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In 1983, a new system of entrance examination was adopted. In order to be accepted to a university, the 3rd and 4th years of high school grades in mathematics, Hungarian language and literature, history, foreign language, physics, (biology, chemistry, geography, another foreign language - students choose from these) are counted toward university entrance performance.

The 'brought' points (i.e. the points comprised of final grades in high school in the subjects listed above) add up to a total of 60 points. In addition, students are assessed by written and oral examinations for a total of 60 points. So, there is a total of 120 points possible.

In Mathematics, the same exam serves as the GED and the university entrance exam. These problem sets consist of 8 problems, presented in order of difficulty (from easiest to most difficult).

This problem set is similar to such an exam. We advise the reader to work through the problem set while measuring the time. There are 180 minutes to solve and present all problems.

1. Is it true that $(4\sqrt{3} - 3)(\sqrt{3} + \sqrt{81} + \sqrt{27})$ is greater than $4^{1+\log_2 3}$?
2. A triangle is inscribed in a circle of radius 4 cm. One of its sides is 6 cm, and one of its angles is 20° . How long is its longest side?
3. Find the smallest positive root of the equation $\sin(x - 1) = \sin(\pi - 1)$.
4. Two space diagonals of a right prism with a regular hexagon base are 24 cm and 25 cm long. Find the volume of the prism.
5. The square $ABCD$ has no common point with a line e in its plane. The distances of the vertices of the square from e are a , b , c , and d , respectively. Prove that $a + c = b + d$.
6. For which values of a does the given equation have a root?

$$(8 - 2a - a^2) \cot x = \tan x$$

7. Solve the given equation.

$$\sqrt{x-3} + \sqrt{7x-1} = 7-x$$

8. Prove that if n is an integer, then $\frac{7n-1}{4}$ and $\frac{5n+3}{12}$ cannot both be integers.