

Flanders Math Olympiad 2009

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- 1 In an attempt to beat the Belgian handshake record come on 20/09/2009 exactly 2009 Belgians together in a large sports hall. Among them are Nathalie and thomas. During this event, everyone shakes hands with everyone exactly once other attendees. Afterwards, Nathalie says: "I have exactly 5 times as many Flemish people shaken hands as people from Brussels." Thomas replies with "I have exactly 3 times as much Walloons and Brussels people shook hands". From which region does Nathalie come and from which region comes Thomas?

- 2 A natural number has four natural divisors: 1, the number itself, and two real divisors. That number plus 9 is equal to seven times the sum of the true divisors. Determine that number and prove that it is unique.

- 3 Consider a line segment $[AB]$ with midpoint M and perpendicular bisector m . For each point $X \neq M$ on m consider we are the intersection point Y of the line BX with the bisector from the angle $\angle BAX$. As X approaches M , then approaches Y to a point of $[AB]$. Which?
<https://cdn.artofproblemsolving.com/attachments/a/3/17d72a23011a9ec22deb20184717cc9c020a2.png>
 Beschouw een lijnstuk $[AB]$ met midden M en middelloodlijn m . Voor elk punt $X \neq M$ op m beschouwen we het snijpunt Y van de rechte BX met de bissectrice van de hoek $\angle BAX$. Als X tot M nadert, dan nadert Y tot een punt van $[AB]$. Welk?

- 4 The maximum number of solid regular tetrahedrons can be placed against each other so that one of their edges coincides with a given line segment in space?
 Hoeveel massieve regelmatige viervlakken kan men maximaal tegen mekaar plaatsen zodat 'e' en van hun ribben samenvalt met een gegeven lijnstuk in de ruimte?