#Solo13Lego: Group A

The instructions below detail the construction of a simple Lego microscope. All units are given in terms of Lego nodes: for example, "2x4" indicates a shape measuring 2 Lego nodes up by 4 Lego nodes across.

You are advised to split into 3 subgroups, each containing 3 people, and assign each subgroup to one of the three sections (Top, Middle, Bottom). The tenth person in the group should act as the group leader, coordinate the actions of the group and liaise with the session leaders as the workshop progresses.

DON'T DISCUSS YOUR WORK WITH THE OTHER GROUPS!

Top

Eyepiece (White bricks):

Stages are numbered downwards from the top of the eyepiece section.
Stage 1 of this Section is staggered one row back from the top stage of the Upper Body.

- Stage 1 is 6x4, made from 3 (4x2) bricks;
- Stage 2 is 6x3, made from (6x1), 5 (2x1) and 2 (1x1), and sits flush with the back of Stage 1;
- Stage 3 is 6x3, made from 3 (3x2), and sits flush with Stage 2;
- Stage 4 is 6x4, made from 2 (4x2), 2 (4x1), and sits flush with the front of Stage 3;
- Stage 5 is 6x3, made from 2 (3x1), (3x2), (6x1) and sits flush with the back of Stage 4;
- Eyepieces are each formed from 3 of the 2x2 bricks and sit at opposite ends of Stage 5.

Objective lenses:

Stages are numbered from the bottom of this section upwards.

- 3 lenses (Orange bricks) use the 2x2 bricks and measure 3,2,1 in height respectively;
- Lenses attach to Stage 1 (Orange bricks), perimeter measuring 6x6 but formed in a U-shape. This requires 4 (4x2), 3 (2x2) and 1 (2x1), leaving space for the arm that holds the objective lens section;
- Stage 2 (Blue bricks) sits atop Stage 1, measuring 6x6, formed from 2 (6x2) and 2 (6x1);
- Stage 3 (Blue bricks) sits atop Stage 2 and requires 2 (14x1) and 2 (2x1) bricks, arranged to make a cross shape over the geometric centre of Stage 2;
- Stage 4 (Blue bricks) is a single 2x2 brick.

Upper body:

Stages are numbered from the base upwards.

- Stage 1 (Black bricks) measures 6x4, formed from 2 (1x1), 2 (3x1), 2 (4x1) and 1 (4x2);
- Stage 2 (Brown bricks) measures 6x4, formed from 3 (4x2);
- Stage 3 (Pale green bricks) measures 6x4, formed from 4 (3x1), 1 (4x1), 2 (2x2);
- Stage 4 measures 6x4, formed from 2 (4x2), 1 (2x2) light green in a U-shape; 1 (2x2) in red;
- Stage 5 measures 6x4 with 4x2 excess arm, formed from 2 (2x2), 1 (4x2), 2 (2x1) in light green in a U-shape, and a red arm sitting in the U-shape;

- Stage 6 measures 6x4, formed from (3x2), (1x1), (4x1)

Middle

Lower body (Dark green bricks)

Stages are numbered from the bottom up.

- *Stage 1:* Place a red 2x3 centrally, length running front-to-back and flush with the front of the arch layer. This will serve to support the stage arm. Rest of the layer sits flush with the back of the previous layer and is formed from 2 (3x2) and 2 (4x1), leaving 6 red nodes exposed to the front of the microscope.
- *Stage 2:* Create 2 3x3 blocks to the far left and right of the layer, using a (2x3) and a (1x3) in each case, linked by a single 2x1 brick at centre back. Remaining space in this layer should be taken up by the red focus arm, extending forwards.
- *Stage 3:* Use 3 (2x1), 1 (2x2), 1 (4x2) to create a 3x6 rectangle flush with the LHS. To the back RHS, attach a 2x1 to this layer, leaving a 2x2 space on this layer for the focus handle. Insert a black 4x2 brick L-to-R for this, extending to the right.
- *Stage 4:* Rectangle of dimensions 3x8, formed from 2 (2x2), 4 (2x1), 1 (4x2);

Focus (Orange and black bricks)

- Build around the end section of the black 4x2 brick mentioned above, using a 1x4 orange brick above and below and a 2x1 orange brick on the same level as the black brick. The orange construction should run front-back, on a perpendicular to the main body of the microscope.

Microscope Stage:

Stages are numbered from the top down.

- Stage 1 (Yellow bricks) measures (7x10) in a closed rectangle, formed from 4 (4x2), 2 (4x1), 1 (3x2), 2 (6x1) and 1 (6x2);
- Stage 2 (Red bricks) measures (7x10) around the perimeter, but with a 5x2 recess left to accommodate the arm. Stage 2 is formed from 2 (4x2), 2 (3x2), 3 (4x1), 4 (2x1), 4 (1x1) and 1 (8x1), arranged in a symmetrical fashion.
- Arm for microscope stage (Red bricks): Single 8x2 brick, extending along the front-back axis.

Base

Base (Blue bricks)

This section is built along one level only and is not numbered in stages.

- Total bricks required: 16 (2x2), 4 (4x2) and 2 (3x2);
- These are arranged in a symmetric fashion to form a rough U-shape;
- *Rectangle A1:* Arrange a rectangle of 6 (2x2) bricks on the base board to form a 4x6 rectangle, long side running front-to-back;
- *Rectangle A2:* Form an identical rectangle lying 8 units away and parallel to the first;
- *Rectangle B1:* Take 2 (2x2) bricks and form a 2x4 rectangle. It should be arranged with its length running along the width of Rectangle A1, towards the back of the board and shifted one unit along from Rectangle A1, in the direction of Rectangle A2;

- *Rectangle B2:* Same size and orientation as Rectangle B1, but shifted one unit laterally towards Rectangle A1.
- *Rectangle C:* Of dimensions 2x12, running parallel to the direction of Rectangles A1 and A2, directly in contact with the back edges of B1 and B2. C is formed from 3 (2x4) bricks and should be placed to maintain the symmetry of the base.
- *Rectangle D:* Of dimensions 2x10, arrangement as for C but formed from 2 (3x2) and 1 (4x2) bricks.

Arch (Yellow and red bricks)

- *Level 1 (Yellow)*: 2 (2x4) bricks, each placed to run front-to-back along the design at the outer edge of Rectangles C and D.
- *Level 2 (Yellow)*: 2 (3x2) and 2 (1x2) bricks, placed on top of those from Level 1;
- *Level 3 (Yellow):* Measures 4x8, made from 2 (1x8), 1 (2x2), 1 (3x2), 2 (3x1), the left and right ends of the rectangle sitting over the inside half of each of the sides of Level 2.
- *Level 4 (Red): D*imensions as for Level 3 but made from 4 (4x2) bricks.
- *Level 5 (Red): D*imensions as for Level 4 but made from 1 (8x1), 2 (6x1), 2 (3x1), 1 (1x2), 1 (4x1).

Mirror

- *Mirror Arm* (Yellow): 1 (2x8) brick, two units of length to be attached to the underside centre of the arch.
- *Mirror* (Blue): 2 (4x2) bricks. The first should be placed symmetrically atop the arm, the brick's length running perpendicular to the direction of the arm and with its width extending beyond the arm by one row. The second blue brick should be placed in the same orientation, but with four units in contact with the arm underneath.