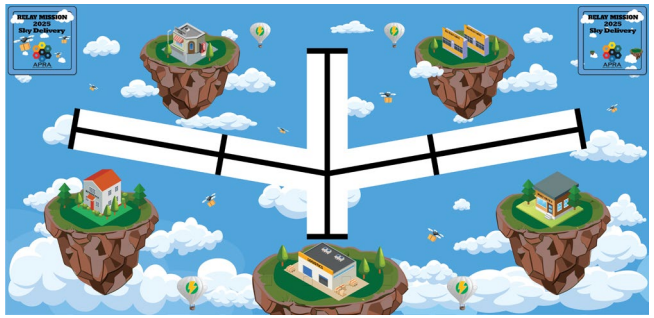


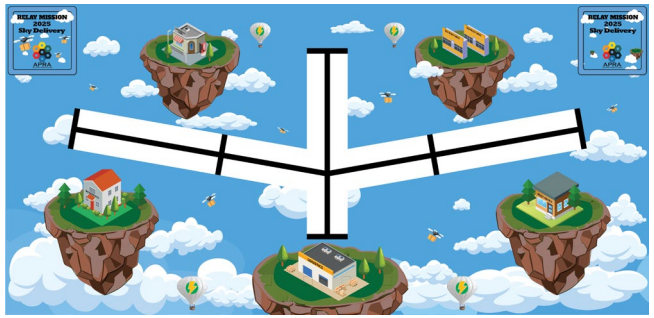
Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

Updated : 02/04/2025

APRA
ASIA PACIFIC ROBOT ALLIANCE

Content

A. Brief
B. Game Description
C. Scoring
D. Game Rules
E. Other Rules
F. Competition System
G. Assembly Of Game Objects



Mission field

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

A. Brief

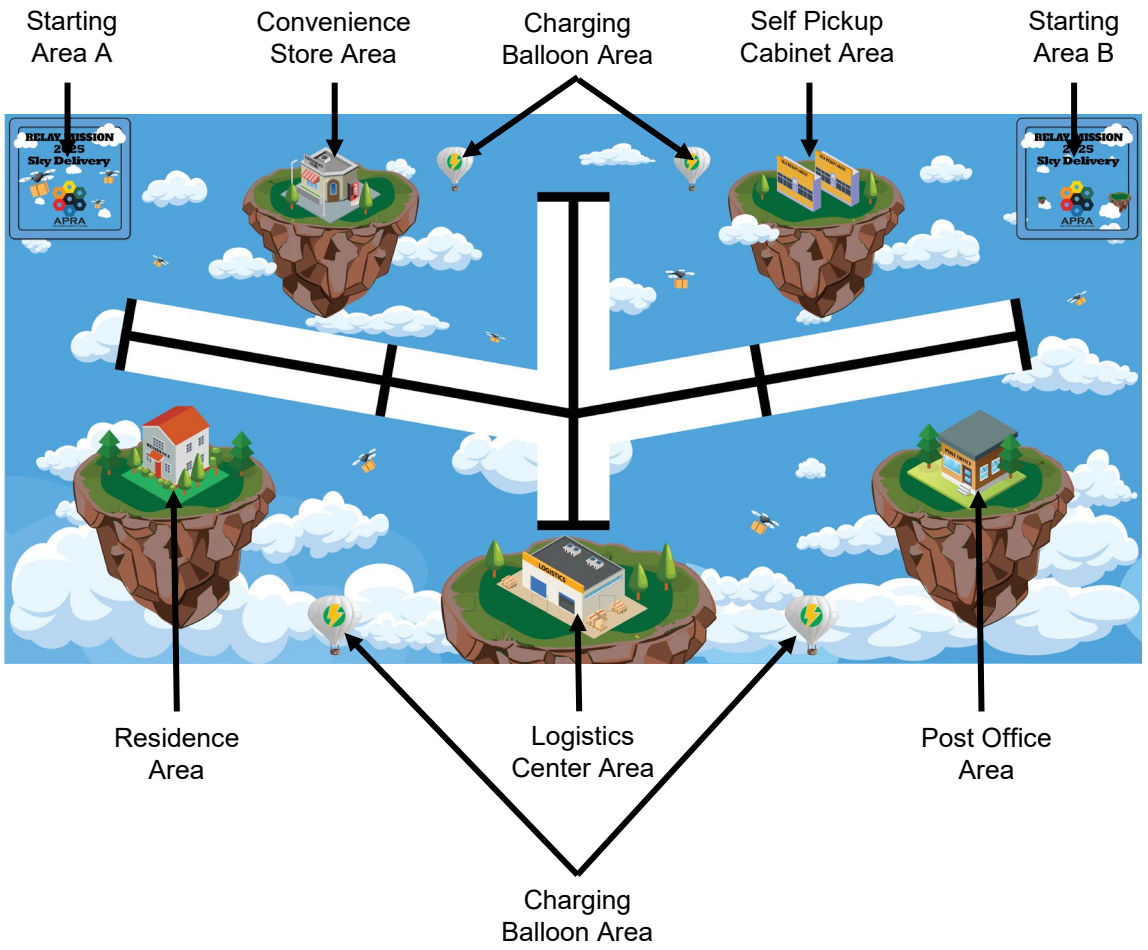
A1. Imagine that one day humans can finally overcome gravity technology and live in the sky, and drones may become a mainstream tool for cargo transportation. This competition allows robots to play the role of drones. In addition to delivering parcels to designated places, they also need to collect parcels to the logistics center and recharge themselves to maintain normal operations.

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

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

A4. Participating age: Participants must be 9 - 13 years old (birth date in 2025 season is 2012 – 2016).

B. Game Description (Field setup and specifications)



Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

B. Game Description (Field setup and specifications)

B1. The mission field has five areas : residence area, convenience store area, self pickup cabinet area, post office area, and logistics center area.

B2. The top left corner of the mission area is the starting area A, while the top right corner is the starting area B.

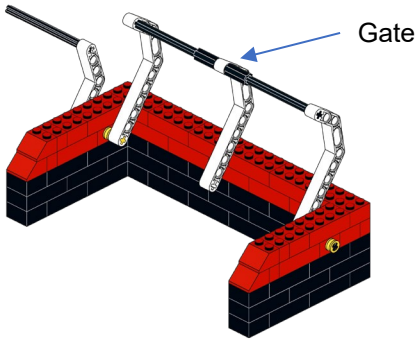
B3. There are four charging balloon areas in the mission area.

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

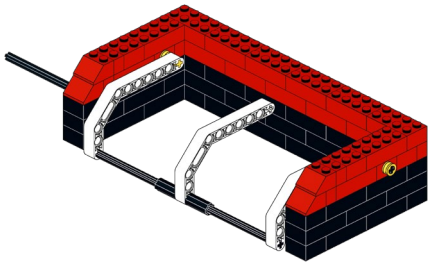
B5. Lockers of different colors will be placed in the mission area : the red one for residence area, the yellow one for the convenience store area, the blue one for the self pickup cabinet area, and the green one for the post office area.

B6. The locker's gate is in a **closed state** when it is in contact with the mission area and in an **open state** when there is no contact.

B7. All lockers will be in the **open state** before the competition starts.



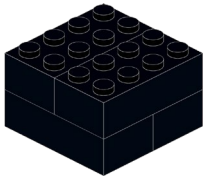
Red locker (**open state**)



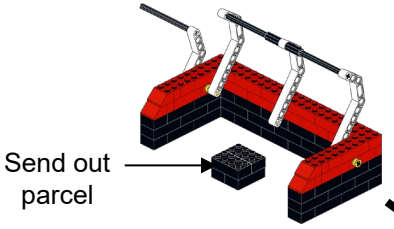
Red locker (**closed state**)

B. Game Description (Field setup and specifications)

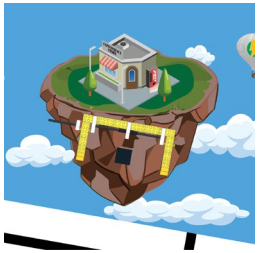
B8. The black 4 x 4 brick will be called ‘Send Out Parcel’, and there will be one in each locker.



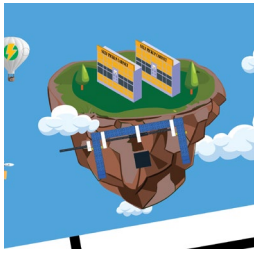
B9. Use Velcro to fix the locker to the marks on the field. The lockers and the send out parcels will be placed on the field as shown below.



Red locker
(**open state**)



Convenience Store Area



Self Pickup Cabinet Area

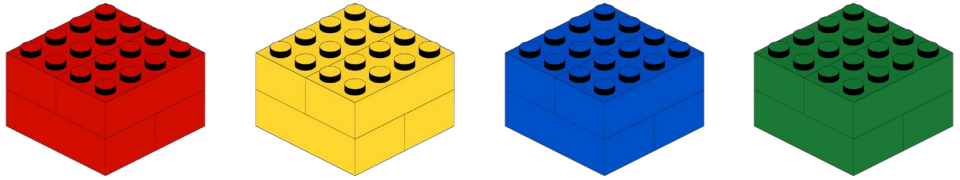
Residence Area

Post Office Area

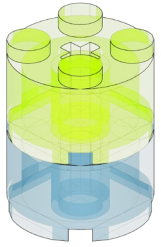
Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

B. Game Description (Field setup and specifications)

B10. The red, yellow, blue, and green 4 x 4 bricks will be called ‘Delivery Parcels’ and will be placed in the logistics center area.



B11. The 2 X 2 round bricks is called ‘Battery’, and each battery is composed of two 2 X 2 round bricks.

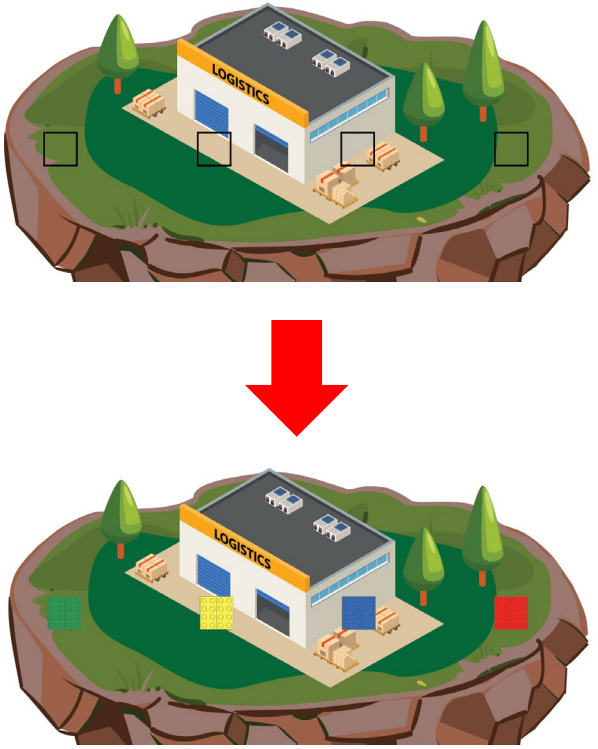


A battery

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

B. Game Description (Field setup and specifications)

B12. Before each round of competition, delivery parcels will be placed on the square mark in the logistics center area in the order of green, yellow, blue, and red from left to right.

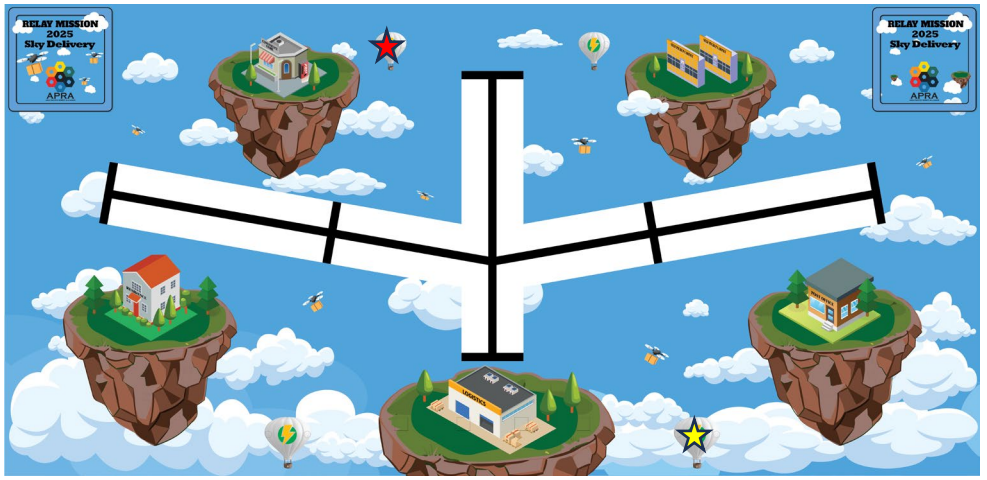


Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

B. Game Description (Bonus mission)

B13. The elementary category will have **one** bonus mission on the day of the competition.

B14. On the day of the competition, **two** charging balloon area positions will be drawn, and **two** batteries will be placed in each position as a bonus mission. Their positions will be drawn randomly using the English letters A to D. (The results will be drawn **before** the testing time and will be uniformly applied in the three rounds of the tournament.)



i. Each balloon is marked with an English letter.
ii. Example : The results of the draw are B and D. Two batteries will be placed in the **red** star position, and the other two batteries will be placed in the **yellow** star positions.
iii. If the team chooses not to take on the bonus mission, they can request to remove it from the field.

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

B. Game Description

B15. There are three rounds on tournament day, and each round lasts 120 seconds.

B16. The robot that starts from starting area A is Robot A, and the robot that starts from starting area B is Robot B.

B17. When the game starts, robots A and B can start at the same time.

B18. When the time exceeds 120 seconds or the participating member says '**finish**', the timing ends.

B19. The vertical projection of the robot, including wires, must be completely within the starting area before the game starts.

B20. All scores will be calculated and recorded after the competition time is over.

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

C. Scoring

C1. Definition of completely entered : The vertical projection of an object is **completely overlapped** with the pattern.

C2. Definition of completely left : The vertical projection of an object is **not overlapped** with the pattern.

C3. Definition of partially entered : The vertical projection of an object is **overlapped** with the pattern.

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

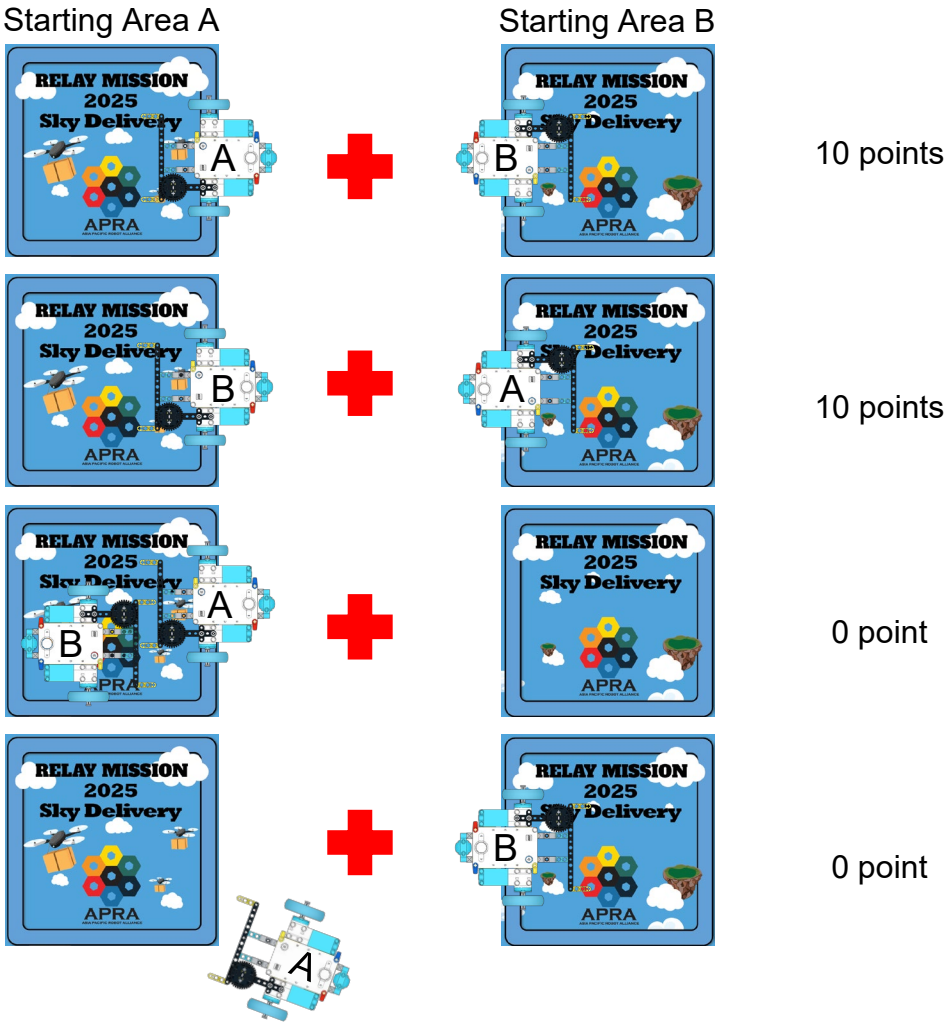
C5. Mission 1 : Robots A and B **completely leave** their respective starting areas (counted only once), getting **10** points.

C6. Mission 2 : As soon as the timer stopped, two robots stopped completely, getting **10** points.

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

C. Scoring

C7. Mission 3 : After the timer stops, each of the two robots **partially entered** the starting area A and starting area B respectively, getting **10** points.



Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

C. Scoring

C8. Mission 4 and 5 : After the timer stops, the robot is **charged successfully**, getting **10** points for each area. The definition of charged successfully is that the following two conditions must be met at the same time :

i. The battery has **completely entered** the starting area. (starting area A or starting area B)
ii. The number of batteries is **two**.

Starting Area A

i. ✓
ii. ✓

10 points

Starting Area B

i. ✗
ii. ✗

0 point

i. ✓
ii. ✗

0 point

i. ✓
ii. ✗

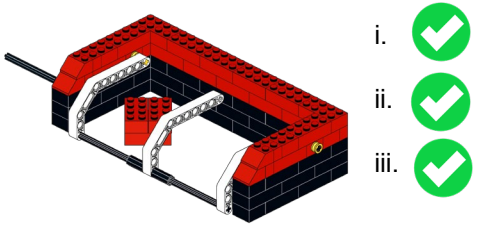
0 point

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

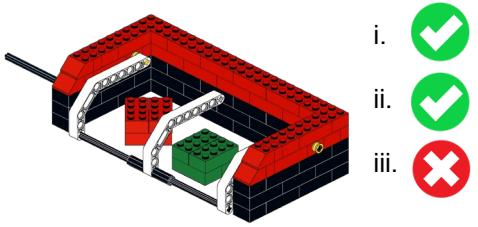
C. Scoring

C9. Mission 6 / 7 / 8 / 9 : After the timer stops, locker being **successfully delivered** and **send out parcel,** getting **10** points. The definition is that the following three conditions must be met at the same time :

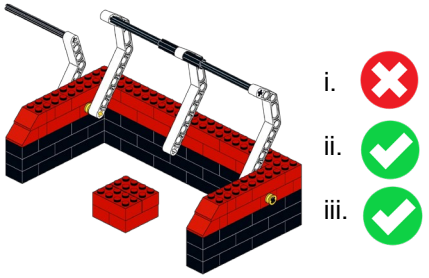
i. The locker is in a **closed state**.
ii. The send out parcel (black 4 x 4 brick) **completely leave** the locker.
iii. A delivery parcel (corresponding to the color of the locker) is inside the locker.



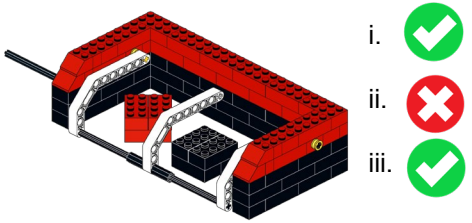
10 points



0 point



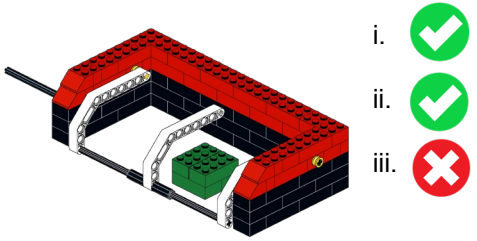
0 point



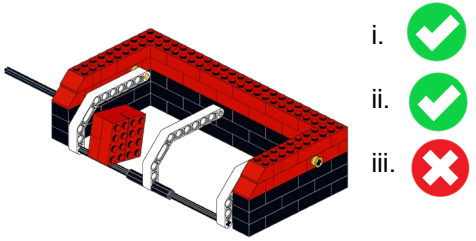
0 point

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

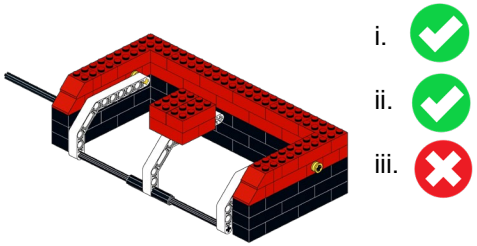
C. Scoring



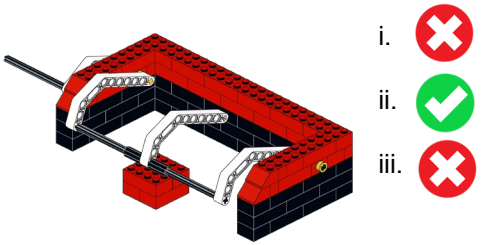
0 point



0 point



0 point



0 point

C10. Mission 10 : Send out parcel **partially entered** the logistics center area, getting **10** points each.

40 points

30 points

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

C. Scoring

Robot	Mission (Scoring Item)		Score
A + B	Mission 1	Robots A and B **completely leave** their respective starting areas (counted only once).	0 / 10
A + B	Mission 2	As soon as the timer stopped, two robots stopped completely.	0 / 10
A + B	Mission 3	Two robots **partially entered** the starting area A and starting area B respectively.	0 / 10
A / B	Mission 4	The robot in starting area A is charged successfully.	0 / 10
	Mission 5	The robot in starting area B is charged successfully.	0 / 10
	Mission 6	The red locker is successfully delivered and send out parcel.	0 / 10
	Mission 7	The yellow locker is successfully delivered and send out parcel.	0 / 10
	Mission 8	The blue locker is successfully delivered and send out parcel.	0 / 10
	Mission 9	The green locker is successfully delivered and send out parcel.	0 / 10
	Mission 10	Send out parcel **partially entered** the logistics center area (10 points each).	0 / 10 / 20 / 30 / 40
Total score (Maximum marks is 130)			_____marks
Completion time (Time limit is 120 seconds)			____:____.____

C. Scoring

C11. The pattern for each area is shown as follows.

Starting
Area A

Starting
Area B

Logistics
Center Area

D. Game Rules

D1. The size of the robot should be within 25 cm (L) x 25 cm (W) x 25 cm (H), but there are no limits after the game has started.

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 can be used for each participating robot. (SPIKE™ Prime, Robot Inventor, EV3 or NXT)

D4. SPIKE™ Prime or Robot Inventor can only use official rechargeable batteries, while EV3 and NXT can also use lithium batteries with a maximum voltage of 1.5V per battery (with a total voltage not exceeding 9V). 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.

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

D. Game Rules

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 requirements 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 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.

D11. On the day of the competition, there will be testing time, inspection time, preparation time, and competition time.

D12. After each round of testing time, no program can be loaded from the computer to the robot.

D13. The robot must shut down, turn off WIFI and Bluetooth during the inspection time. (WIFI and Bluetooth must be turned off during the competition time.)

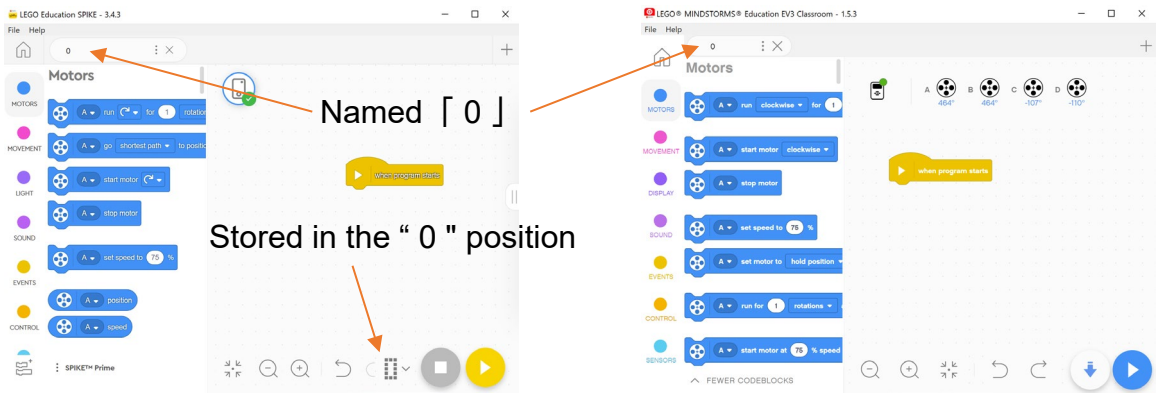
D14. The preparation time is one minute. Participants can turn on and adjust the robot but cannot start any programs.

D15. The robot is not allowed to input data in any form before starting. If any violation is found, the relevant team will be disqualified from the competition, and the results will be recorded as zero points and 120 seconds.

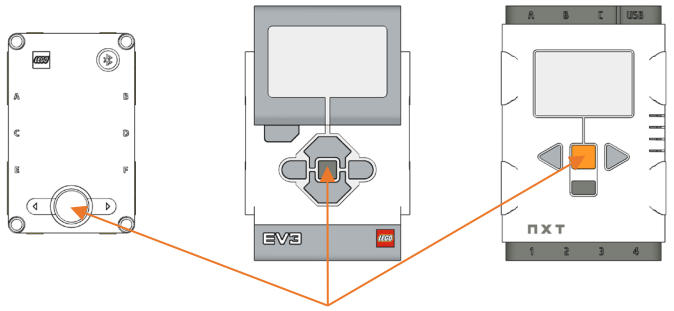
Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

D. Game Rules

D16. There can be only one competition program (but not the default program) in the microcomputer controller, and it is stored in a designated way (the program is stored with the name “ 0 ", and SPIKE must be stored in the “ 0 " position). Participants can only press the central button of the microcomputer controller to execute the program. After the program is executed, they are not allowed to touch the robot. If a robot violates the above rules, the robot will be removed from the field and cannot participate in that round of the competition.



LEGO® SPIKE Prime APP　　LEGO®classroom APP



Central button

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

D. Game Rules

D17. After the start of each round, if any parts of the robot accidentally fall off, the referee will not remove them and will not return them to the contestants until the end of the competition.

D18. 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.

D19. All teams are not allowed to bring the game field to the venue for practice. The organizer will provide testing time for all teams, and each testing time session is limited to two minutes.

D20. Participants must bring their robots to lineup； otherwise, the simulation will be canceled, and they will need to line up again.

D21. 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.

D22. Teams are strictly prohibited from interfering with their opponents in any way, otherwise, they will be disqualified immediately.

D23. If there are any special circumstances, all decisions shall be made based on the decision of the chief referee, and no objections will be permitted.

D24. The minimum score recorded is 0 point, and there will be no negative points. The highest time recorded will be the competition time limit.

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

D. Game Rules

D25. There is no limit to the number of motors and sensors that can be used. The types 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	 88017-Inventor Large Motor	 88018-Inventor Medium Motor

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 participants continue to argue, the team will be immediately disqualified from the tournament.

E3. After the game, participants from 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 abilities of robots that everyone agrees on in the tournament, the rules can only be changed with the consent of the chief referee.

Inspection of Robots

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 be used in the game until it is corrected.

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

E. Other Rules

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

E10. 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 canceled.)

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.

Rule's Content

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 > Sky Delivery Relay Mission Elementary Category Rules.

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 for each team will be sorted from high to low. If the scores are the same, the team with the shorter completion time will be sorted first.

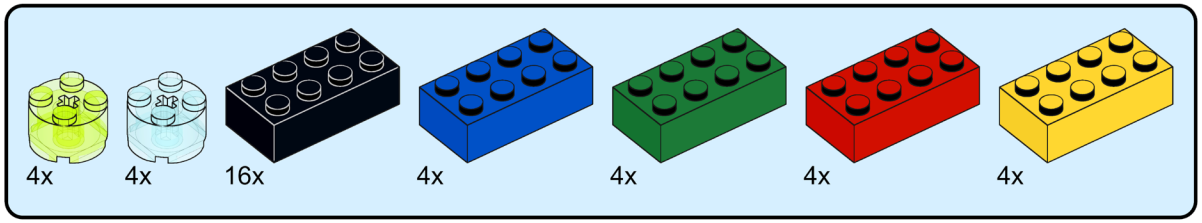
F3. Teams will be ranked according to their highest scores. If the scores are the same, the team with the shorter completion time will be ranked higher.

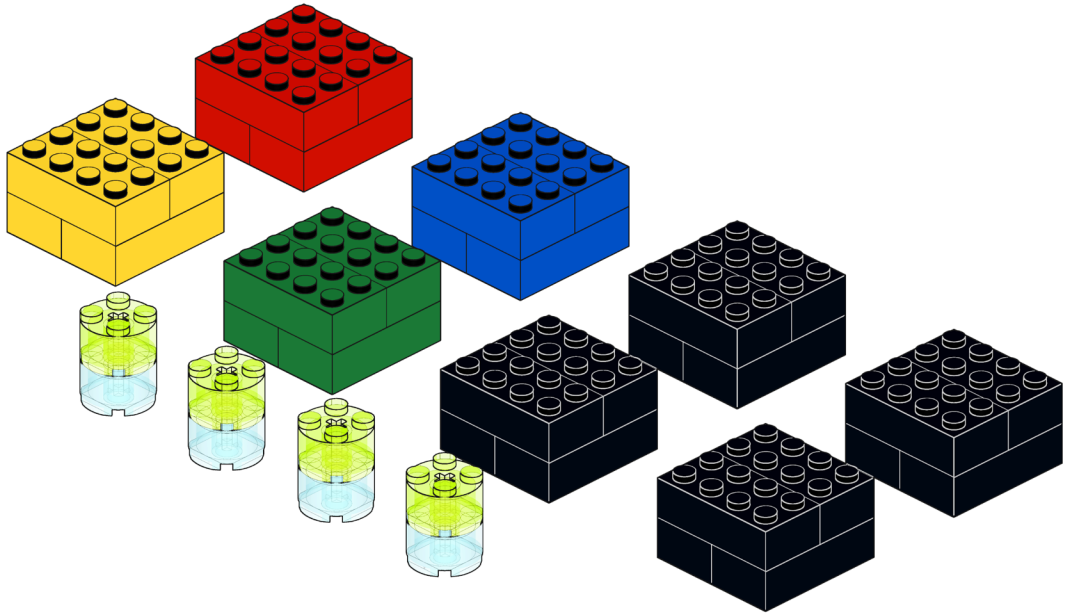
F4. If the scores and times of the teams are the identical, the best scores and times from the next round will be compared.

Sky Delivery Relay Mission
Elementary Category
Game Description, Rules and Scoring

G. Assembly Of Game Objects

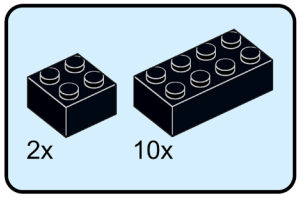
1

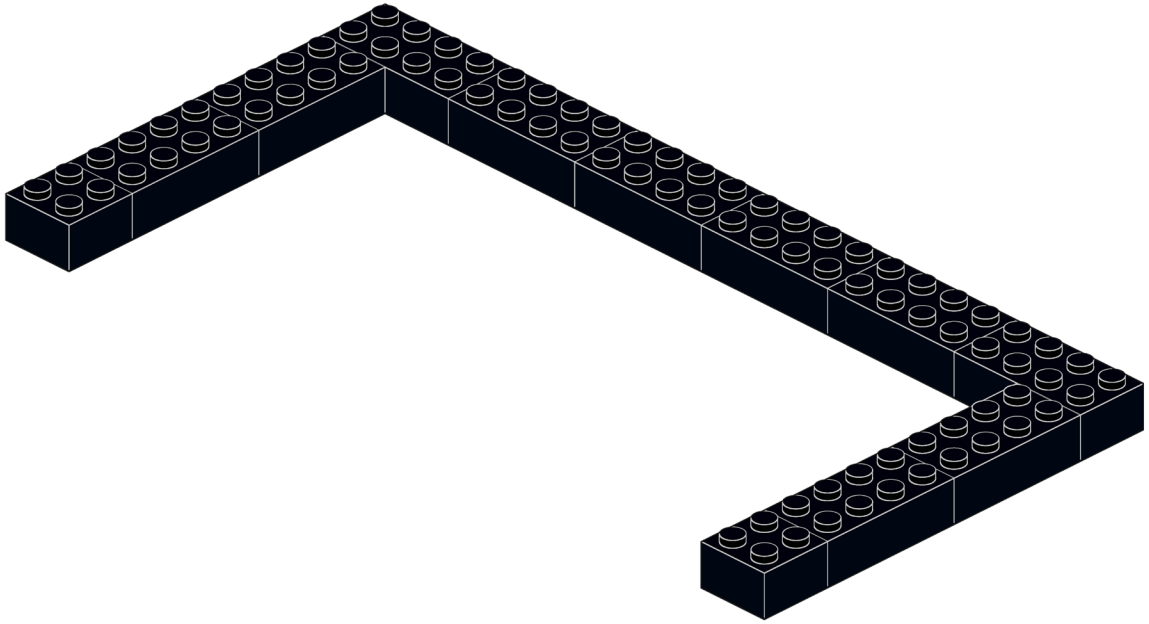




G. Assembly Of Game Objects

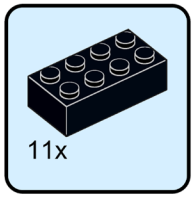
1

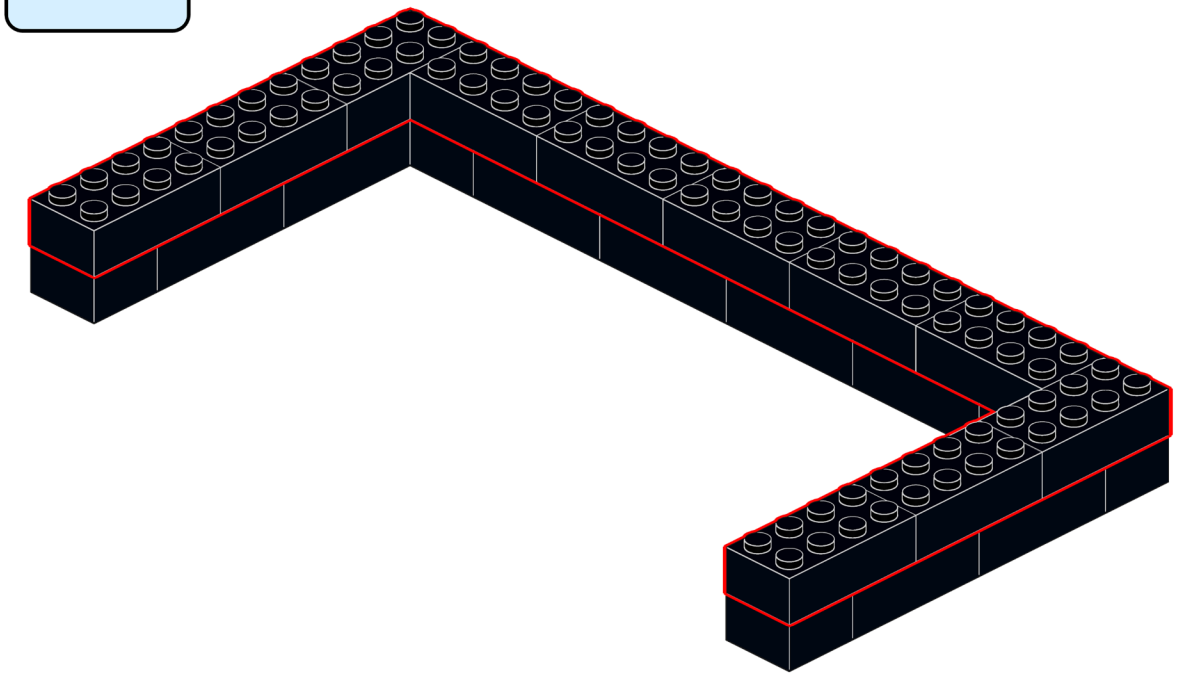




G. Assembly Of Game Objects

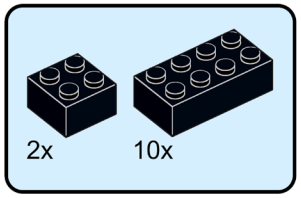
2

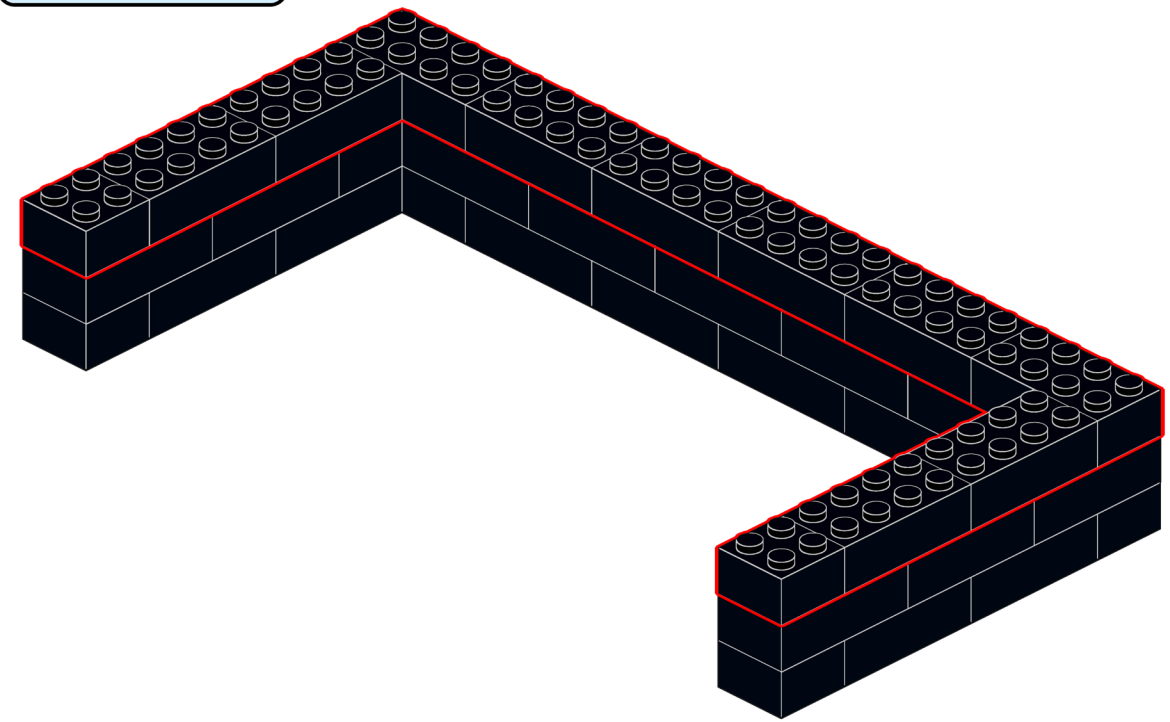




G. Assembly Of Game Objects

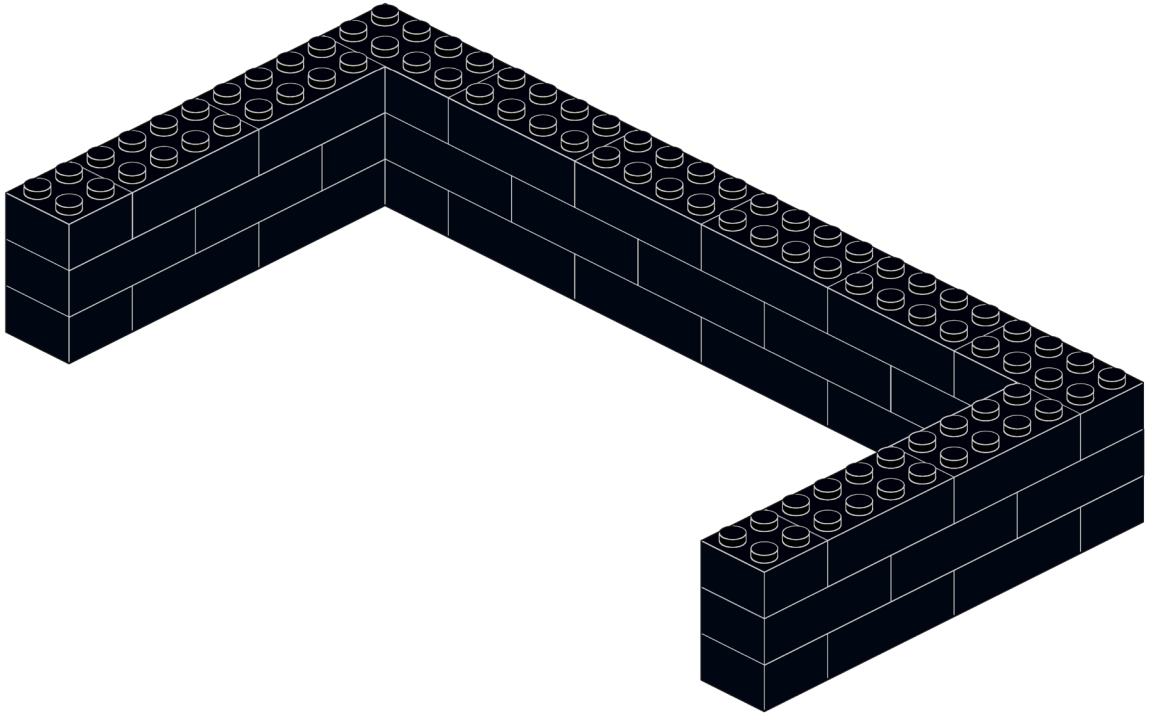
3





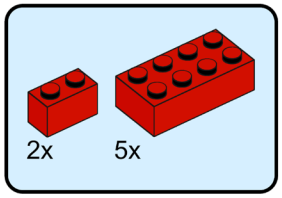
G. Assembly Of Game Objects

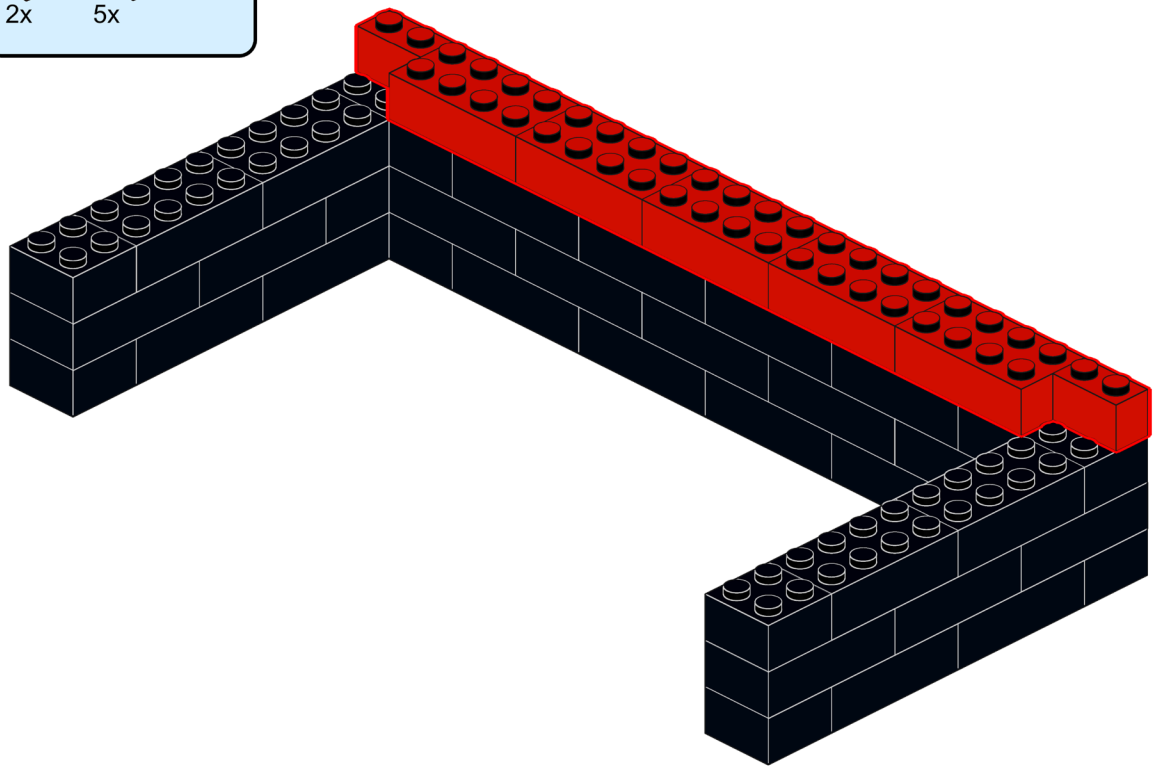
4



G. Assembly Of Game Objects

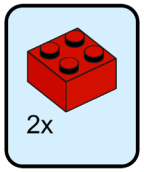
5

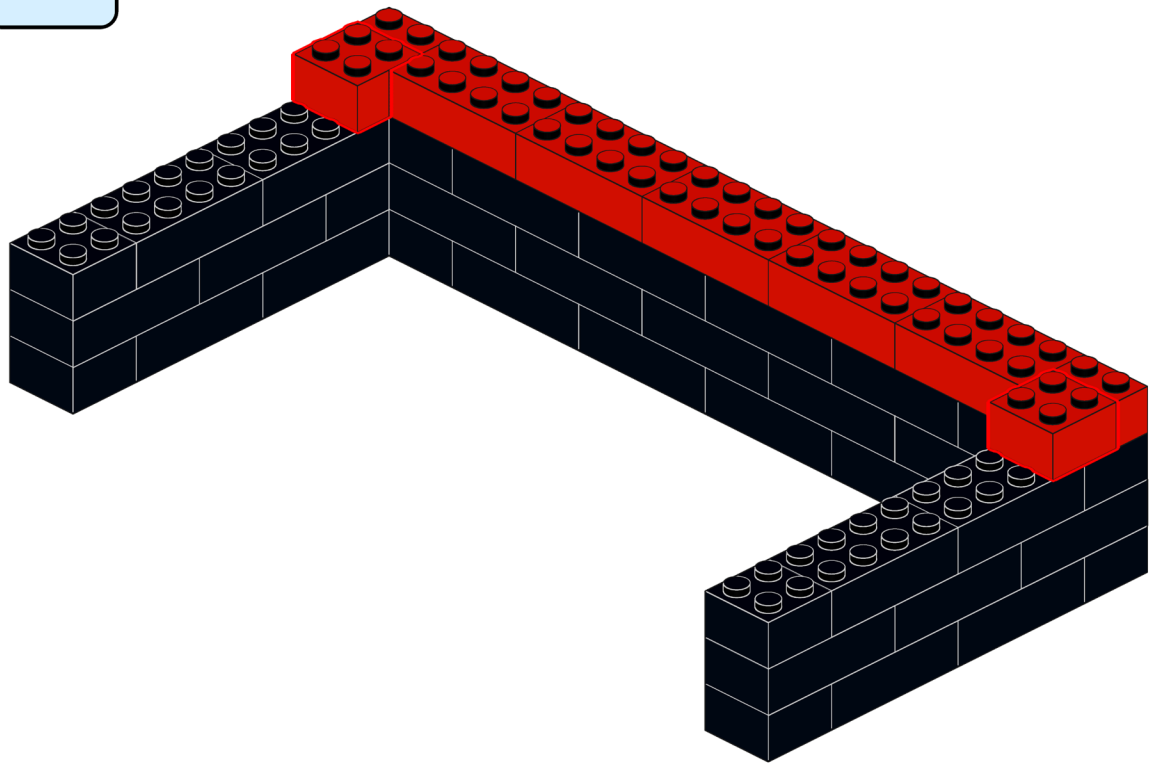




G. Assembly Of Game Objects

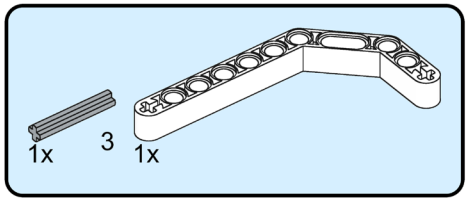
6

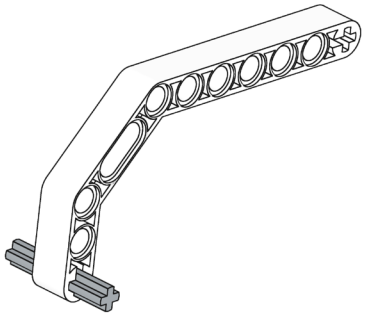




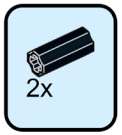
G. Assembly Of Game Objects

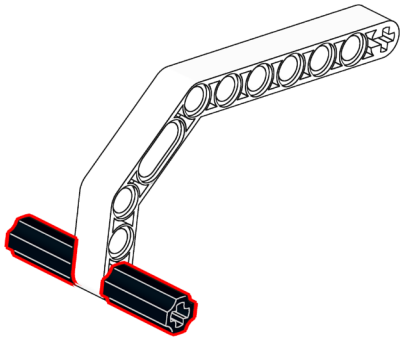
7





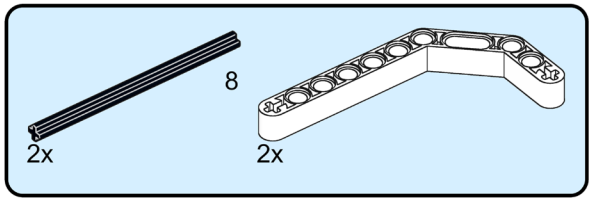
8

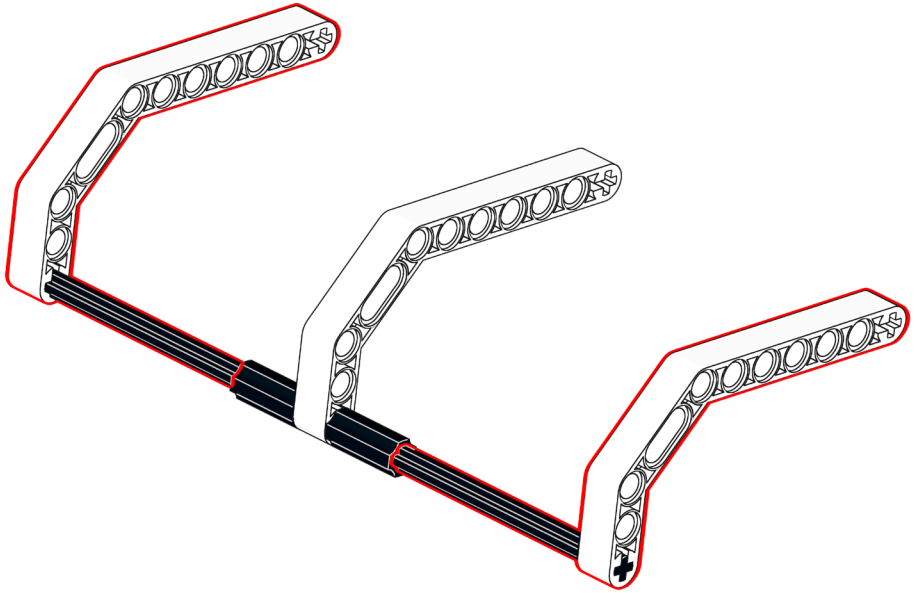




G. Assembly Of Game Objects

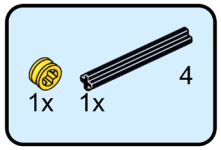
9

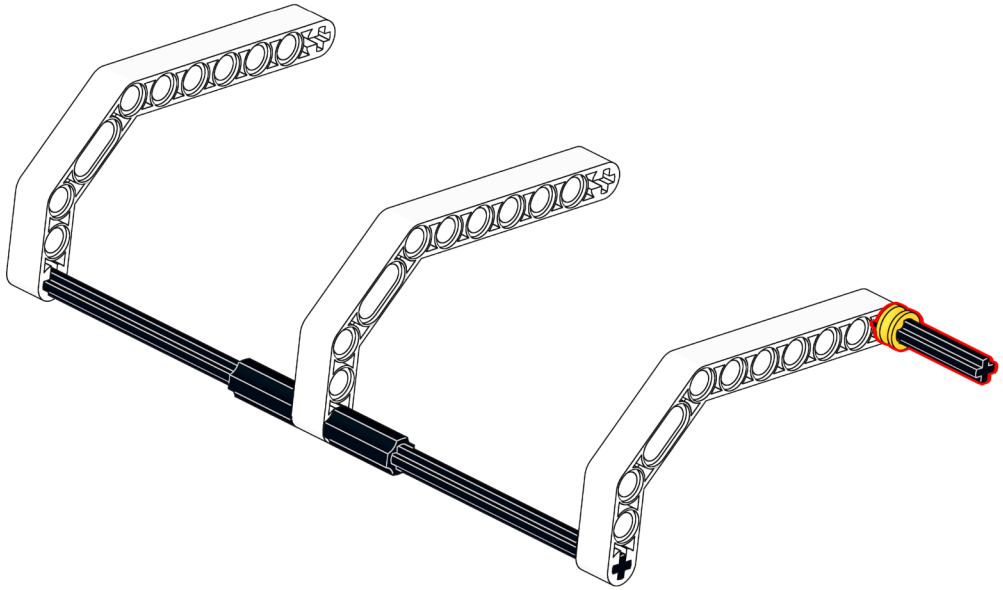




G. Assembly Of Game Objects

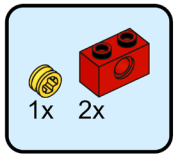
10

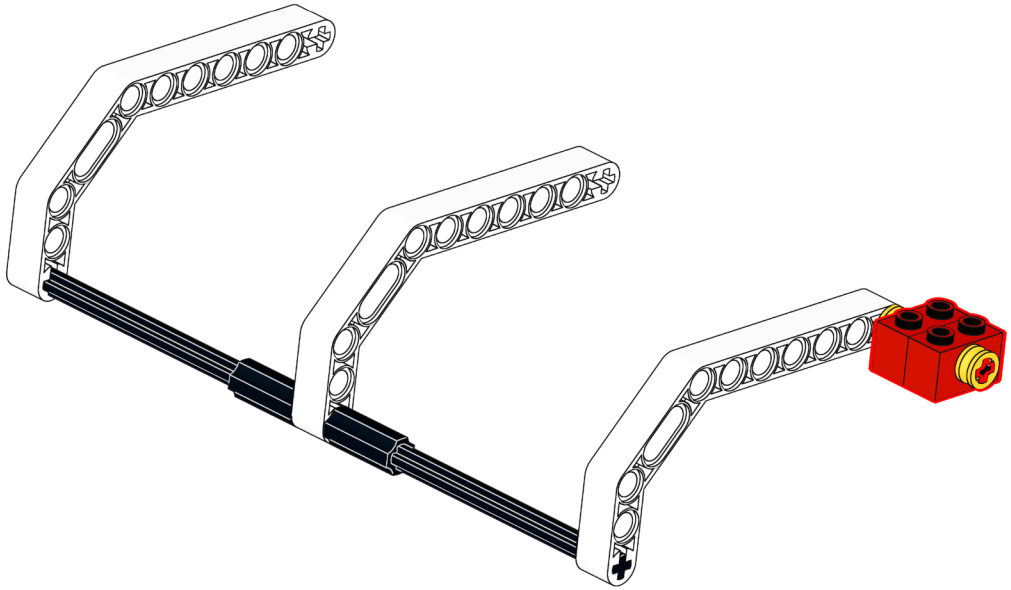




G. Assembly Of Game Objects

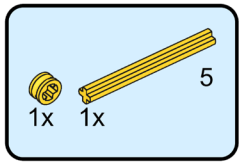
11

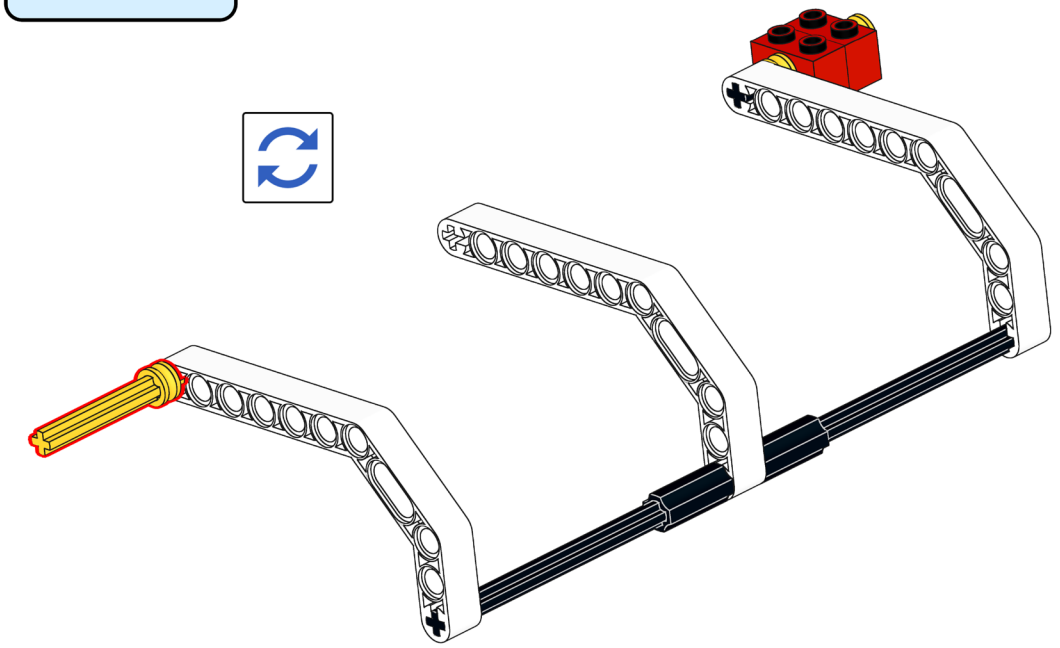




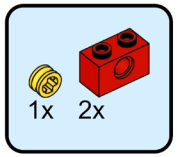
G. Assembly Of Game Objects

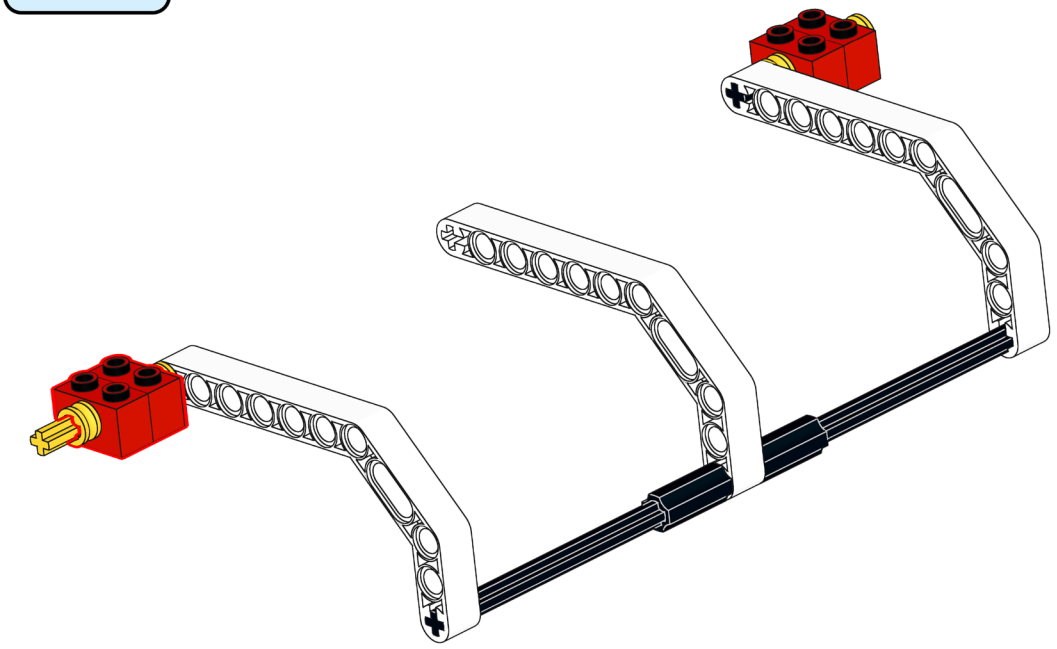
12





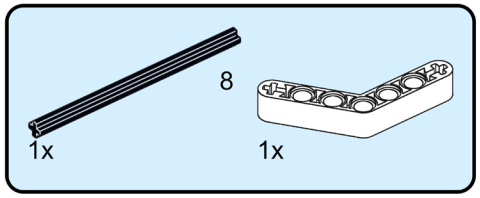
13

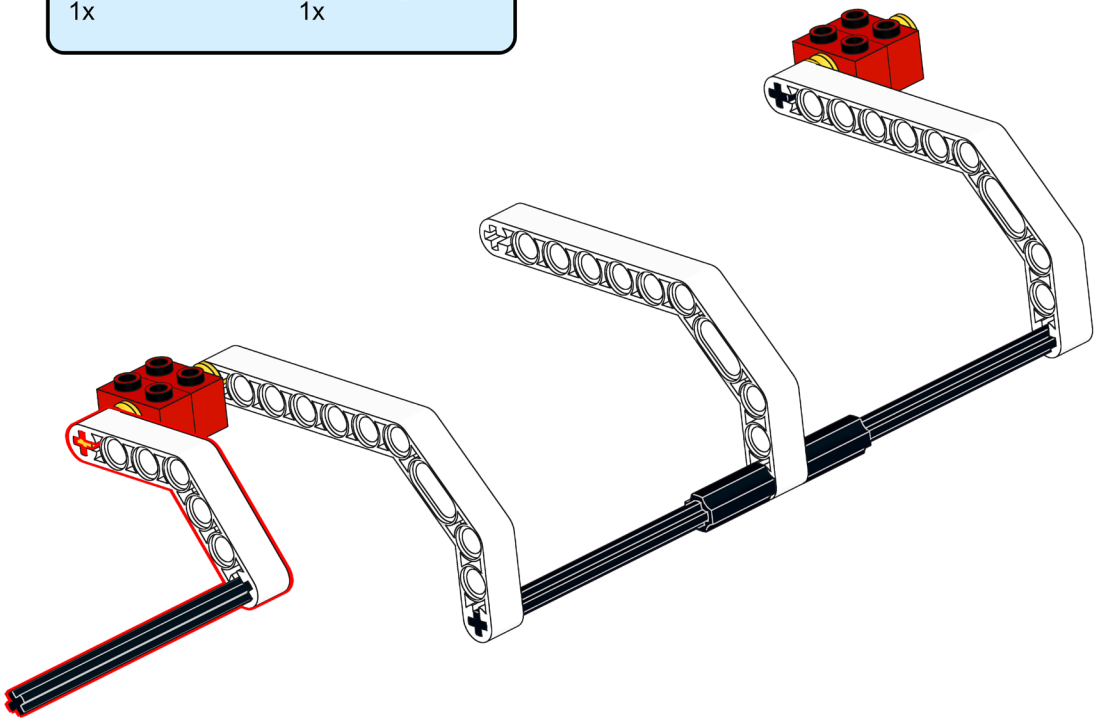




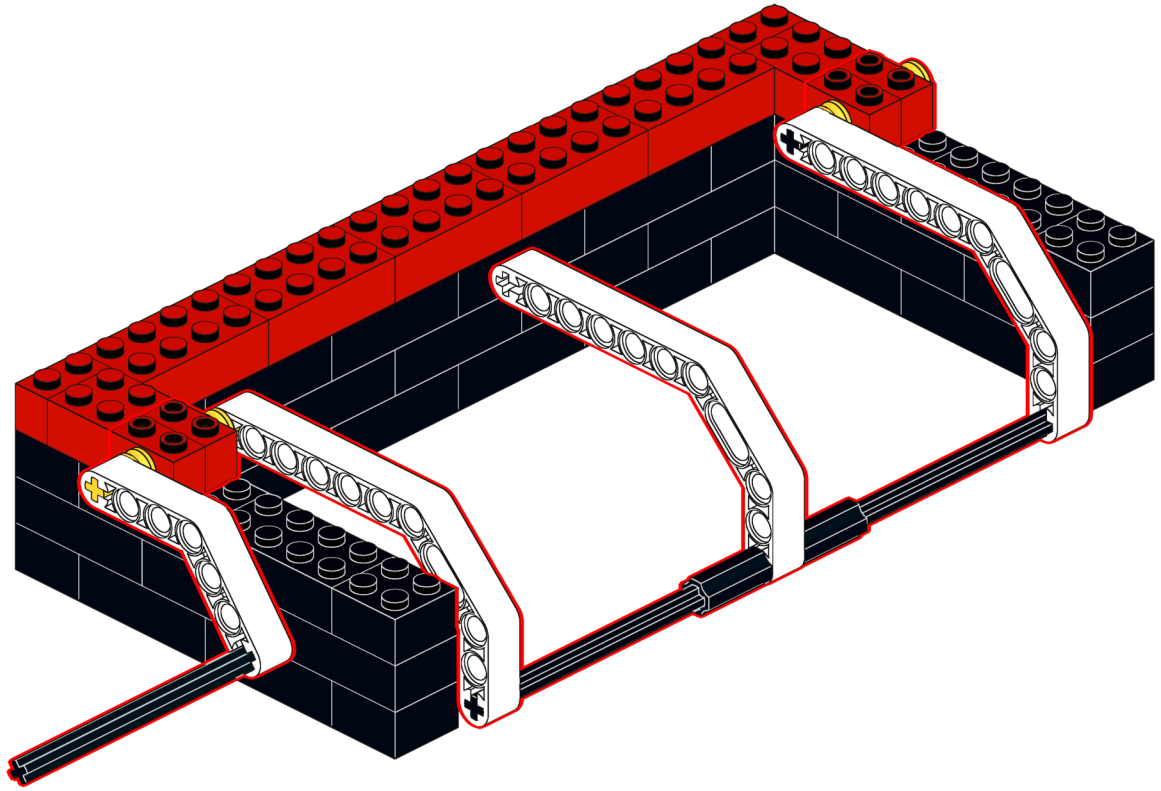
G. Assembly Of Game Objects

14



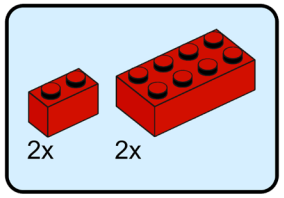


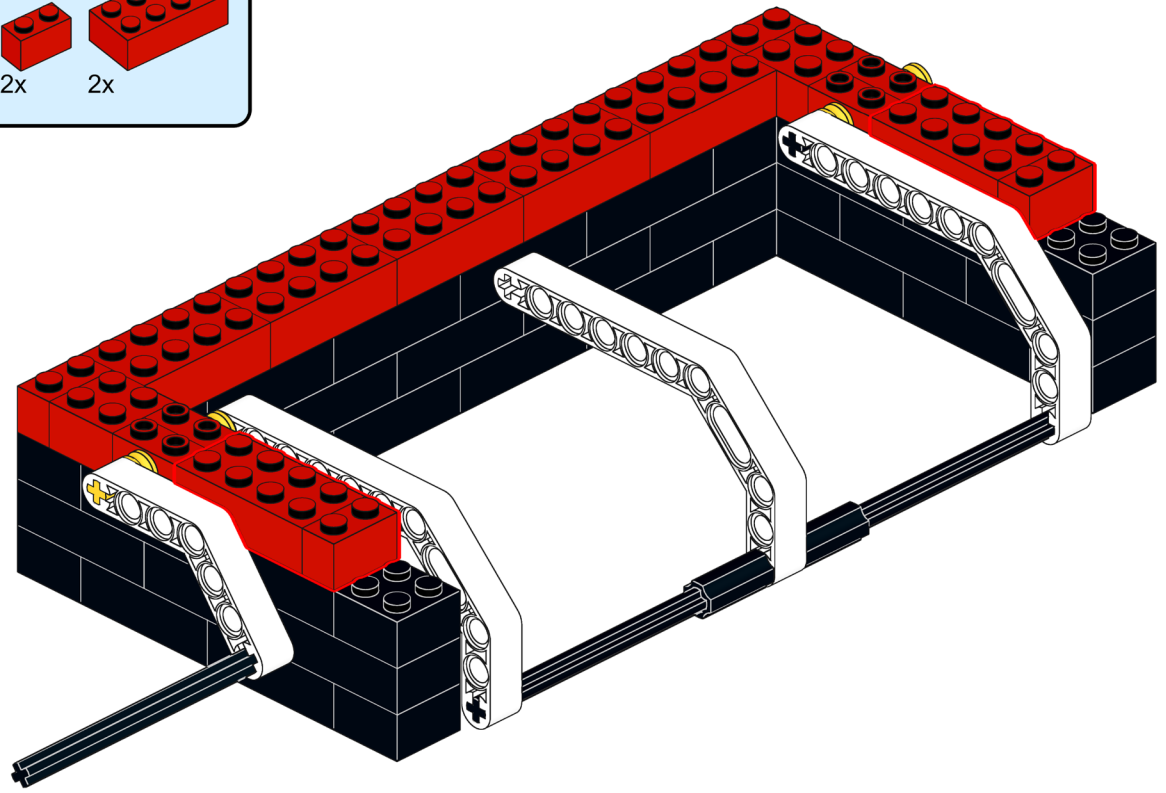
15



G. Assembly Of Game Objects

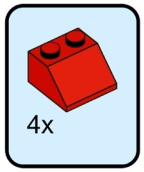
16

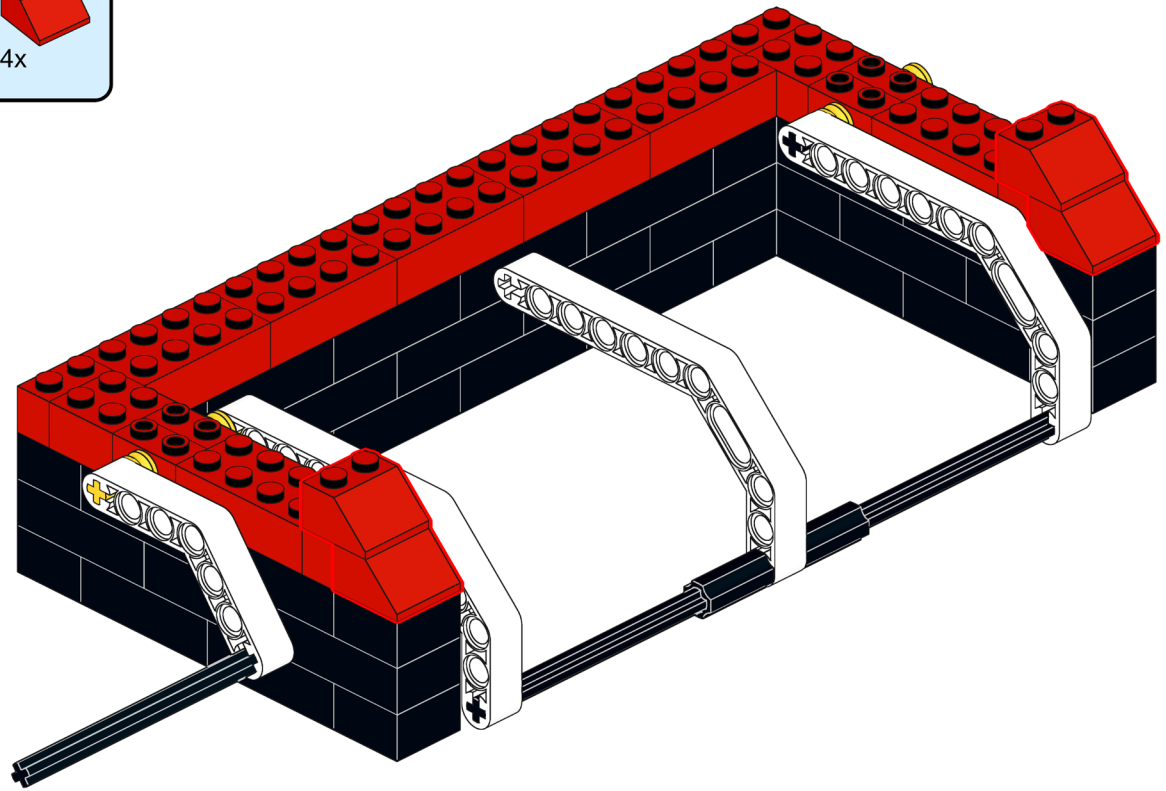




G. Assembly Of Game Objects

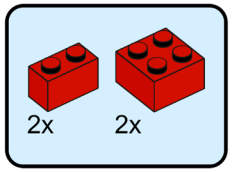
17

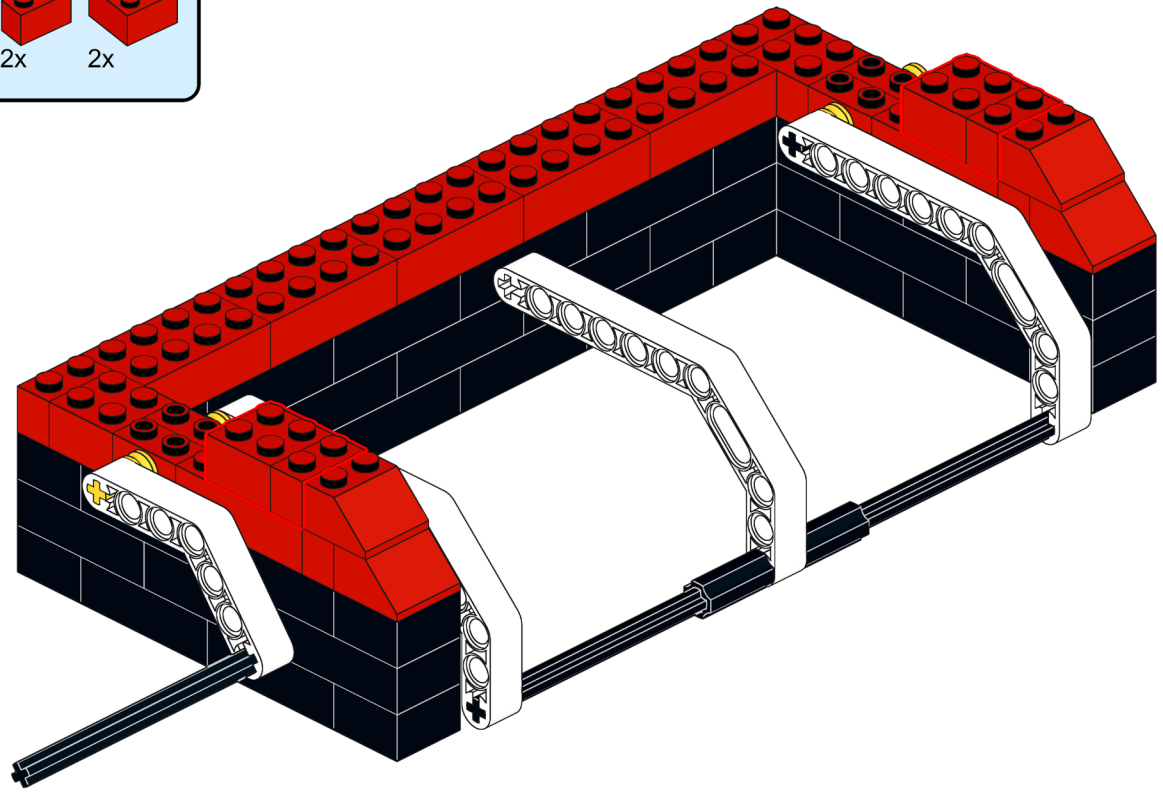




G. Assembly Of Game Objects

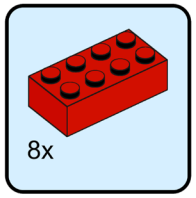
18

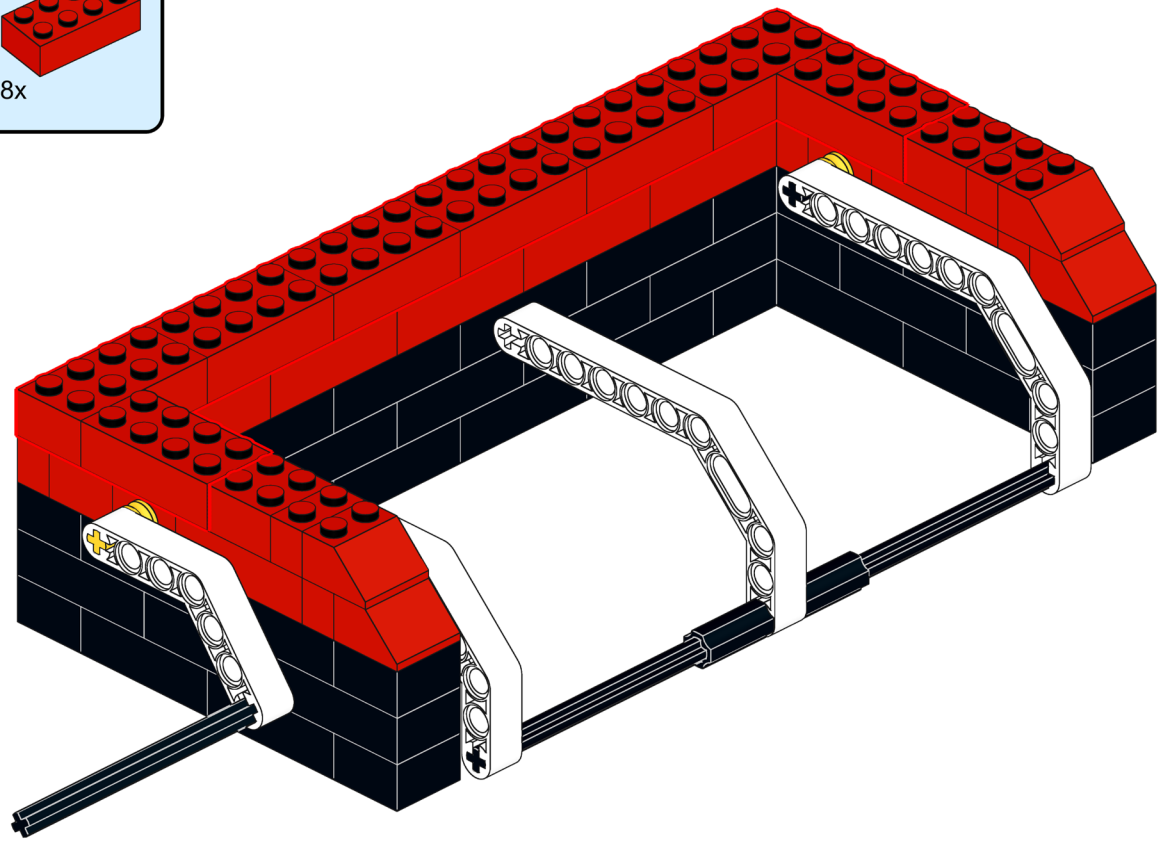




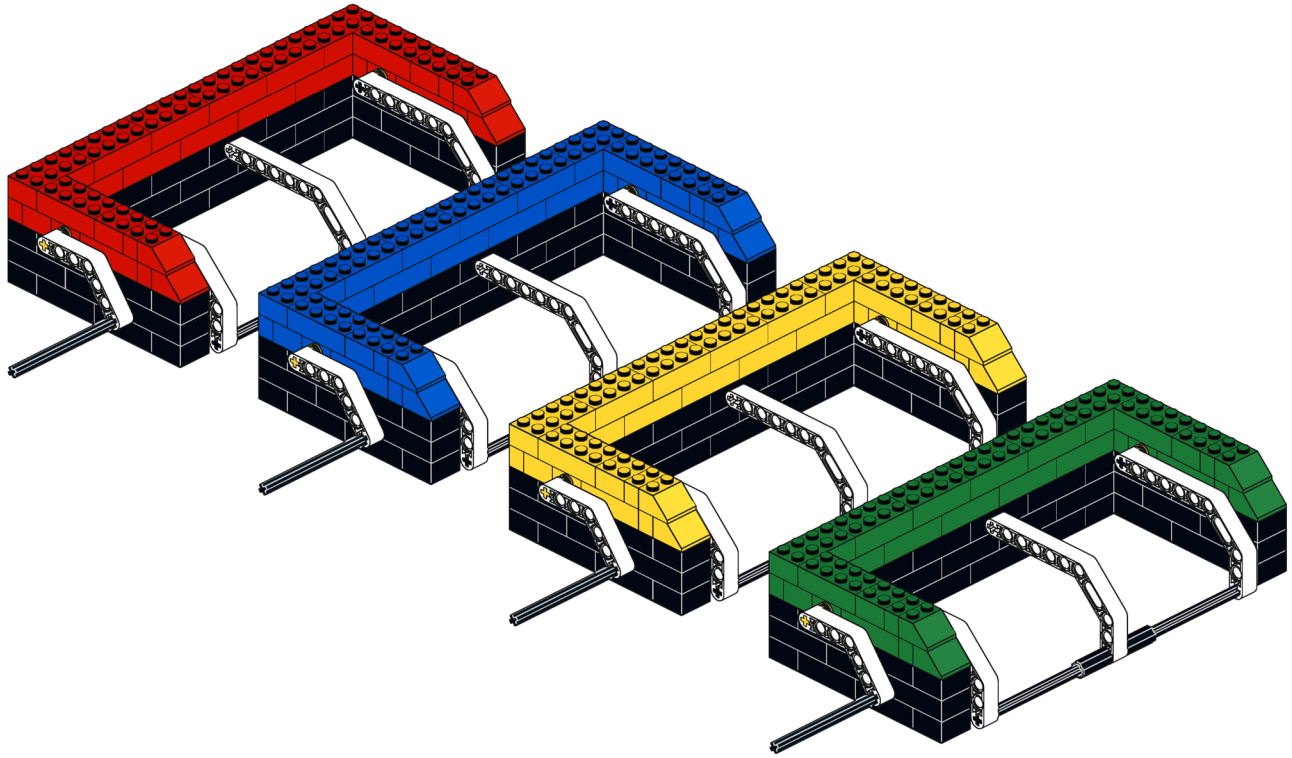
G. Assembly Of Game Objects

19





G. Assembly Of Game Objects



Please repeat the above steps to complete other color lockers.