SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

Updated : 21/01/2025

APRA
ASIA PACIFIC ROBOT ALLIANCE

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

Content

A. Brief
B. Field Setup And Specifications
C. Game Description
D. Scoring
E. Game Rules
F. Other Rules
G. Assembly Of Game Objects

Mission field

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

A. Brief

A1. Iron Three Mission is a sport that not only tests players' physical fitness and willpower, but also requires the use of strategies to gain an advantage. This competition requires a robot to play the role of contestant and complete three events: swimming, cycling and running. In the process, they need to complete multiple tasks to gain points and complete the event as quickly as possible.

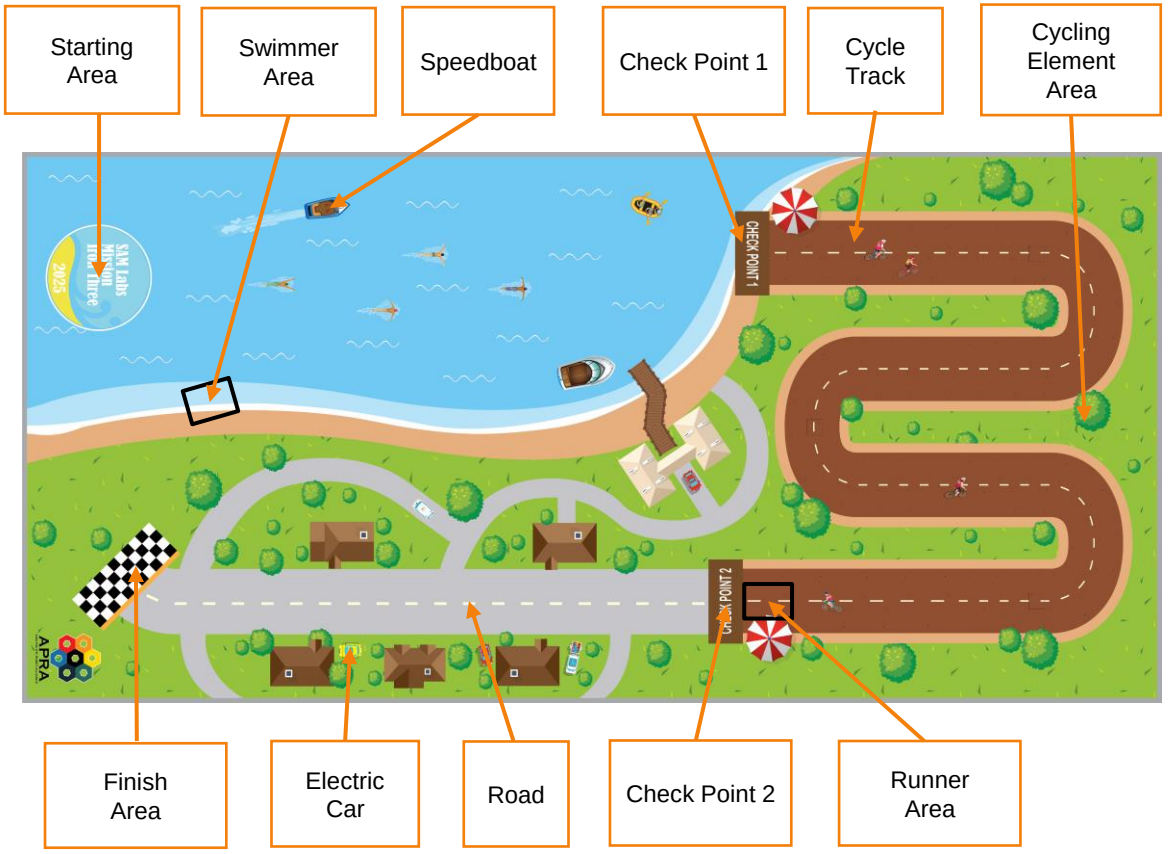
A2. The participating teams consist of one to three members, and each team will use one SAM Labs robot to compete against another team's robot. The team with the higher score within the time limit is the winner.

A3. The quota for each school or organization will be determined according to the actual number of participating teams.

A4. Participating age: Participants must be 6 - 10 years old (birth date in 2025 season is 2015 – 2019).

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

B. Field Setup And Specifications

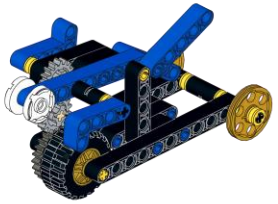


SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

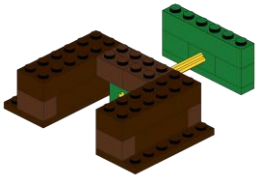
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

B. Field Setup And Specifications

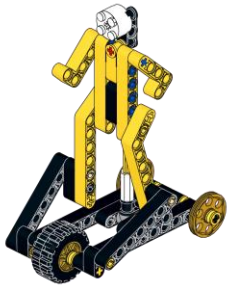
B1. ‘Swimmer’, ‘cycling element device’ and ‘runner’ will be placed on the field.



Swimmer

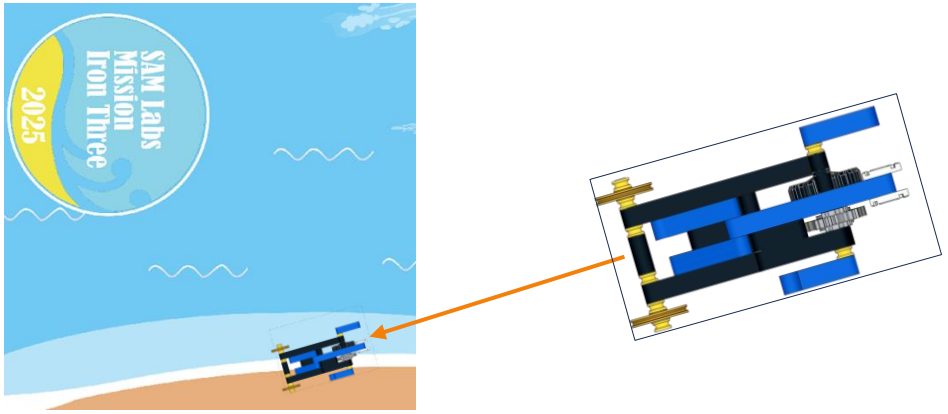


Cycling element device



Runner

B2. The swimmer will be placed inside the swimmer area.

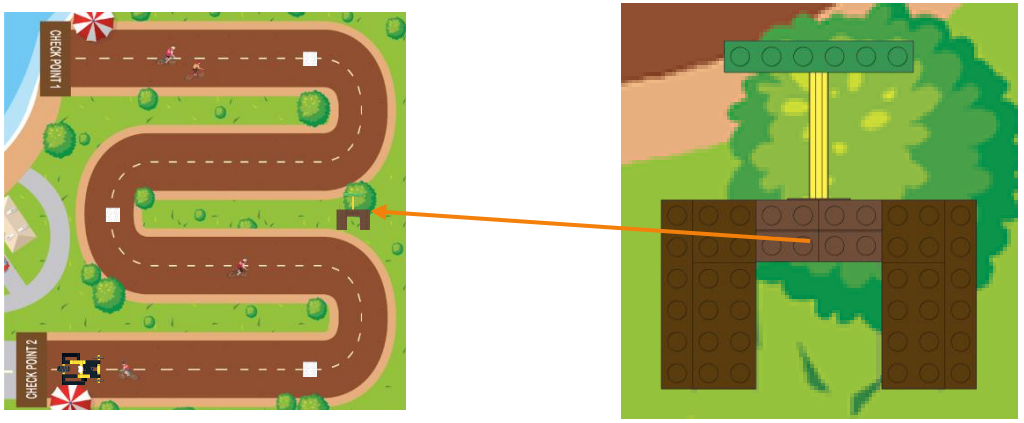


SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

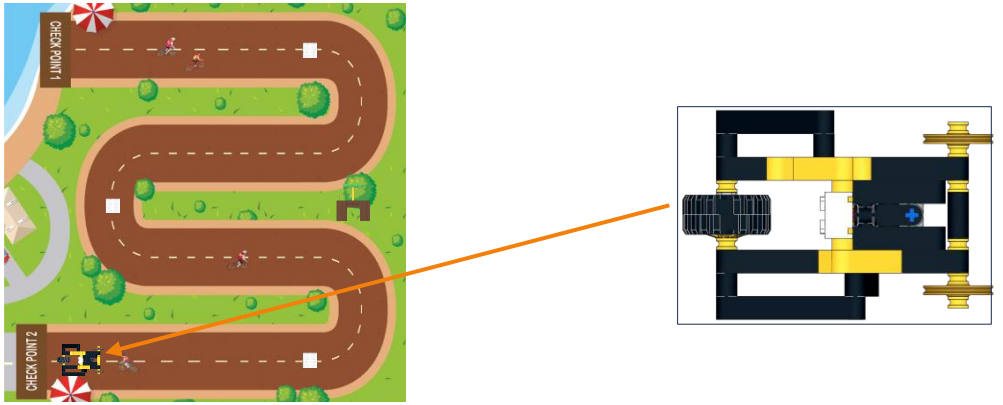
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

B. Field Setup And Specifications

B3. Use Velcro to fix the cycling element device on the cycling element area.



B4. The runner will be placed inside the runner area.

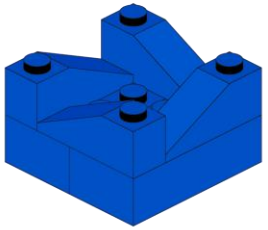


SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

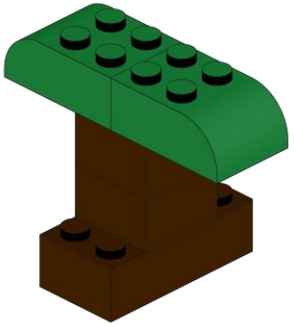
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

B. Field Setup And Specifications

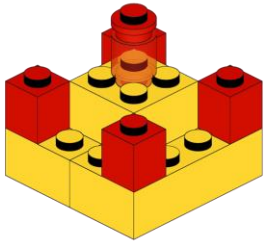
B5. There are three 'Iron three elements' on the field, which are 'swimming element', 'cycling element' and 'running element' respectively.



Swimming element

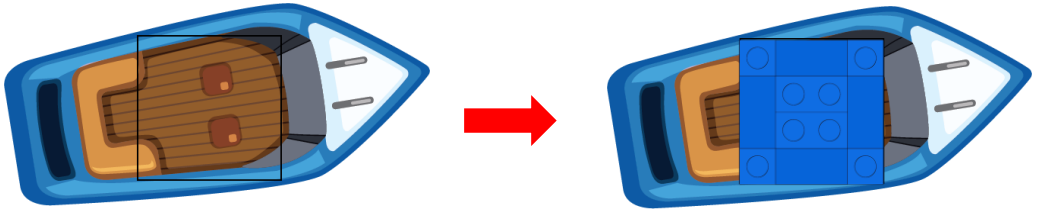


Cycling element



Running element

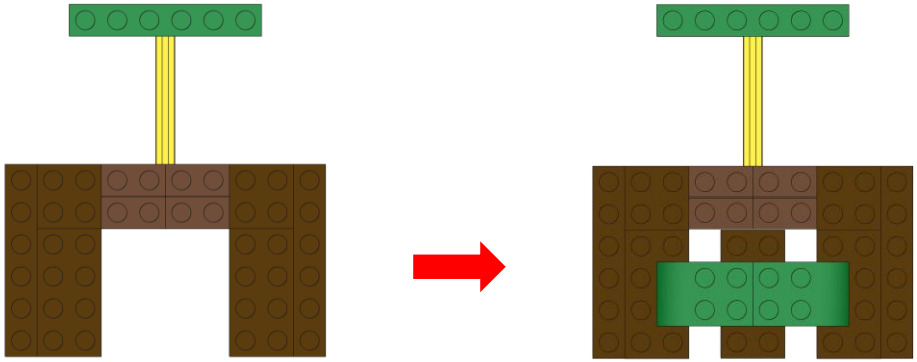
B6. The swimming element will be placed on the speedboat.



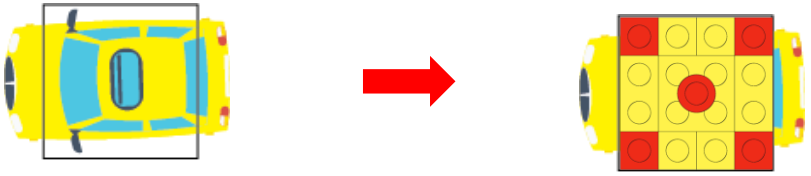
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

B. Field Setup And Specifications

B7. The cycling element will be placed inside the cycling element device.



B8. The running element will be placed on the electric car.

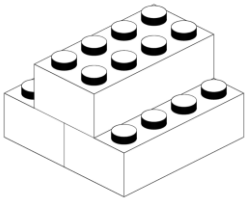


SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

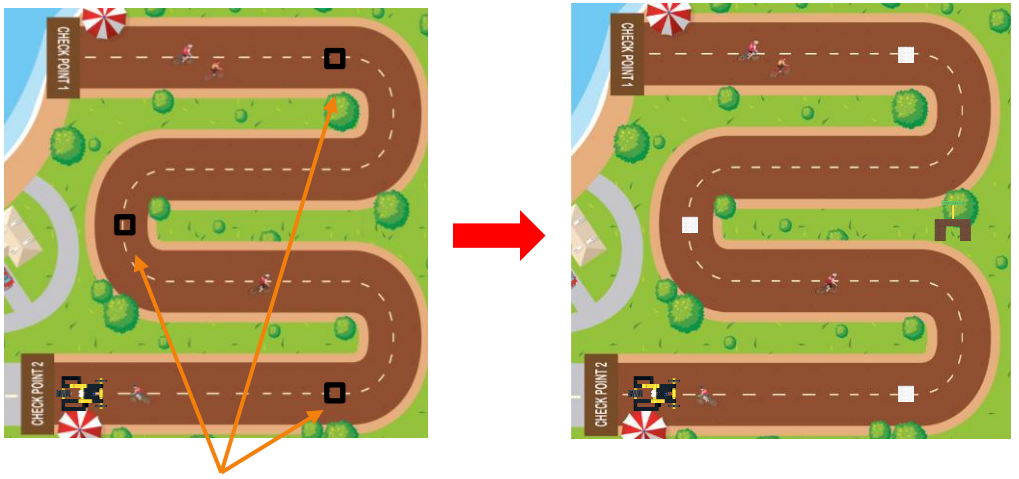
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

B. Field Setup And Specifications

B9. Three obstacles will be placed on the square markers of the cycle track.



Obstacle



square markers

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

C. Game Description

C1. During the tournament, each team will have three rounds, and the score and time of each round will be recorded.

C2. The vertical projection of the robot must be completely within the starting area before starting the game.

C3. After the competition begins, participants are not allowed to touch the robot until the end of the round.

C4. During the competition time, the robot can move freely on the field.

C5. When the time exceeds 120 seconds or the participants says "finish", the timing ends.

C6. The scores of the three rounds of each team will be sorted from high to low. If the scores are the same, the team with the shorter completion time will be ranked higher.

C7. If the scores and time of teams are the same, the best scores and times of the next round will be compared.

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

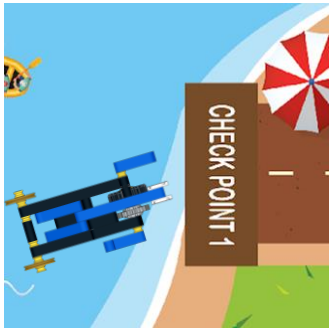
D. Scoring

D1. Definition of completely entered: The vertical projection of an object **completely overlaps** the pattern.

D2. Definition of partially entered: The vertical projection of an object **overlaps** the pattern.

D3. Definition of completely left: The vertical projection of an object is **completely separated** from the pattern.

D4. Mission 1 : The swimmer **<u>partially entered</u>** the check point 1 and **<u>remained upright</u>**, 10 points will be scored.



0 point

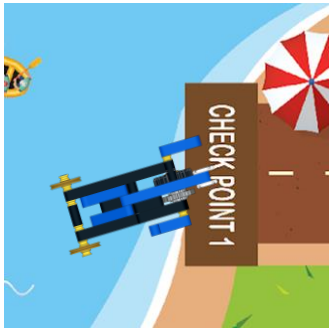
partially entered ✗

remained upright ✓

0 point

partially entered ✓

remained upright ✗



10 points

partially entered ✓

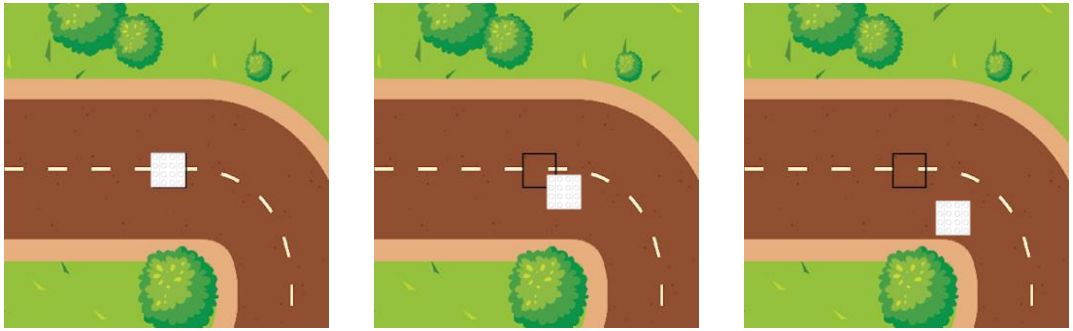
remained upright ✓

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

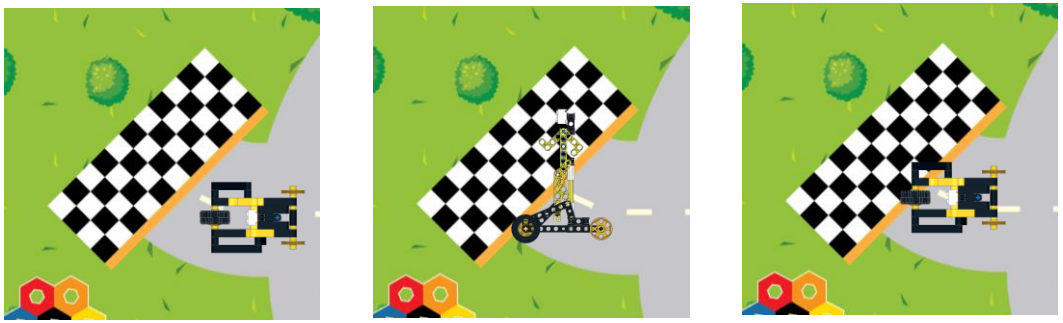
D. Scoring

D5. Mission 2 : The obstacle **completely left** the square marker of the cycle track, will score 10 points each, 30 points in total.



0 point | 0 point | 10 points

D6. Mission 3 : The runner **partially entered** the finish area and **remained upright**, 10 points will be scored.



0 point | 0 point | 10 points

partially entered ✗ | partially entered ✓ | partially entered ✓

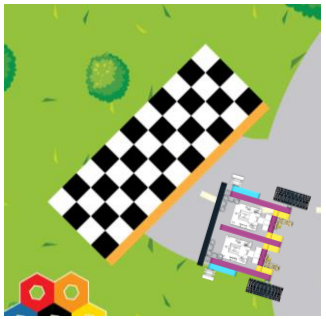
remained upright ✓ | remained upright ✗ | remained upright ✓

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

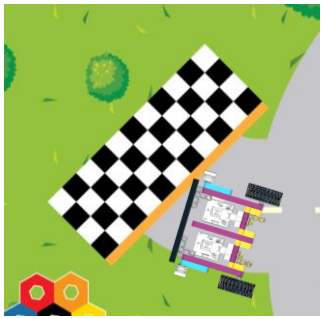
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

D. Scoring

D7. Mission 4 : The robot **partially entered** the finish area, 10 points will be scored.

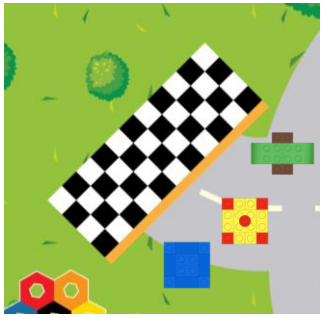


0 point

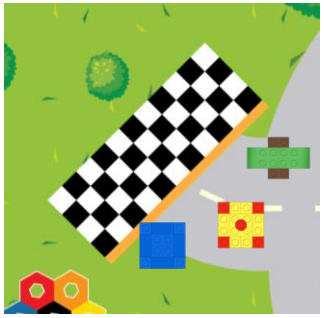


10 points

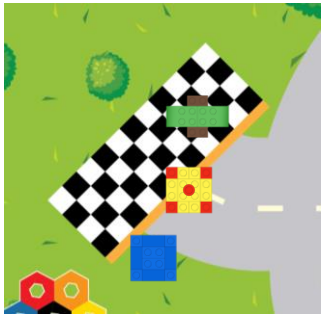
D8. Mission 5 : The iron three elements **partially entered** the finish area, will score 10 points each, 30 points in total.



0 point



10 points



30 points

D9. Mission 6 : As soon as the timer stopped, the robot **stopped completely**, 10 points will be scored.

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

D. Scoring

D10. The pattern for scoring is shown as follows.

Finish area

Check point 1

D11. If the participant touch the robot during the competition, that round will end, the score and time will be recorded as 0 point and 120 seconds.

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

D. Scoring

D12. All scores will be calculated and recorded after the competition time is over.

Mission (Scoring item)		Score
Mission 1	The swimmer **partially entered** the check point 1 and **remained upright**.	0 / 10
Mission 2	The obstacle **completely left** the square marker of the cycle track.	0 / 10 / 20 / 30
Mission 3	The runner **partially entered** the finish area and **remained upright**.	0 / 10
Mission 4	The robot **partially entered** the finish area.	0 / 10
Mission 5	The iron three elements **partially entered** the finish area.	0 / 10 / 20 / 30
Mission 6	As soon as the timer stopped, the robot **stopped completely**.	0 / 10
Total score (highest score is 100)		_____marks
Completion time (time limit is 120 seconds)		___:___.___

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

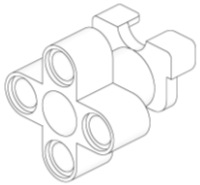
E. Game Rules

E1. The electronic components (including motors and sensors) used to build the robot must be from SAM Labs products. The number of sensors is not limited but **two** motors (DC MOTOR) must be used for the robot.

E2. The maximum extension size of the robot (including the attached accessories) cannot exceed a circle with a diameter of 220 mm, and the height cannot exceed 220 mm.

E3. The robot can be designed freely but the parts for building the robot must be strictly LEGO® parts.

E4. Only APRA officially specified 3D motor connection components can be used.



Motor Component A

Motor Component B

E5. Building materials such as glue, tape, screws, etc. must not be used.

E6. The control program must be official SAM Labs software (SAM Studio or SAM Space).

E7. Participants must bring their own computer or tablet for the tournament.

E8. Participating teams can bring pre-built robots for the tournament.

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

E. Game Rules

E9. If the referee finds a robot that does not meet the specifications at any time, the team must modify the offending parts within 1 minute. If teams do not meet the requirement within the time limit, they will not be allowed to participate in the existing round.

E10. Only one robot can be used in each round of the tournament. Teams can use different robots in the next round of the tournament, but it is strictly forbidden for different teams to exchange robots or parts. Once violations are found, the relevant teams will be disqualified.

E11. The preparation time before the existing round is 1 minute, team can adjust their robot.

E12. All teams are not allowed to bring the game field to the venue for practice. The organizer will provide simulation time to all teams.

E13. Participants must bring their robots to line up, otherwise the simulation will be cancelled, and they need to line up again.

E14. After the game starts, if the participating member interferes with the game in any way, the round will be regarded as 0 point and recorded according to the competition time limit; if the contestant is influenced by others, the referee will judge whether to rematch.

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

E. Game Rules

E15. Teams are strictly prohibited from interfering with their opponents in any way, otherwise they will be disqualified immediately.

E16. If there are any special circumstances, all decisions shall be based on the decision of the chief referee, and no objection shall be allowed.

E17. The minimum score recorded is 0 point, and there will be no negative points. The highest time recorded will be the competition time limit.

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

F. Other Rules

Responsibility of the parties

F1. In the tournament, the referee has the final decision.

F2. Any objections to the decision of the referee will be warned. If participants continue to argue, the team will be immediately disqualified from the tournament.

F3. After the game, participants in each team need to sign the score sheet for confirmation.

F4. When confirming the score sheet, a protest can only be lodged if the score is incorrect or if there is a problem with the result of the game. Once the score sheet has been signed, no protest may be made by either party.

F5. The referee may interpret the rules.

F6. In special circumstances, such as unforeseen problems or the ability of robots that everyone agrees in the tournament, the rules can only be changed with the consent of the chief referee.

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

F. Other Rules

Inspection of Robot

F7. If the robot is modified during the game, the referee may ask the robot to check again.

F8. Any robot that does not comply with inspection regulations, it will not be able to be used in the game until it is corrected.

F9. Modifications must be made within the time schedule of the game and teams must not delay game play while making modifications.

F10. If the robot cannot comply with all the regulations (and cannot comply after the amendment), the existing round will be disqualified. (the qualification will not be cancelled.)

SAM Labs Iron Three Mission
Primary Category
Game Description, Rules and Scoring

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

F. Other Rules

Fair Play

F11. Except for the participants and staff, no one is allowed in the game area.

F12. No one other than the participants is allowed to modify the robot or the program.

F13. Participants are not to be prompted or assisted in any way during the tournament.

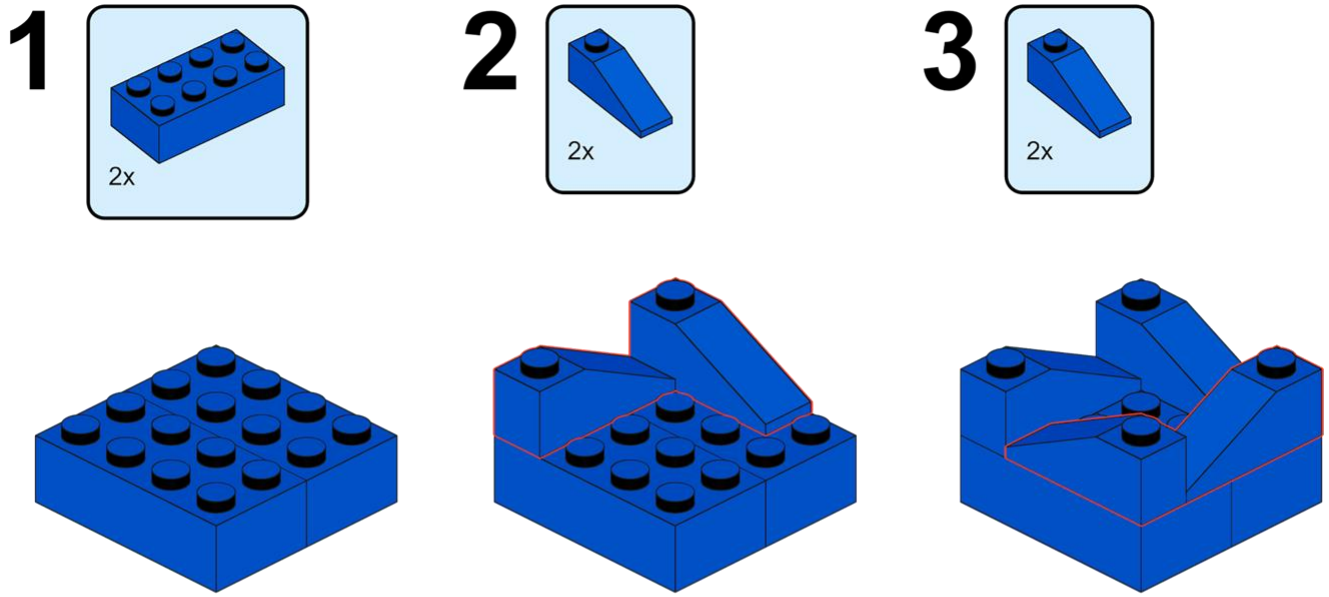
F14. If the above situations are found during the game, the team may be disqualified from the tournament.

F15. When the team registers for the tournament, it is also necessary to clearly read the relevant registration terms and competition rules.

F16. When the content of different files conflicts, the order of precedence of the rules is:
Final Decision of Organizer > Rules Update > SAM Labs Iron Three Mission rules.

Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

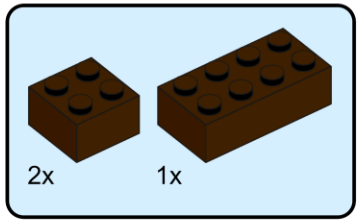
G. Assembly Of Game Objects



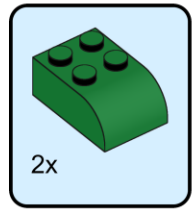
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

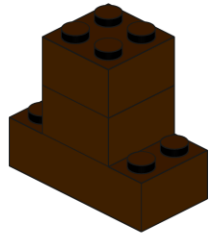
G. Assembly Of Game Objects

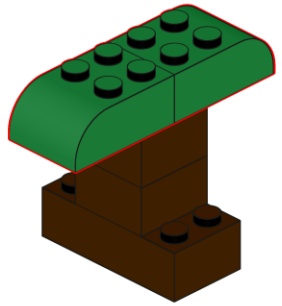
1



2

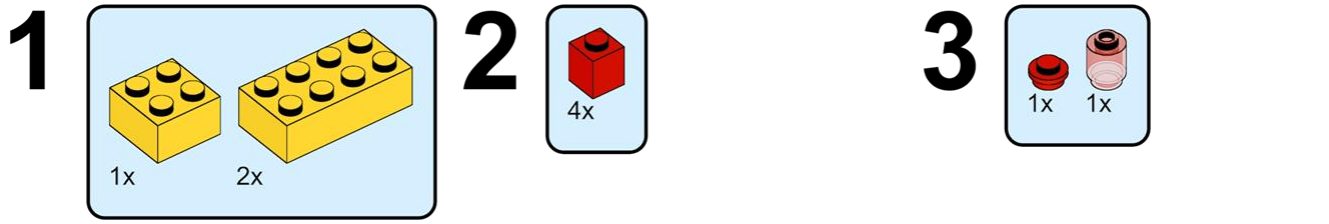


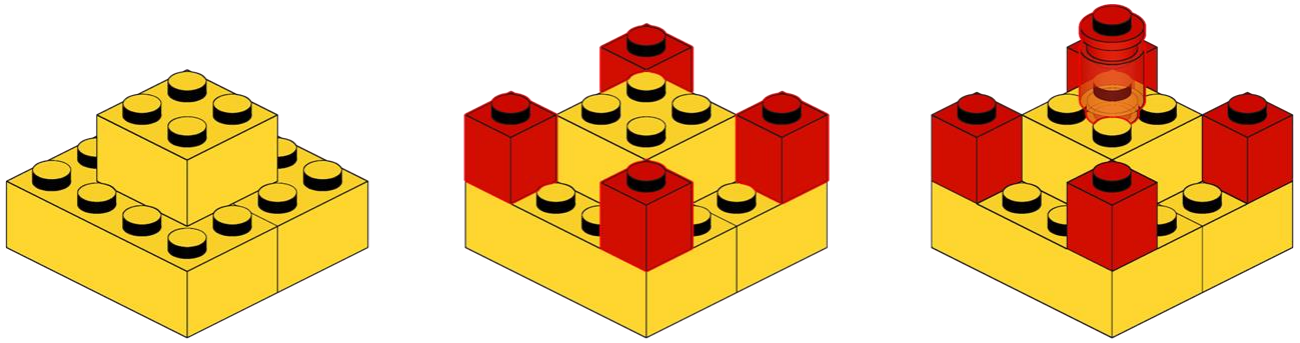




Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects

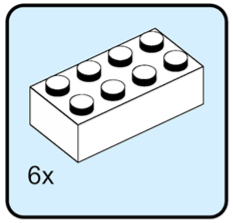




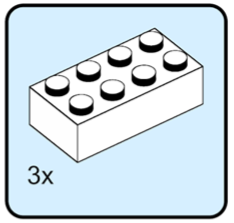
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

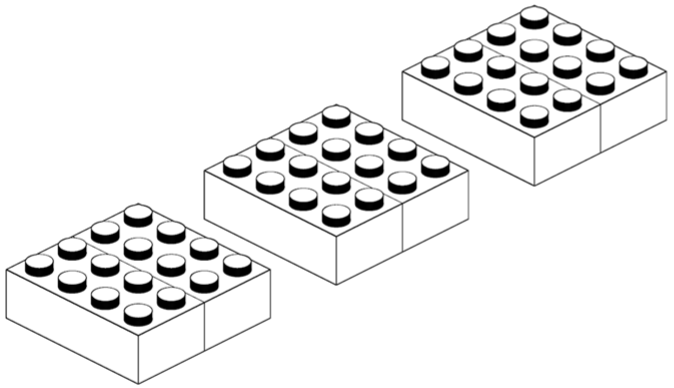
G. Assembly Of Game Objects

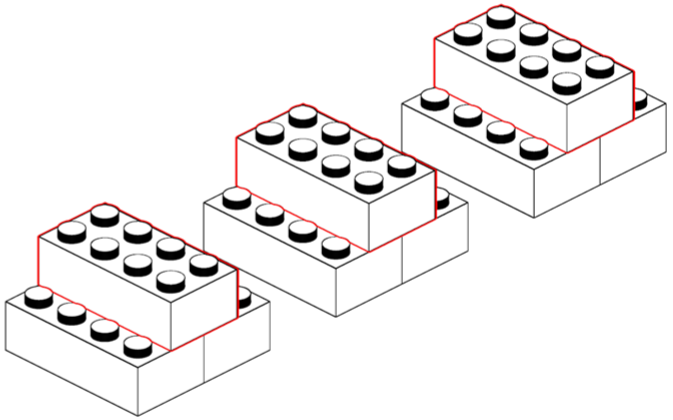
1



2



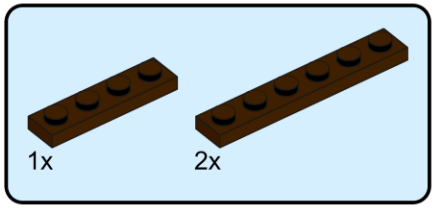




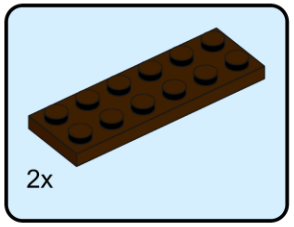
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

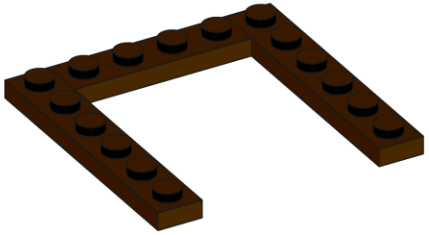
G. Assembly Of Game Objects

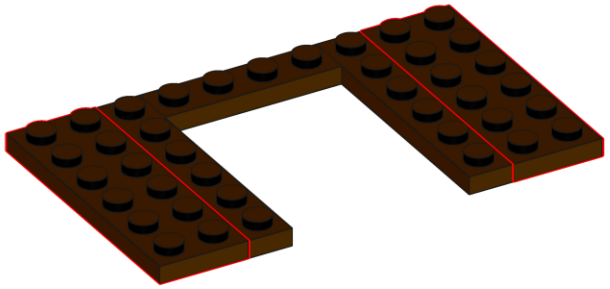
1



2

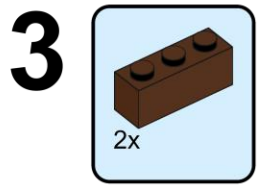


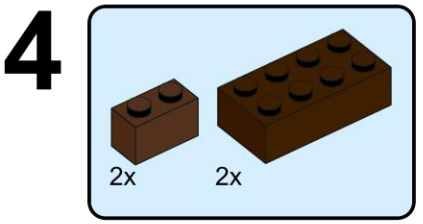


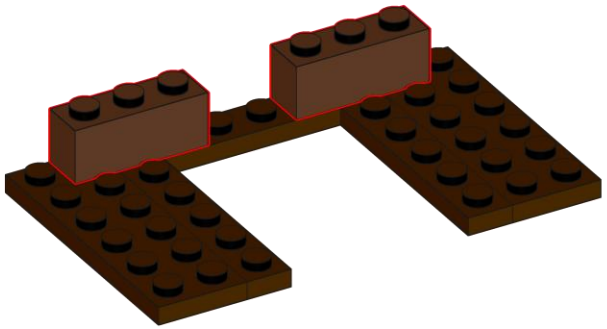


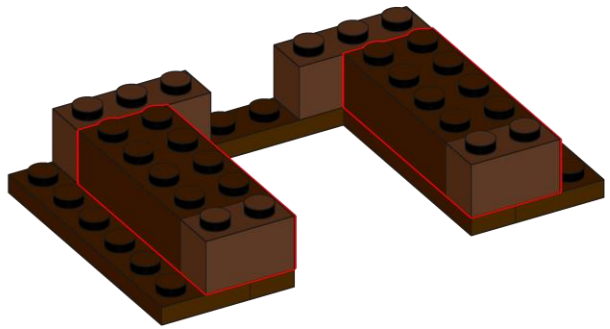
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects





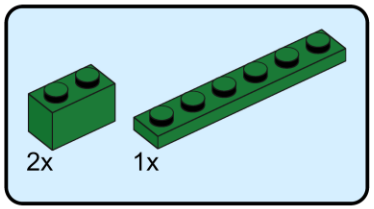


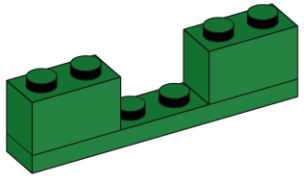


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

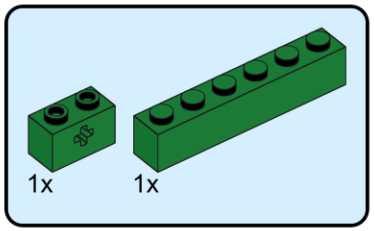
G. Assembly Of Game Objects

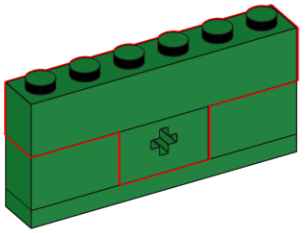
5





6

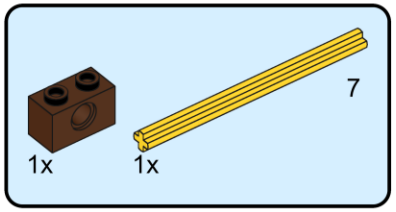


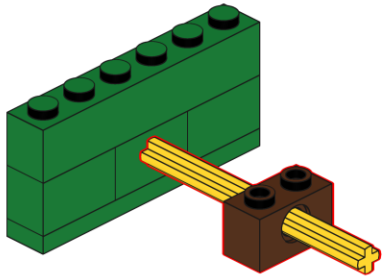


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

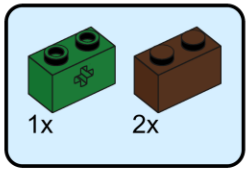
G. Assembly Of Game Objects

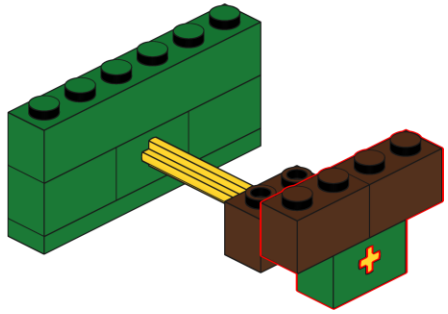
7





8

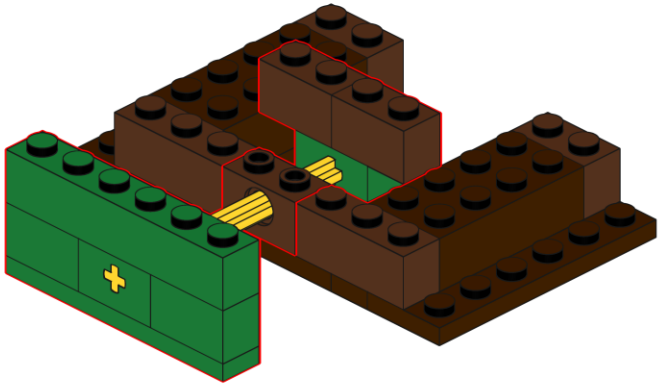




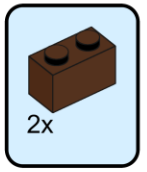
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

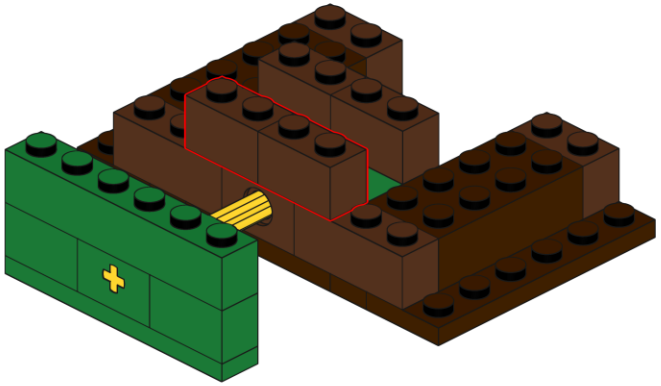
G. Assembly Of Game Objects

9



10

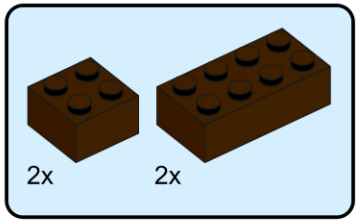


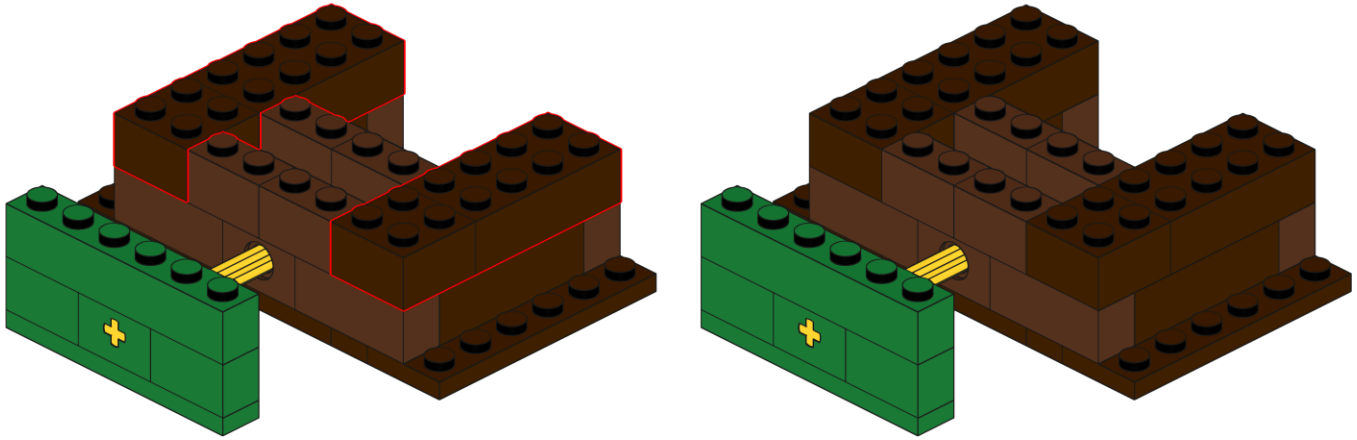


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects

11

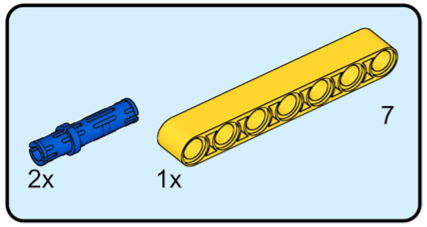




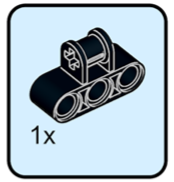
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

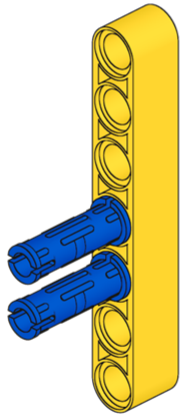
G. Assembly Of Game Objects

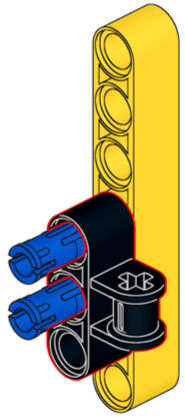
1



2



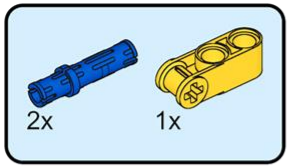


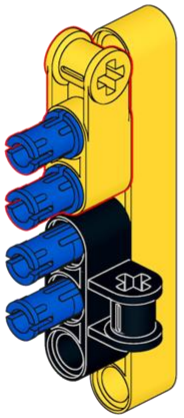


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

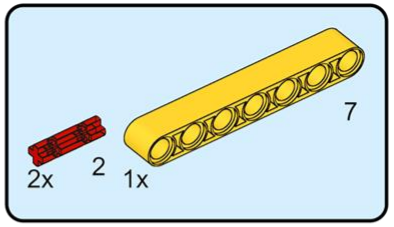
G. Assembly Of Game Objects

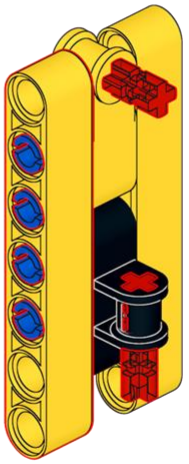
3





4

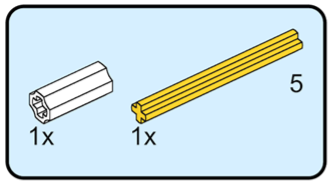




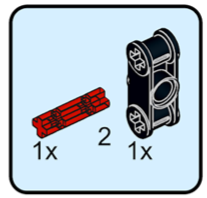
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

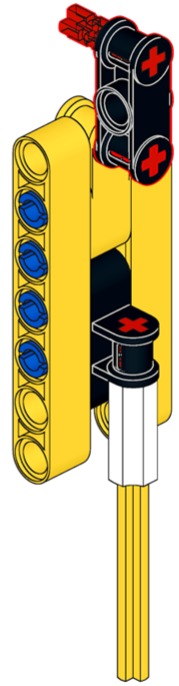
G. Assembly Of Game Objects

5



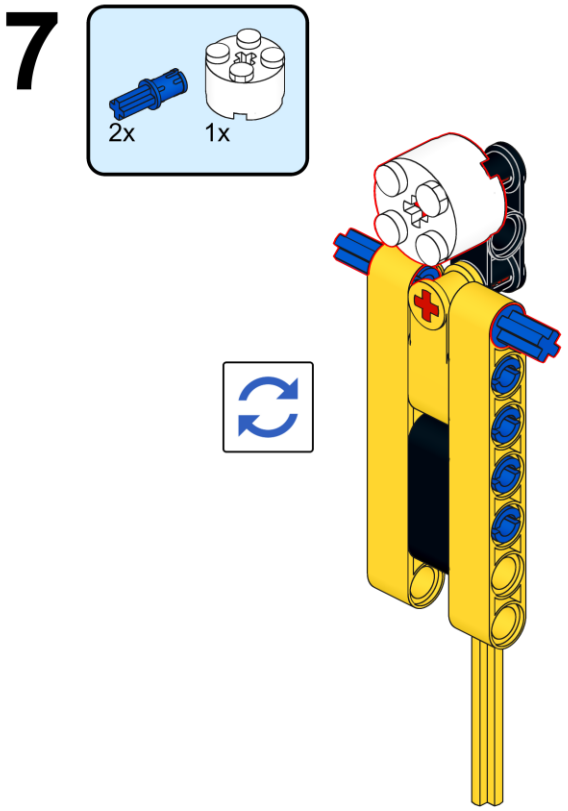
6

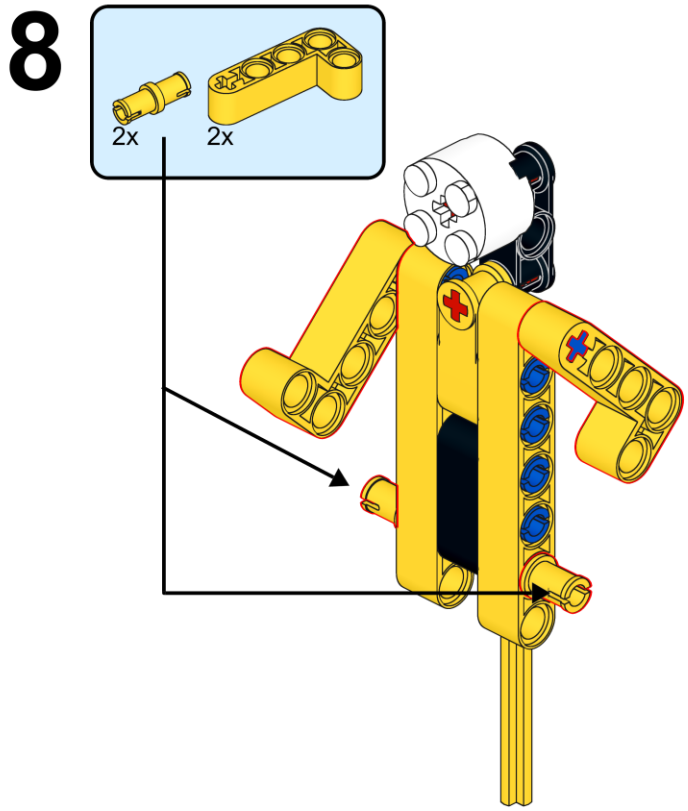




Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects

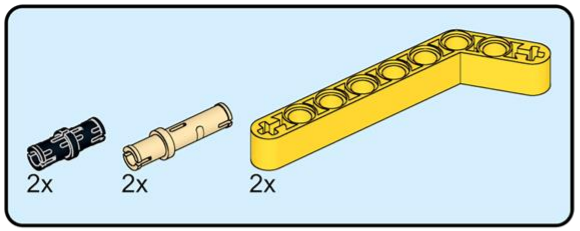


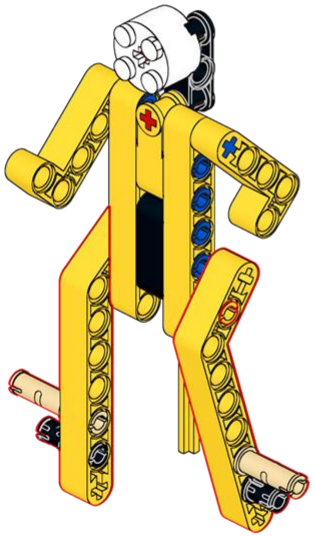


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

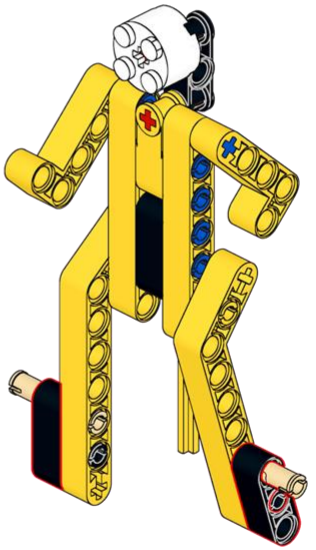
G. Assembly Of Game Objects

9





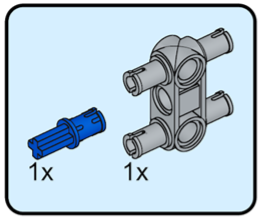
10

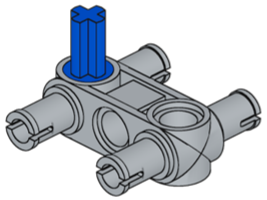


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

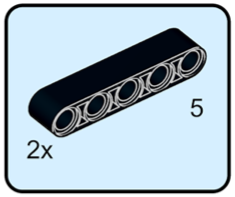
G. Assembly Of Game Objects

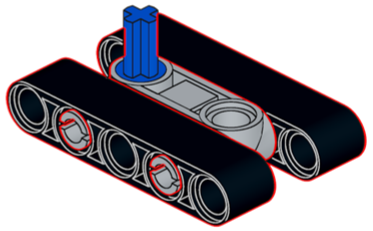
11





12

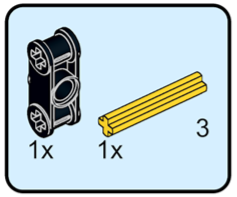


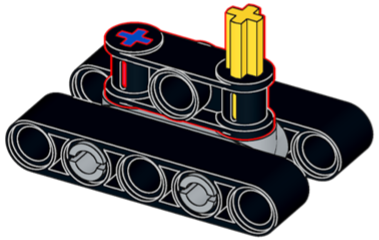


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

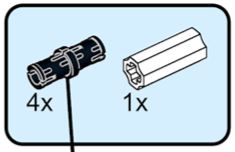
G. Assembly Of Game Objects

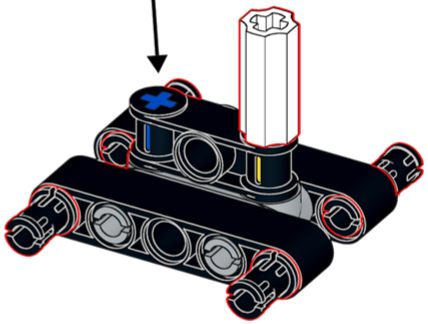
13





14

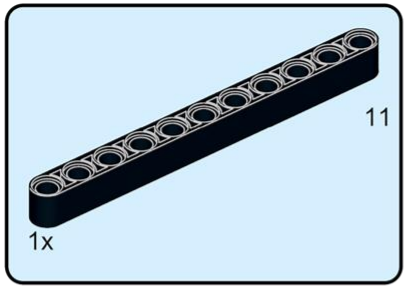


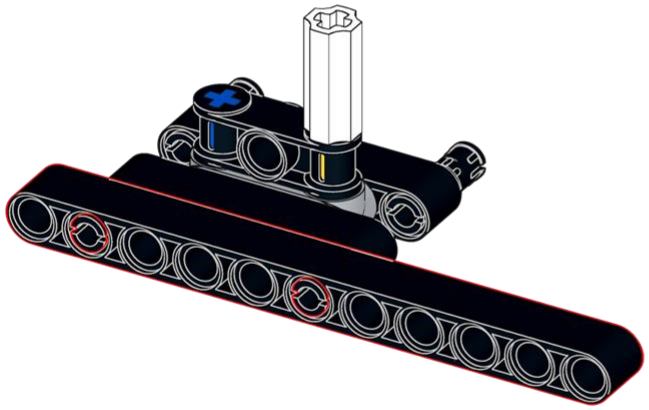


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

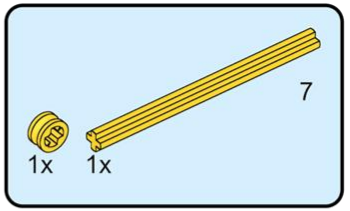
G. Assembly Of Game Objects

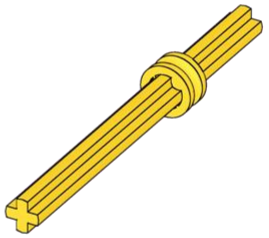
15





16

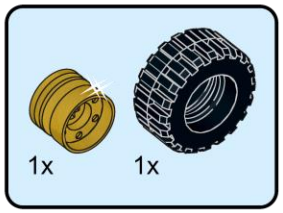


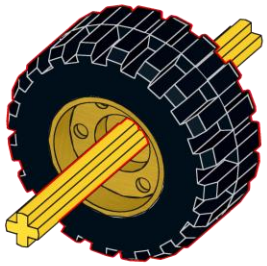


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

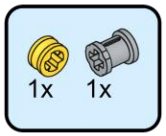
G. Assembly Of Game Objects

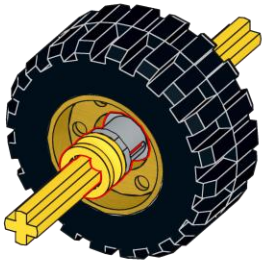
17



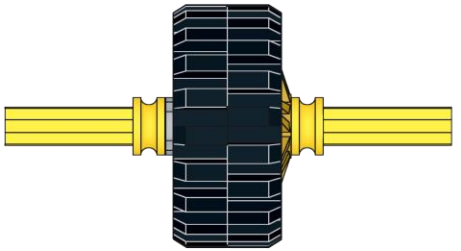


18





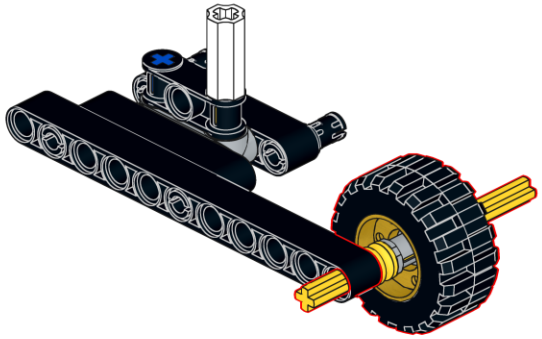
19



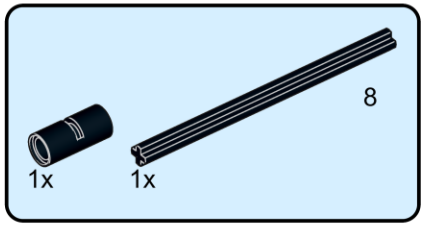
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

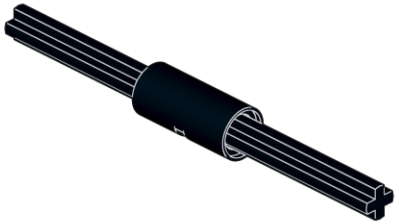
G. Assembly Of Game Objects

20



21



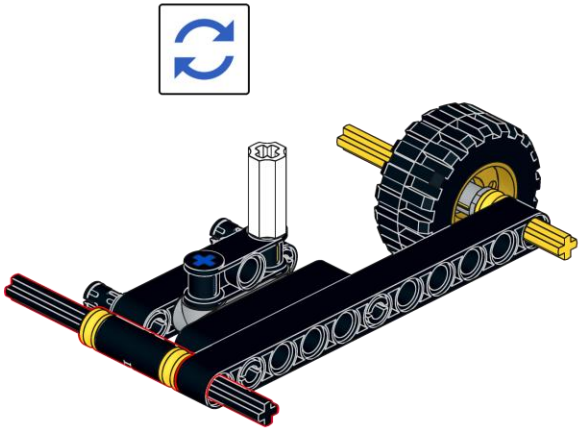


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects

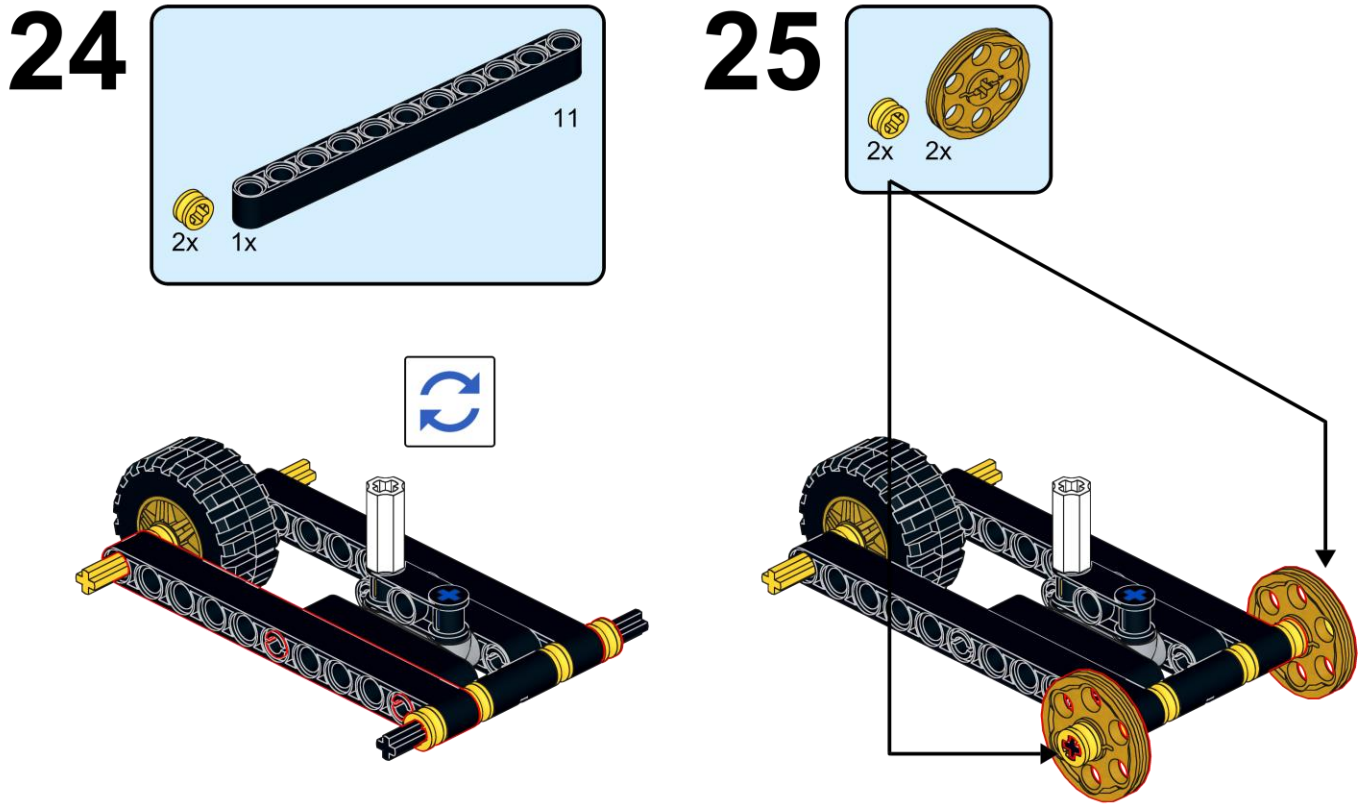
22

23



Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

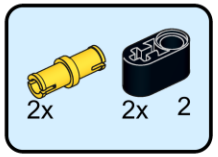
G. Assembly Of Game Objects

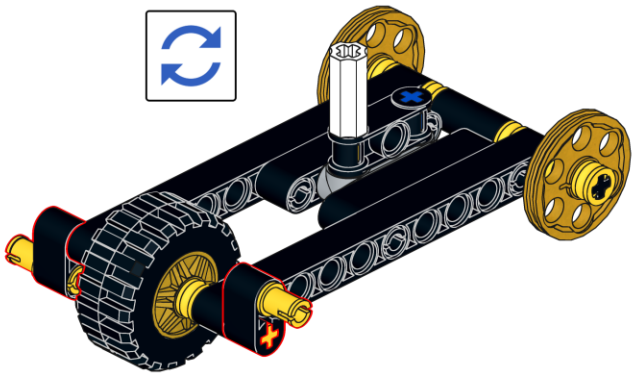


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

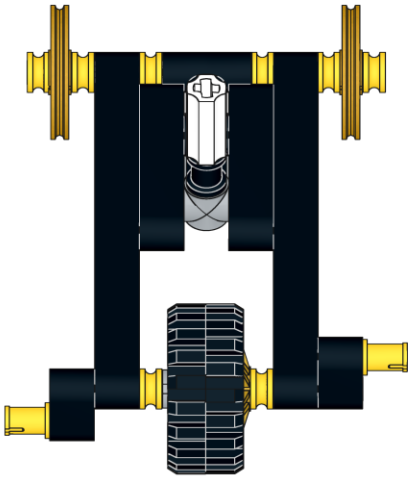
G. Assembly Of Game Objects

26





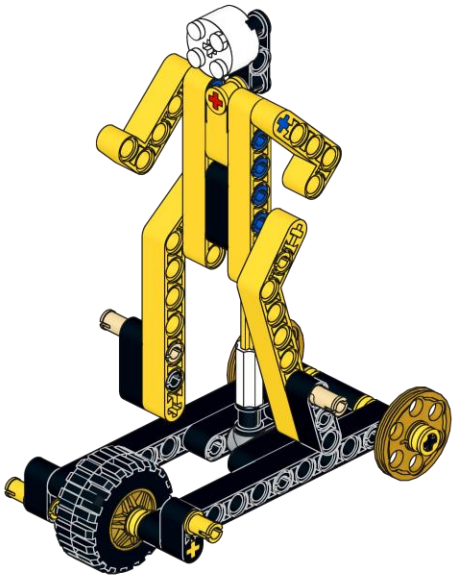
27



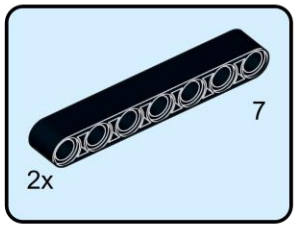
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

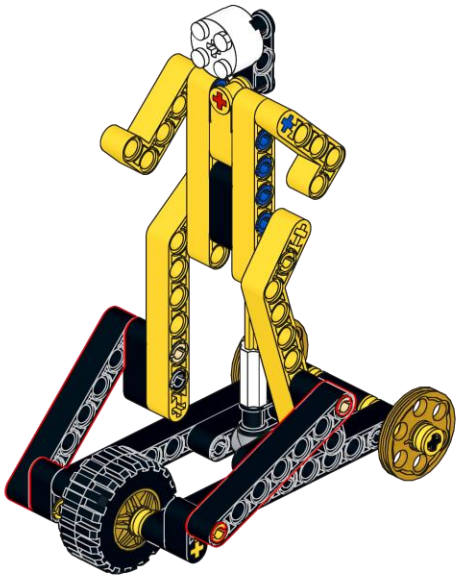
G. Assembly Of Game Objects

28



29

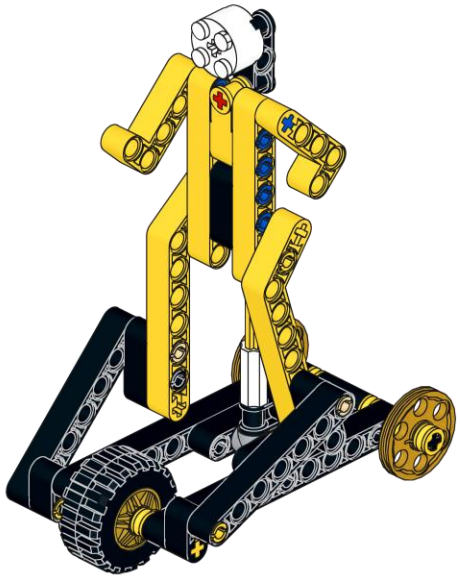




Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

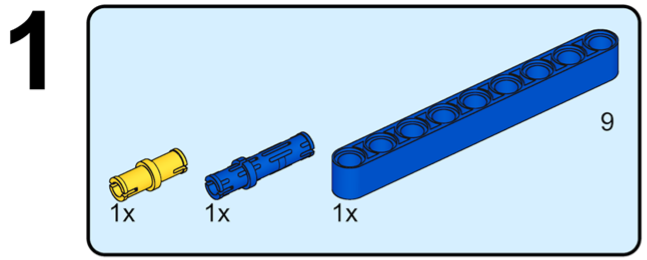
G. Assembly Of Game Objects

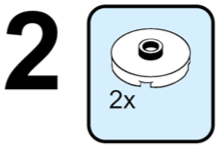
30

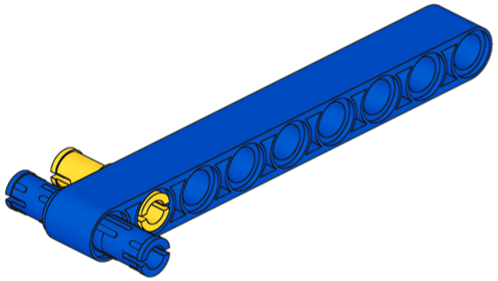


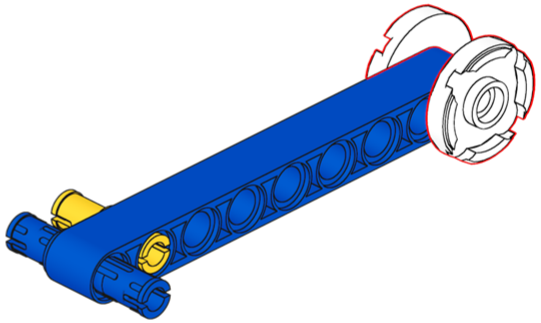
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects





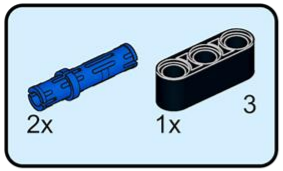


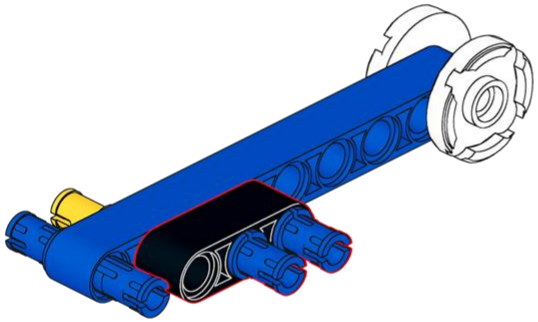


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

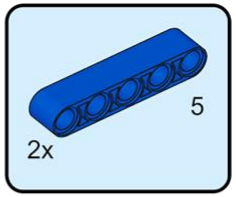
G. Assembly Of Game Objects

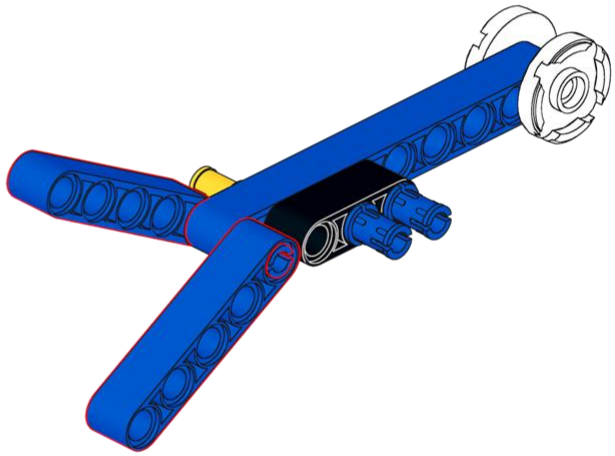
3





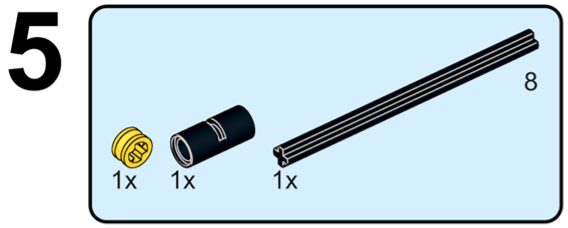
4

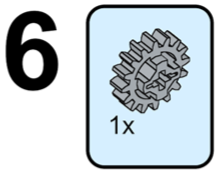


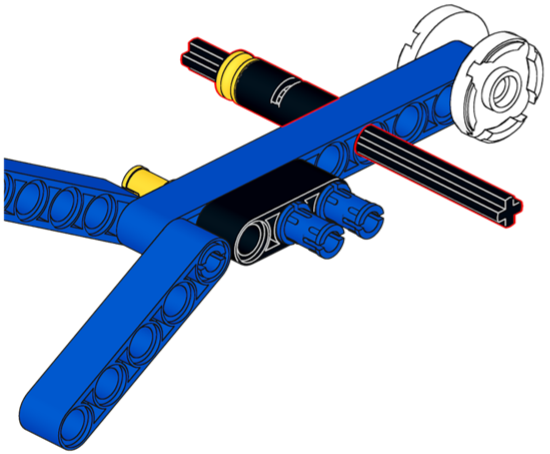


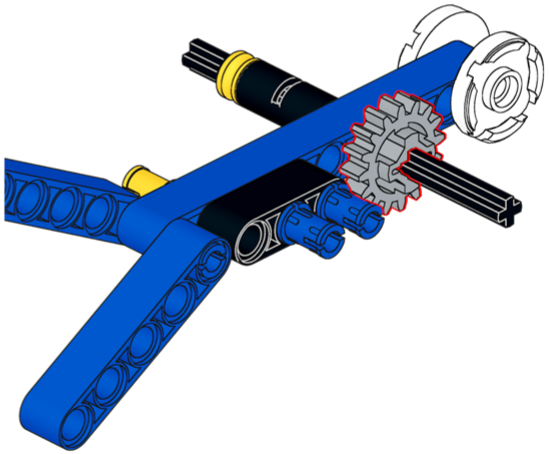
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects





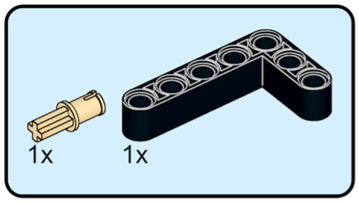




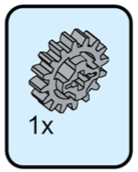
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

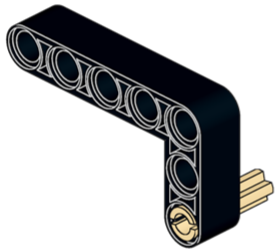
G. Assembly Of Game Objects

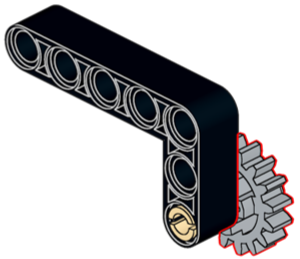
7



8

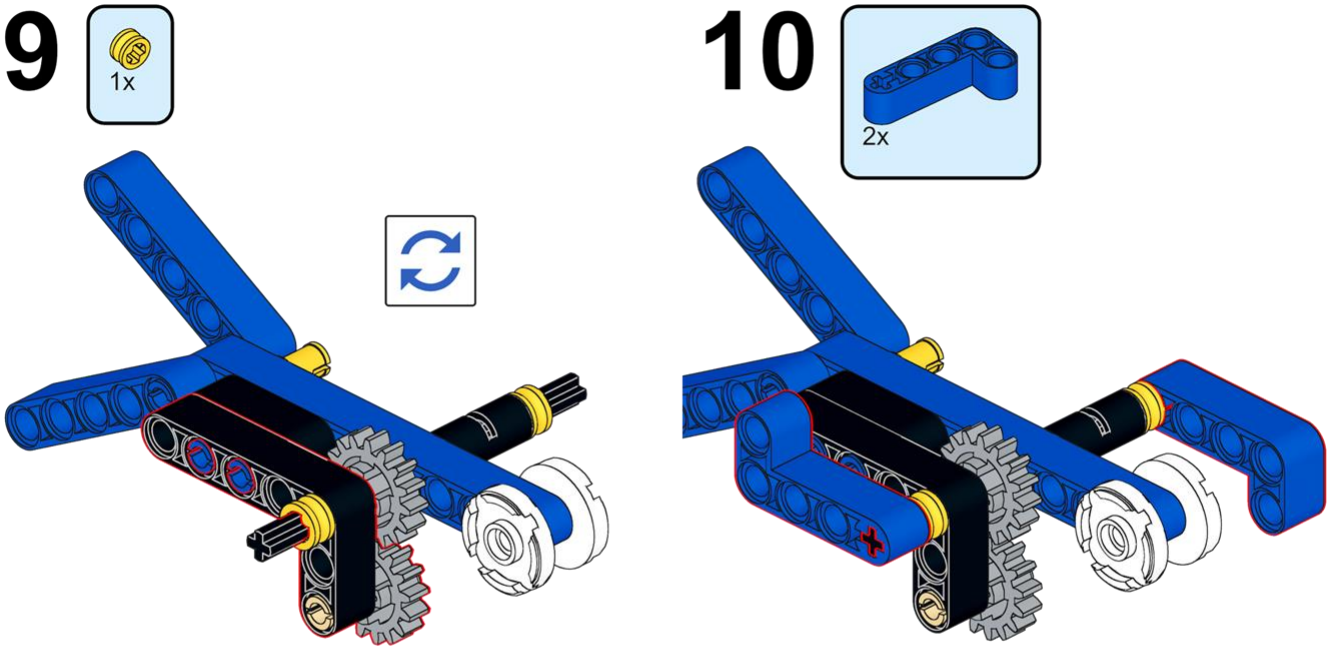






Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

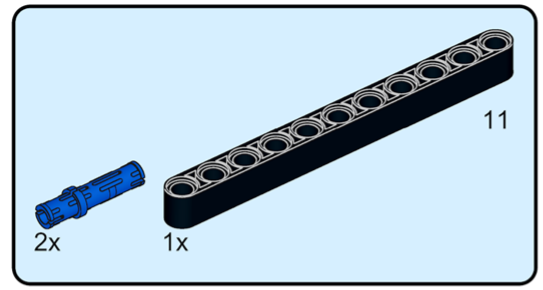
G. Assembly Of Game Objects

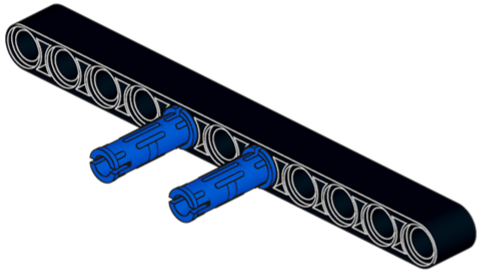


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

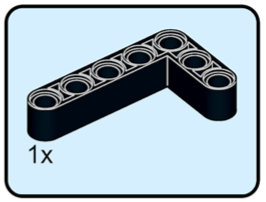
G. Assembly Of Game Objects

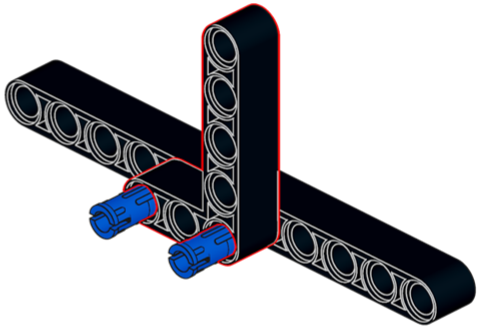
11





12

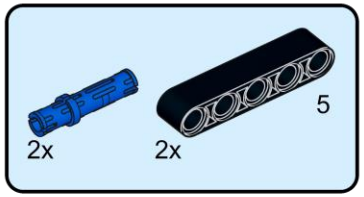


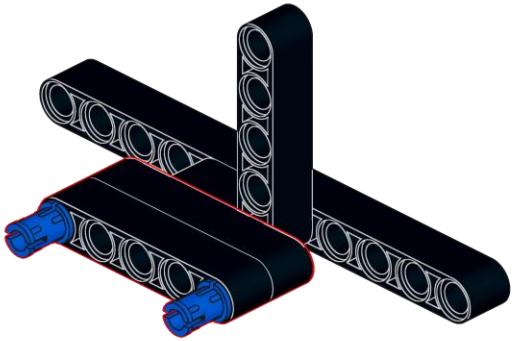


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

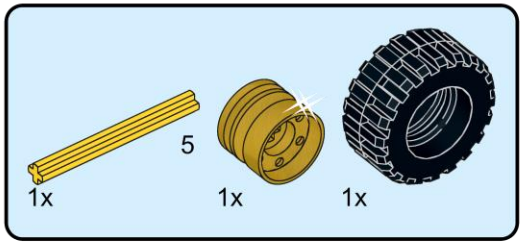
G. Assembly Of Game Objects

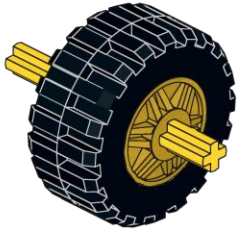
13





14

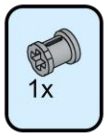




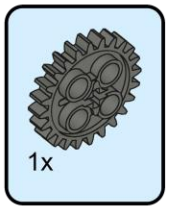
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects

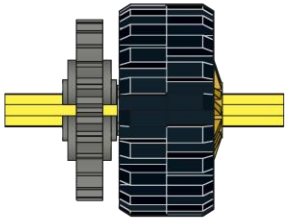
15



16



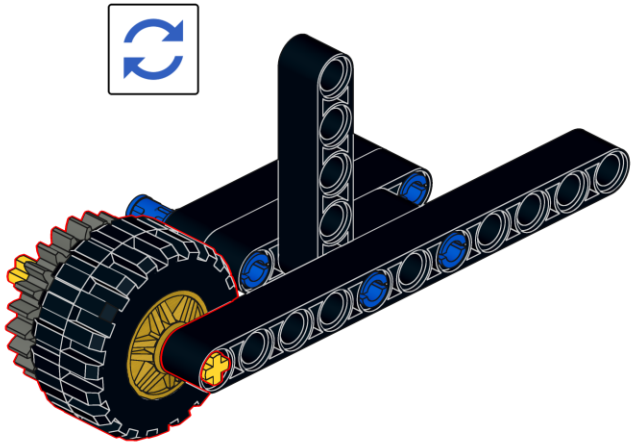
17



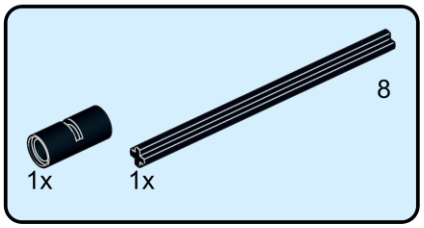
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

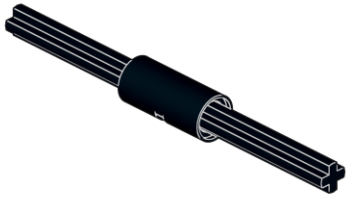
G. Assembly Of Game Objects

18



19



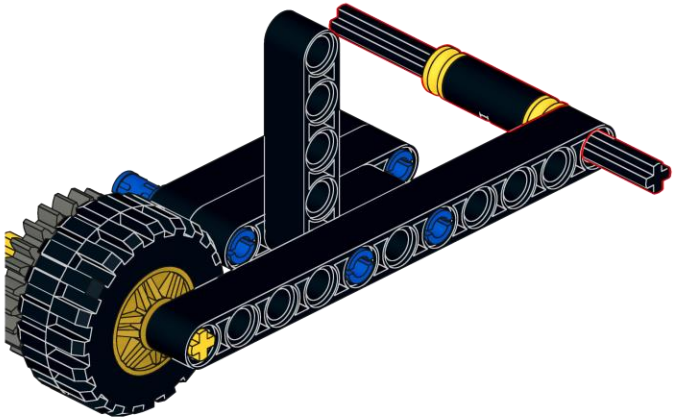


Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects

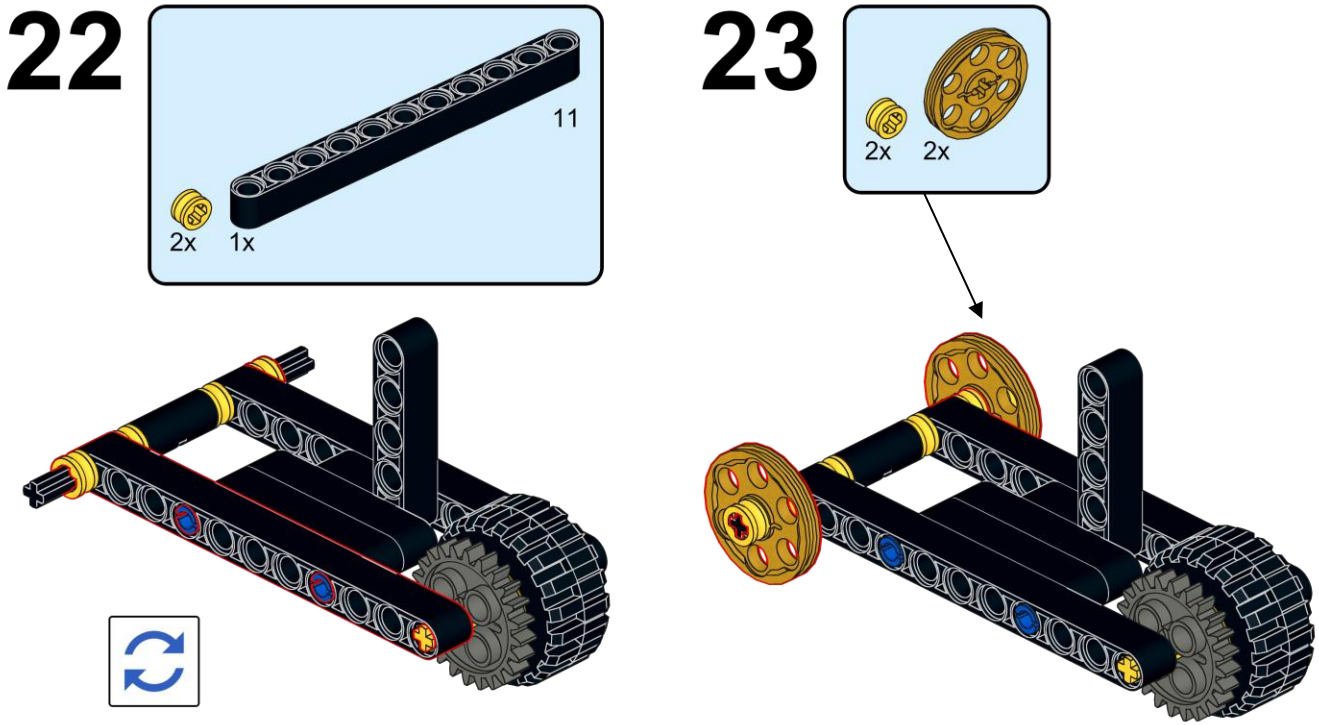
20 2x

21



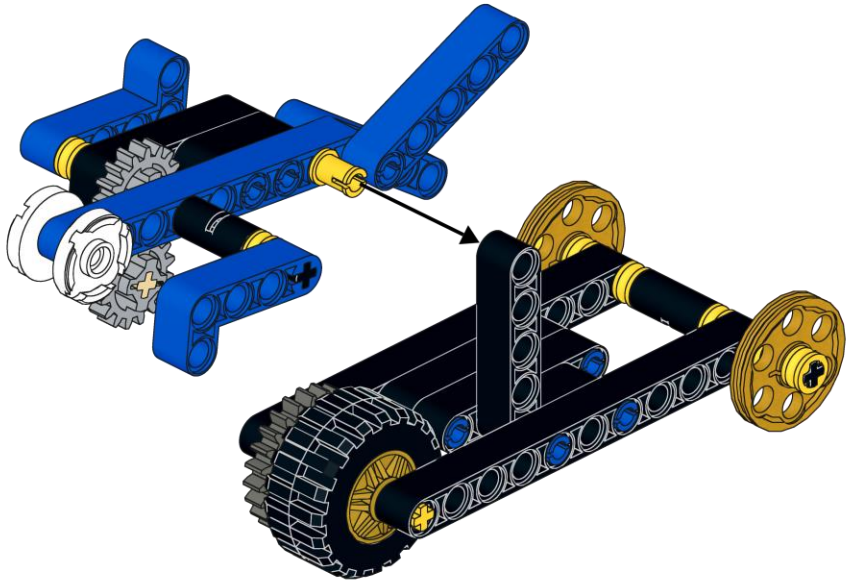
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

G. Assembly Of Game Objects



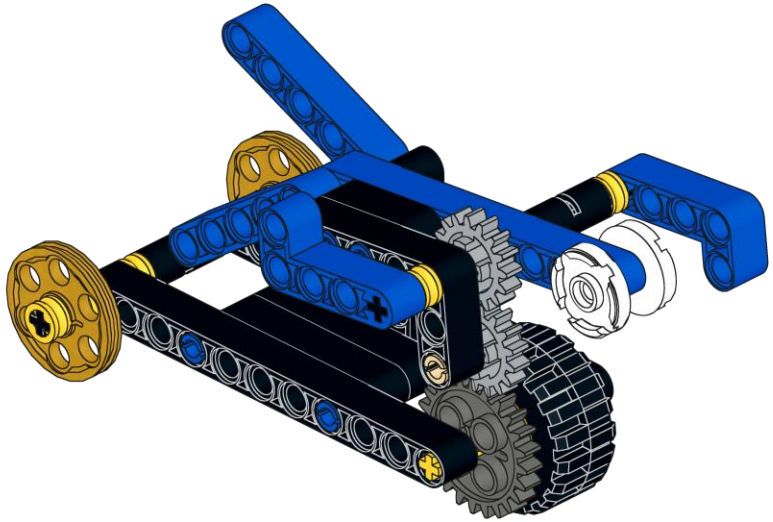
Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

24



Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025

25



Asia Pacific Robot Alliance and APRA logo are trademarks of Asia Pacific Robot Alliance ©2025