

Building Mission Models

for FIRST LEGO League Challenge



Getting Organized

Sort Your Bags by Number

For the SUPER POWERED season, you should find the following items in your Challenge set box

Bag #1 - 1	Bag #10 - 2
Bag #2 - 3	Bag #11 - 2
Bag #3 - 2	Bag #12 - 1
Bag #4 - 2	Bag #13 - 2
Bag #5 - 1	Bag #14 - 3
Bag #6 - 1	Bag #15 - 2
Bag #7 - 3	Bag #16 - 1
Bag #8 - 2	3 unnumbered bags
Bag #9 - 1	4 loose black frames

1 sheet of 3M dual lock



Photo Credit: Sharon Tiger Techs

Open and Sort by Number

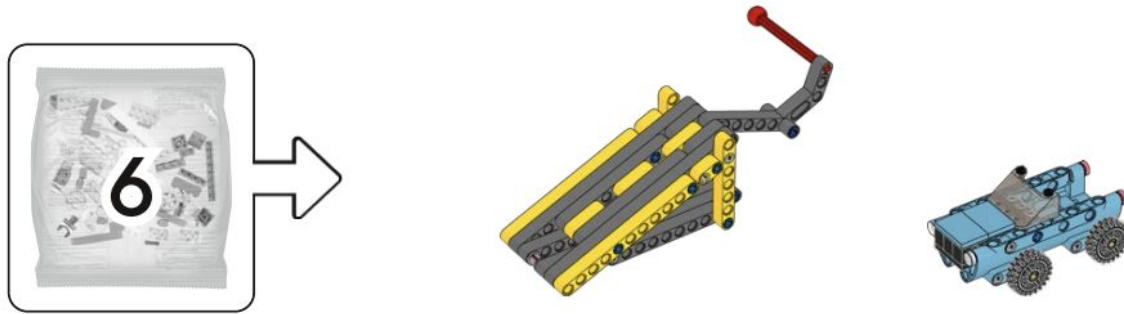
- Open each numbered bag one at a time as you need.
Instructions (released on August 2) are by bag number.
- Sort the parts into general part types so that they are easier to find (axles, liftarms, frames, pins, etc.)
- You can use LEGO sorting trays, paper plates, small bowls, box lids, trays, etc.

Bag Number
Element Overview
Prepack Overview
Bag 1
Bag 2
Bag 3
Bag 4
Bag 5



One Bag, Multiple Models

- One Bag number can sometimes produce multiple models.
- For example, Bag 6 from SUPER POWERED makes 2 models



**Building
Efficiently and
Reliably**

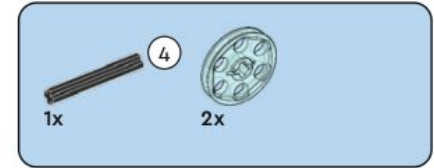
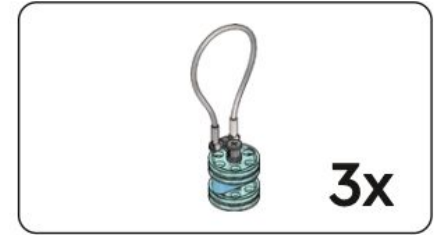
Build in Pairs

- Building in pairs or small groups works well.
- One person finds the parts for the step, one person puts the pieces together, and one person checks to make sure the step was done correctly.
- Change roles every few steps.



Multiplier Symbols

- Be sure to pay attention to the multiplier symbols (e.g. X2, X3) symbols at the start of a subset of instructions.
- You can save time by constructing them simultaneously.
- In the example on the right, you will build 3 copies of the item. The parts box (light blue) shows what you need for building the first step of one copy.



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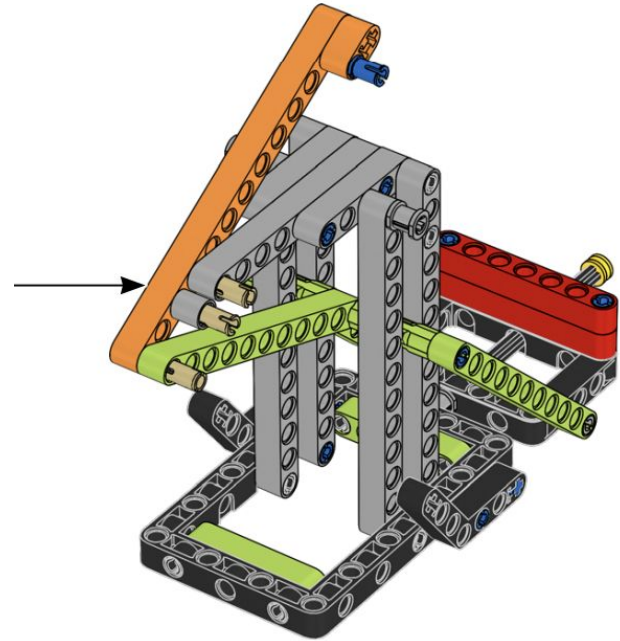
Follow the Instructions

- Take your time and always build exactly what the instructions tell you.
- Do not improvise or “improve” the model.
- Your model must look like and behave exactly the same way as the ones at the competition.



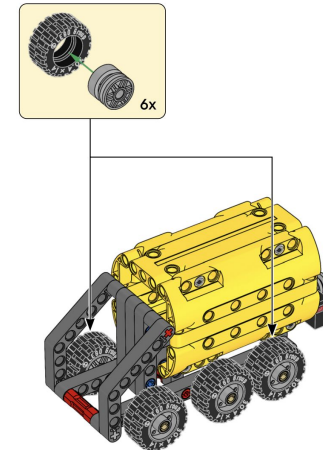
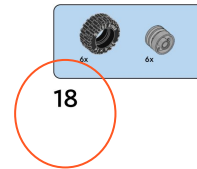
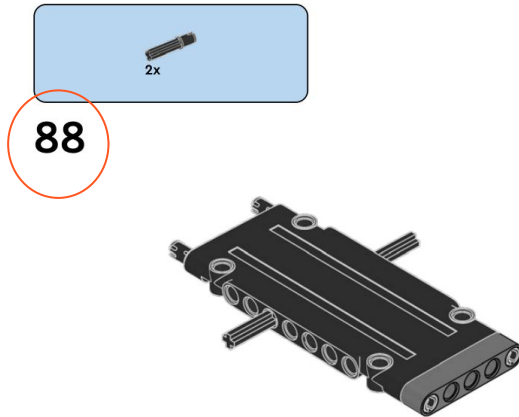
Check Your Work

- Have your coach or adult check the build or compare with another team's set if needed.
- Be careful and use the right part in the right step
- For example, using blue friction connector pegs instead of these tan ones without friction will make a huge difference in how the model operates



Some Models Take Longer to Build

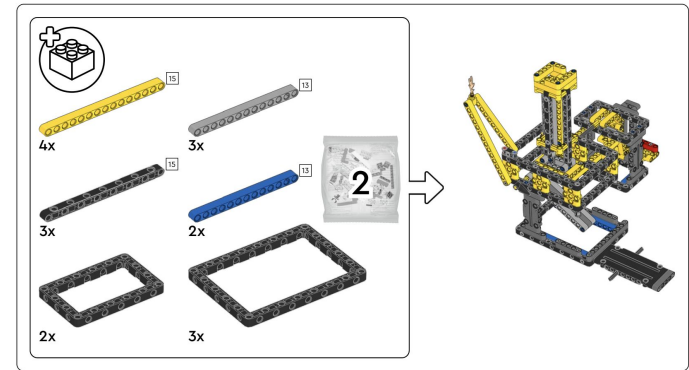
- When splitting up the work, note that some models and bag numbers take a lot longer to complete than others.
- You can check ahead and see how many step numbers there are (below, one model has 88 steps vs. another has 18)



Unnumbered Bags

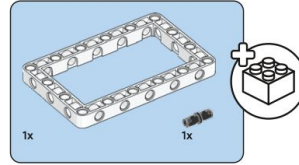
- Larger elements such as hoses, long axles, and 13M/15M beams are just loose in the box or in unnumbered bags. (M = LEGO Modules)
- Check the top of the instructions page for parts needed before you begin. In the example on the right, there are many elements from unnumbered bags or loose items (frames) in addition to needing Bag 2
- If you are trying to presort by mission model so that a student can take elements home and build, be sure you look for all the larger items in the unnumbered bags.

Elements in Unnumbered Bags
+ Loose Items
+ Bag 2



Flipping/Turning the Model

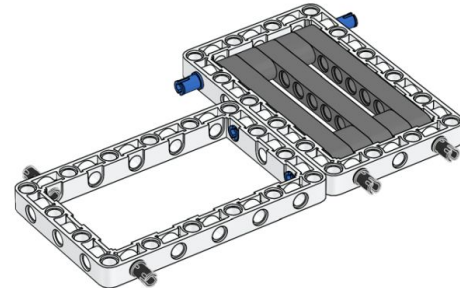
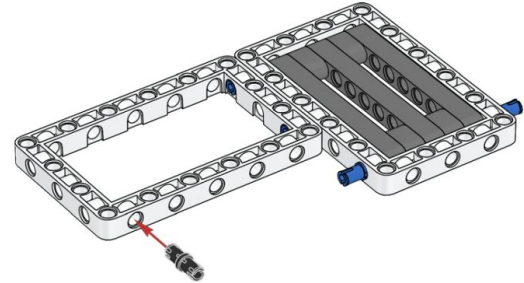
- Sometimes LEGO instructions will include a turn symbol and sometimes they do not.
- In the example on the right, you can see that the model was flipped. Check before you add the pins.



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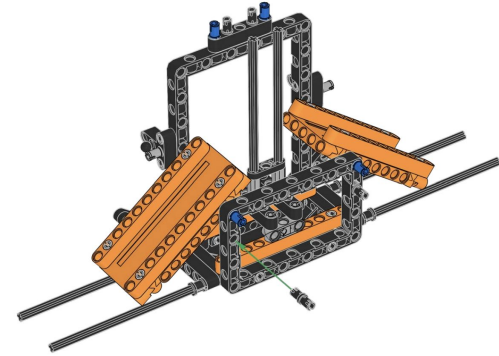


Look Carefully

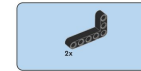
- Sometimes instructions have arrows or show where one element is added.
- However, pay attention to how many items are in the blue box and look for closely at the image.
- In Step 25 on the right, you can see an arrow for 1 pin. However 3 other pins are added in this step.
- In Step 26, there is no arrow for where the 2 L-shaped beams are added. You need to look closely at the image.



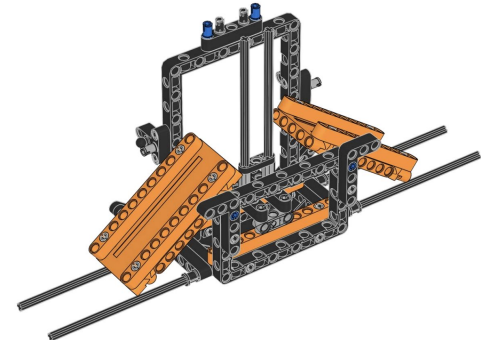
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Setting Up the Mat

Setting up the Challenge Mat

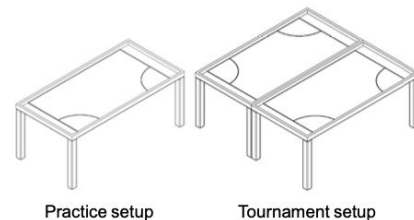
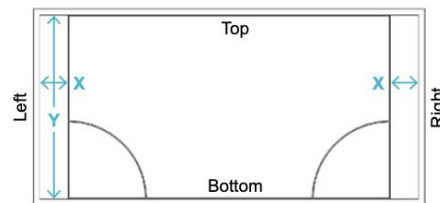
- Placement of the challenge mat is a very important step before placing the models on it.
- The rules for placement can vary every year (See image on right for Super Powered)
- The instructions will tell you how far East-to-West and North-to-South the mat should be placed relative to the table.

Field Mat Placement

1. Check the table surface for bumps. Sand or file them away and then vacuum well.
2. On the vacuumed table only, unroll and place the mat as shown below. Never fold the mat, and never crush or bend a rolled mat.
3. Slide the mat against the bottom border wall and align it centrally. There should be no gaps except for one at

the top wall of about 1/4 in. (6 mm). When table size and mat placement are correct, the areas to the left and right of the mat each measure about $X = 6.75$ in. by $Y = 45$ in. (171 mm by 1,143 mm).

4. Optional – To hold the mat in place, you can use thin strips of black tape, covering only the mat's left and right borders.



Setting up the Models

- Place finished models loosely on the challenge mat.
- Be sure to follow the text and images in the Field Setup section of the Robot Game Rulebook very carefully. They will tell you which way a model should face.
- Use the markings on the challenge mat itself as alignment points. If it doesn't align, it could be an indication of something wrong with the build itself.



Pressing Models into Place

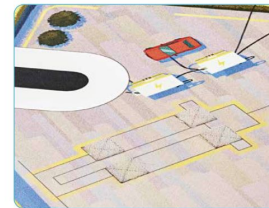
- Once everything looks correct, follow the set-up instructions to place the dual-lock (square with X) on the Challenge mat as shown in the Robot Game Rulebook.
- Press the models down in place holding and pressing as close to the dual lock as possible.
- Not all models will need to be dual-locked. Some will stay loose on the markings on the mat.

3M™ DUAL LOCK™ RECLOSABLE FASTENER PLACEMENT

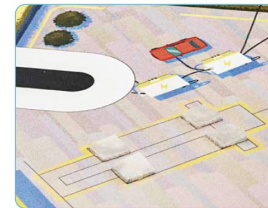


You will find sheets of Dual Lock™ squares in your Challenge set to secure the models to the mat. Dual Lock is an important part of field setup. If the models are not secured properly, you will have difficulty completing the missions.

SECURING MODELS – The squares on the mat with the X inside show where to apply the Dual Lock. Use the Dual Lock as shown in this example and be very exact. When pressing down a model, press on its base instead of pressing from higher up, which might crush the model. To remove the model from the mat, lift it from its base to separate the Dual Lock.



Step 1: First Dual Lock square sticky side down.



Step 2: Second Dual Lock square sticky side up.



Step 3: Align the model and press down.

Packing Away Models

- You can pack up and put away your challenge set if you need to. The models are very durable most seasons and should fit in a small box as shown.
- Remove models from as close to the dual lock as possible.
- One side of the dual lock should come off with the model. The other side stays on the mat.



Common Questions and Issues

Leftovers

- There are always some small leftover elements
- Although rare, in 2018 there was an extra grey 11M liftarm
- In 2021, a whole spare set of cargo contents (liftarms were provided) deliberately.
- In Superpowered, there are only small items such as pins, etc. left over from each model.



No Build Instructions

- No build instructions for a bag number simply means the bricks are used in some other way in the challenge.
- Bag 14 LEGO bricks are used for building the team's Innovation Project Model that you will bring to your competition (Mission 01)
- Bag 15 LEGO bricks are used for an optional design exercise (Mission 03)
- Bag 16 contains some team souvenirs and penalty tokens

INNOVATION PROJECT BRICKS



LEGO pieces found in Bag 14 used for prototyping your Innovation Project model.

DESIGN TILES



Tiles found in Bag 15 to be used on your team's design wall activity in Session 3 (optional) for the energy storage model.



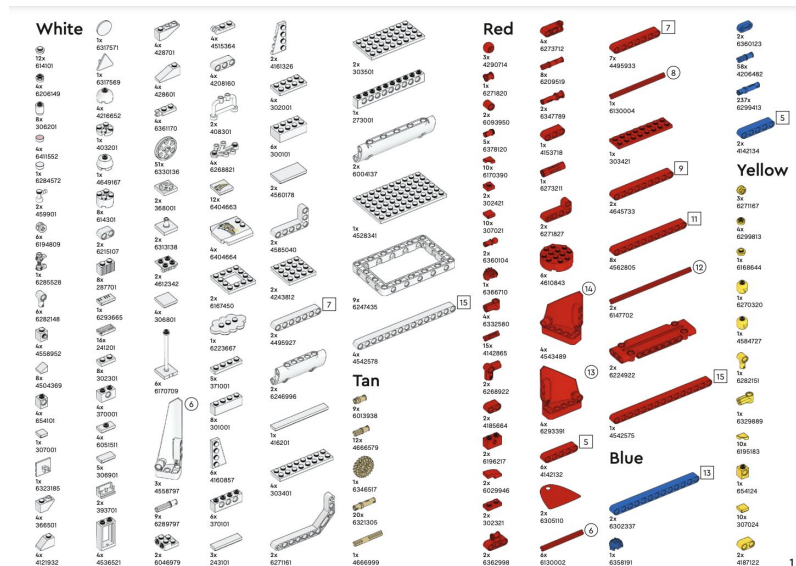
Missing Items

- It is very uncommon to be missing a LEGO element or a whole bag.
 - Can't find a small part? Check the bags, check the ground, and check to see that the element was not used earlier in another step by mistake.
 - Can't find the Dual-lock? Check the box again - it tends to blend in with the cardboard
 - Can't find a larger item? Check the unnumbered bags.
 - If you really can't find it, call LEGO for help:
1-800-422-5346 (USA/CAN) or 00800 5346 5555 (International), You can also visit the missing parts/customer service page of the [LEGO website](https://www.lego.com/en-us/customer-service/missing-parts)
- You will need to know the set number (45820) and the part you need. The Element Overview document in the Building Instructions section will tell you the part number.

Bag Number

Element Overview

Prepack Overview



Issues Specific to This Season

Alignment Issues

- Red beams of the Wind Turbine Model do not line up with markings on the mat when placed as indicated on the Challenge Mat

