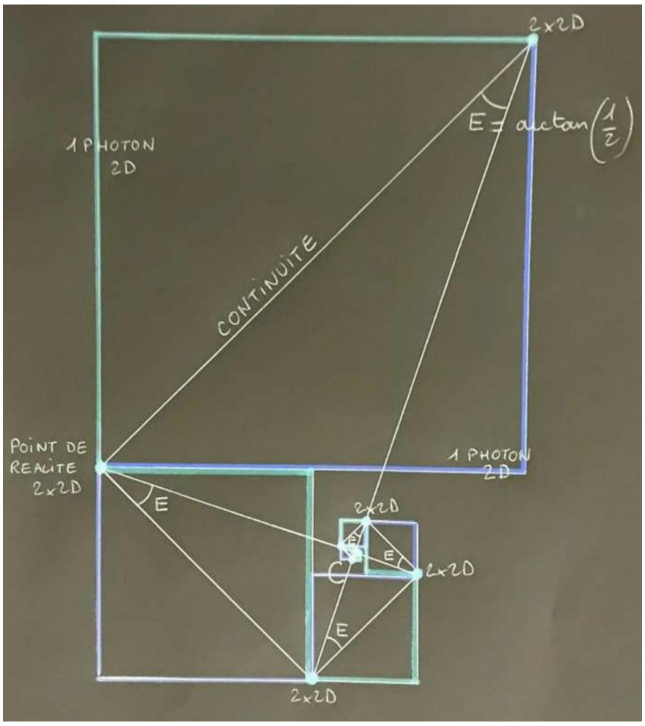
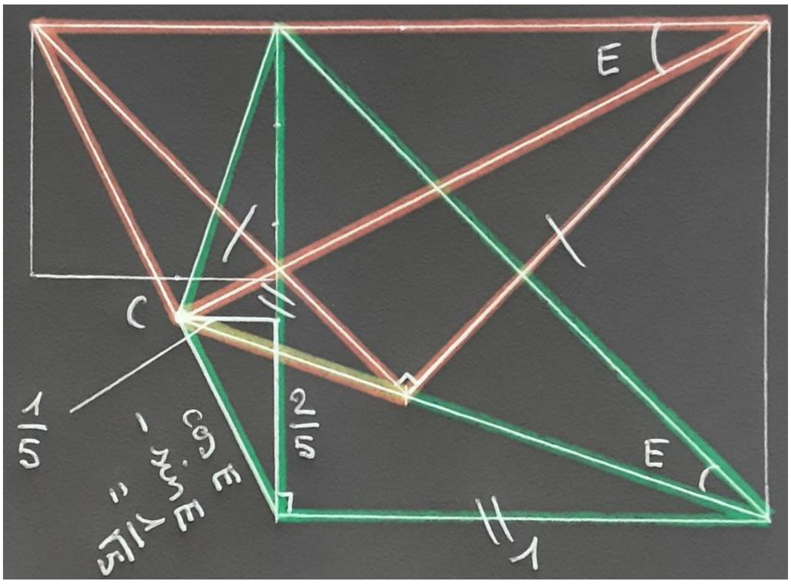
cos A – sin A = L root of 2 / H

Internet website EFD

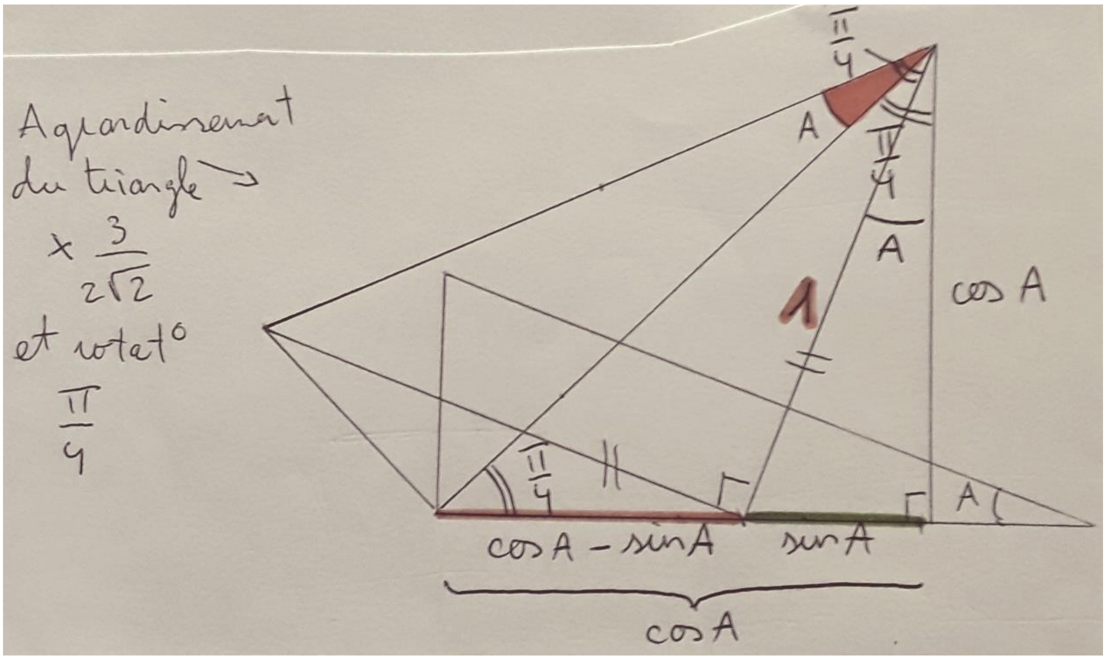
The study is based on an interesting figure describing, in the Light and Shadow experiment, the evolution of two 2D photons of light into flattened 2x2D.



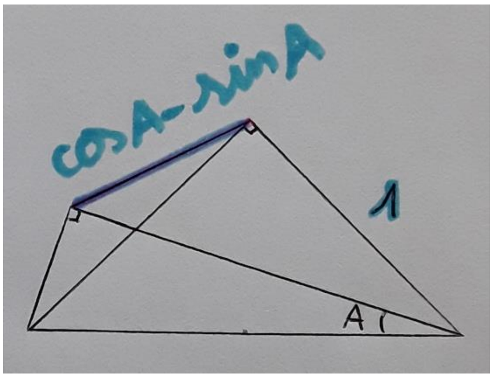


In the figure on the right, the length of the hypotenuse of the small triangle = cos E – sin E = 1 / root of 5, with E = arctan (1 / 2) and taking as scale 1 at the bottom of the right square. The length that connects the right-angled vertices of the green figure = cos E – sin E.

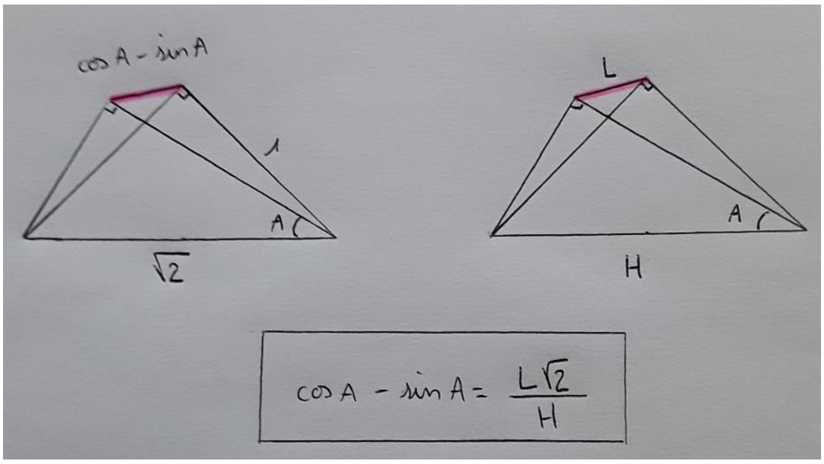
We then propose to find out if this length can be equal to cos A – sin A for any acute angle A by noticing the transformation of the triangle of green E towards the triangle of orange E (on the previous diagram), and by positioning the 1 at the right place (on the next diagram). By an angular study and because of the positioning of the 1, we notice that the rectangular vertex of the right-angled isosceles triangle comes to touch the base at the length cos A – sin A.



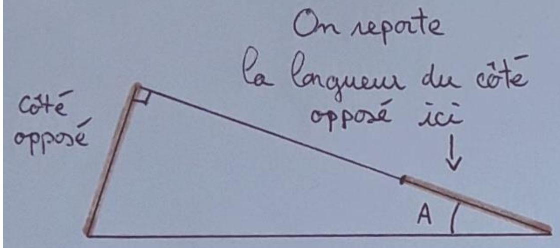
The length that connects the rectangular tops of the triangles = cos A – sin A provided that the side of the isosceles triangle takes as scale 1.

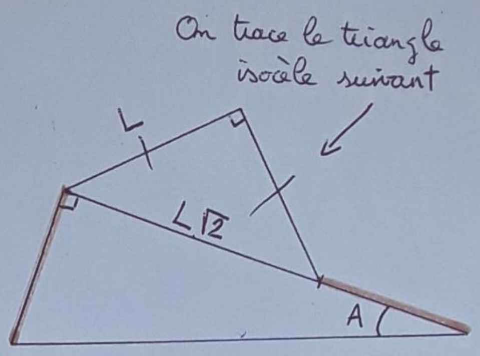


Scaling for all rectangular triangles.

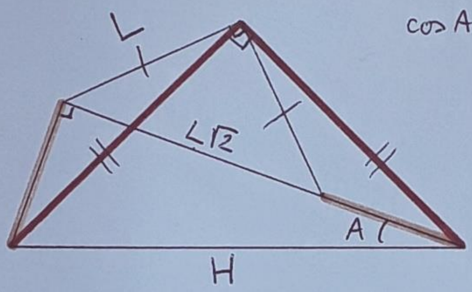


We get « cos A – sin A = L root of 2 / H » and write the demonstration.





Et on s'aperçoit que pour tout triangle rectangle, le sommet du triangle isocèle précédent est confondu au sommet du triangle isocèle qui partage l'hypoténuse H avec le triangle étudié



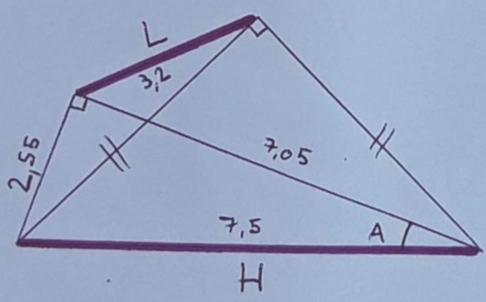
$$\cos A - \sin A = \frac{\text{côté adjacent}}{H} - \frac{\text{côté opposé}}{H}$$

$$= \frac{L\sqrt{2} + \text{côté opposé}}{H} - \frac{\text{côté opposé}}{H}$$

$$= \frac{L\sqrt{2}}{H} + \frac{\text{côté opposé}}{H} - \frac{\text{côté opposé}}{H}$$

$$= \frac{L\sqrt{2}}{H}$$

$$\boxed{\cos A - \sin A = \frac{L\sqrt{2}}{H}}$$



La valeur de cos A − sin A est obtenue sans utiliser les côtés adjacents et opposés

Vérification.

$$\frac{L\sqrt{2}}{H} = \frac{3{,}2 \times \sqrt{2}}{7{,}5} \simeq 0{,}603$$

$$\cos A - \sin A = \frac{7{,}05}{7{,}5} - \frac{2{,}55}{7{,}5} \simeq 0{,}6$$

OK.

Cette relation est-elle intéressante ?

Simon Rivera