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For the best of you in geometry

*Message #1 Posted by **Jean-Michel** on 7 May 2007, 4:11 p.m.*

Hi,

just to see what the best of you can do with their powerful brain and HP's, let me submit to you this little problem. (I apologize first for my poor english writing.)

"A bricklayer is working a the tenth floor af a building, without any lift in order of working at the moment. He is in a corridor, from which he needs to know the with, but he has forgotten his measuring tape in his car, and is too lazy to go to take it by feet... Fortunately, he's noting that his 3 m long ladder and his 2 m long, placed "symetricaly" in the corridor (the bottom of one ladder at one side of the corridor, and the top of this ladder on the opposite wall, and the opposite for the other ladder), are crossing themselves at just 1 m of the floor (the length of his plumbline). He is thinking that it must be enough to calculate the witdh of the corridor, but he finds the problem difficult..."

Could someone here help him to find the solution (not graphicaly, of course...)

(I'm sorry, but I didn't manage to enclose any picture.)

Hope this will entertain you !

Regards from J.-M.

Re: For the best of you in geometry

*Message #2 Posted by **Valentin Albillo** on 7 May 2007, 6:19 p.m.,*
in response to message #1 by Jean-Michel

Hi, Jean-Michel:

It's just a simple problem of dealing with similarity relationships among the several triangles that result from drawing it all. It readily leads to a 4th-degree polynomial equation in the general case, and this small HP-71B program I've just written for the occasion does it all in 3 lines: prompt for the necessary data,

construct the equation, solve it, and output the labeled result:

```
10 DESTROY ALL @ INPUT "Ladder1,Ladder2,Height=";A,B,C
20 DEF FNE(K)=K^4-2*C*K^3+(A^2-B^2)*K^2-2*C*(A^2-B^2)*K+C^2*(A^2-B^2)
30 K=FNROOT(C,MAX(A,B),FNE(FVAR)) @ W=SQR(B^2-K^2) @ DISP "Width=";W


>RUN


 Ladder1,Ladder2,Height=3,2,1  [ENTER]


    Width= 1.23118572377
```

Best regards from V.

Re: For the best of you in geometry

Message #3 Posted by Jean-Michel on 8 May 2007, 12:52 p.m.,
in response to message #2 by Valentin Albillo

Hi Valentino,

just one word : congratulations.

Next time, I'll finder something more difficult to solve...

Kind regards.

Re: For the best of you in geometry

Message #4 Posted by Giancarlo (Italy) on 8 May 2007, 1:12 p.m.,
in response to message #3 by Jean-Michel

Hi Jean-Michel.

Quote:

...something more difficult to solve

I'm afraid you'll need something enormously much more difficult to solve for VA :-)

Best regards.
Giancarlo

Re: For the best of you in geometry

Message #5 Posted by Valentin Albillo on 8 May 2007, 2:45 p.m.,
in response to message #3 by Jean-Michel

Hi again, Jean-Michel:

It wasn't my intention to spoil your interesting challenge, matter of fact I thought you would receive a number of additional inputs such as, for example, detailing the triangle relationships necessary to form the quartic equation (which is what results after squaring some intermediate expressions to get rid of several square roots), perhaps additionally including graphics, etc. With a lot of visitors owning and being very fond of graphic RPL models, I was sure some screen dumps would appear in this thread.

An interesting extension of your challenge would be the following: notice that with the particular numbers you provide for the lengths of the ladders and the height of their crossing point, namely 3, 2, and 1, the resulting width comes out as an ungainly irrational number. So, it would be interesting to write a program to search for *integer lengths and heights* that do result in *integer widths* as well. Other interesting constraints come to mind but the one searching for all-integer inputs and outputs in the simplest to program and probably the most interesting too.

Perhaps you or other readers might give it a try :-)

Best regards from V.

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