
LUT
University

Exercise 1 Tutorial:
Phone Case Modeling

Exercise 1 task:

Measure your own phone with measurement tool(s) (such as ruler, measure tape) that is/are available with you, and make 3-D model based on those measurements. Convert 3-D model into a technical drawing. You are encouraged to use other features in Solidworks to perfect your design. If you have any questions, you can send email or attend the exercise class in LUT campuses at Lahti or at Lappeenranta.

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Exercise 1 Tutorial:
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In this exercise we are going to model a custom phone case.

Methods:
1. **Measure** your phone size/case size using basic ruler or documentation
2. **Model** the case using basic features given in this tutorial

Goal:
1. Able to **measure** dimensions of simple object using ruler/technical document and apply them to make 3-D CAD model using SolidWorks
2. Able to **learn and apply different basic features** (such as sketch, extrude, cut, smart dimensions and drawing) of SolidWorks to prepare simple object.
3. Able to **convert 3-D model into a technical drawing document.**

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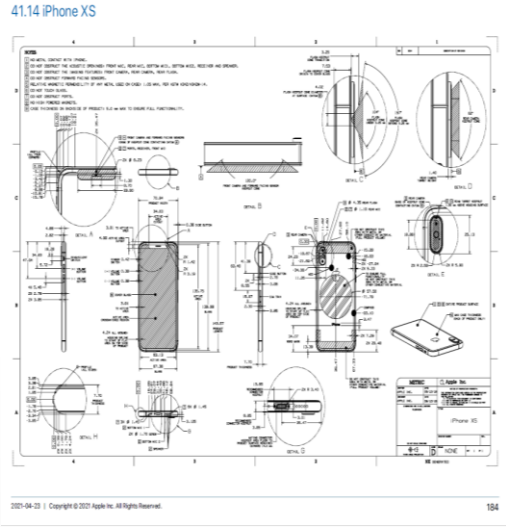
To start with this exercise, **first step is to collect the measurements** of your own phone.

How to collect Phone's measurements:
1. **Measure with ruler** (1 mm accuracy (e.g. 24 mm)).
Or
2. Search for **technical drawing/ documentation** from company's model number (optional)

(**Hint**: You can find your phone's documentation online, but It is recommended to use ruler and measure the dimensions by own).

Measuring using ruler



Iphone xs technical documentation from APPLE

Example: https://developer.apple.com/accessories/Accessory-Design-Guidelines.pdf

Note: In this tutorial, the dimensions are based on technical documentation acquired from internet.

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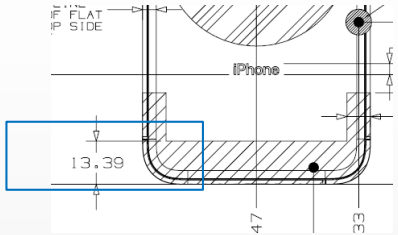
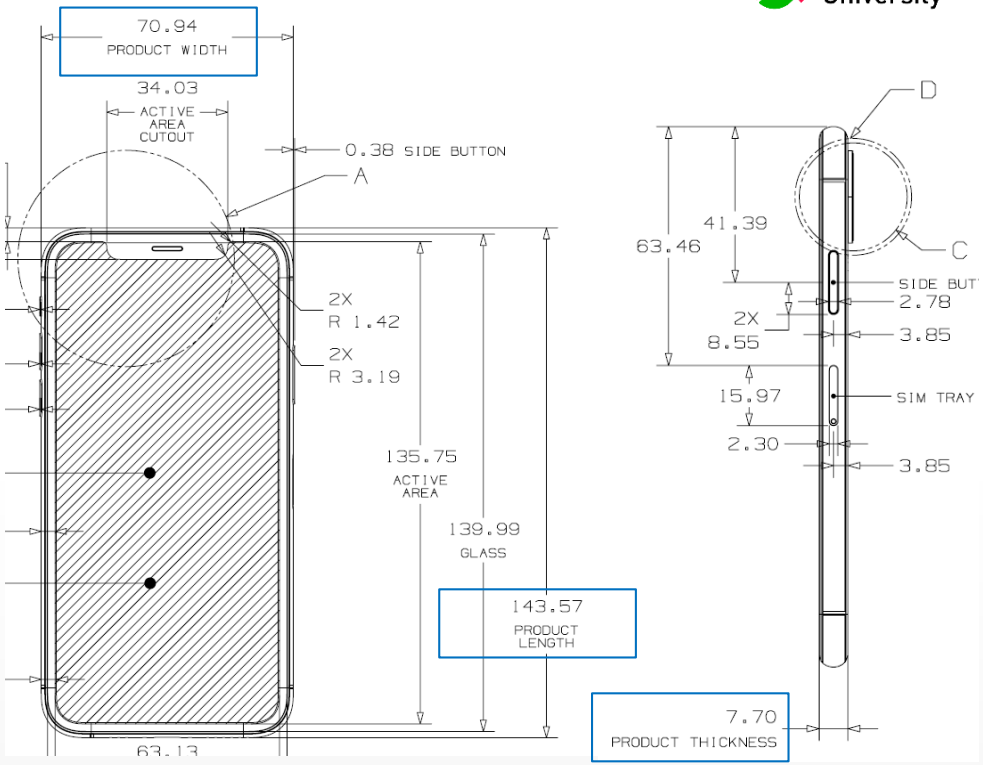
Here you can see an example of technical documentation provided by a phone manufacturer

Width: 70.94 mm
Length: 143.57 mm
Thickness: 7.70 mm
Fillet radius: 13.39 mm





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Estimate case size based on phone size by adding 2 millimeters to the overall dimension. For our example phone:

Width:	70.94 + 2 = 72.94 mm
Length:	143.57 + 2 = 145.57 mm
Thickness:	7.70 + 1 = 8.70 mm
Fillet radius:	13.39 + 1 = 14.39mm
Case thickness:	1.00 mm

In case of using ruler, the measurement can be rounded to 73 mm in width, 146 mm in length, 9 mm in thickness, and you can work with these dimensions

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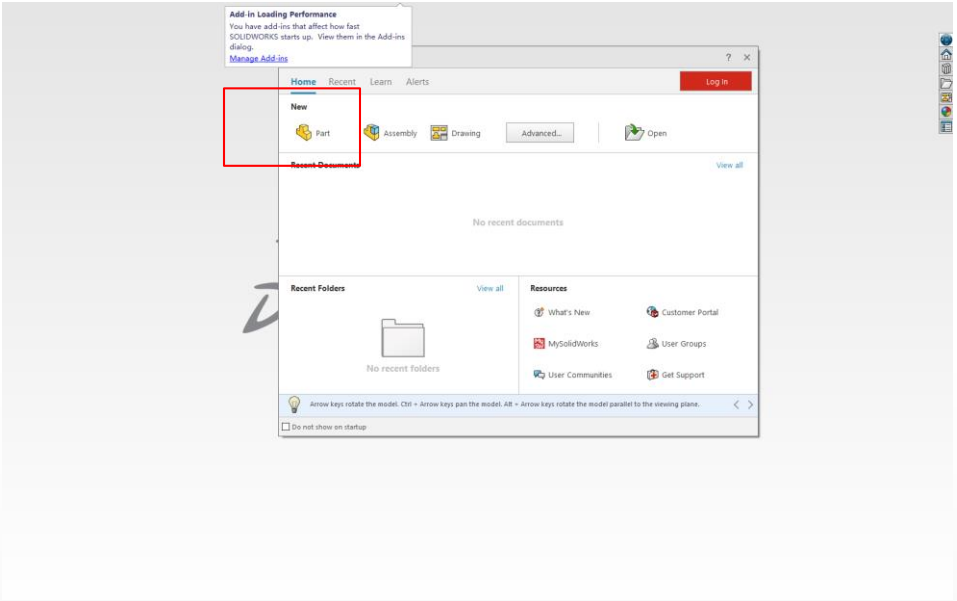
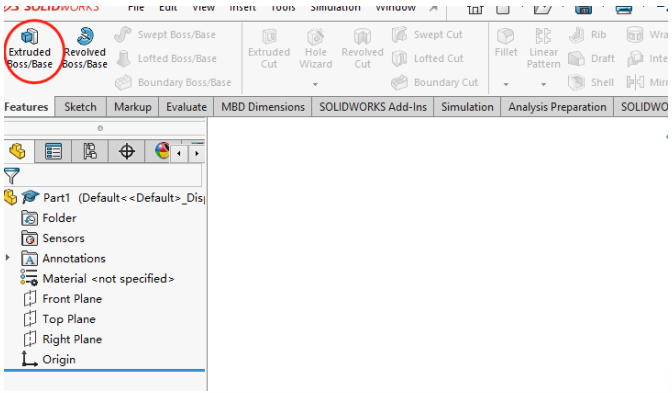


1. To start create click “Part”



2. Click “Extruded Boss/Base”

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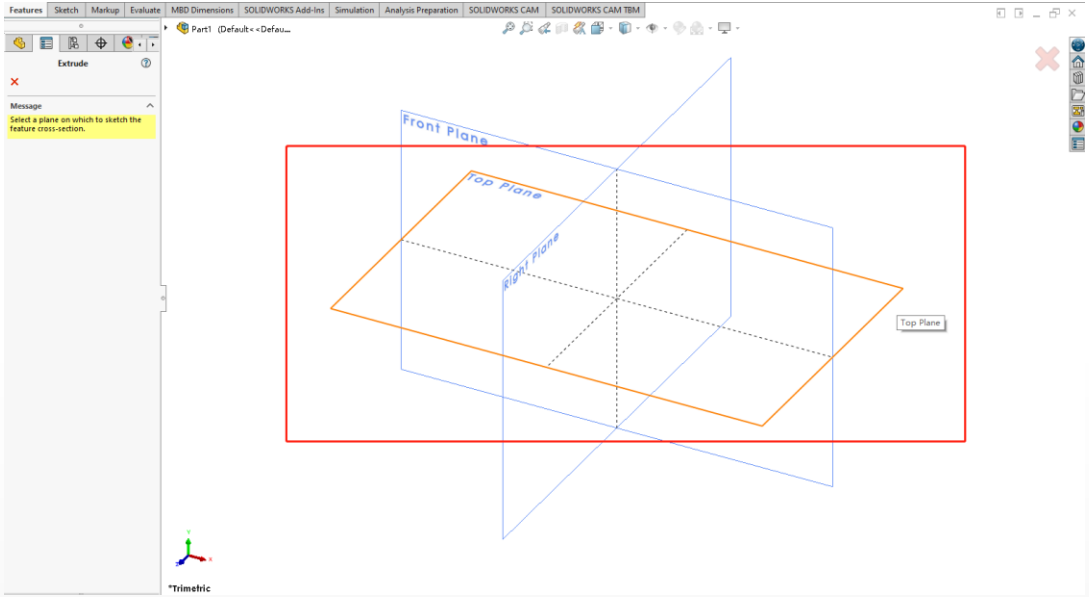
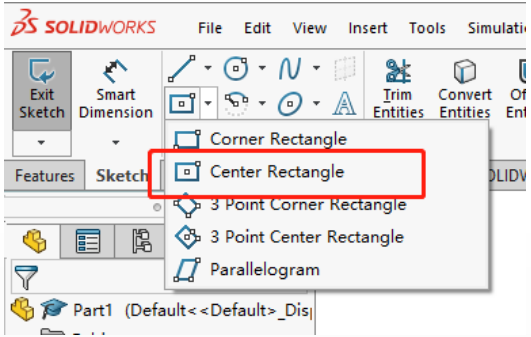


3. Click “Top Plane” to select the drawing plane



4. Click “Center Rectangle”

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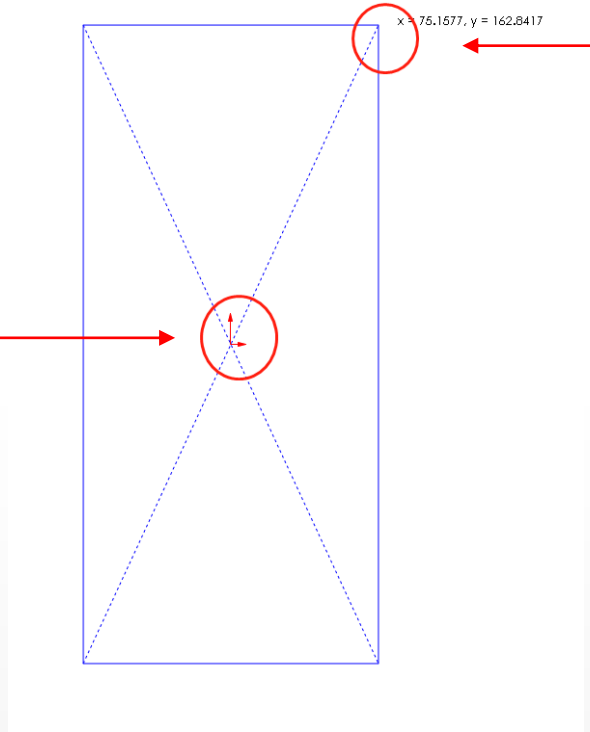

6. Drag to shape

5. Click center point

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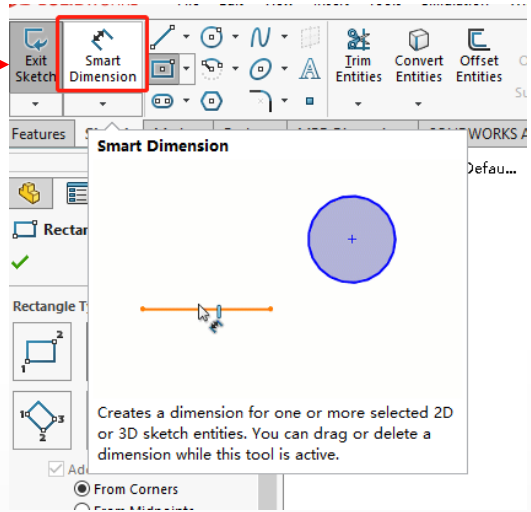
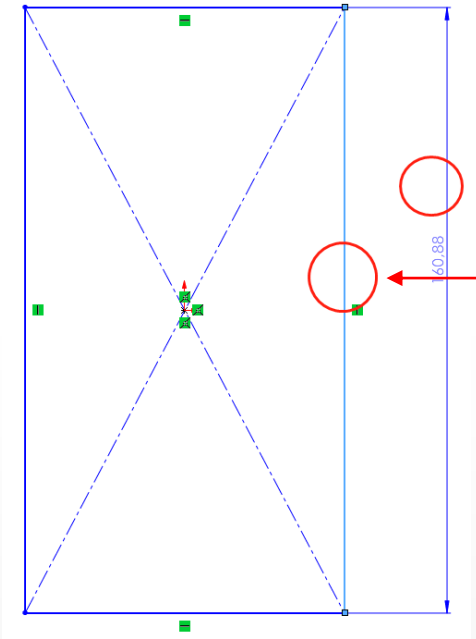
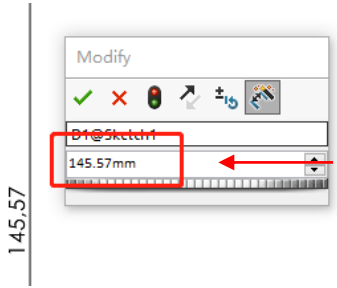
7. Click “Smart Dimension”



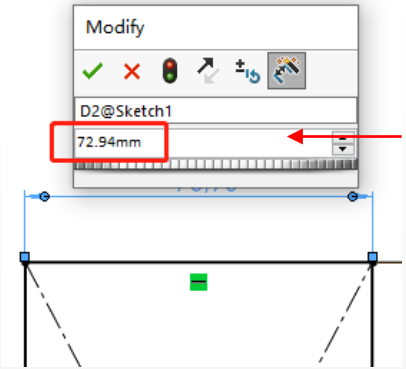
Exercise 1 Tutorial: Phone Case Modeling



8. Click length



9. Type “145.57mm”
From your measurement as length of phone case



10. Click width and type “72.94 mm”
From your measurement as width of phone case

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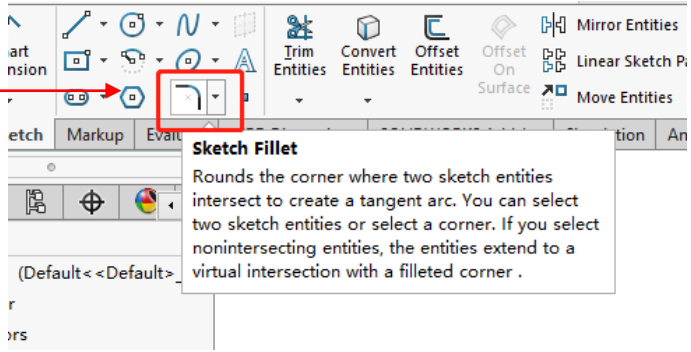
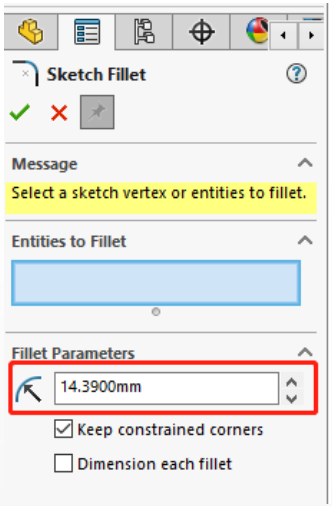
11. Click “Sketch Fillet”





12. Type “14.39 mm”
From your measurement and estimates as the fillet of phone case

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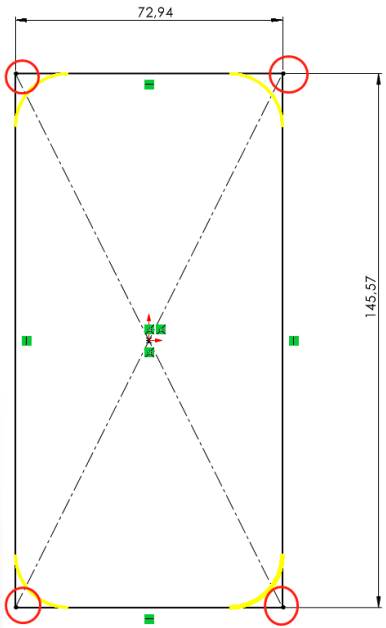
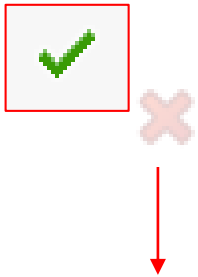
13. Click each 4 corners





14. Click “Accept” in the upper right corner of screen

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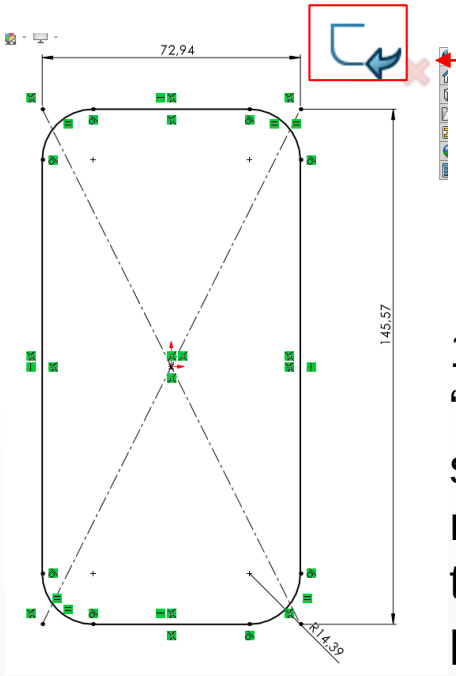
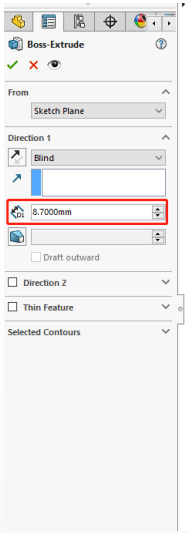
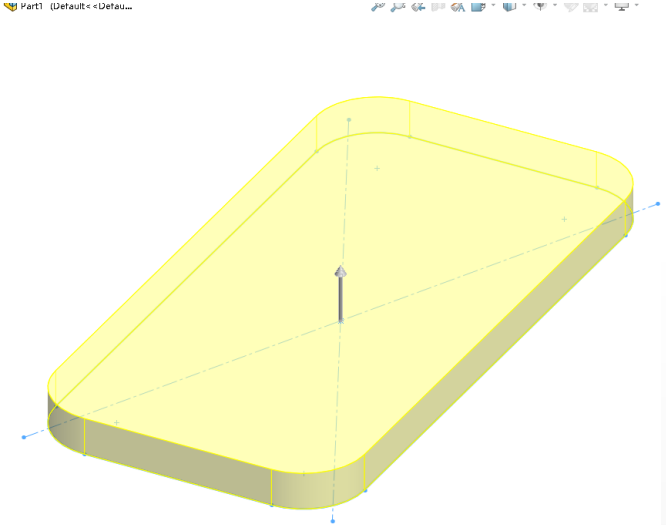


15. Click to finish sketch

16. Type thickness “8.70 mm” on the left side, From your measurement as total thickness of phone and phone case





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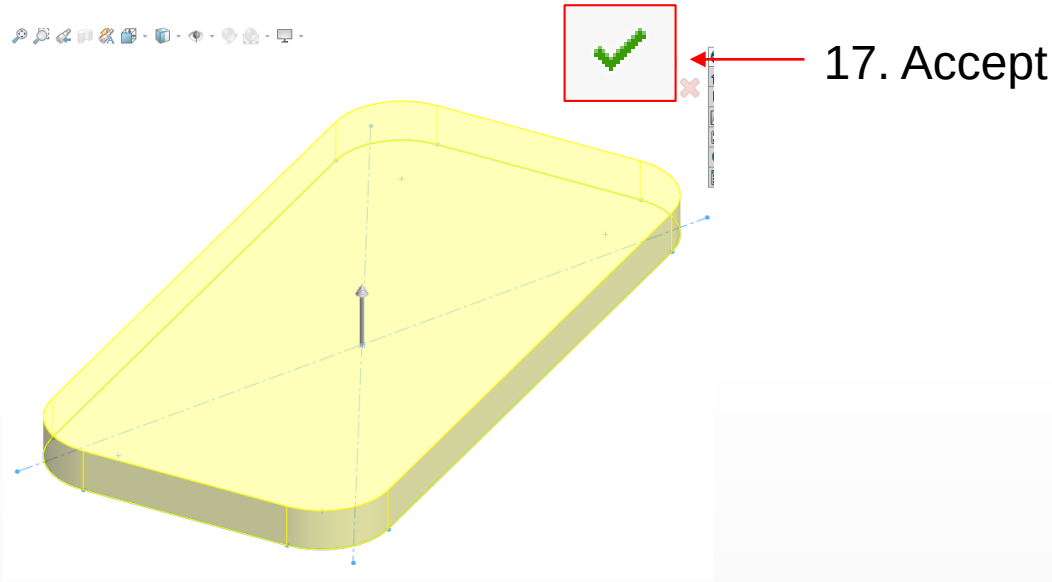

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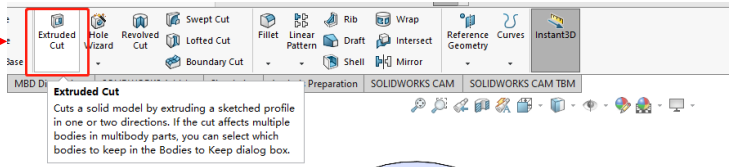
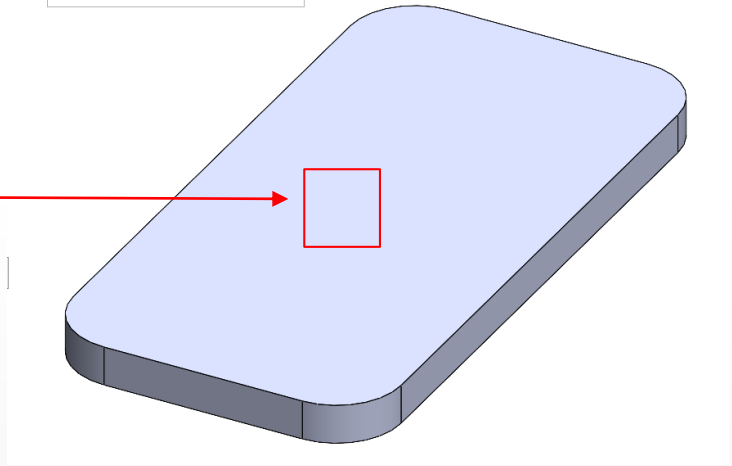
18. Click “Extruded Cut”



19. Click “Top plane”



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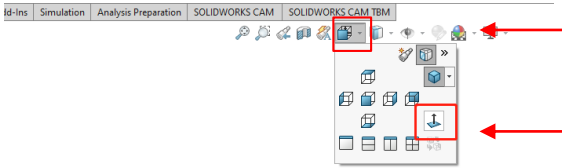
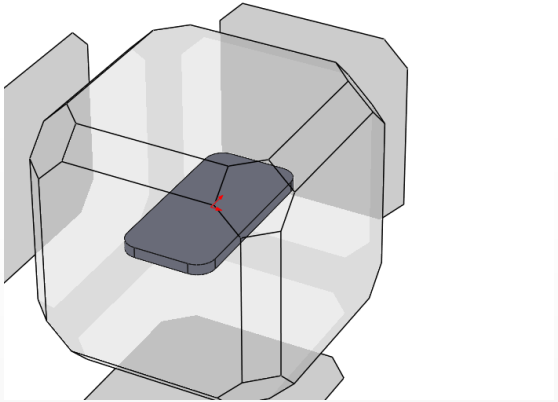


20. Click “View Orientation”

21. Click “Normal to”



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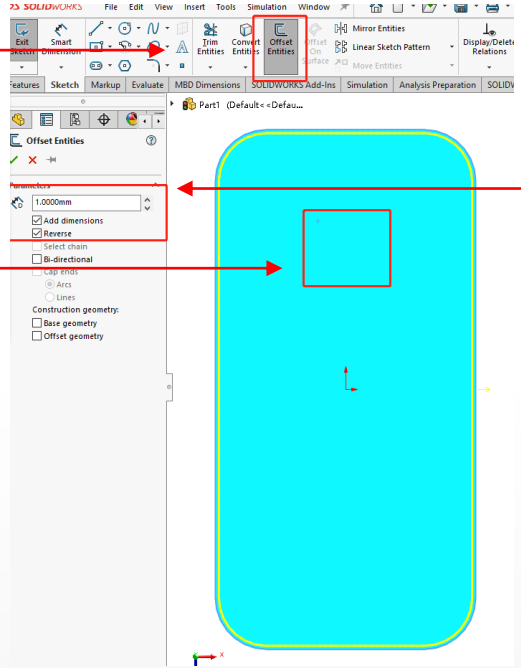
22. Click “Offset Entities”

23. Click surface



24. Set “Reverse”, “1 mm” From your measurement as thickness of phone case

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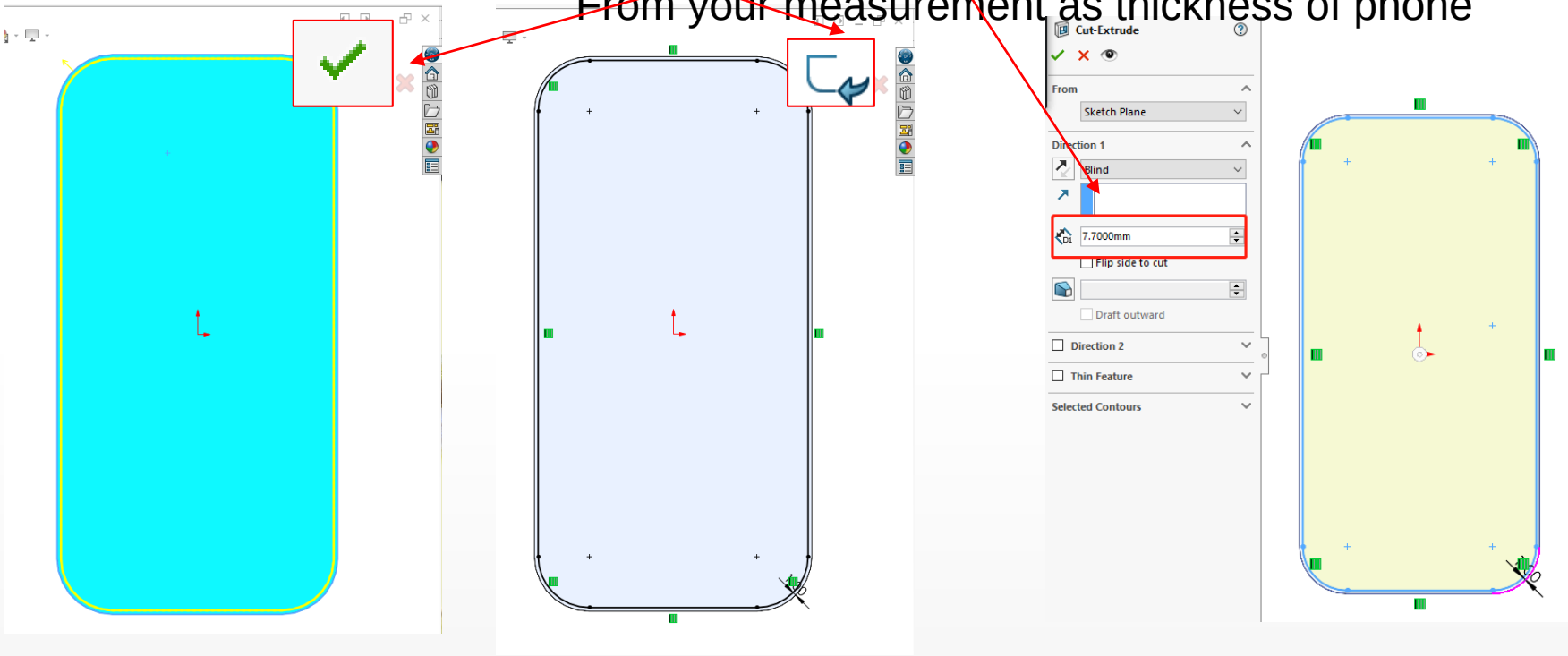
25. Accept, and Set “7.70 mm” for cut depth, accept From your measurement as thickness of phone



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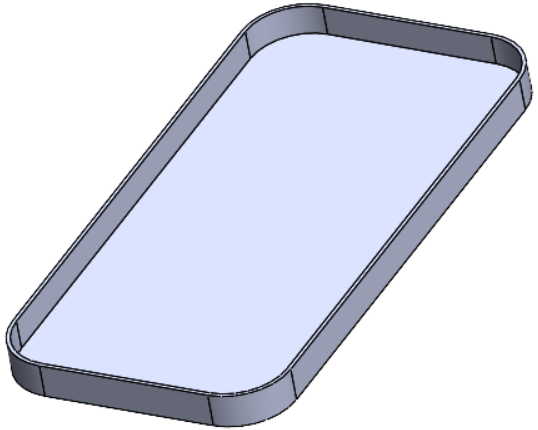

26. Current model is looking like this

27. Next step is to make hole for camera

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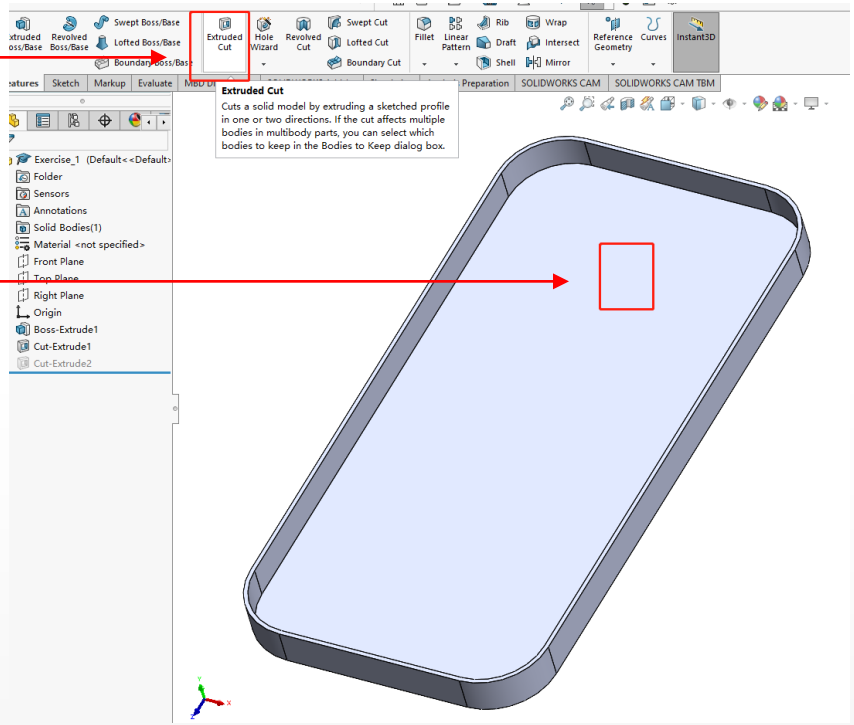
28. Click “Extruded Cut”

29. Click surface



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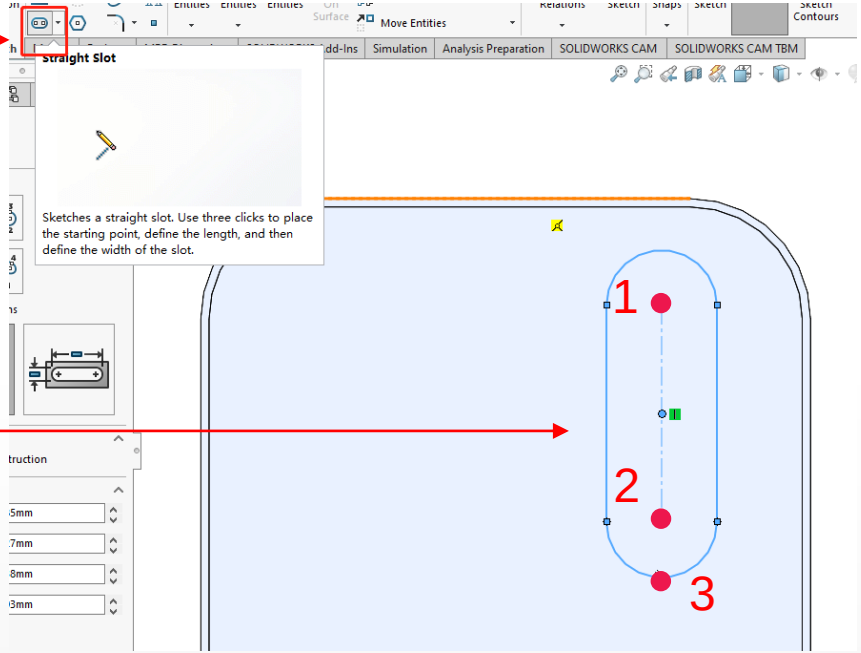
30. Select “Straight Slot”



31. Click following “1”, “2”, “3” to create a straight slot

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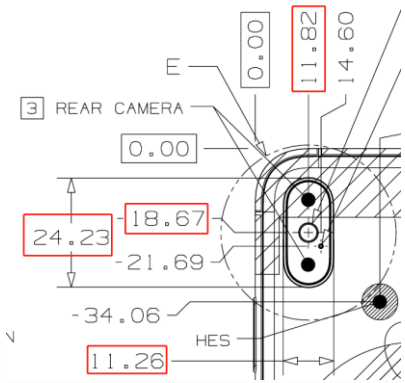

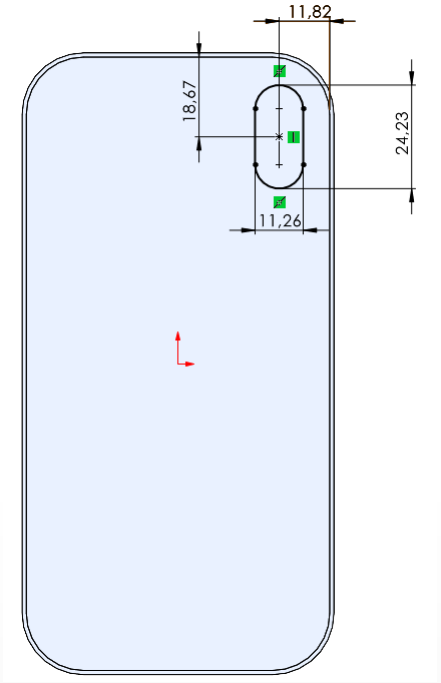

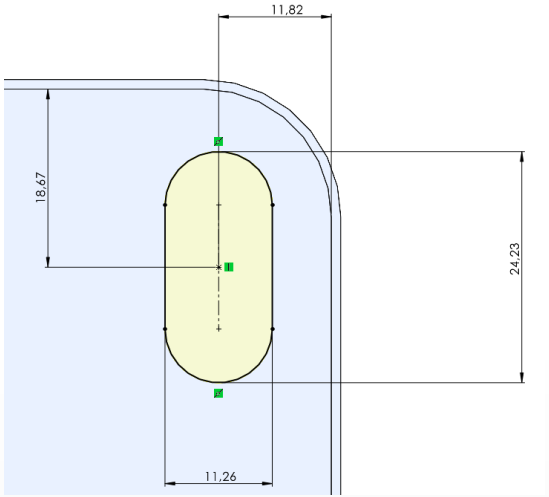

32. Use “Smart dimension” to locate the camera, details of sketch in the next slide

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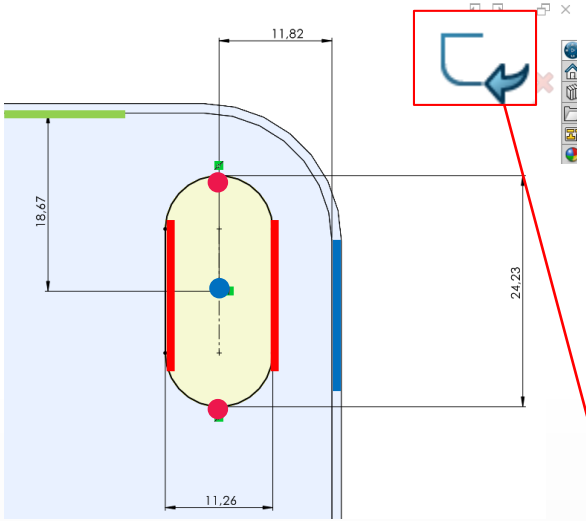

33. “Smart dimension” the width of slot by clicking the two lines marked as , “11.26 mm”, measurement as width of camera slot

34. “Smart dimension” the length of slot by clicking the two dots marked as , “24.23 mm”, measurement as length of camera slot

35. “Smart dimension” the location of slot to right side of case by clicking dot and , “11.82 mm”, measurement as phone case right inner side to middle of camera slot

36. “Smart dimension” the location of slot to top side of case by clicking dot and , “18.67 mm”, measurement as phone case top inner side to camera slot

37. Click to accept sketch.

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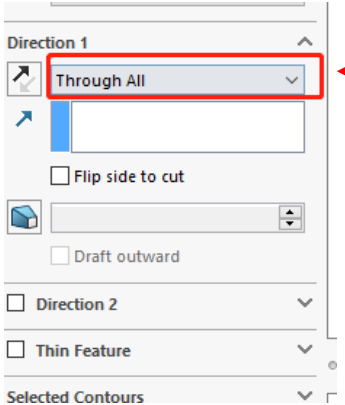

38. Select “Through All” on the left side of screen, then accept

39. Final model is looking like this

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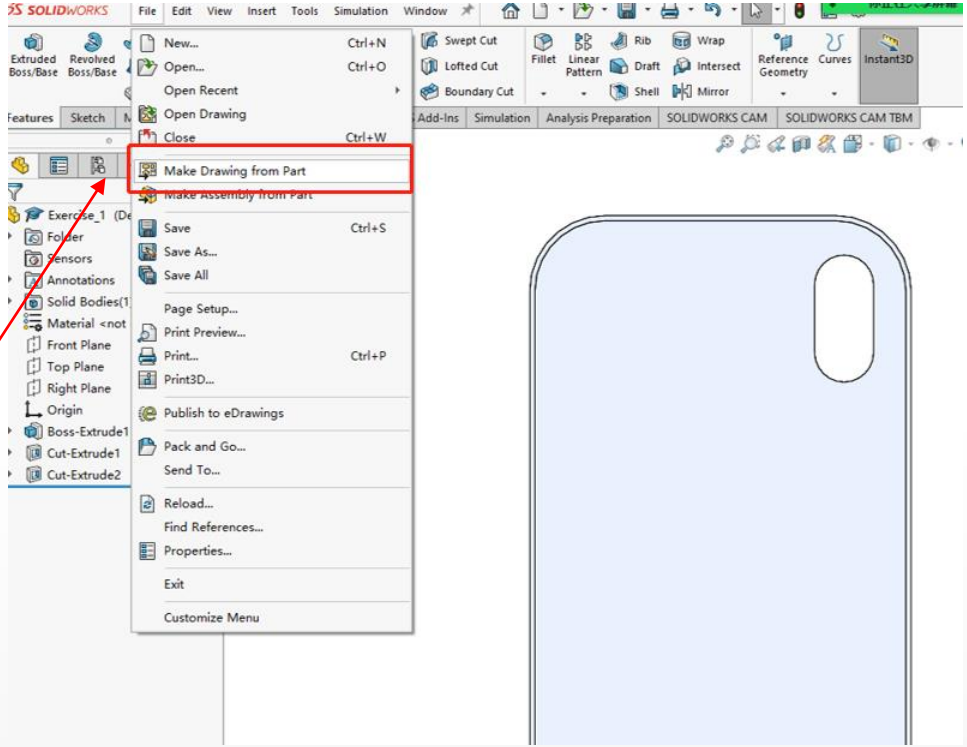
3D model was built, now the 2D drawing should be delivered as technical documentation, here shows the tutorial how to “Make Drawing from Part”.

40. Click “Make Drawing from Part” from File option



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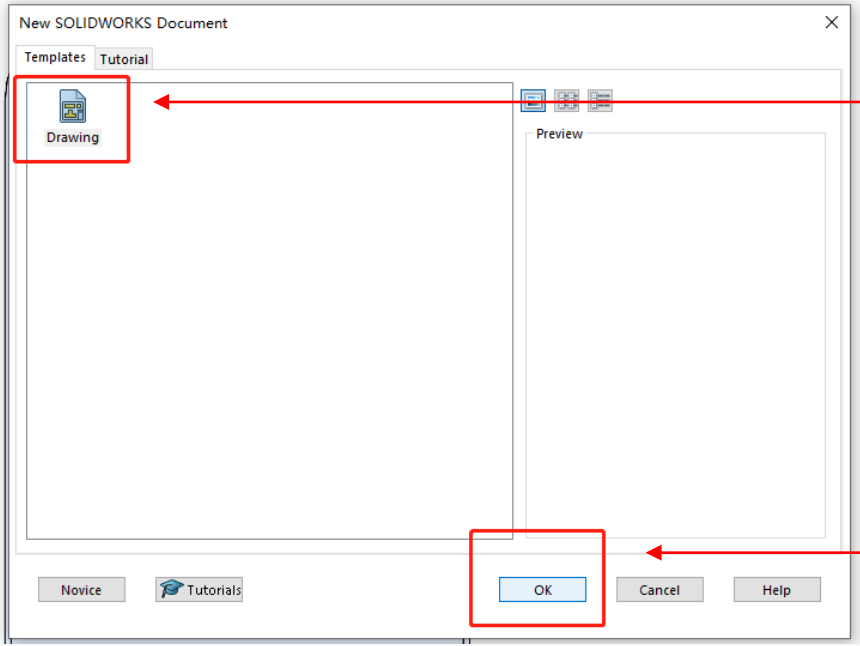

41. Click “Drawing”

42. Click “OK”

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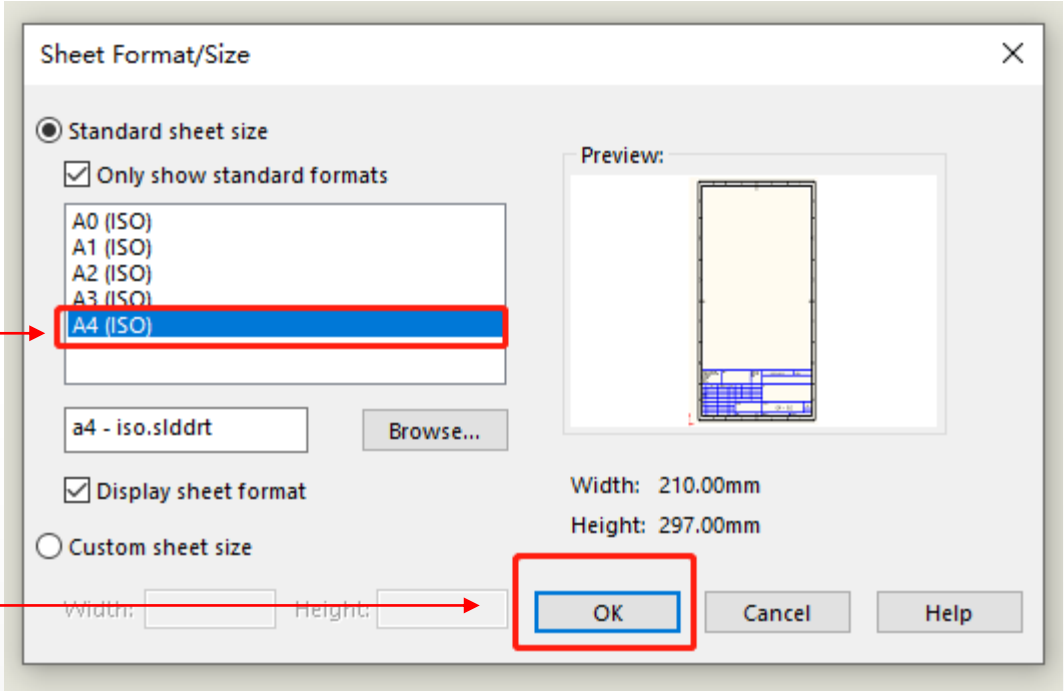
43. Click “A4”

44. Click “OK”



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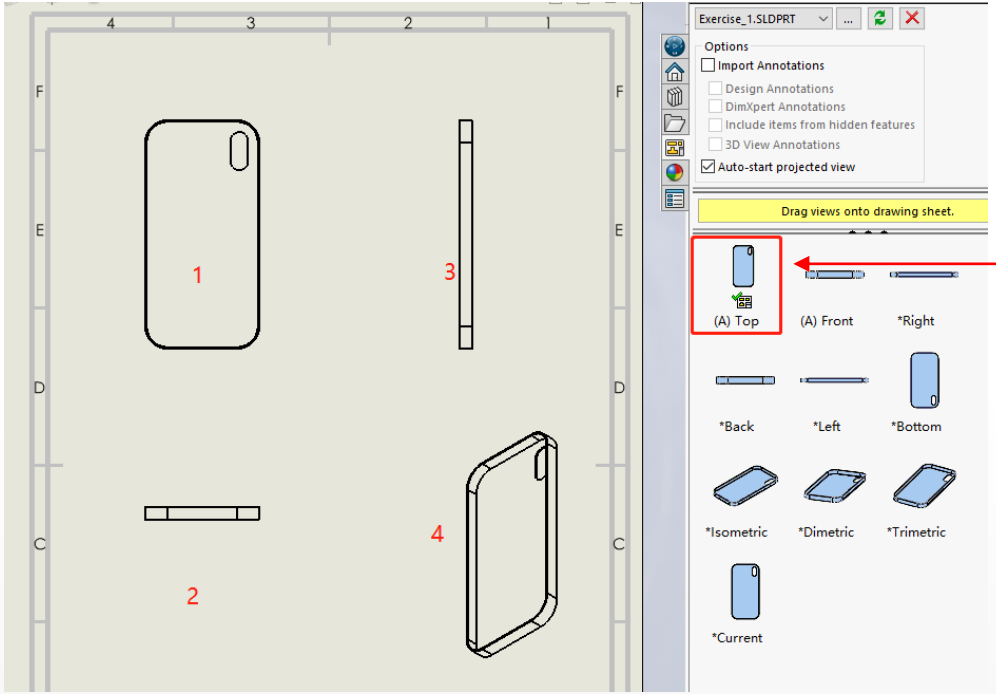

45. Drag “(A) Top” to position “1”, then move mouse, and click to position “2”, “3”, and “4”

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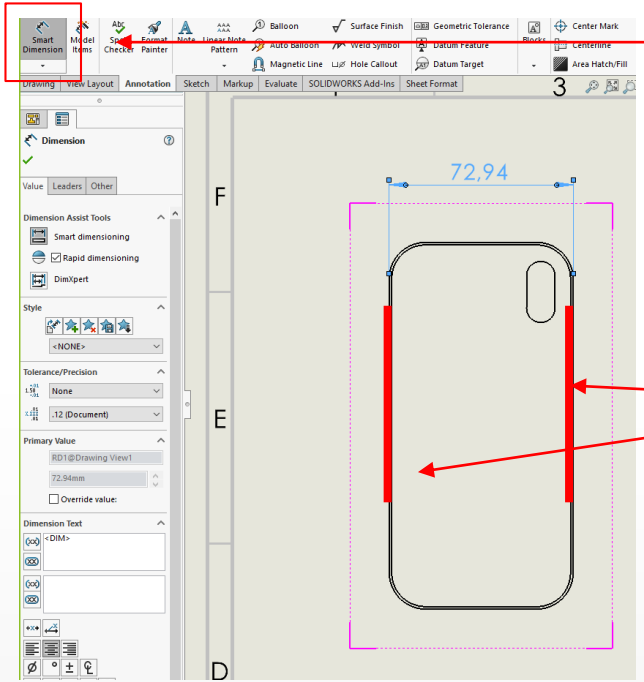

46. Click “Smart Dimension”

47. Click two outer lines marked in , and drag the dimension line to the top (width)

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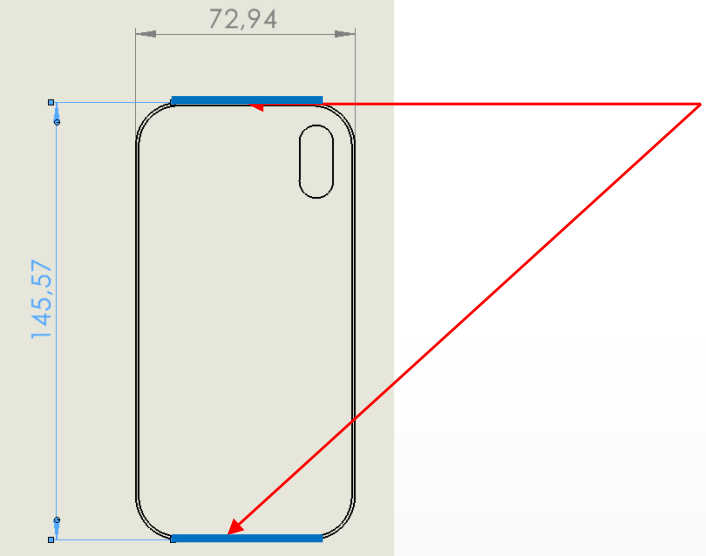

48. Click two outer lines marked in —, and drag the dimension line to the left (length)

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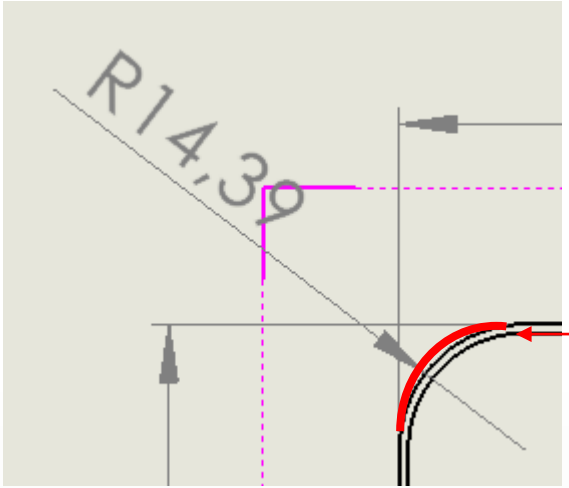

49. Click fillet, and drag the dimension line to the right

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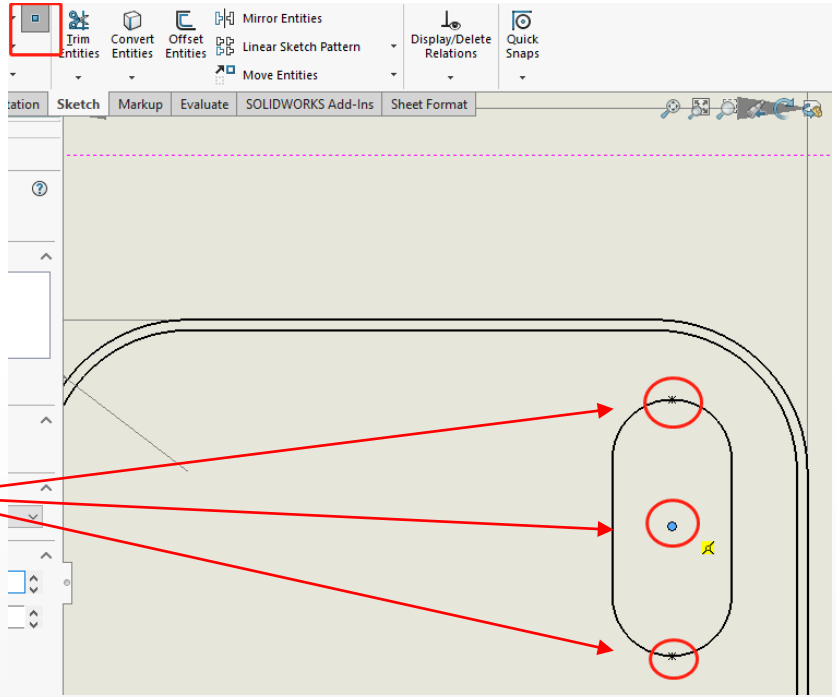
50. Click “Point” in Sketch toolbar



51. Add 3 points for reference

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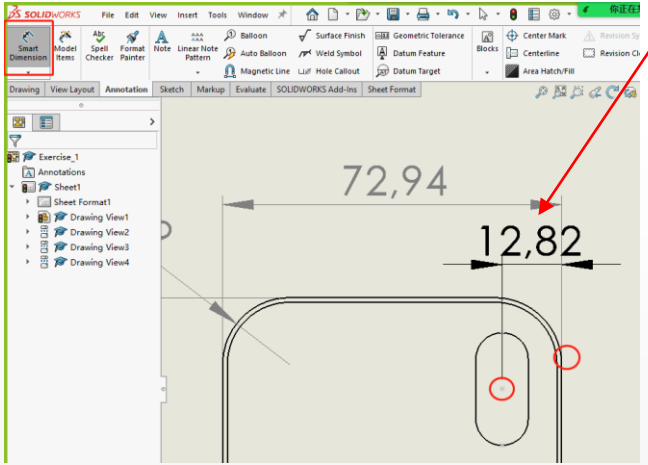
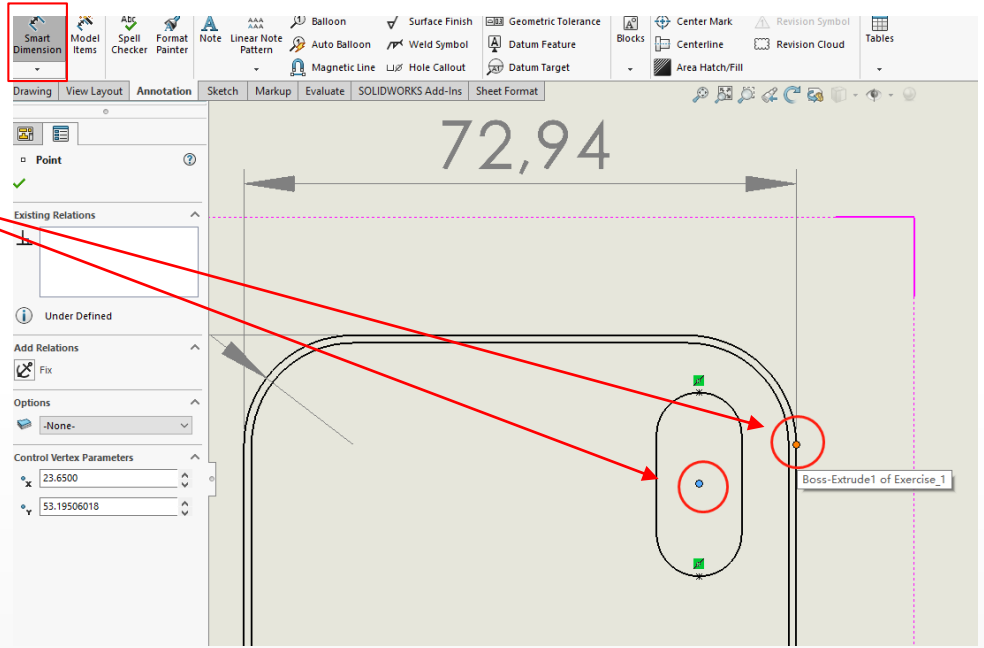
52. Click “Smart Dimension” in Annotation

53. Click 2 points to dimension





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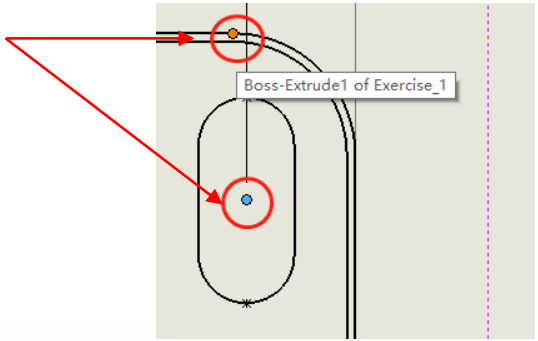
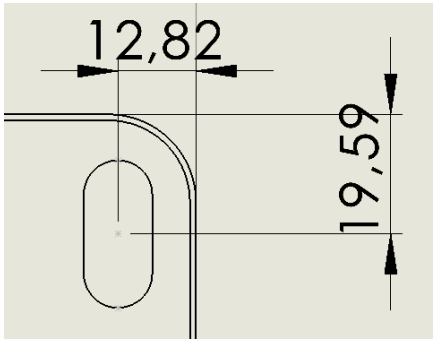
54. Click 2 points to dimension





Now the position of the center of the straight slot is definied

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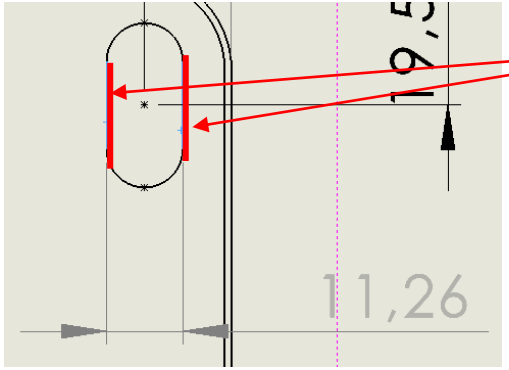
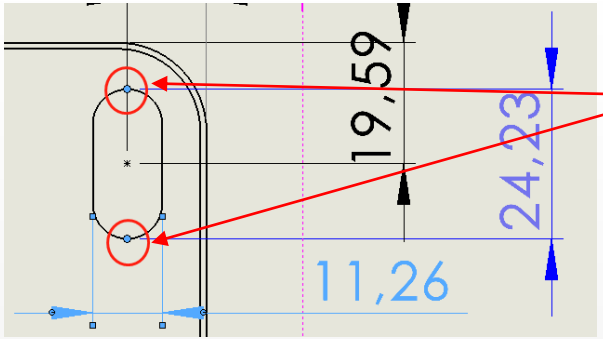


55. Click two lines marked as | , then drag it to free space



56. Click two dots marked as ◯, then drag it to free space

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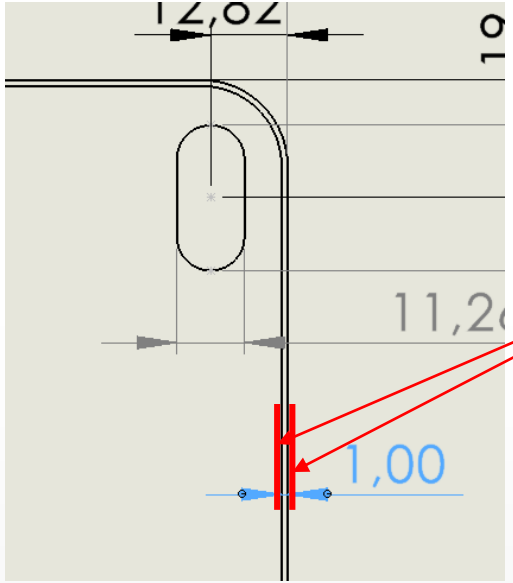
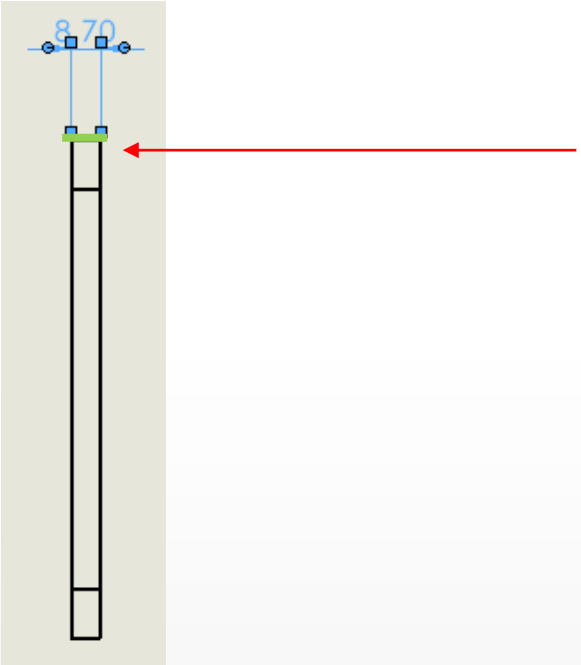


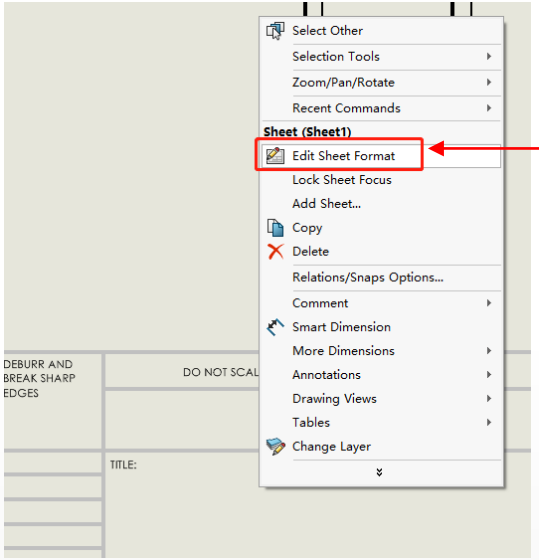
57. Click two lines marked as |, then drag it to free space

Exercise 1 Tutorial: Phone Case Modeling



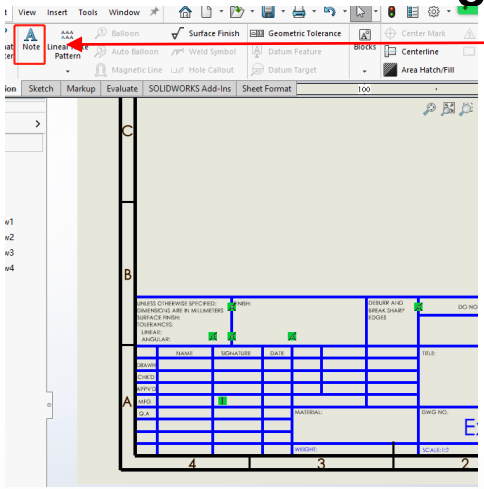
58. Click line marked in —, and drag the dimension line to the left (thickness)

Exercise 1 Tutorial: Phone Case Modeling

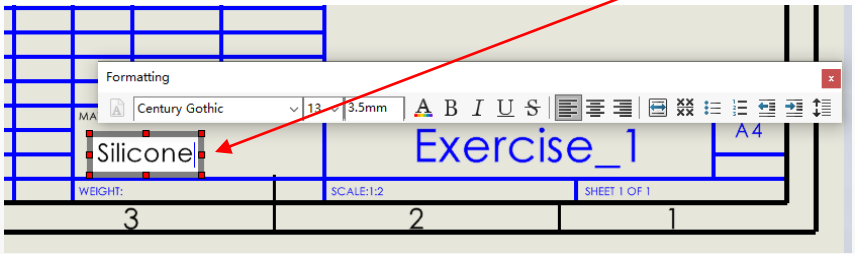


59. Right click the blank space, then click “Edit Sheet Format”

Exercise 1 Tutorial: Phone Case Modeling

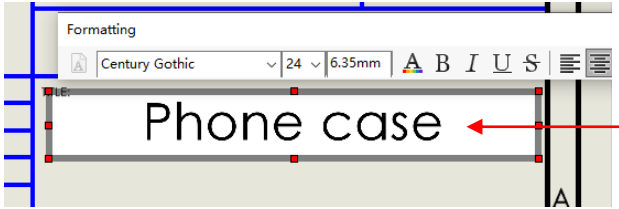


60. Click “Notes”

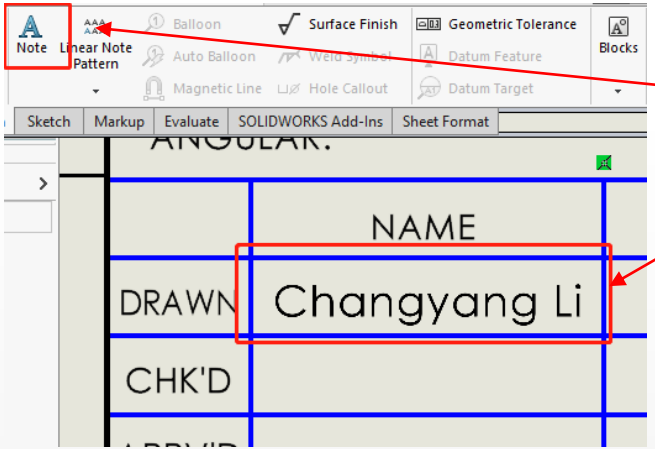


61. Create box here, and type material “Silicone”

Exercise 1 Tutorial: Phone Case Modeling

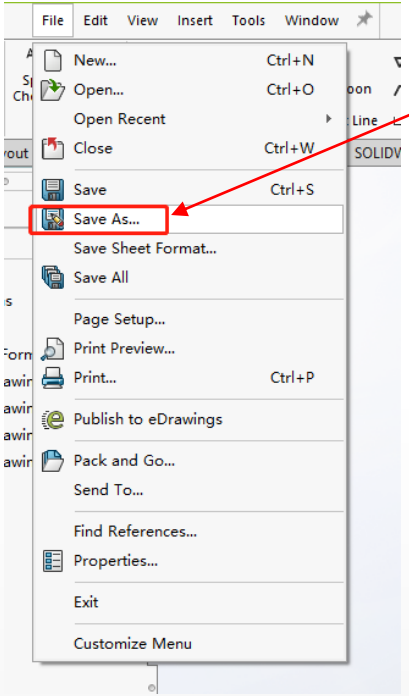


62. Double click area in “Title”, write title “Phone case for xx (your own phone model)”



63. Click “Notes”, and create box under the “Name”, then write your name

Exercise 1 Tutorial: Phone Case Modeling

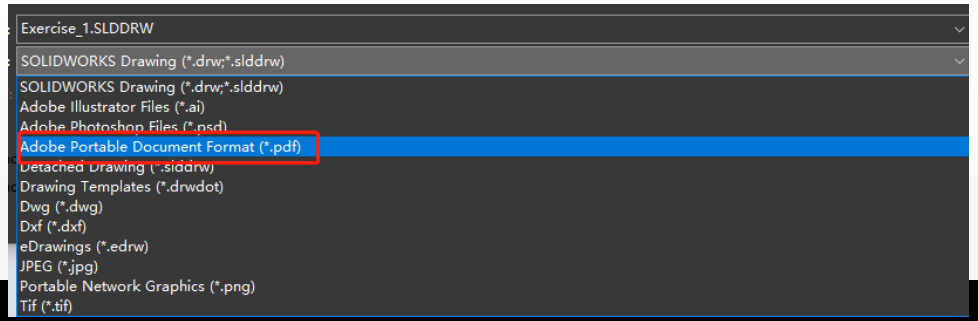


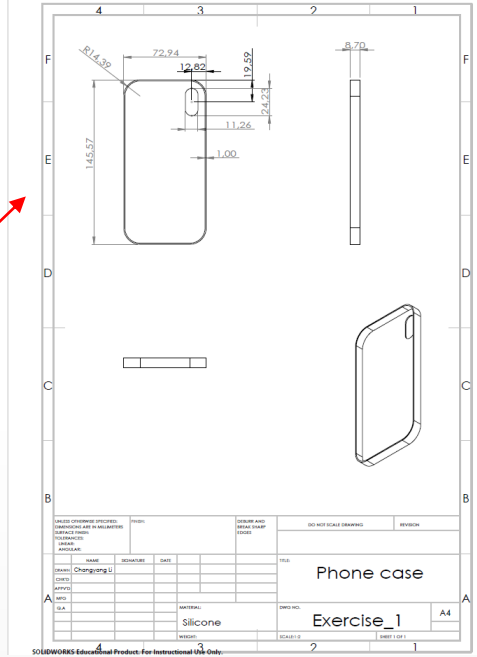
64. Click “Save As…”

65. Choose “*.pdf” format

66. PDF file will be looking like this

67. Upload created pdf to Moodle assignment





Exercise 1 Tutorial:
Phone Case Modeling

Summary**:**
Features used in this exercise 1:

- Part (Sketch)
- Part (Extruded boss/bass)
- Part (Extruded cut)
- Part (Smart dimension)
- Part (Vie orientation)
- Part (Fillet)

- Technical drawing (Layout)
- Technical drawing (Edit sheet format)
- Technical drawing (Smart dimension)
- Technical drawing (Save as pdf)