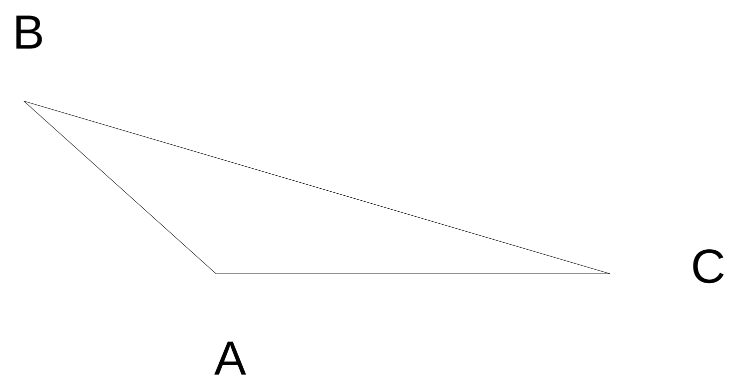
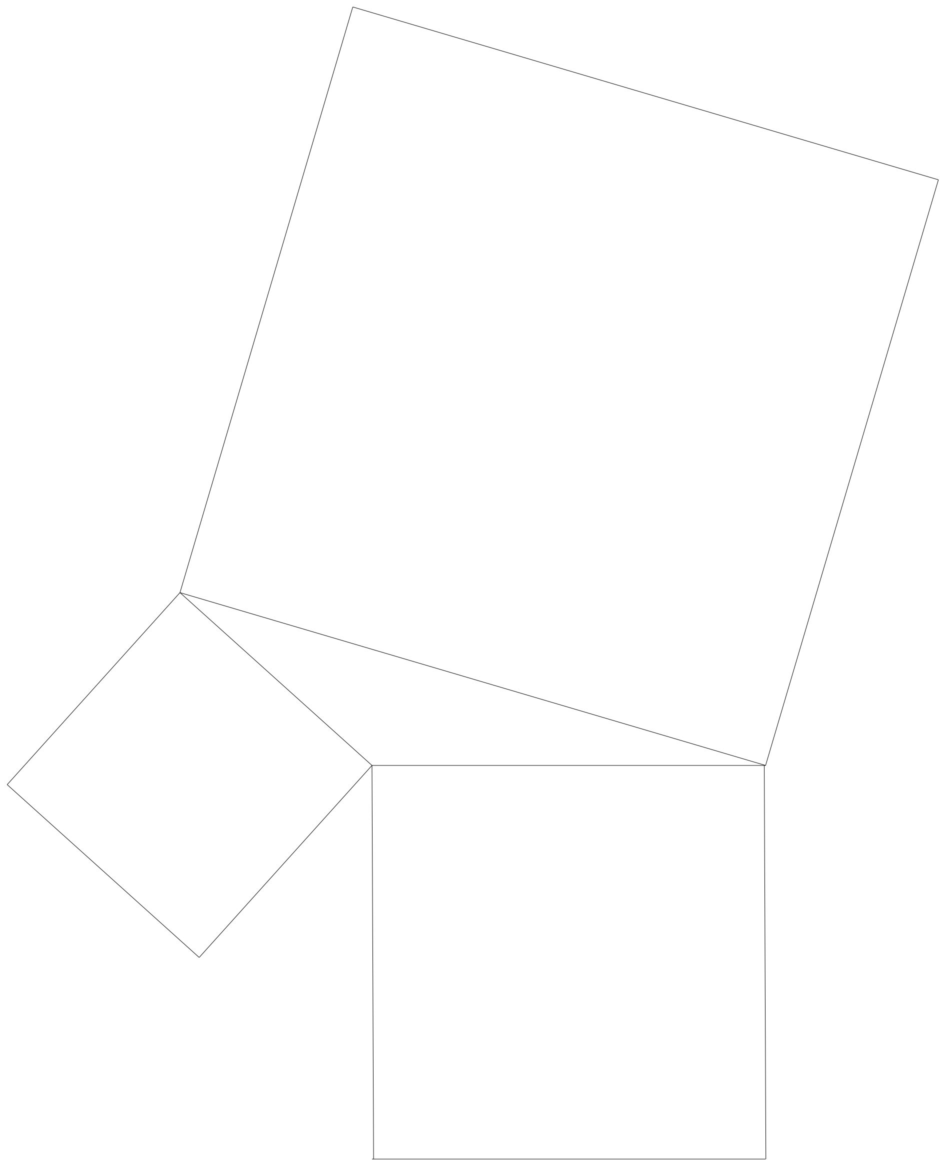
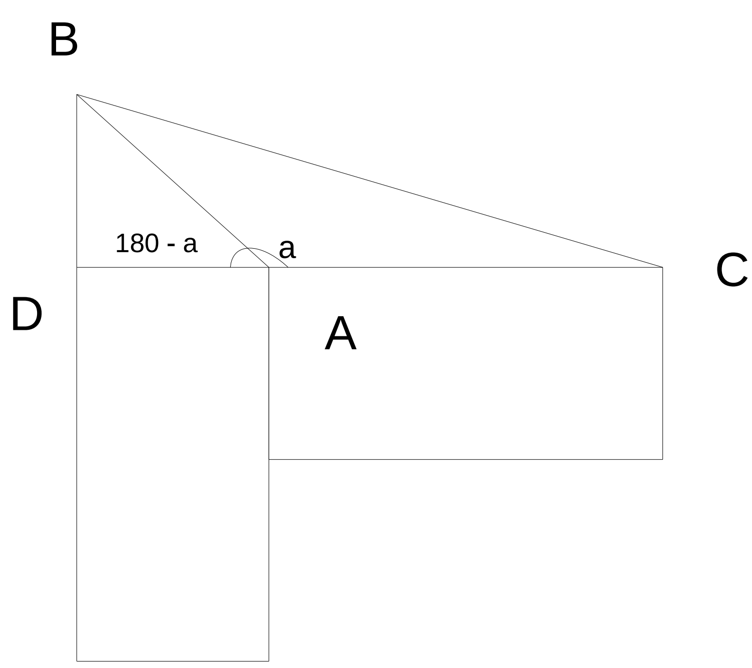
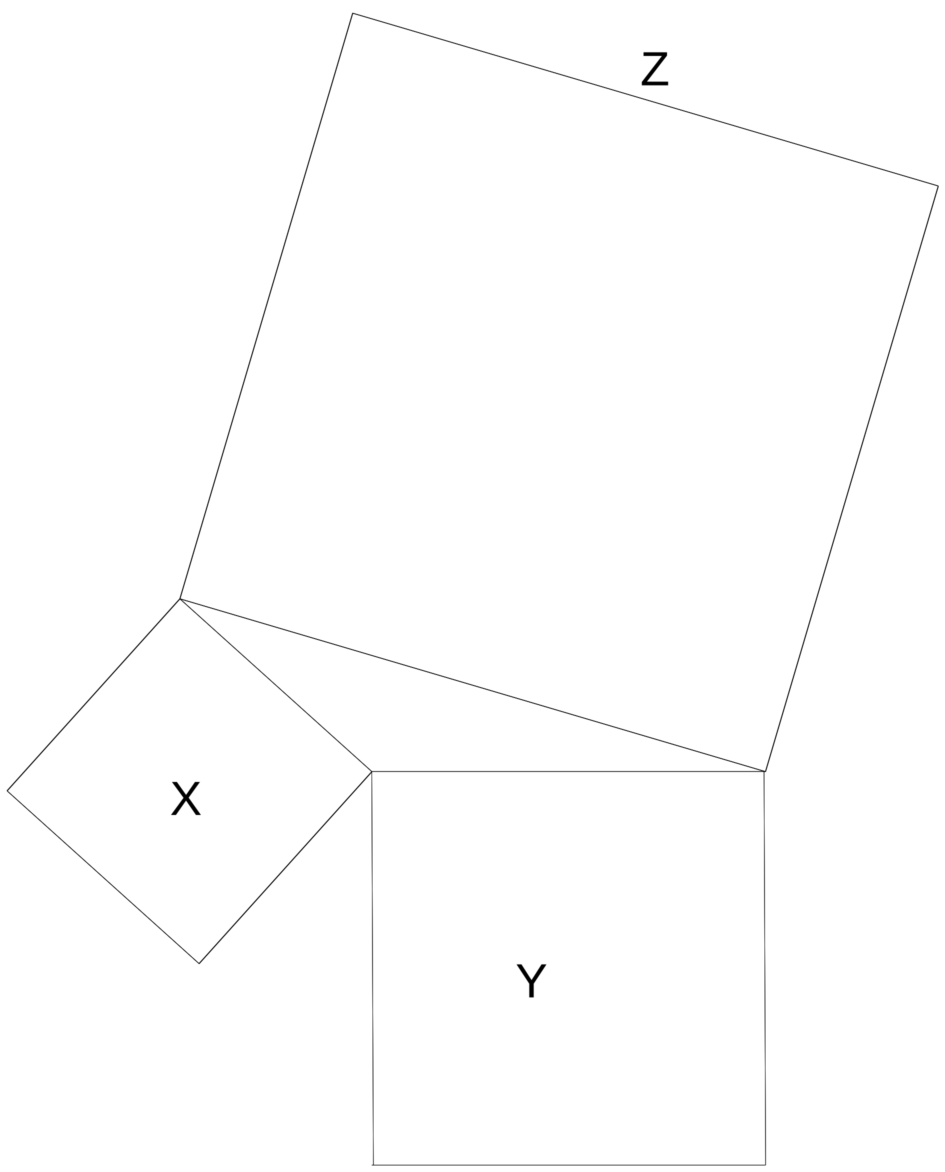
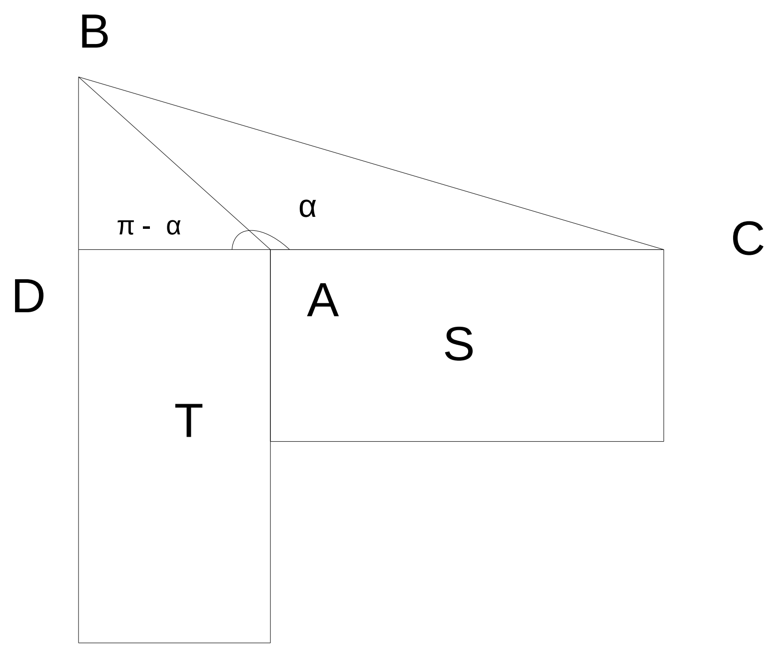
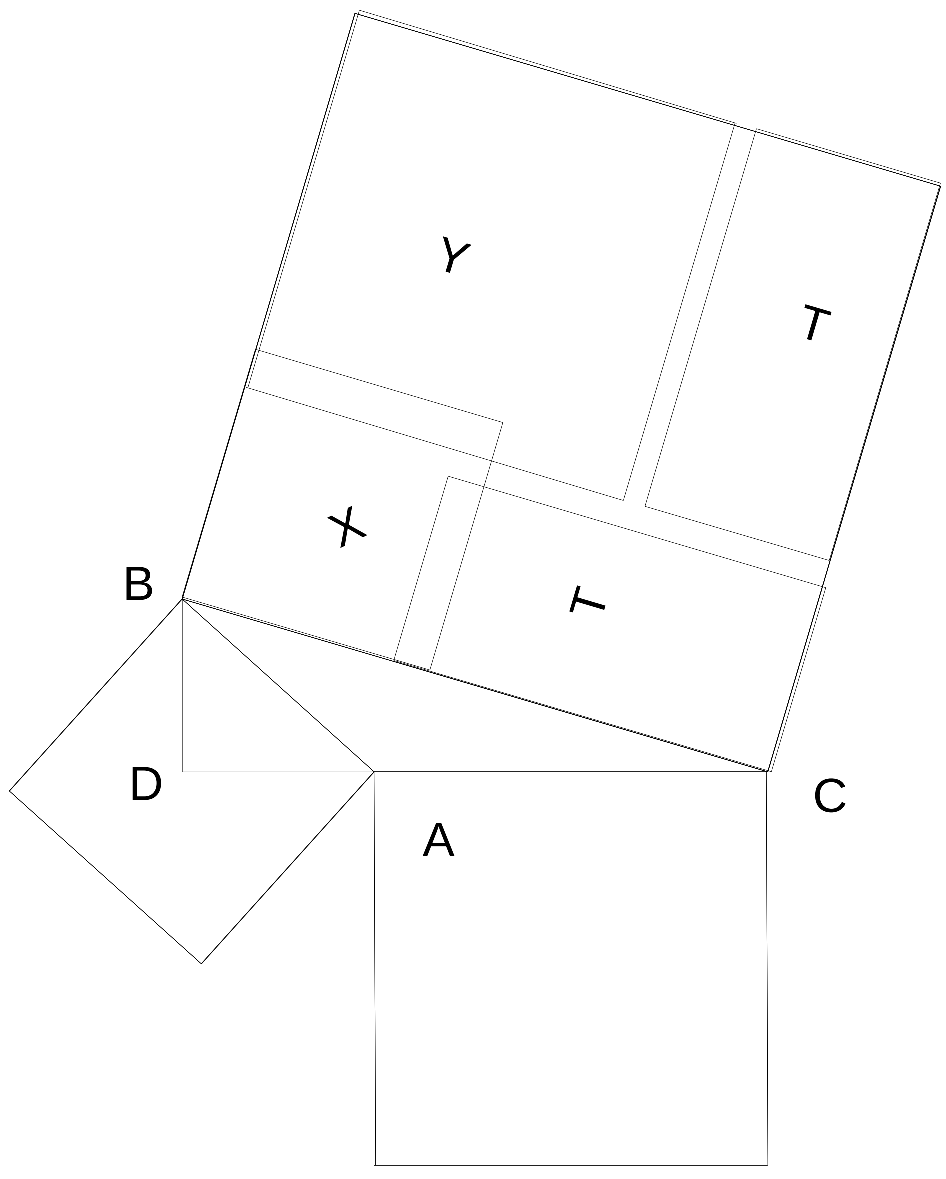

B
C
A

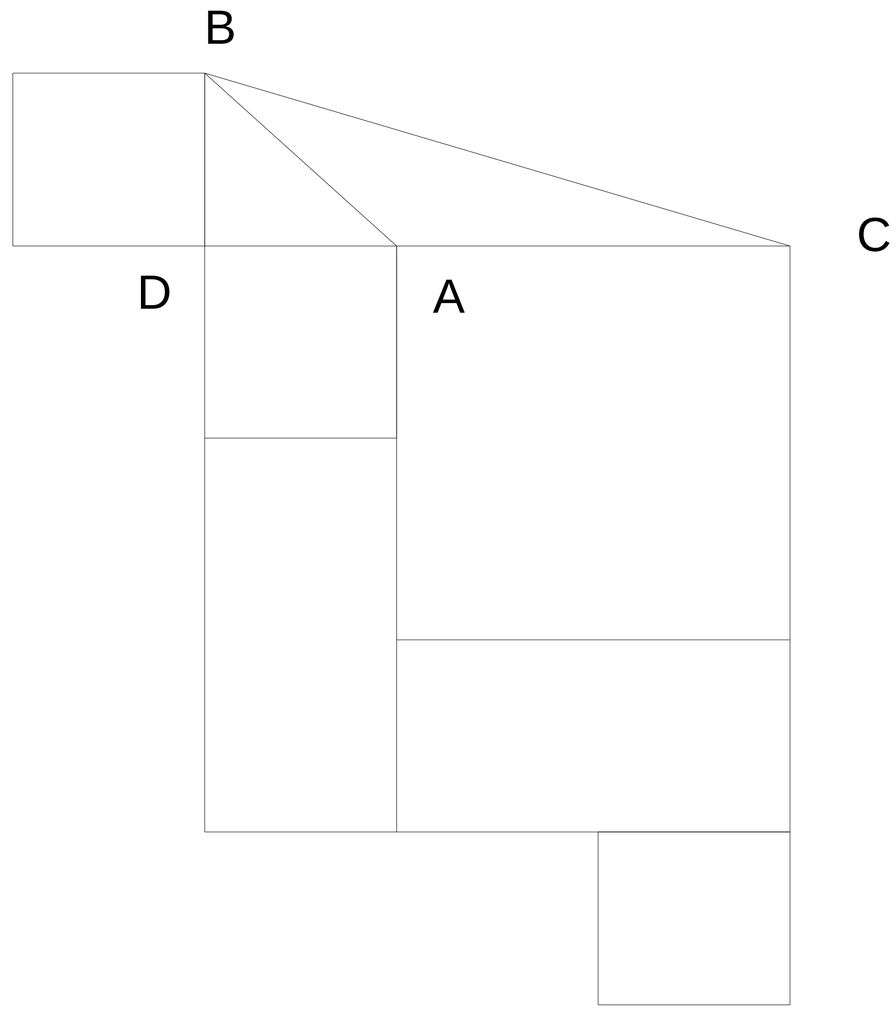


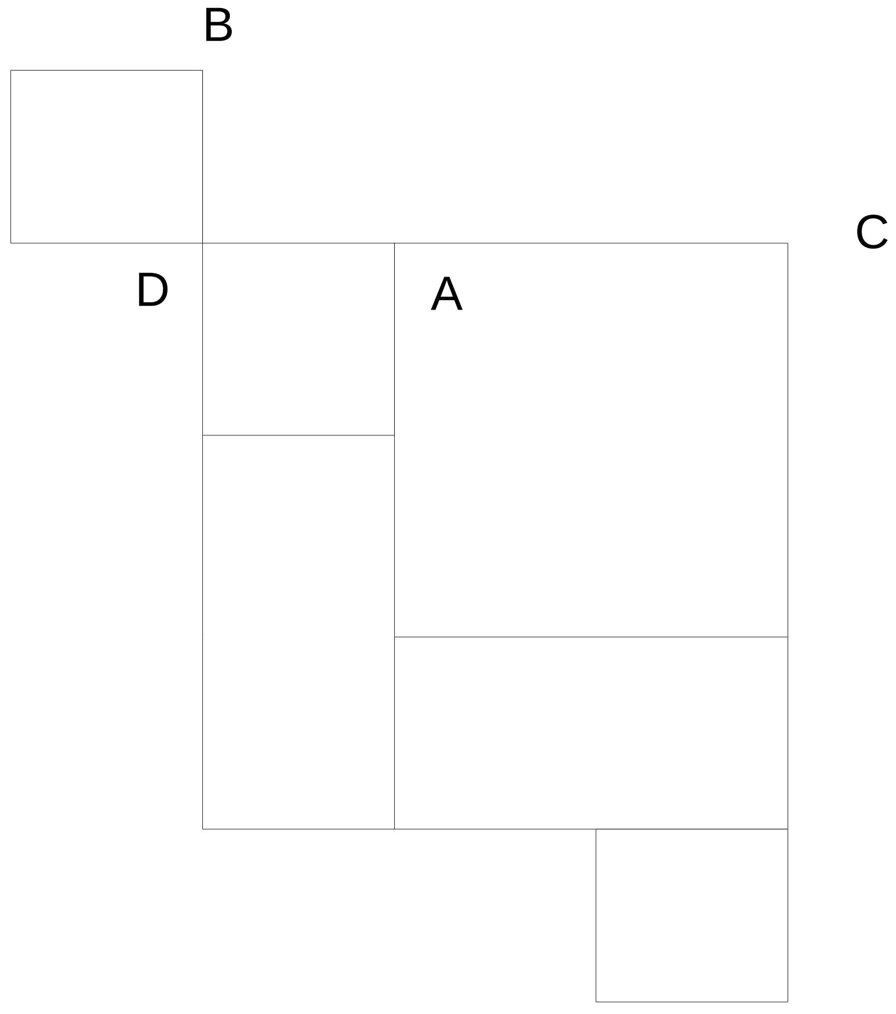

B
180 - a
a
C
D
A

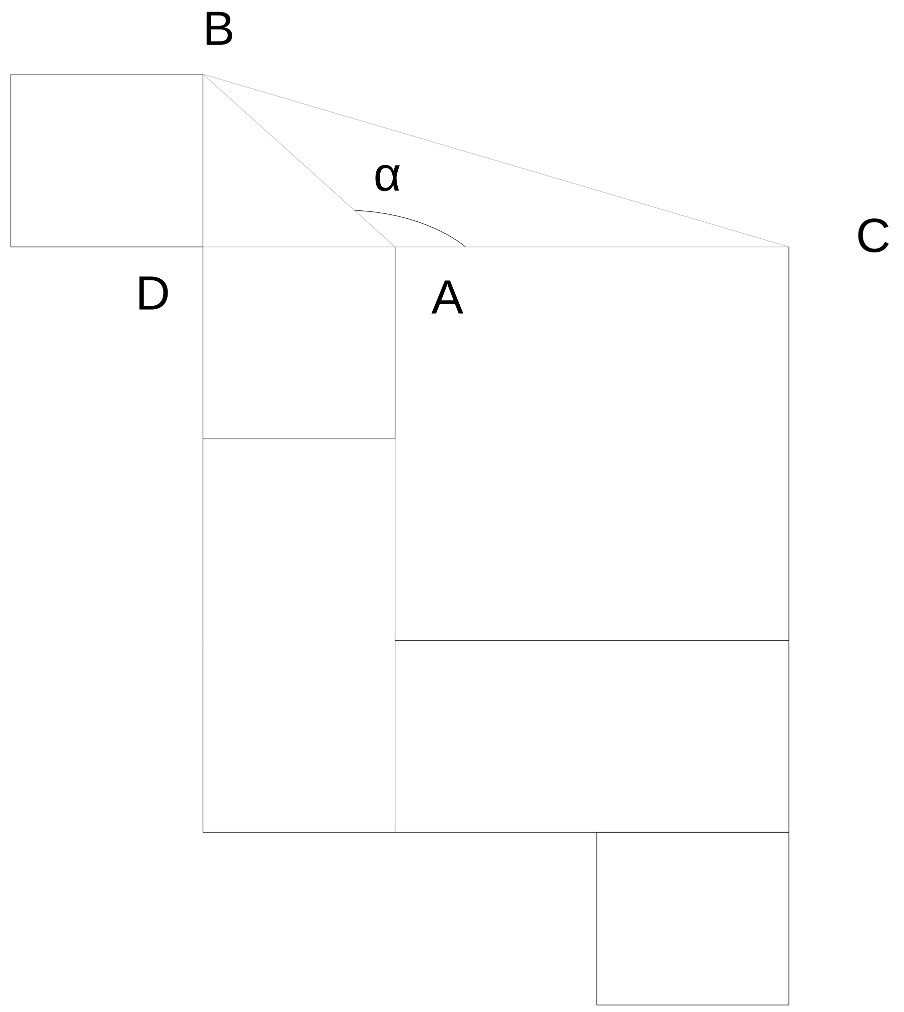

Z
X
Y


B
π - α
α
C
D
A
S
T


Y
T
X
B
T
D
A
C


B
C
D
A


B
C
D
A



Using Euclidean proofs

|CD|^2 = |AC |^2 + |AD |^2 + 2*|AC|*|AD| (prop 2.4)

|CB|^2 = |CD|^ 2 + |DB|^2 (prop 1.47)
|AB|^ 2 = |AD|^2 + |DB|^2 (prop 1.47)

|CB|^2 = |AC|^2 + |AD|^2 + 2*|AC|*|AD| + |DB|^2
|CB|^2 = |AC|^2 + |AB |^2 + 2*|AC|*|AD|

In Trigonometry

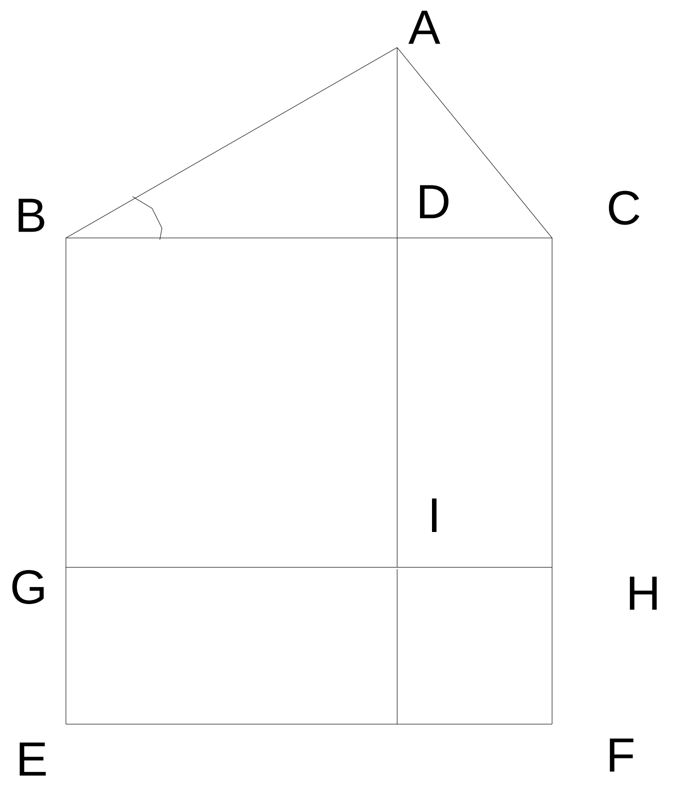
|CB|^2 = |AC|^2 + |AB|^2 + 2*|AC|*|AB|*cos(π – α)
|CB|^2 = |AC|^2 + |AB|^2 + 2*|AC|*|AB|*(-cos(α))
|CB|^2 = |AC|^2 + |AB|^2 – 2*|AC|*|AB|*cos(α)

In Vector

|CB|^2 = (AC – AB)^2
|CB|^2 = |AC|^2 + |AB|^2 – 2*|AC|*|AB|*cos(α)
(AC – AB)^2 = |AC|^2 + |AB|^2 – 2*|AC|*|AB|*cos(α)
(AC – AB)(AC – AB) = |AC|^2 + |AB|^2 – 2*|AC|*|AB|*cos(α)
AC^2 + AB ^2 – 2*AC*AB = |AC|^2 + |AB|^2 – 2*|AC|*|AB|*cos(α)
AC*AB = |AC|*|AB|*cos(α)

What is AC*AB ?
AC*AB = |AC|*|AB|*cos(α) = -|AC|*|AD|
AD = AB*cos(π – α)

What is AD ?
How come |AC| * |AD| = Cx * Bx + Cy * By



AC^2 = AD^2 + CD^2

AD^2 = BA^2 + BD^2
BC2 = BD^2 + DC^2 +2*BD*DC

AC^2 = BA^2 + BD^2 + DC^2
BD^2 = BC^2 -DC^2 – 2*BD*DC
AC^2 = BA^2 + BC^2 – DC^2 – 2*BD*DC + DC^2
AC^2 = BA^2 + BC^2 - 2*BD*DC