FIRST® LEGO® League Challenge UNEARTHED™ Building Instructions

Build 12: Salvage Operations

This build is 139 pieces, and 47 building steps.

Welcome to text-based instructions from Bricks for the Blind. Before you start building, here are some terms we'll be using:
- In Front of/Front: towards you.
- Behind/Back: away from you.
- Up: towards the ceiling.
- Down: towards the floor.
- Stud: the bump on a LEGO brick. Example: A 2x1 brick has two studs on it.
- Vertically: going from front to behind.
- Horizontally: going from left to right.
- Upright: pointing up towards the ceiling.
- That one/ppp: previously placed piece.
- Plate: piece with studs.
- Tile: smooth piece without studs (unless otherwise specified)
- Symmetrically: a mirror image. Example: If you place a 2x1 brick with technic connector on the front wall at the right, connector to the front, and then place another such piece symmetrically on the back wall, at the right, the technic connector of the second piece should point to the back, since it will be placed symmetrically.
- Centered-vertically: even amount of space in front of and behind the piece
- Centered-horizontally: even amount of space left and right of the piece.
- Row: studs lined up horizontally (left to right/side to side).
- Column: studs lined up upright or vertically (top to bottom/back to front).
- Standing upright: the piece is perpendicular to the ground, like a wall.
- Lying flat: the piece is parallel to the ground, like a piece of toast which fell off the table.
- Anti-stud: the portion of a piece which accepts studs, like the bottom of a plate.
- Jumper plate: a 1x2 plate with a single stud on top, or a 1x3 plate with only two studs on top.

A note on LEGO Technic™ part names. These parts are somewhat different from regular LEGO bricks. Here are some definitions in case the builder or helper is not familiar with LEGO Technic™.

Axles - An axle is a connector which has an X shaped cross-section. Because their cross section is not round, anything connected to an axle using an axle-hole will rotate with that axle. Axles are longer than they are wide, and the length of an axle corresponds with how many bricks long it is. Aka a 3L axle is three bricks long. Axles come in a variety of lengths, with a 2L axle being the shortest available. They may be combined with pins, or have circular stops on them. A stop prevents the axle from sliding through an axle-hole at a specific point on the axle.

Pins - A pin is a connector which has a circular cross section and a flanged notch out of one or both ends. This flanged notch allows them to click into bricks with a pin-hole. Pins come with and without friction ridges, which are small bumps on the pin which prevent them from rotating freely. For standard pins, black is a high friction pin, and gray is a low friction pin. A standard length pin is two brick lengths long, with a stop in the middle. This prevents a brick from being pushed from one side of the pin to the other. A 1L pin is one brick long and still retains the stop, however it also includes a hollow stud at the other end. A 3L pin is three bricks long, and only contains a stop at one side, allowing two bricks to be pushed onto the other side of the pin. Pins may also have one side which is an axle.

Lift-arms - A lift-arm is a basic structural element, similar to a brick or a plate, but usually without any studs. It is a beam with rounded ends and with holes in it, with the same spacing as the studs on a LEGO brick. lift-arms come in a variety of lengths, including a 1x1 lift-arm which looks like a cylinder. Thick lift-arms are as wide as a LEGO brick, and thin lift-arms are half as wide as a LEGO brick, but not the same thickness as a LEGO plate! The holes in a lift-arm arm may accept axles or pins. They also come in a variety of shapes, including tees, ells and triangles.

Gears - A gear is a functional element. They are typically discs with teeth on the outside, there are also worm gears which look like a spiraling cylinder! Gears connected by axles transmit or even transform rotational motion!

Axle and Pin Connectors - These elements are typically smaller than lift-arms and are used to connect some combination of pins or axles. They might have pins or axles, as well as axle or pin-holes. They have a lot of different angle combinations! The simplest just connects two axles or pins together in a straight line.

Bushes/Bushings - LEGO Technic™ uses bushes largely as spacers, but they also can reduce friction between rotating parts, or can form useful elements such as handles. Bushes are typically light gray, generally cylindrical, and have an axle-hole running through the middle. They have a flange at the front and back to make them easier to pull on and off.

Technic™ Bricks and Plates – There are also regular bricks and plates that are adapted for use with Technic™ elements. Technic™ bricks have holes for either pins or axles on the sides and are only one brick wide. One of the most common of these is a 1x2 brick with a single pin hole. Most often, these bricks have pin holes, not axle holes. Technic™ plates have holes on the flat surface between the studs and are a minimum of two bricks wide. The holes in these plates can accept pins or can allow an axle to pass through and still spin.

For builders with low vision, or a sighted building partner who may want to follow along with the printed visual instructions that come with each set. As low vision users may benefit from viewing the instructions on a personal device where they can zoom in on content and use assistive technologies to enhance the visuals.

Sorting Instructions:

This LEGO set comes in the bag labeled 20-21 and some large pieces from bag 0. Sort the pieces into groups as described below. Note that where there are multiple colors of the same brick in a step, the colors will be split across two groups to make telling the difference easier for the builder! LEGO includes a few spare parts in case you lose something. Set these into their own group away from the rest, in case you need them later.

Build 12
Group A contains all of the black 2L pins from this bag. These pins have friction ridges.
Group B contains all of the blue 3L pins from this bag. These pins have friction ridges.
Group C contains all of the blue 2L axle/pin combos from this bag. These pins have friction ridges.

Bag 20 (5 groups of bricks)
Main Build: Base

Group 1 contains the pieces for steps 1-7. Include three blue 15L liftarms from bag 0.
Group 2 contains the pieces for steps 8-10.

Sub-build: Shipwreck
Group 3 contains the pieces for steps 11-20. Include a brown 8x6 wedge plate with a grille pattern from bag 0.
Group 4 contains the pieces for steps 21-27.

Group 5 contains the pieces for steps 28-31.

Bag 21 (2 groups of bricks)
Sub-build: Sediment Assembly
Group 6 contains the pieces for steps 32-41.
Group 7 contains the pieces for steps 42-47. Include a light gray 13L liftarm from bag 0.

Building Instructions:

Groups A, B, C and 1. You will use the pins from groups A, B and C throughout the build.

Main Build

1.1. Let's start by building the base! Place a blue 15L liftarm, horizontally with the holes facing the front and back, in front of you.

1.2. Push a black 2L pin from group A, from the front, into the second and fifth holes from the right, and the fifth hole from the left on the previous piece.

1.3. Push a blue 3L pin from group B, with the stop ring at the back, from the front into the leftmost hole of the 15L liftarm.

2. Push a light gray 3x5 L-shaped liftarm, with the short leg upright at the left pointing up and the long leg at the bottom pointing horizontally to the right, onto the left two pins on the front side of the 15L liftarm, so the left side of the L-shaped liftarm is even with the left side of the 15L liftarm. Repeat symmetrically on the right side.

3.1. Place a blue 15L liftarm, horizontally with the holes facing the front and back, in front of you.

3.2. Push a black 2L pin from group A, from the front, into the leftmost and rightmost holes on the previous piece.

3.3. Push the pins on the 15L liftarm, from the back, into the top holes of the two L-shaped liftarms.

4. Push a black 2L pin from group A, from the front, into the middle hole on the bottom row of both L-shaped liftarms from step 2.

5.1. Find a light gray 3x11 panel. This piece has three pin holes on each short end, seven pin holes on each long side, and four pin holes on the top and bottom. One side is flat, and one side has a gap between the two long rows of pin holes. Place this piece, vertically with the flat side at the bottom, in front of you.

5.2. Find a light gray 3L pin connector with two pins. This looks like a 3L liftarm where the middle pin hole is perpendicular to the end holes. There are also two pins extending parallel to the middle pin hole on one side of the piece. When viewed from the front, it looks like a letter C. Push this, horizontally with the pins pointing down, into both pairs of holes on top of the previous piece.

5.3. Repeat steps 5.1-5.2.

5.4. Push the holes on the back side of the pieces from step 5.2 onto each of the pairs of pins extending from the front on the L-shaped liftarms on the front of the base. The two panels should extend quite a ways to the front now.

6.1. Push a black 2L pin from group A, from the front, into the holes on the front left 3L pin connector from step 5.2. Push another, from the front, into the left hole on the front right 3L pin connector.

6.2. Push a tan 3L pin, with the stop ring at the front, from the front into the right hole of the front right 3L pin connector. Push it all the way in so it extends 1L to the front and back.

7. Push a blue 15L liftarm, horizontally with the holes facing the front and back, onto the four pins on the front side of the base.

Group 2.

8.1. Now we'll build a plate to push on! Place a red 3x7 panel, vertically with the flat side on the top, in front of you.

Push a black 2L pin from group A, into the front and back holes on the right side of the previous piece.

8.2. Push a black 1L pin with a ball on one side, with the ball on the left, into the back hole on the left side of the 3x7 panel.

8.3. Push a black 2L pin from group A, into the left and right holes on the front side of the 3x7 panel.

8.4. Find a red 3x3x1 square liftarm. This piece is shaped like a square with five holes forming a cross on the flat sides. Two sides are rounded, and the other two sides have two holes each. Push the left and right holes on the back side of the cross, with the 3x3 square liftarm standing upright with the rounded sides on the top and bottom, onto the pins from the previous step.

8.5. Push a black 2L pin from group A, from the front, into the top hole of the cross on the front side of the previous piece.

Push the pin side of a black 3L axle/pin combo with a 2L axle side and a 1L pin side, with the axle side at the front, into the center hole of the cross on the 3x3 square liftarm.

Push the top two holes of a white 3L liftarm, standing upright with the holes facing the front and back, onto the previous two pieces. Push it all the way back so the axle of the previous piece extends 1L to the front.

8.6. Now we'll add this push plate to the base. Keeping the 3L white liftarm at the front, rotate the push plate assembly 90 degrees counterclockwise so the 3L white liftarm is horizontal and so the ball on the left side of the 3x7 panel is now at the bottom. Place the 3L liftarm in between the two 15L liftarms on the back side of the base. The ball should rest on the table and the panel should extend back behind the frame. The push plate won't be connected for now, so it can slide left and right.

9.1. Find a light gray axle connector with a perpendicular axle hole. This piece has a 1L axle connector on one side, and a perpendicular axle hole on the other. If you were to push axles through both holes they would form a T with the axle connector making the stem. Push the axle hole, with the axle connector on top, from the front over the axle on the push plate assembly.

9.2. Push the axle side of a blue 2L axle/pin combo from group C, with the pin side on top, into the axle connector on top of the previous piece.

10. Push the front hole of a red 9L liftarm, vertically with the holes facing the top and bottom, from the top onto the previous piece. The second and fourth holes from the back should connect to the pins on top of the push plate assembly. Make sure that the push plate assembly can slide freely to the left and right.

Group 3.

11.1. Now we'll build a linkage to connect the push plate to the base. Place a dark gray 9L liftarm, horizontally with the holes facing the front and back, in front of you.

Push a tan 3L pin, with the stop ring at the back, from the front into the rightmost and third from the left holes of the previous piece. These pins will extend 2L to the front. These pins do not have friction ridges and should spin freely.

11.2. Push a light gray 1L liftarm, from the front, onto the left pin from the previous step. Push it all the way back so it touches the 9L liftarm.

11.3. Push the rightmost hole of a light gray 7L liftarm, horizontally with the holes facing the front and back, onto the left pin on the linkage.

11.4. Keeping the linkage horizontal, flip it over so the previous piece is now at the back on the left. Find the front facing hole near the back above the right column of the right 3x11 panel which forms the bottom of the base. This hole should be on a 3L liftarm. Push the right pin of the linkage into this hole. Push the linkage all the way back. The liftarms on the linkage can rotate freely and will be pretty floppy.

11.5. Slide the push plate all the way to the left on the base. You will need to rotate the linkage parts out of the way. With the push plate all the way to the left, rotate the linkage so the leftmost hole of the left liftarm is lined up with the right hole on the 3L liftarm on the front of the push plate. This means the hole of the liftarm will be to the right of the axle connector that attaches the 9L liftarm on the top of the push plate. The liftarms should form a peak above the base. Push a light gray 3L pin with stop on one side, with the stop at the front, into the leftmost hole of the leftmost liftarm so it connects the linkage to the push plate. Push this pin all the way in.

12. Push the push plate all the way to the right. The linkage should move up and to the right, with the 9L liftarm standing almost straight upright. Set the base aside for now.

Sub-build: Shipwreck

13.1. Now we'll build a shipwreck! Find a brown 8x6 wedge plate with a grille pattern. This piece has a 2x6 plate on one end, and a stepped 2x2 plate on the other, connected by a triangular frame. Place this, horizontally with the 2x6 side on the left, in front of you.

13.2. Place the right column of a light gray 2x4 plate with a hole on the bottom of each long side, vertically and centered vertically, with the holes facing left and right, under the leftmost column of the previous piece.

14. Place the rightmost column of a brown 6x12 plate, horizontally, on the left column of the previous piece.

15.1. Flip the ship upside down so it is horizontal with the 8x6 wedge plate on the left. Place a light gray 2x4 plate with a hole on the bottom of each long side, upside down and vertically with the holes facing left and right, centered vertically on the rightmost two columns of the previous piece.

15.2. Place a dark orange 1x2 plate, upside down and horizontally, in front of each of the 2x4 plates with holes.

15.3. Place a dark orange 1x6 plate, upside down and horizontally, on the back row of the 6x12 plate so the right sides are even.

15.4. Skip one anti-stud to the left and place a dark orange 1x4 plate, upside down and horizontally.

16. Place a brown 2x2 plate, upside down, on both the left and right two studs on the front two rows of the ship. The left piece will be to the right of the grille portion of the 8x6 wedge plate. Repeat symmetrically on the back side.

17. Flip the ship rightside up so it is horizontal with the 8x6 wedge plate on the right. Place a brown 1x2 plate with a vertical clip on one short side, horizontally with the clip on the left, on the left two studs of the second row from the front. Repeat symmetrically on the back side.

18. Place the back row of a brown 2x2 curved slope tile, with the tall side at the back, on the front previous piece. Repeat symmetrically on the back side.

19.1. Now we'll build the stern of the ship. Place a brown 2x4 plate, vertically, in front of you.

Place a brown 1x2 plate with a short bar on one side, horizontally with the bar on the right, on both the front and back rows of the previous piece.

19.2. Place the right two columns of a dark orange 2x6 plate, horizontally, between the previous two pieces.

19.3. Place two brown 3x6 wedge plates, horizontally, with the two stud columns on the right, in front of you. Place the one with the longest row at the back on the front two rows on the stern of the ship so the left sides are even. Place the other symmetrically behind the first.

19.4. Place a brown 1x2 slope brick, horizontally with the slope on the left, on the front row of the previous piece so the right sides are even.

19.5. Clip the two bars on the stern onto the two clips on the left side of the shipwreck.

20. Rotate the ship 180 degrees so the stern is now on the right. Place a brown 1x4 slope brick, horizontally with the slope on the right, on the left four studs on the back row of the shipwreck.

Group 4.

21. Place a dark orange 2x2 brick with a groove on each side, centered vertically, on the third and fourth columns from the left side of the ship. This goes to the right of the grille portion of the 8x6 wedge plate.

22.1. Let's make a small assembly. Place a dark orange 1x2 plate, horizontally, in front of you.

22.2. Place the back row of a brown 2x2 curved slope tile, with the tall side at the back, on the previous piece.

22.3. Place the previous two pieces on the second and third studs from the left on the front two rows of the shipwreck.

23. Find the 1x4 slope brick from step 20. Skip one row in front of this piece and place a brown 1x1 slope tile, with the tall side at the front, in front of the rightmost stud. The left piece will be to the right of the grille portion of the 8x6 wedge plate and the right piece will be to the left of the triangular portion of a wedge plate. Skip five studs to the right and place another in the same orientation.

24. Find the two 2x2 curved slope tiles on the front two rows of the shipwreck. Place a brown 1x4 slope brick, vertically with the slope at the front, to the right of the left one, and to the left of the right one. Place these so they overhang the front of the shipwreck by one stud.

25. Place a brown 1x2 slope tile, vertically with the tall side on the left, on the second column from the left of the shipwreck. This side will be the bow of the ship.

26.1. Place a brown 2x3 inverted slope brick, horizontally with the slope on the left, in front of you.

Place a brown 1x2 jumper plate, vertically, on the rightmost column of the previous piece.

26.2. Place a brown 2x2 tile with a single stud to the left of the previous piece.

26.3. Place the right column of the 2x3 inverted slope brick on the leftmost column of the ship so the slope overhangs to the left.

27.1. Now we'll build the ship's figurehead. This might be a dragon or sea serpent head. Place a light gray 1x3 plate, vertically, in front of you.

Place the left stud of a light gray 1x3 half arch, horizontally with the arch on the right, centered vertically on the previous piece.

27.2. Place the right stud of a light gray 1x2 curved slope tile, horizontally with the tall side on the right, on the left stud of the previous piece.

27.3. Place a light blue 1x1 round plate under the left stud of the previous piece. This is the eye of the figurehead.

27.4. Place the right stud of a light gray 1x2 inverted curved slope tile, horizontally with the higher side on the left, under the previous piece. This is the lower long snout of the figure head.

27.5. Place the 1x3 plate on the bottom of the figurehead on the leftmost stud on the bow of the ship. This is on the 2x2 tile with a single stud from step 26.2.

Group 5.

28.1. Now we'll build the ship's mast. Place a red 2L axle vertically in front of you.

Find a brown axle and pin connector #4. This piece has two 1L axle connectors which form an angle between 90 and 180 degrees, and a perpendicular pin hole between them. Place this in front of you, with the connectors pointing to the front, and to the back left. The pin hole should face up and down. Push the front axle connector onto the back side of the previous piece.

28.2. Push a black 8L axle into the free axle connector on the previous piece.

Push a light gray thin bushing onto the free end of the previous piece. Push it about 1L down so the axle extends a little bit beyond it.

28.3. Find the 2x2 brick with a groove on each side from step 21. This piece has an axle hole running up and down between the studs. Rotate the mast 90 degrees towards you so the 2L axle points straight down and the rest of the mast points up and to the left. Push the axle on the bottom, from the top, into the axle hole on top of the 2x2 brick with grooves.

29. Place a brown 1x8 brick, horizontally and centered horizontally, under the front row of the shipwreck between the two 2x2 plates from step 16. It doesn't attach to the front studs of the two 1x4 slope bricks from step 20.

30. Place the base back in front of you, with the push plate on the left. Push the push plate all the way to the back so the linkage is all the way at the back, with the 9L liftarm upright. Find the left 2x4 plate with holes on the bottom of the shipwreck. Line up the right hole on this piece with the left side of the top hole of the 9L liftarm on the linkage. Push a light gray 3L pin with a stop on one side, with the stop on the right, from the right through the top hole of the 9L liftarm, pushing it all the way through so it connects to the 2x4 plate with a hole. The ship should now be connected. Let it rotate away from you so the anti-studs are at the front.

31.1. Let’s make a small assembly. Place a dark gray 9L liftarm, vertically with the holes facing left and right, in front of you.

31.2. Push a light gray 3L pin with a stop on one side, with the stop on the left, into the rearmost hole on the left side of the previous piece. Only push it in 1L so the right sides are flush.

31.3. Find the left facing pin above the back 3x11 panel that is the bottom of the base. This pin is on a 3L liftarm on the second column from the right. Rotate the 9L liftarm with the 3L pin upright, with the pin on top, and push the bottom hole onto the pin we just found.

31.4. Rotate the 9L liftarm back and line up the top hole with the left hole of the right 2x4 plate with a hole, then push the 3L pin to the right to connect the two pieces. Set the base and shipwreck aside for now.

Bag 21.

Group 6.

32.1. Now we’ll build a layer of sediment that covers the shipwreck. This layer is built in three connected segments. Find a dark gray 2x4 plate which has a 1x2 brick with an axle hole on each end. Place this horizontally in front of you.

32.2. Place a dark gray 1x2 technic brick, vertically, on the second column from the left on the previous piece.

33. Place a dark gray 1x2 technic brick, vertically, to the right of the previous piece. Flip this assembly upside down while keeping it horizontal.

34. Place a tan 4x6 plate, upside down and horizontally, in front of you. Place the dark gray assembly from steps 32-33, centered horizontally, on the back two rows of this piece.

35.1. Find a light gray axle and pin connector #1. This piece has a 1L axle connector on one side, and a perpendicular pin hole on the other. Place this in front of you, with the axle connector at the front and the pin hole at the back facing left and right.

Push the axle side of a blue 2L axle/pin combo from group C, with the pin at the front, into the axle connector of the previous piece.

35.2. Slide the axle of a dark gray 4L axle with a stop on one end, with the stop at the left, into the pin hole of the #1 axle and pin connector from step 35.1. Slide it all the way to the right.

Push a black thick bushing onto the right side of the previous piece. Push it all the way to the left until it touches the #1 axle and pin connector.

35.3. Push a light gray thin bushing onto the right side of the 4L axle. Push it all the way to the left until it touches the previous piece.

35.4. Keep the sediment assembly upside down and push the axle into the left axle hole on the left side of the sediment assembly.

36. Push a red 8L axle into the right axle hole on the right side of the sediment assembly.

37.1. Push a light gray thin bushing onto the right side of the previous piece. Push it all the way to the left.

37.2. Push a black thick bushing onto the right side of the 8L axle. Push it all the way to the left.

38.1. Now we will make the assembly to connect the first two sediment segments. Place a brown 3L liftarm, vertically with the holes facing the left and right, in front of you.

Push a light gray 2L pin, from the right, into the front and back holes of the previous piece. These pins do not have friction ridges and should spin freely.

38.2. Push the hole of a light gray 2x2 plate with a hole, upside down with the hole on the left, onto the free side of each of the pins from the previous step.

38.3. Repeat steps 38.1-38.2.

38.4. Place the rear 2x2 plate of one assembly on the left two columns of the 4x6 plate so the front sides are even. The other 2x2 plate and liftarm should hang loosely at the front. Repeat symmetrically on the right side.

39. Place the back two rows of a tan 4x6 plate, upside down and horizontal, under the front two 2x2 plates.

40. Now we'll make another connecting assembly. Place a brown 3L liftarm, vertically with the holes facing the left and right, in front of you.

Push a light gray 2L pin, from the right, into the front and back holes of the previous piece. These pins do not have friction ridges and should spin freely.

40.2. Push the hole of a light gray 2x2 plate with a hole, upside down with the hole on the left, onto the free side of each of the pins from the previous step.

40.3. Repeat steps 40.1-40.2.

40.4. Place the rear 2x2 plate of one assembly on the left two columns of the 4x6 plate so the front sides are even. The other 2x2 plate and liftarm should hang loosely at the front. Repeat symmetrically on the right side.

41. Place the back two rows of a tan 4x6 plate, upside down and horizontal, under the front two 2x2 plates.

Group 7.

42.1. Place a blue 2L axle/pin combo from group C, vertically with the axle at the back, in front of you.

42.2. Push the axle connector of a light gray axle and pin connector #1, with the axle connector at the front and the holes facing left and right, onto the axle side of the previous piece.

42.3. Slide the holes of the previous piece over the 8L axle on the right side of the sediment assembly. Slide it all the way to the left and let the axle/pin combo hang down.

43. Now we will place the sediment on the base. Set the base in front of you, with the shipwreck horizontally at the back. Find the two top-facing holes on the base near the front. These are on the side of the vertical 15L liftarms on the left and right sides of the base. Find the two pins dangling near the back of the sediment assembly and push them into these holes, with the 4x6 plates of the sediment layer at the front. The sediment should be upside down and extending to the front.

44.1. Place a blue 2L axle/pin combo from group C, vertically with the axle at the back, in front of you.

Push the axle connector of a light gray axle and pin connector #1, with the axle connector at the front and the holes facing left and right, onto the axle side of the previous piece.

44.2. Push a black 2L pin from group A, from the right, into the hole of the previous piece.

44.3. Rotate the previous three pieces so the axle pin combo is at the bottom pointing down and the other pin points to the right. Find the top facing hole near the back right corner of the base, to the left of the right 15L liftarm. Push the bottom pin into this hole.

45.1. Place a light gray 13L liftarm, vertically with the holes facing left and right, in front of you.

45.2. Push a dark gray 1L pin with a ball on a bar on it, with the pin on the left and the ball on the right, from the right into the fifth hole from the front of the previous piece.

45.3. Find the axle pointing to the right near the front right corner of the base. Slide the front hole of the 13L liftarm onto this axle and attach the rearmost hole onto the right facing pin near the back of the base.

46.1. Next we'll make a handle. Place a red 2x4 L-shaped liftarm, with the long leg horizontally at the back pointing to the left and the short leg vertically at the right pointing to the front, in front of you. The holes should face the top.

Push a black 2L pin from group A, from the top, into the back right corner hole of the previous piece.

46.2. Push the axle side of a tan 2L axle/pin combo, with the axle side at the bottom, from the top into the leftmost hole of the L-shaped liftarm. The pin side of this piece has no friction ridges and will spin freely when we attach it to something.

46.3. Push the pin hole of a red 2L liftarm with a pin hole and an axle hole, vertically with the axle hole at the front, from the top onto the black 2L pin on the right side of the L-shaped liftarm.

46.4. Push the rightmost hole of a red 11L liftarm, horizontally with the holes facing the top and bottom, onto the pin on the left end of the L-shaped liftarm. This pin has no friction ridges so the 11L liftarm should rotate freely.

46.5. Push a light gray 3L axle into one side of a red 3L axle connector.

Push the axle, with the axle connector at the bottom, from the bottom, through the leftmost hole of the 11L liftarm. It will extend 1L above the liftarm.

Push one end of a red 3L axle connector onto the axle.

47. Rotate the handle so it is vertical with the two axle connectors at the front and the holes facing left and right. The short leg of the L-shaped liftarm from step 46.1 should be at the back pointing down. Push the bottom hole of the short leg of the L-shaped liftarm, from the right, onto the free axle on the right side of the base near the front. Push it all the way to the left.

Congratulations! Now this build is complete!