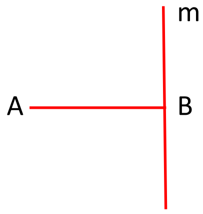
➢ Constructions of $\sqrt{2}$ and $\sqrt{3}$:

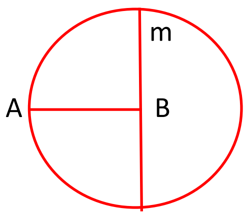
Construction of $\sqrt{2}$

1. Let the line segment [AB] be of length 1 unit.

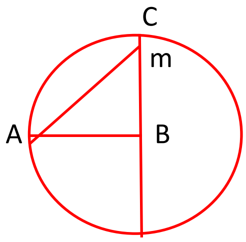
2. Construct a line m perpendicular to [AB] at B.



3. Construct a circle with centre B and radius length [AB] and mark the intersection, C, of the circle and m.



4. Draw the line segment [AC]. $|AC| = \sqrt{2}$ units.



Proof:

$|AB| = |AC| = 1$ (radii of circle)

$|AB|^2 + |BC|^2 = |AC|^2$ (Pythagoras Thm)

$\Rightarrow 1^2 + 1^2 = |AC|^2$

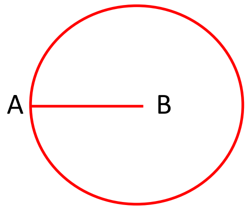
$\Rightarrow |AC|^2 = 2$

$\Rightarrow |AC| = \sqrt{2}$

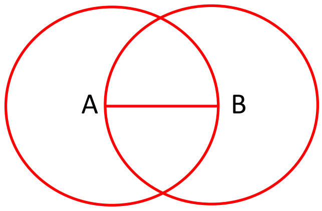
Construction of $\sqrt{3}$

1. Let the line segment [AB] be of length 1 unit.

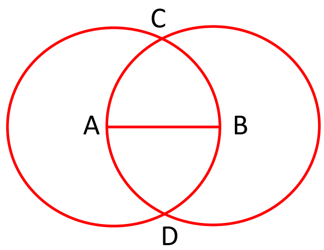
2. Construct a circle with centre A and radius length |AB|.



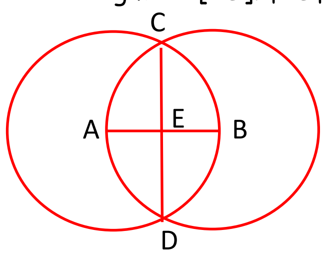
3. Construct a circle with centre B and radius length |AB|.



4. Mark the intersection of the two circles C and D.



5. Draw the line segment [CD]. $|CD| = \sqrt{3}$ units.



Proof:

[CD] and [AB] are perpendicular bisectors of each other. (Method of construction)

$\Rightarrow |AE| = \frac{1}{2}$ and $|AB| = \frac{1}{2}$

$|AC| = 1$ (Construction)

$|AE|^2 + |EC|^2 = |AC|^2$ (Pythagoras Thm)

$\Rightarrow (\frac{1}{2})^2 + |EC|^2 = 1^2$

$\Rightarrow |EC|^2 = \frac{3}{4}$

$\Rightarrow |EC| = \frac{\sqrt{3}}{2}$

$\Rightarrow |CD| = 2 \times |EC| = \sqrt{3}$