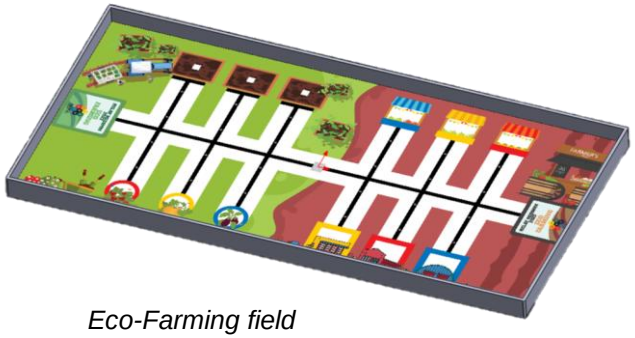
Eco-Farming Relay Mission
Junior Category
Game Description, Rules and Scoring

Updated: 03/05/2023

APRA
ASIA PACIFIC ROBOT ALLIANCE



Eco-Farming field

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Content

A. Brief

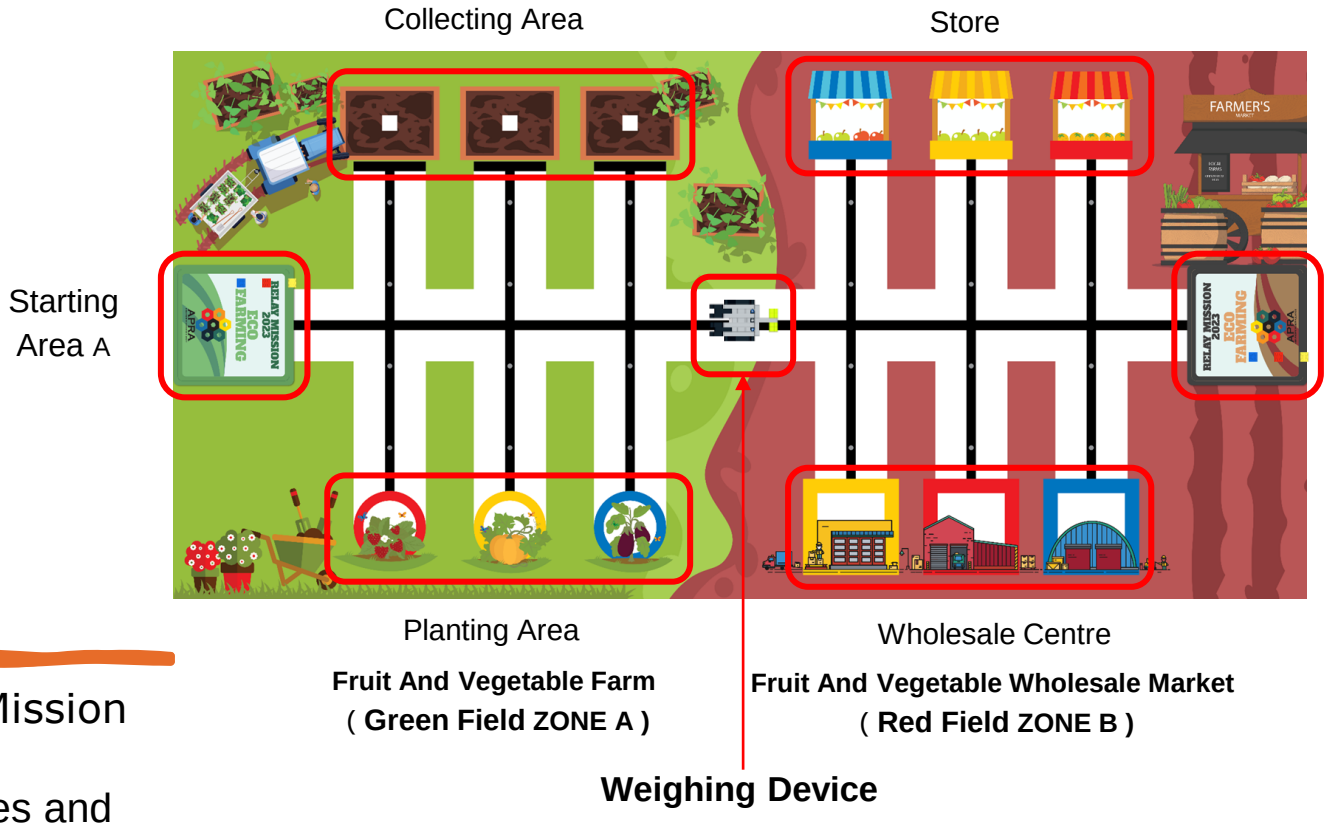
A1. With the progress of society and the continuous growth of the world population, the quality and quantity of human beings are constantly improving. How to shorten the planting cycle and how to quickly deliver fresh fruit and vegetable from farm to consumers has become a challenge.

A2. The participating teams are composed of two to three members, and each team will use two robots. They will start at the same time to complete the tasks that can only be scored individually and cooperatively.

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 13-18 years old (birth date in 2023 season is 2005-2010).

B. Game Description (Field setup and specifications)



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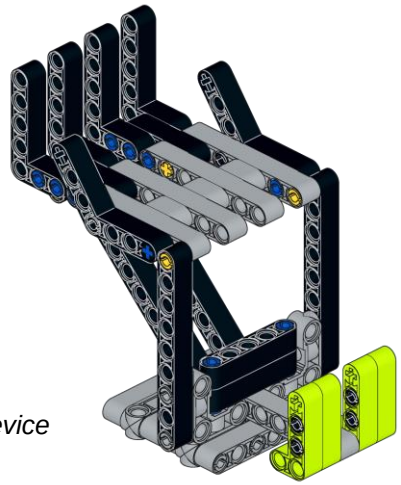

Weighing Device

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B. Game Description (Field setup and specifications)

B1. The mission area is divided into two zones, vegetable and fruit planting field (ZONE A) and vegetable and fruit wholesale market (ZONE B)

B2. The fruit and vegetable farm (ZONE A) has 3 areas, which are the planting area, the collecting area and the starting area for robot A

B3. The fruit and vegetable wholesale market (ZONE B) has 3 areas, which are the store, the wholesale centre and the starting area for robot B.

B4. There will be walls around the game table with a height of approximately 80mm.

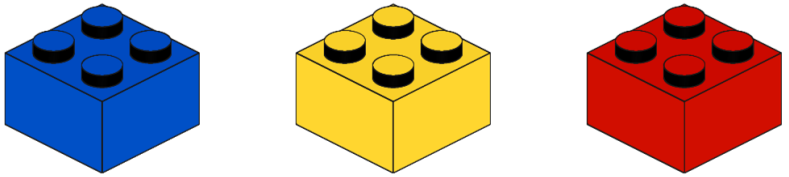
B5. In the collecting area of ZONE A, color red, yellow and blue fruit and vegetable (4x4 brick) will be placed randomly from left to right. (Sort result will be drawn before the simulation time on the day of the tournament, and it will be uniformly used in the three rounds of tournament.)

B6. Before the game starts, robot A and B will each be loaded with red, yellow and blue 2x2 brick.

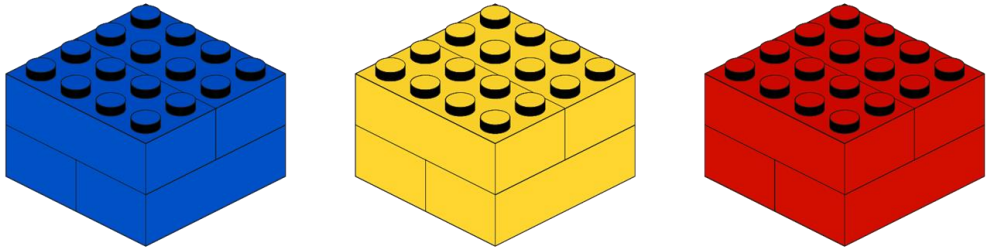
B7. A weighing device will be placed in the centre of the field.

B. Game Description (Field setup and specifications)

B8. 2x2 brick will be called **seeds** in ZONE A and **commodities** in ZONE B.



B9. 4x4 brick will be called fruit and vegetable.



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Bonus Mission

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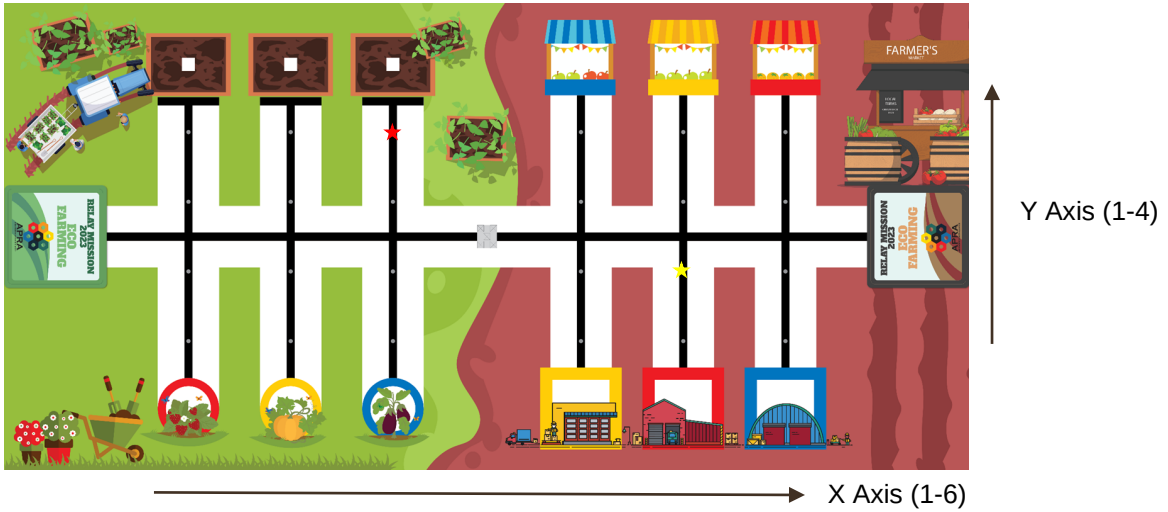
B. Game Description (Bonus mission)

B10. An additional green 2x2 brick will be added as a bonus mission on the day of the game, its position will be drawn randomly in the form of coordinates (X-axis and Y-axis). (The result will be drawn before the simulation time on the day of the tournament, and it will be uniformly used in the three rounds of tournament.)



i. A circle with diameter of 15mm is marked on the black line of ZONE A and ZONE B.

ii. Example 1: The drawn result is X=3, Y=4, and the green brick will be placed at the red star position.

iii. Example 2: The drawn result is X=5, Y=2, and the green brick will be placed at the yellow star position.

iv. If the drawn result is in ZONE A, robot A needs to send it to any planting areas.

v. If the drawn result is in ZONE B, robot B needs to send it to any stores.

vi. If the team chooses not to take on the bonus mission, they can ask to remove it from the field.

B. Game Description

B11. There are 3 rounds on tournament day, and each round lasts 120 seconds.

B12. When the game starts, robot A and B can start at the same time.

B13. If the vertical projection of the robot is completely entered the opponent's area, 10 points will be deducted, and the referee will remove the robot from the field, but the previous points will be retained.

B14. When the time exceeds 120 seconds or the participating member says "finish", the timing ends.

B15. The vertical projection of the robot including wires must be completely within the **starting area** before starting the game.

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C. Scoring

Robot	Mission (Scoring Item)		Score
A	Mission1	Robot A **completely leaves** the starting area. (only counted once)	0 / 10
A	Mission2	The green 2x2 brick is **partially entered** into one of the planting areas.	0 / 10
A	Mission3	Seeds (2x2 brick) is **partially entered** into the planting area of the corresponding color. (10 points each)	0 / 10 / 20 / 30
A	Mission4	Deliver fruit and vegetable (4x4 brick) to the weighing device for weighing. (10 points each)	0 / 10 / 20 / 30
B	Mission5	Robot B **completely leaves** the starting area. (only counted once)	0 / 10
B	Mission6	The green 2x2 brick is **completely entered** into one of the stores.	0 / 10
B	Mission7	Commodity (2x2 brick) is **completely entered** into the store of the corresponding color. (10 points each)	0 / 10 / 20 / 30
B	Mission8	Red fruit and vegetable (4x4 brick) is **completely entered** into the red wholesale centre.	0 / 5 / 10
B	Mission9	Yellow fruits and vegetables (4x4 brick) is **completely entered** into the yellow wholesale centre.	0 / 5 / 10
B	Mission10	Blue fruit and vegetable (4x4 brick) is **completely entered** into the blue wholesale centre.	0 / 5 / 10
A+B	Mission11	As soon as the timer stopped, the two robots stopped completely.	0 / 10
A		Robot A completely enters ZONE B	0 / -10
B		Robot B completely enters ZONE A	0 / -10

C. Scoring

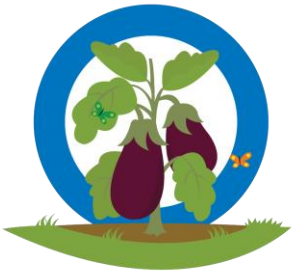
C1. Definition of completely entered: The vertical projection of an object **completely** overlaps the pattern.

C2. Definition of completely left: The vertical projection of an object is **completely** separated from the pattern.

C3. Definition of partially entered: The vertical projection of an object **partially** overlaps the pattern.

C4. There is no requirement for the direction in which the objects are placed, as long as they meet the scoring requirements.

C5. Mission 3: Seeds (2x2 brick) partially enter the planting area of the corresponding color below, get 10 points.



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C. Scoring

0 Point

10 Points

10 Points

10 Points

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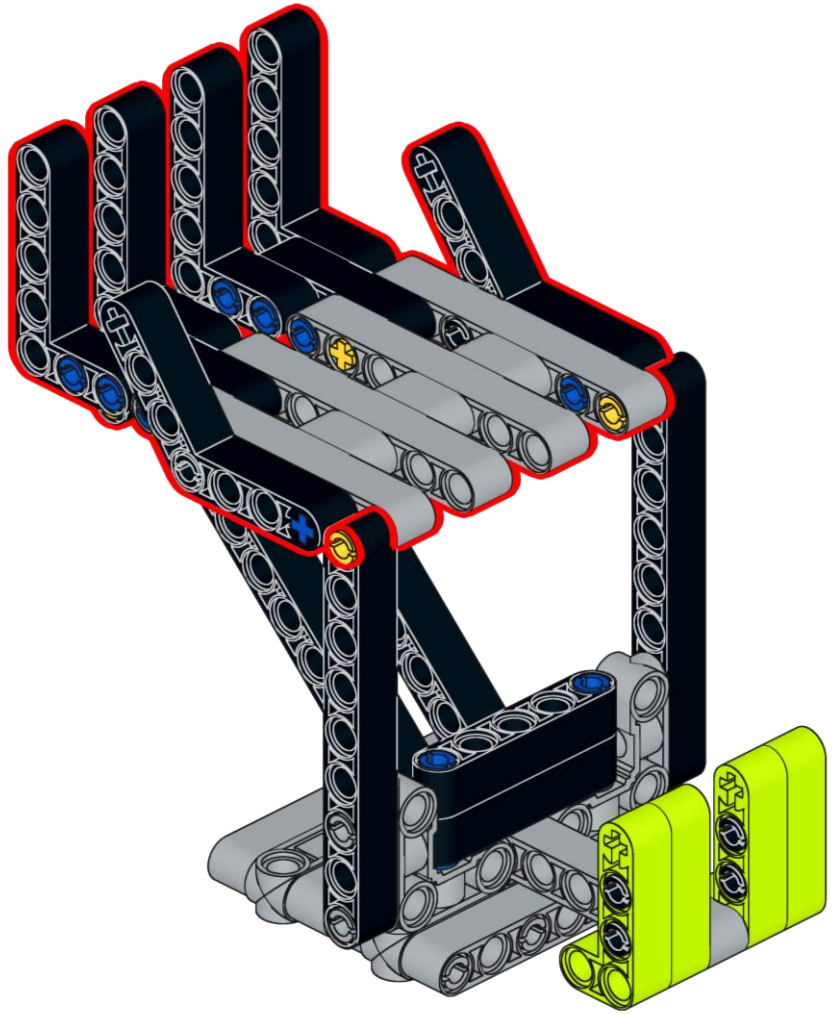
C. Scoring

C6. Mission 4: Fruit and vegetable (4x4 brick) have touched the weighing area (red circled area), Each color is worth 10 points.



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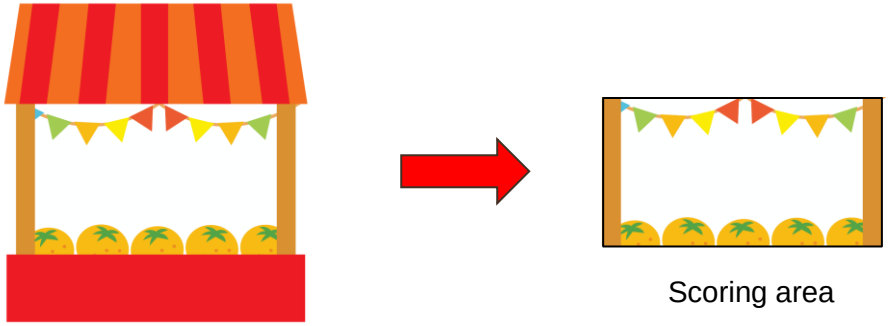
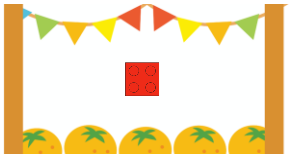
C. Scoring

C7. Mission 7: Commodity (2x2 brick) is **completely entered** into the store of the corresponding color. (10 points each)



Scoring area

0 Point



10 Points

10 Points

10 Points

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C. Scoring

C8. Mission 8 / 9 / 10:

i. Fruit and vegetable (4x4 brick) is **completely entered** into the wholesale centre of the corresponding color, scored 5 points. or

ii. Fruit and vegetable (4x4 brick) is **completely entered** the white area in the wholesale centre of the corresponding color, scored 10 points.

0 Point

5 Points

5 Points

10 Points

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D. Game Rules

D1. When the robot is fully extended, it should be within 25cm(L)x25cm(W)x25cm(H).

D2. The electronic components (including motors, sensors and microcomputer controllers) used to build the robot must be from LEGO® and Hitechic products.

D3. Only one microcomputer controller (SPIKE or EV3 or NXT) can be used for each participating robot.

D4. Only official rechargeable battery or lithium battery with a maximum voltage of 1.5V per battery (total voltage not exceeding 9V) can be used. The referee has the right to ask the contestants to turn on the microcomputer controller and check it.

D5. The parts for building the robot must be strictly LEGO® parts, and other building materials such as glue, tape, screws, etc. must not be used.

D6. The control program must be written by LEGO® MINDSTORMS® Robot Inventor, LEGO® SPIKE Prime, LEGO® classroom, LEGO® MINDSTORMS™ EV3, LEGO® MINDSTORMS™ NXT or ROBOLAB software.

D7. Robots must operate automatically and cannot be operated by remote control.

D8. Participating teams can bring pre-built robots for the tournament.

D9. 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.

D10. Only two robots can be used in each round of tournament. Teams can use different robots in the next round of tournament, but it is strictly forbidden for different teams to exchange robots or parts. Once violations are found, the relevant teams will be disqualified.

D. Game Rules

D11. The types of motors and sensors that can be used are as follows:

 9842-NXT Motor	 9843-NXT Touch Sensor	 9844-NXT Light Sensor	 9845-NXT Sound Sensor	 9846-NXT Ultrasonic Sensor
 9694-NXT Color Sensor	 45502-EV3 Large Motor	 45503-EV3 Medium Motor	 45504-EV3 Ultrasonic Sensor	 45505-EV3 Gyro Sensor
 45506-EV3 Color Sensor	 45507-EV3 Touch Sensor	 HiTechnic-NXT Color Sensor V2	 45602-SPIKE Large Motor	 45603-SPIKE Medium Motor
 45606-SPIKE Force Sensor	 45604-SPIKE Ultrasonic Sensor	 45605-SPIKE Color Sensor		

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D. Game Rules

D12. If the referee finds a robot that does not comply with the rules during the inspection 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.

D13. The preparation time before the existing round is 1 minute. A maximum of two participants can enter the competition field, and the team can adjust their robots.

D14. During the preparation time before the existing round and after the start of each round, it is not allowed to load the program from the computer to the robot.

D15. After the start of each round, if any parts of the robot accidentally fall off, it is no longer part of the robot, and the referee can remove it and give it to the team.

D16. After the start of each round, it is not allowed to reassemble all the components of the robot or replace parts and batteries, and it is not allowed to suspend the tournament.

D17. All teams are not allowed to bring the game field to the venue for practice. The organizer will provide simulation time to all teams, and each simulation time is limited to two minutes.

D18. Participants must bring their robots to line up, otherwise the simulation will be cancelled, and they need to line up again.

D19. After the game starts, if the participating member interferes with the game in any ways, the round will be regarded as 0 point; if the contestant is influenced by others, the round will not be scored.

D20. Teams are strictly prohibited from interfering with their opponents in any way, otherwise they will be disqualified immediately.

D21. If there are any special circumstances, all decisions shall be based on the decision of the chief referee, and no objection shall be allowed.

E. Other Rules

Responsibility of the parties

E1. In the tournament, the referee has the final decision.

E2. Any objections to the decision of the referee will be warned. If participant continue to argue, the team will be immediately disqualified from the tournament.

E3. After the game, participants in each team need to sign the score sheet for confirmation.

E4. 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.

E5. The referee may interpret the rules.

E6. 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.

Inspection of Robot

E7. If the robot is modified during the game, the referee may ask the robot to check again

E8. Any robot that does not comply with inspection regulations, it will not be able to use in the game until it is corrected.

E9. Modifications must be made within the time schedule of the game and teams must not delay game play while making modifications.

E10. If the robot cannot comply with all the regulations (and cannot comply after the amendment), the exiting round will be disqualified.

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E. Other Rules

Fair Play

E11. Except for the participants and staff, no one is allowed in the game area.

E12. No one other than the participants is allowed to modify the robot or the program.

E13. Participants are not to be prompted or assisted in any way during the tournament.

E14. If the above situations are found during the game, the team may be disqualified from the tournament.

E15. When the team registers for the tournament, it is also necessary to clearly read the relevant registration terms and competition rules.

E16. When the content of different files conflicts, the order of precedence of the rules is:
Final Decision of Organizer > Rules Update > Eco-Farming Relay Mission Rules.

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F. Competition System

F1. During the tournament, each team will have three rounds, and the score and time of each round will be recorded.

F2. The scores of the three rounds of each team will be sorted by from high to low. If the scores are the same, the team with the shorter completion time will be sorted first.

F3. Teams will be ranked according to their highest scores. If the scores are the same, the team with the shorter completion time will be ranked higher.

F4. If the scores and time of teams are the same, the best scores and times of the next round will be compared.

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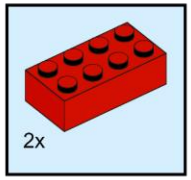
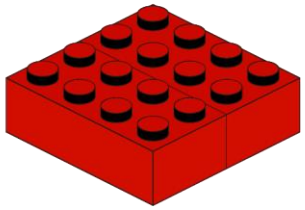
G. Assembly Of Game Objects

1





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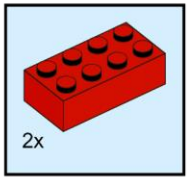

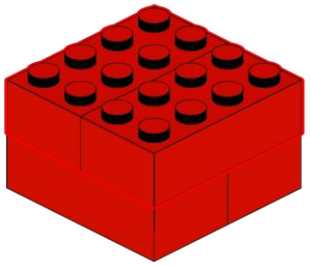

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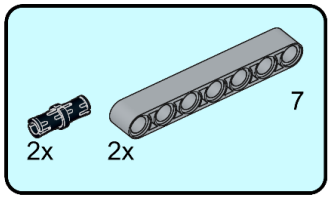

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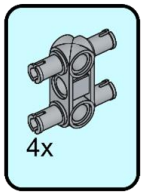

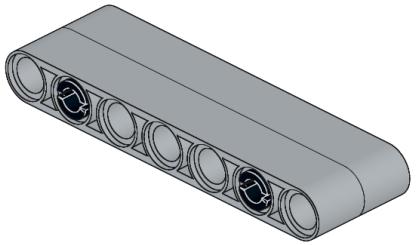

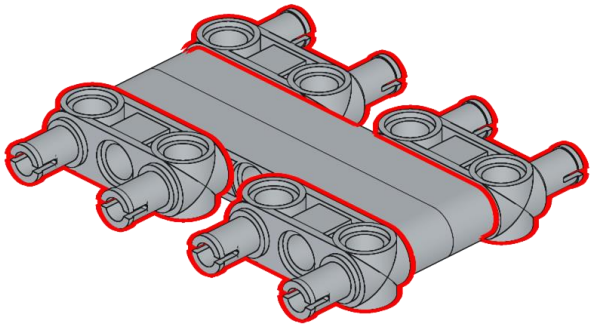

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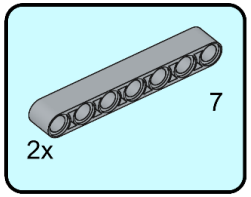

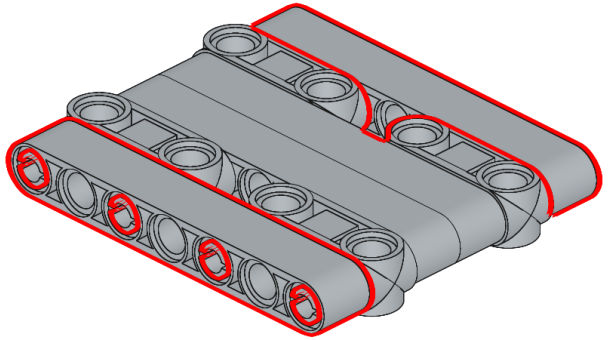

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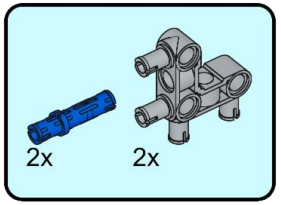

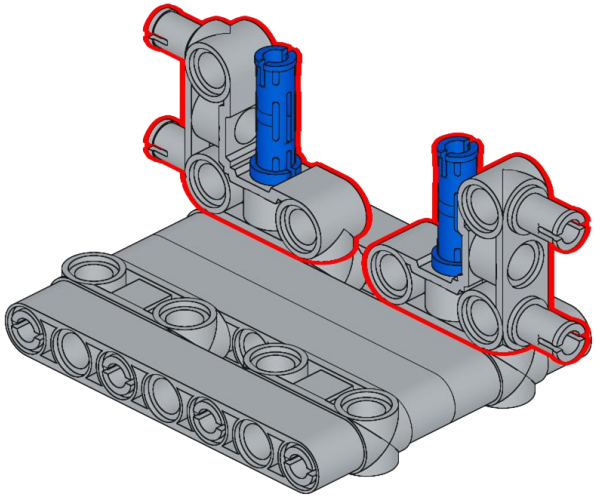

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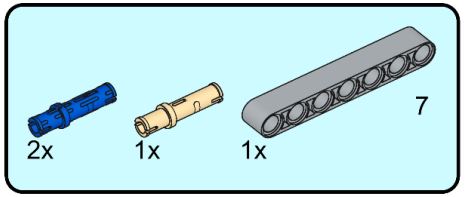

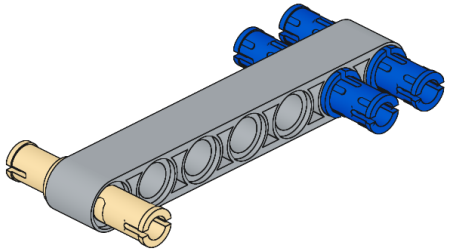

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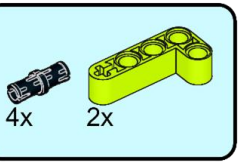

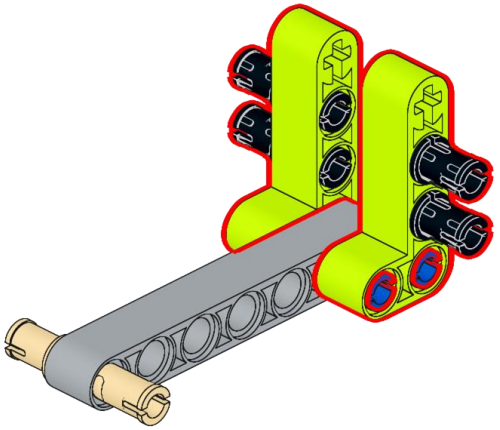

G. Assembly Of Game Objects

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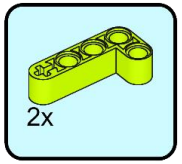

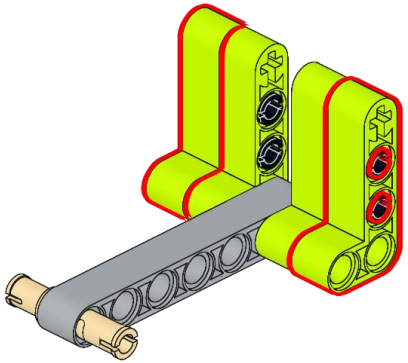

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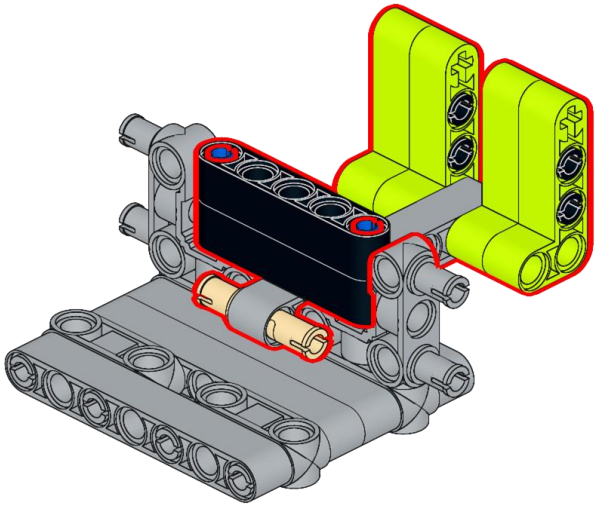

G. Assembly Of Game Objects

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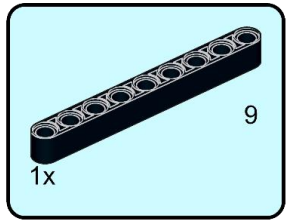

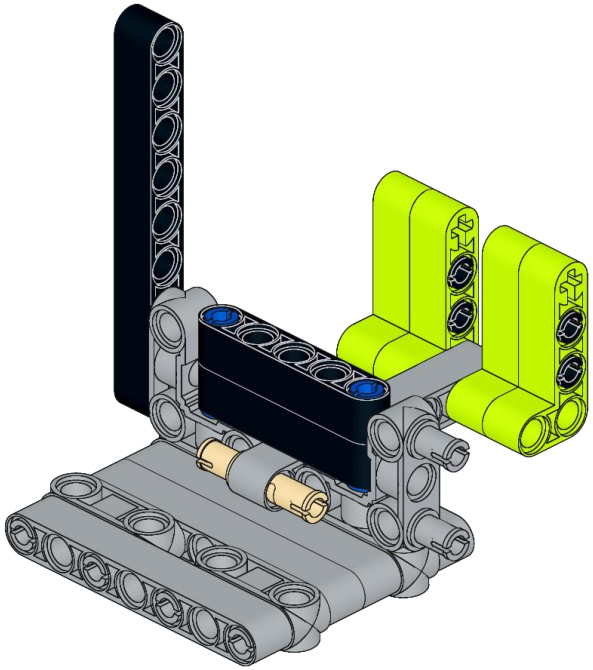

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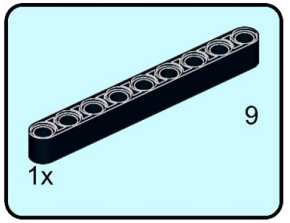

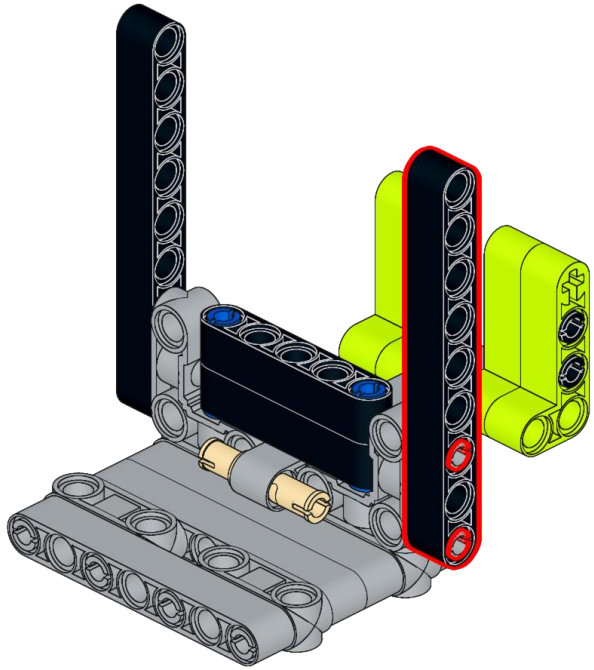

G. Assembly Of Game Objects

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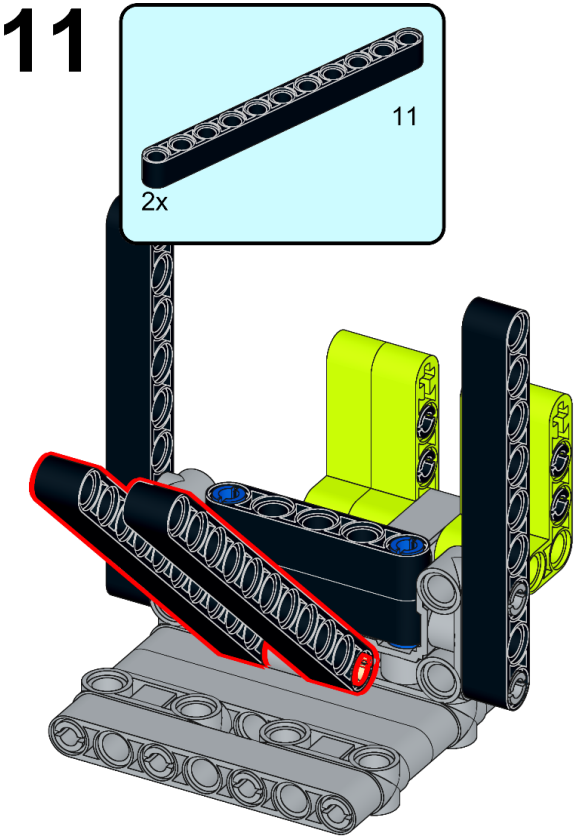

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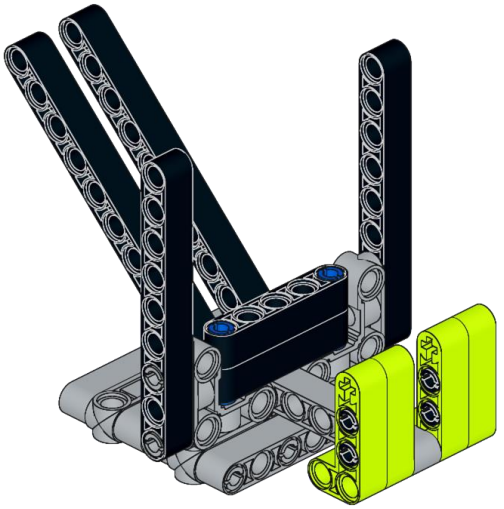

G. Assembly Of Game Objects

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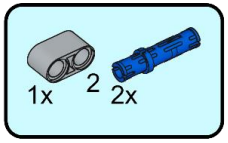

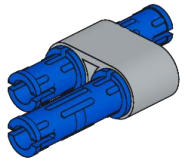

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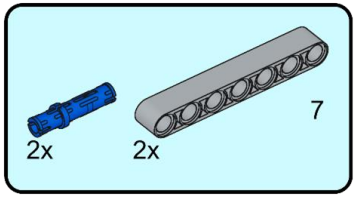

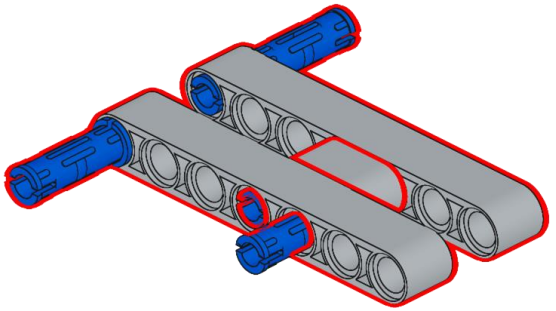

G. Assembly Of Game Objects

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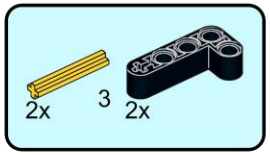

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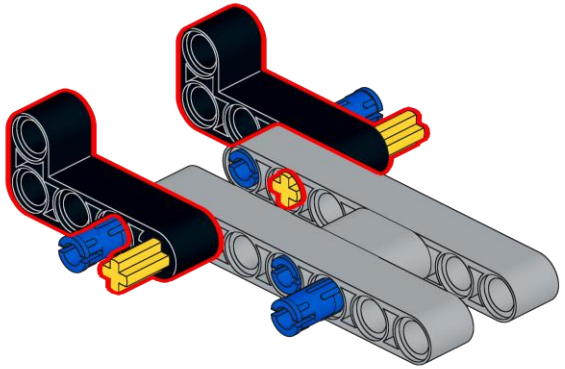

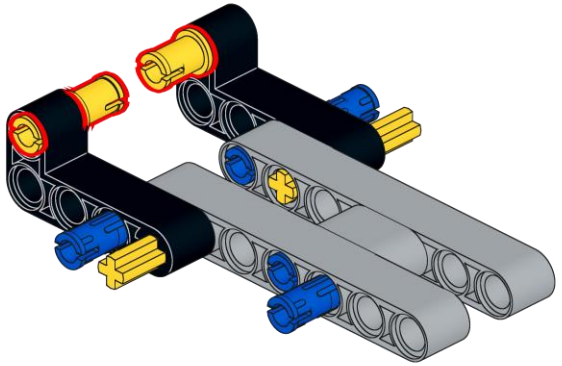

G. Assembly Of Game Objects

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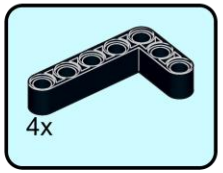

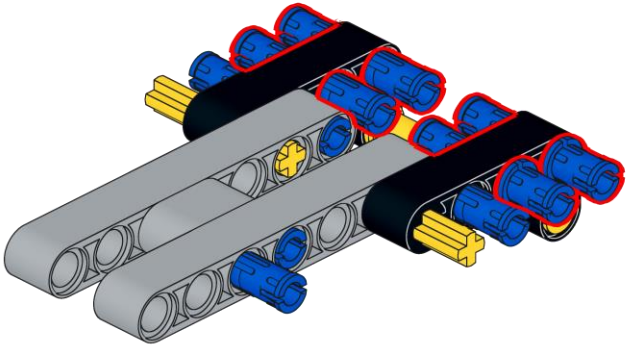

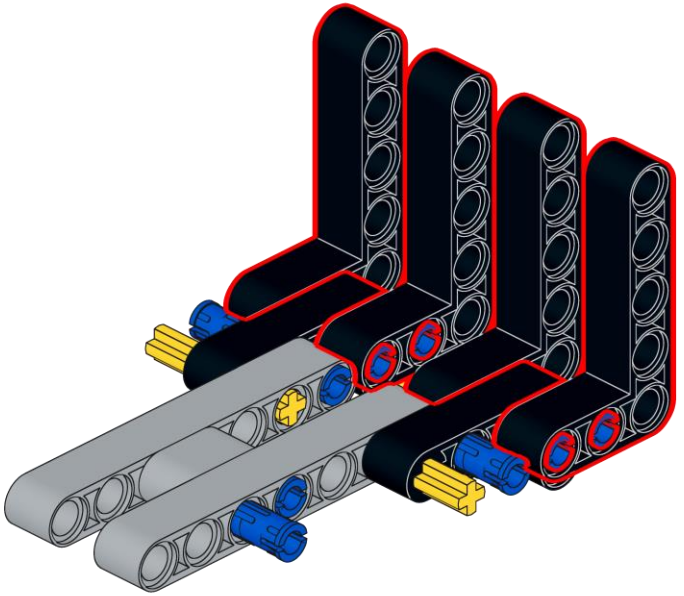

G. Assembly Of Game Objects

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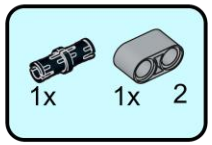

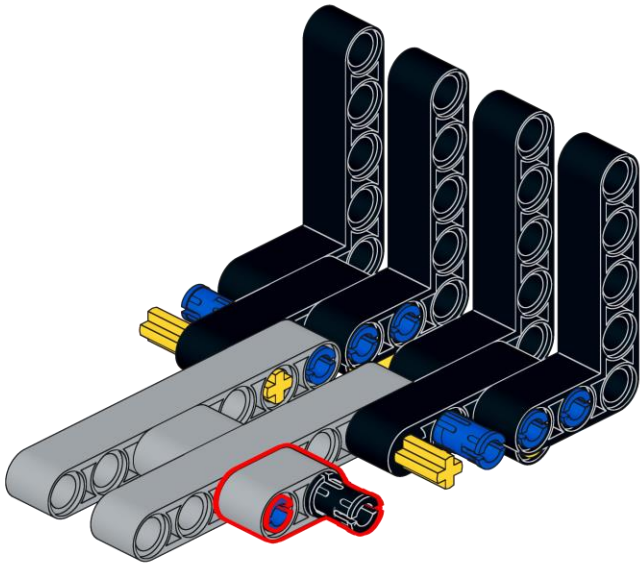

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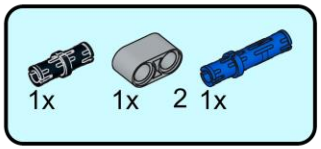

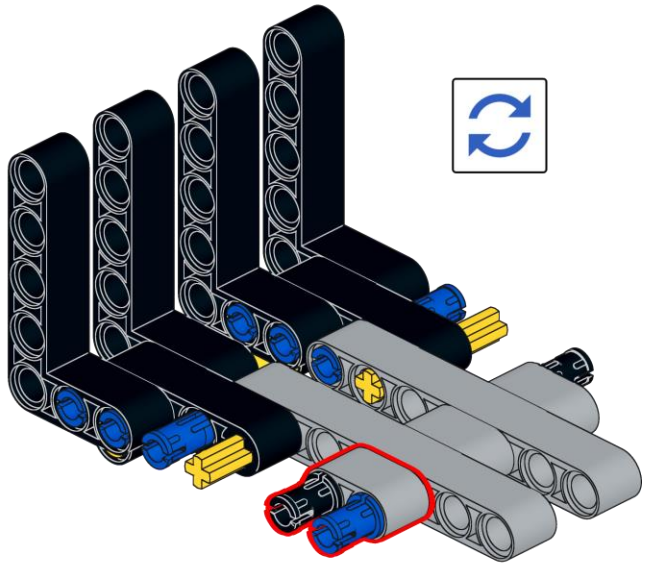

G. Assembly Of Game Objects

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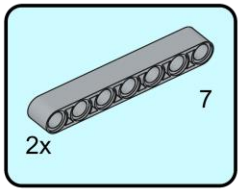

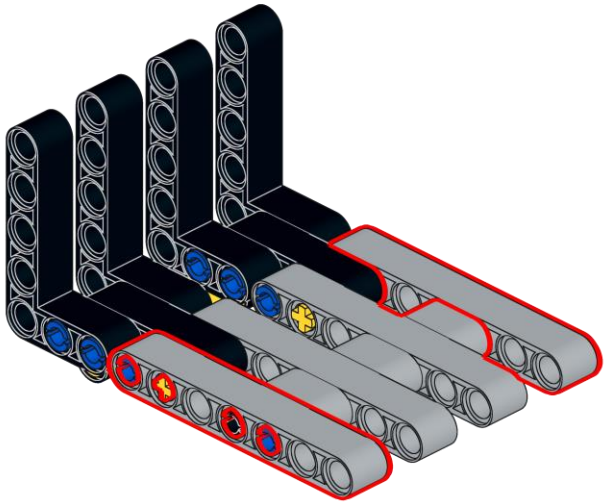

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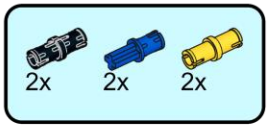

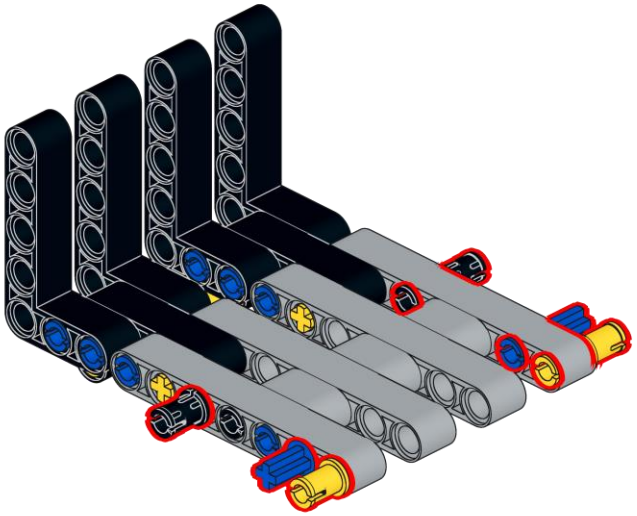

G. Assembly Of Game Objects

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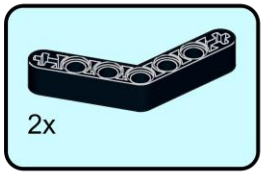

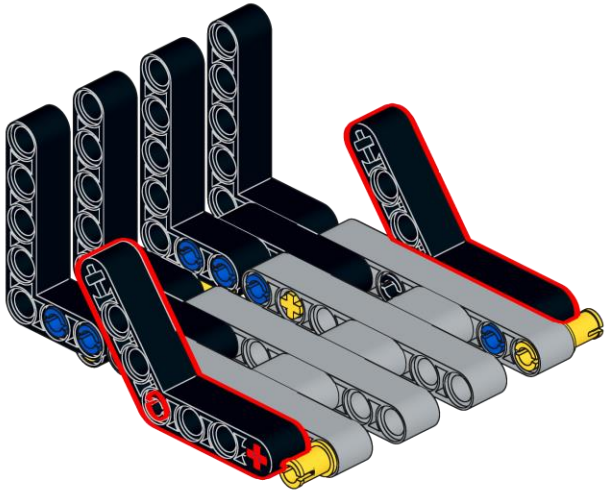

G. Assembly Of Game Objects

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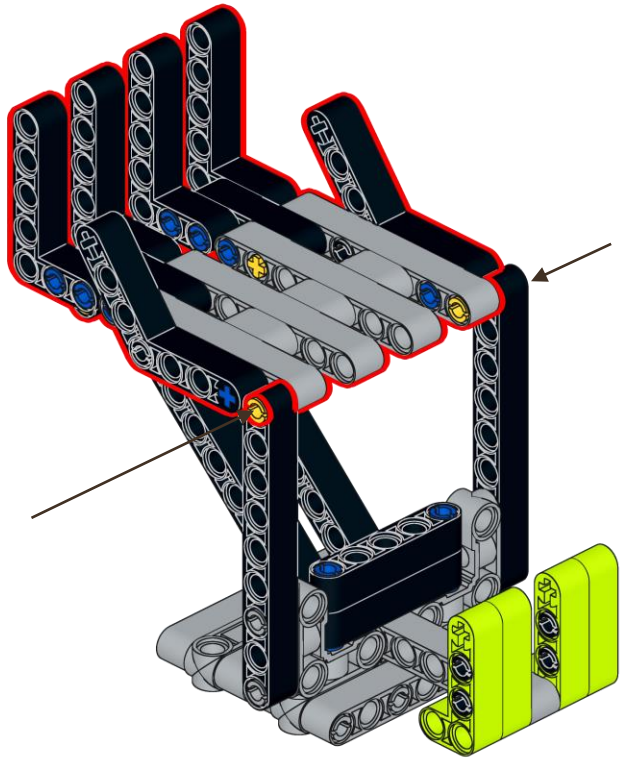

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