

**M3H PROBLEMS 2. 23.1.2018**

Q1 (Euclid, Book III, Prop. 20). Show that the angle subtended by a chord of a circle at the centre is twice that subtended at the circumference.

Q2 (Euclid, Book III, Prop. 21). Show that angles in the same segment are equal.

Q3 (Euclid, Book III, Prop. 22). Show that opposite angles of a cyclic quadrilateral sum to  $\pi$ .

Q4. Describe a regular polyhedron by its *Schläfli symbol*  $\{p, q\}$ , where the faces are regular  $p$ -gons and  $q$  faces meet at a vertex.

(i) Find the inequality satisfied by  $p, q$ .

(ii) Give each Platonic solid its Schläfli symbol.

Q5. For a polyhedron, let the number of faces, vertices and edges be  $F$ ,  $V$  and  $E$ . Find  $F - E + V$  for each Platonic solid.

Q6 (Euclid, Book IX, Prop. 20). Show that there are infinitely many primes.

NHB