

Attendance Quiz for Lecture 14

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1. (a) Define a *platonic solid* (b) Prove that there are only five of them, and determine them all.

A platonic solid is an object with identical faces
and incident edges

p	q	m	n	f	name
3	3	6	4	4	tetrahedron
3	4	12	8	6	hexahedron
3	5	30	20	12	dodecahedron
4	3	12	6	8	octahedron
5	3	30	12	20	icosahedron

Equations:

$$m = \frac{2}{\frac{2}{p} - 1 + \frac{2}{q}}$$

$$n = \frac{2m}{p} \quad f = \frac{2m}{q}$$

From this table, we see all the possible platonic solids. These are the only five platonic solids as we must determine m to be a positive integer value. As such, these are the only combination of p and q that allow m to do this, as we check by simplifying into $\frac{1}{p} + \frac{1}{q} > \frac{1}{2}$