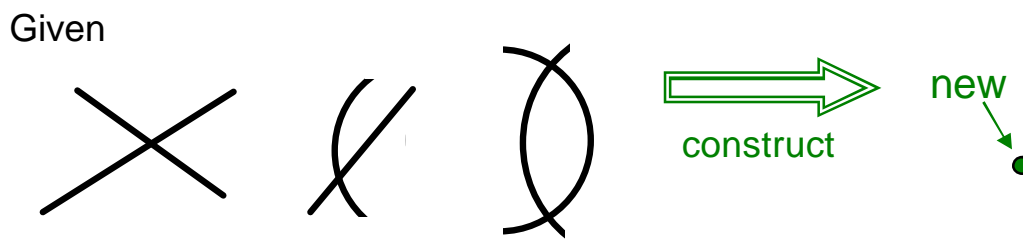
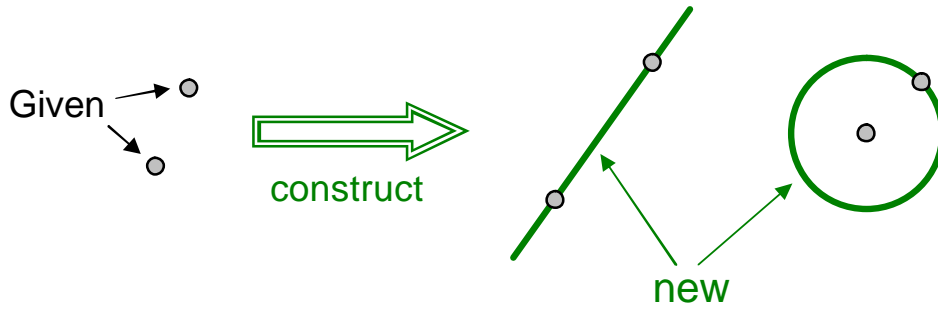


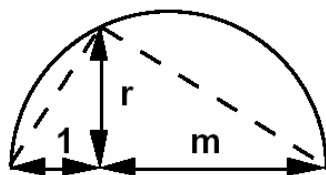
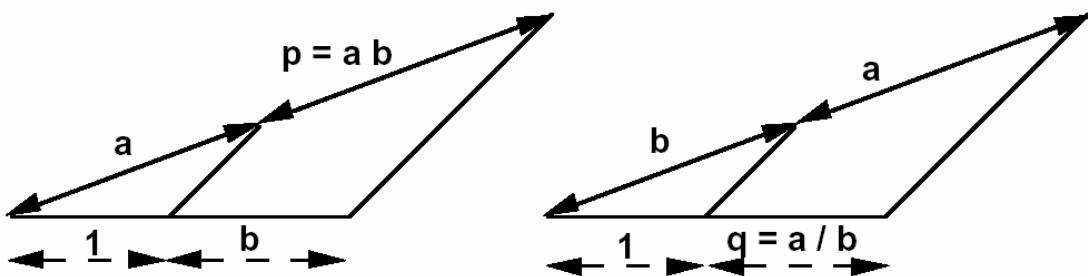
Construction with ruler and compass



Start with arbitrary



Arithmetic: $+$, $-$, $*$, $/$, $2\sqrt{\quad}$



$$(1 + r^2) + (r^2 + m^2) = (1 + m)^2$$

$$r^2 = m$$

Thm:

A proposed construction is possible by ruler and compass **iff** the numbers which define the desired geometric elements can be derived from those defining the given elements by a finite number of rational operations and extractions of real square roots.

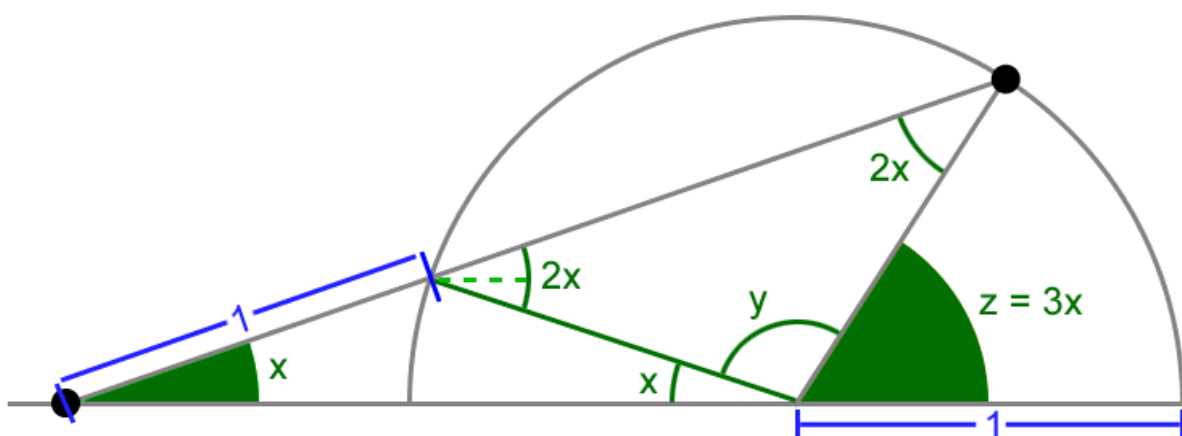
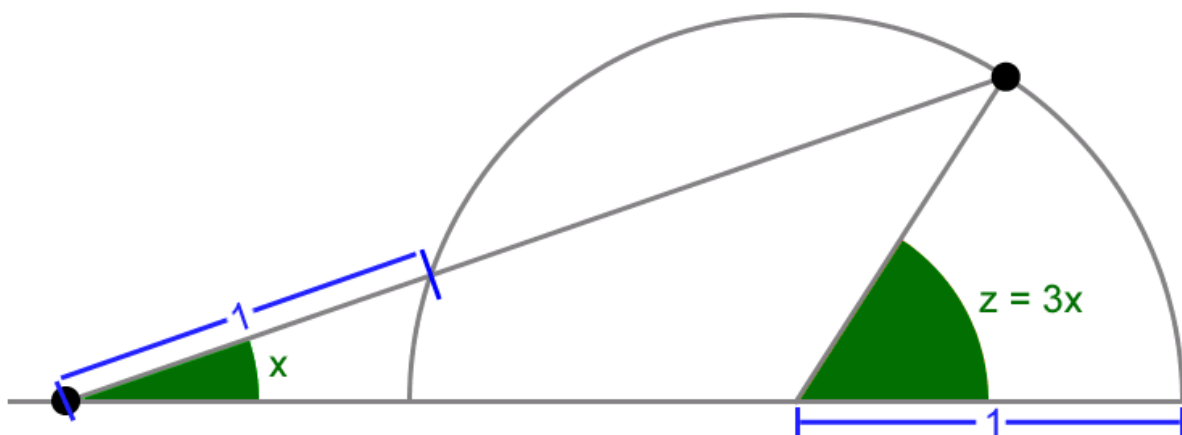
E.g. regular polygon of 17 sides (C.F. Gauss)

Impossible:

- double the volume of a unit cube ($x^3=2$)
- trisect an angle
- square the circle

Archimedes ~287BC – 212BC

Trisection with ruler and compass:



$4x$	$+ y$	$= 180^\circ$	
x	$+ y$	$+ z$	$= 180^\circ$
<hr/>			
$3x$	$- z$	$= 0$	$\rightarrow z = 3x$