Chromogeometry

http://arxiv.org/pdf/0806.3617.pdf

The pdf file above is where I first encountered Chromogeometry which uses the identity below:

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(red geometry)^2 + (green geometry)^2 = (blue geometry)^2

(x^2-y^2)^2 + (2xy)^2 = (x^2+y^2)^2

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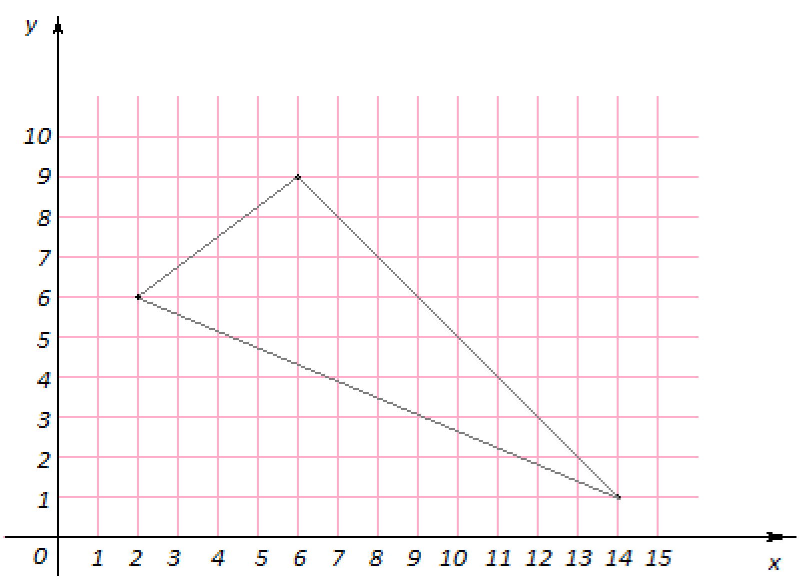
A triangle has coordinates u(2,6), v(6,9), w(14,1).



Q is the quadrance = the length of a line squared.

b is blue geometry = Euclidean geometry ($x^2 + y^2$)

r is red geometry = Hyperbolic geometry ($x^2 - y^2$)

g is green geometry = Hyperbolic geometry 2(xy)

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Using blue geometry:

$Qb(u,v)=(x2-x1)^2 + (y2-y1)^2$

$=(6-2)^2 + (9-6)^2$

$=25$

$Qb(v,w)=(x2-x1)^2 + (y2-y1)^2$

$=(14-6)^2 + (1-9)^2$

$=128$

$Qb(w,u)=(x2-x1)^2 + (y2-y1)^2$

$=(2-14)^2 + (6-1)^2$

$=169$

So the line lengths of the triangle are the square roots of the above results: 5, 11.31370850 and 13

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Using red geometry:

Qr(u,v)=(x2-x1)^2 - (y2-y1)^2

=(6-2)^2 - (9-6)^2

=7

Qr(v,w)=(x2-x1)^2 - (y2-y1)^2

=(14-6)^2 - (1-9)^2

=0

Qr(w,u)=(x2-x1)^2 - (y2-y1)^2

=(2-14)^2 - (6-1)^2

=119

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Using green geometry:

Qg(u,v)=2(x2-x1)(y2-y1)

=2(6-2)(9-6)

=24

$Qg(v,w)=2(x2-x1)(y2-y1)$

$=2(14-6)(1-9)$

$=-128$

$Qg(w,u)=2(x2-x1)(y2-y1)$

$=2(2-14)(6-1)$

$=-120$

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$Qr(u,v)^2 + Qg(u,v)^2 = Qb(u,v)^2$

$49 + 576 = 625$

$Qr(u,v)^2 + Qg(u,v)^2 = Qb(u,v)^2$

$0 + 16384 = 16384$

$Qr(u,v)^2 + Qg(u,v)^2 = Qb(u,v)^2$

$14161 + 14400 = 28561$