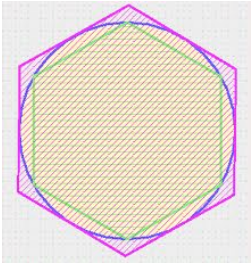
BACCALAUREAT SESSION 2011-Section Européenne Anglais - Série S
Epreuve de DNL Mathématiques

Document: Archimedes' π≈ $3\frac{1}{7}$

Throughout the history of mathematics, one of the most enduring challenges has been the calculation of the ratio between a circle's circumference and diameter. As the Greek for perimeter is περίμετρος, this constant has come to be known by the Greek letter π.

The first individual to determine a rather accurate estimate of π was Archimedes (287 - 212 BC). He bounded π from below and above by inserting circles of radius 1 into regular polygons of n sides, and then determined the outer perimeters of the polygons and the inner perimeters.



Using this method, Archimedes determined that π was between $3\frac{10}{71}$ and $3\frac{1}{7}$. He obtained these inequalities by considering regular polygons of 96 sides.

From various sources

Questions

1) What is the origin of the letter π to designate the ratio between a circle's circumference and diameter?
2) In what era did Archimedes live?
3) Write $3\frac{10}{71}$ then $3\frac{1}{7}$ as ratios of two whole numbers.
4)
   a) Explain the principle of squeezing a circle into polygons.
   b) What would the polygons turn into if an infinite number of sides were added?
5)
   a) Recall the name of a regular polygon of 3 sides.
   b) If n=3, find the length of the side of the inner polygon. Deduce the perimeter.
   c) Likewise, find the perimeter of the outer polygon of 3 sides.
   d) Deduce the boundaries of π if n=3.
   e) Give the accuracy of this approximation.
6) Give the accuracy of Archimedes' squeezing given n=96. Is it good enough for most geometry situations?