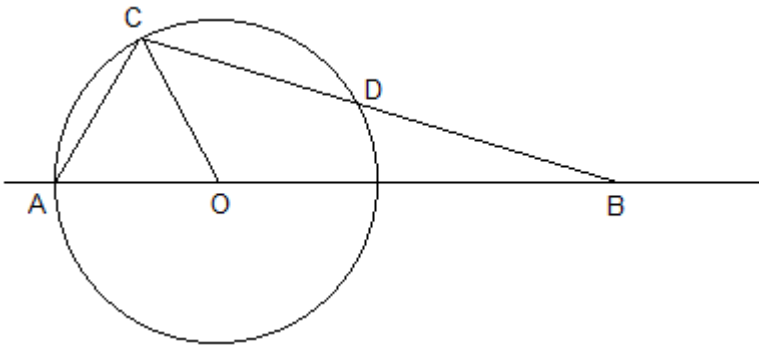
November – 1st Round

1. 4 points

In the figure below, point O is the centre of the circle and $|CO| = |BD|$. Calculate the ratio of angles $\angle COA$ and $\angle OCD$.



2. 5 points

Calculate the inner angles of a right-angled triangle where the length of one leg of the right triangle is a, the length of the hypotenuse is c, and $4a^2 - 8ac + 3c^2 = 0$

3. 4 points

A car travels at a constant speed. If the speed was increased by 20 kmh^{-1} the time required to travel the distance would decrease by 6 minutes. If the speed was decreased by 20 kmh^{-1} the time required to travel the distance would increase by 9 minutes. Calculate the distance.

4. 4 points

Find all integers x, y that are solutions of the equation bellow:

$$\frac{1}{x} - \frac{1}{y} = \frac{1}{2}$$

5. 3 points

If $a = \frac{r}{2}(\sqrt{5} + 1), b = \frac{r}{2}\sqrt{10 - 2\sqrt{5}}$, and $c = 2r$ then $a^2 + b^2 = c^2$. Prove.

Attention!

1. The solutions are due on 30November. Send your solutions to macova@gynome.cz,
2. You can track your score and rankings on http://www.gynome.cz/predmety/matematika/993-mathematical-task-league.
3. The next set of tasks will be posted on the same webpage on January 2.