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Principles of Mechanical Drawings – CONSTRUCTION OF A BOLT OR STUD

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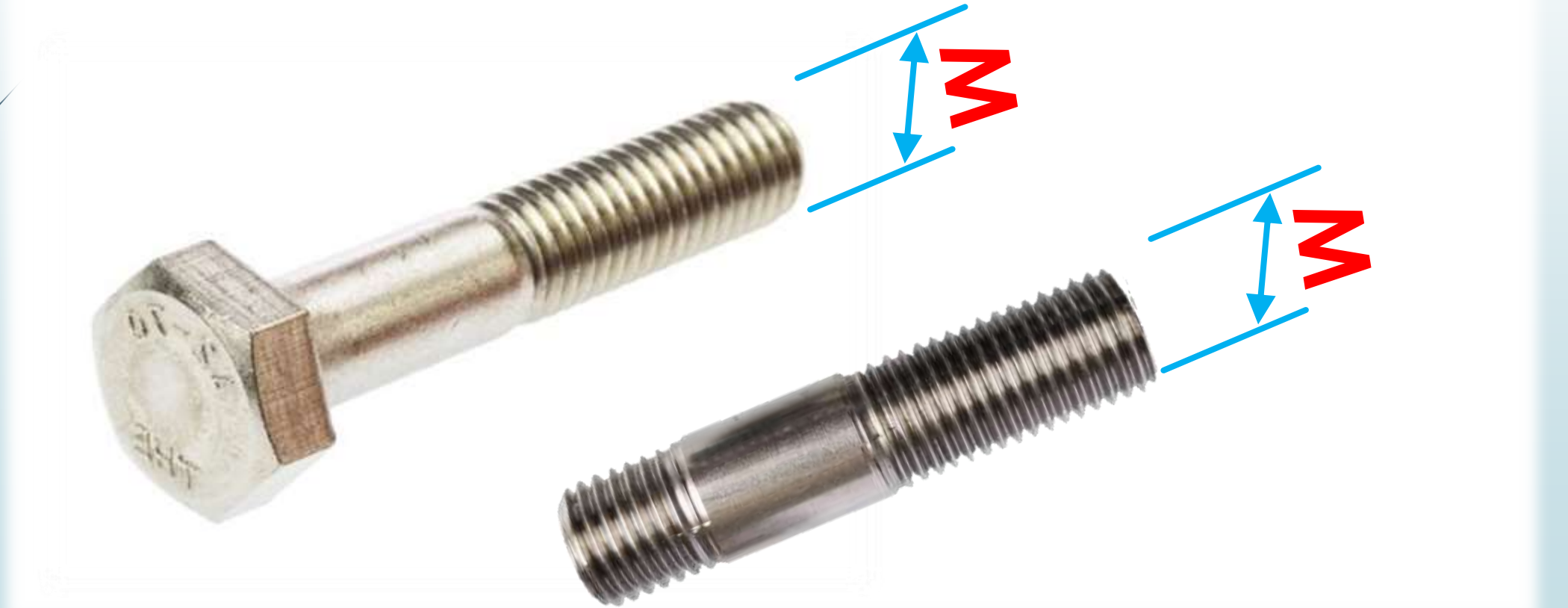
Senior Educational Specialist for
Engineering Graphics and Design
Free State Province

Construction of a BOLT

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

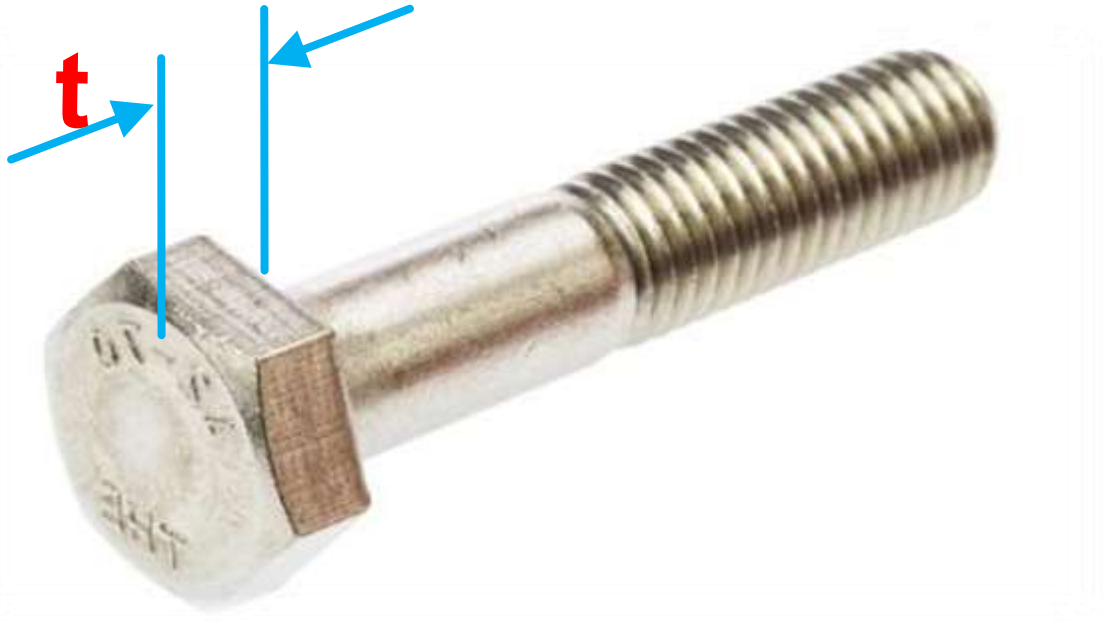


Construction of a BOLT

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

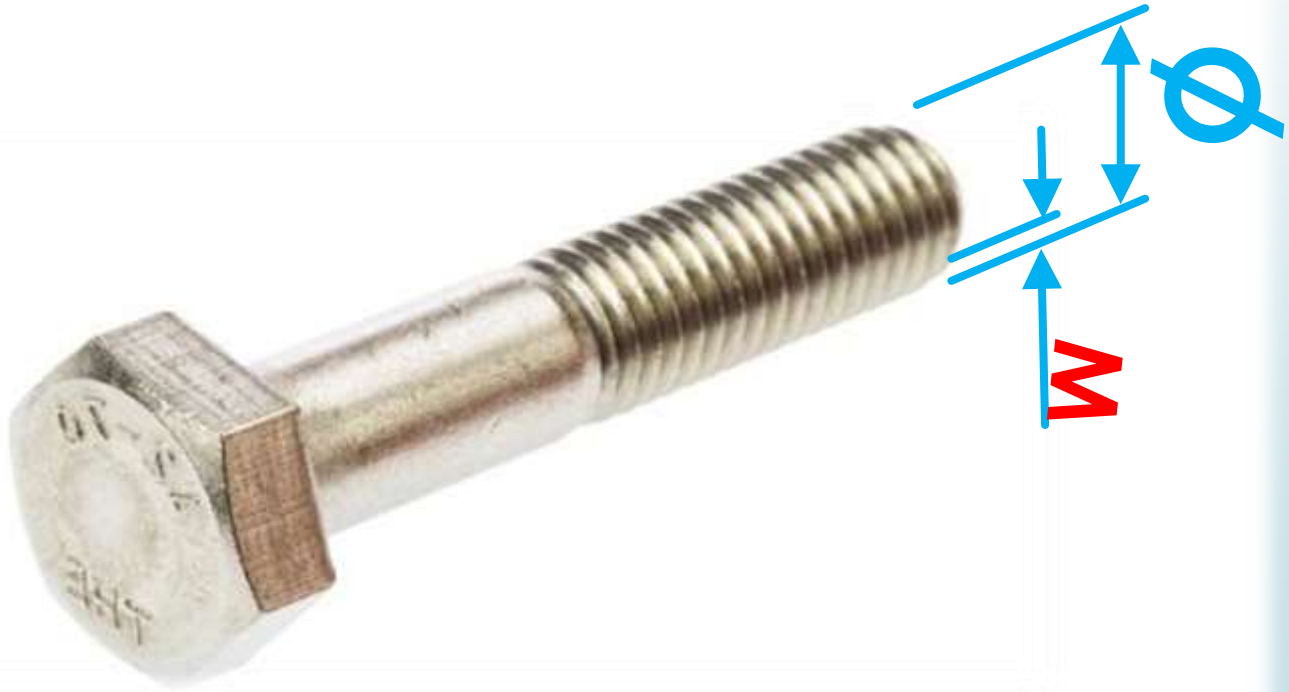
Construction of a BOLT

- General terminology
  - **THICKNESS OF THE BOLT (t)**
  - The thickness of the **bolt (t)** will always be **0,7 of diameter**



Construction of a BOLT

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



Construction of a BOLT

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

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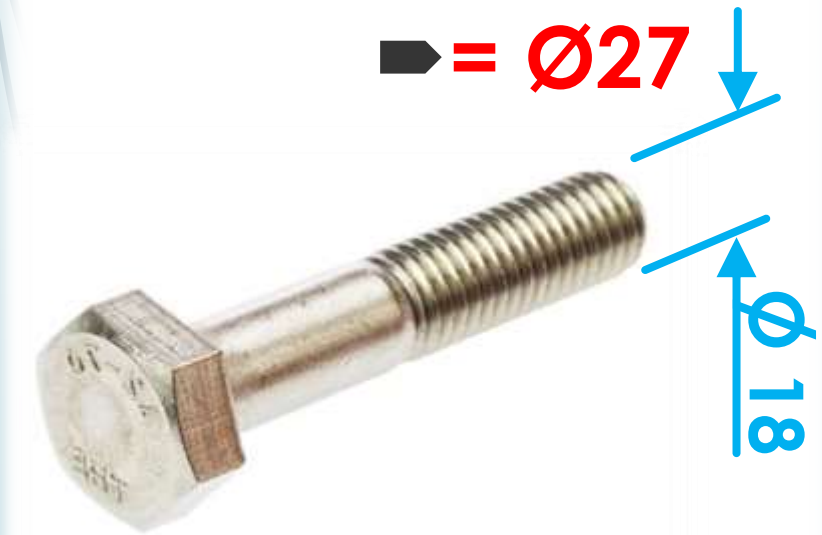
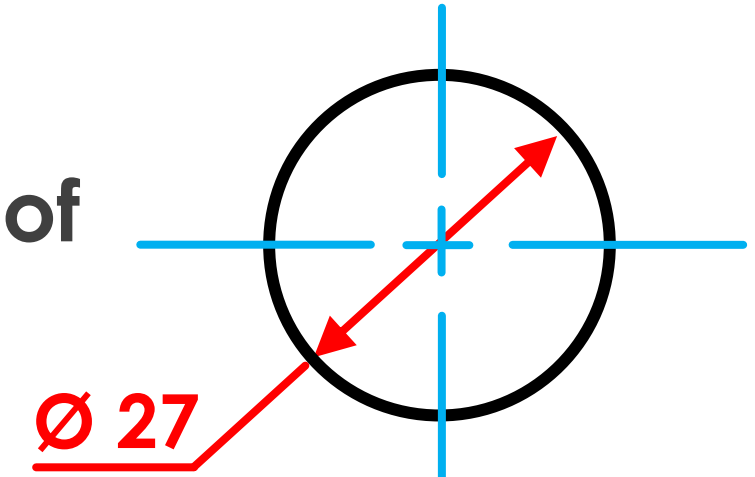
Construction of a BOLT

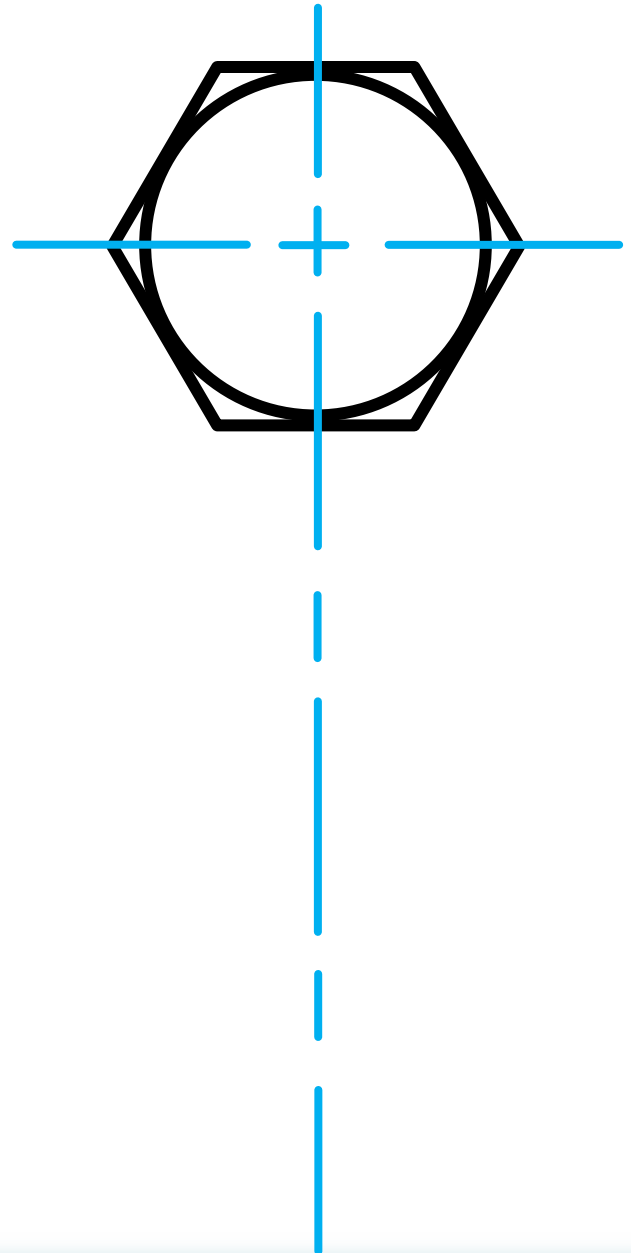
- Use diameter (18mm) to determine the across flat **(1,5 of M)** of the hexagon.
- **= M X scale factor**
- **= M18 X 1,5**
- **= Ø27**





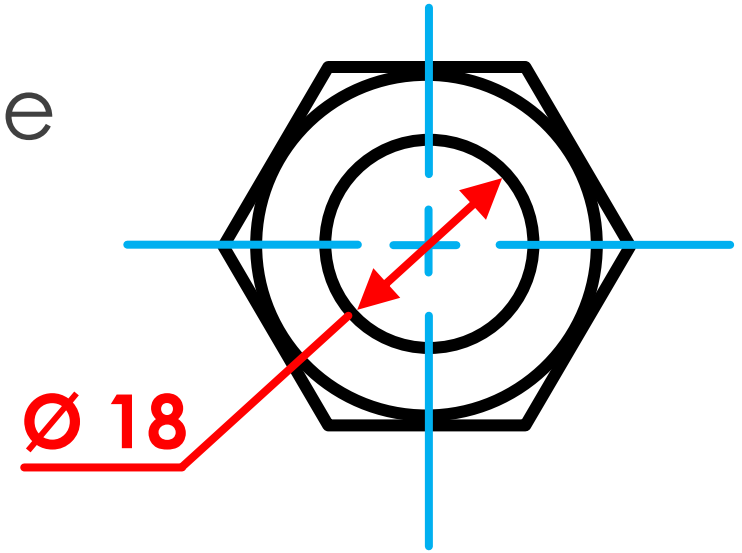
Construction of a BOLT

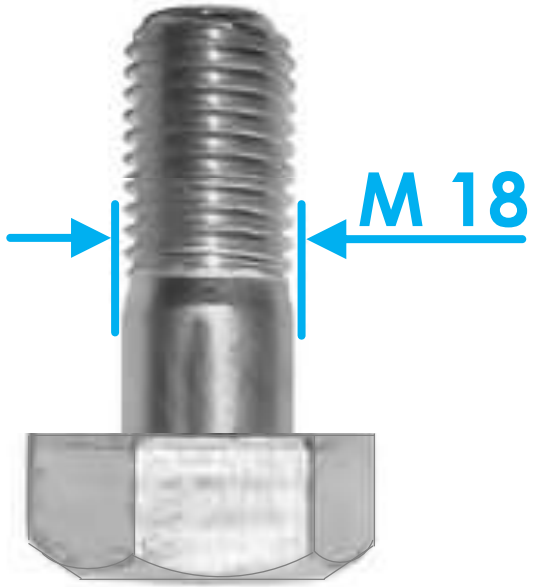
- Construct an external tangent hexagon around the circle to indicate the outer portion of the nut.



Construction of a BOLT

- Since the shaft diameter will be visible, indicate the **diameter (18mm)** by means of an circle (A-line type).





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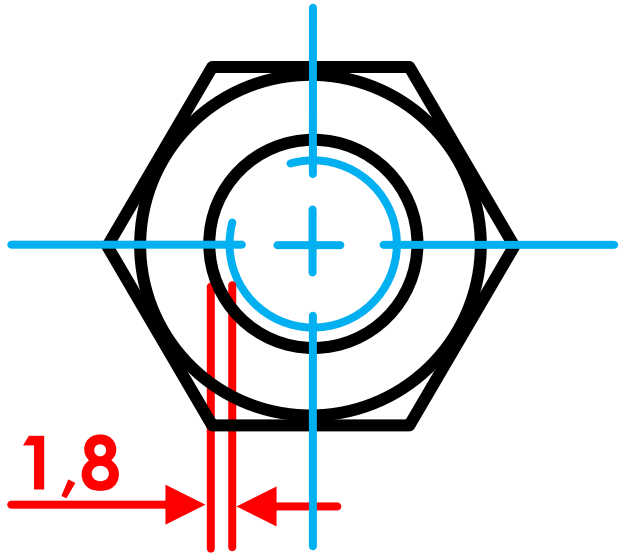
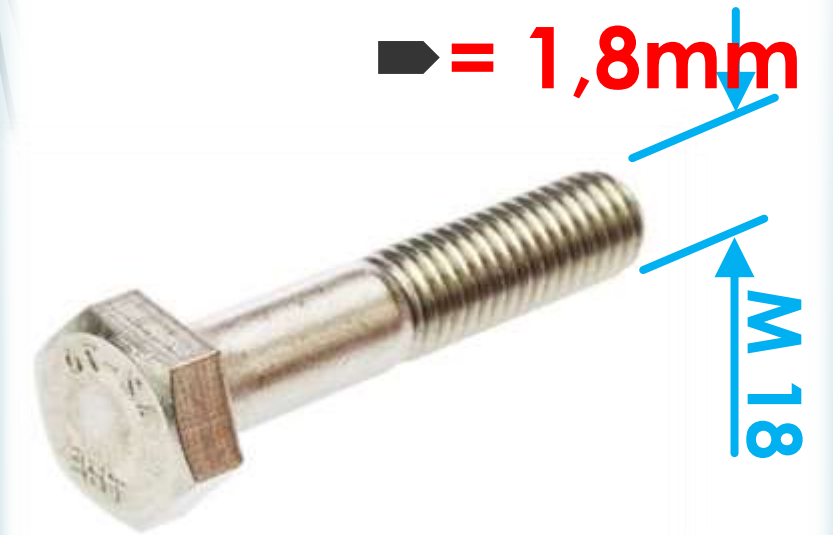
Construction of a BOLT

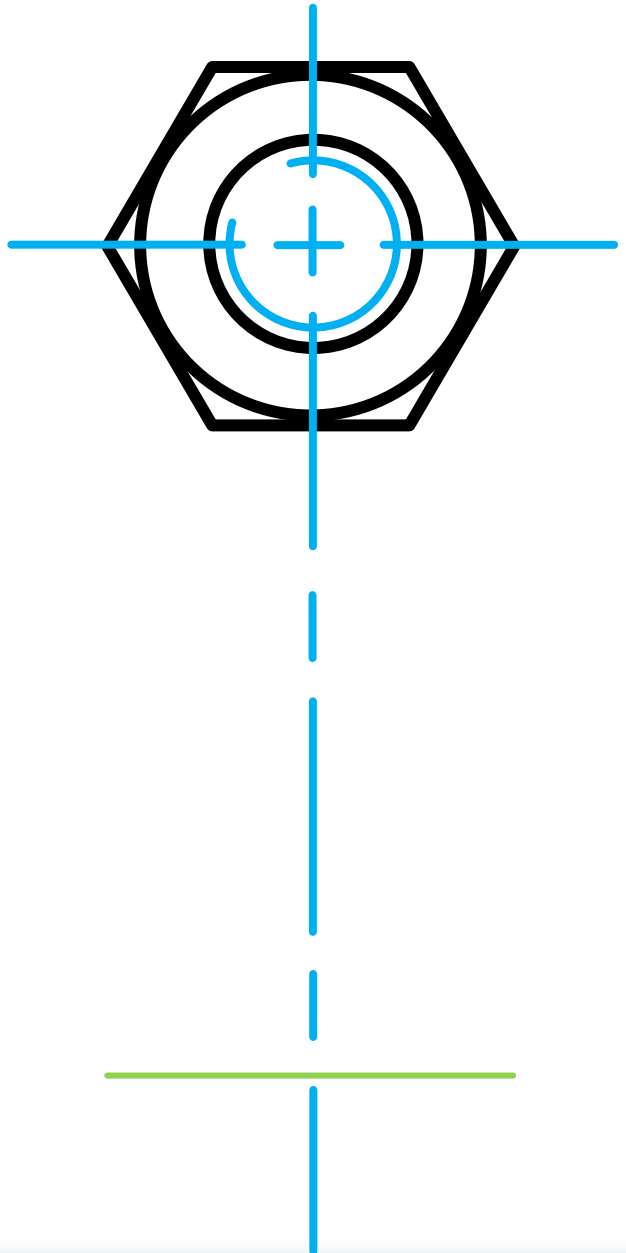
- Indicate the inner threat by means of a broken circle (B-line type).
- = **M X scale factor**
- = **M18 X 0,1**
- = **1,8mm**





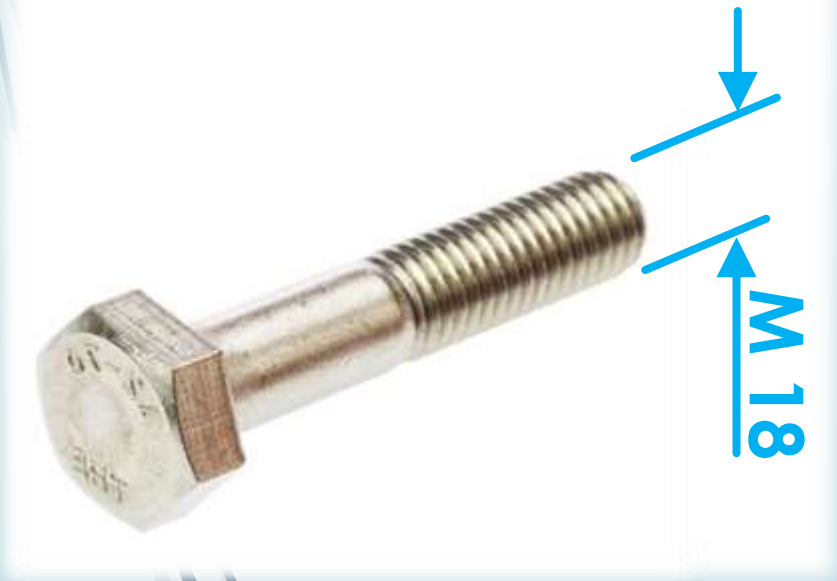
Construction of a BOLT

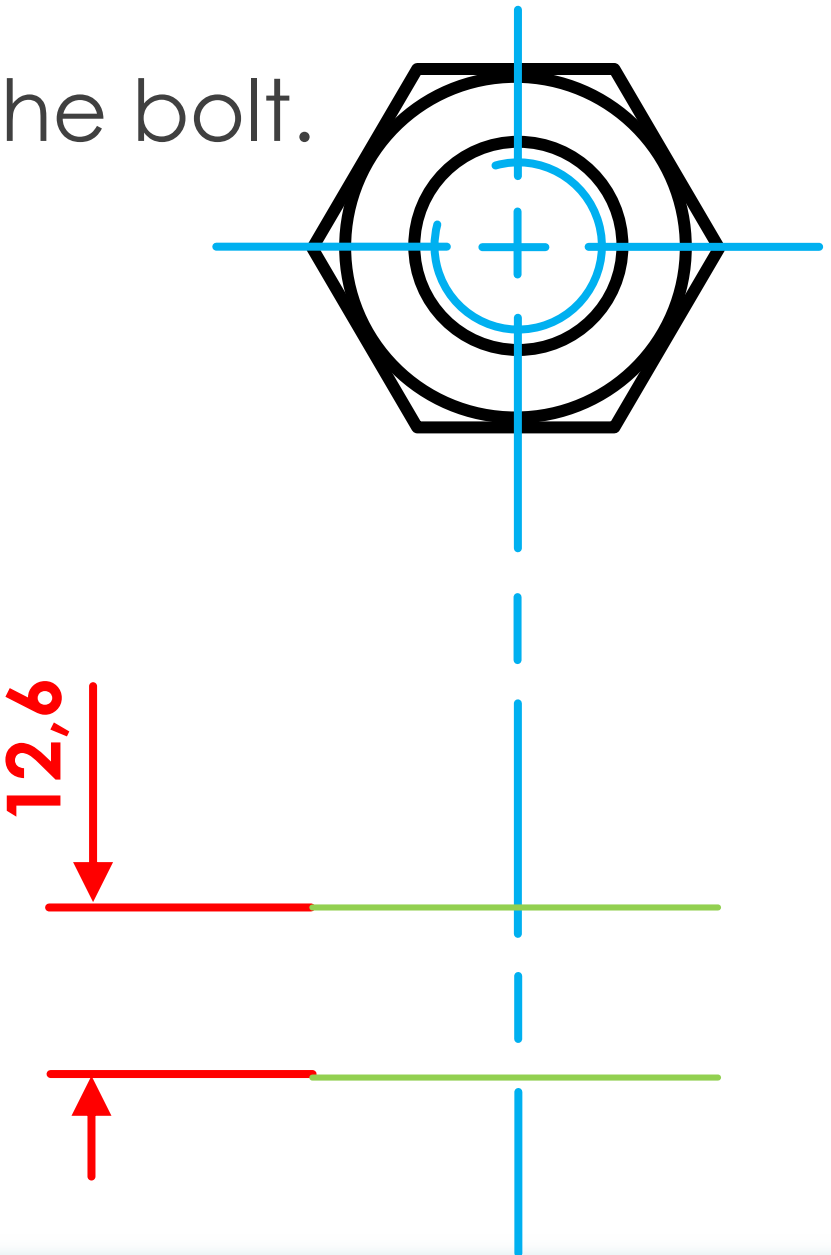
- Determine the front view start position of the nut.



Construction of a BOLT

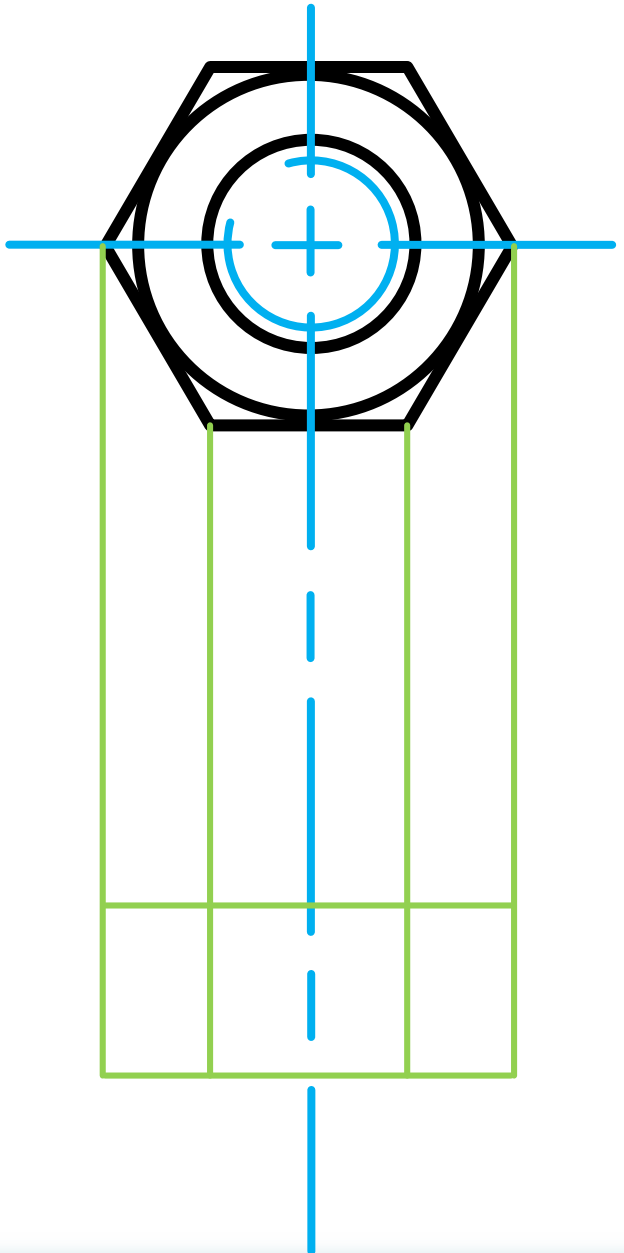
- Determine the thickness of the bolt.
- = **M X Scale factor**
- = **M18 X 0,7**
- = **12,6**





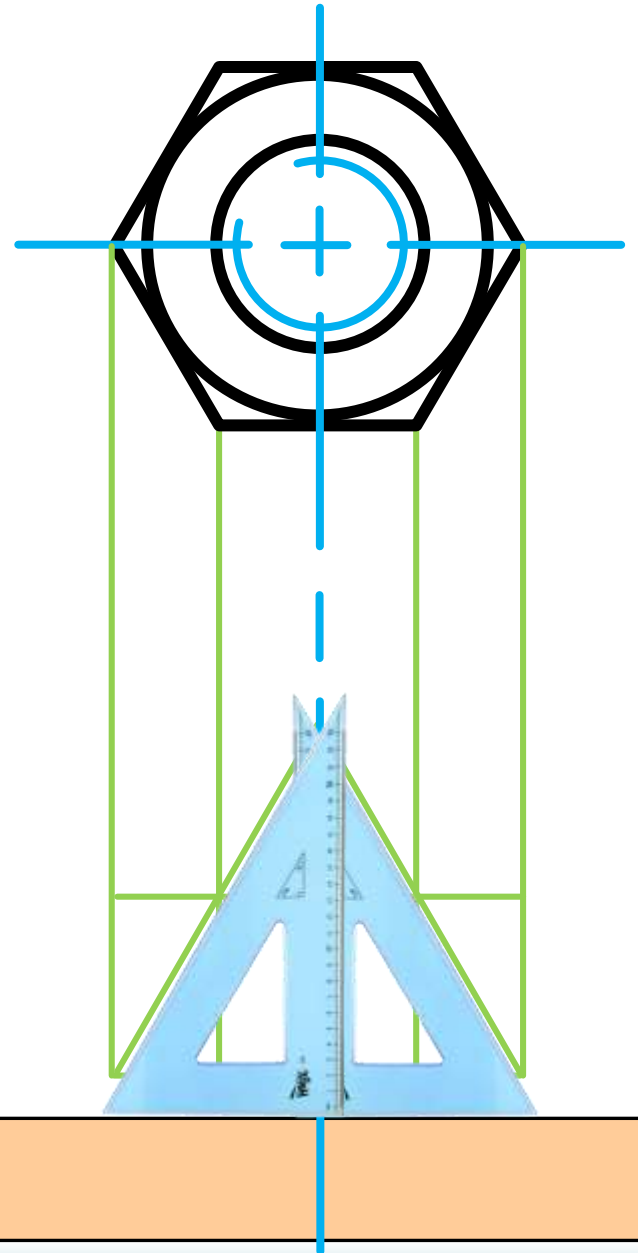
Construction of a BOLT

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



Construction of a BOLT

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



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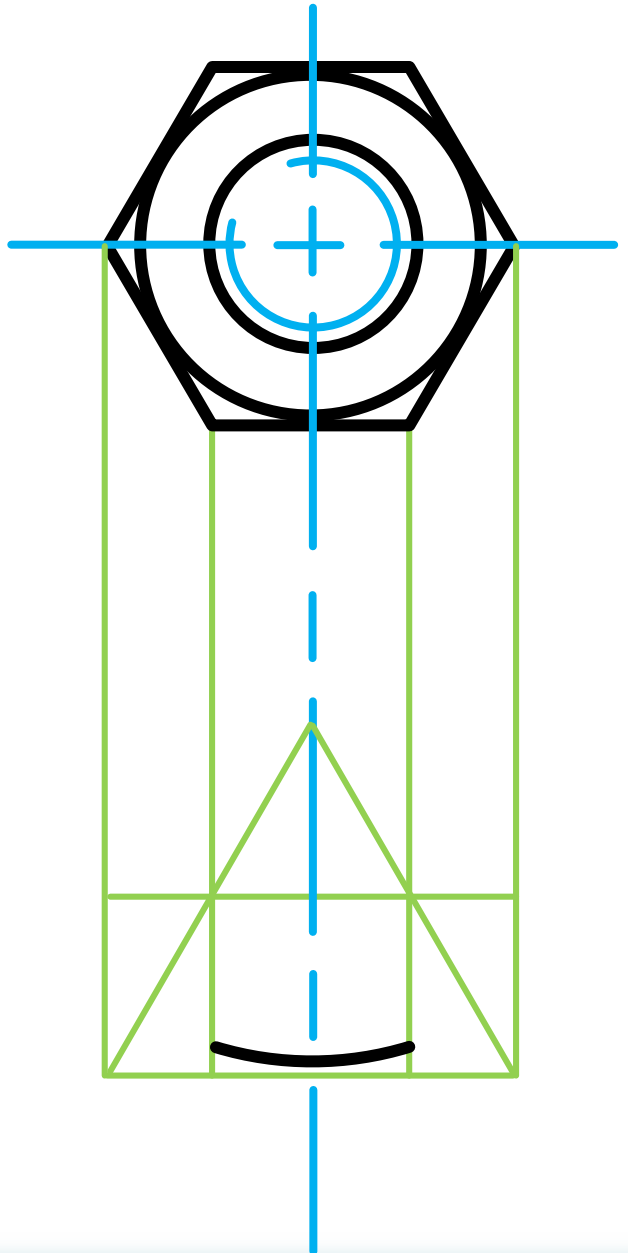
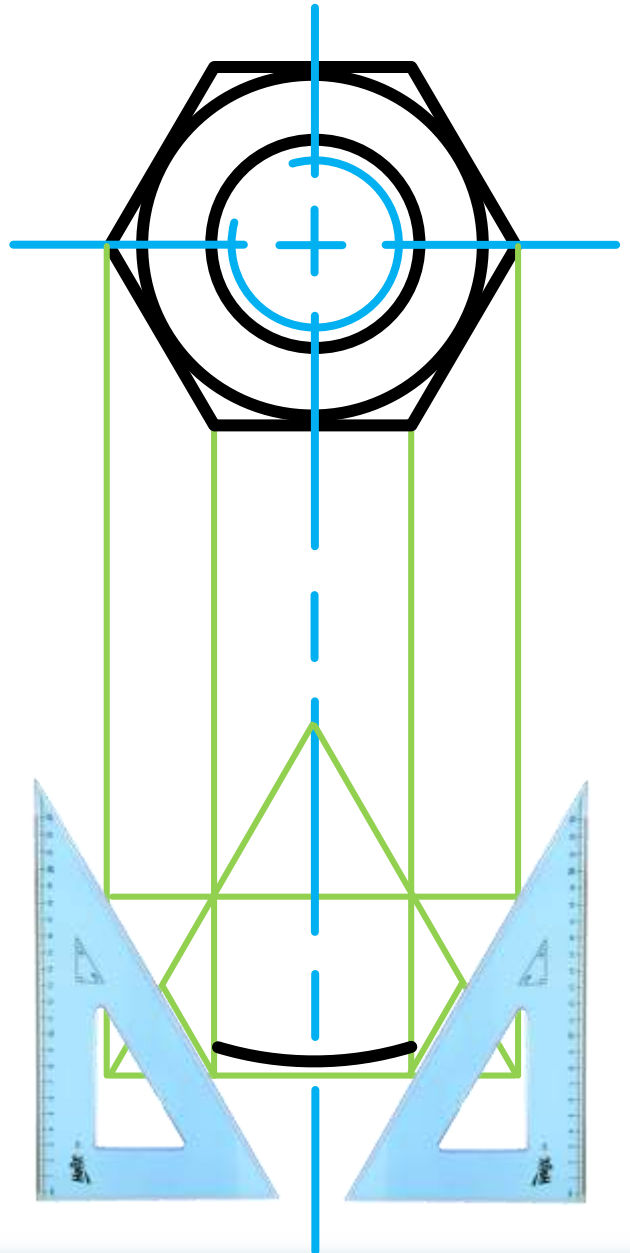
Construction of a BOLT

- Construct the centre arc.



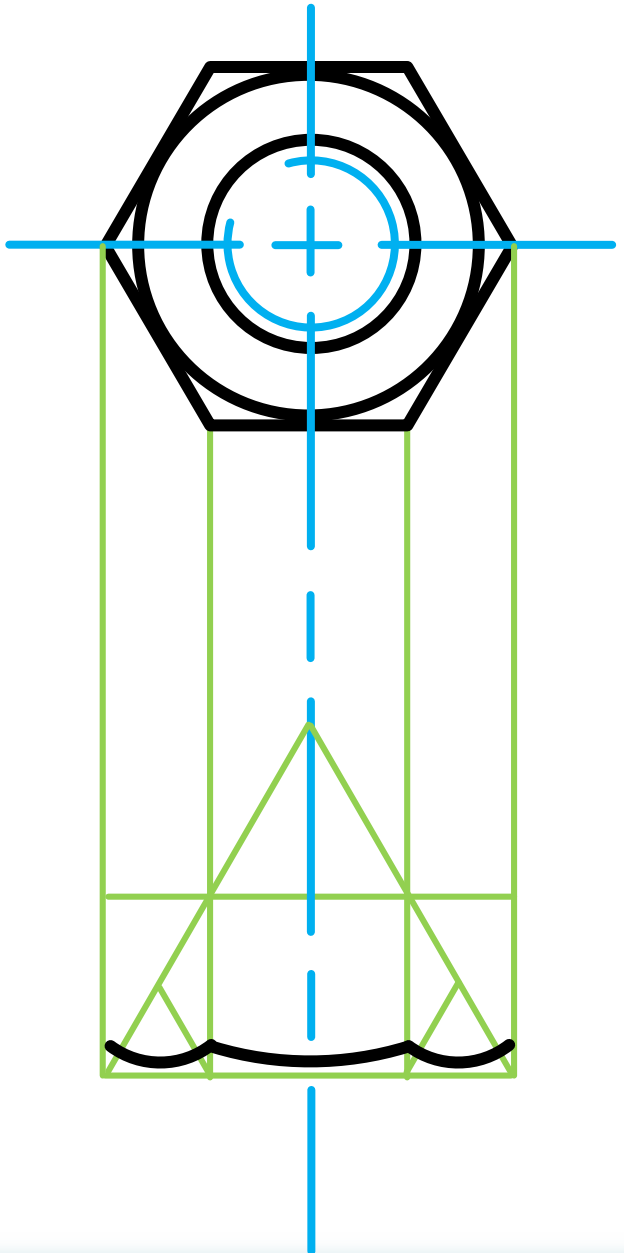
Construction of a BOLT

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



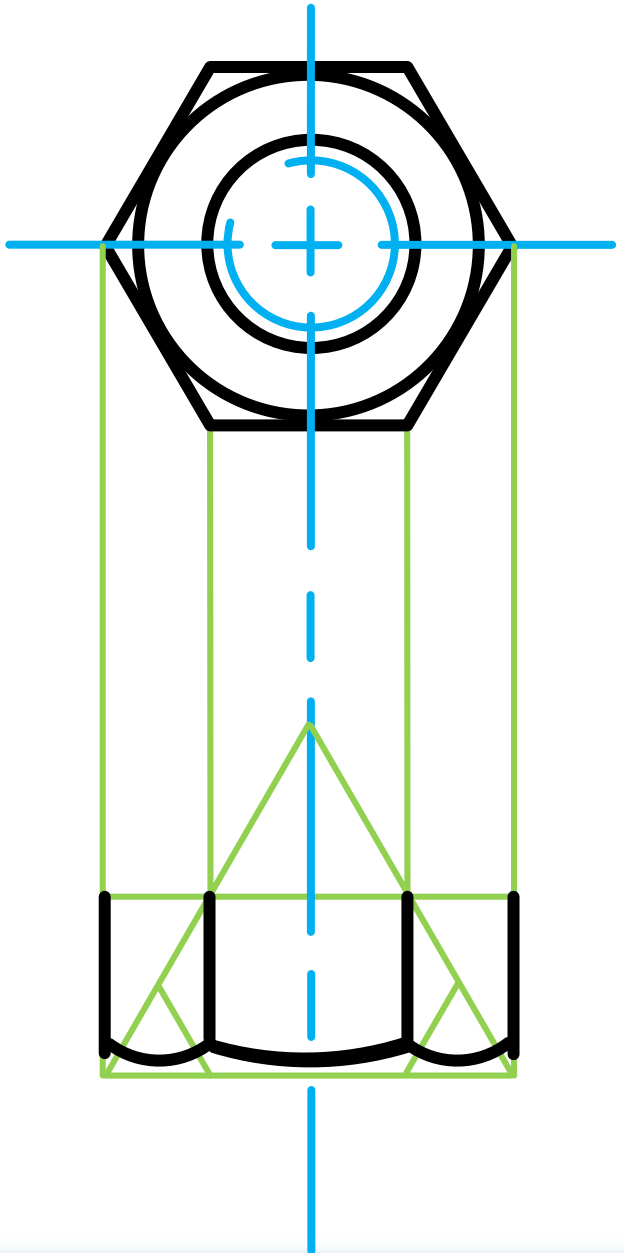
Construction of a BOLT

- Construct the smaller arcs.



Construction of a BOLT

- Join the endpoints of each arc with the opposite bolt bed.



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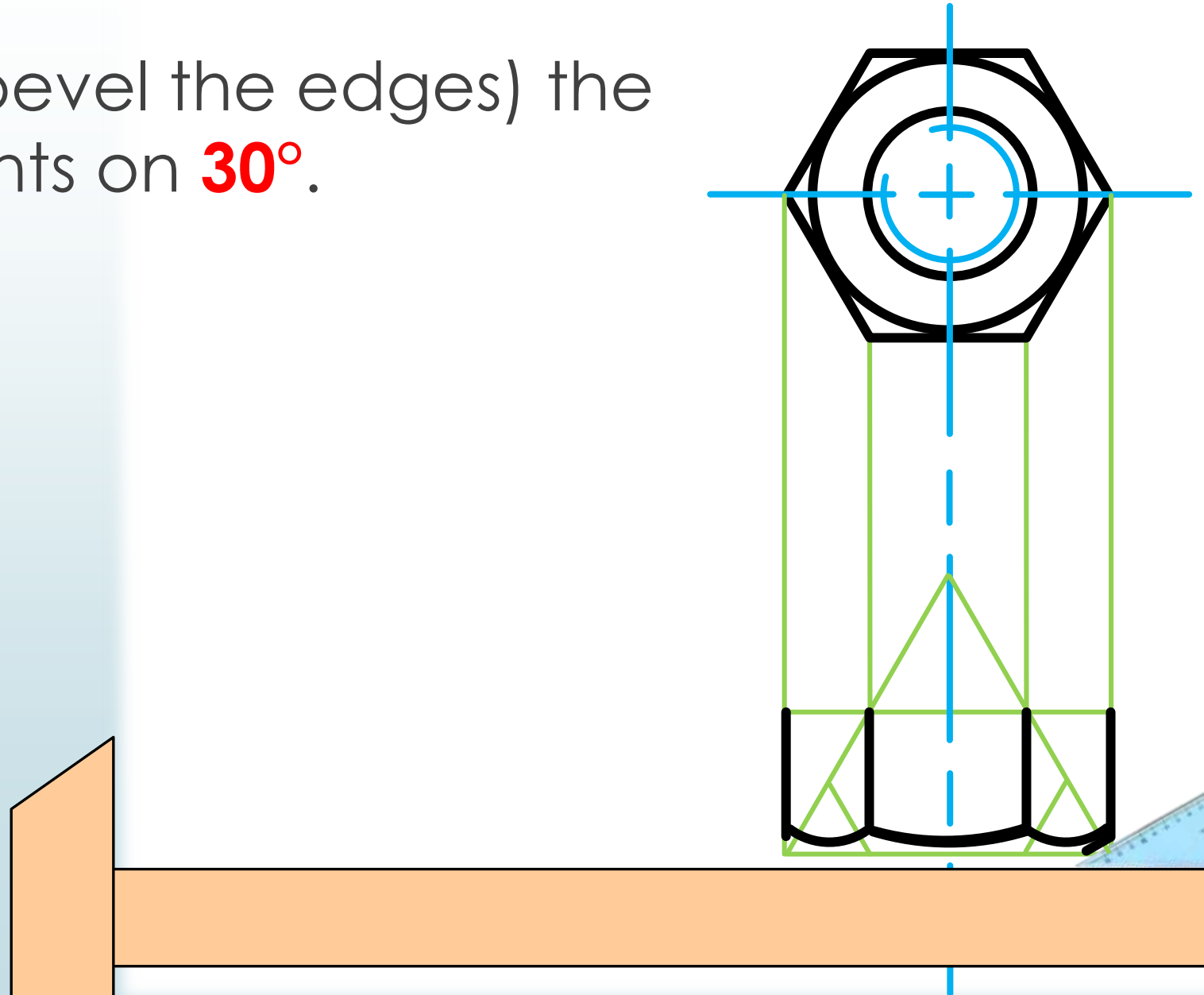
Construction of a BOLT

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



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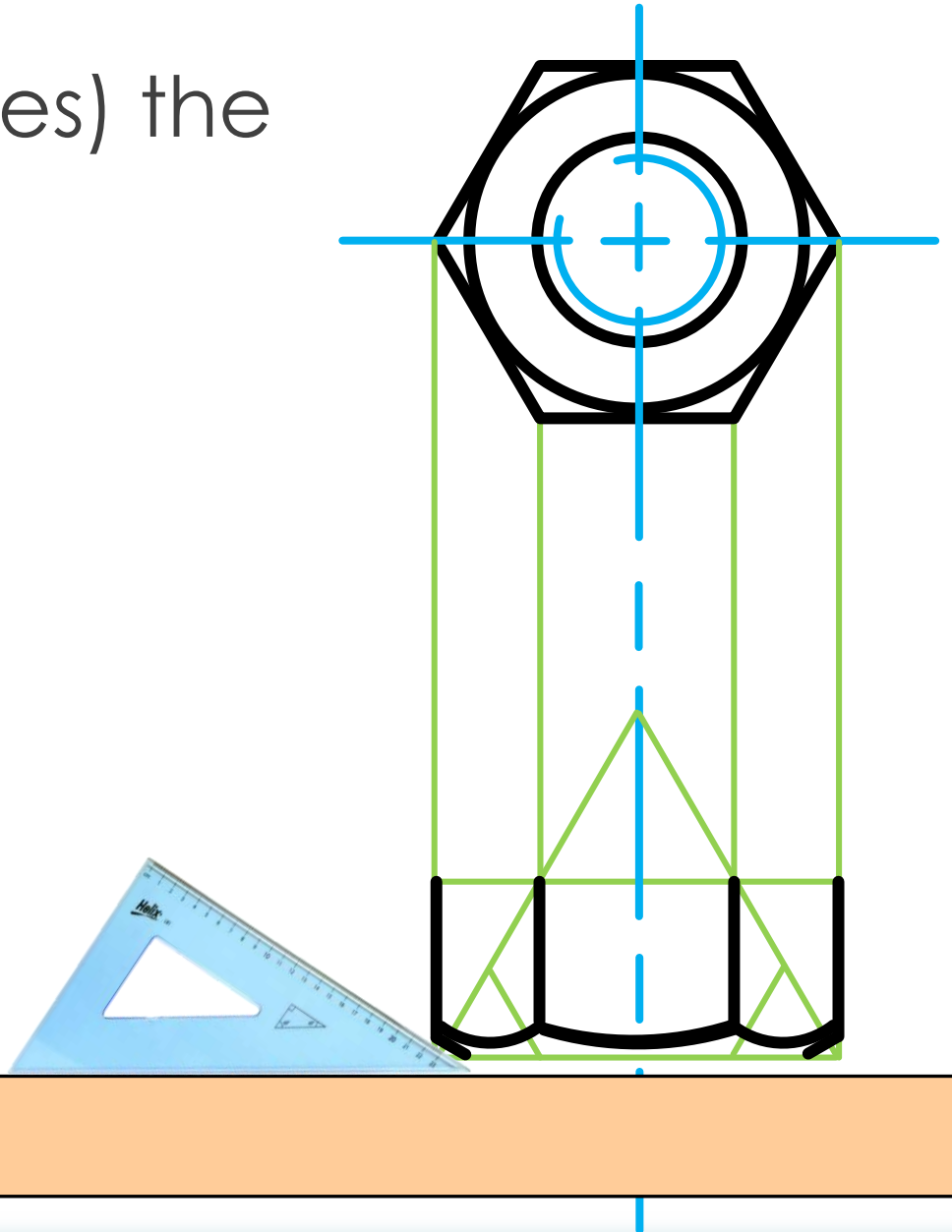
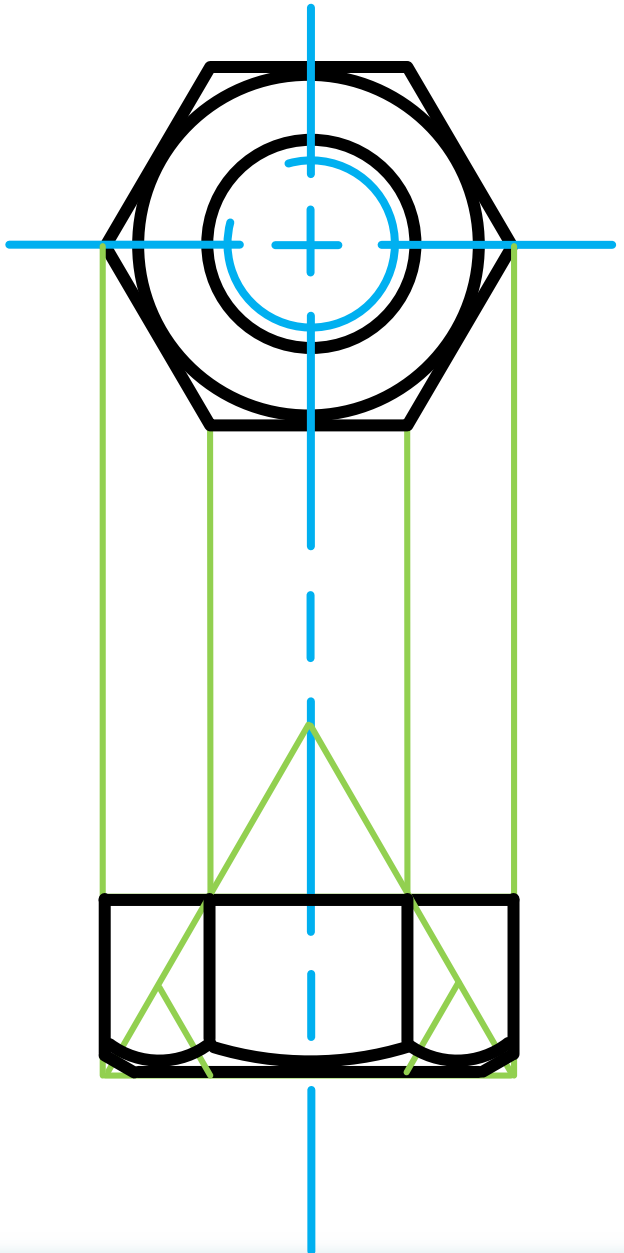
Construction of a BOLT

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



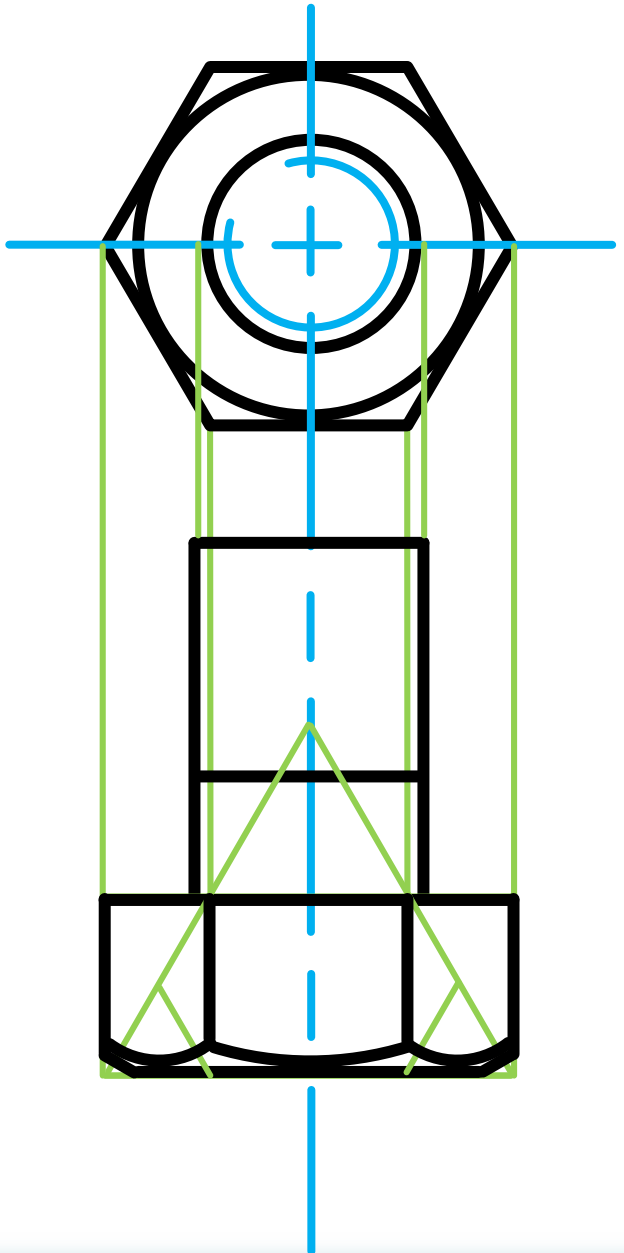
Construction of a BOLT

- Complete the shaft the bolt.



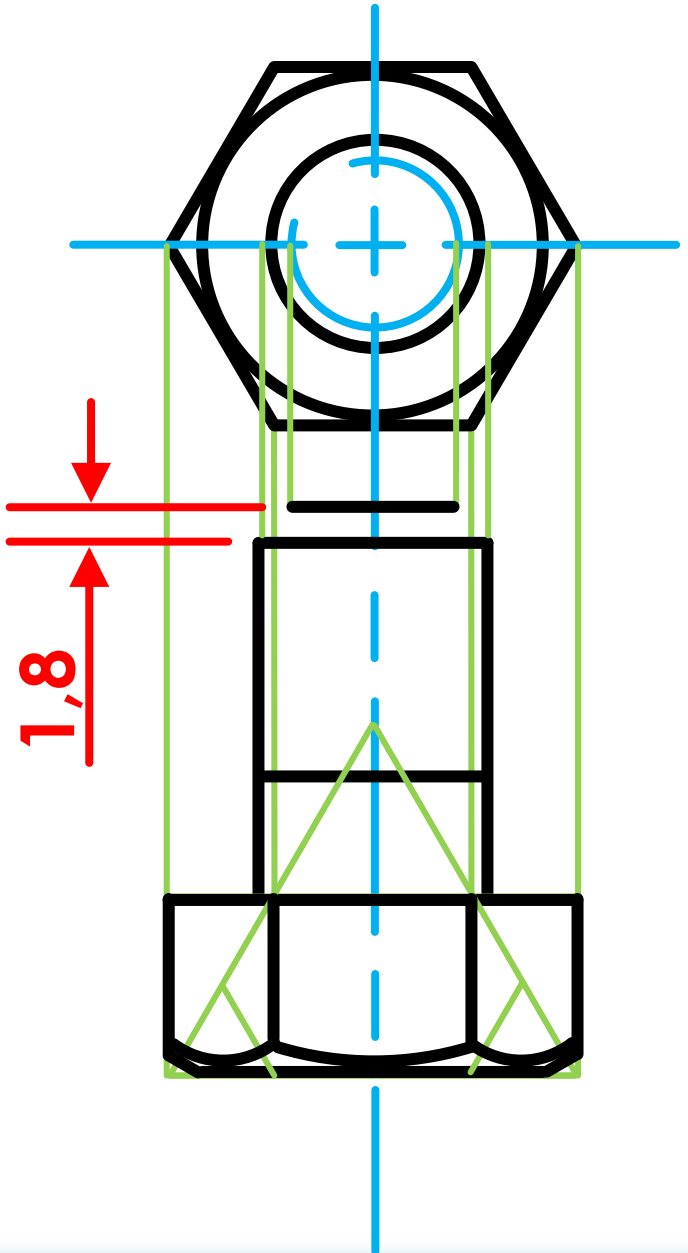
Construction of a BOLT

- Complete the shaft of the bolt.



Construction of a BOLT

- Complete the shaft of the bolt.
- = M X scale factor
- = M18 X 0,1
- = 1,8mm



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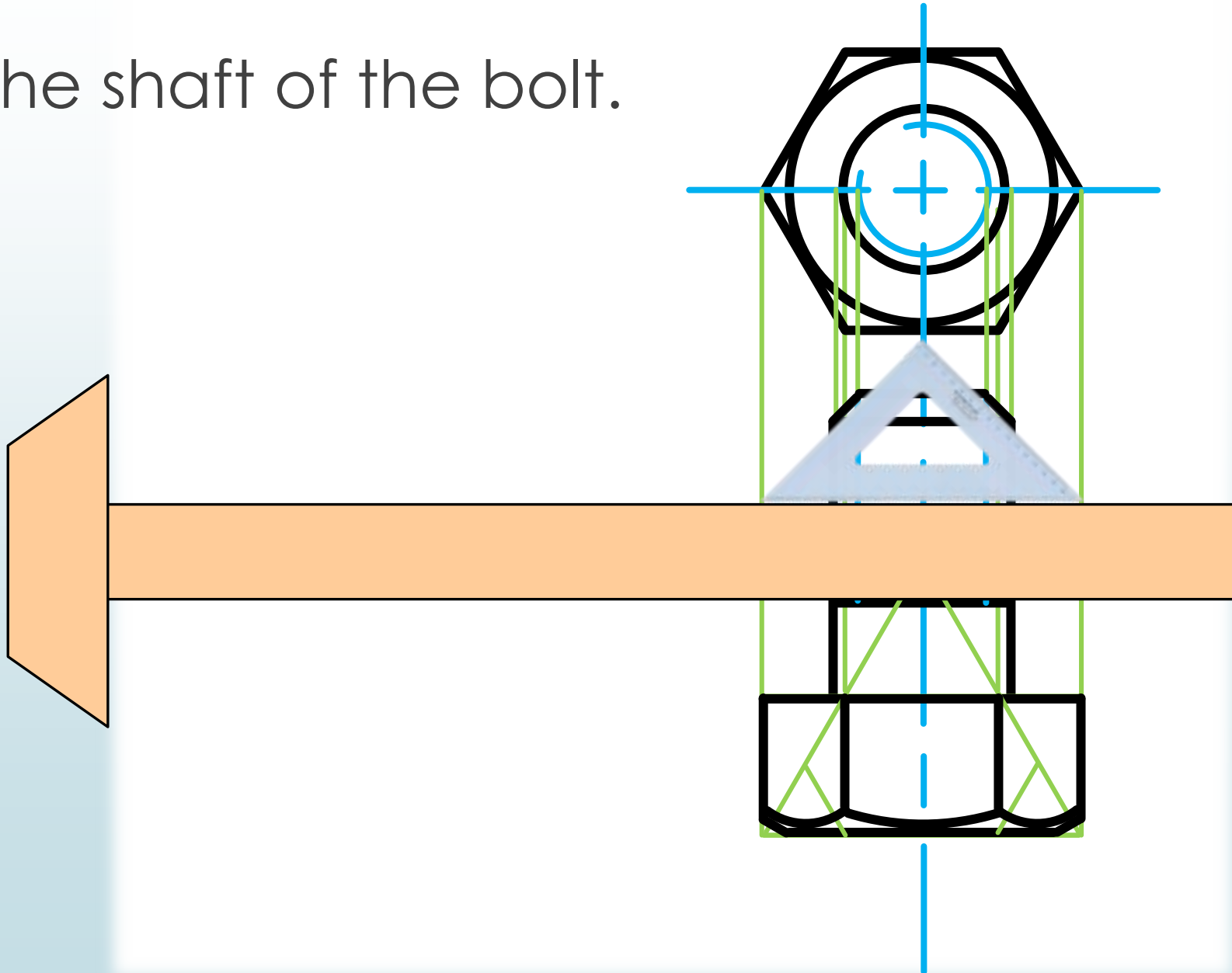
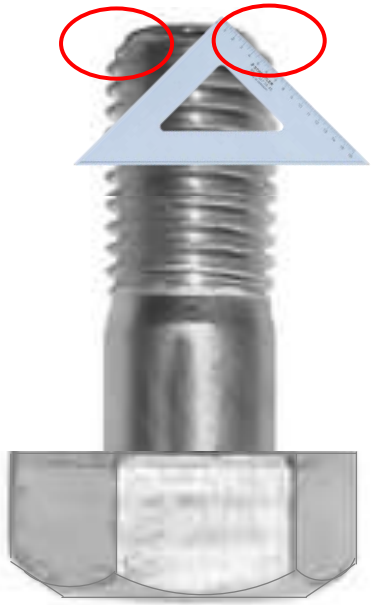
Construction of a BOLT

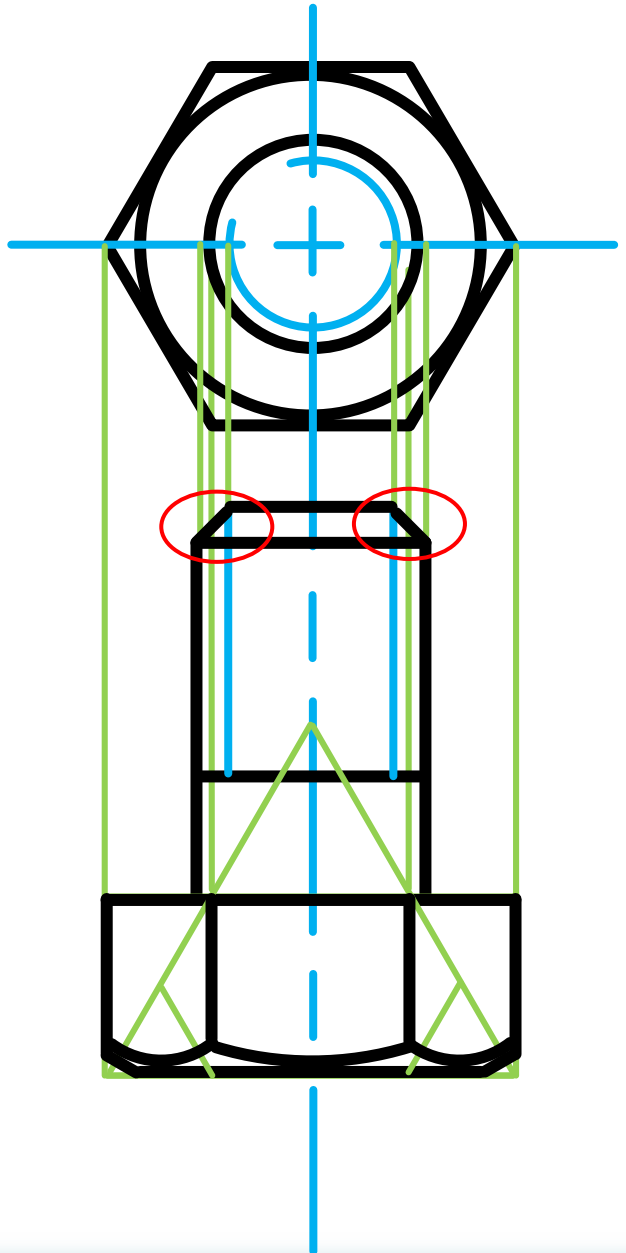
- Complete the shaft of the bolt.



Construction of a BOLT

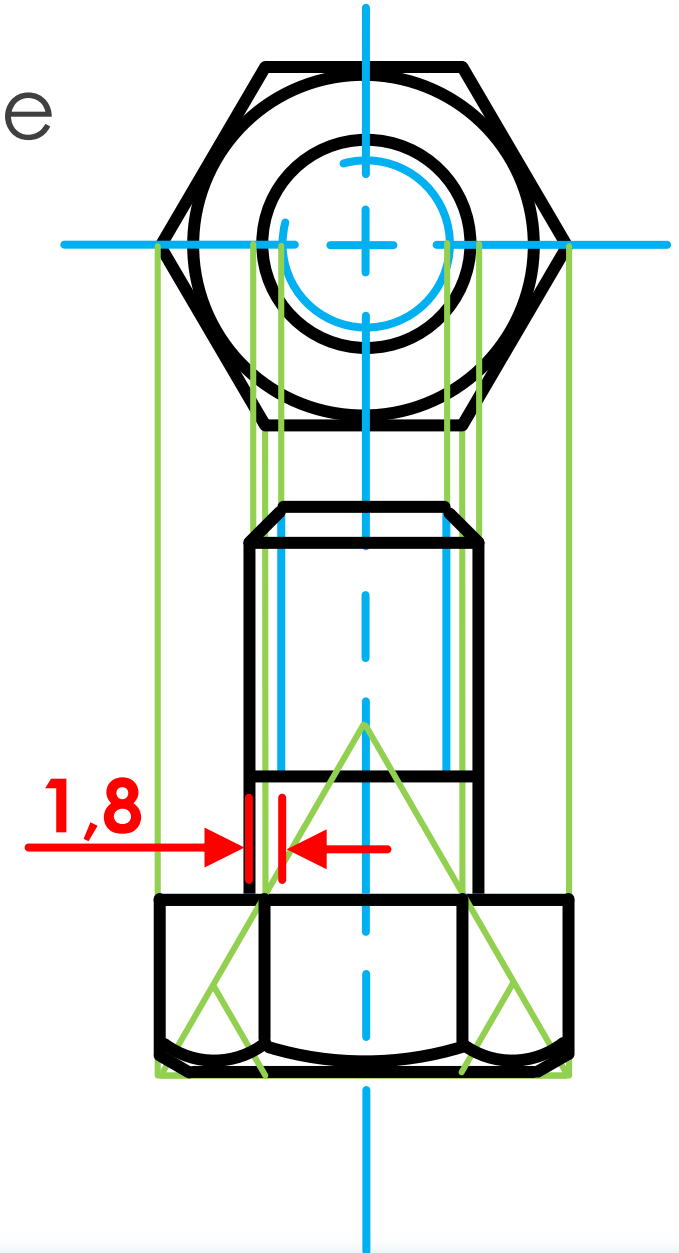
- Complete the shaft of the bolt.





Construction of a BOLT

- Complete the inner threat (B-line type).
- = M X scale factor
- = M18 X 0,1
- = 1,8mm



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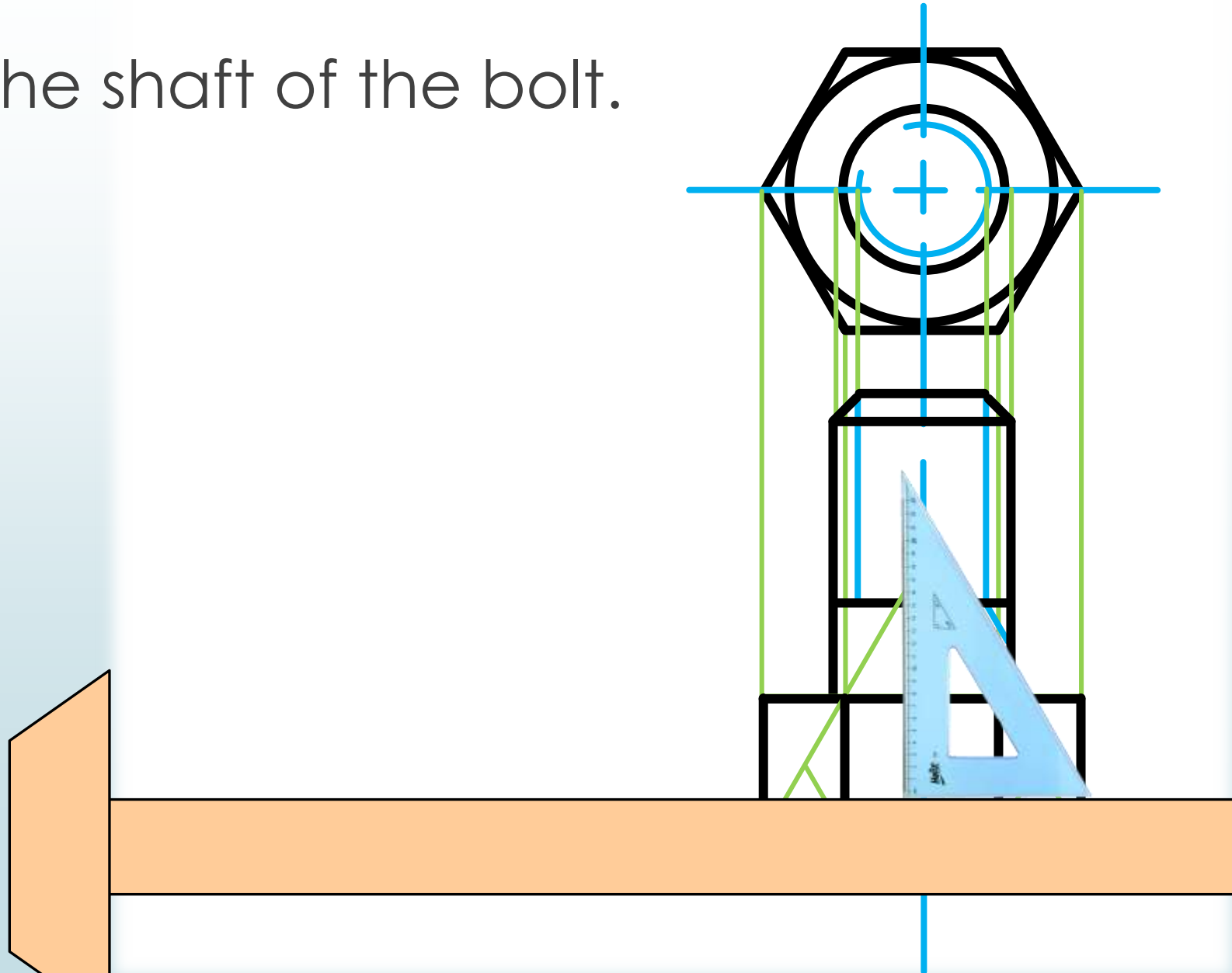
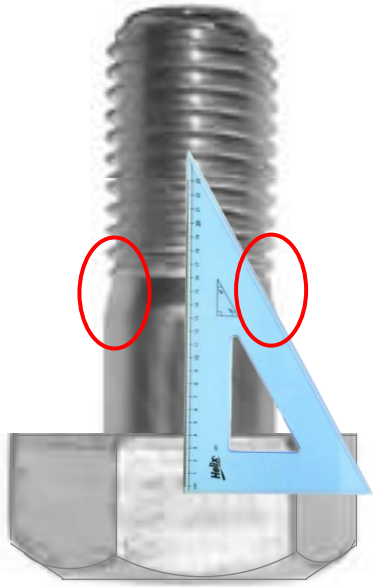
Construction of a BOLT

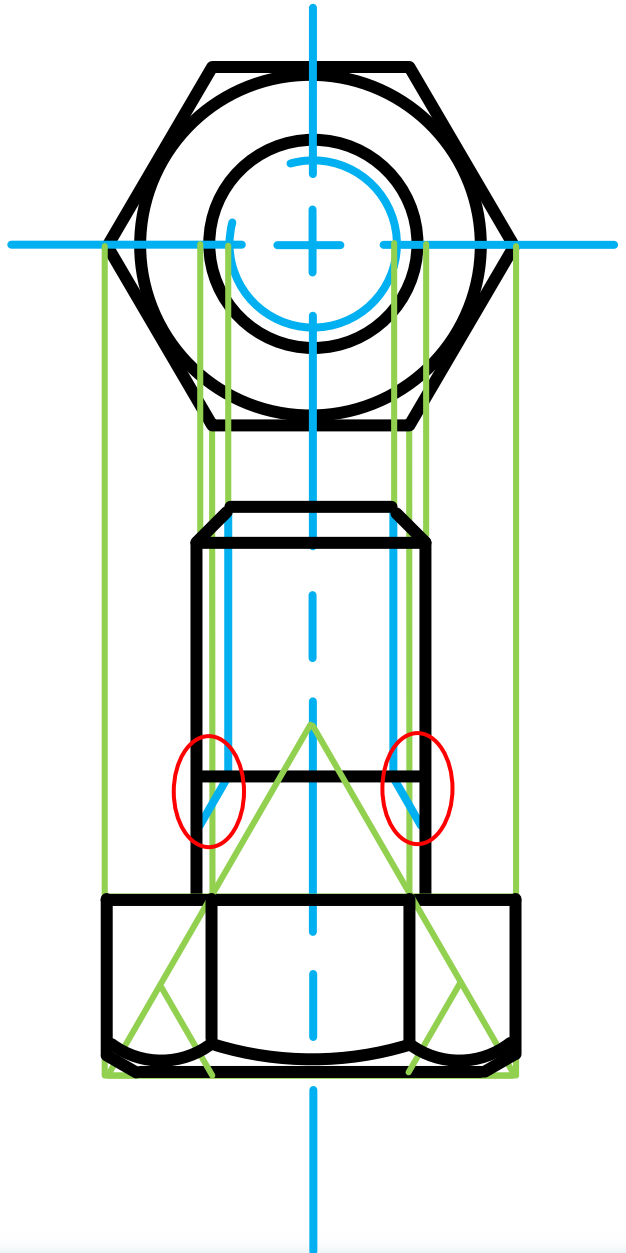
- Complete the shaft of the bolt.



Construction of a BOLT

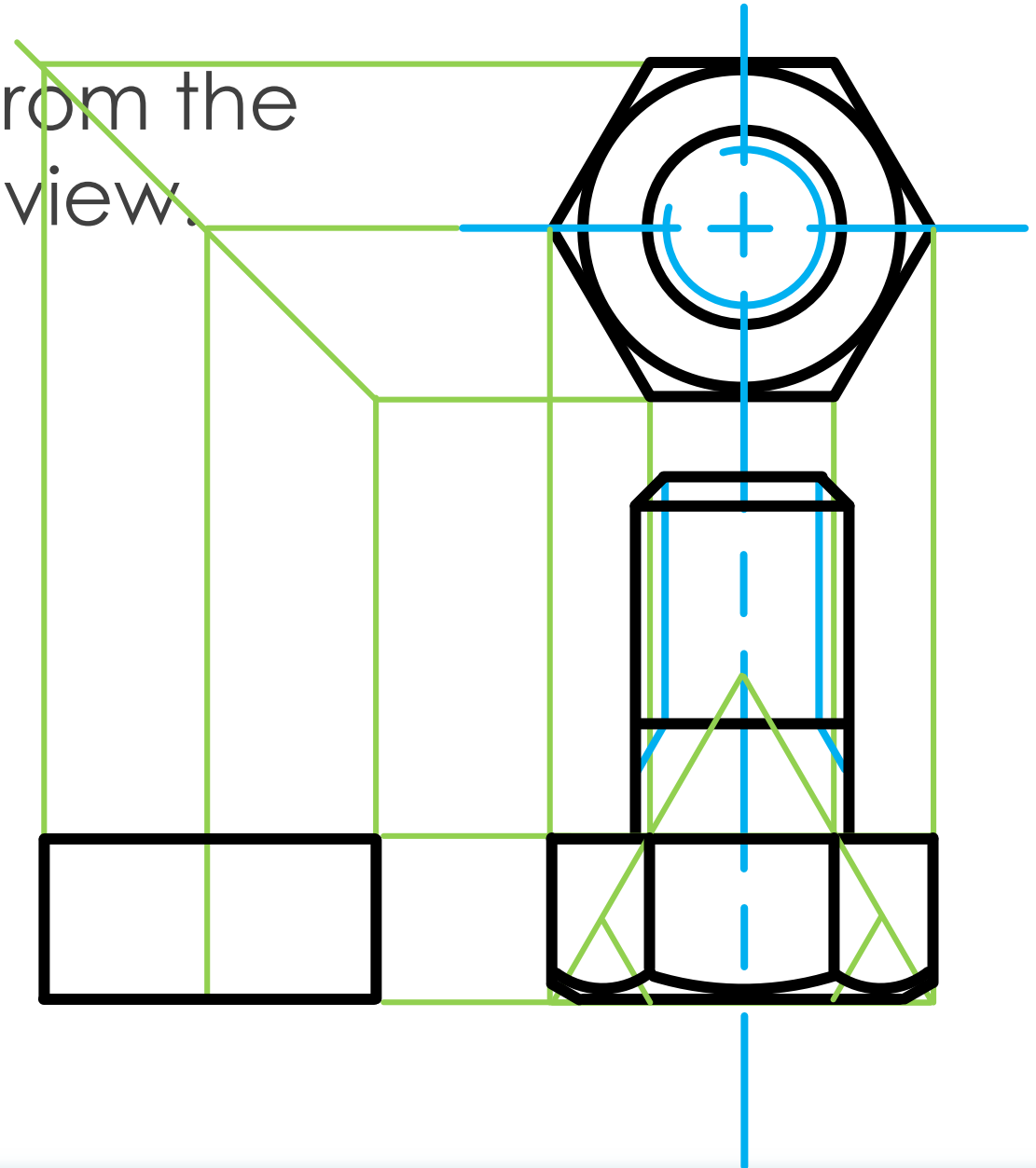
- Complete the shaft of the bolt.





Construction of a BOLT

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



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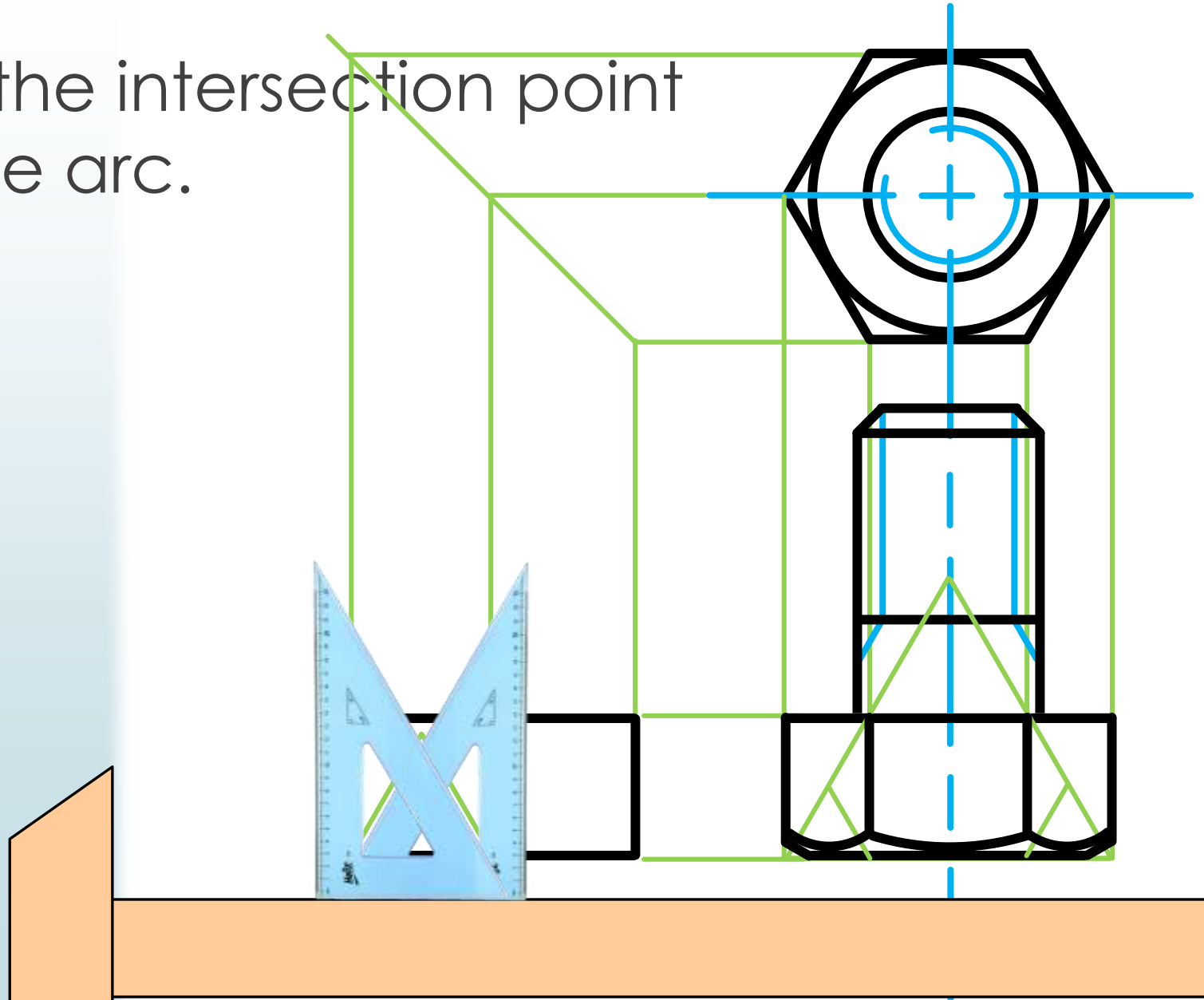
Construction of a BOLT

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



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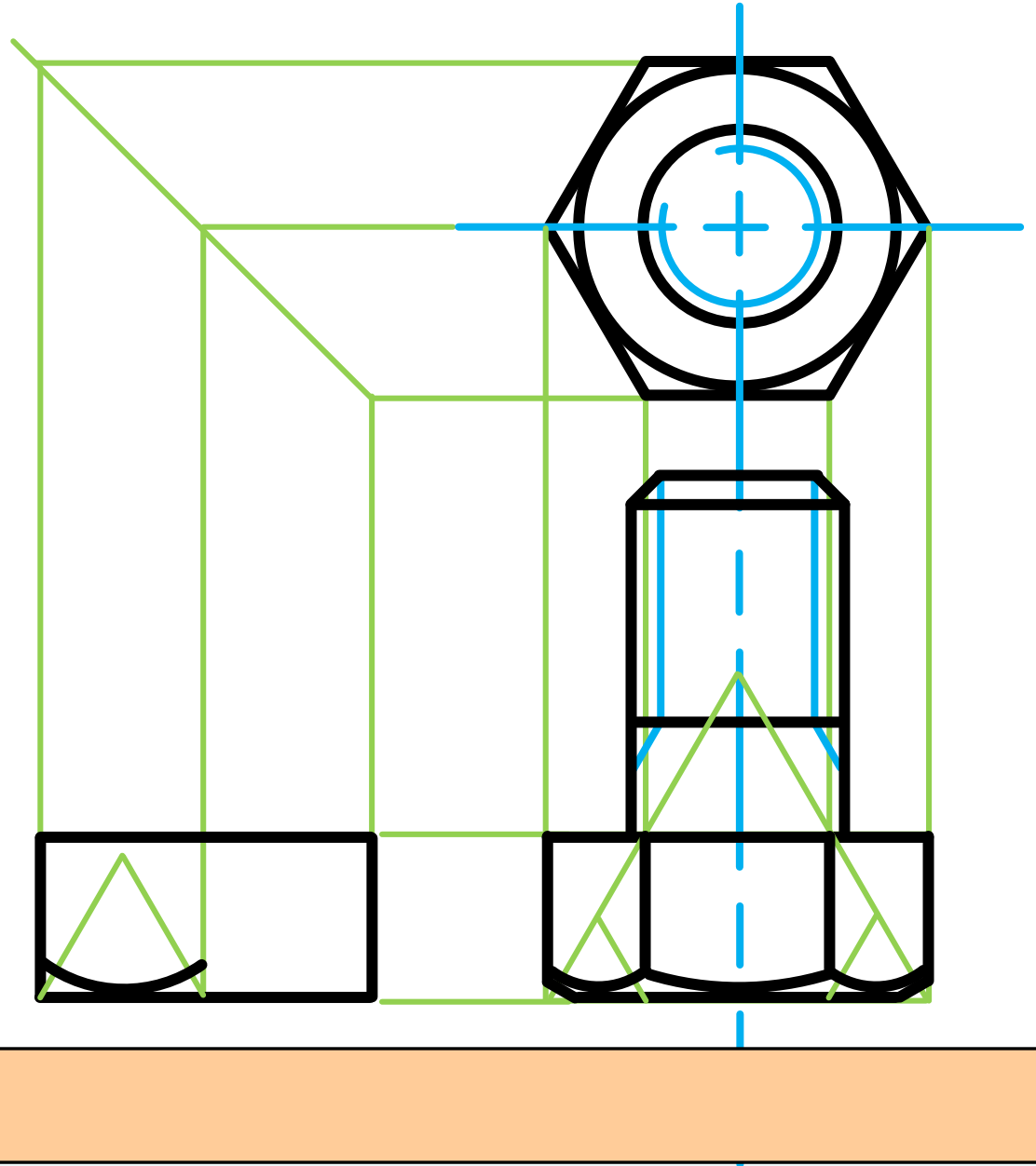
Construction of a BOLT

- Draw the arc.



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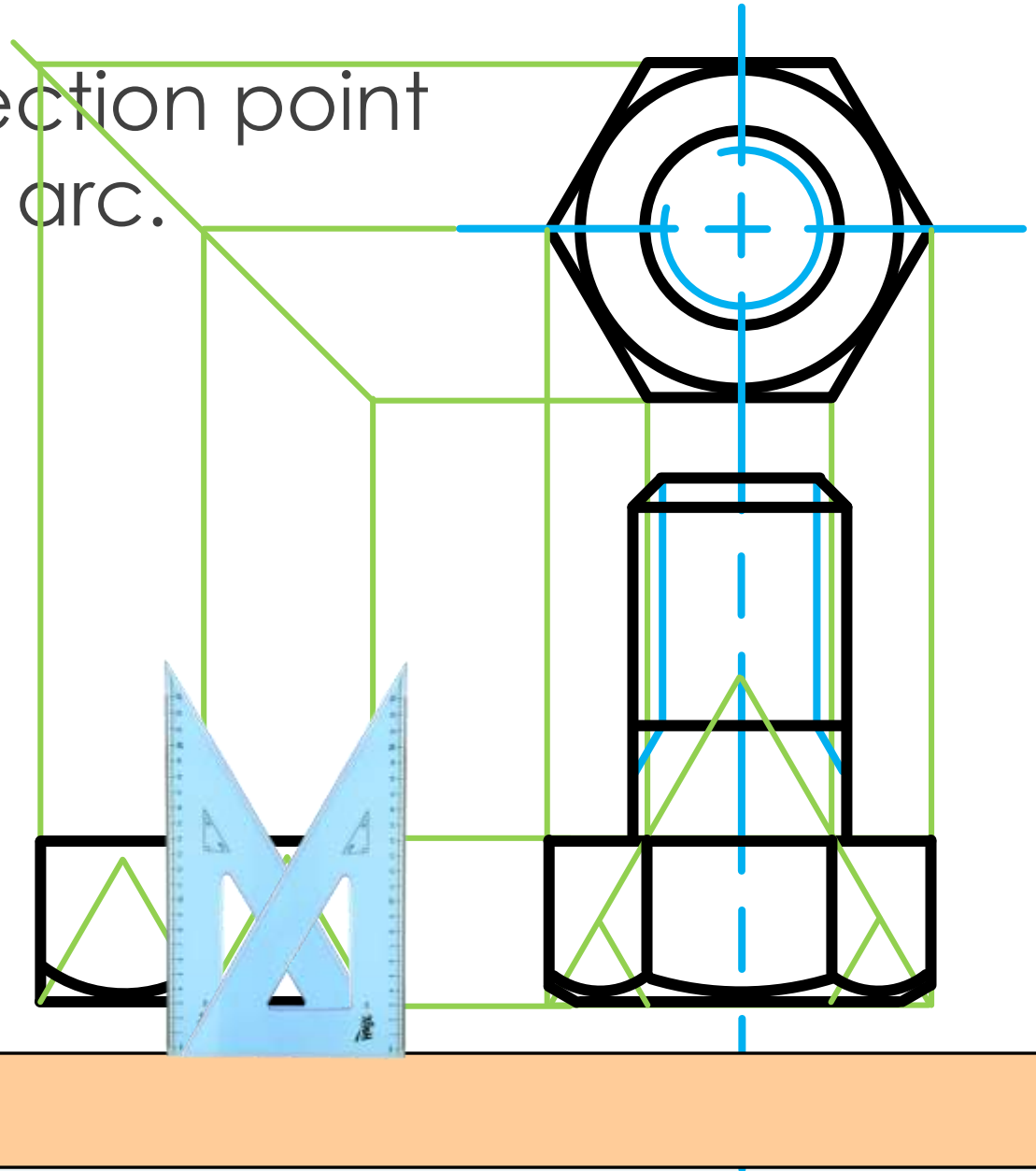
Construction of a BOLT

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



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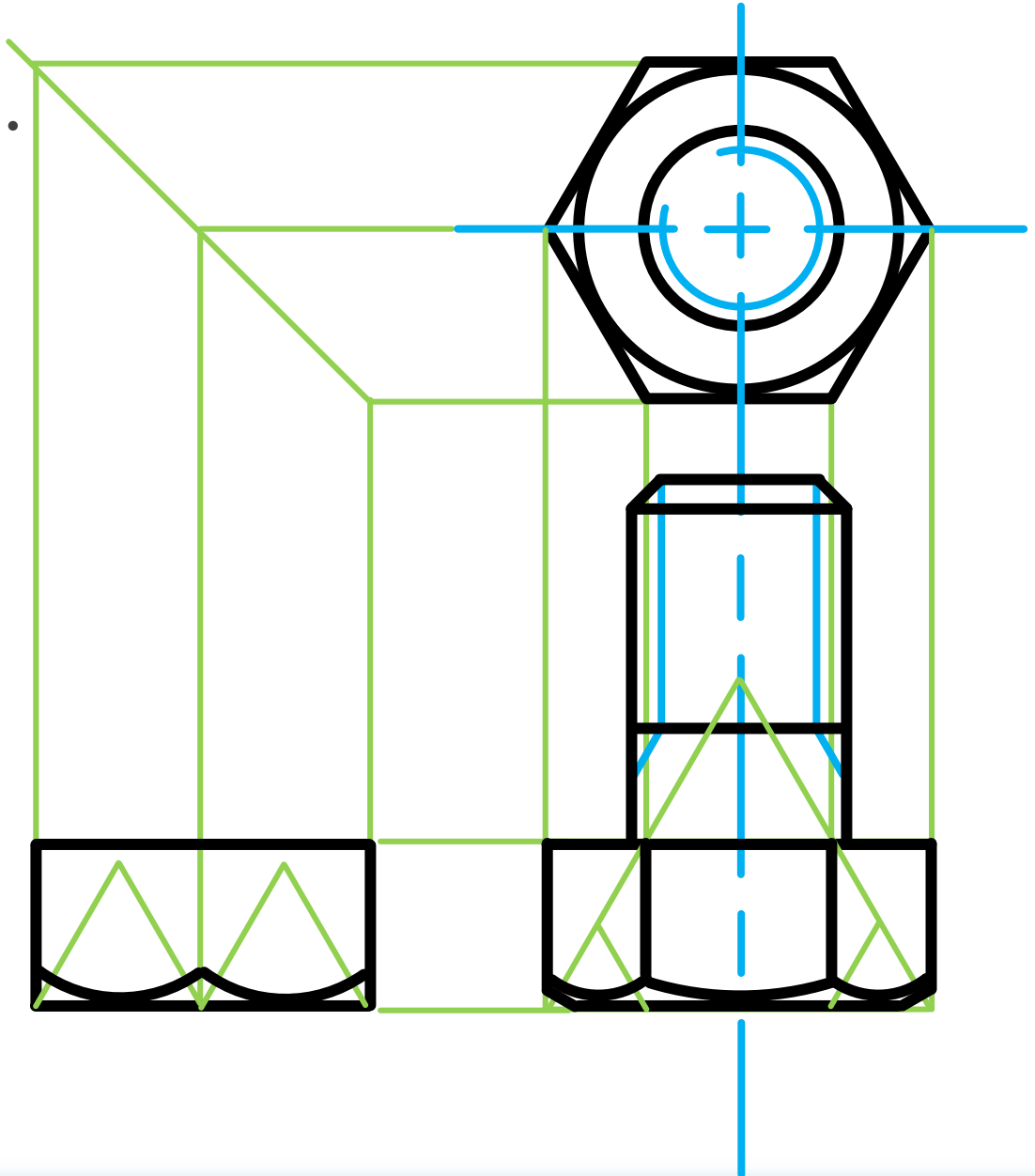
Construction of a BOLT

- Draw the second arc.



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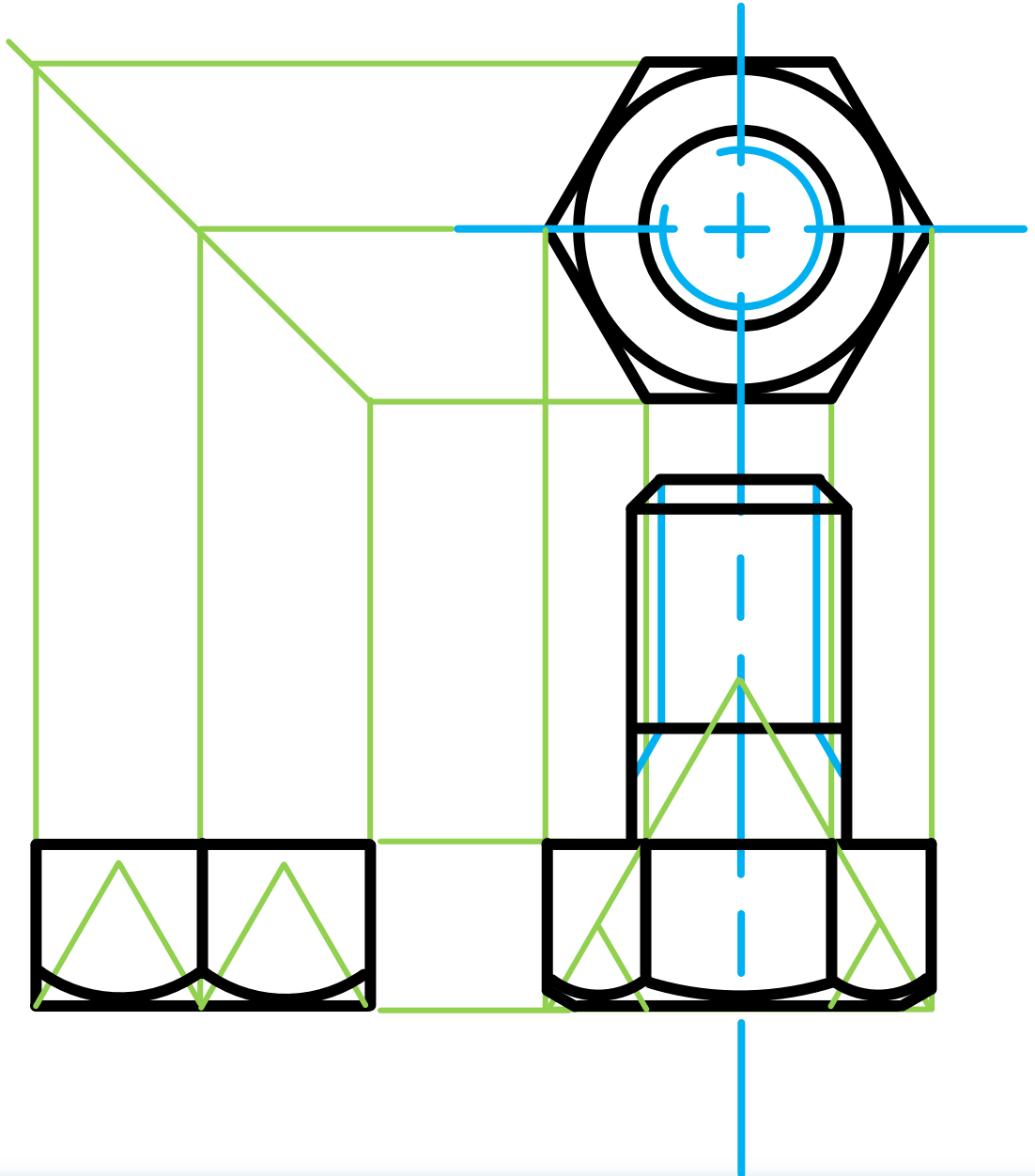
Construction of a BOLT

- Complete the head of the bolt.



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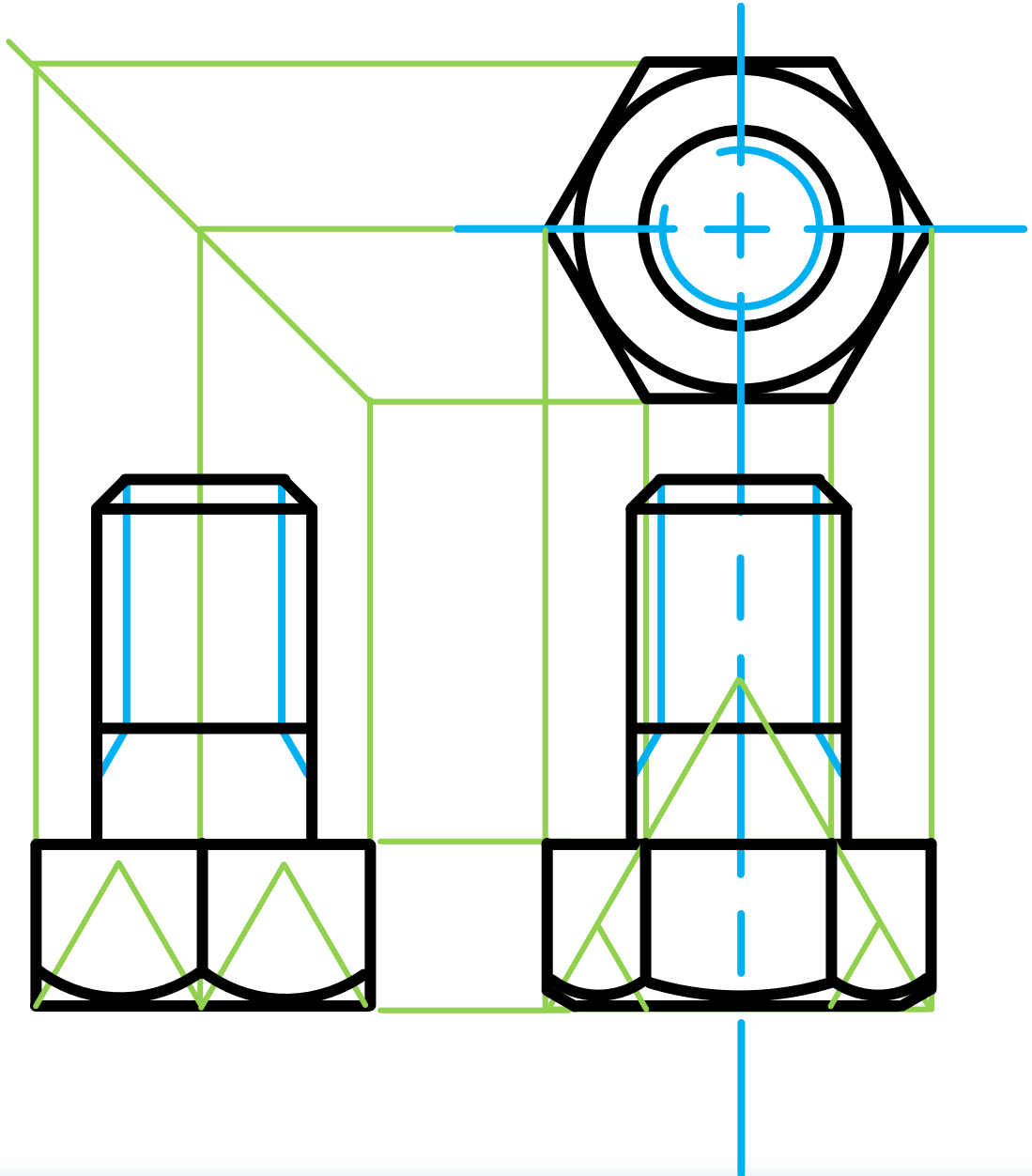
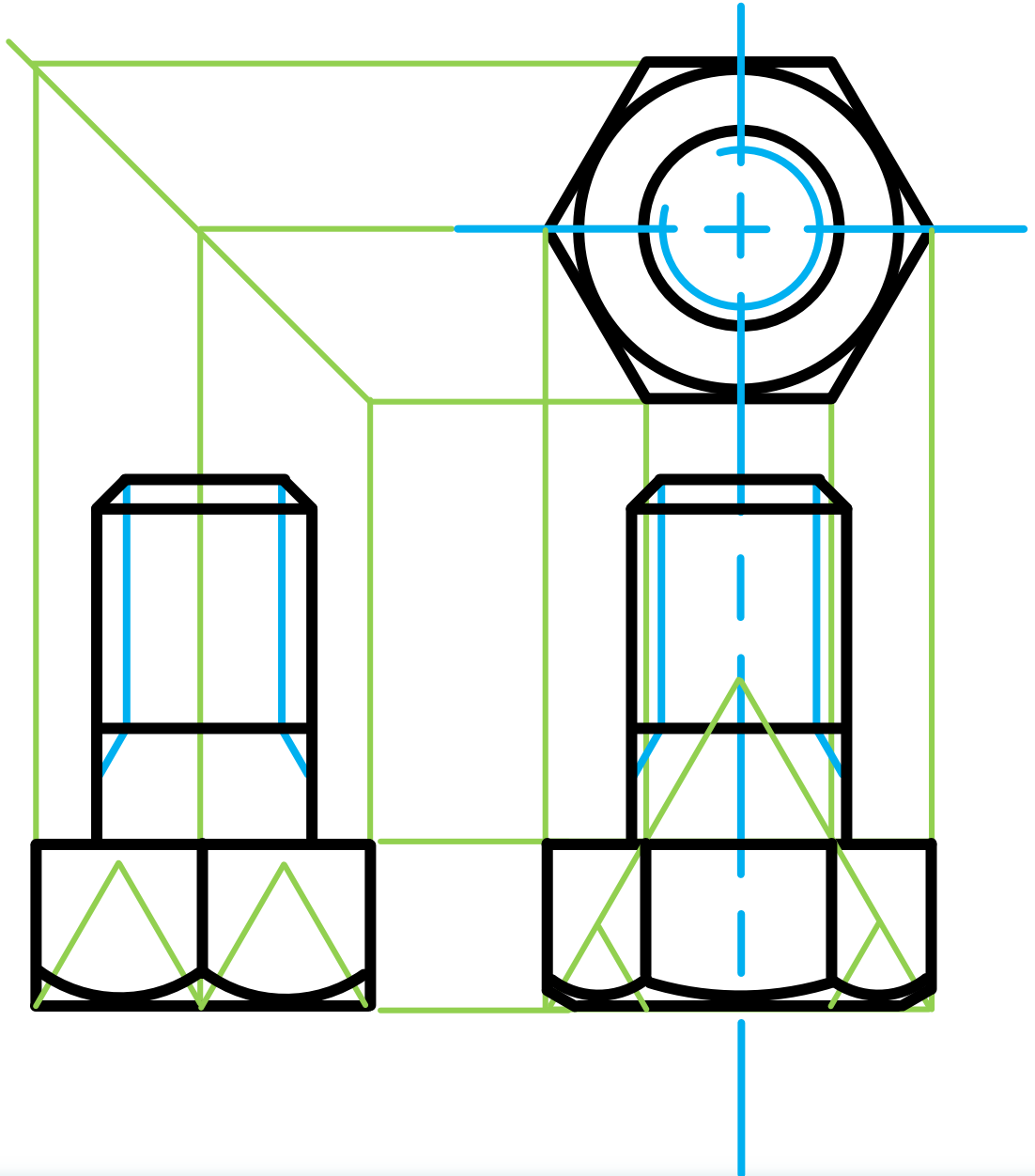
Construction of a BOLT

- Complete the threated shaft on the bolt.



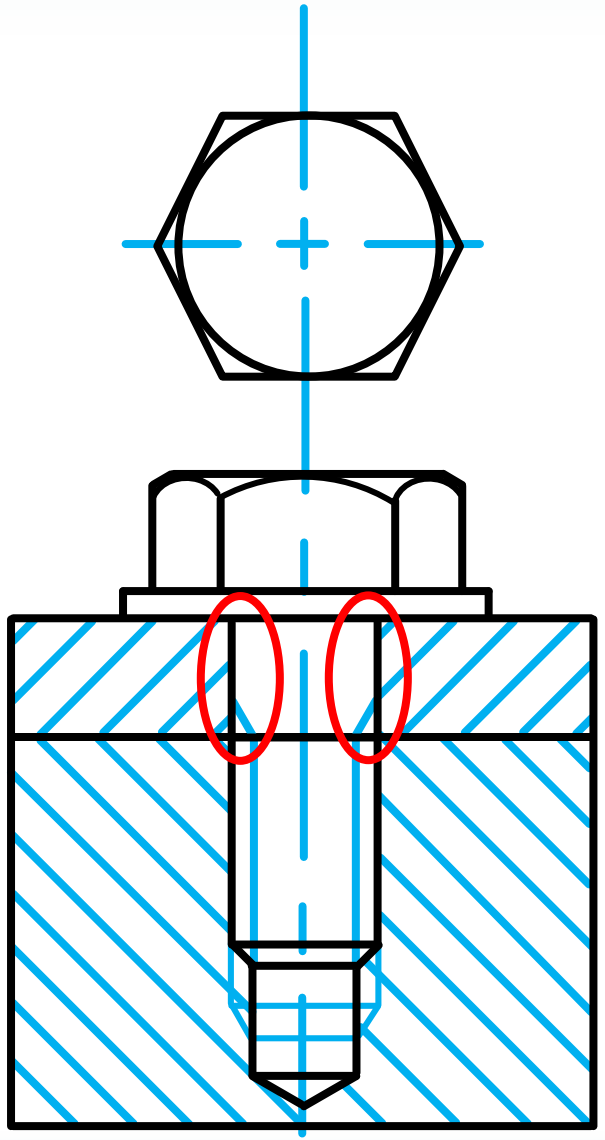
Construction of a BOLT

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



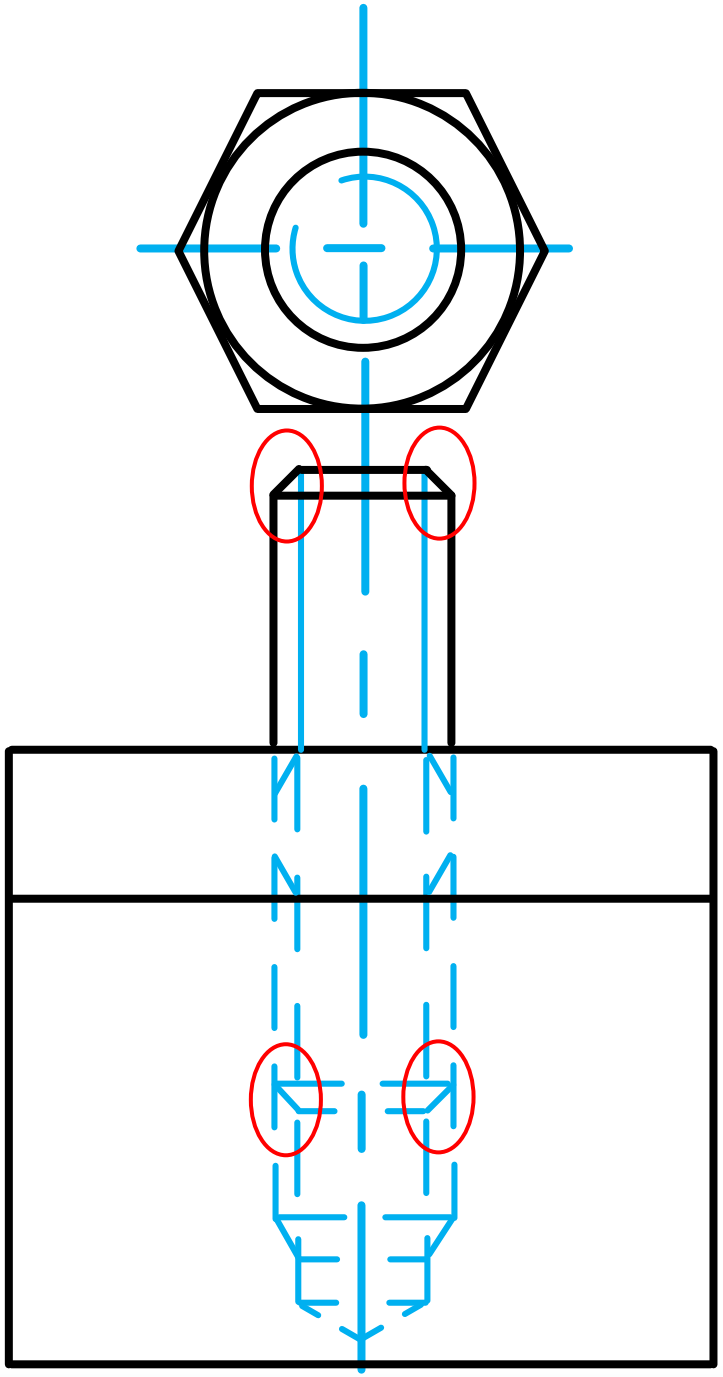
Mechanical Drawings (sectioning)

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



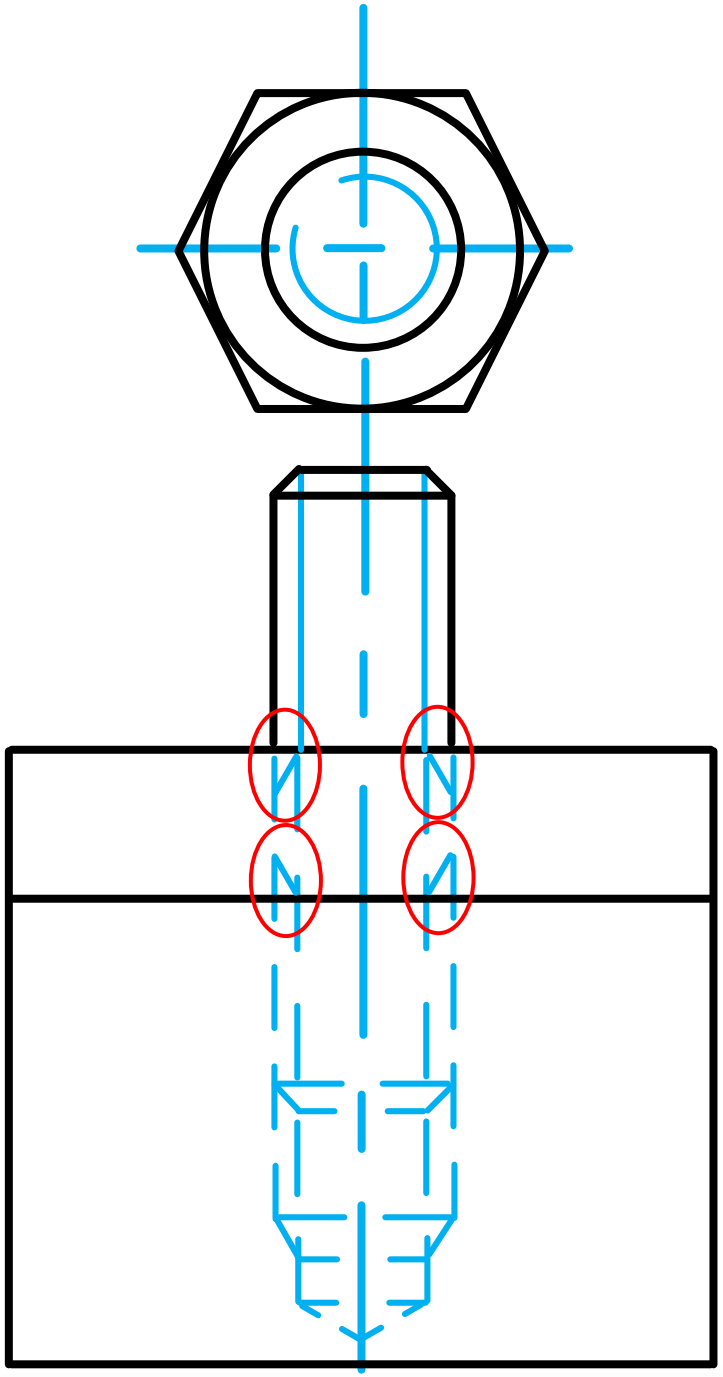
Construction of a STUD

- Hidden detail of an internal hole including the threat, washer, nut and a stud.



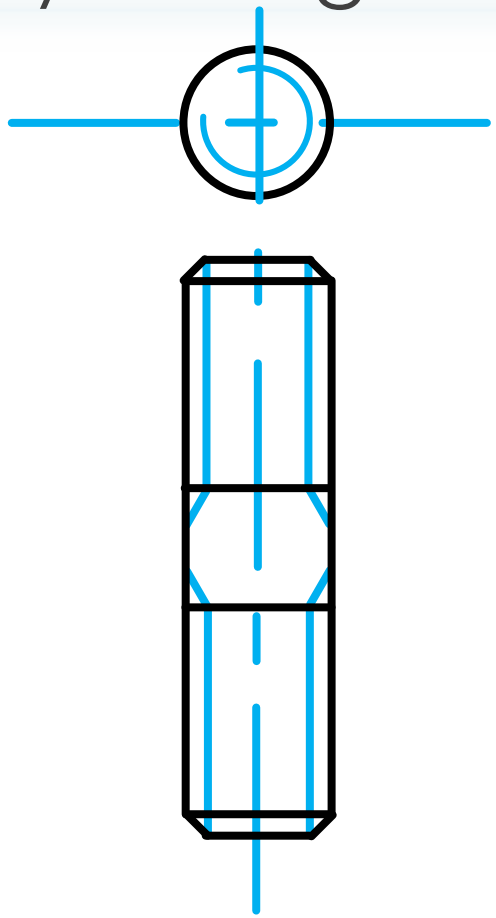
Construction of a STUD

- Hidden detail of an internal hole including the threat, washer, nut and a stud.



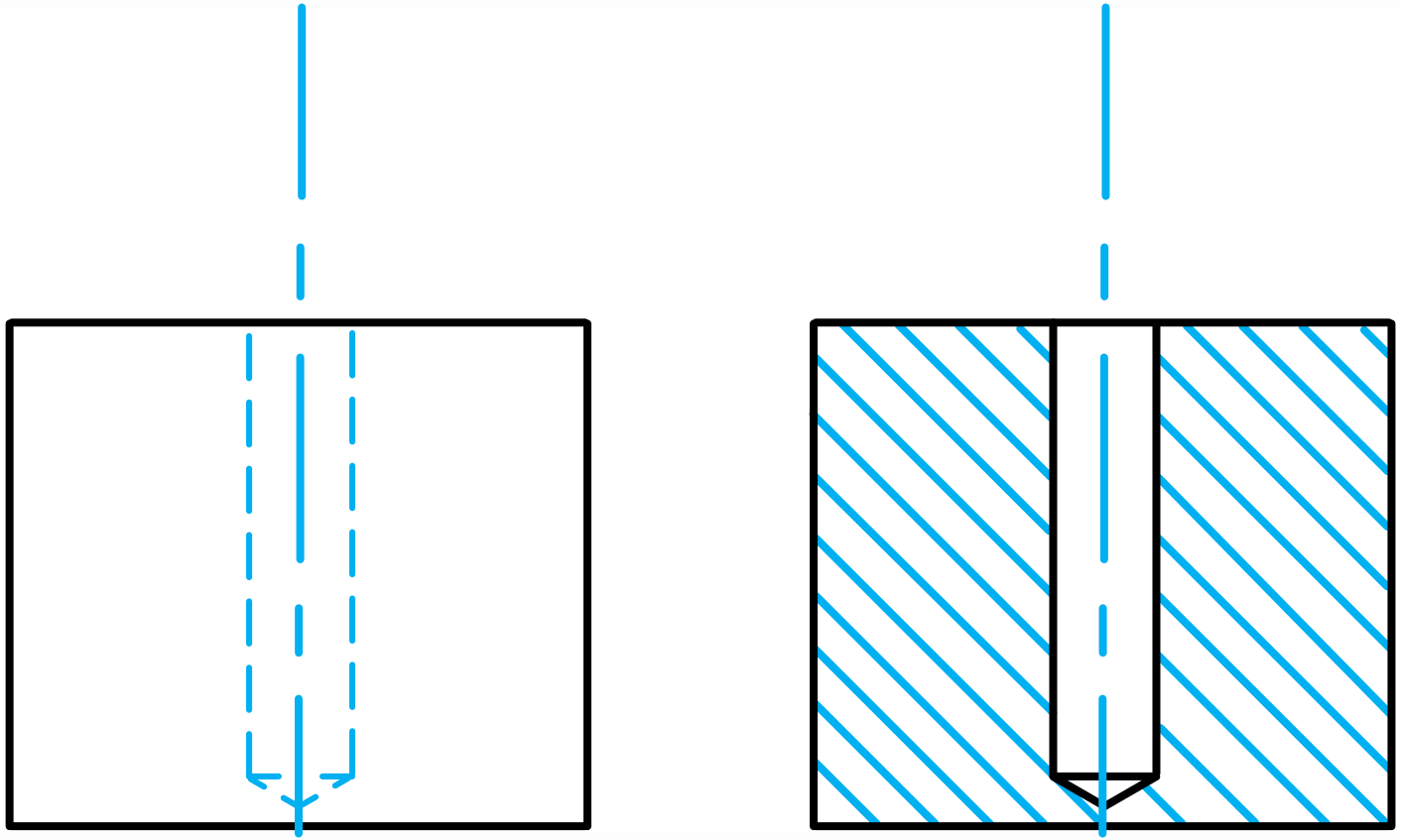
Construction of a STUD

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



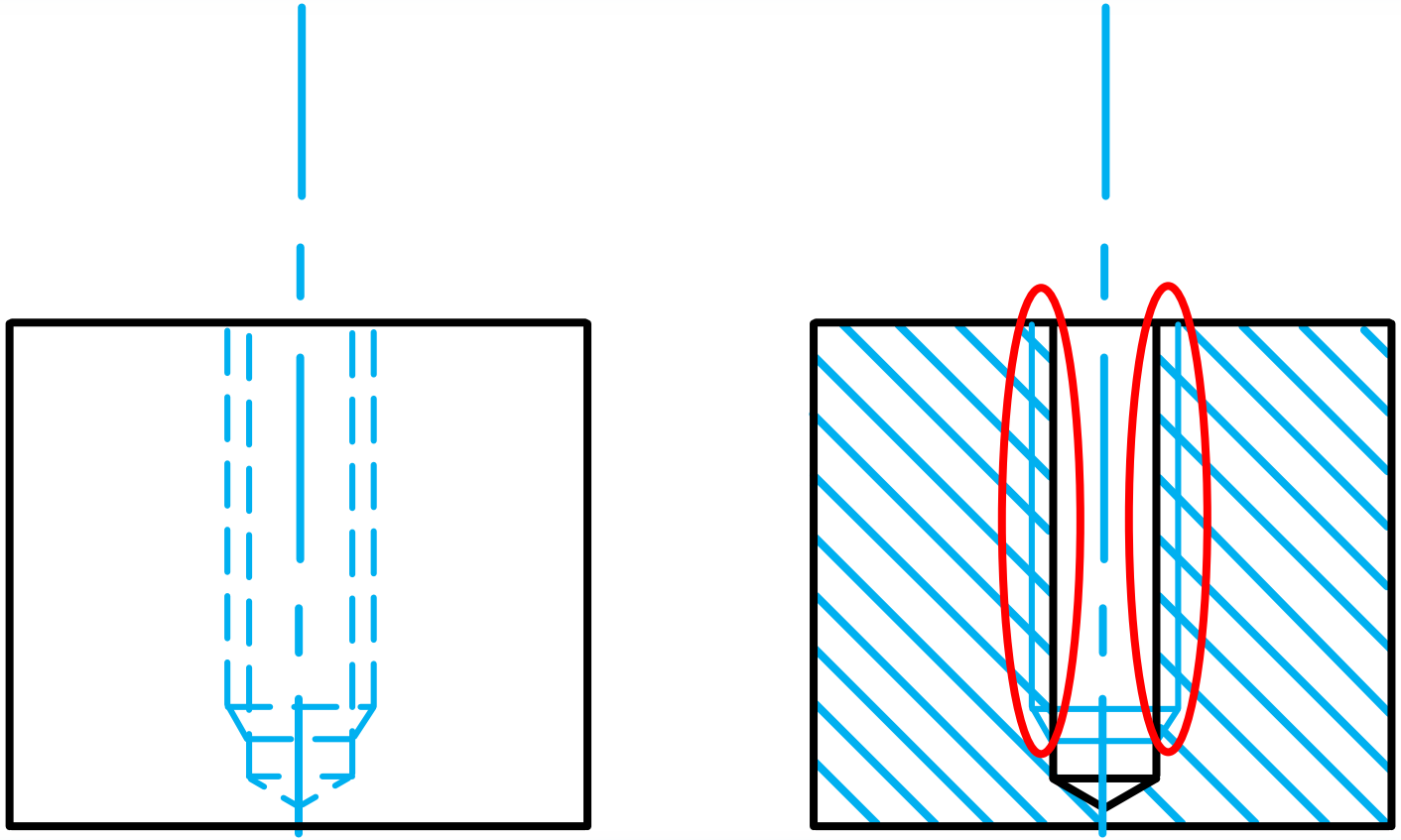
Mechanical Drawings (sectioning)

- Hatching of an internal hole.



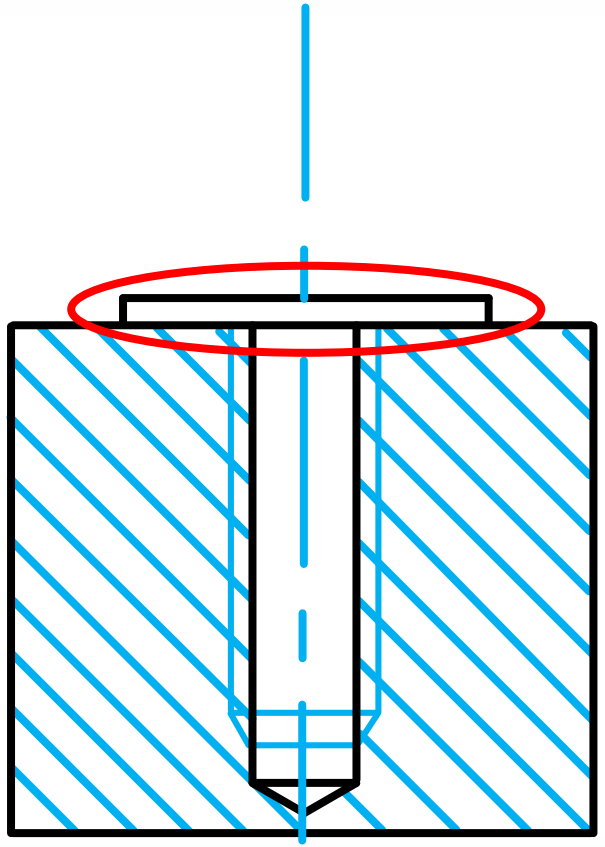
Mechanical Drawings (sectioning)

- Hatching of an internal hole with threat.



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.