Principles of Mechanical Drawings – CONSTRUCTION OF NUTS & BOLTS

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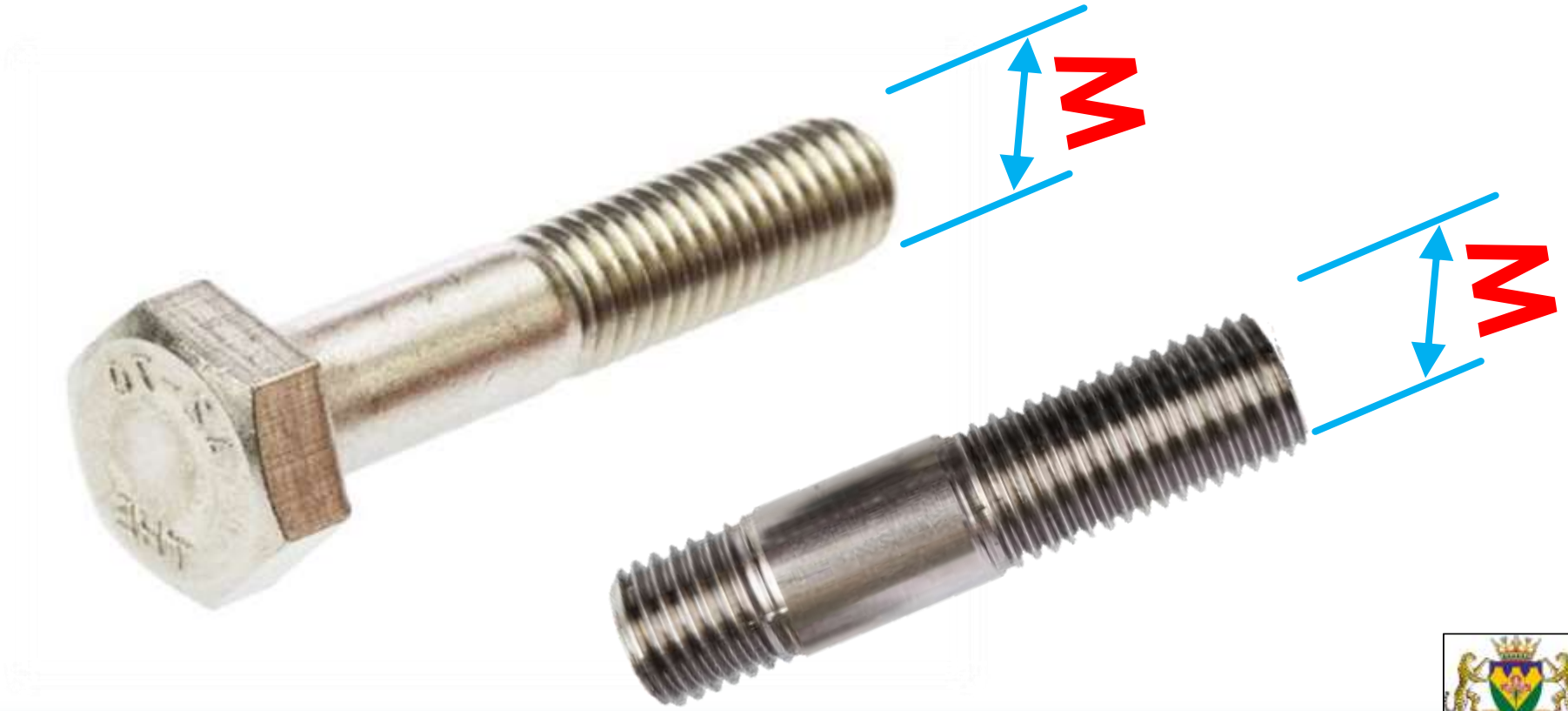
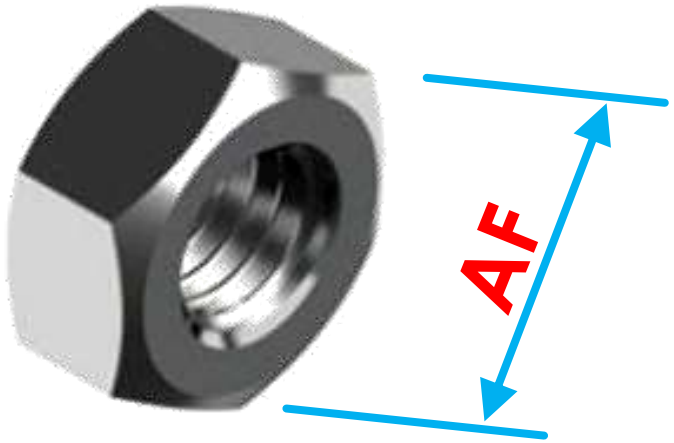
Construction of a NUT

- The **outer diameter** of the bolt/stud will determine all the dimensions of the **nut** and **bolt**



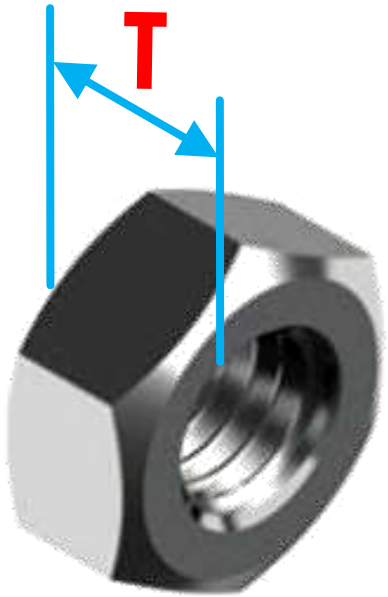
Construction of a NUT

- General terminology
  - **ACROSS FLAT (AF)**
  - The **AF** will always be **1,5 of diameter**



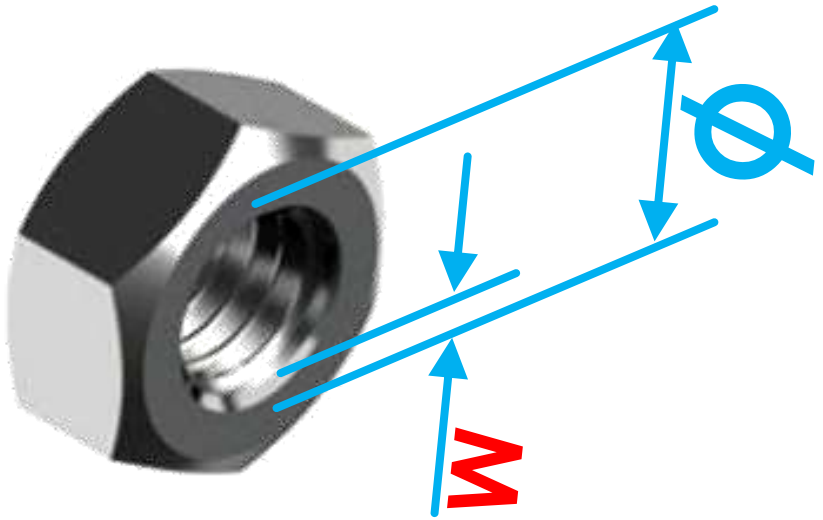
Construction of a NUT

- General terminology
  - **THICKNESS OF THE NUT (T)**
  - The thickness of the **nut (T)** will always be **0,8 of diameter**



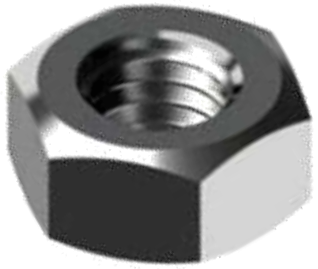
Construction of a NUT

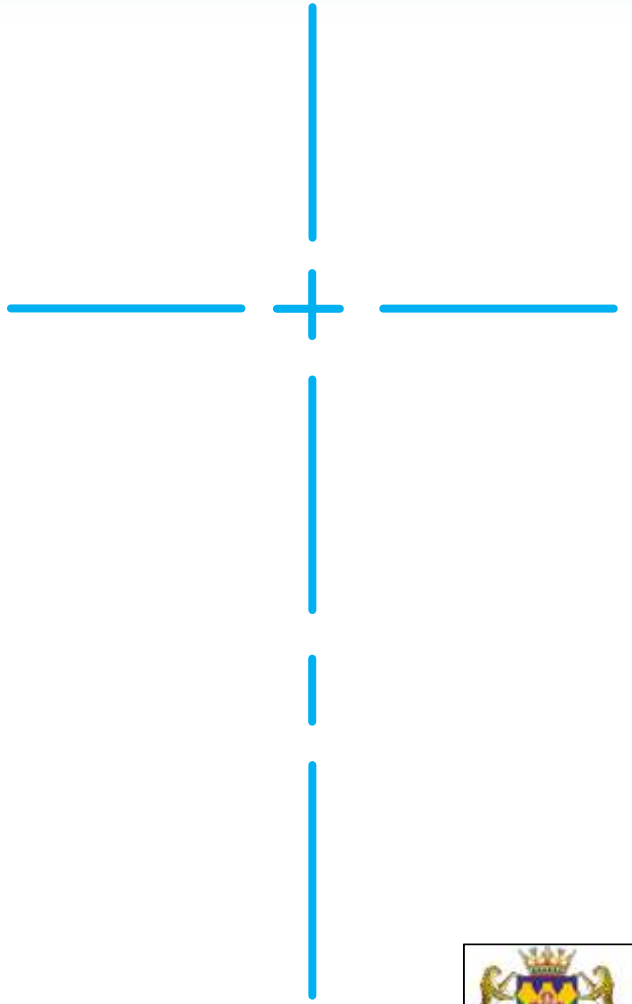
- The threat size M
- The thickness of the **threat (M)** will always be **0,1 of diameter**



Construction of a NUT

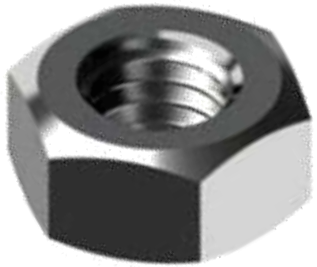
- When constructing a nut, **always** determine the true shape first.

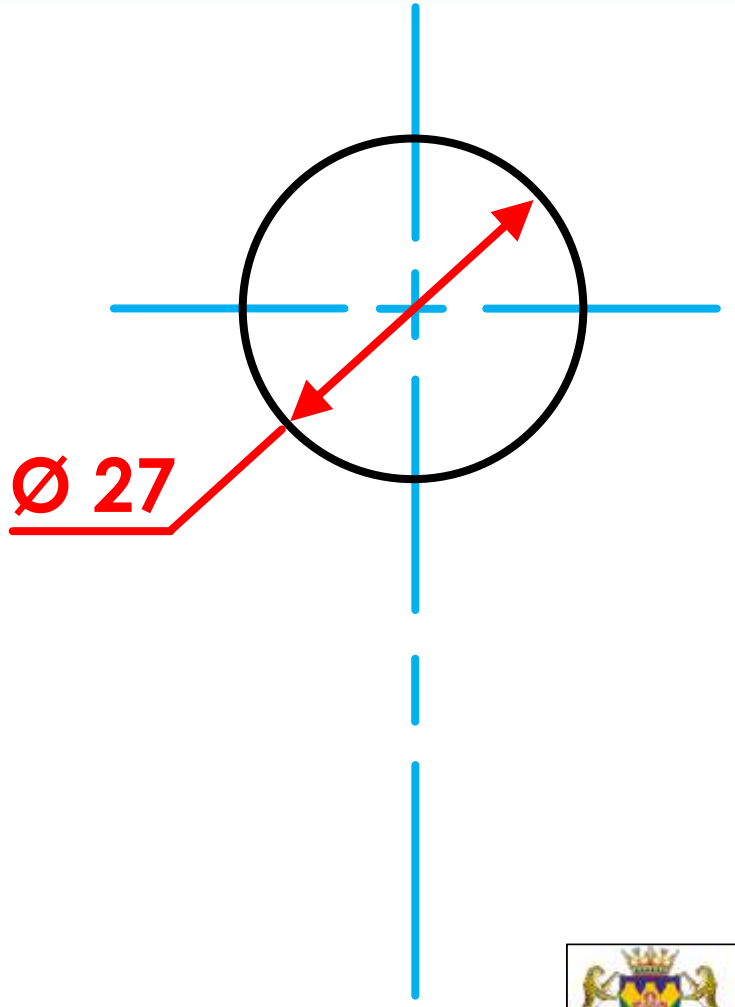




Construction of a NUT

- Use diameter (18mm) to determine the across flat **(1,5)** of the hexagon.
- = **M X scale factor**
- = **18 X 1,5**
- = **27**





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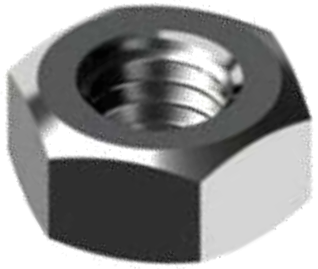
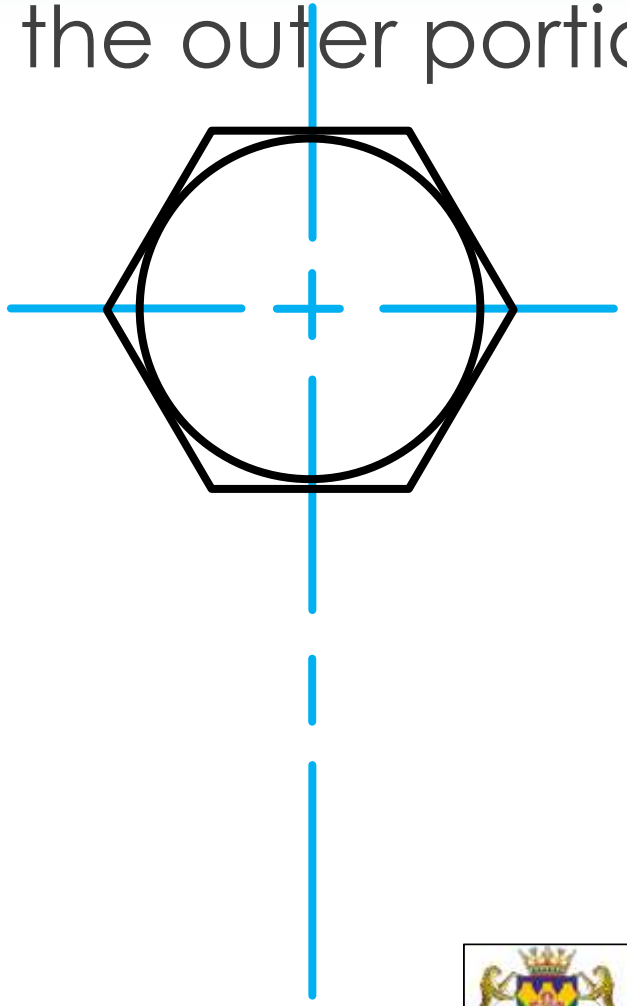
Construction of a NUT

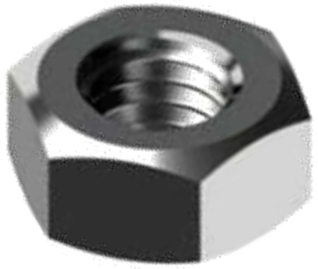
- Construct an external tangent hexagon around the circle to indicate the outer portion of the nut.

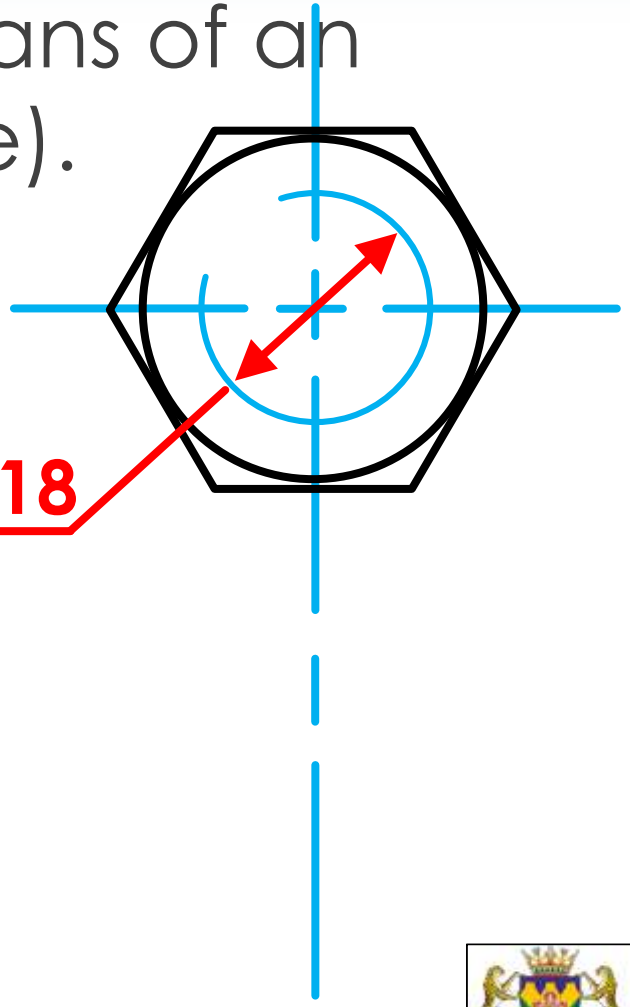




Construction of a NUT

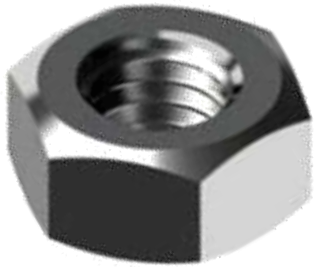
- Since the diameter will not be visible, indicate the **diameter (18mm)** by means of an incomplete circle (B-line type).

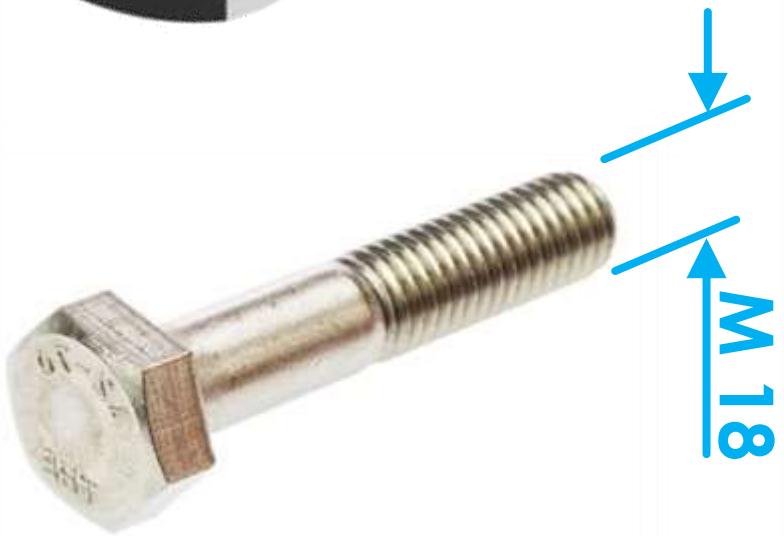


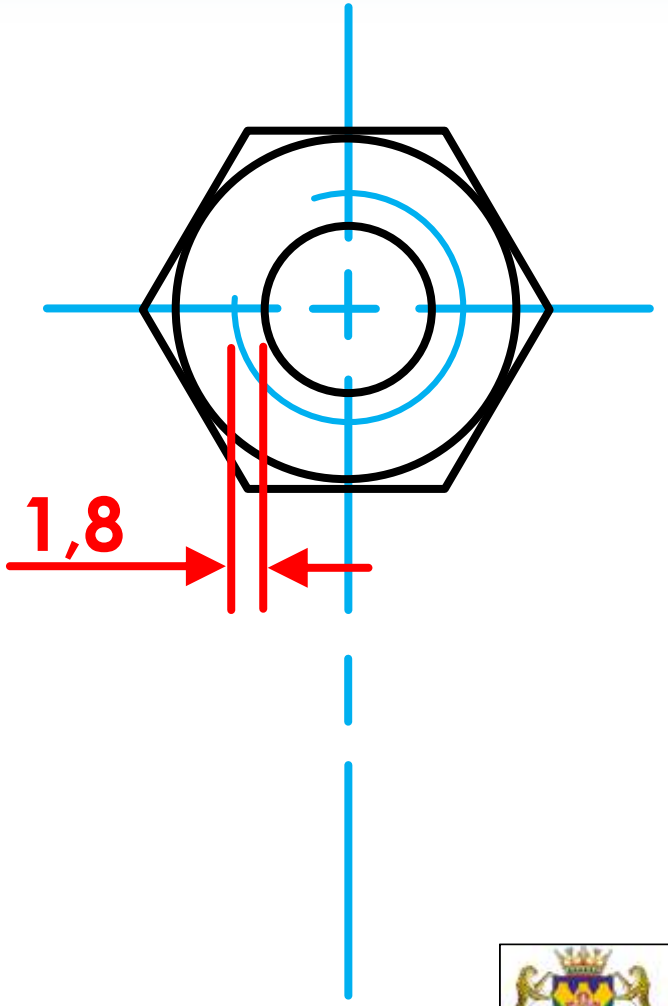


Construction of a NUT

- Indicate the inner threat by means of a solid circle.
- = M X scale factor
- = 18 X 0,1
- = 1,8mm

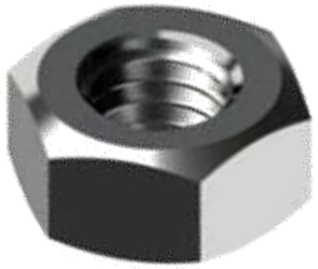


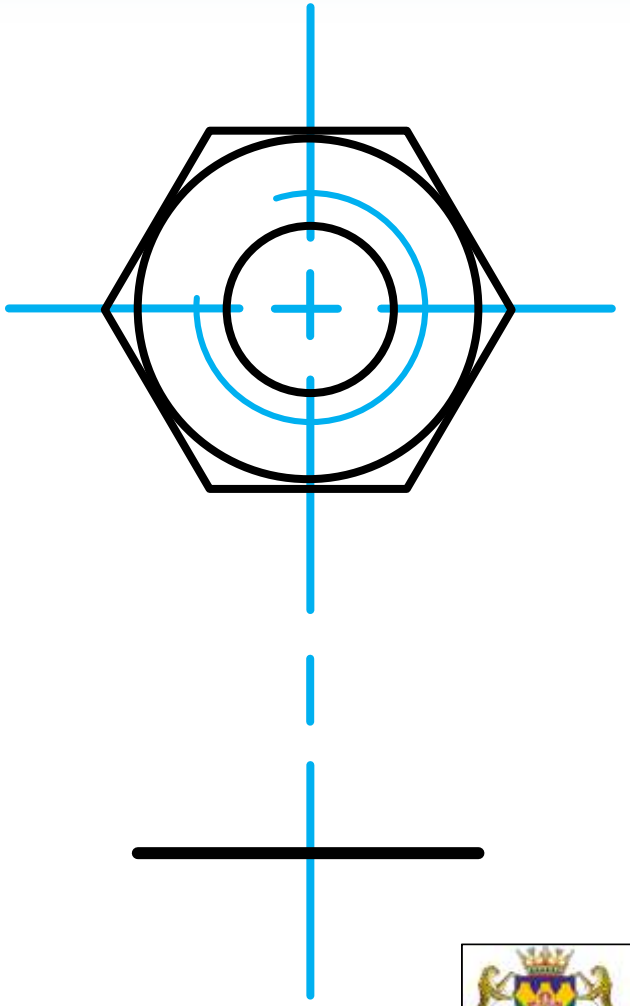




Construction of a NUT

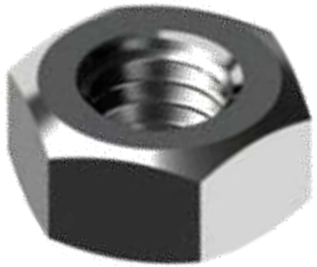
- Determine the front view start position of the nut.

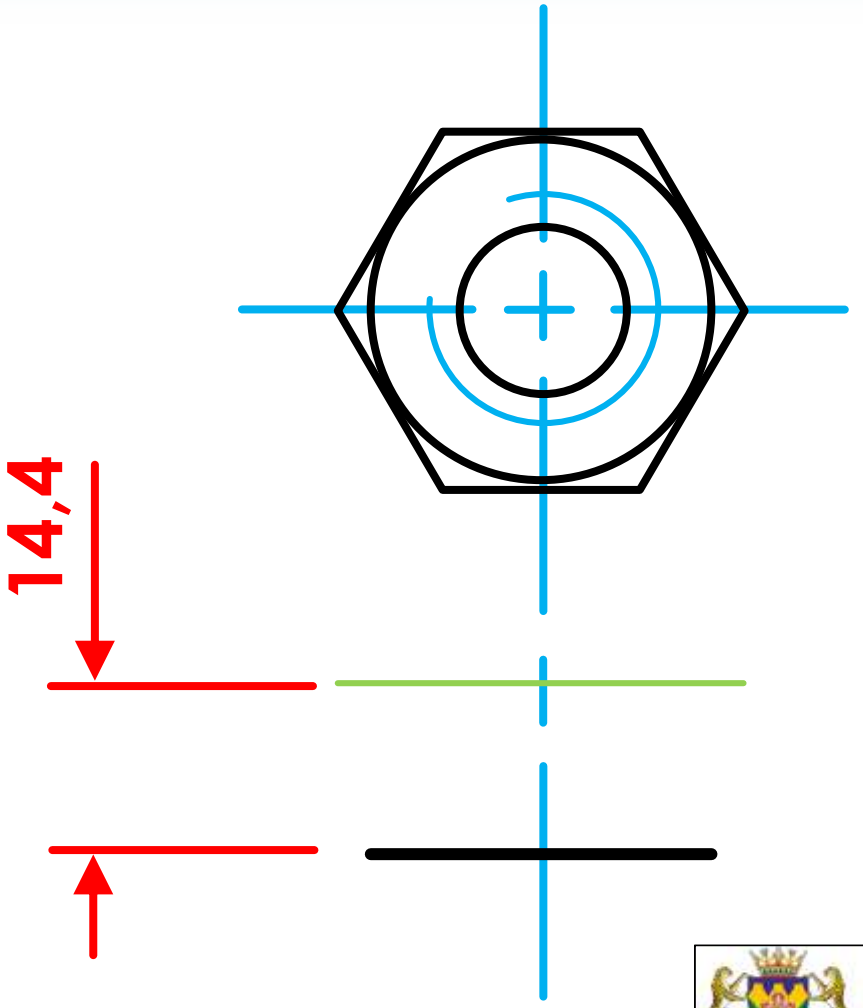




Construction of a NUT

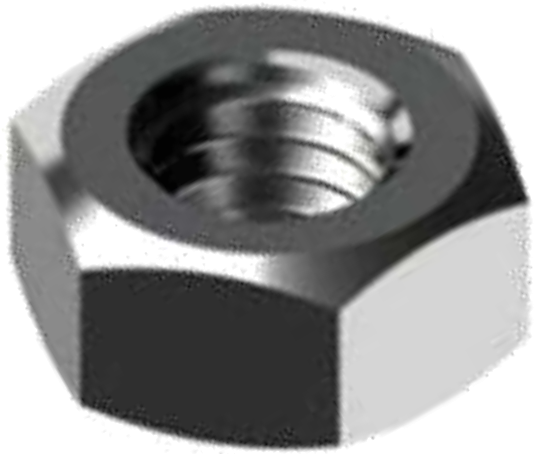
- Determine the thickness of the nut.
- = M X 0,8
- = 18 X 0,8
- = 14,4

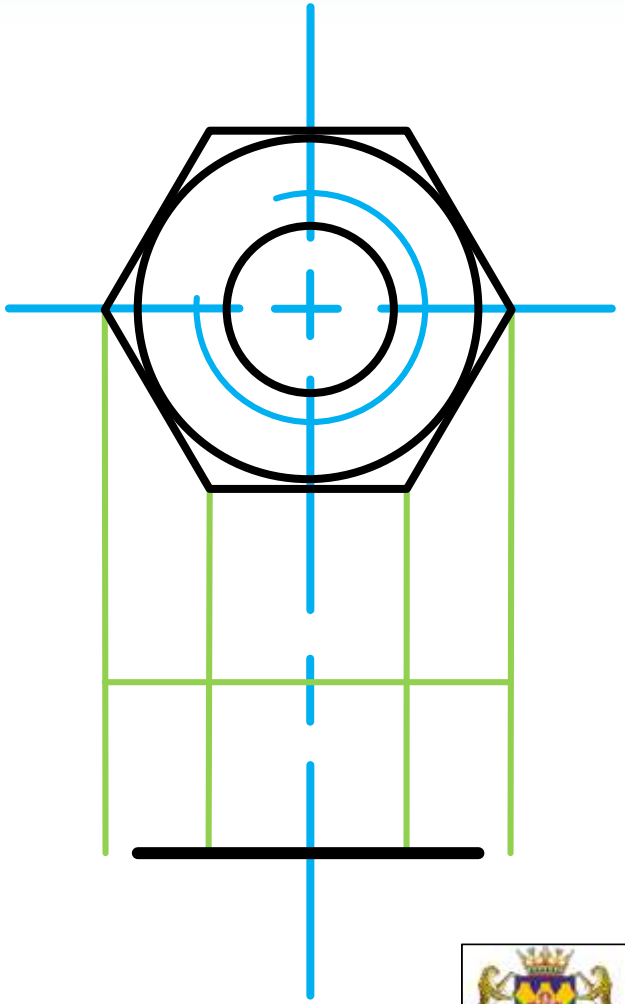




Construction of a NUT

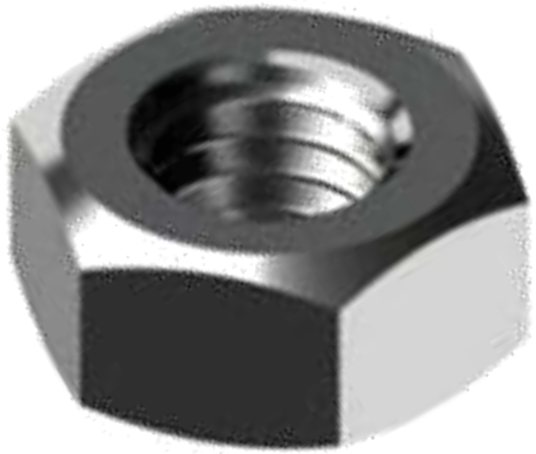
- Project the front view from the true shape of the nut

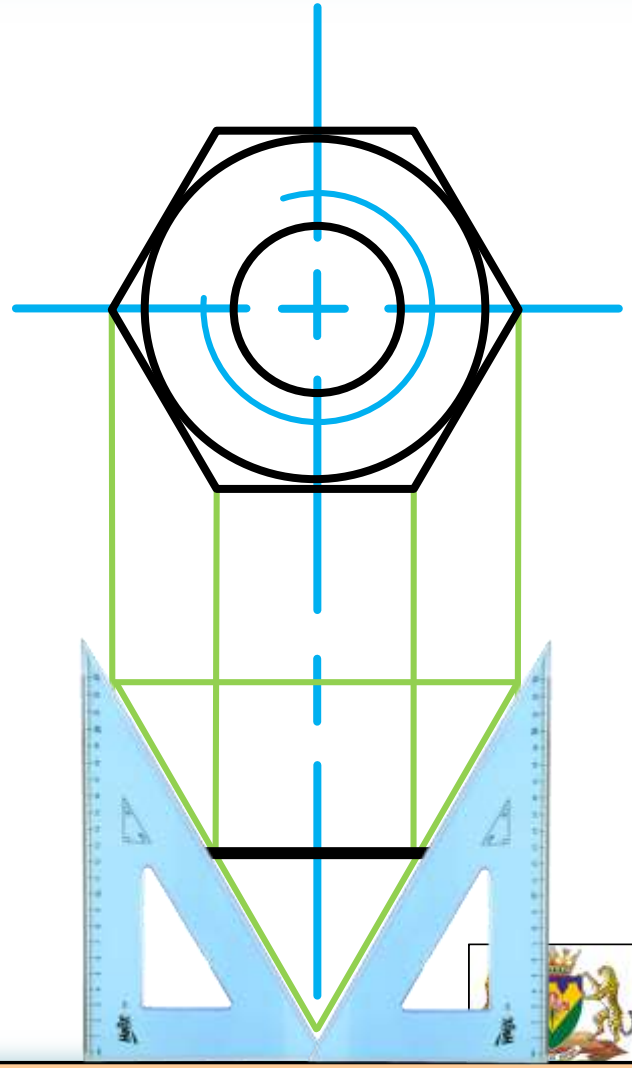




Construction of a NUT

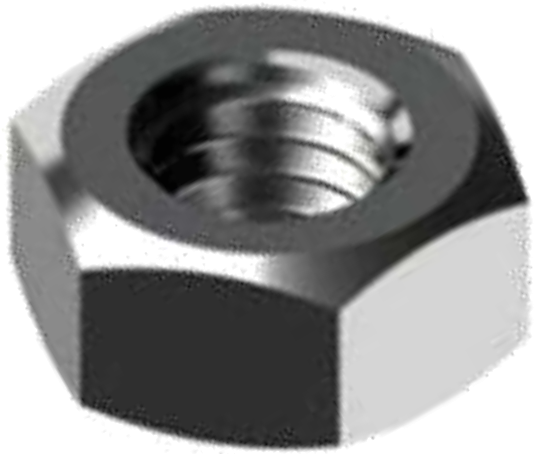
- Determine the intersection point for the upper arc at **60°**.

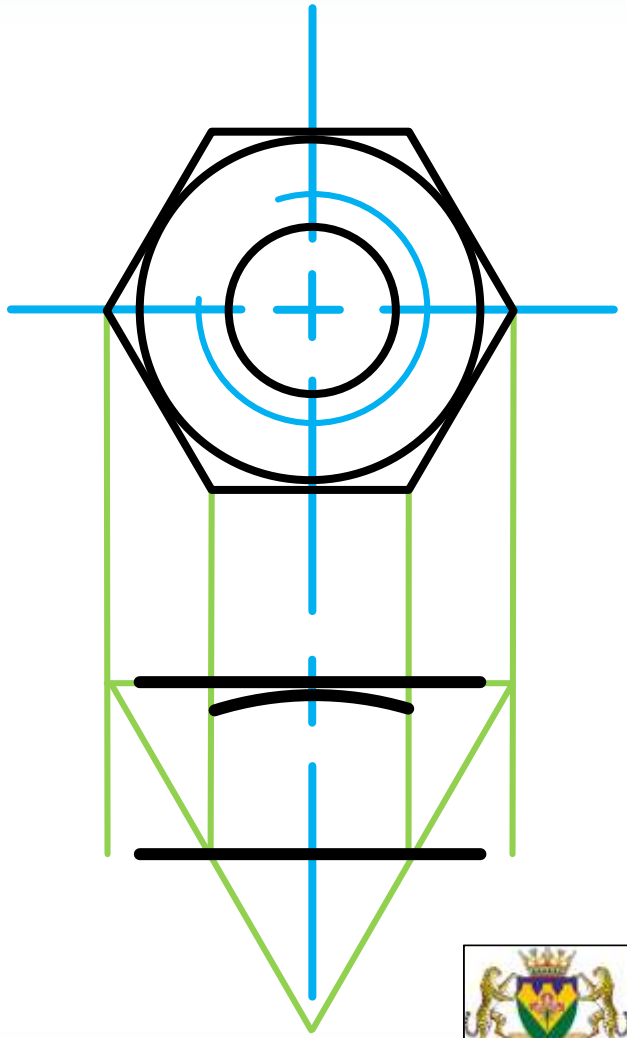




Construction of a NUT

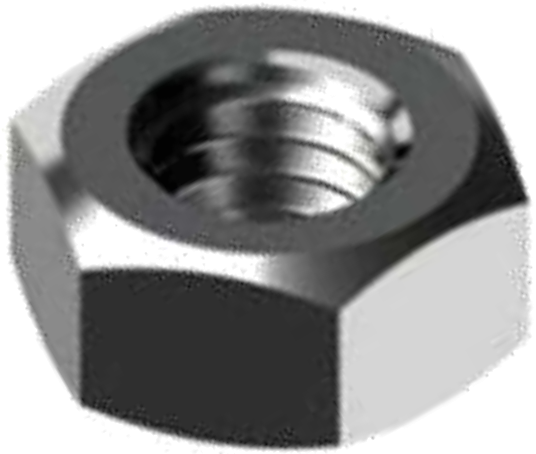
- Construct the upper arc.

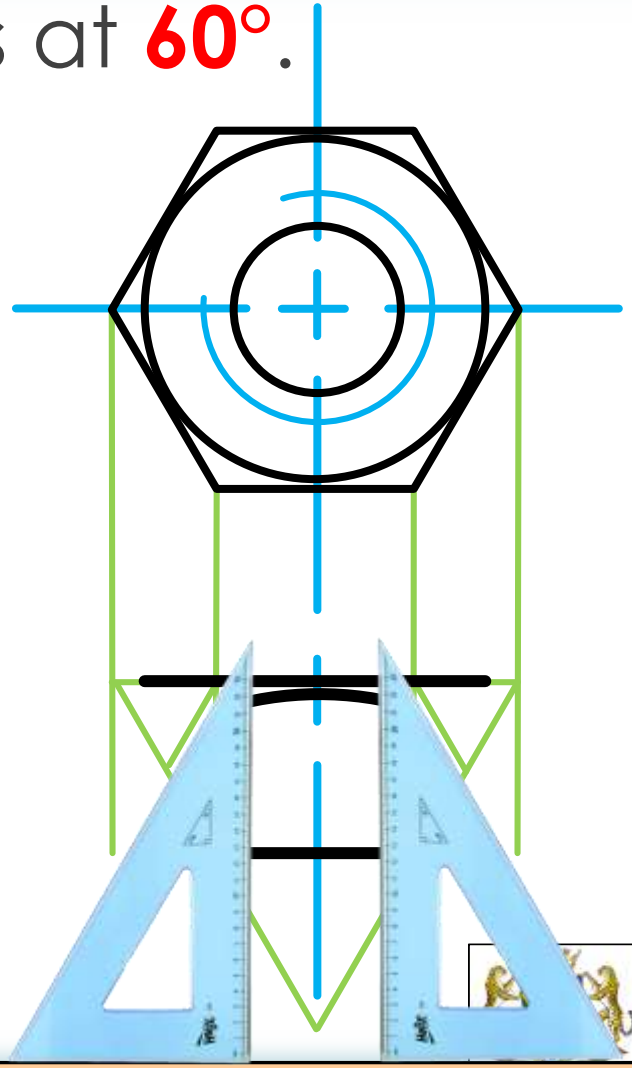




Construction of a NUT

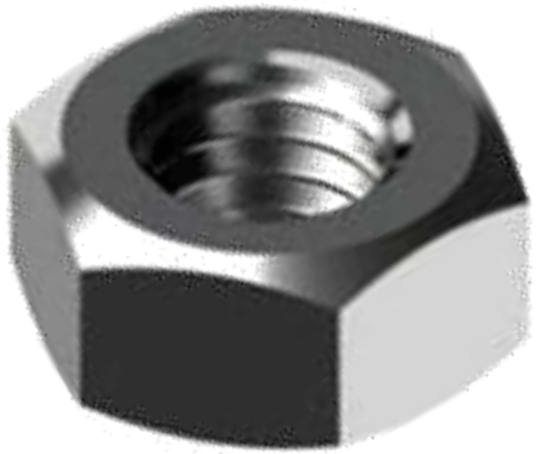
- Determine the intersection point for the remaining smaller upper arcs at **60°**.

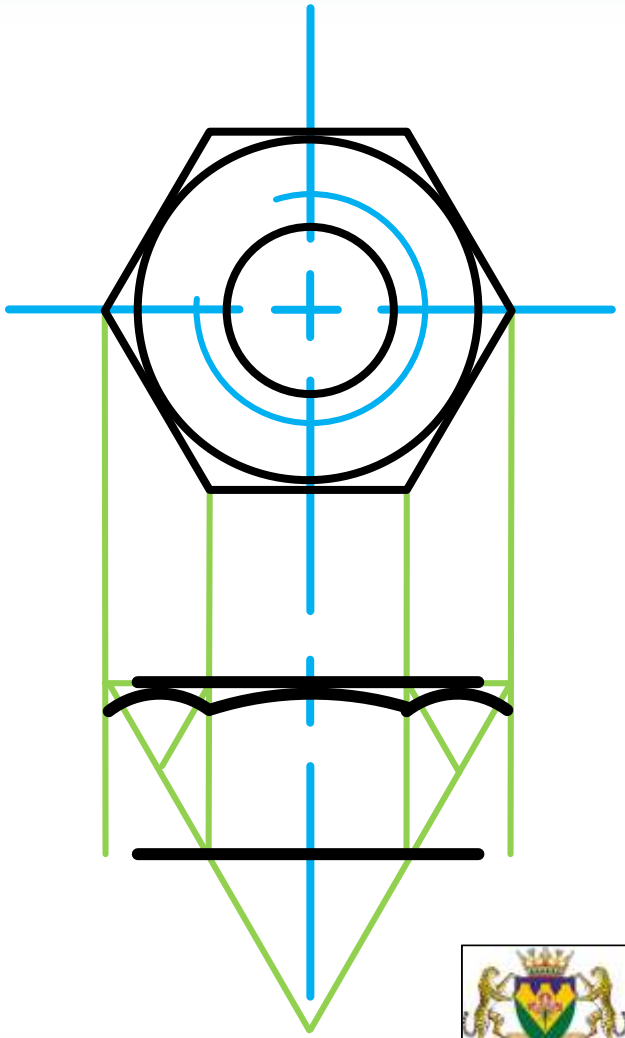




Construction of a NUT

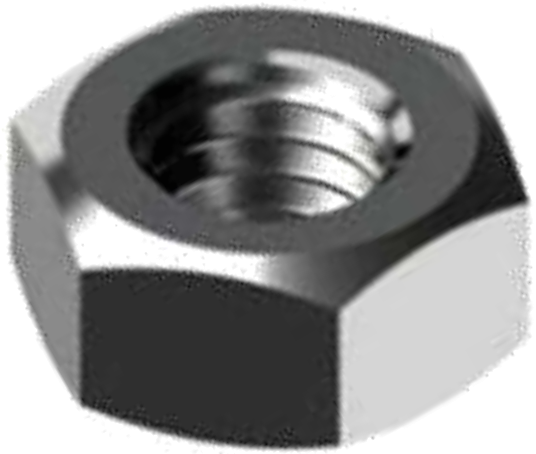
- Construct the smaller upper arcs.

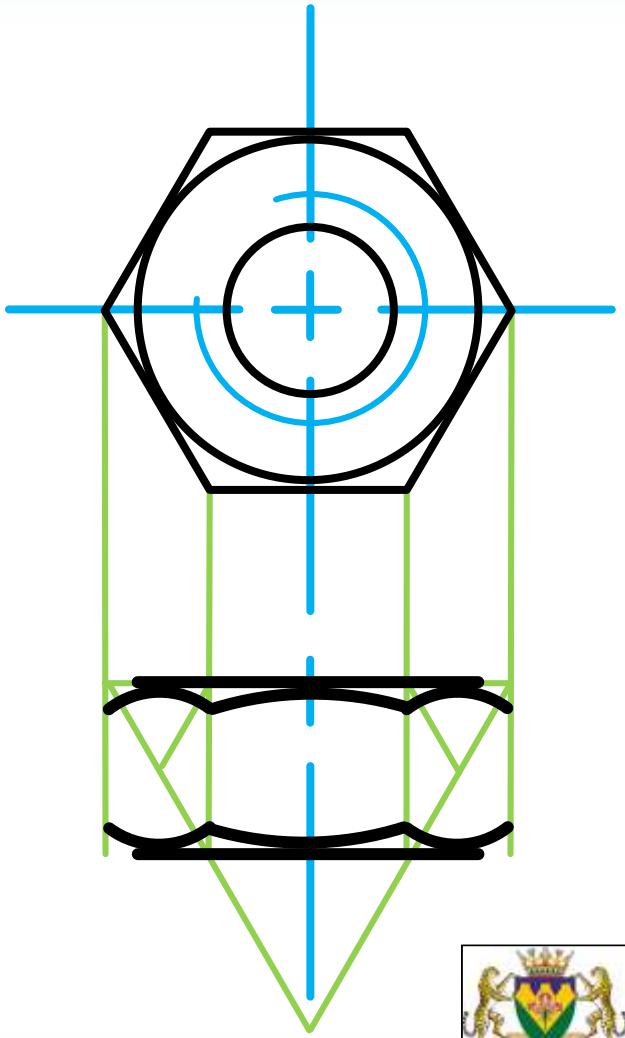




Construction of a NUT

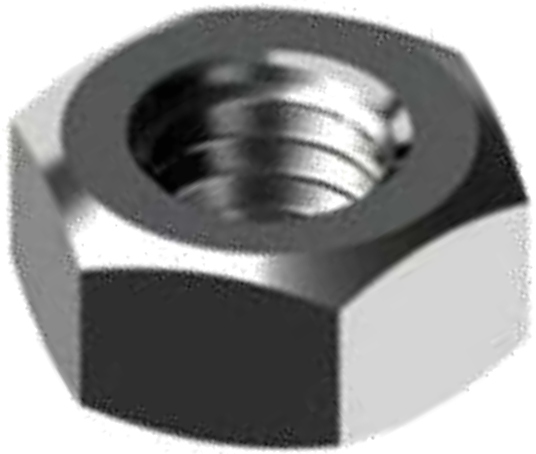
- Construct the lower arcs.

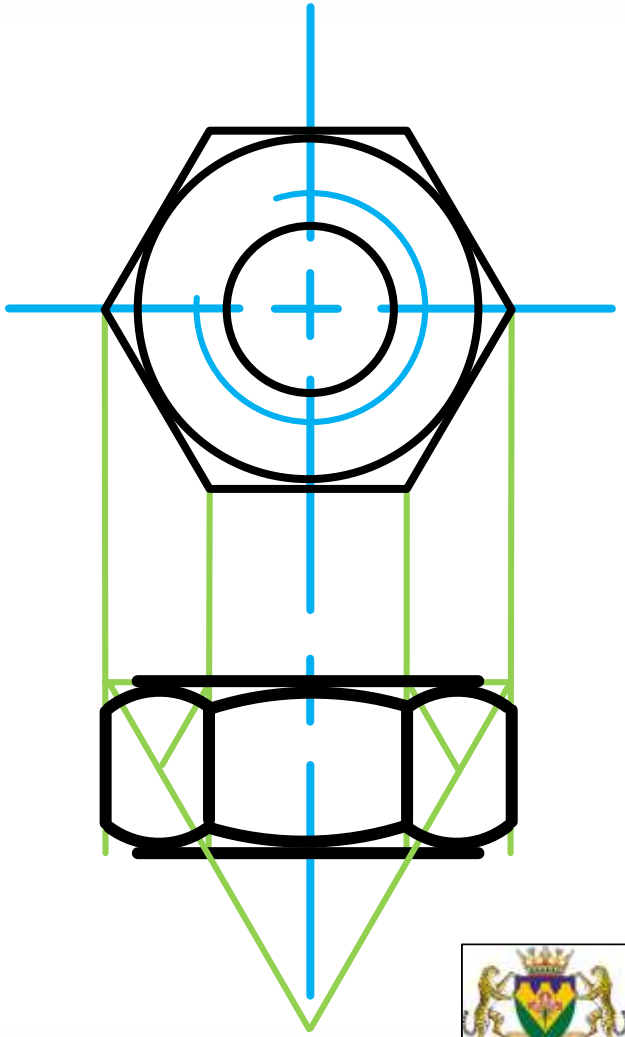




Construction of a NUT

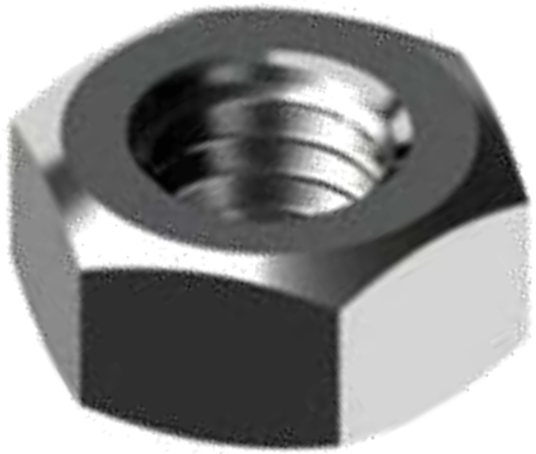
- Join the endpoints of each arc with the opposite corresponding arc.

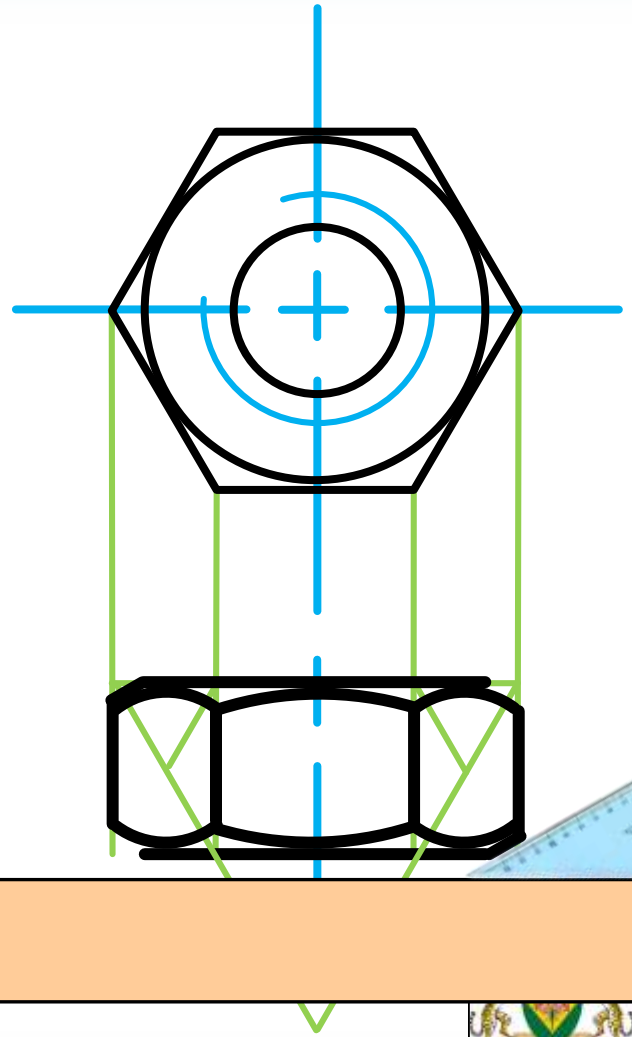




Construction of a NUT

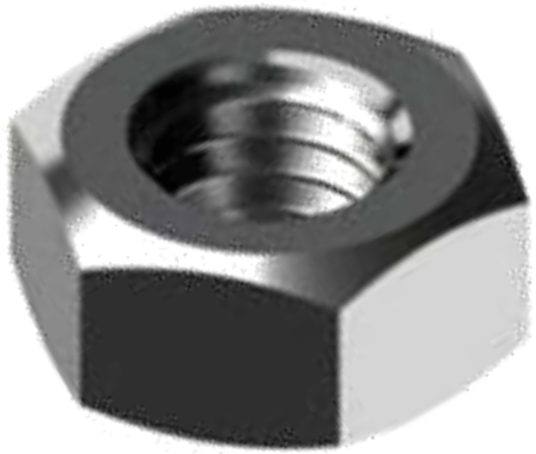
- Chamfer (bevel the edges) the nut endpoints on **30°**.

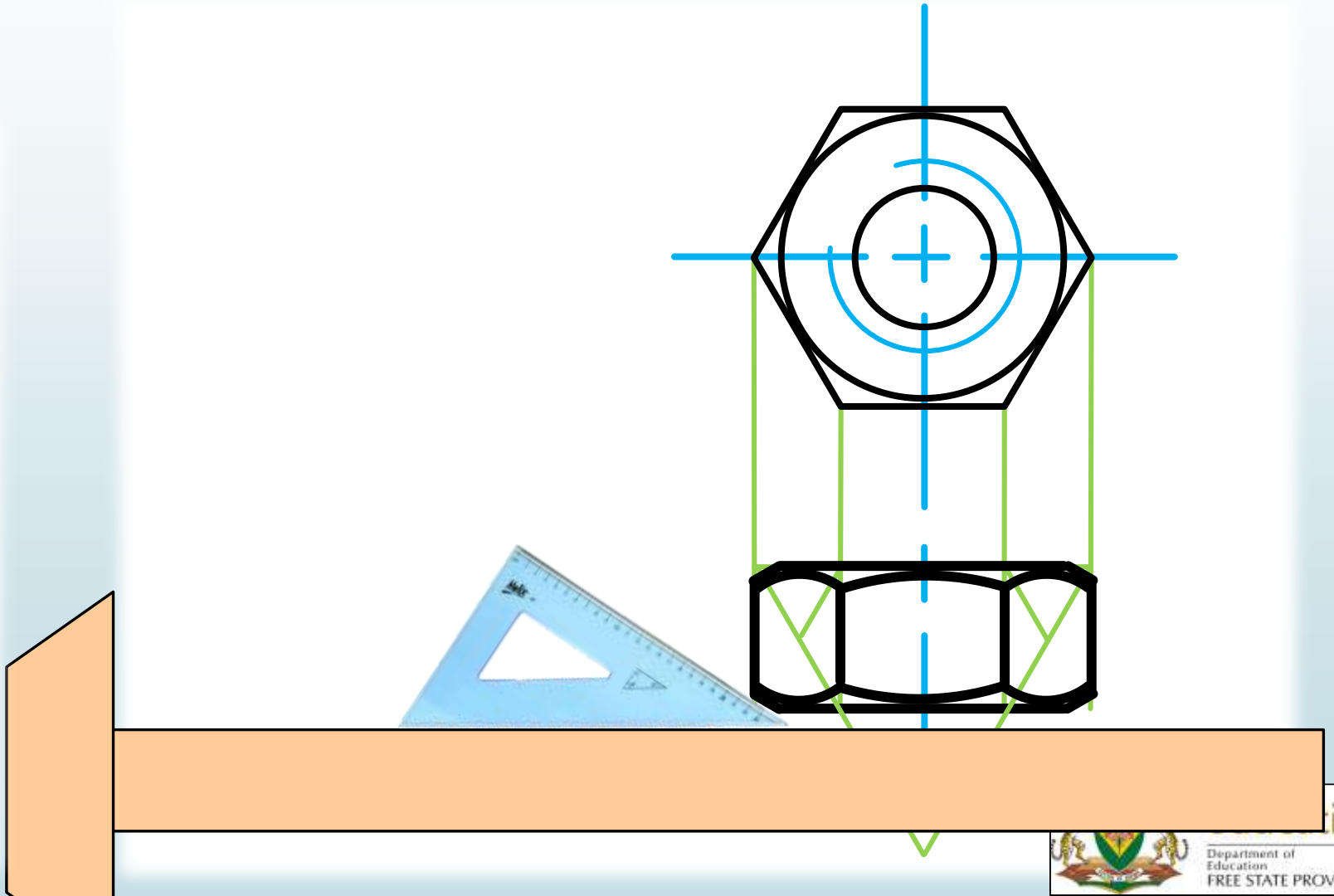




Construction of a NUT

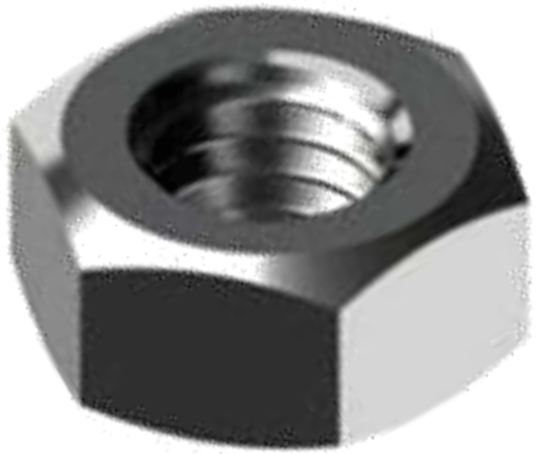
- Chamfer (bevel the edges) the nut endpoints on **30°**.

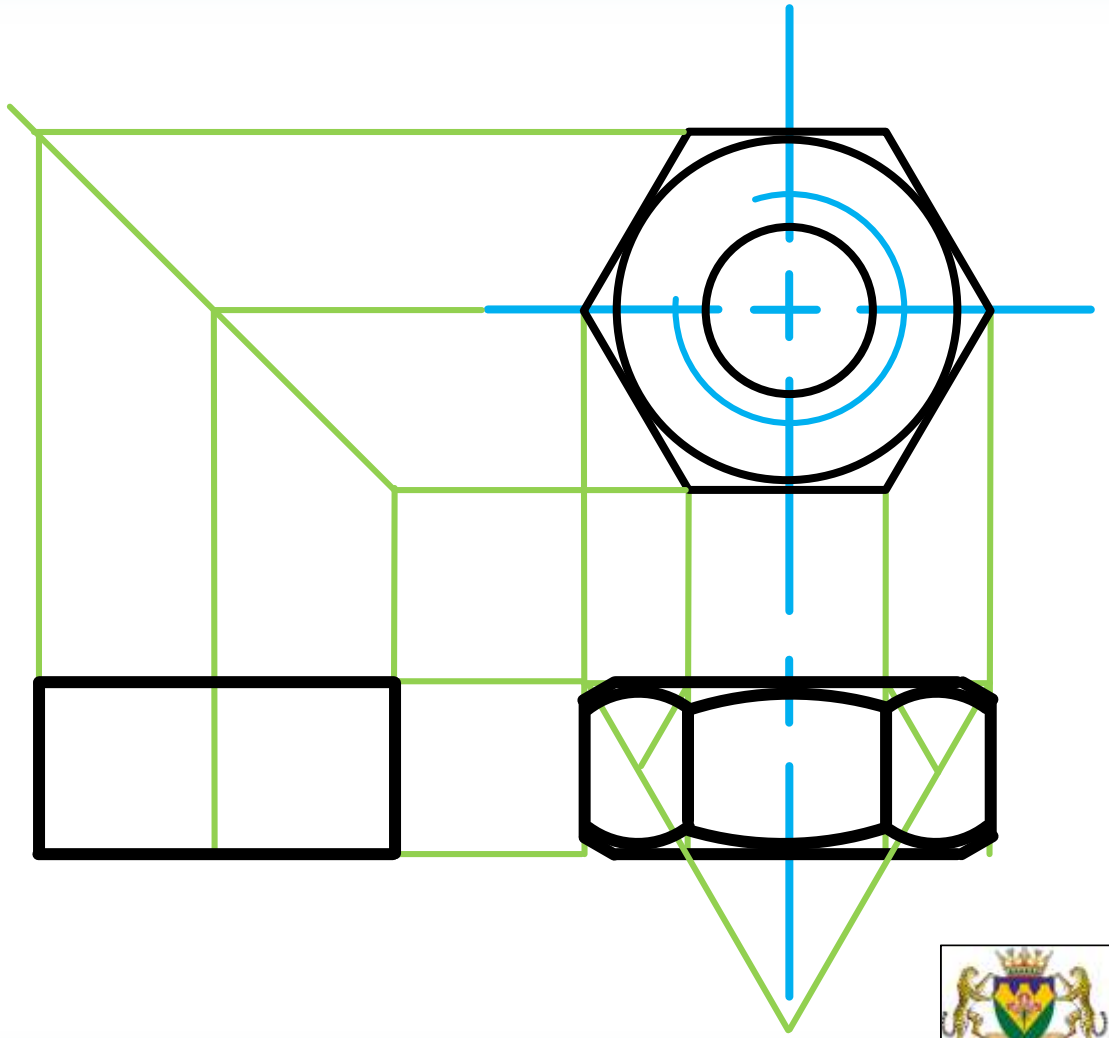




Construction of a NUT

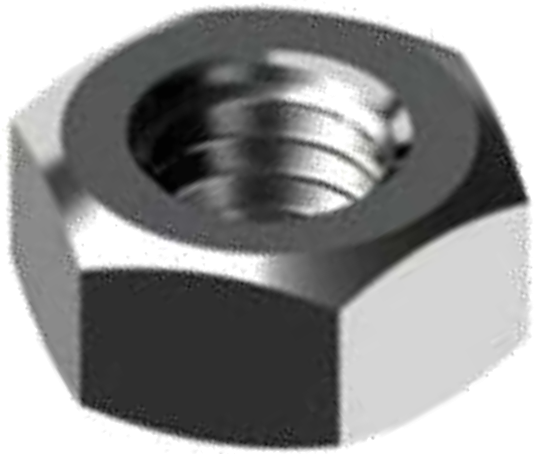
- Project the left view from the true shape and front view.

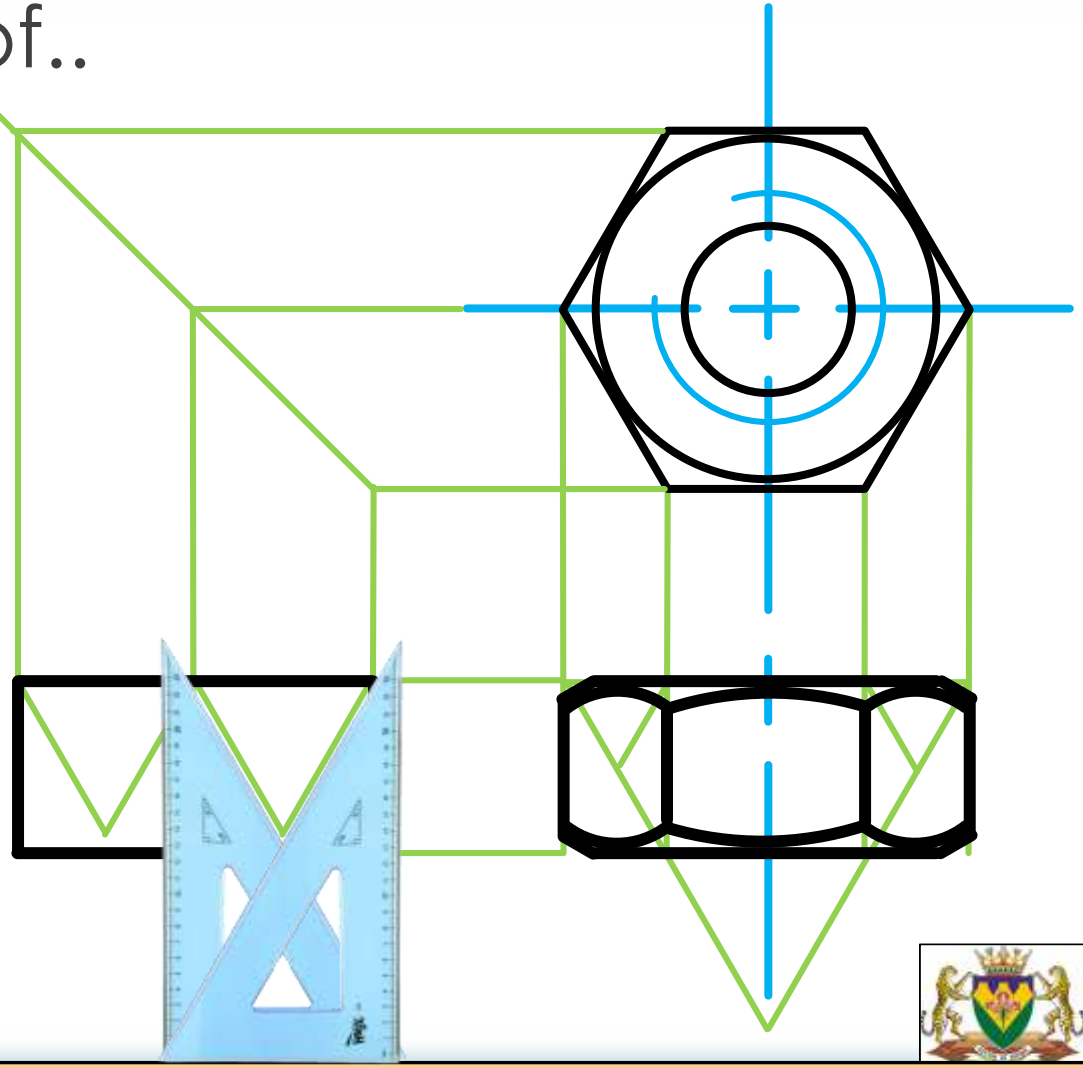




Construction of a NUT

- Determine the intersection point for the upper arcs at **60°** point of..





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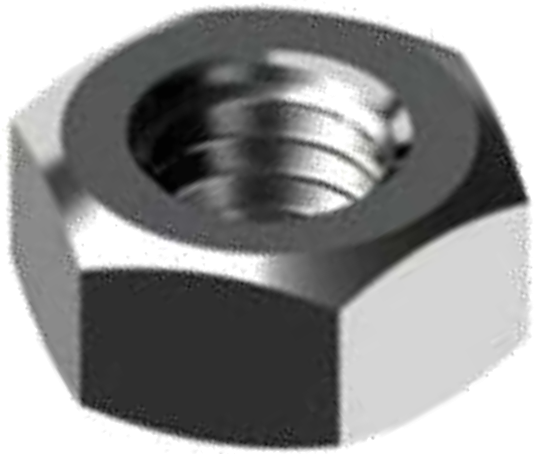
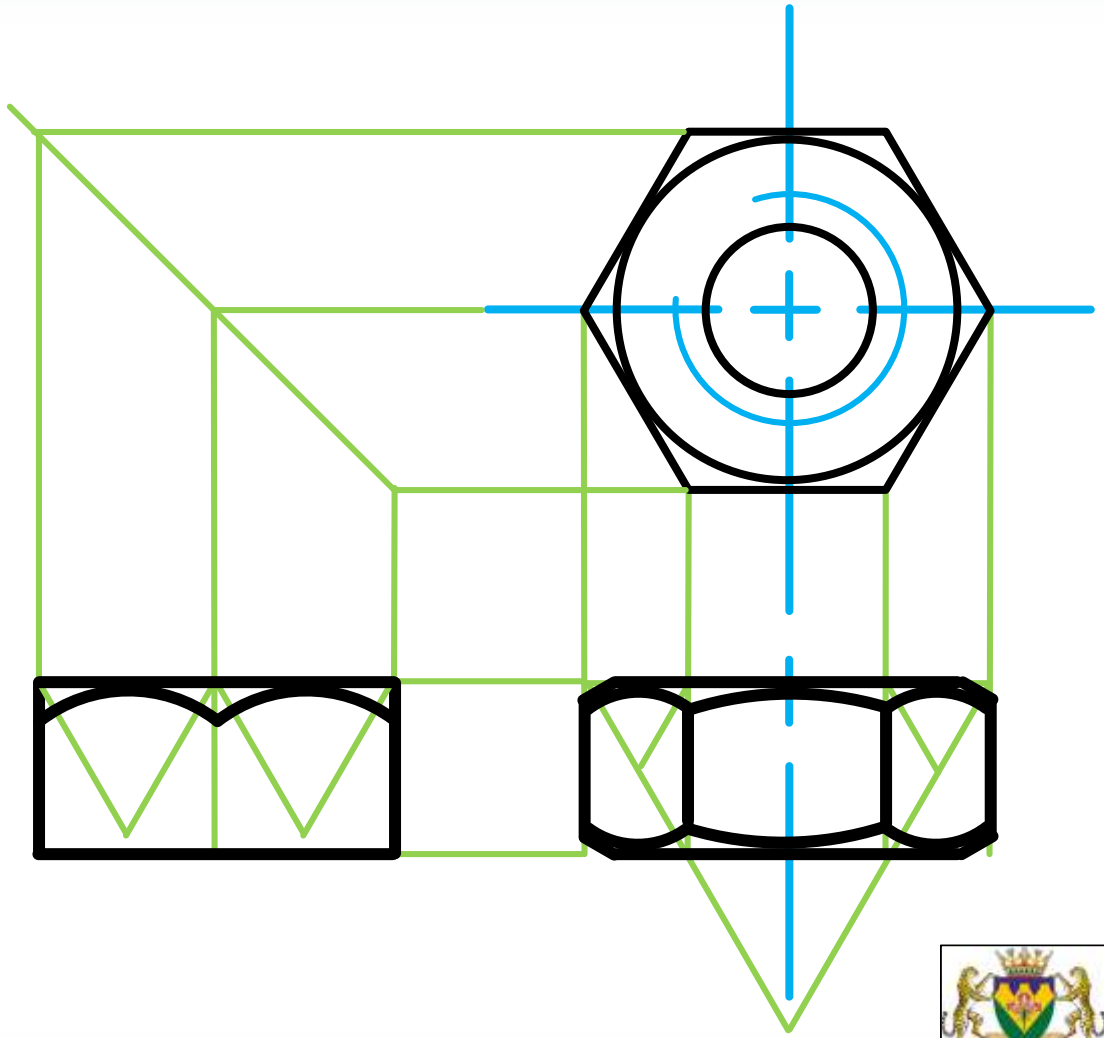
Construction of a NUT

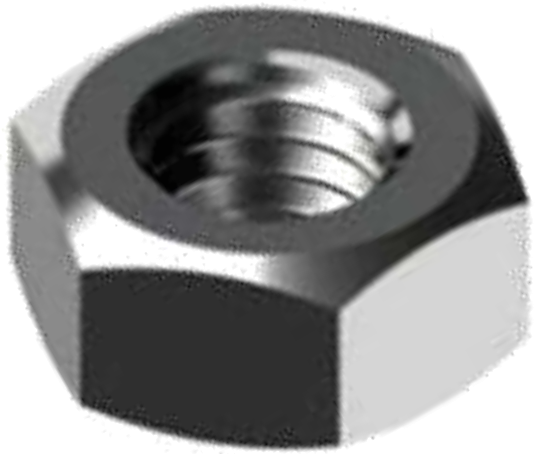
- Construct the smaller upper arcs.

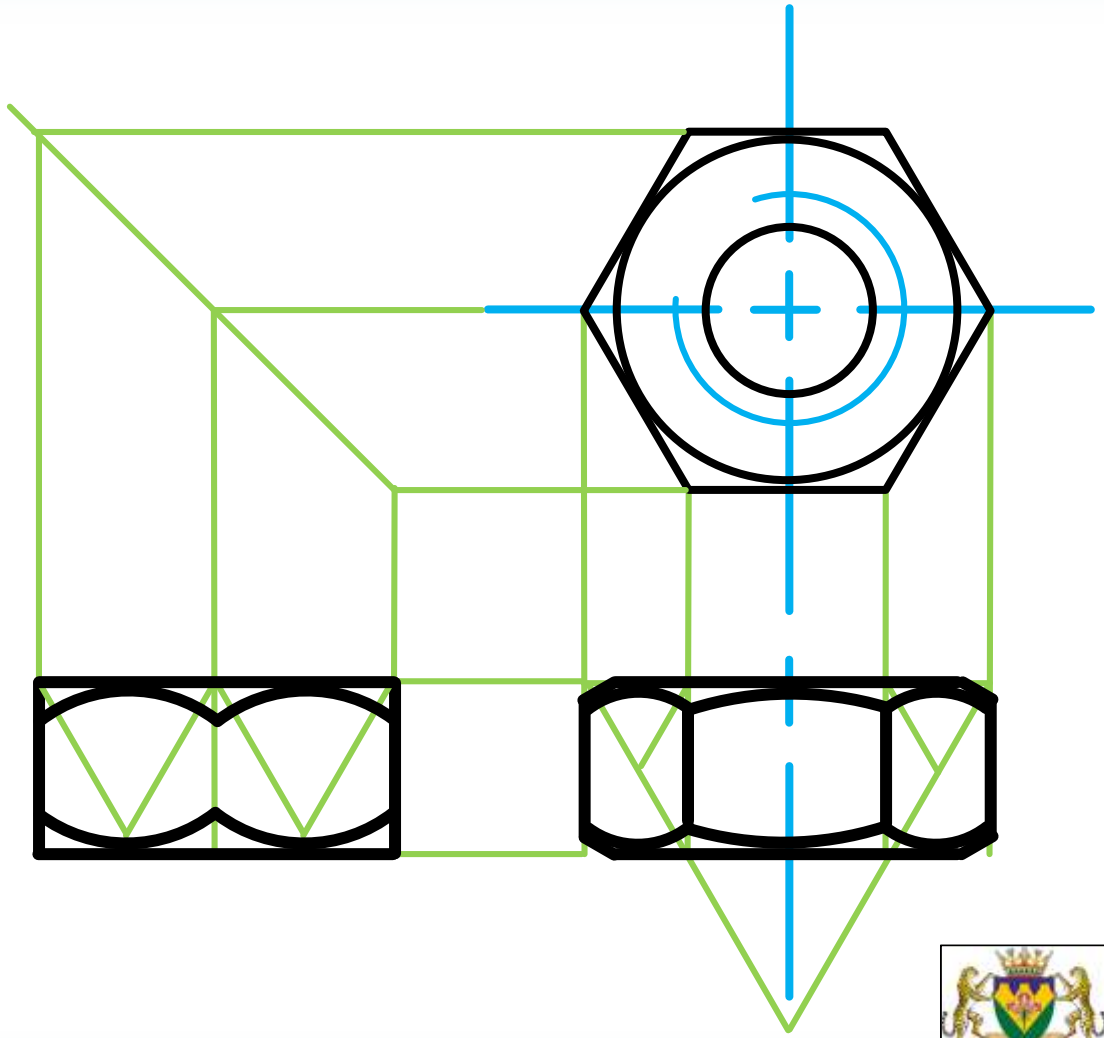




Construction of a NUT

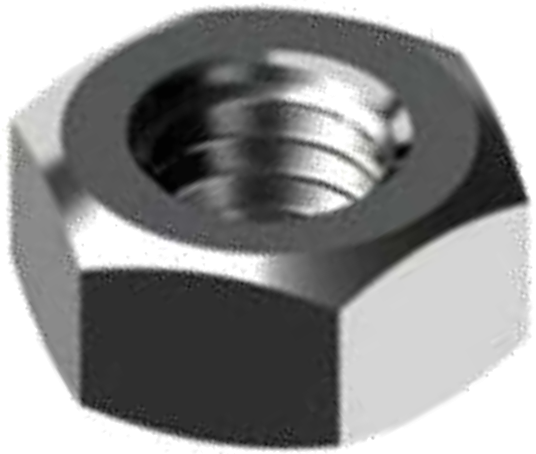
- Construct the lower arcs.

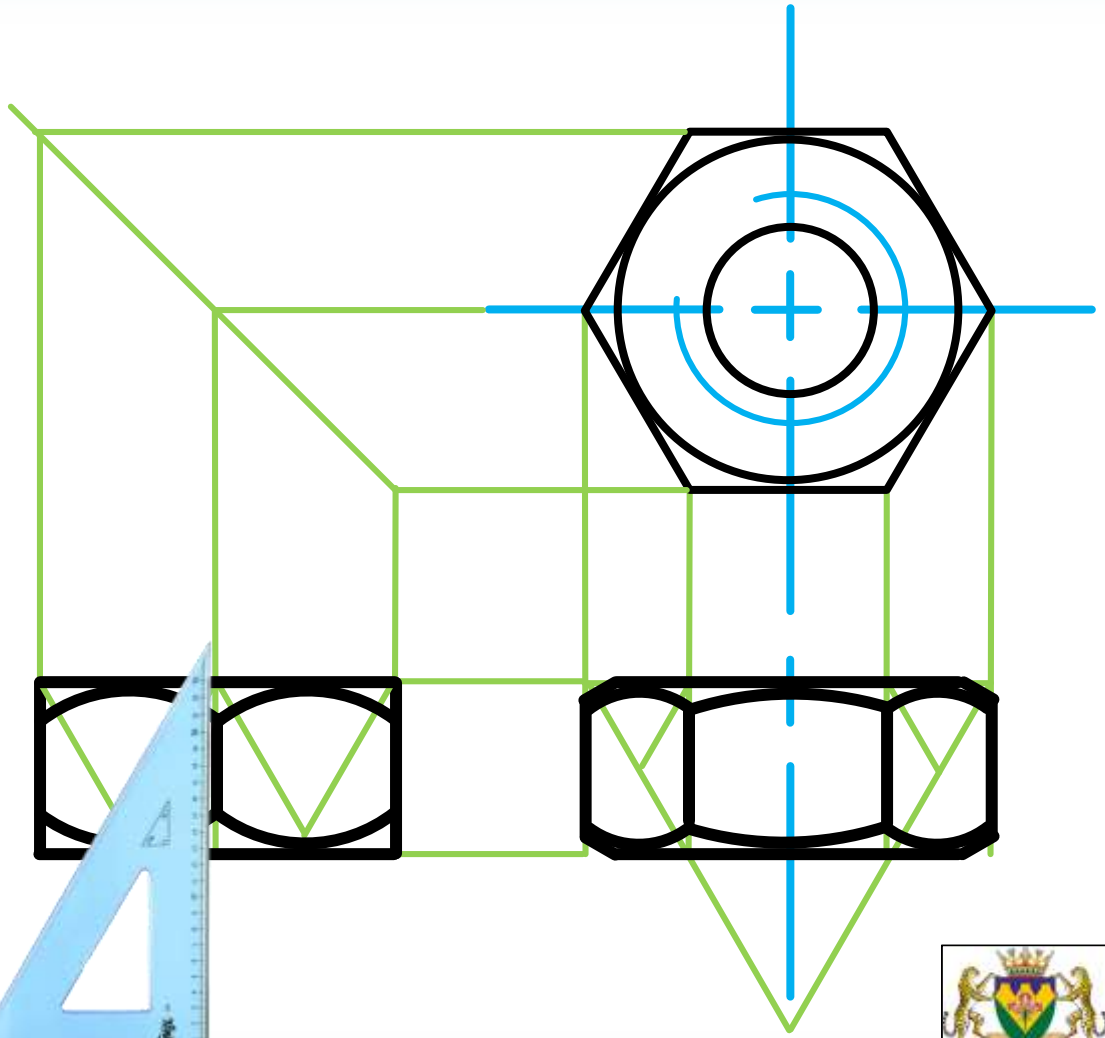




Construction of a NUT

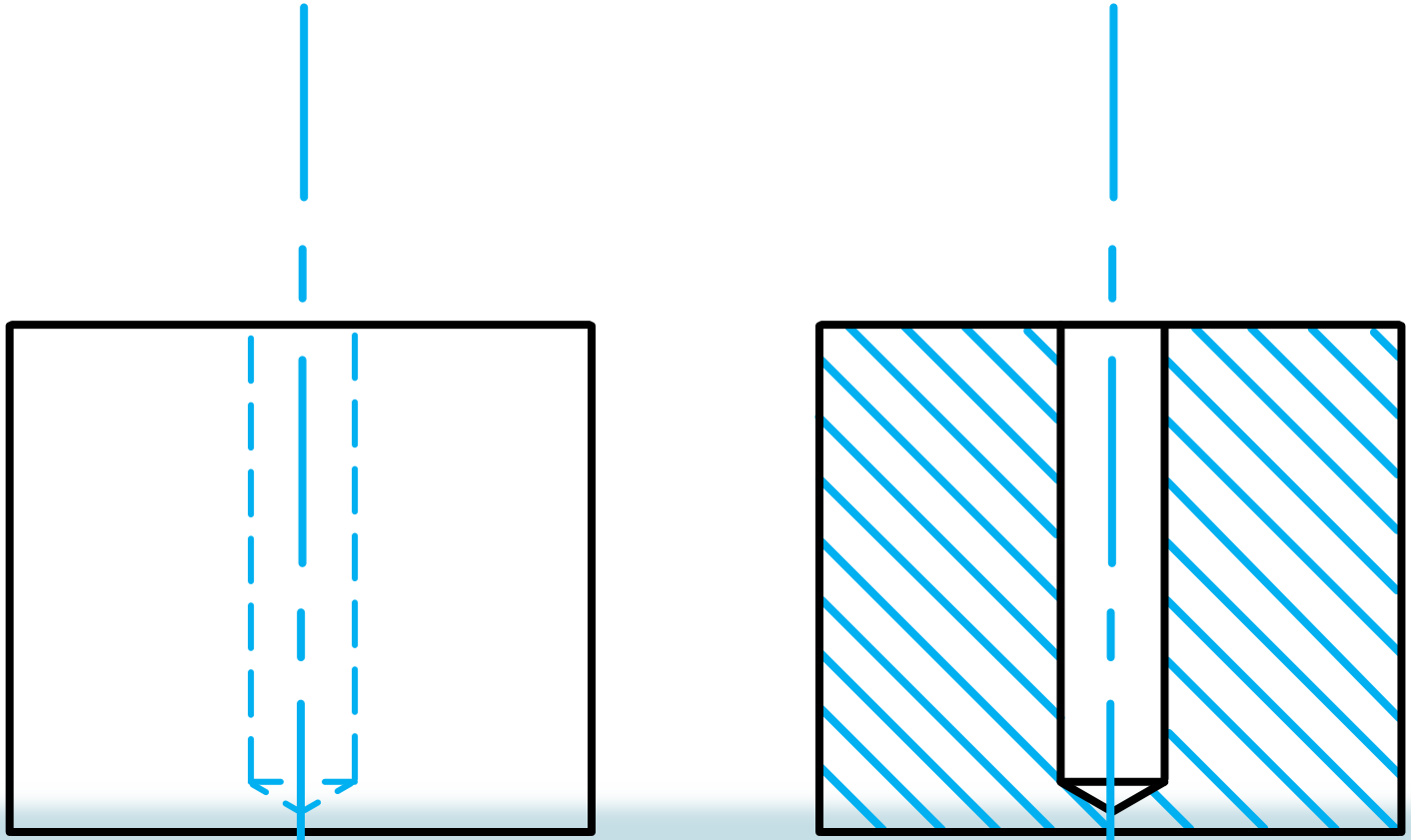
- Compete the nut.





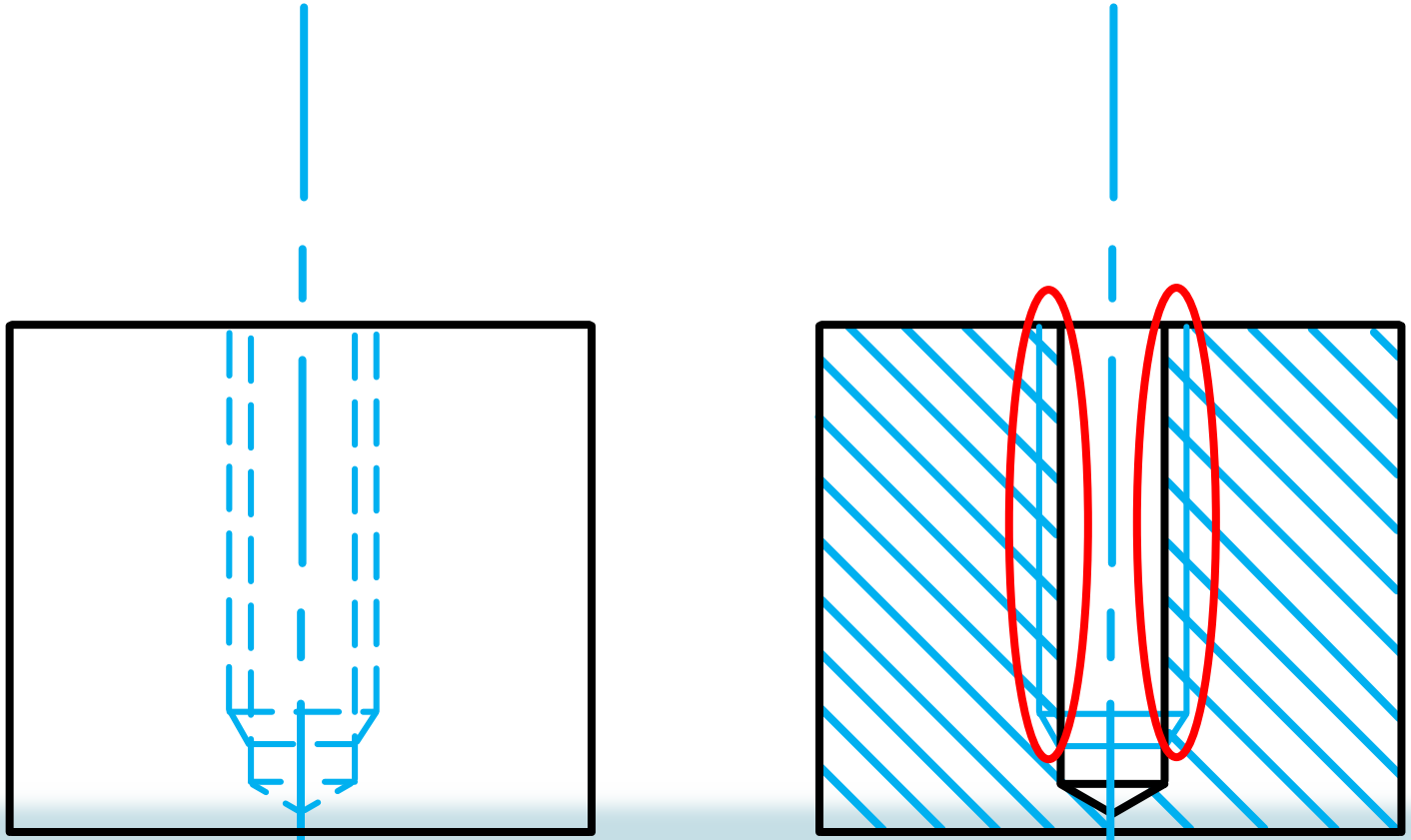
Mechanical Drawings (sectioning)

- Hatching of an internal hole.



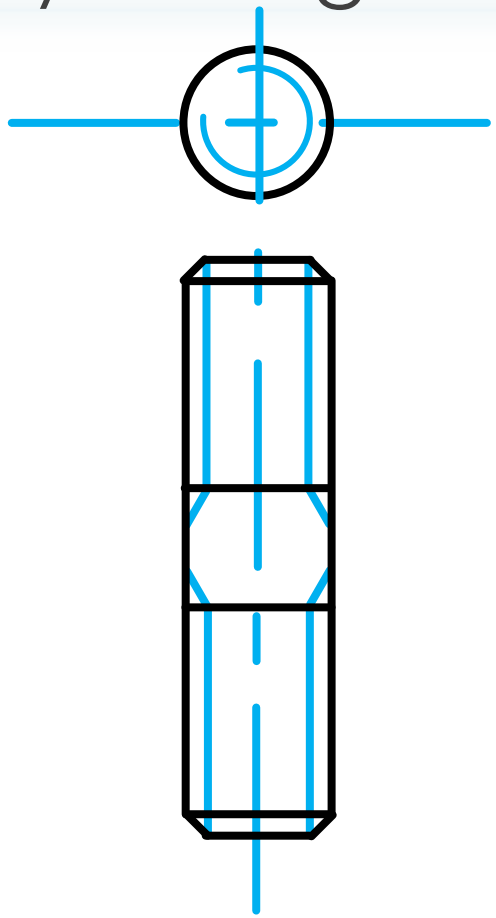
Mechanical Drawings (sectioning)

- Hatching of an internal hole with threat.



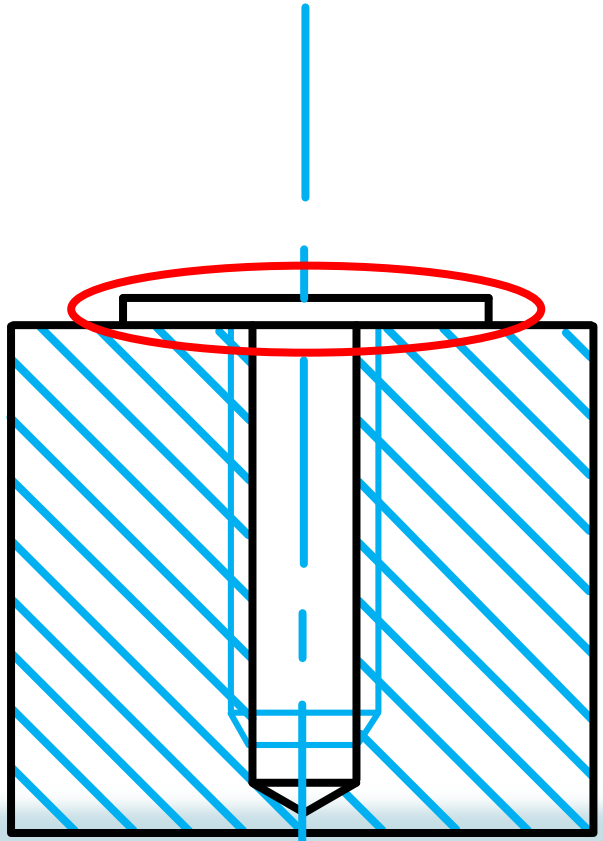
Mechanical Drawings (sectioning)

- **Studs** may **not** be sectioned when the cutting plane passes longitudinally through them.



Mechanical Drawings (sectioning)

- **Washers** may **not** be sectioned when the cutting plane passes longitudinally through them.



Mechanical Drawings (sectioning)

- Hatching an internal hole including a threat, washer, nut and a stud.