SG51 GEOMETRY PROBLEMS

3rd ROUND

You may take as many breaks as you like, but they may add up to no more than **1 month.**

Reference policy: No interaction with your fellow students, teachers or parents.

This is an INDIVIDUAL competition.

Grading:

5 points: clear, concise, correct solution

4 points: minor shortcoming in solution

3 points: larger holes in a promising solution

2 points: some good ideas but not much more

1 point: evidence of understanding the problem

0 points: nothing presented that is credible

You should submit FULL DATAILS of the working of your solutions and of your particulars (Full name, home address, school and class and email).

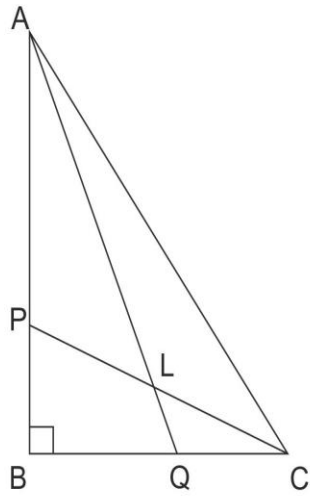Send your solutions to:

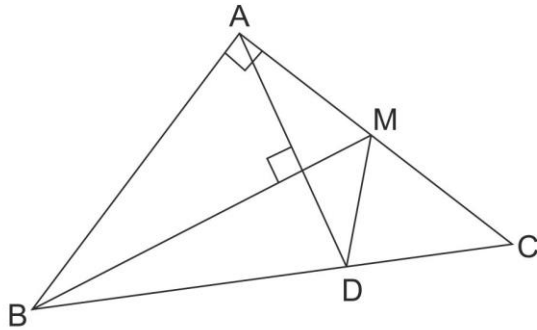williey2014@gmail.com

and

mwb_en@mathematicalmail.com

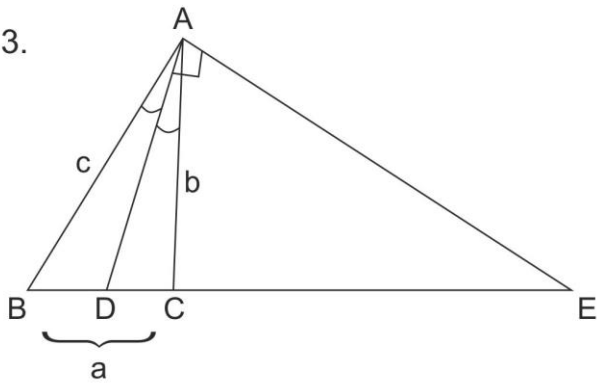Prizes will be awarded to the top 10 contestants.

1.

In $\triangle ABC$, $\sphericalangle B = 90^0$.
$AP = BC$, $BP = CQ$.
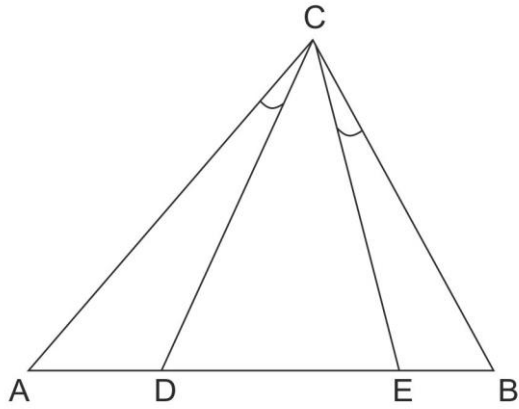$AQ \cap CP$ at L.
Find $\sphericalangle ALP$.

2.

In $\triangle ABC$, $AB = AC$ and M is the midpoint of AC. $AD \perp BM$.
Show that $\sphericalangle AMB = \sphericalangle CMD!$

3.

AD bisects $\sphericalangle BAC$.
BC is extended to E such that $\sphericalangle DAE = 90^0$.
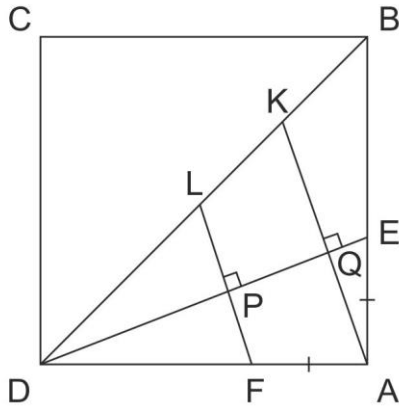Find DE in terms of a, b and c.

4.

In $\triangle ABC$,
$$\frac{AD}{DB} \times \frac{AE}{EB} = \left(\frac{AC}{CB}\right)^2.$$
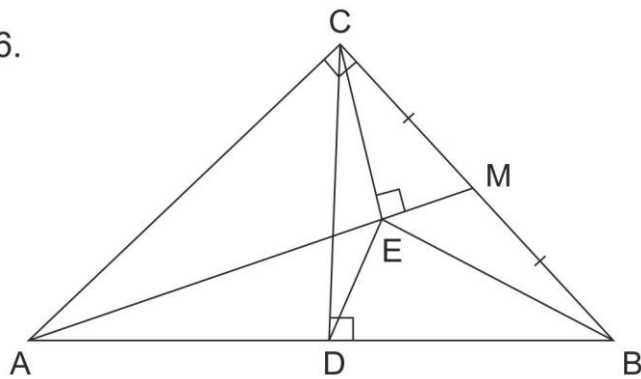
Show that $\angle ACD = \angle BCE$!

5.

$AE = AF$.
$AK, FL \perp DE$.
Show that K is the midpoint
of BL.

6.

M is the midpoint of BC.
$\angle C = 90^0$.
$CD \perp AB, CE \perp AM$.

If $BE = 2 \times DE$, find $\angle ABC$.