SG51 GEOMETRY PROBLEMS

4th ROUND

by 30 April, 2017

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:

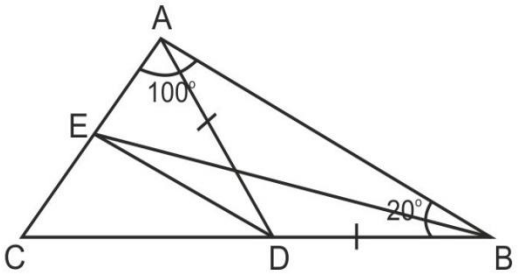
williey2014@gmail.com

and

mwb_en@mathematicalmail.com

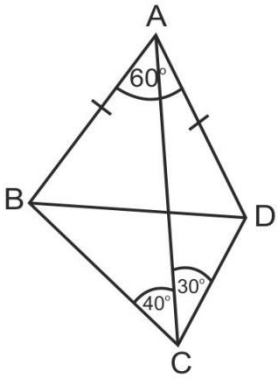
Prizes will be awarded to the top 10 contestants.

1.



BE bisects $\sphericalangle ABC$.
$DA = DB$.
If $\sphericalangle CAB = 100^0$,
$\sphericalangle ABC = 20^0$,
find $\sphericalangle DEB$.

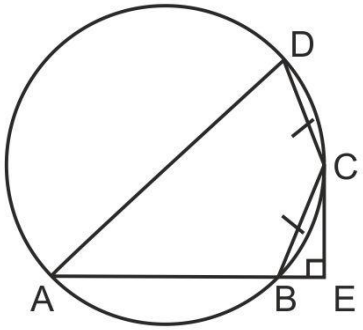
2.



In quadrilateral *ABCD*, *AB* = *AD*,
$\sphericalangle BAD = 60^0$, $\sphericalangle ACB = 40^0$,
and $\sphericalangle ACD = 30^0$.

Find $\sphericalangle CBD$.

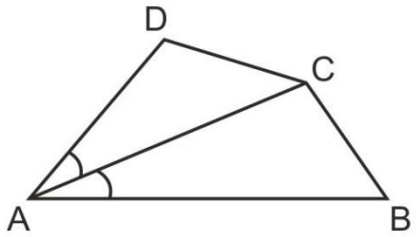
3.



In quadrilateral *ABCD*,
CB = *CD*,
CD is perpendicular to *AB*.

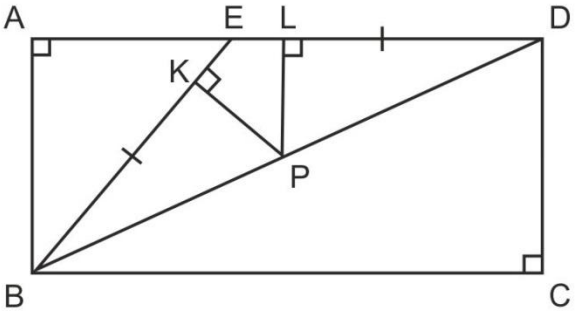
Show that
AD + *AB* = 2*AE*.

4.



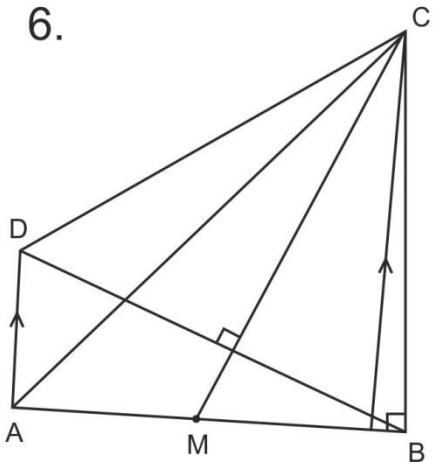
In quadrilateral *ABCD*, *AB* >*AC*.
AC bisects $\sphericalangle BAD$.
a) If $\sphericalangle B + \sphericalangle D = 180^0$, show that *CD* = *CB*.
b) If *CD* = *CB*, show that $\sphericalangle B + \sphericalangle D = 180^0$.

5.



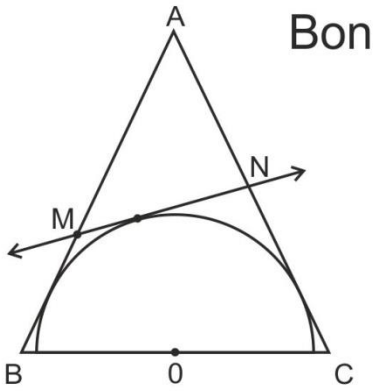
In rectangle *ABCD*, *EB* = *ED*.
P is a point on *BD*.
$PK \perp BE$, $PL \perp AD$.
Show that *PK* + *PL* = *AB*.

6.



In trapezoid *ABCD*,
$\sphericalangle ABC = 90^0$, *AD*|| *BC*
and *BA* = *BC*.
M is the midpoint of *AB*.
Show that *DB* = *DC*!

Bonus Question



AB = AC.
The tangent to the semicircle cuts *AB*, *AC* at *M*, *N* respectively.
$BM \times CN = (\frac{1}{2}BC)^2$.