

Re: Geometric construction of the product of two numbers

Source: <http://sci.tech-archive.net/Archive/sci.math/2008-02/msg03761.html>

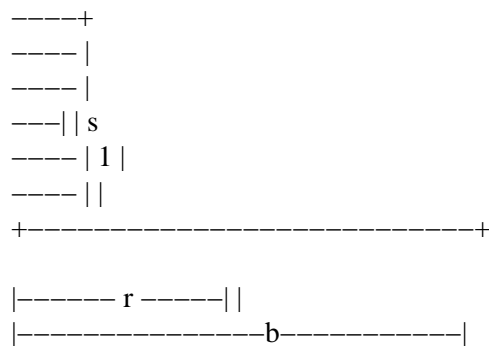
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- *Date:* 23 Feb 2008 00:17:38 GMT

On 2008-02-22, Mariano Suárez-Alvarez <mariano.suarezalvarez@xxxxxxxxxx> wrote:

Can anyone point me to a web reference giving the construction of a segment of length ab from segments of lengths a and b ?

-- m

Not a web reference, but I can give you the gist of it. If you want the product of r and s .



(consider this to be two congruent triangles)
Then: $1/r = s/b \implies b = s*r$

More explicitly:

– Before any construction can start, we always have two points in the plane as constructable. A , and B .

Define

- $(0,0) := A$
- $(1,0) := B$

Then, we can construct, in order

- (1) $\{(x,0), x \in \mathbb{R}\}$ (line through A and B)
- (2) $\{(0,x), x \in \mathbb{R}\}$ (the perpendicular to (1) in A)

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- (3) $(0,1)$ (point on (2))
- (4) $(r,0)$ (point on (1), r constructable)
- (5) $(0,s)$ (point on (2), s constructable)
- (6) $\{(r,x), x \in \mathbb{R}\}$ (the perpendicular to (1) in $(r,0)$)
- (7) $(r,1)$ (point on (6))
- (8) $\{(rx,x), x \in \mathbb{R}\}$ (the line through $(r,1)$ and $(0,0)$)
- (9) $\{(x,s), x \in \mathbb{R}\}$ (the perpendicular to (2) in $(0,s)$)
- (10) (rs,s) (intersection of (8) and (9))
- (11) $\{(rs,x), x \in \mathbb{R}\}$ (perpendicular to (9) in (rs,s))
- (12) $(rs,0)$ (intersection of (11) and (1))

Walk through the construction if you want to see that it checks out.

The important part here is to form the congruent triangles.

Regards,
Sjoerd Job