

FIRST® LEGO® League Explore BIOGLOW™ Building Instructions

Build 2

This build is 265 pieces, and 104 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.

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.

A note on LEGO Technic™ part names. These parts are somewhat different from regular LEGO bricks. I'll include 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, els 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.

Sorting Instructions:

This LEGO set comes in the bags labeled 4-8 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 2

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 4 (4 groups of bricks)

Sub-Build: Black and White Flying Creature

Group 1 contains the pieces for steps 1-6 of the black and white flying creature, not including the red 1x2 plate with rounded ends from step 6.

Group 2 contains the red 1x2 plate with rounded ends from step 6.

Group 3 contains the pieces for steps 7-11.

Group 4 contains the pieces for steps 12-20

Group 5 contains the pieces for step 21.

Bag 5 (6 groups of bricks)

Sub-Build: Colorful Flying Creature

Group 6 contains the pieces for steps 1-6 of the colorful flying creature.

Group 7 contains the pieces for steps 7-9.

Group 8 contains the pieces for steps 10-17, not including the black 1x1 round tile from step 15.

Group 9 contains the black 1x1 round tile from step 15.

Group 10 contains the pieces for steps 18-25, not including the black 1x1 round tile from step 23.

Group 11 contains the black 1x1 round tile from step 23.

Bag 6 (4 groups of bricks)

Sub-Build: Amphibious Creature

Group 12 contains the pieces for steps 1-6 of the amphibious creature.

Group 13 contains the pieces for steps 7-9.

Group 14 contains the pieces for step 10.

Group 15 contains the pieces for steps 11-19.

Group 16 contains the pieces for step 20.

Bag 7 (6 groups of bricks)

Minifigure Group 1 contains the pieces for the park ranger minifigure.

Minifigure Group 2 contains the pieces for the Santa's elf minifigure.

Sub-Build: lift research device

Group 17 contains the pieces for steps 1-10 of the lift research device. Also include a tan 8x8 plate from Bag 0.

Group 18 contains the pieces for steps 11-17. Also include the small motor.

Group 19 contains the pieces for steps 18-22.

Group 20 contains the pieces for steps 23-31. Also include the small hub.

Bag 8 (1 group of bricks)

Sub-Build: Hub and Sensor Frame

Group 21 contains the pieces for steps 1-7 of the Hub and Sensor Frame. Also include the small hub and color sensor.

Building Instructions:

Bag 1.

Group 1.

Sub-Build: Black and White Flying Creature

1.1. Let's build a black and white flying creature! This has a lot of the same colors as a toucan, including a colorful beak! We'll start by making the body. Place a white 4x4 triple inverted slope, with the columns of two studs on the right, in front of you.

1.2. Place a black 1x2 plate with rounded ends, vertically and centered vertically, on the left column of the previous piece.

2. Place a white 2x4 plate, horizontally and centered vertically, on the assembly so it overhangs two columns to the left.

3. Place a dark gray 1x2 plate with a ball on one short side, horizontally with the ball on the right, to the right of the front row of the previous piece. Place another behind the first.

4.1. Place a white 2x4 plate, vertically and centered vertically, to the left of the previous two pieces.

4.2. Place a dark gray 1x2 plate with a ball on one short side, vertically with the ball at the front, to the left of the front two rows of the previous piece so the ball overhangs to the front. Place another symmetrically behind the first.

4.3. Place a light gray 1x2 plate with a socket on one long side, vertically with the socket on the left, centered vertically to the left of the previous two pieces. The socket on this piece looks kind of like a cube with a spherical hole that you can clip a ball into.

5.1. Place the leftmost column of a black 4x4 round plate, centered vertically, on the previous piece.

5.2. Place a black 2x2 plate, centered vertically, to the right of the previous piece.

Group 2 contains the red 1x2 plate with rounded ends from the next step.

6.1. Place the red 1x2 plate with rounded ends from group 2, vertically, on the right column of the previous piece.

6.2. Place a white 2x4 plate, horizontally, to the left of the previous piece.

6.3. Place a white 1x2 plate with rounded ends, vertically, to the left of the previous piece.

Group 3.

7.1. Place a white 1x4 double curved slope tile, vertically and centered vertically, to the right of the previous piece.

7.2. Place a red 1x2 plate with rounded ends, vertically and centered vertically, to the right of the previous piece. Skip one column to the right and place another.

8. Place a black 6x4 triple curved slope, horizontally with the columns of studs on the left, on the assembly to the right of the 1x4 double curved slope tile from step 7.1.

9.1.1. Next, we'll build two legs for our creature! Set the body aside for now. Place a light gray 1x2 plate with a socket on one long side, vertically with the socket on the left, in front of you.

9.1.2. Place a black 1x2 plate with a handle bar on one side, vertically with the handle bar on the right, on the previous piece.

9.2.1. Clip the ball of a dark gray 1x2 plate with a ball on one side and a socket on the other, horizontally with the ball on the right, into the socket on the left side of the leg assembly.

9.2.2. Place a black 1x2 tile on the previous piece.

9.3. Repeat steps 9.1.1 - 9.2.2 to make another leg.

9.4. Place the body in front of you so it's horizontal with the socket on the left. Find the two balls that are on the right side of the body. Rotate one leg so it's horizontal with the socket on the left and so the 1x2 tile is sideways at the front. Clip the socket onto the front ball on the right side of the body. Repeat symmetrically on the back side with the other leg. Spread the legs apart so there's an angle about half of 45 degrees between them.

10.1. Next, we'll build the creature's head. Set the body aside for now. Place a black 2x4 plate, horizontally, in front of you.

10.2. Place the front row of a black 2x2 inverted curved slope tile, centered horizontally with the upper row of studs at the back, under the back row of the previous piece.

11. Repeat the previous step symmetrically on the front side.

Group 4.

12.1. Place a light gray 1x2 plate with a socket on one long side, vertically with the socket on the left, on the left column of the head so the socket overhangs.

12.2. Place a white 2x2 plate to the right of the previous piece.

12.3. Place a dark gray 1x2 plate with a ball on one long side, vertically with the ball on the right, to the right of the previous piece.

13.1. The front and back rows of the head should only have two studs each. Place a blue 1x1 plate with a stud sticking up from one side, with the side stud at the front, on the left stud of the front row of the head. Repeat symmetrically on the back side. We'll put the creature's eyes on these studs!

13.2. Place a white 1x1 round plate to the right of each of the previous two pieces.

14. Place a white 4x4 round plate, centered vertically and horizontally, on the head.

15. Now we'll add the eyes! Place a black 1x1 round tile on the front and back side studs. We'll place two pieces in this step.

16.1. Place a white 2x2 plate, centered vertically and horizontally, on the 4x4 round plate.

16.2. Place a white 1x2 plate with rounded ends, horizontally, in front of the previous piece. Repeat symmetrically on the back side.

17. Place a white 1x4 double curved slope tile, horizontally and centered horizontally, behind the front piece from the previous step. Place another behind the first.

18. Now we'll attach the head to the body! Place the body, horizontally with the legs on the right, in front of you. Find the socket on the left side of the body. Clip the bar on the right side of the head into the socket we just found.

19.1.1. Next we'll build the colorful beak! Set the rest of the creature aside. Place a yellow 1x4 inverted curved slope, horizontally with the slope on the left, in front of you.

19.1.2. Place the left stud of a blue 1x2 inverted curved slope tile, horizontally with the higher stud on the right, under the rightmost stud of the previous piece.

19.2. Place a black 1x4 plate, horizontally, on the beak so the rightmost stud overhangs.

19.3. Place a dark gray 1x2 plate with a ball on one short side, horizontally with the ball on the right, on the right two studs of the previous piece so the ball overhangs.

19.4. Place a pale green 1x6 slope tile, horizontally with the tall side on the right, on the beak.

19.5. Place the rest of the creature, horizontally with the legs on the right, in front of you. Find the socket on the left side of the head. Clip the ball on the right side of the beak into the socket we just found.

20.1.1. Now, we'll make wings! Place a light gray 1x2 plate with a socket on one long side, horizontally with the socket at the front, in front of you.

20.1.2. Place the front row of a black 2x2 inverted curved slope tile, with the upper row of studs at the back, under the previous piece.

20.2. Find a black 8x3x2 left wedge curved slope. This piece is curved on the top and one side. There is one long side and a row of two studs. Place this piece, horizontally with the row of two studs at the front left, on the previous two pieces so the front and left sides are even.

20.3. Clip the socket on the wing onto the ball on the back side of the body. Rotate the tip counterclockwise away from the body to spread the wing.

Group 5.

21.1.1. Now we'll make the other wing! Place a light gray 1x2 plate with a socket on one long side, horizontally with the socket at the front, in front of you.

21.1.2. Place the front row of a black 2x2 inverted curved slope tile, with the upper row of studs at the back, under the previous piece.

21.2. Find a black 8x3x2 right wedge curved slope. This piece is curved on the top and one side. There is one long side and a row of two studs. Place this piece, horizontally with the row of two studs at the front right, on the previous two pieces so the front and right sides are even.

21.3. Rotate the wing 180 degrees so the socket is at the back near the left. Clip the socket on the wing onto the ball on the front side of the body. Rotate the tip of this wing clockwise away from the body. This completes the first creature.

Bag 5.

Group 6.

Sub-Build: Colorful Flying Creature

1.1. Next, we'll build another flying creature! This one has lots of green and yellow and looks kind of like a butterfly! Let's start by building the body. Place a pale yellow 2x6 plate, horizontally, in front of you.

1.2. Place a yellow 2x2 plate on the right two columns of the previous piece.

2.1. Next, we'll make some attachment points for the wings. Place a black 1x2 plate with two balls on opposite ends, vertically, to the left of the previous piece.

2.2. Place a yellow 1x2 plate, vertically, to the left of the previous piece.

2.3. Place a black 1x2 plate with two balls on opposite ends, vertically, to the left of the previous piece.

2.4. Place a yellow 1x2 plate, vertically, to the left of the previous piece.

3.1. Place a light gray 1x2 plate with a socket on one long side, vertically with the socket on the left, on the previous piece. The socket on this piece looks kind of like a cube with a spherical hole that you can clip a ball into.

3.2. Place a pale yellow 2x3 plate, horizontally, to the right of the previous piece.

4. Place a black 1x10 curved slope tile, horizontally with the studs on the left, on the front row of the creature's body so the left sides are even. Place another behind the first.

5. Place a yellow 2x2 plate on the left two columns of the body. This will go on the previous two pieces.

6.1.1. Now we'll build the creature's head. Set the body aside for now. Place a yellow 1x2 plate, horizontally, in front of you.

6.1.2. Place a dark gray 1x2 plate with a ball on one side and a socket on the other, horizontally with the ball on the right, on the previous piece.

6.2.1. Place a green 1x1 round plate on the left stud of the previous piece.

6.2.2. Place a yellow 1x1 brick with studs on two opposite sides, with the side studs at the front and back, to the right of the previous piece.

6.3. Place the right stud of a yellow 1x1 tile with a 1x1 slope tile on one side, horizontally with the slope on the left, on the previous piece. The left stud will attach to the 1x1 round plate.

6.4. Next, we'll add some eyes. Place a transparent red 1x1 dome on the front side stud on the head. Repeat symmetrically on the back side.

6.5. Place the rest of the body, horizontally with the socket on the left, in front of you. Clip the ball on the right side of the head into the socket on the body.

Group 7.

7.1.1. Next, we'll make the creature's mouth. Set the rest of the creature aside for now. This is a long, curved appendage that looks like a butterfly's proboscis! Place a green 1x2 plate, horizontally, in front of you.

7.1.2. Place a dark gray 1x2 plate with a ball on one short side, horizontally with the ball on the right, on the previous piece.

7.2. Place the right stud of a dark green 1x3x2 curved slope, horizontally with the stud on the right, on the left stud of the previous piece.

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

7.4. Place the rest of the creature, horizontally with the head on the left, in front of you. Clip the ball on the right side of the mouth into the socket on the left side of the head.

8.1.1. Next, we'll start making the wings. This creature has four wings! Set the creature aside for now. Place a light gray 1x2 plate with a socket on one short side, horizontally with the socket on the left, in front of you.

8.1.2. Place the front row of a green 2x2 inverted curved slope tile, with the upper row of studs at the back, under the previous piece.

8.2. Place a green 4x4 quarter circle plate, with the corner at the front left, on the wing assembly so the front and left sides are even.

8.3. Place a white 2x2 round tile with a hole, centered vertically and horizontally, on the previous piece. There will be one free row in front of this piece and one free column to the left of it.

8.4. Place the creature, horizontally with the mouth on the left, in front of you. Rotate the wing 90 degrees clockwise so the socket is at the back near the left. Clip the socket on this wing onto the right ball on the front side of the body.

9.1.1. Let's build another wing. Set the creature aside for now. Place a light gray 1x2 plate with a socket on one short side, horizontally with the socket on the right, in front of you.

9.1.2. Place the front row of a green 2x2 inverted curved slope tile, with the upper row of studs at the back, under the previous piece.

9.2. Place a green 4x4 quarter circle plate, with the corner at the front right, on the wing assembly so the front and right sides are even.

9.3. Place a white 2x2 round tile with a hole, centered vertically and horizontally, on the previous piece. There will be one free row in front of this piece and one free column to the right of it.

9.4. Place the creature, horizontally with the mouth on the left, in front of you. Rotate the wing 90 degrees clockwise so the socket is at the front near the left. Clip the socket on this wing onto the right ball on the back side of the body. It should mirror the first wing.

Group 8.

10.1. Next, we'll build the creature's larger pair of wings. Set the creature aside for now. Place a green 2x4 plate, horizontally, in front of you.

10.2. Place the front row of a green 4x4 quarter circle plate, with the corner at the front right, on the back row of the previous piece so there are two free studs to the right of it.

11. Place a green 2x4 left wedge plate, horizontally with the row of four studs at the back and the pointed corner at the front right, in front of the previous piece.

12. Place a green 6x6 plate with one rounded corner, with the rounded corner at the front right, to the right of the previous two pieces.

13. Now we'll start adding some markings to the wing! This creature has large circles on the wings that might look like eyes to scare off potential predators! Place a white 4x4 round plate, centered vertically, on the wing so there are two free columns to the left of it.

14.1. Place a black 2x2 round tile with a single stud, centered vertically and horizontally, on the previous piece.

14.2. Place a yellow 1x2 tile with rounded ends, vertically, on the leftmost column of the wing.

Group 9 contains the black 1x1 round tile from the next step.

15.1. Place the black 1x1 round tile from group 8 on the second stud from the front on the second column from the right of the wing.

15.2. Place a white 1x1 round tile on the second stud from the back on the third column from the right of the wing.

16.1. Now, we'll make a way to attach the wing to the rest of the creature. Place a light gray 1x2 plate with a socket on one short side, horizontally with the socket on the right, under the back row of the wing so the socket overhangs to the right.

16.2. Place the back row of a green 2x2 inverted curved slope tile, with the upper row of studs at the front, under the previous piece.

17. Place the creature, horizontally with the mouth on the left, in front of you. Rotate the large wing 90 degrees clockwise so the socket is at the front and clip the socket onto the remaining ball on the back side of the creature.

Group 10.

18.1. Let's build the last wing. Set the creature aside for now. Place a green 2x4 plate, horizontally, in front of you.

18.2. Place the front row of a green 4x4 quarter circle plate, with the corner at the front left, on the back row of the previous piece so there are two free studs to the left of it.

19. Place a green 2x4 right wedge plate, horizontally with the row of four studs at the back and the pointed corner at the front left, in front of the previous piece.

20. Place a green 6x6 plate with one rounded corner, with the rounded corner at the front left, to the left of the previous two pieces.

21. This wing has the same markings as the other wing. Place a white 4x4 round plate, centered vertically, on the wing so there are two free columns to the right of it.

22.1. Place a black 2x2 round tile with a single stud, centered vertically and horizontally, on the previous piece.

22.2. Place a yellow 1x2 tile with rounded ends, vertically, on the rightmost column of the wing.

Group 11 contains the black 1x1 round tile from the next step.

23.1. Place the black 1x1 round tile from group 10 on the second stud from the front on the second column from the left of the wing.

23.2. Place a white 1x1 round tile on the second stud from the back on the third column from the left of the wing.

24.1. We'll need to attach this wing to the rest of the creature as well. Place a light gray 1x2 plate with a socket on one short side, horizontally with the socket on the left, under the back row of the wing so the socket overhangs to the left.

24.2. Place the back row of a green 2x2 inverted curved slope tile, with the upper row of studs at the front, under the previous piece.

25. Place the creature, horizontally with the mouth on the left, in front of you. Rotate the large wing 90 degrees clockwise so the socket is at the back and clip the socket onto the remaining ball on the front side of the creature. Great job! Now this creature is complete as well.

Bag 6.

Group 12.

Sub-Build: Amphibious Creature

1.1. Next, we'll build an amphibious creature that looks similar to a frog! Let's start by making the body. Place a light blue 4x6 triple inverted slope, with the columns of two studs on the right, in front of you.

1.2. Place a red 1x2 plate with rounded ends, vertically and centered vertically, on the leftmost column of the previous piece. Skip two studs to the right and place another.

2. Place a blue 2x4 plate, horizontally, on the previous two pieces.

3. Place a red 1x2 plate with rounded ends, vertically, on the rightmost column of the creature.

4.1. Now we'll add some attachment points for the legs. Place a dark gray 1x2 plate with a ball on one short side, vertically with the ball at the front, on the leftmost column so the ball overhangs to the front. There will be two free studs behind this piece. Place another symmetrically behind the first.

4.2. Place a blue 2x4 plate, vertically, to the right of the previous two pieces.

4.3. Place a dark gray 1x2 plate with a ball on one short side, vertically with the ball at the front, to the right of the front two rows of the previous piece. Place another symmetrically behind the first.

5. Place a blue 2x4 plate, horizontally and centered vertically, on the creature's body so the left sides are even.

6. Place a light gray 1x2 plate with a socket on one long side, vertically with the socket on the left, on the left column of the previous piece.

Group 13.

7. Place a red 6x4 triple curved slope, horizontally with the columns of studs on the left, on the body. The right sides should be even, and only the socket should extend to the left of this piece.

8.1.1. Next, we'll build the creature's back legs. These look really strong, probably to help with jumping and swimming! Set the body aside for now. Place a red 1x4 inverted curved slope, horizontally with the slope on the right, in front of you.

8.1.2. Place the right stud of a blue 1x2 inverted curved slope tile, horizontally with the higher stud on the left, under the leftmost stud of the previous piece.

8.2.1. Place a light gray 1x2 plate with a socket on one long side, horizontally with the socket at the front, on the left two studs of the leg.

8.2.1. Place a blue 1x1 round plate to the right of the previous piece.

8.3. Place the right stud of a blue 1x2 plate, horizontally, on the previous piece.

8.4.1. Place a red 1x4 double curved slope tile, horizontally, on the left four studs of the leg. It should go over the previous piece.

8.4.2. Place a yellow 1x1 slope tile, with the slope facing to the right, to the right of the previous piece.

8.5. Place the body, with the socket on the left, in front of you. Clip the socket on the front side of the leg onto the right ball on the back side of the body.

9.1.1. Let's build the creature's other back leg. Set the body aside for now. Place a red 1x4 inverted curved slope, horizontally with the slope on the left, in front of you.

9.1.2. Place the left stud of a blue 1x2 inverted curved slope tile, horizontally with the higher stud on the right, under the rightmost stud of the previous piece.

9.2.1. Place a light gray 1x2 plate with a socket on one long side, horizontally with the socket at the front, on the right two studs of the leg.

9.2.2. Place a blue 1x1 round plate to the left of the previous piece.

9.3. Place the left stud of a blue 1x2 plate, horizontally, on the previous piece.

9.4.1. Place a red 1x4 double curved slope tile, horizontally, on the right four studs of the leg. It should go over the previous piece.

9.4.2. Place a yellow 1x1 slope tile, with the slope facing to the left, to the left of the previous piece.

9.5. Place the body, with the socket on the left, in front of you. Rotate the leg 180 degrees so the socket is at the back near the left. Clip the socket on the leg onto the right ball on the front side of the body.

Group 14.

10.1.1. Next, we'll build the creature's front legs. Set the rest of the creature aside for now. Place a blue 1x2 plate, horizontally, in front of you.

10.1.2. Place a dark gray 1x2 plate with a ball on one side and a socket on the other, horizontally with the ball on the left, on the previous piece.

10.2. Place a red 1x2 tile, horizontally, on the previous piece.

10.3.1. Let's add the foot now! Clip the socket of a light gray 1x2 plate with a socket on one long side, vertically with the socket on the right, onto the ball on the left end of the leg.

10.3.2. Place the right stud of a yellow 1x2 plate with rounded ends under the front stud of the previous piece. Rotate this piece 45 degrees counterclockwise so it points to the front left. This will be one of the toes. Repeat symmetrically on the back side.

10.3.3. Place a yellow 1x2 jumper plate, vertically, on the light gray 1x2 plate with a socket on the long side from step 10.3.1.

10.3.4. Place the right stud of a yellow 1x1 tile with a 1x1 slope tile on one side, horizontally with the slope tile on the left, on the previous piece so it overhangs between the two toes on the left.

10.4. Repeat steps 10.1.1-10.3.4 to make another leg.

10.5. Place the creature back in front of you, with the back legs on the right and the socket on the left side. Find the two free balls on the body. Rotate one leg so the toes are at the front and the socket is at the back. Clip the socket onto the ball on the front side of the body. Repeat symmetrically on the back side.

Group 15.

11.1. Next we'll build the head. Set the rest of the creature aside for now. Place a blue 2x4 plate, horizontally, in front of you.

11.2. Place the front row of a blue 2x2 inverted curved slope tile, centered horizontally with the upper row of studs at the back, under the back row of the previous piece.

12. Repeat the previous step symmetrically on the front side.

13.1. Place a light gray 1x2 plate with a socket on one long side, vertically with the socket on the left, on the left column of the head so the socket overhangs.

13.2. Place a white 2x2 plate to the right of the previous piece.

13.3. Place a dark gray 1x2 plate with a ball on one long side, vertically with the ball on the right, to the right of the previous piece.

14. The front and back rows of the head should only have two studs each. Place a red 1x2 plate with a 2x2 of studs on one side, horizontally with the side studs at the front, on the front row of the head. Repeat symmetrically on the back side.

15. Place a red 4x4 round plate, centered vertically and horizontally, on the head.

16.1. Let's add the eyes! Place a yellow 2x2 round tile with a single stud on the four side studs on the front side of the head. Repeat symmetrically on the back side.

16.2. Place a black 1x1 round tile on each of the previous two pieces.

17.1. Place a red 1x2 plate with rounded ends, vertically and centered vertically, on the leftmost column of the head.

17.2. Place a red 2x3 plate, horizontally, to the right of the previous piece.

18. Place a red 1x4 double curved slope tile, vertically and centered vertically on the leftmost column of the previous piece. Place another to the right of the first.

19. Place the rest of the creature, with the back legs on the right and the socket on the left. In front of you. Clip the ball on the right side of the head into the socket on the left side of the body.

Group 16.

20.1.1. Finally, we'll make the creature's long tongue! Set the rest of the creature aside for now. Place a pink 1x4 plate, horizontally, in front of you.

20.1.2. Place a dark gray 1x2 plate with a ball on one short side, horizontally with the ball on the right, on the right two studs of the previous piece so the ball overhangs to the right.

20.2. Place a pink 1x2 plate with a horizontal clip on one side, horizontally with the clip on the left, to the left of the previous piece.

20.3. Place the left stud of a pink 1x2 plate, horizontally, on the right stud of the previous piece.

20.4. Place a pink 1x4 double curved slope tile, horizontally and centered horizontally, on the tongue.

20.5. Place the creature, horizontally with the head on the left, in front of you. Clip the ball on the right side of the tongue into the socket on the left side of the head. This completes the amphibious creature!

Bag 7.

Minifigure Group: Park Ranger

Assemble the park ranger minifigure by placing the torso on the legs, the head on the torso, and the hair on the head. The ranger wears khaki pants, and a khaki vest with lots of pockets over an orange long-sleeved shirt. He has a compass in the top right pocket of his vest. He has a big smile and short brown hair.

Minifigure Group: Santa's Elf

Assemble the elf minifigure by placing the torso on the legs, the head on the torso, and the hair on the head. The elf wears green pants, and a green jacket with a dark green collar and a gold horn logo. She is also wearing a black belt. She is smiling and has freckles and she has braces on her teeth. Her blonde hair is tied up in a pony tail.

Group 17.

Sub-Build: Lift Research Device

1.1. Next we'll build the lift research device, which is a kind of scissor lift! Place a tan 2x8 plate, vertically, in front of you.

1.2. Place a light gray 1x4 tile, vertically, on the right column of the previous piece so the back sides are even.

2. Place a light gray 2x2 tile with a pin on top to the left of the previous piece so the back sides are even. Place another in front of the first. The left column of these pieces will overhang.

3. Place the rightmost column of a tan 8x8 plate under the overhanging column of the previous two pieces so the front side is even with the front of the 2x8 plate.

4. Place a light gray 1x4 tile, vertically, to the left of the two 2x2 tiles with pins.

5.1.1. Place a tan 1x6 plate, horizontally, on the front row of the lift research device so the left sides are even.

5.1.2. Now, we'll add the attachment point for the scissor portion of the lift! Place a dark gray 1x2 plate with a hole on one of the studs, horizontally with the hole on the left, on the previous piece so the left sides are even.

5.2. Place the left stud of a yellow 1x3 curved slope tile, horizontally with the tall side on the left, on the right stud of the previous piece.

6.1. The lift research device will use a rack gear to move the scissor up and down. This is a long straight gear with the teeth on one side that moves back and forth when a circular gear spins. We need to make a smooth track for this gear. Place a white 1x2 tile, horizontally, on the second row from the front on the lift research device so the left sides are even. This piece will be behind the 1x2 plate with a hole from step 5.1.2.

6.2. Place a white 1x8 tile, horizontally, to the right of the previous piece.

7. Place a light gray 1x4 brick with a groove on one side, horizontally with the groove at the front, behind the previous piece so the left side is even with the left side of the lift research device. Place another to the right of the first.

8. Place a light gray 1x2x2 tall brick, vertically, behind the left piece from the previous step so the left sides are even.

9.1. Place the left stud of a light gray 1x2 brick, horizontally, in front of the previous piece. This piece will be on one of the 1x4 bricks with grooves from step 7.

9.2. Skip three studs to the right of the previous piece and place a dark gray 1x3 brick, horizontally, so its right side is even with the right side of the other 1x4 brick with a groove.

10.1.1. Next, we'll build the rack gear assembly. Set the rest of the lift research device aside for now. Place a dark gray 1x8 plate with a rail on one side, horizontally with the rail at the back, in front of you.

10.1.2. Place a dark gray 1x2 plate with a hole on one of the studs, horizontally with the hole on the left, on the previous piece so the right sides are even.

10.2. Place a white 1x4 rack gear, horizontally, to the left of the previous piece. Place another to the left of the first. This piece looks kind of like a 1x4 tile that has a bunch of grooves on it. The left two studs of this piece will overhang.

10.3. Place a dark gray 1x2 plate with a rail on one side, horizontally with the rail at the back, under the overhanging studs of the left piece from the previous step.

10.4. Now we'll add the rack gear to the rest of the lift research device. Place the main part of the lift research device in front of you so the row of tiles is horizontal near the front. Place the left end of the rack gear assembly on the tiles and slide it to the right so the rail on the rack gear fits into the 1x4 bricks with grooves that are behind the row of tiles. Slide the rack gear left until its left side is even with the left side of the lift research device.

Group 18.

11.1. Next we'll add a motor to power the lift research device. Set the rest of the lift research device aside for now. Place a black 12 tooth gear, laying flat with the axle holes facing up and down, in front of you. This is the middle-sized gear in this group.

11.2. Find a white 3L axle/pin combo with a 2L axle side. Push the axle side, with the pin on top, through the hole on top of the previous piece. Push it all the way through until the axle extends 1L below the gear.

12.1. Find a light blue 3x4x5 electric motor. This looks like a box with a short cylinder on one side. The cylinder has four pin holes around the edge and an axle hole through the middle. Place this in front of you so it's horizontal with the cylinder at the top near the right. There should be a cord on the left side.

12.2. Push the axle on the bottom of the axle/gear assembly into the hole in the center of the cylinder on top of the motor. When the motor is commanded to run, the motor will now spin the gear!

13.1.1. Next, we'll add some more gears to transfer the rotation from the motor to the rack gear! Place a tan 20 tooth gear, laying flat with the axle holes facing up and down, in front of you. This is the largest gear in this group.

13.1.2. Push a yellow 3L axle, from the top, into the axle hole of the previous piece. Only push it in until the bottom side is even with the bottom of the gear.

13.2. Slide the leftmost hole of a white 1x3 brick with three pin holes, horizontally with the holes facing up and down and the studs at the back, over the top half of the previous piece. The axle will extend 1L above this piece.

13.3. Push a dark gray 8 tooth gear, with the hole facing up and down, onto the remaining 1L of the axle. Don't push it down too hard, we want the axle to spin freely in the brick. This is the smallest gear in this group.

13.4. Push the rightmost pin hole on the brick with three holes onto the pin that's sticking up from the top of the motor. The teeth on the large gear should interlock with the teeth of the gear on the motor.

14. Find the four holes that are on the front side of the motor. Push the pin side of a green 1L pin with an anti-stud on one side, with the anti-stud at the front, into each of these four holes so the motor can be attached to studs.

15. Place the rest of the lift research device, horizontally with the rack gear near the front, in front of you. Find the three stud gap in the wall that's behind the rack gear. Rotate the motor assembly so the gears are at the front and so the cable extends to the left. The four anti-studs from the previous piece should be at the bottom. Place the motor to the left of the tiles that are on the back four rows of the lift research device assembly so it's even with the back side. The brick with holes on the motor should fit into the gap in the wall behind the rack gear. Only the small gear should extend in front of this wall, and it should engage with the teeth in the rack gear.

16.1. Place a black 1x5 plate, horizontally, on the wall behind the rack gear so the right sides are even.

16.2. Place the front row of a black 3x3 L-shaped plate, with the corner at the front left, to the left of the previous piece. The left column of this piece should be even with the left column of the assembly.

17.1. Place a white 1x2 tile, vertically, on the back two studs of the previous piece.

17.2. Place a white 1x8 tile, horizontally, in front of the previous piece and on the wall behind the rack gear.

Group 19.

18.1. Now, we'll build the scissor for the lift! Set the rest of the lift research device aside for now. Place a yellow 9L thick liftarm, horizontally with the holes facing up and down, in front of you.

18.2. Push a light gray 2L pin, from the top, into the rightmost and center holes in the previous piece so they extend 1L above it. There will be three holes between these two pieces. These pins do not have friction ridges and will spin freely.

19. Push the center hole of a yellow 9L thick liftarm, vertically with the holes facing up and down, onto the top side of the left pin from the previous step.

20.1. Push a light gray 2L pin, from the bottom, into the frontmost hole in the previous piece so it extends 1L below it. This pin does not have friction ridges and will spin freely.

20.2. Push the leftmost hole of a yellow 9L thick liftarm, horizontally with the holes facing up and down, onto the bottom side of the previous piece. It will extend 8L to the right.

20.3. Push a light gray 2L pin, from the top, into the rightmost and center holes in the previous piece so they extend 1L above it. There will be three holes between these two pieces. These pins do not have friction ridges and will spin freely.

21.1. You should now have two horizontal 9L liftarms connected by a single vertical 9L liftarm. We're going to add another vertical one connecting the two horizontal ones. Push the back hole of a yellow 9L thick liftarm, vertically with the holes facing up and down, onto the free pin on the back horizontal liftarm. At the same time, push the center hole onto the left free pin on the front horizontal liftarm. The front four holes of the liftarm we just placed should be free.

21.2. Push a light gray 2L pin, from the top, into the frontmost hole in the previous piece so it extends 1L above it. This pin does not have friction ridges and will spin freely. The scissors are complete now! Let's try them out. There should only be two free pins now, one at the front and one on the right. Move these close together and the liftarms should all move towards each other, making the entire assembly get longer! Pull them apart, and the liftarms should move away from each other, shortening the assembly.

22. Now we'll attach the scissors to the rest of the lift. Place the rest of the lift research device assembly, horizontally with the motor at the back, in front of you. There are two holes near the front: one on the front row all the way at the left, and the other on the right end of the rack gear. Rotate the scissors so the holes face front and back and so the pins are at the bottom, facing the back. Push the two pins into the holes we just identified.

Group 20.

23.1. A scissor lift isn't much good unless it lifts something! We'll make a platform for it to raise up and down. Set the rest of the lift research device assembly aside for now. Place a tan 2x4 plate, horizontally, in front of you.

23.2. Place the front stud of a dark tan 1x2 inverted curved slope, vertically with the upper stud at the back, under the back left corner of the previous piece.

24. Place a tan 2x2 inverted curved slope tile, with the upper row of studs at the front, in front of the previous piece so the left sides are even. The front row should extend past the 2x4 plate. Place another to the right of the first.

25. Place a tan 4x6 plate, vertically, on the platform assembly so the front sides are even.

26. Keeping it vertical with the curved slope tiles at the front, flip the platform upside down. Place a light gray 1x2 plate with a hole on one side, upside down and vertically with the hole at the back, on the leftmost column of the assembly and behind a 2x4 plate. The back of the hole should be even with the back of the assembly. Skip one column to the right and place another.

27. Place the back two studs of a yellow 1x3 plate, upside down and vertically, on each of the previous two pieces. This will connect them to a 2x4 plate.

28. Push a light gray 3L pin with a stop ring on one end, horizontally with the stop ring on the right, into the hole on the right side of the assembly. Only push it in 1L so the right side overhangs by 2L.

29. Rotate the platform so it's rightside up and horizontal, with the pin from the previous step at the back on the right. Place a tan 1x4 low lattice fence panel, vertically with the fence on the left, on the leftmost column of the platform. Repeat symmetrically on the right side.

30. Now we'll attach the platform to the lift research device! Place the lift research device, horizontally with the scissor at the front, in front of you. Find the top hole on the top right liftarm. Align the two holes on the bottom of the platform with this hole, then push the pin from the back so it goes through all three holes and connects the platform to the lift research device.

31. Next, we'll attach a hub to control the motor. Find a yellow 5x7x4 small electric hub. This looks like a box with a variety of holes. Find the side that has two pin holes and two thin rectangular holes. Rotate the hub so it's upright with this side at the front with the rectangular holes on the left side. The top and bottom sides should each have two rows of three holes. Rotate the lift research device assembly so the scissor and platform are at the back. There should be two pins pointing up near the left side of the assembly. Push the holes on the bottom of the hub down onto these holes so the hub is to the left of the motor. Take the cable from the motor and connect it to the bottom rectangular hole on the front side of the hub. This completes the lift research device.

Bag 8.

Groups A, B, C and 21. You will use the pins from groups A, B and C throughout the build.

Sub-Build: Hub and Sensor Frame

1.1. Next, we'll build a frame that holds a hub and a sensor. Find a light gray 5x7 hollow frame. This looks like two 7L liftarms connected by two 3L liftarms on the ends, forming an open rectangle. Place this vertically in front of you.

1.2. Push a black 2L pin from group A, from the left, into the front and back holes on the left side of the previous piece. They will extend 1L to the left of the frame. Repeat symmetrically on the right side.

2. Push the front and back holes of a light gray 1x6 brick with five holes, vertically, onto the left two pieces from the previous step. Repeat symmetrically on the right side.

3. Push a blue 3L pin from group B, vertically with the stop ring near the back, from the front into the left and right holes on the front side of the frame. These will extend 2L to the front and there will be one free hole between them.

4. Push a red 15 L thick liftarm, horizontally with the holes facing the front and back, centered horizontally onto the previous two pieces. Push it as far back as it will go so the pins extend 1L in front of it. There will be six free holes in this piece to the left of the left pin.

5.1. Push a black 2L pin, from the back, into the leftmost and third from the left holes on the previous piece so they extend 1L to the back. There will be one free hole between these pieces. Repeat symmetrically on the right side.

5.2. 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 holes on the front side of this piece, with it laying flat with the rounded sides on the left and right, from the back onto the left pair of pins from the previous step. Repeat symmetrically on the right side.

5.3. Push a black 2L pin, from the back, into the leftmost and rightmost holes on the back side of each of the previous two pieces. You'll place a total of four pieces in this step.

5.4. Push a red 3L thick liftarm, horizontally with the holes facing front and back, from the back onto each pair of pins from the previous step.

6.1. Next, we'll get the hub ready to attach to the frame. Find a yellow 5x7x4 small electric hub. This looks like a box with a variety of holes. Find the side that has two pin holes and two thin rectangular holes. Rotate the hub so it's horizontal with this side at the bottom with the rectangular holes near the back. The front side should have six pin holes, including one on each corner. Push the pin side of a green 1L pin with an anti-stud on one side, with the anti-stud at the front, into each of the four corner holes so the hub can be attached to studs.

6.2. Rotate the hub so it's horizontal with the four previous pieces at the bottom and the rectangular holes at the back. Place the four anti-studs on the two 1x6 bricks with holes so the back of the hub is even with the back of the frame.

7.1. Next, we'll add a sensor. Find an electric color sensor. This looks like a black and white 3x3x3 cube with a cable on one side and a window on the opposite side. Attach the cable to the right rectangular hole on the side of the box.

7.2. Rotate the sensor so the window is at the bottom and so there are two holes on the back side. Push the holes on the back side of the sensor to the two pins on the front side of the frame. This completes the hub and sensor frame.

Congratulations! Now this build is complete!

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