Quadrature of a simple polygonial

Pavel Hájek,

Munich, 27.11. 2013

Tax on land in ancient Egypt

Measuring in ancient Egypt

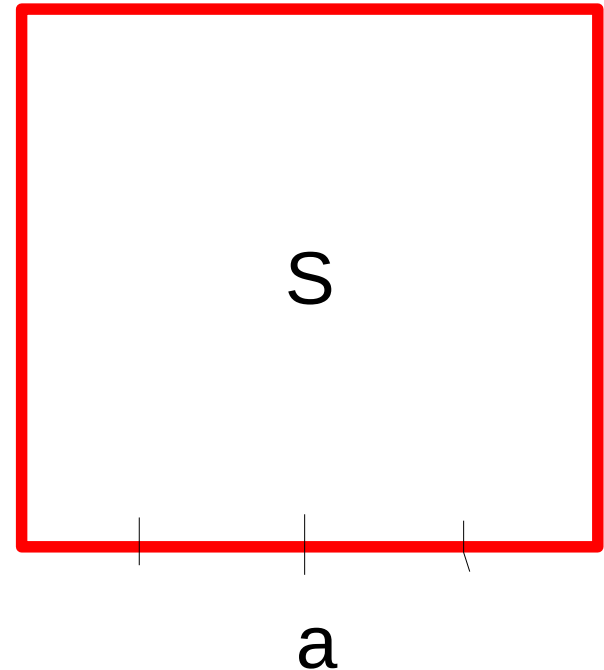- Royal measure, **cubit**, the length of pharaoh's arm

Measuring in ancient Egypt

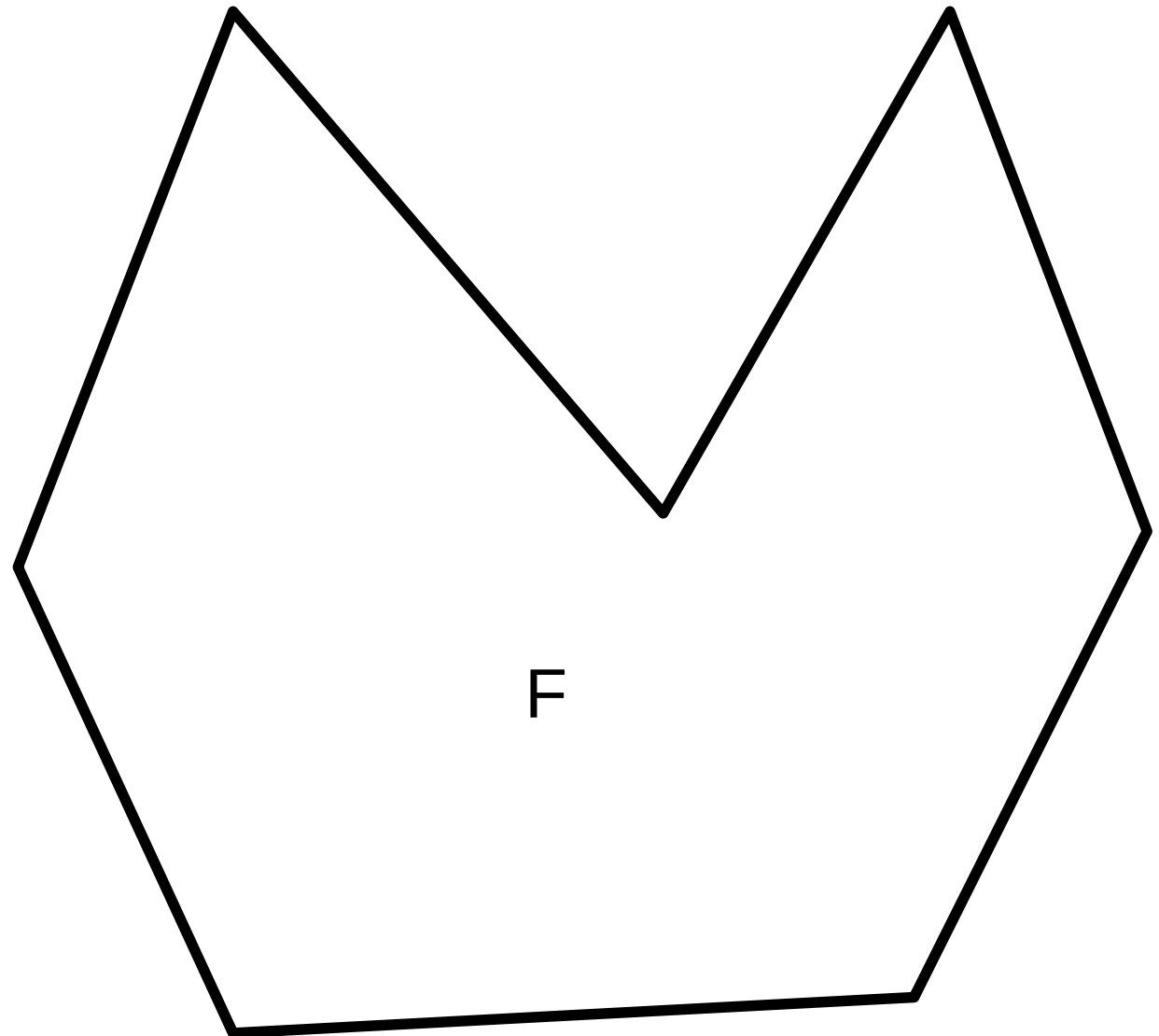- Royal measure, **cubit**, the length of pharaoh's arm

cubit

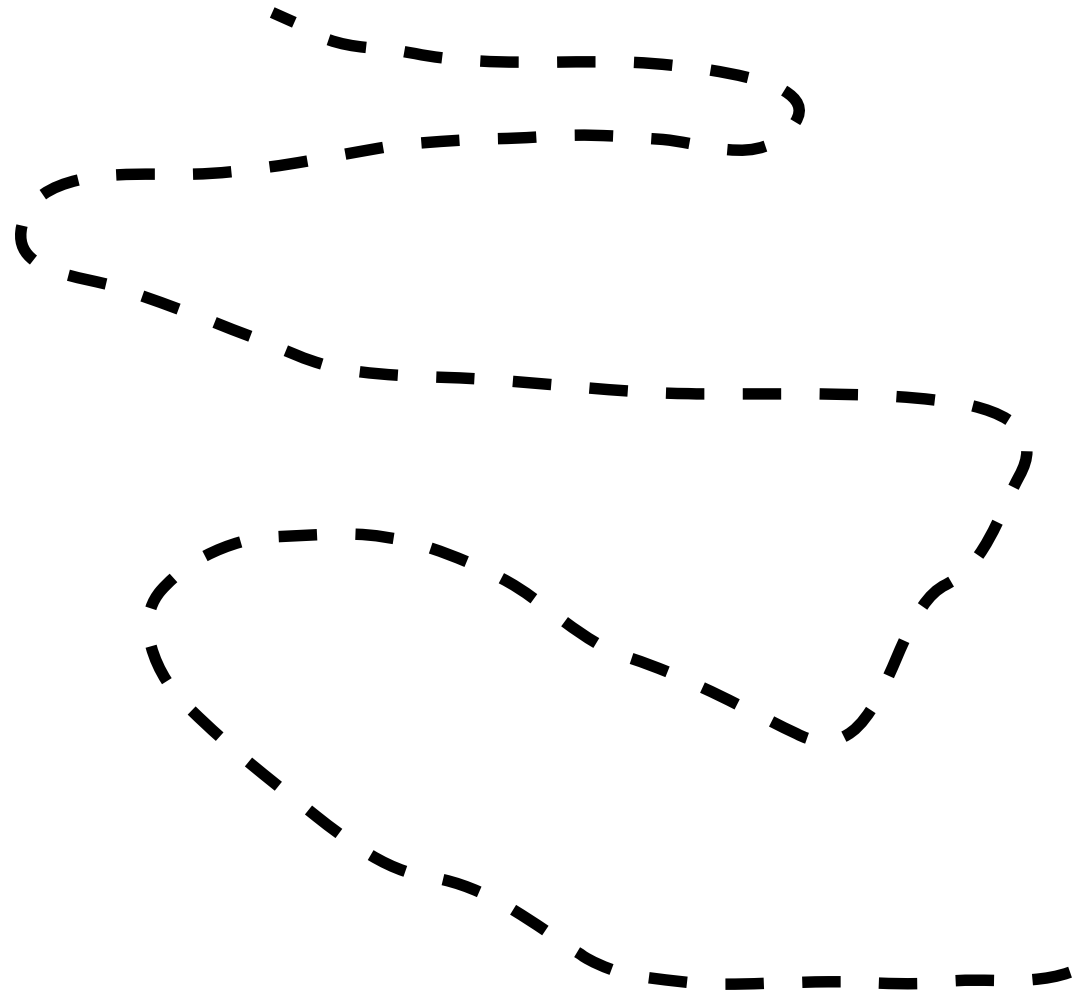- Square field **S** of side **a** => xxx **debens** of grains

S

a

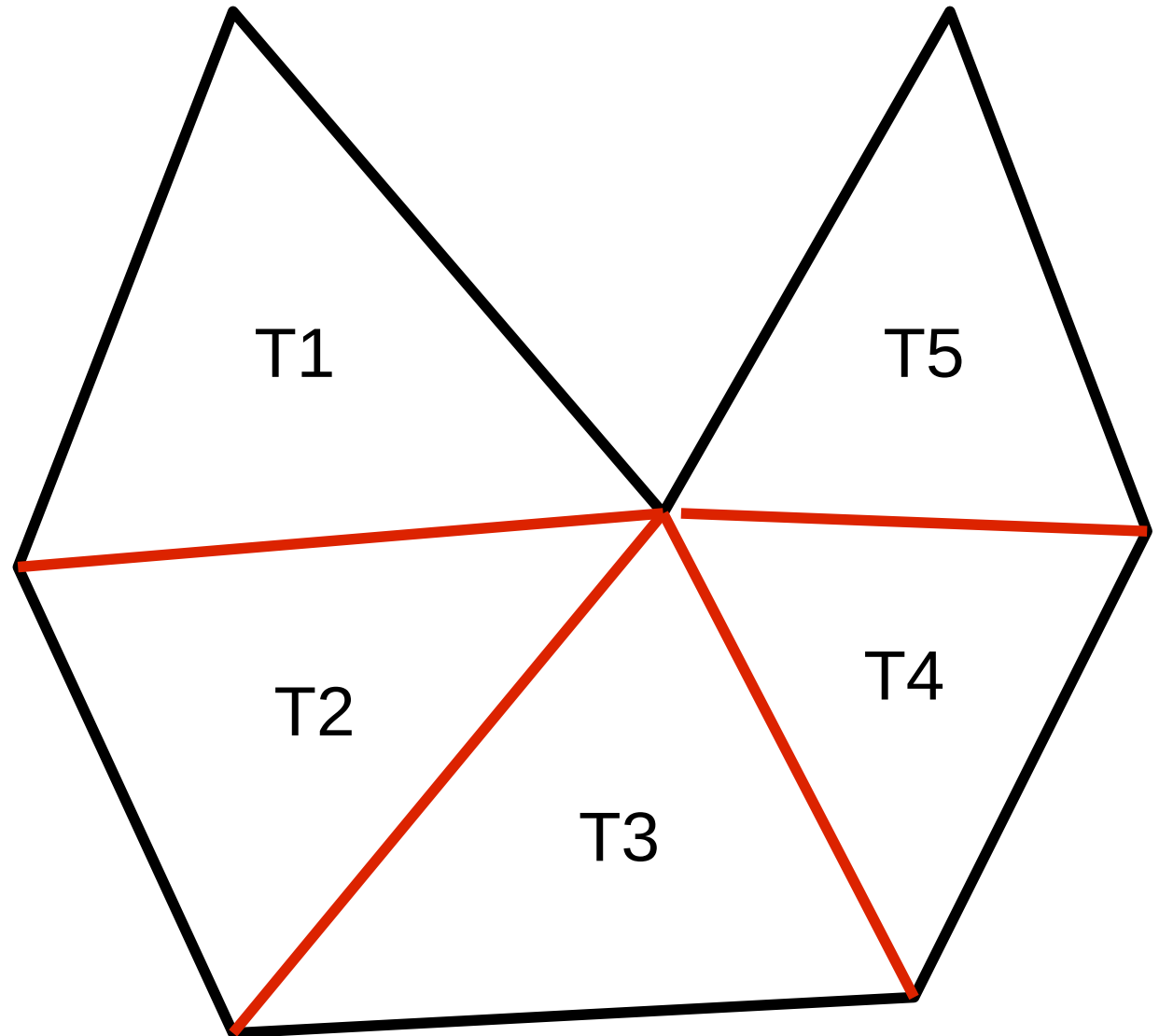# The egyptian land surveyor
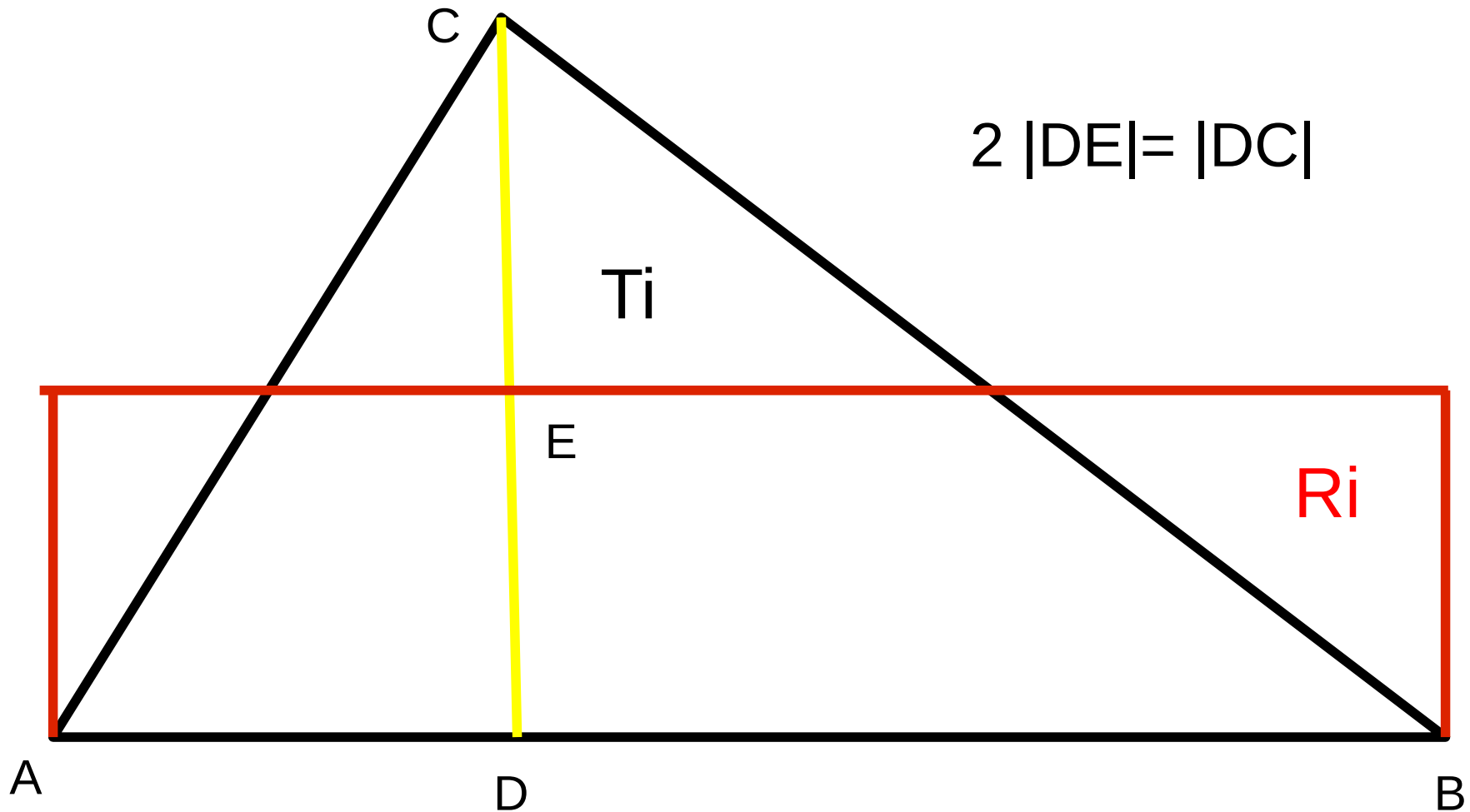
The land surveyor comes and sees a field F ...

F

The only tool he has is a rope with knots in the distance of one cubit...
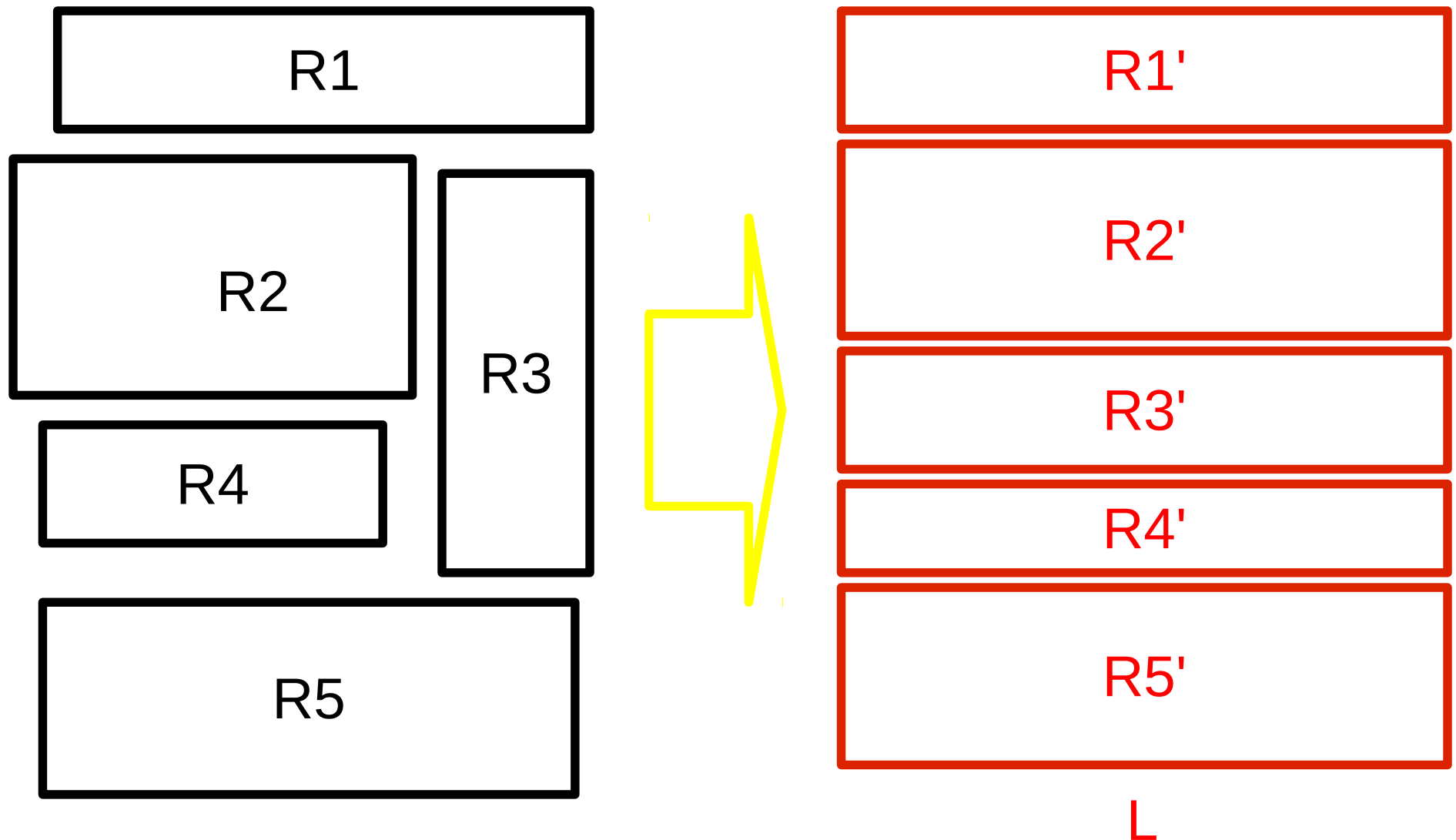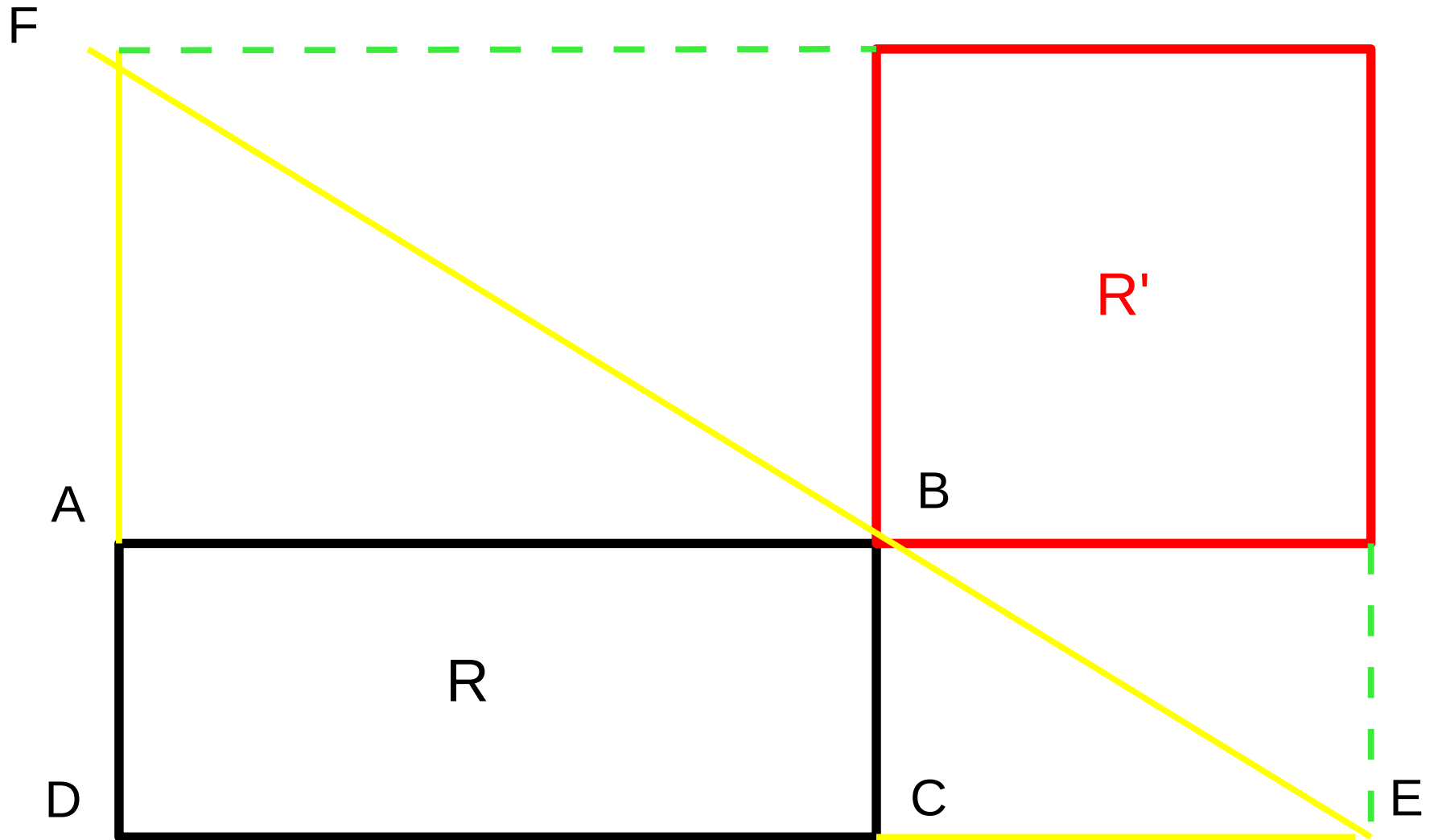
He begins by triangulating the area...

T1

T5

T2

T4

T3

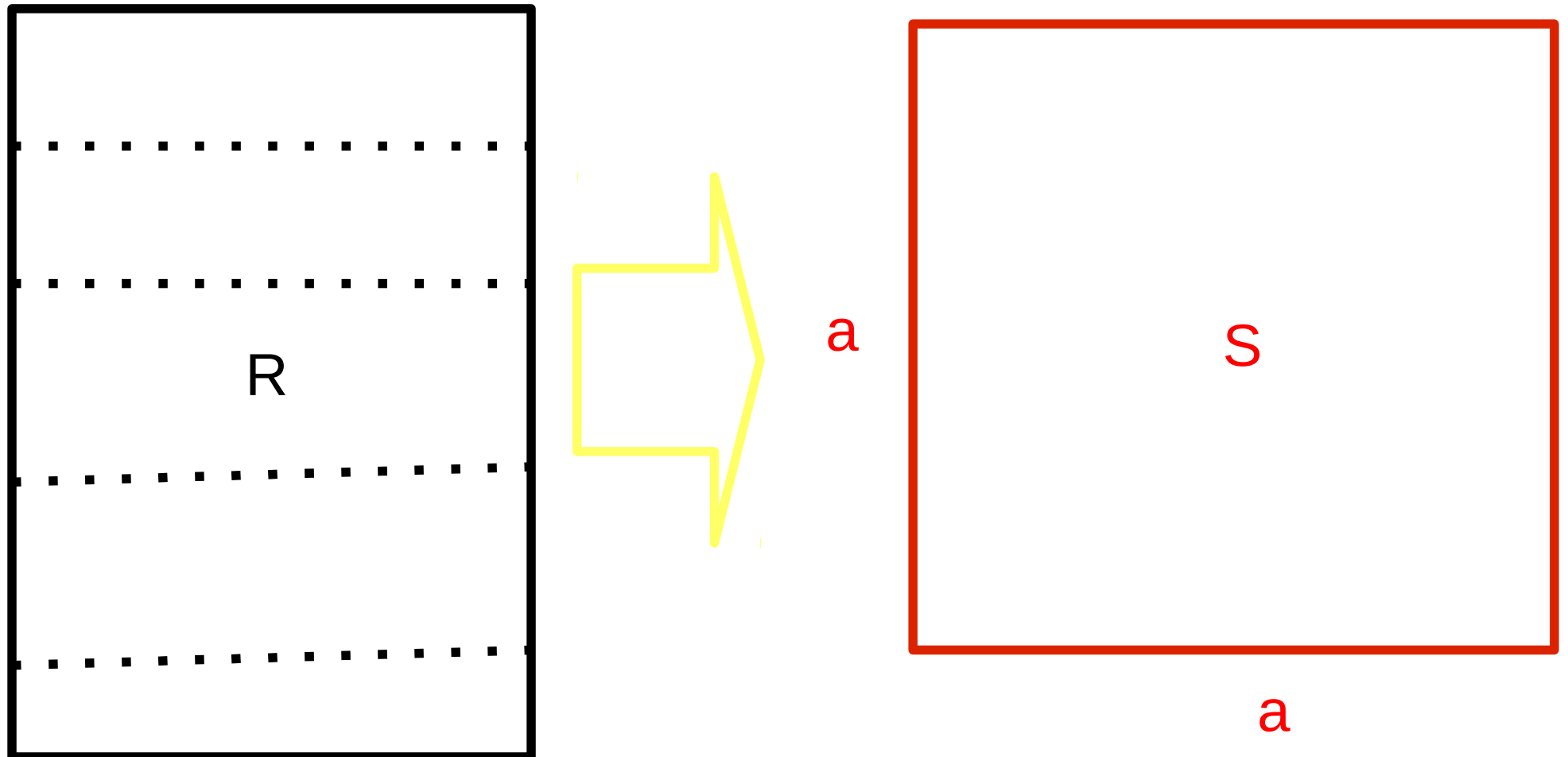# ...transforms triangles Ti into rectangles Ri of the same area...

2 |DE|= |DC|

Ti

Ri

C

E

A

D

B

...modifies rectangles Ri to rect. Ri' preserving area so that all Ri' have one side of the same length L...
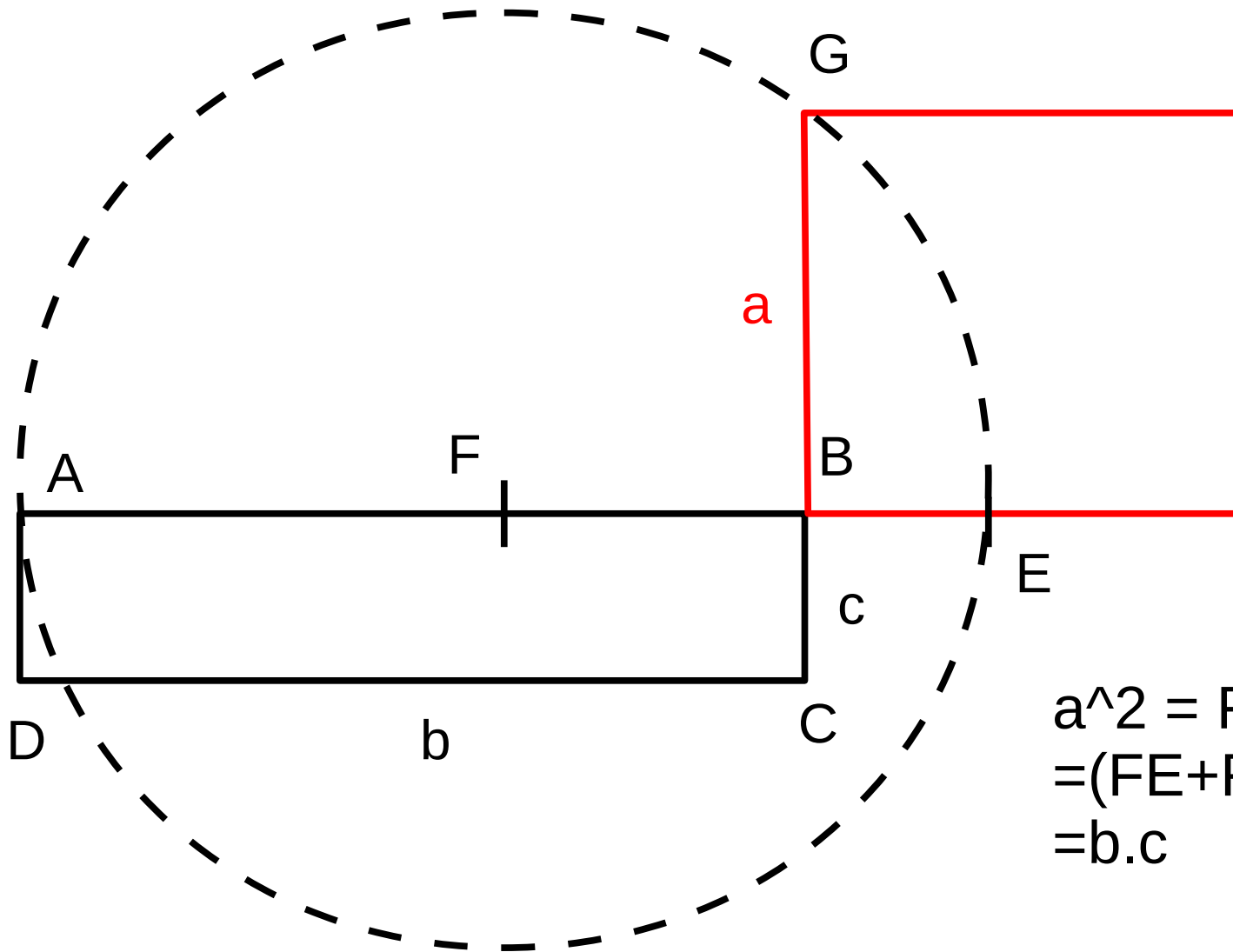
R1

R2

R3

R4

R5

R1'

R2'

R3'

R4'

R5'

L

Adjusting one side of a rectangle...

...sums up Ri' into a big rectangle R and constructs a square S of side a having the same area as R.

R

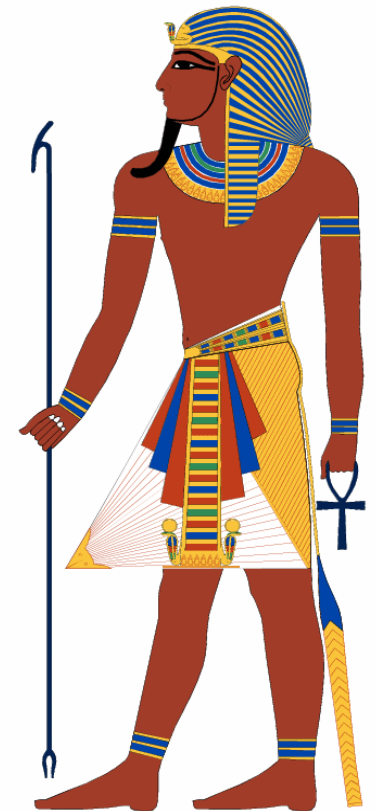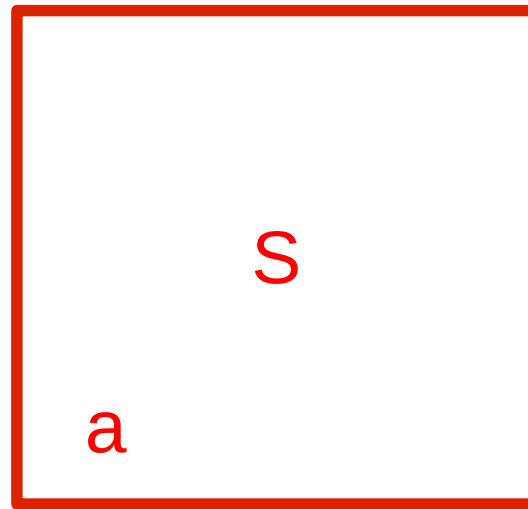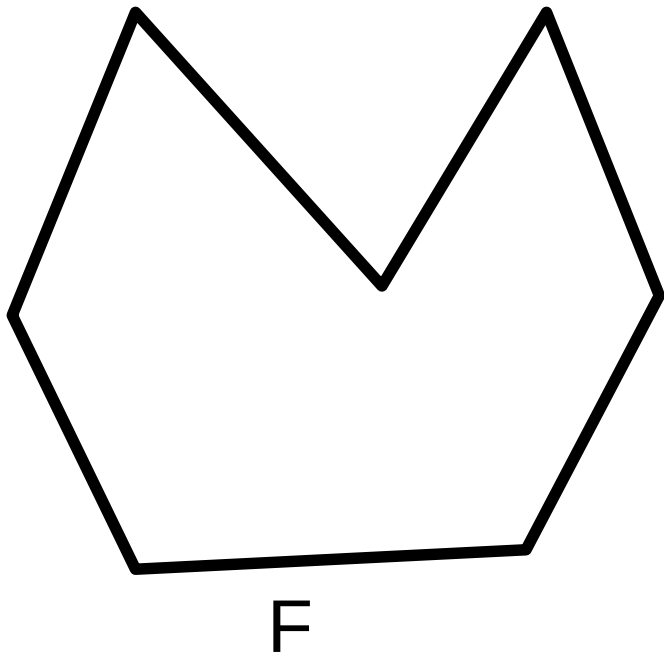a

S

a

Squaring a rectangle

G

a

A

F

B

D

b

c

C

E

$a^2 = FE^2 - FB^2 =$
$=(FE+FB)(FE-FB) =$
$=b.c$

F is transformed into S of the same area and the tax is determined

F

S

a

The land surveyor is done.