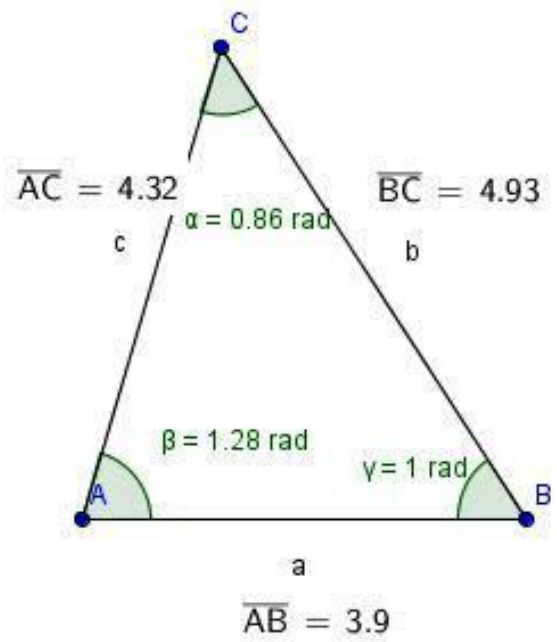


# Teorema del coseno o di Carnot

Con geogebra, derive, cabri, excel

- Angolo
  - $\alpha = 0.86 \text{ rad}$
  - $\beta = 1.28 \text{ rad}$
  - $\gamma = 1 \text{ rad}$
- Numero
  - $d = 15.18$
  - distanzaAB = 3.9
  - distanzaAC = 4.32
  - distanzaBC = 4.93
  - $e = 3.9$
  - $f = 4.33$
  - $g = 4.92$
  - $h = 0.65$
  - $i = 0.86$
- Punto
  - $A = (-2.26, -0.18)$
  - $B = (1.64, -0.18)$
  - $C = (-1.04, 3.96)$
- Segmento
  - $a = 3.9$
  - $b = 4.93$
  - $c = 4.32$



teorema del coseno o di Carnot  
 in un triangolo qualsiasi vale la relazione  
 tra i lati a, b, c e angoli tra due di essi compresi

$$a^2 = b^2 + c^2 - 2bc \cos(\alpha)$$

$$b^2 = a^2 + c^2 - 2ac \cos(\beta)$$

$$c^2 = a^2 + b^2 - 2ab \cos(\gamma)$$

$$\cos(\alpha) = (b^2 + c^2 - a^2) / 2bc$$

$$\cos(\beta) = (a^2 + c^2 - b^2) / 2ac$$

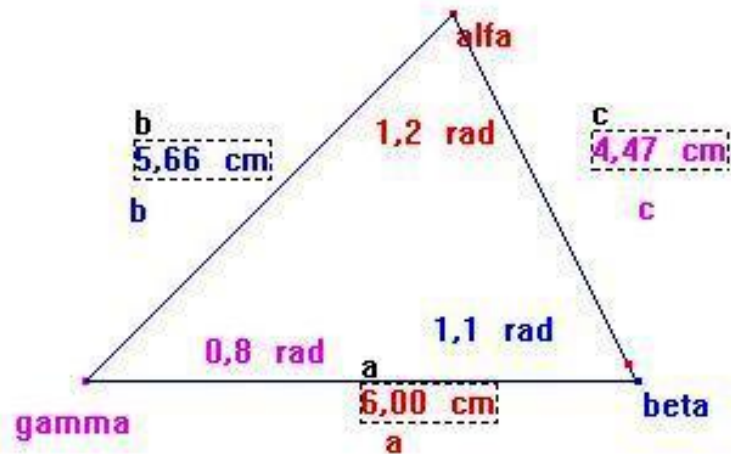
$$\cos(\gamma) = (a^2 + b^2 - c^2) / 2ab$$

noti b, c,  $\alpha$   
 calcolo  $a^2$  (d) 15.18  
 $\sqrt{15.18} = 3.9$  (e)

noti a, b,  $\gamma$   
 calcolo  $\sqrt{c^2} = 4.33$  (f)

noti a, c,  $\beta$   
 calcolo  $\sqrt{b^2} = 4.92$  (g)

calcolo alfa  $(4.93^2 + 4.32^2 - 3.9^2) / (2 * 4.93 * 4.32) = 0.65$  (h)  
 $\text{acos}(0.65) = 0.86$  (i)



teorema del coseno o di Carnot  
relazione tra lati e angoli di triangolo

sqrt: lato

$$a^2 = b^2 + c^2 - 2bc \cdot \cos[\text{alfa}]$$

Risultato: 36,00 cm<sup>2</sup>

Risultato: 6,00 cm

$$b^2 = a^2 + c^2 - 2ac \cdot \cos[\text{beta}]$$

Risultato: 32,00 cm<sup>2</sup>

Risultato: 5,66 cm

$$c^2 = a^2 + b^2 - 2ab \cdot \cos[\text{gamma}]$$

Risultato: 20,00 cm<sup>2</sup>

Risultato: 4,47 cm

$$\cos[\text{alfa}] = (b^2 + c^2 - a^2) / (2bc)$$

Risultato: 0,32

acos= angolo rad

Risultato: 1,25 rad

$$\cos[\text{beta}] = (a^2 + c^2 - b^2) / (2ac)$$

Risultato: 0,37

Risultato: 1,19 rad

$$\cos[\text{gamma}] = (a^2 + b^2 - c^2) / (2ab)$$

Risultato: 0,71

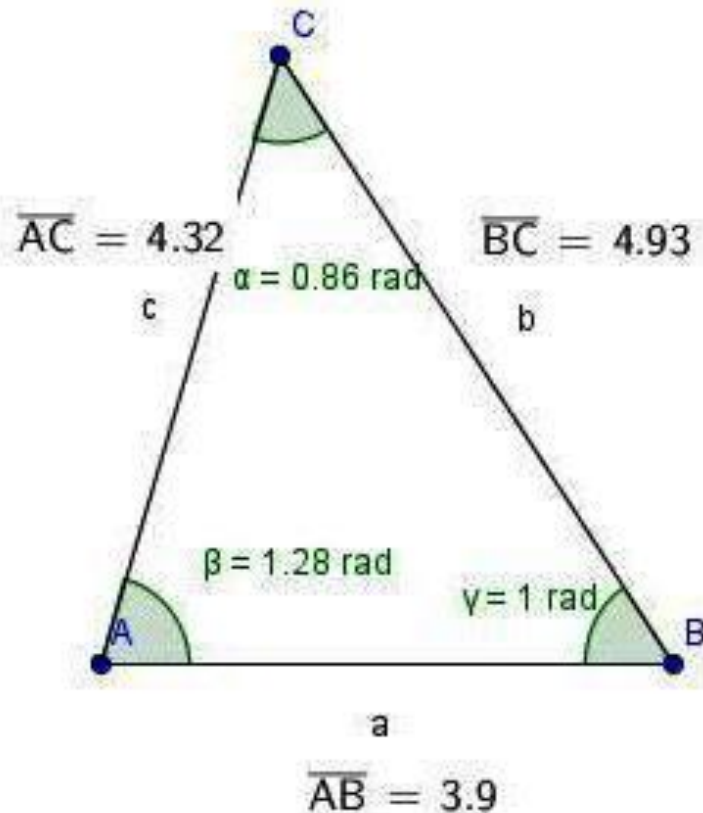
Risultato: 0,79 rad

Calcolatrice

Stop Annulla  $[a^2 + b^2 - c^2] / [2 * a * b]$  = 0,71

inv sin cos tan sqrt ^ ln log abs pi { } + - × / =

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in un triangolo qualsiasi vale la relazione  
tra i lati  $a$ ,  $b$ ,  $c$  e angoli tra due di essi compresi



$$a^2 = b^2 + c^2 - 2bc \cos(\alpha)$$

$$b^2 = a^2 + c^2 - 2ac \cos(\beta)$$

$$c^2 = a^2 + b^2 - 2ab \cos(\gamma)$$

$$\cos(\alpha) = (b^2 + c^2 - a^2) / 2bc$$

$$\cos(\beta) = (a^2 + c^2 - b^2) / 2ac$$

$$\cos(\gamma) = (a^2 + b^2 - c^2) / 2ab$$



#1: "teorema del coseno o di Carnot"

#2: a := 6

#3: b := 5.66

#4: c := 4.47

#5:  $\alpha$  := 1.2

#6:  $\beta$  := 1.1

#7:  $\gamma$  := 0.8

#8: "....."

#9: " $a^2 = b^2 + c^2 - 2 \cdot b \cdot c \cdot \cos(\alpha)$ "

#10: " $b^2 = a^2 + c^2 - 2ab \cdot \cos(\beta)$ "

#11: " $c^2 = a^2 + b^2 - 2ab \cdot \cos(\gamma)$ "

#12: " $\cos(\alpha) = (b^2 + c^2 - a^2) / (2bc)$ "

#13: " $\cos(\beta) = (a^2 + c^2 - b^2) / (2ac)$ "

#14: " $\cos(\gamma) = (a^2 + b^2 - c^2) / (2ab)$ "

#15: "\_\_\_\_\_"

#15: "-----"

#16: "calcolo a^2 e radice=lato"

$$\#17: b^2 + c^2 - 2 \cdot b \cdot c \cdot \cos(\alpha)$$

#18: 33.7

#19:  $\sqrt{33.7466}$

#20: 5.8

#21: "calcolo b^2 e radice= lato"

$$\#22: a^2 + c^2 - 2 \cdot a \cdot c \cdot \cos(\beta)$$

#23: 31.6

#24:  $\sqrt{31.6315}$

#25: 5.6

#26: "calcolo c^2 e radice = lato"

$$\#28: a^2 + b^2 - 2 \cdot a \cdot b \cdot \cos(0.8)$$

$$\#29: a^2 + b^2 - 2 \cdot a \cdot b \cdot \cos(0.8)$$

#30: 20.7

#31:  $\sqrt{20.7894}$

#32: 4.5

#33: "-----"

#33: "-----"

#34: "calcolo  $\cos(\alpha)$  e  $\text{acos}(\alpha) = \text{angolo alfa}$ "

$$\#35: \frac{b^2 + c^2 - a^2}{2 \cdot b \cdot c}$$

#36: 0.31

#37:  $\text{ACOS}(0.316666)$

#38: 1.2

#39: "calcolo  $\cos(\beta)$  e  $\text{acos}(\beta) = \text{beta}$ "

$$\#40: \frac{a^2 + c^2 - b^2}{2 \cdot a \cdot c}$$

#41: 0.44

#42:  $\text{ACOS}(0.446808)$

#43: 1.1

#44: "calcolo  $\cos(\gamma)$  e  $\text{acos}(\gamma) = \text{gamma}$ "

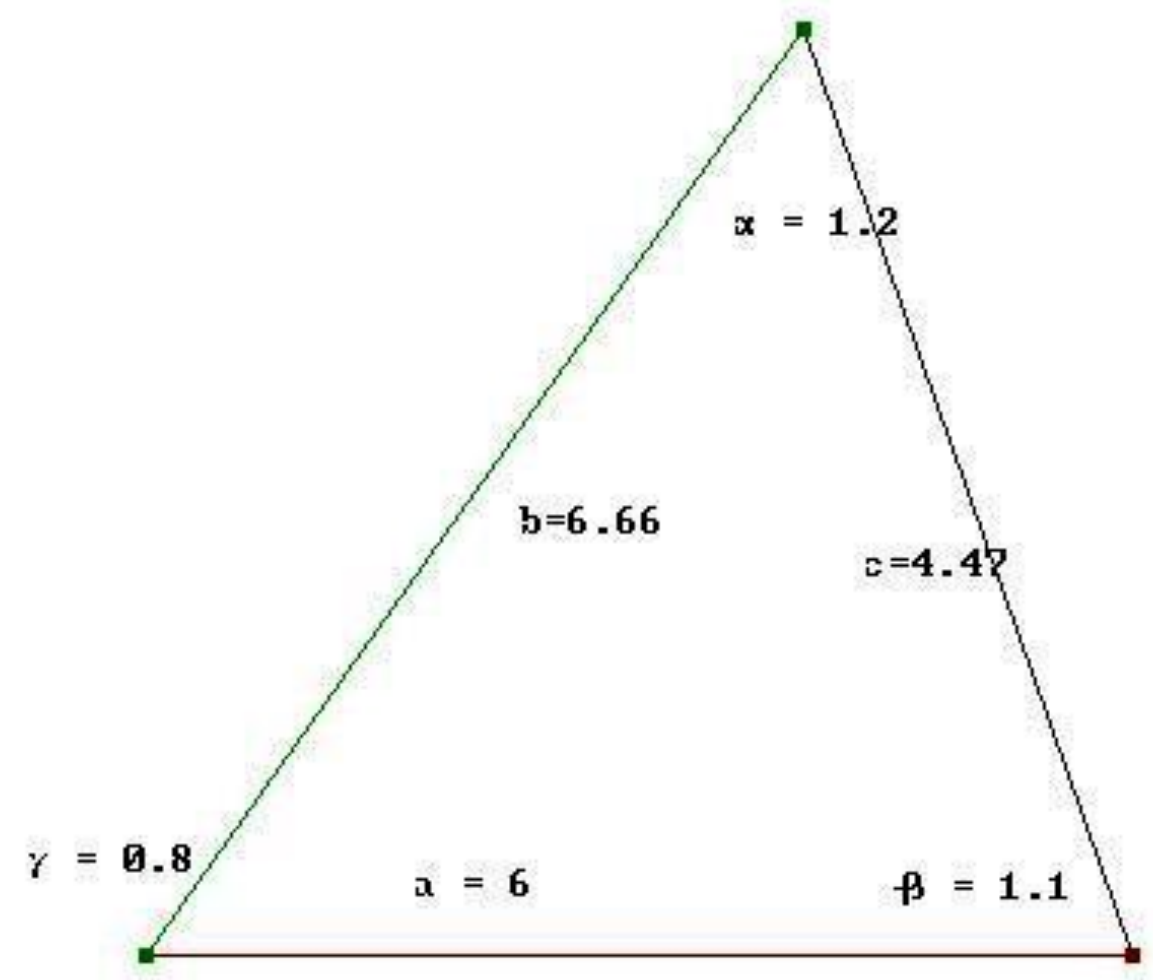
$$\#45: \frac{a^2 + b^2 - c^2}{2 \cdot a \cdot b}$$

#46: 0.70

#47:  $\text{ACOS}(0.708333)$

#48: 0.78

- #1:  $\begin{bmatrix} 6 & 7 \\ 12 & 7 \end{bmatrix}$
- #2:  $\begin{bmatrix} 6 & 7 \\ 10 & 11 \end{bmatrix}$
- #3:  $\begin{bmatrix} 10 & 11 \\ 12 & 7 \end{bmatrix}$





A	B	C	D	E	F	G	H	I	J	K
a	6				33,68105268	5,803538				
b	5,66				31,65000405	5,625834				
c	4,47				20,7152803	4,551404				
				lato^2		lato				
alpha	1,2				0,316529118	1,248728				
beta	1,1				0,446407532	1,10805				
gamma	0,8				0,70751914	0,784815				

**teorema del coseno o di Carnot**

$$a^2 = b^2 + c^2 - 2bc \cdot \cos(\alpha)$$

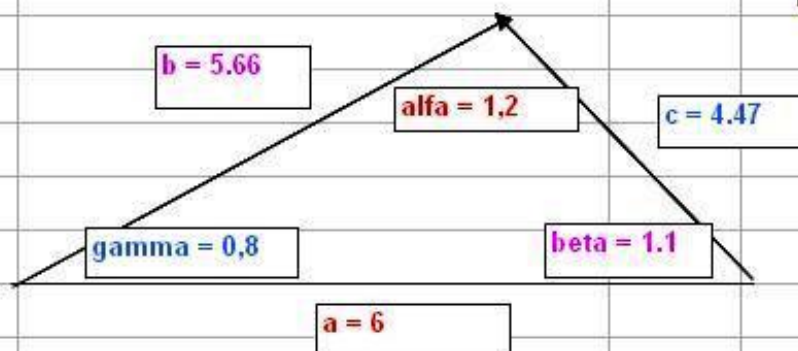
$$b^2 = a^2 + c^2 - 2ac \cdot \cos(\beta)$$

$$c^2 = a^2 + b^2 - 2ab \cdot \cos(\gamma)$$

$$\cos(\alpha) = (b^2 + c^2 - a^2) / 2bc$$

$$\cos(\beta) = (a^2 + c^2 - b^2) / 2ac$$

$$\cos(\gamma) = (a^2 + b^2 - c^2) / 2ab$$



3,10

	A	B	C	D	E	F
1	a	6			=B2^2+B3^2-2*B2*B3*COS(B5)	=RADQ(E1)
2	b	5,66			=B1^2+B3^2-2*B1*B3*COS(B6)	=RADQ(E2)
3	c	4,47			=B1^2+B2^2-2*B1*B2*COS(B7)	=RADQ(E3)
4					lato^2	lato
5	0alfa	1,2			=((B2^2+B3^2-B1^2)/(2*B2*B3))	=ARCCOS(E5)
6	beta	1,1			=(B1^2+B3^2-B2^2) / (2*B1*B3)	=ARCCOS(E6)
7	gamma	0,8			=(B1^2+B2^2-B3^2)/(2*B1*B2)	=ARCCOS(E7)
8						
9						
10		=B5+B6+B7				
11						
12						
13						
14						
15						
16						
17						

**teorema del coseno o di Carnot**

$a^2 = b^2 + c^2 - 2bc \cdot \cos(\text{alfa})$   
 $b^2 = a^2 + c^2 - 2ac \cdot \cos(\text{beta})$   
 $c^2 = a^2 + b^2 - 2ab \cdot \cos(\text{gamma})$

$\cos(\text{alfa}) = (b^2 + c^2 - a^2) / 2bc$   
 $\cos(\text{beta}) = (a^2 + c^2 - b^2) / 2ac$   
 $\cos(\text{gamma}) = (a^2 + b^2 - c^2) / 2ab$



Vista Algebra

- Angolo
  - $\alpha = 0.92 \text{ rad}$
  - $\beta = 0.88 \text{ rad}$
  - $\gamma = 1.34 \text{ rad}$
- Numero
  - distanzaAB = 5.28
  - distanzaAC = 5.45
  - distanzaBC = 6.65
- Punto
  - A = (-2.42, -0.48)
  - B = (2.86, -0.4)
  - C = (-1.24, 4.84)
- Segmento
  - a = 6.65
  - b = 5.45
  - c = 5.28
- Triangolo
  - poli1 = 14

Vista Grafica

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