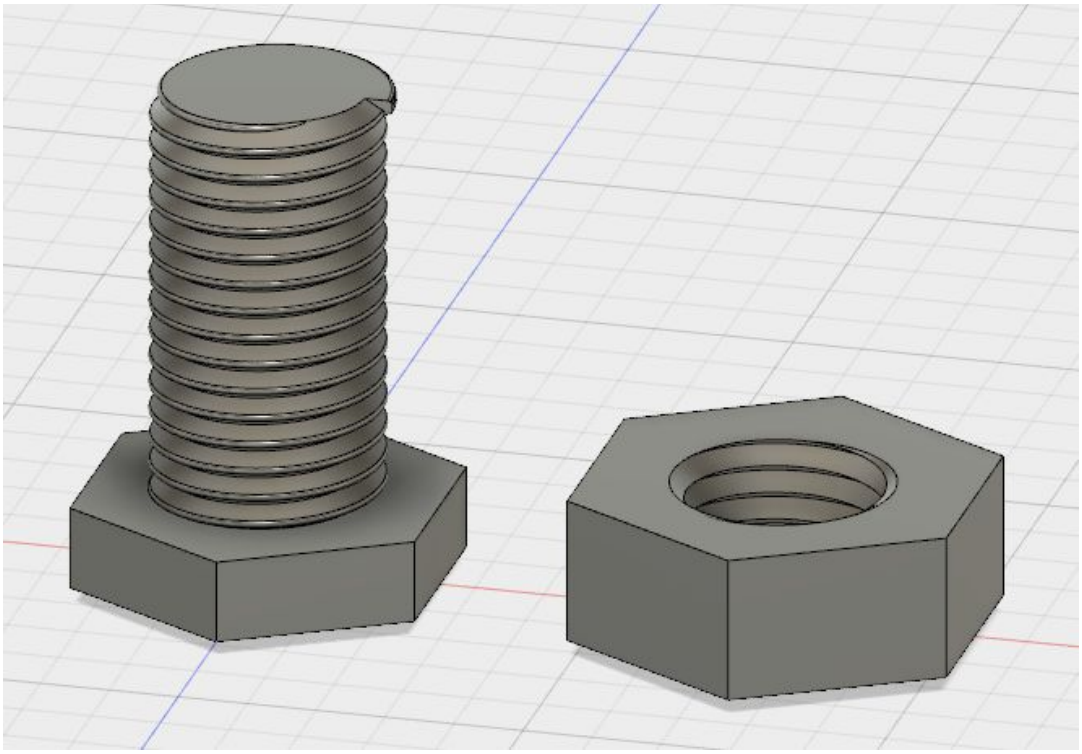
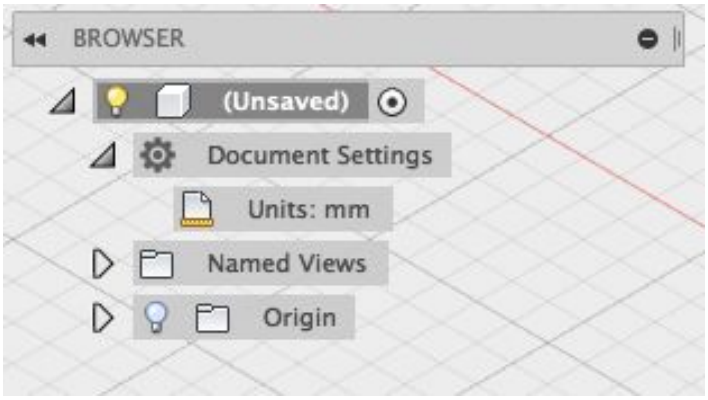
Project: M36x4 Nut and Bolt
Description: This tutorial will teach you to model a functional nut and bolt! You'll learn to create coils, smooth edges, and parts that fit together. If you need help, message one of the instructors!

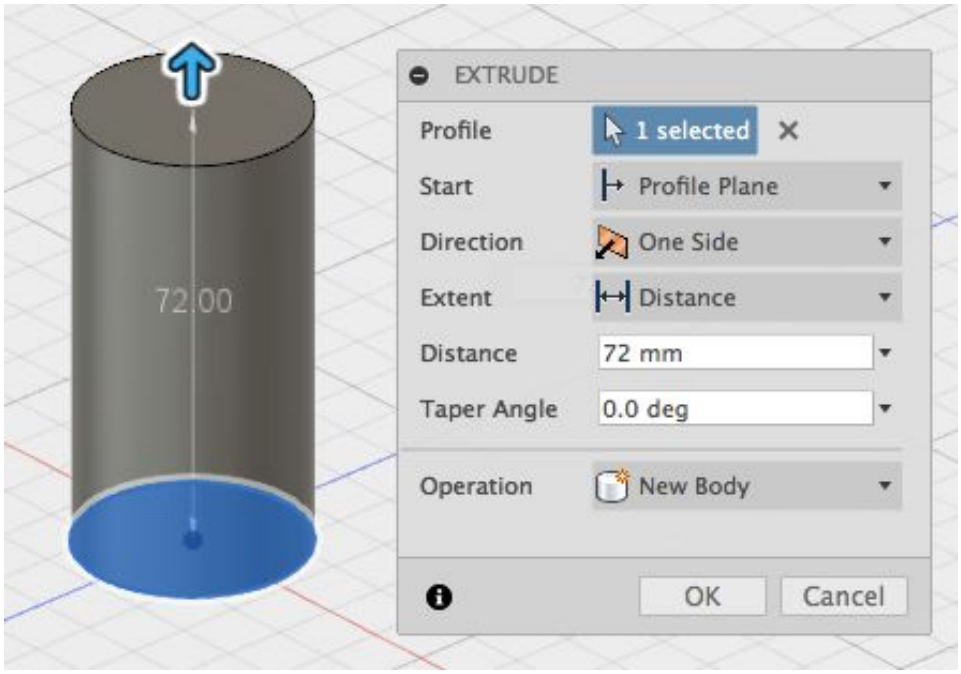


Bolt:

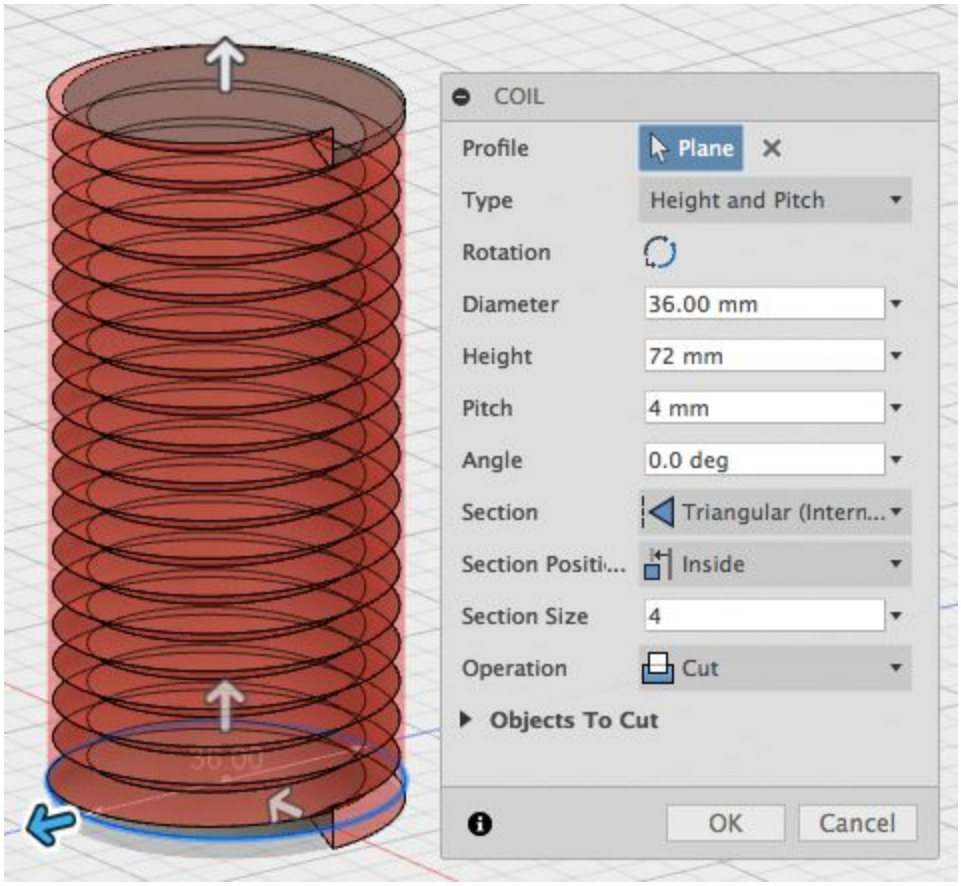
1. Change units to mm



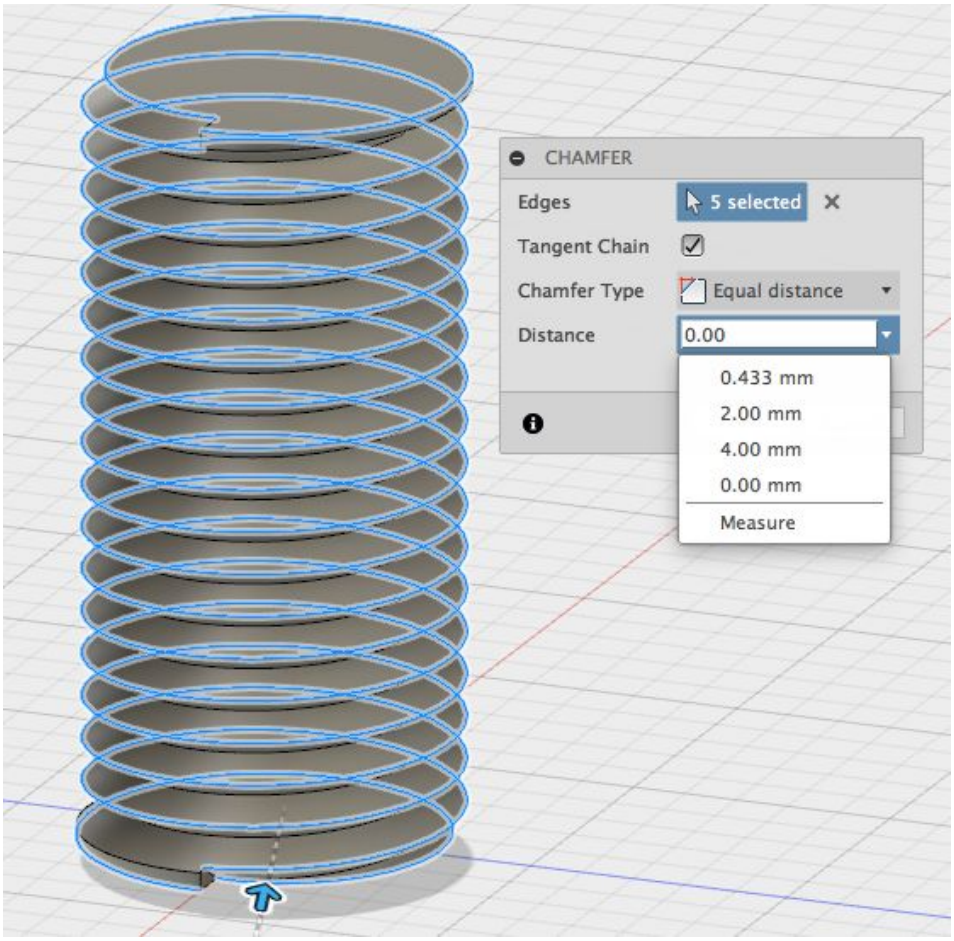
2. Model a 36mm diameter x 72mm tall cylinder
    a. Sketch -> Circle -> Center Diameter Circle: 36mm diameter
    b. Create -> Extrude: 72mm tall



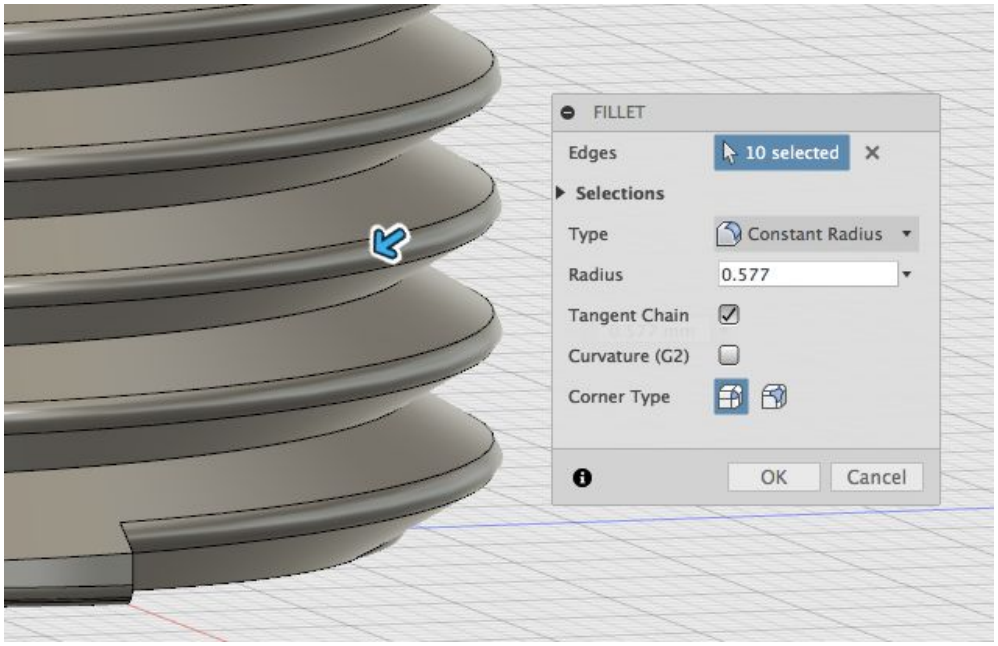
3. Cut the threads for the bolt
    a. Create -> Coil: Create a coil centered at the cylinder using the settings in the below picture; this will allow us to cut away material to construct the threads



4. Smooth the edges
    a. Modify -> Chamfer: Select the main spiraling edges of the thread; use 0.433mm for 'Distance'



    b. Modify -> Fillet: The fillet tool will allow us to create rounded edges; use a radius of 0.577mm

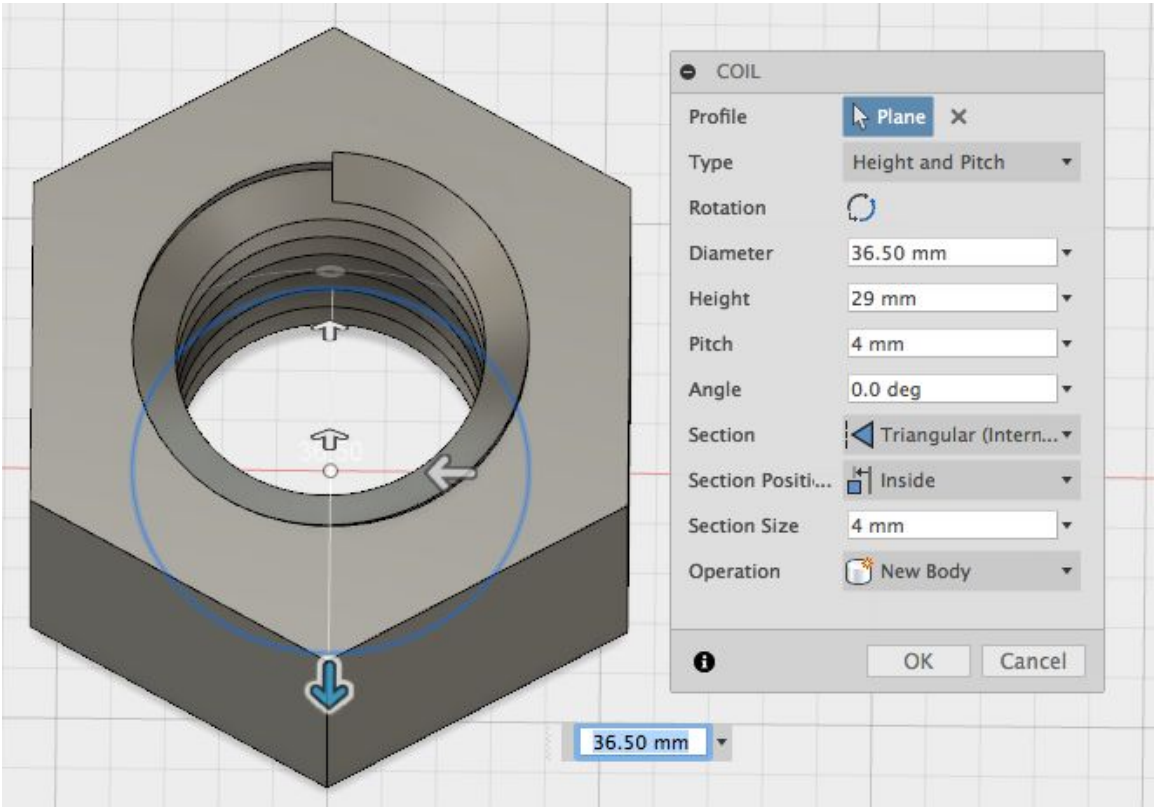


5. Create 6-sided head for bolt
    a. Sketch -> Polygon -> Circumscribed Polygon: Use a radius of 25mm
    b. Create -> Extrude: Extrude 12mm on the z-axis; for 'Operation', use 'Join'; this new body should be connected to the bolt

Nut:

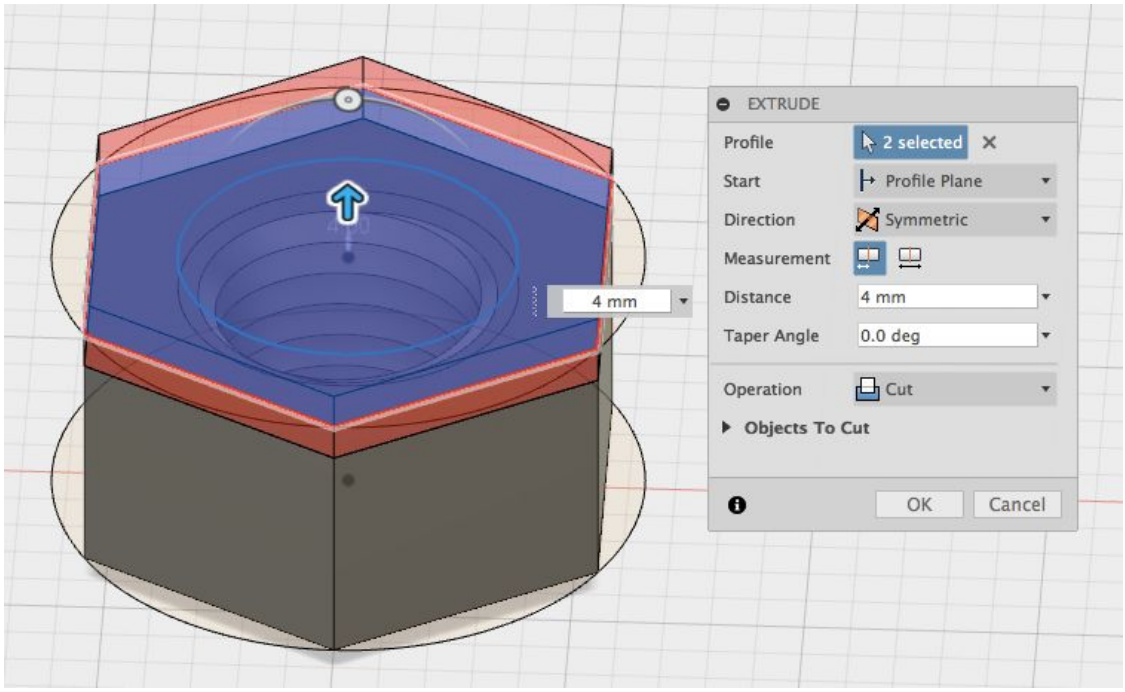
1. Build the base of the nut
    a. Sketch -> Circle -> Center Diameter Circle: 36.5mm diameter
    b. Sketch -> Polygon -> Circumscribed Polygon: 27.5mm radius
    c. Create -> Extrude: 29mm up

2. Cut threads for the nut
    a. Create -> Coil: Center it inside the nut; use the settings in the below picture



3. Modify -> Combine: For 'Target Body' and 'Tool Bodies', select the nut and threads in either order; for 'Operation', select 'Join'

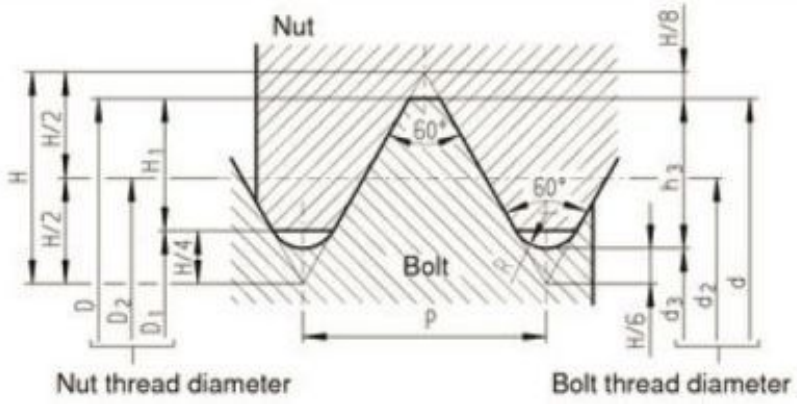
4. Remove extra material from top and bottom of nut
    a. Sketch -> Circle -> Center Diameter Circle: Sketch a circle on the top and bottom of the nut
    b. Create -> Extrude: use the settings in the below picture for the top and bottom



5. Move the nut down to the same plane as the bolt
    a. Right-click the nut -> Move/Copy: For 'Y Distance', enter -4mm

6. Finished! This tutorial has hopefully taught you the following skills:
    a. Dimensioning your sketches and fully defining your sketch using constraints
    b. Using 'Create' tools to cut material
    c. Using the coil, fillet, and chamfer tools
    d. Creating parts which will fit together, using tolerances of 0.5mm

7. If you'd like, look at this technical drawing of a bolt's threads.



D_1 $d = 2\,H_1$
d_2 D_2 $d = 0.64952\,P$
d_3 $d = 1.22687\,P$
H $0.86603\,P$
H_1 $0.54127\,P$
h_3 $0.61343\,P$
R $\frac{H}{6}$ $0.14434\,P$