



REPUBLIC OF TURKIYE
MINISTRY OF NATIONAL EDUCATION
The General Directorate
of Technical and Vocational Education

15th INTERNATIONAL MoNE ROBOT CONTEST

INDUSTRIAL ROBOTIC ARM RULES

INTERNATIONAL
MoNE
ROBOT
CONTEST

Rules

1. Robotic arm should have minimum 4 degrees of freedom (DoF). The number of DoF can be increased optionally (sample robotic arm is shown in figure 1)
2. All equipments (such as actuator, power supply, controller, driver etc.) are provided by competitors.
3. Electric power is 220V and 50Hz. If competitors need lower voltage, they can bring their own equipments to reduce voltage.
4. Hydraulic ,pneumatic or electrical actuators on robotic arms can be used.
5. Joint axis will be controlled separately. In other words, axis can move independently. It is because DoF of robot will be tested.
6. Opening/closing gripper is not a DoF. It should be considered while calculating robot DoF.
7. Robot can be controlled manually or wireless. Autonomous / half autonomous works won't be accepted.
8. Workspace is maximum 1200 mm. Therefore, robot must not go out of this area when all joint angles are maximum . Robot must be placed in this area.
9. When robot grips the objects , it should inform this action with a light indicator (LED etc.) and audible warning (Buzzer etc.). **In another word, light indicator will show and audible warning on , if robot catches any object.** Only one indicator and audible warning is enough for all objects. Robots which don't have such functions will be disqualified.
10. Competitor places the robot in workspace. After the competition starts, it is not allowed to change its place or touch to robot. Horizontal and vertical movement of the Robotic Arm on a base axis will be allowed during the competition.
11. The area to be used to start the competition is the 12 cm x 12 cm sized yellow colour coated area on the ground in front of the platform number 8 shown in Figure 7. The competition will start when the robot touches this area and the time will be completed when it touches the same area.
12. After starting game, teams have to finish tasks in 3 minutes. Competitors will stop to operate their robots by instruction of judge which is "Time is up".

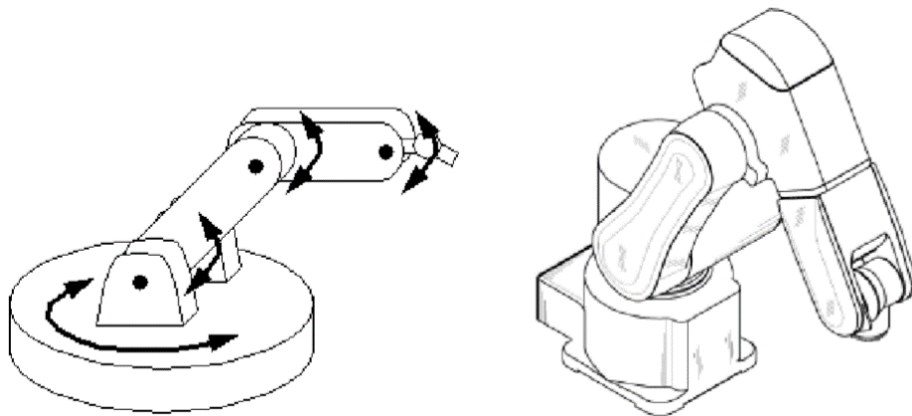


Figure 1- Sample Robot Arm



13. Each team can request only one technical break. During this break , teams can fix simple and basic problems or damages. Break is limited with 1 hour. End of break, team will continue its game from current task and time.
14. Robotic arm picks and places various objects (made by PLA plastic) to the platform which is shown at figure 2. Platform dimensions are given at figure 3 and figure 4.
15. All competitors will log in to the system at robot.meb.gov.tr until 17 February 2023 and upload their production reports in pdf format for evaluation.
16. The robots are expected to be originated from the original thoughts of the students, shaped by them, and completed with their own knowledge and skills. Robots, project owner students and counsellors will be eliminated from the competition.
17. The rules of the competition can be changed by the decision of the Organising Executive Committee

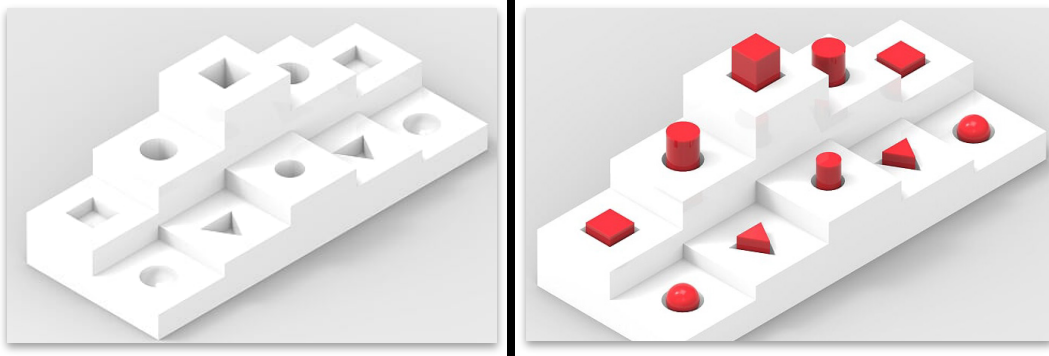


Figure 2- Platform and objects

Scoring

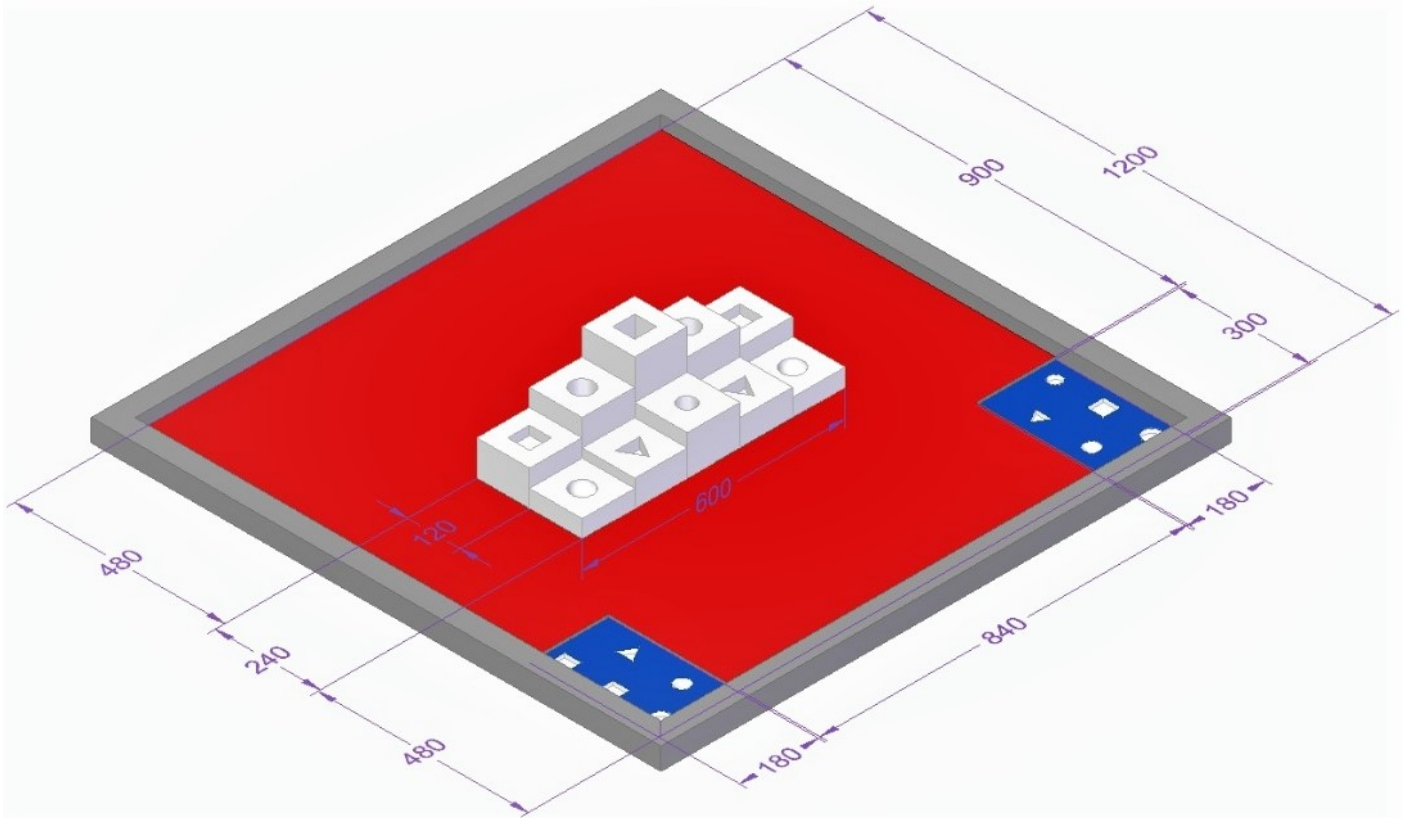
1. Ranking list is announced after all teams played. Teams will be sorted from best score in ranking list. In case of equal scores, their times will be taken into consideration. Top 10 teams on the ranking list will get chance to go final games. In final games, team which gets best score in shortest time will be winner. Scoring table is explained at below
2. Winner is determined by calculating total scores considering two different criterions.
3. Each object is 10 points. Competitor gets 100 points totally if all objects are placed correctly.
4. Placement order is not important . The important one is to put the objects in correct places.
5. While robot is moving, if it causes to fall objects which were already placed, penalty (-5 points) is given to team. It is not allowed to pick this object again.
6. While robot is carrying an object, If it drops this object down the workplace, it gets -5 points as a penalty. Competitor can take the object again and carry to platform. It is not allowed to pick the object if it is dropped second time.
7. Any damage to the platform made by robotic arm or its operator will be disqualified.
8. Total score will be calculated according to the following table.

Criterion	Percentage (%)	Calculation
Object placement score	85	0-100
Robot time	15	$\frac{\text{Best time in the contest}}{\text{Robot time}} \times 100$

Score: (%85 x object placement score)+(%15 x Robot time)

Dimensions of platform and objects

1. Location of platform on red ground is given in figure-3. It is placed according to these given dimensions.
2. Red zone is working area, blue zones are first locations of objects to be placed. Any of these blue zones will be determined by drawing lots. Competitors can place their robots any where in red zone. You can also place additional equipment such as power supply, controller, etc. on the red background. Grey areas are for scaling. There will be no such section in the competition area. The same layout will be used for all competitors. There is no drawing process.



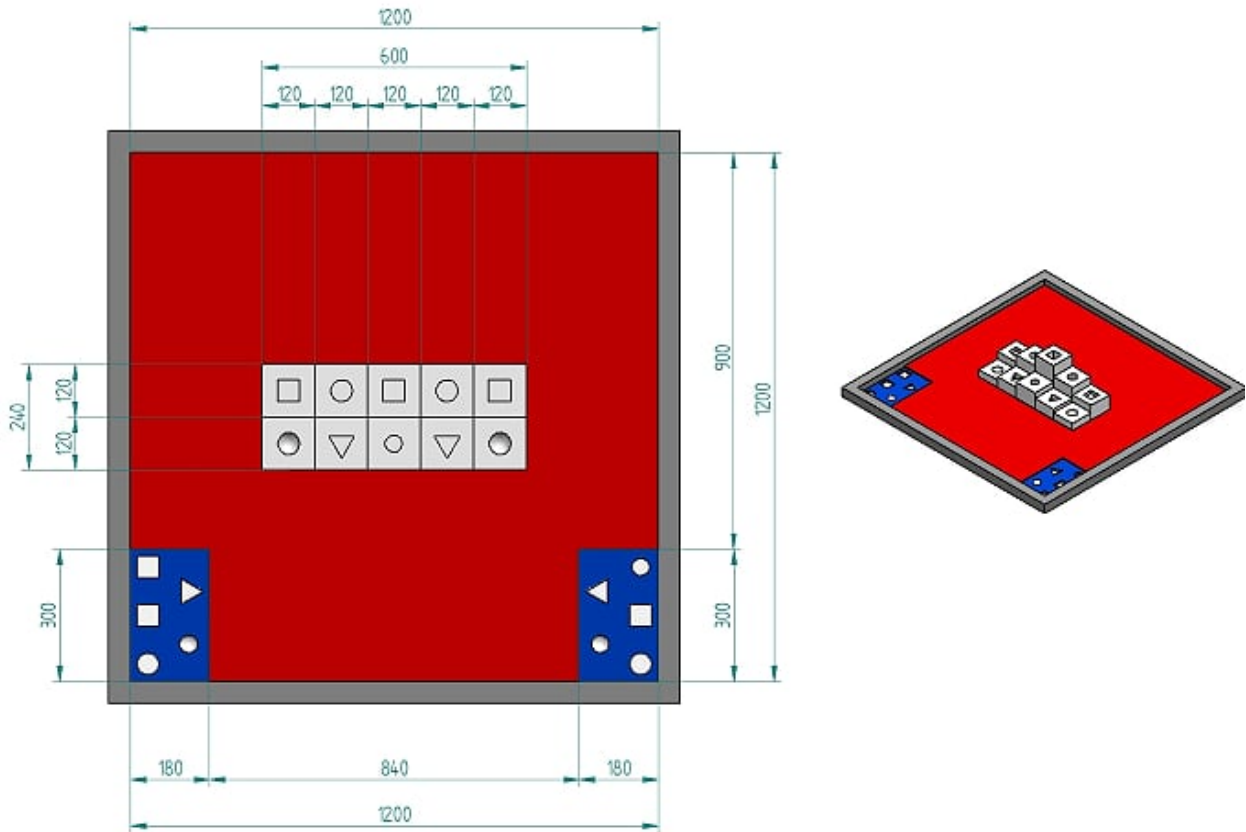


Figure 3- Location of Platform

3. Dimensions of blue zones given at figure 4a and figure 4b.

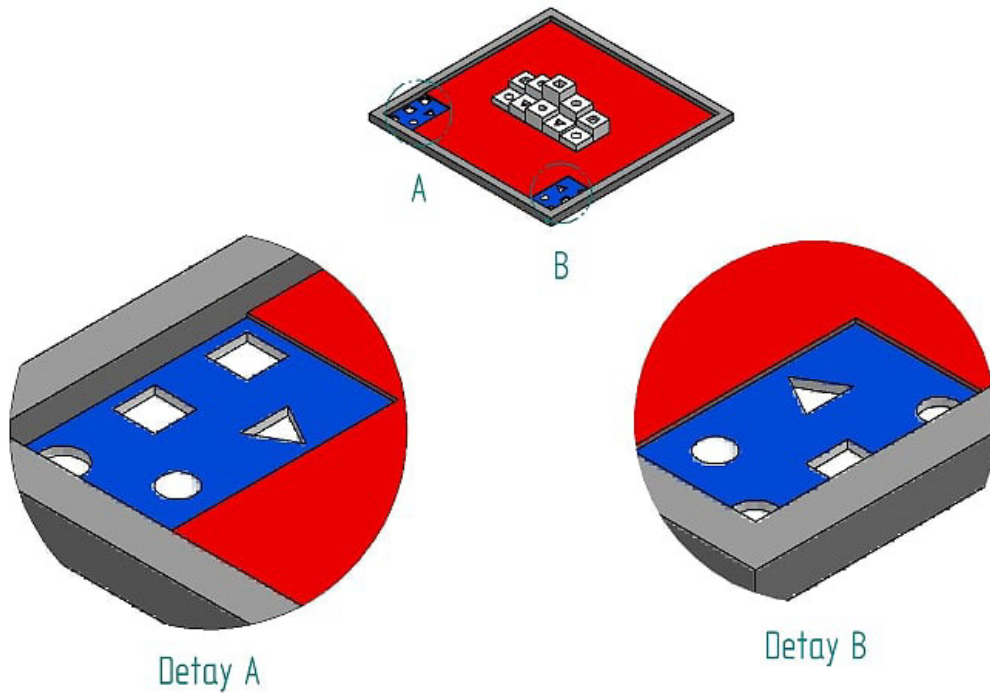
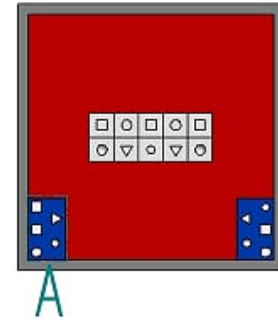
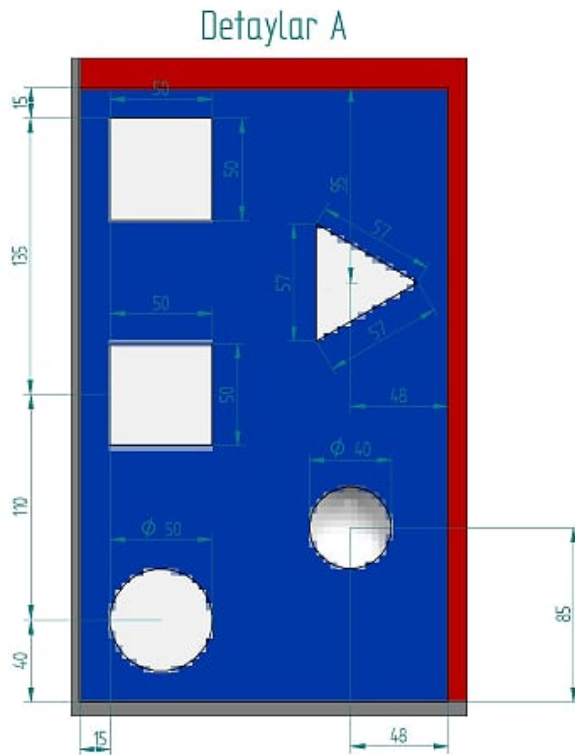
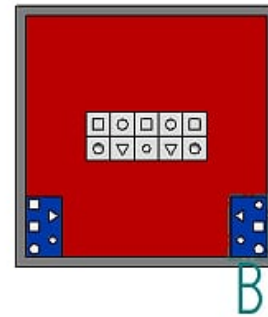
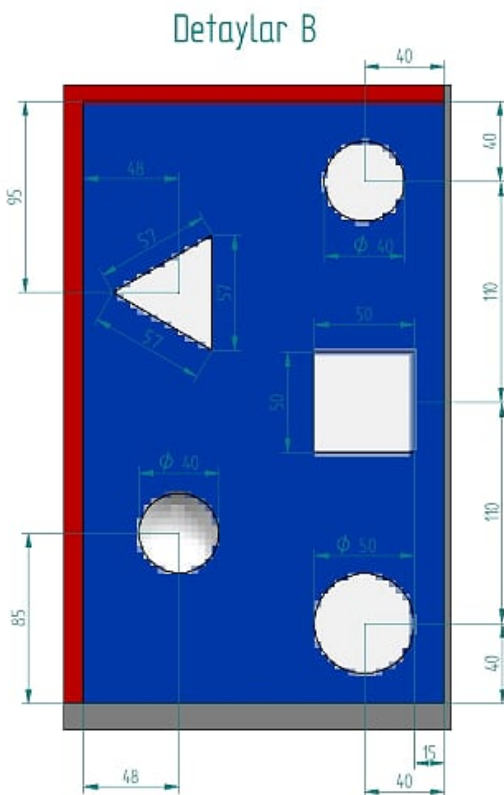


Figure 4a- Object placement zones



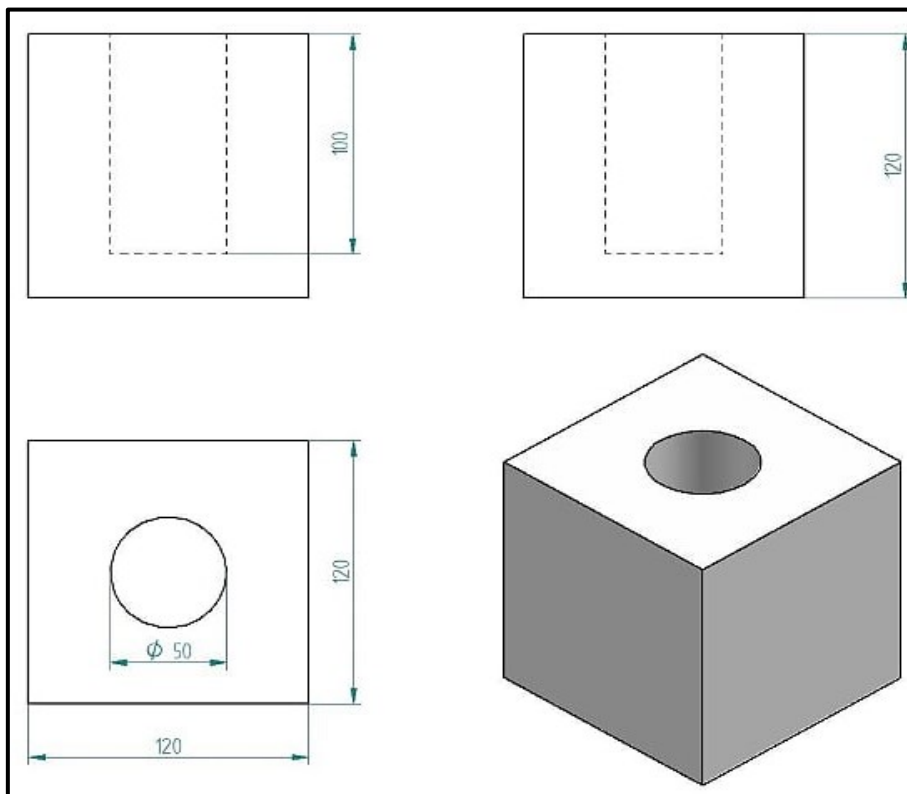
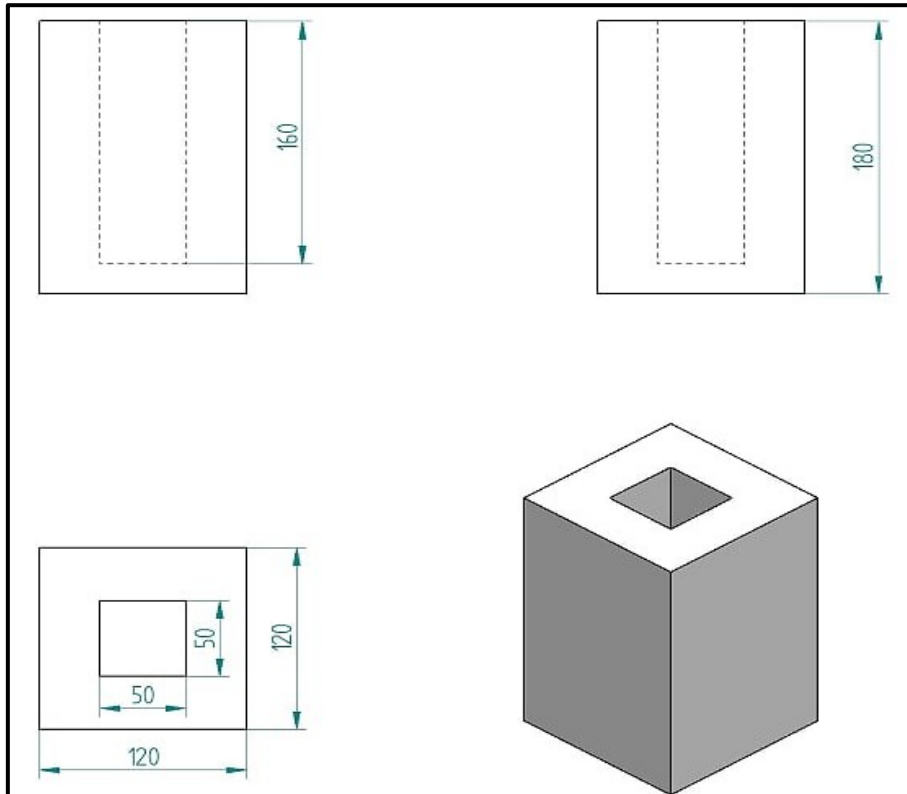
Derinlikler buton yuvaları için 10mm

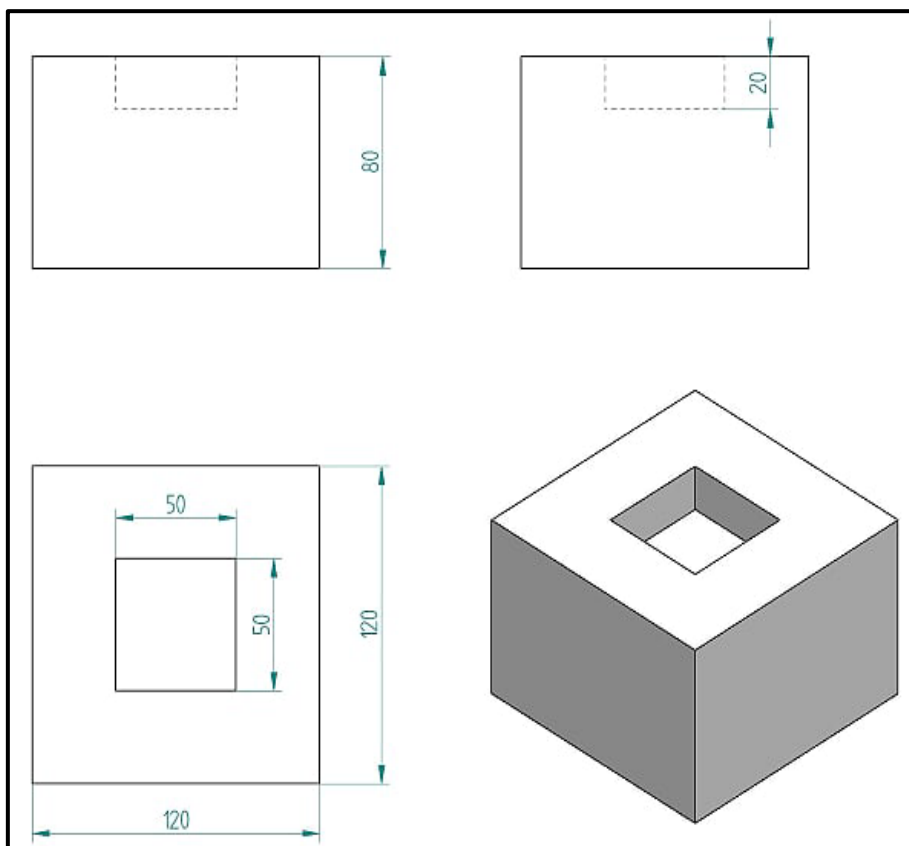
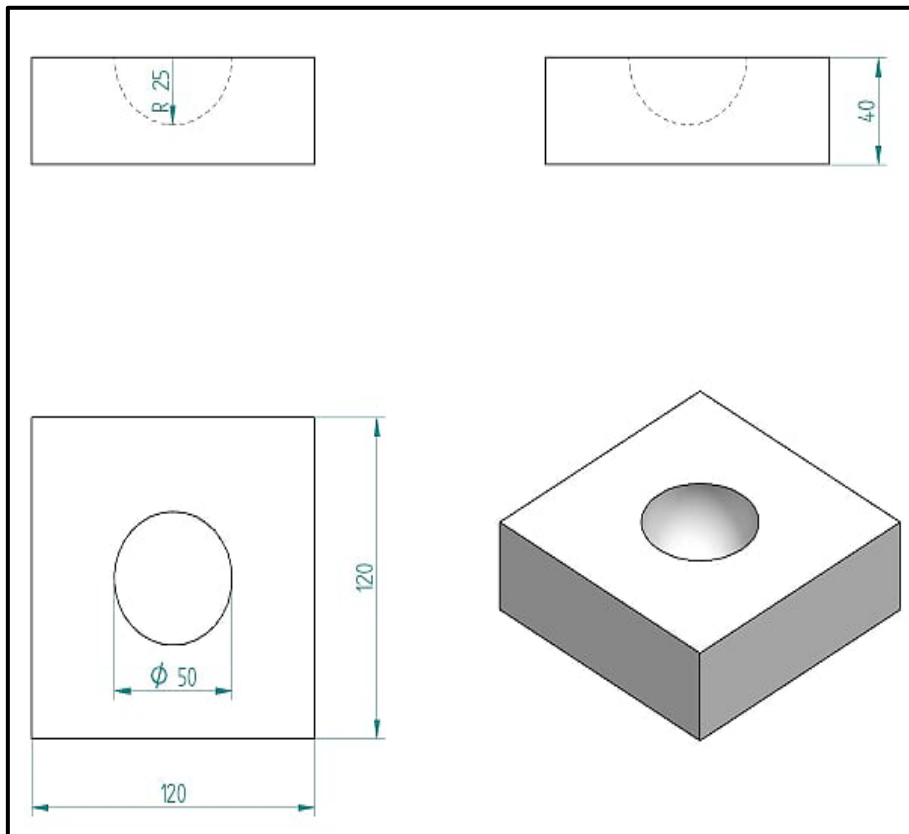


Derinlikler buton yuvaları için 10mm

Figure 4b- Location of blue zones

- There is only one platform to use in this competition and its dimensions are given at figure 5. Platform parts will be produced with 3D printer by using PLA material.
- Platform consists of 10 parts. Dimensions are given at figure 5.





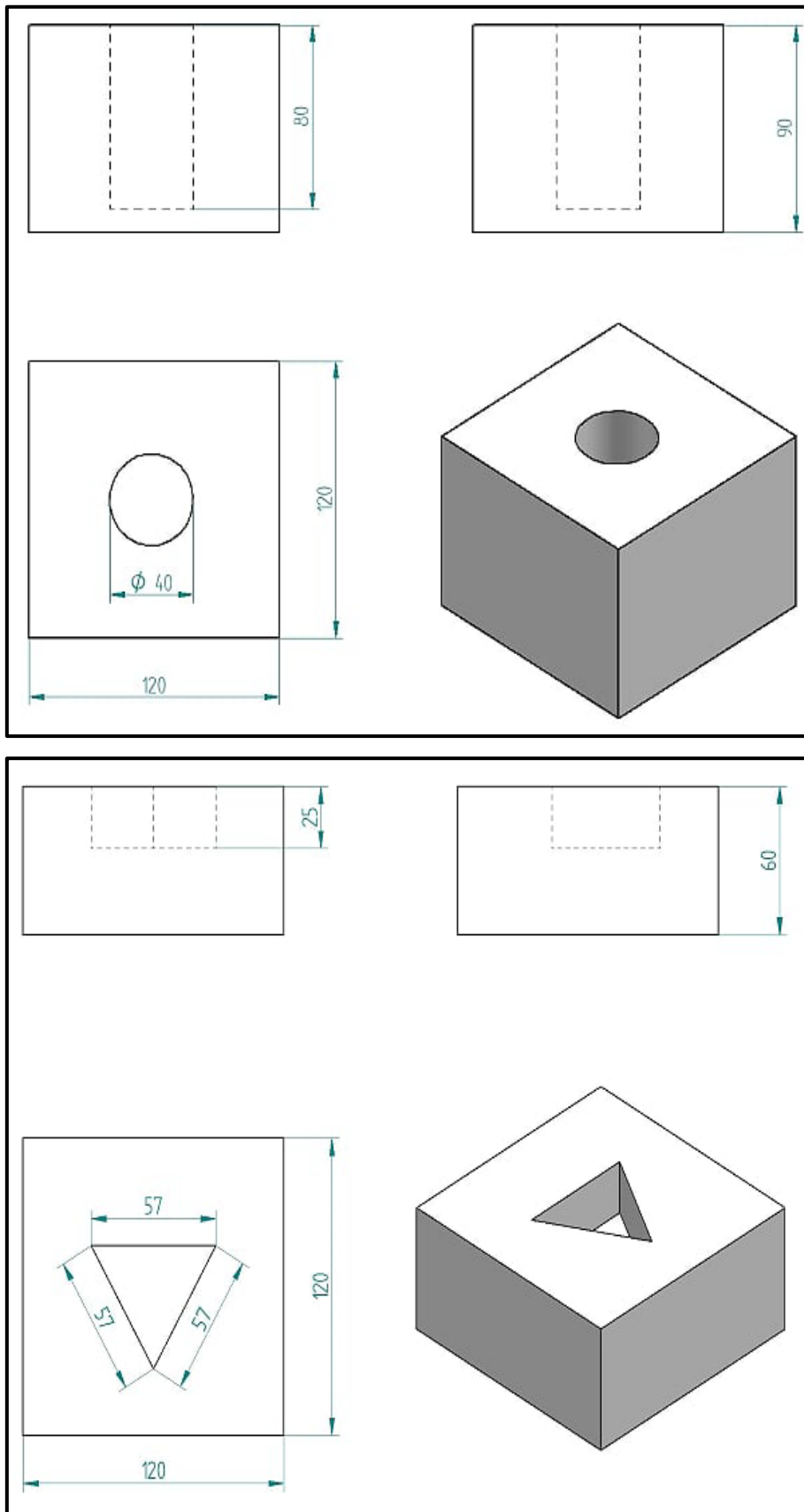


Figure 5- Platform dimensions

6. There are 6 different objects to be placed on the platform. Dimensions are shown at figure 6.
7. Information about the weights of objects will not be given. Objects will be produced by using 3D printer with PLA material and %20 infill density.

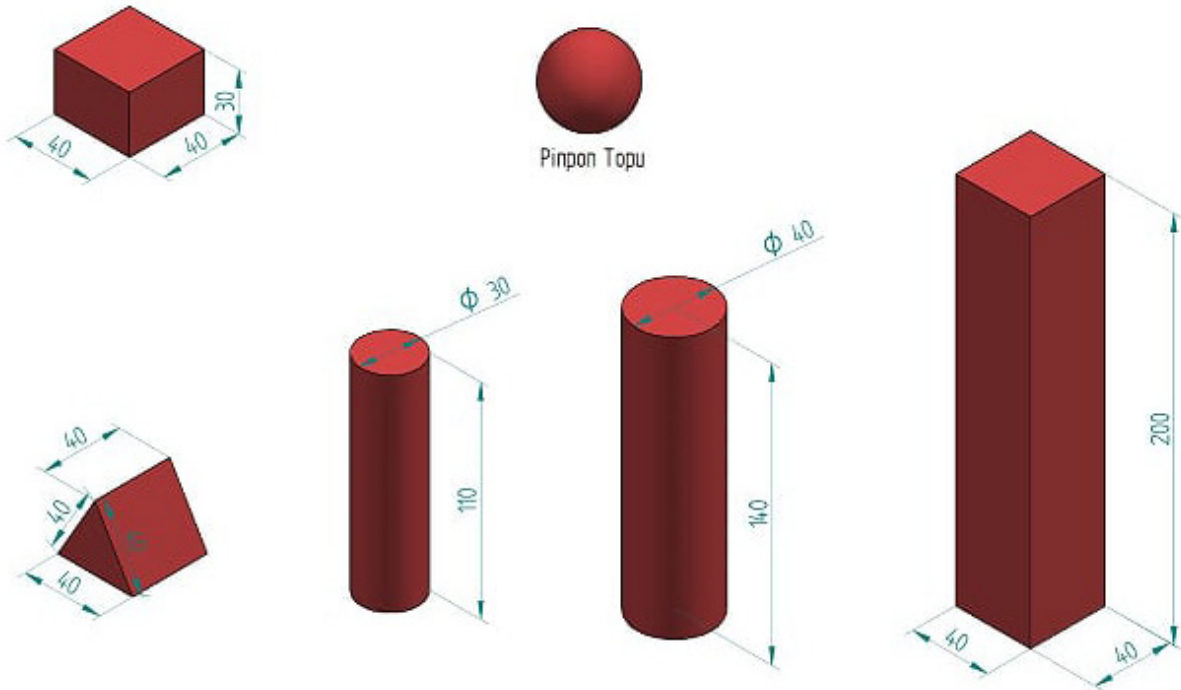


Figure 6- Objects

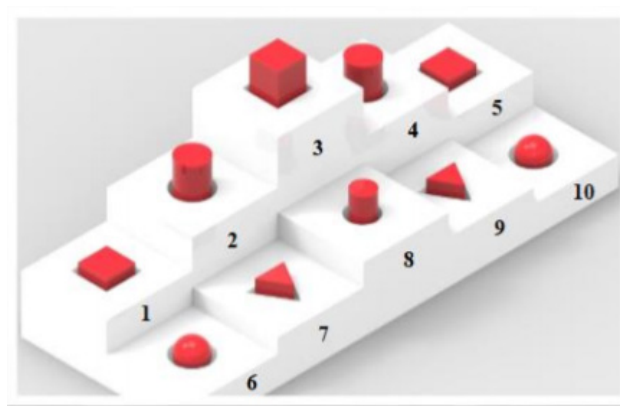


Figure 7- Arrangement of objects on the platform

- 1 and 5: 30 mm high prism
- 2 and 4: Ø 40 Cylinder Part
- 6 and 10: Ping-Pong Ball
- 7 and 9: Triangle Piece
- 8: Ø 30 Cylinder Track
- 3: 200 mm High Prism