



STEP III, 1999, Q4

- 4 A polyhedron is a solid bounded by F plane faces, which meet in E edges and V vertices. You may assume *Euler's formula*, that $V - E + F = 2$.

In a regular polyhedron the faces are equal regular m -sided polygons, n of which meet at each vertex. Show that

$$F = \frac{4n}{h},$$

where $h = 4 - (n - 2)(m - 2)$.

By considering the possible values of h , or otherwise, prove that there are only five regular polyhedra, and find V , E and F for each.



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