

Usability Report for the S.S. Save Wheezy

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Abstract:

Two rounds of usability testing were done to assess the time it took to complete the construction of the S.S. Save Wheezy and to bring to light any issues with the instructions posted on www.Instructables.com. Round 1 was completed using three test subjects. Following testing, it was found that users were not using the yellow boxes for clarification on the pictures. The yellow boxes were designed to help the construction of the base sub assembly and the ignorance of their existence caused the construction of the base to take longer than expected. To fix this, a picture was posted on the Instructables page saying, "Please look for yellow boxes on images for clarification". The idea was that this would draw attention to the yellow boxes and help the user complete the construction. Following Round 2, using four test subjects, it was again brought up that people did not know how to use the yellow boxes and that some of the pictures for the base assemblies were unclear and confusing. The remedy these issues, the picture that was made to draw attention to the yellow boxes was changed to "Please click on yellow boxes in images for clarification" to draw attention to the boxes and show how to use them. All the pictures for the construction of the base were reshot to emphasize which pieces were put where and to eliminate any confusion. The group feels that these changes have created a more streamlined user experience.

Introduction:

This report overviews the usability of the S.S. Save Wheezy instructions found on www.Instructables.com. In testing the usability, the results have been collected and analyzed to make changes to improve the instructions and to make recommendations for improvements to the website. The report describes testing methods, presents the findings of the usability tests conducted in October of 2011, and the changes made as a result of the test findings.

Methods and Protocols:

Two rounds of usability testing were run on the instructions for the S.S. Save Wheezy posted on the website, www.Instructables.com. The usability testing was conducted by three engineers: Alex, Mike, and David. Two engineers (Mike and Dave) recorded data during the testing and the third engineer (Alex) oversaw general operations and facilitated success of testing.

As a group, we decided that the best method for our usability testing would be observing one tester at a time attempting to assemble our Lego. Chosen at random, we asked each tester to speak out loud what they were thinking as much as possible. This would eliminate engineers attempting to guess the testers thoughts on the Lego build.

With a timer running from the start of the construction, engineers were able to increase the reliability of their findings. This timer was used aiding in multiple parts of the observing process. The timer allowed the engineers to have a benchmarking system that noted what time the testers were having difficulties. It also allowed the engineers to compute the completion time of each sub-assembly and the final assembly.

Testers were introduced to the website, www.Instructables.com and the interface

briefly. They were then taken to the link with the Lego they would be making www.Instructables.com/id/SS-Save-Wheezy/. At this point they asked to begin assembling. Testers were allowed as much time as needed to complete the assembly. However, they were not allowed to ask specific questions to the observers about piece placement or step guidance.

At the completion of assembly, testers we're asked if they noticed two things. The first was whether or not testers noticed the yellow boxes on certain images. These boxes provide additional detail, and emphasized certain parts of the assembly that may be considered more difficult. Additionally, testers were asked if they utilized the text provided below the pictures as additional means of assembly instructions. When testers had completed this brief Q+A session they were thanked for their time and relieved of their duties.

Predictions before testing:

We predicted that:

- The www.Instructables.com interface would be easy to use.
- The base sub-assembly would be the most difficult overall.
- Distinguishing between the two blue "beak" pieces would be a challenge.
- The smokestack would be the easiest of all sub-assemblies.
- "Wheezy's back would be a challenge because of the color of the pieces used.
- The average assembly time would be 10 minutes.

Description of First Round Testing and Findings:

For the first round of testing, three testers were randomly chosen were asked to complete the instructions in a setting, similar to that to be completed by the final subject. To simulate this, the subjects completed the construction of the S.S. Save Wheezy on a table with just a laptop in front of them. The group felt that this would be done by the final test subject.

Table 1. Average Time to Build Each Assembly

	Boat Base	Smoke Stack	Engine	Wheezy	Cargo Area	Final Assembly
Average Time to Build (minutes)	5	1	1.33	2.33	1.27	1.55

Table 2. Individual Build Times for Each Assembly

Name	Time to Complete Base (sec)	Time to Complete Smoke Stack (sec)	Time to Complete Engine (sec)	Time to Complete Wheezy (sec)	Time to Complete Cargo Area (sec)	Time to Complete Final Assembly (sec)
Max	270	50	60	120	90	50
Nick	140	50	50	80	50	80
Lili	490	80	130	220	90	150

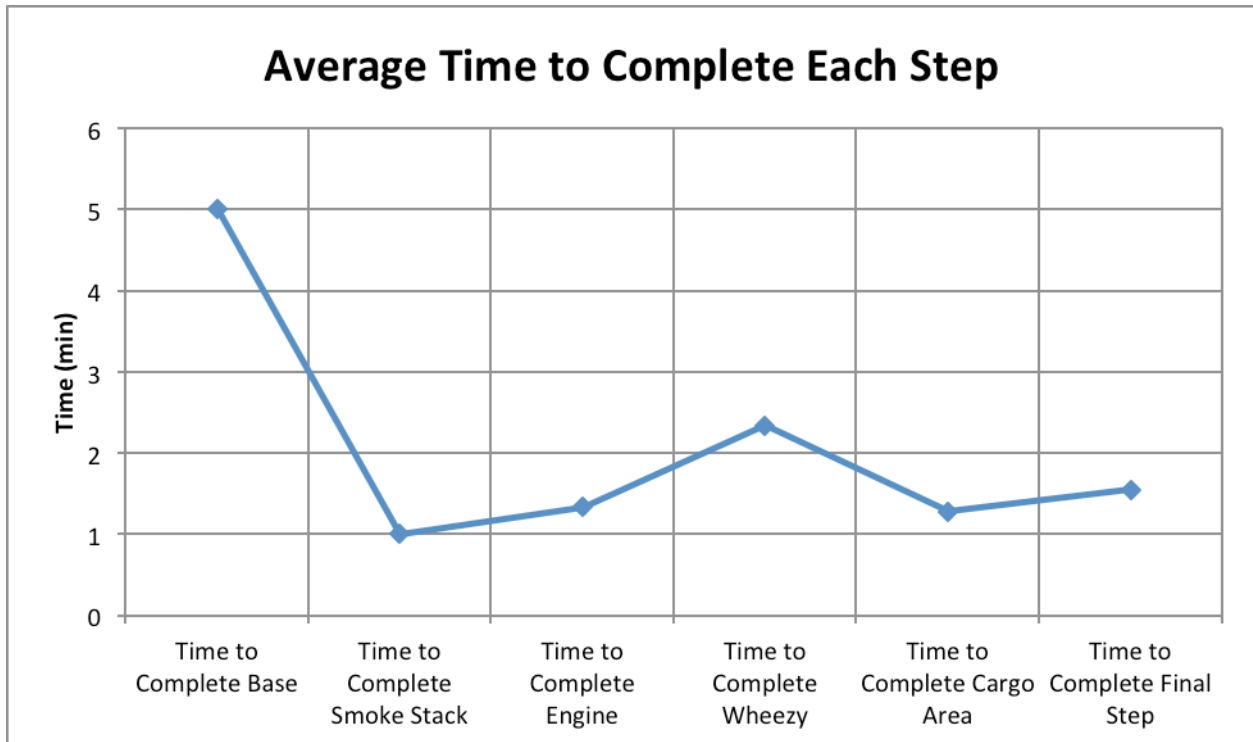


Figure 1. Average Time to Complete Each Step

As shown in Table 1 and Figure 1, the construction of the base took the longest of any of the other steps. Part of the reason for this can be attributed to the fact that the base has the most parts and would thus take the longest. However, one of the testers, Lili, tried to build the base for over eight minutes, as shown in Table 2. This is a stark contrast to another tester who built the entire S.S. Save Wheezy in less time.

When building the base, Lili said that she had a lot of trouble figuring out which pieces needed to be used for the blue section. All the testers agreed that some of the pictures were unclear about which pieces to use. When asked if they used the yellow boxes on the picture or the text below each picture, all testers said they did not use them. The yellow boxes and text instructions were intentionally added to the Instructables page to clarify such issues. The fact that no tester had used them informed us that we needed to either draw more attention to the boxes and text or remove them.

Total Time of Completion

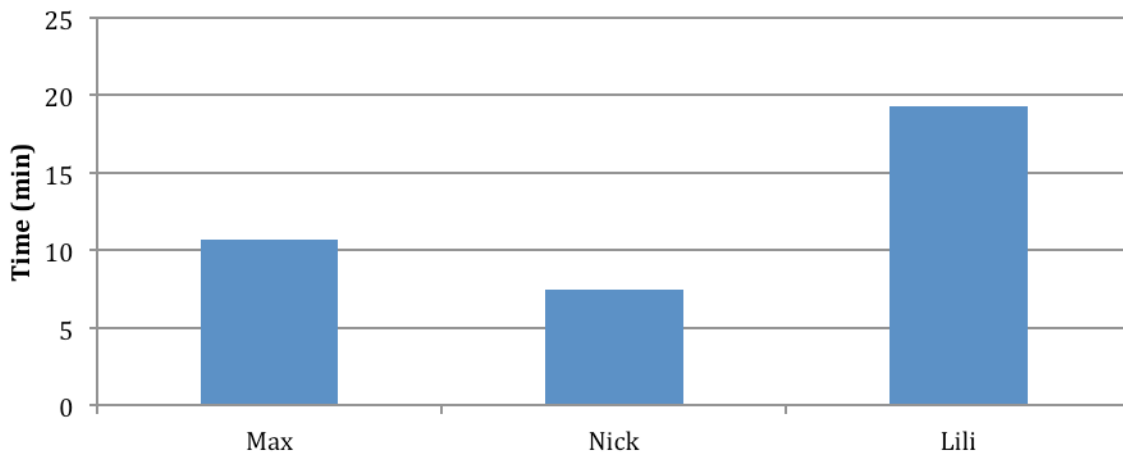


Figure 2. Total Time of Completion.

As shown in Figure 2 the total time of completion was not constant among the three testers. As discussed in the predictions section, the target time of completion was 10 minutes. The average time of completion for the first round of testing was 12.5 minutes. As discussed above, the biggest cause for the length of completion was the confusion from the assembly of the base. Ideally, if the problems with the assembly are fixed, the completion time average should be ten minutes or less.

Revisions After Round 1:

To remedy the issues from the assembly of the base, the group increased the size of the yellow boxes to draw the users' eye to the fact that they existed. Furthermore, at the beginning of the first sub-assembly, a picture was inserted that said, "Please Look For Yellow Boxes on Images for Clarification". Also, a yellow box was added to the construction of the base assembly to clarify what the "beak" pieces were and where they went. Another yellow box was added to suggest that users separate the pieces into piles to make construction easier. The text was not removed. However, if the second round of testing yields results with encouraging build times and no tester uses the text, then the text may be removed. Lastly, the text for instructions was edited.

Description of Second Round Testing and Findings:

For the second round of testing, four random testers were chosen from the areas we were working in. Again the tests were run in simulation of the final test area. They testers were put in front of a table with a laptop and told to construct the S.S. Save Wheezy using the Instructables website. Again, the testers were asked to speak aloud about what they were thinking and the engineers recorded the testers thoughts and took notes over what the tester was doing.

Table 3. Average Time to Build Each Assembly

	Boat Base	Smoke Stack	Engine	Wheezy	Cargo Area	Final Assembly
Average Time to Build (minutes)	4.29	1.19	1.52	2.57	1.7	4.29

Table 4. Individual Build Times for Each Assembly

Name	Time to Complete Base (sec)	Time to Complete Smoke Stack (sec)	Time to Complete Engine (sec)	Time to Complete Wheezy (sec)	Time to Complete Cargo Area (sec)	Time to Complete Final Assembly (sec)
Manny	170	50	70	122	93	50
Alexander	155	55	95	104	101	20
Katie	240	80	90	290	80	50
Chelsea	465	100	110	100	135	50

Average Time to Complete Each Step

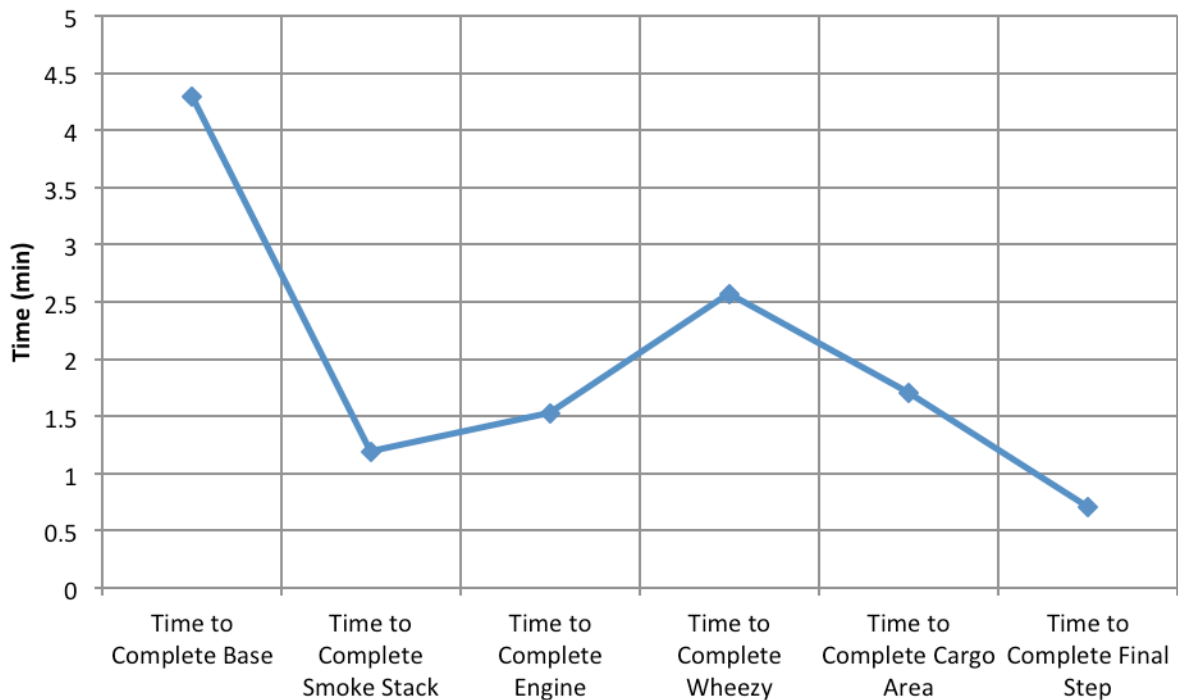


Figure 3. Average Time to Complete Each Step

The biggest motivation behind the revisions made after the first round of testing was to make the construction of the base quicker and easier. The average build time for

the base in round one was 5 minutes. For round two, it dropped down to 4.29 minutes. While this is encouraging, there were still issues when constructing the base. Both Katie and Chelsea voiced issues with the pictures not showing that the beak pieces were being used as opposed to the square blocks. Once they figured it out, the rest of the base was easy to complete. Moreover, all testers claimed that the other assemblies were easy to construct. One encouraging part about the problems with the construction with base is that the text instructions were actually used when the testers were stuck.

One trend the group noticed was that although the base construction time improved, the averages of the other assemblies were larger. This can be partly attributed to the fact that more testers put the pieces in piles for each assembly before construction. This added the less than minute addition of the build time.

Another issue the group found was that no tester was using the yellow boxes. Some testers did not even notice the picture describing what the yellow boxers were there for. Moreover, when people were using the website, the yellow boxes actually caused inconveniences. For example, one of the yellow boxes was too large and overlapped into the text. Another website issue was that some test subjects did not realize they needed to scroll down to the “Next Step” button to get to the next part of the assembly.

Total Time of Completion

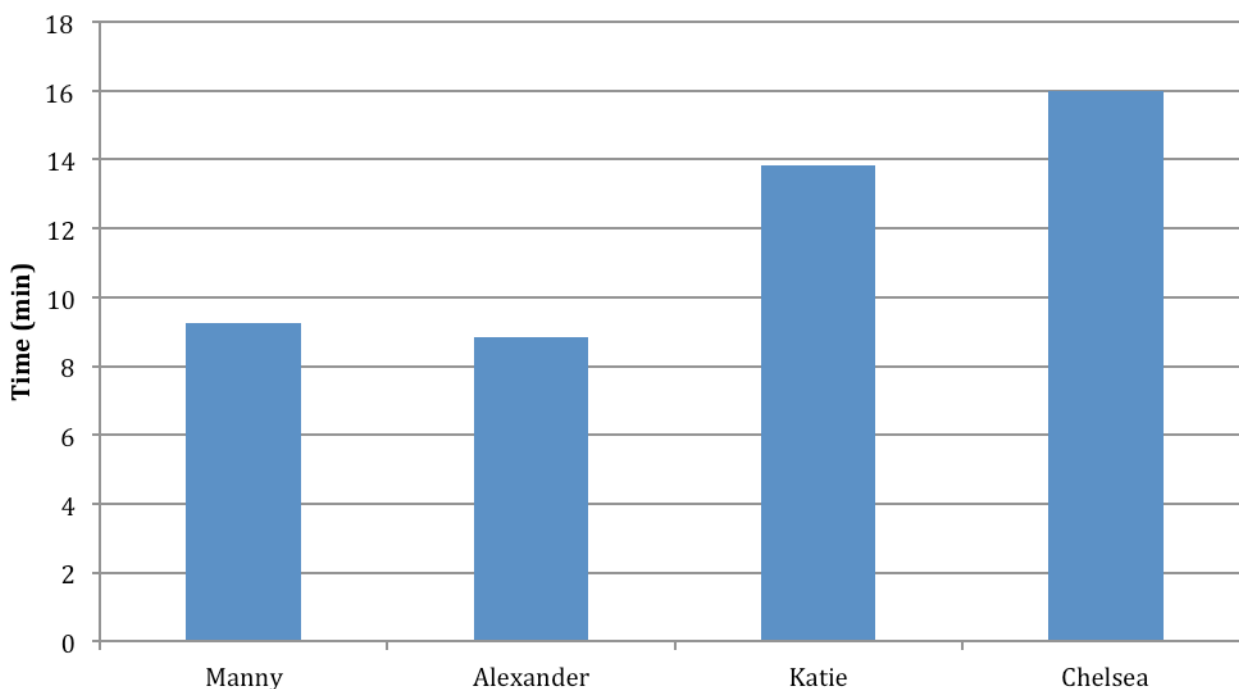


Figure 4. Total Time of Completion

The average time of total completion came out to be 11.8 minutes, an improvement to the initial 12.5 minutes from the first round. It is still over a minute off the target time of 10 minutes but the improvement is encouraging. The group feels that after the final revision post round 2, the build time will reach the target 10 minutes.

Revisions from Round 2

The first two revisions made after the second round of testing were designed to fix the issues with the yellow boxes. First, to correct the excessively large box, the group simply shrunk the size of the box and opened the website up on multiple laptops to verify that issue was resolved.

The second issue is that testers were not sure how to use the yellow boxes when they noticed them. To correct this issue, we changed our first photo in the first sub-assembly from saying, "Please Look for Yellow Boxes on Images for Clarification" to "Please Click on Yellow Boxes in Images for Clarification." Hopefully, this change will inform people how to use the boxes and also draw attention to them.

To remedy the situation with the base assembly confusion, the group retook each of the photos for the base assembly. With the new photos, there was a strong emphasis on showing what the "beak" pieces were and where each "beak" piece should be placed on the green platform. This was to ensure that there was no confusion about where each piece was placed on assembly. Also, one picture error was noticed in the base assembly section and this picture was removed and replaced with the correct one.

Finally, the text instructions were kept in with the pictures because they provided an important safety net if users became confused with the pictures.

Conclusion

Most of the testers found that the construction of the S.S. Save Wheezy was simple and easy to follow except when constructing the base assembly. The revisions made after rounds 1 and 2 were strongly oriented to fix these issues. The group feels that the new and improved instructions as a result of the usability testing will make the construction of the S.S. Save Wheezy an enjoyable and easy to follow process.

Some of the issues the group ran into stemmed from the website design. Some of the testers could not locate the "Next Step" button because it was below all the photos. It would be easier to use if the button was at the top of the page as well as the bottom. Furthermore, there were some issues with the yellow boxes going into the text body. This appears to be an error in the website code and should be brought to the attention of those in charge of the website.

We would like to thank Max Dowaliby, Nick Kowalski, Lily Elao, Manny Rodriguez, Alexander Jimenez, Katie Hoole, and Chelsea Convery for volunteering and helping with the usability testing.

Appendix A – Observations.

David's Notes

1st Round

1. Max

0:26 The subject recognize what were the first pieces
 0:40 He got confuse by the instructions.
 1:10 He started the figure with the wrong piece
 2:38 He made a mistake in constructing the base
 3:00 He is finalizing the construction of the base.
 4:37 Finished the first part.
 5:00 Finished the smokestack
 6:13 Finished constructing the engine
 6:40 He separate pieces
 7:00 Began constructing the penguin.
 8:28 Finished the penguin.
 8:41 Began the "House".
 9:22 Finished putting the house together
 10:11 Begin working on the boat
 10:40 The boat

2. Nick

0:20 Found the first piece
 0:45 Assembling the base
 0:50 Had trouble differencing some of the small pieces
 1:30 Completed the first level of the base
 2:32 Completed the base
 2:44 Begin working on the smokestack
 3:00 Completed the smoke stack
 3:32 Working on the engine
 4:13 Begin working on the penguin.
 4:56 Put the eyes together.
 5:23 Finished the penguin
 5:40 Began working on the "House"
 6:00 He is identifying the pieces to finish the house
 6:45 Begin putting the boat together.
 7:20 He got problems clicking on the pictures
 7:40 Finished the boat.

Comments: The user didn't utilize the text direction under it.
 Didn't notice the yellow boxes in the pictures.

3. Lili

0:17 Begin assembling the pieces
 0:47 Confused with the instructions
 2:28 The user is confused
 4:18 After further instructions the user found the right pieces and continued building it
 5:45 The user being constructing the top part of the base
 8:31 The user begin working on the second step
 9:00 Begin building the smokestack
 9:37 Finished the smokestack
 10:06 Began working on the engine
 11:32 Finished the engine
 12:00 Begin working on the penguin
 12:16 Looking for further instructions
 12:48 Made a mistake putting the penguin's body together (use the wrong pieces)
 14:52 Finished working on the penguin
 16: 14 Almost done working on the cargo are of the Lego
 16:48 The user forgot to use to pieces for the smokestack
 17:51 The user is assembling the ship.
 18:38 Had problems clicking on one of the pic
 19:00 Finished working on the pictures.

2nd Round

1. Manny

0:05 The user separate the pieces
 1:00 The user begin assembling the base
 1:38 He made a mistake in constructing the base
 2:50 Completed the base
 2:55 Begin working on the smokestack
 3:40 Finished the smoke stack
 3:56 Working on the engine
 4:50 Finished the engine
 5:06 Begin working on the penguin
 5:20 The user got confuse wit h one of the pieces
 6:52 Finished working on the penguin
 7:50 Begin working on the cargo
 8:25 Finished the cargo
 8:50 The user begin assembling the ship.
 9:15 Finished the ship.

2. Alexander

00:30 The user is assembling the base
 1:45 Completed the first level of the base
 2:35 Completed the base
 2:56 Begin building the smokestack
 3:30 Finished the smokestack
 3:50 The user is gathering the pieces to build the engine

4:15 Begin working on the engine
 5:05 Finished the engine
 5:25 Begin working on the penguin
 6:49 Finished the penguin
 8:30 Finished the cargo
 8:37 Begin assembling the different parts of the ship
 8:50 Finished the ship

Comments: This user did not utilize the yellow squares in the picture “ He said that the pictures are self-explanatory.

3. Katie Hoole

1:15 Begin working on the base
 1:40 Fixing some of the pieces
 2:16 Almost done with the first part of the base
 3:40 Working on the second part
 3:51 The user complain that the some of the pictures are confusing (the orientation)
 5:00 Begin working on the smokestack
 5:45 Completed the smokestack
 6:13 Begin working on the engine
 7:02 Completed the engine
 7:15 Started constructing the penguin
 8:02 Looking at the directions
 8:30 The user was confused with some of the directions
 11:25 The user still working on the penguin
 11:45 completed the penguin.
 12:03 Started Working on the cargo area
 13:05 The different pieces are completed
 13:50 Finished the ship.

4. Chelsea

0:23 Starts getting pieces for base
 0:42 Looks back at instructions and nods
 1:09 Starts building base incorrectly – 2x2 instead of beaks
 1:30 Looks back at instructions
 1:53 Resumes building
 2:10 Fixes base – adds beaks
 2:33 Looks at instructions to see which beaks to use
 3:05 Begins to build base again
 3:27 Looks at notes again
 4:18 Photos don't show angles which beak to use
 4:50 Destroys base and starts a new – beak still in wrong place
 5:30 Realizes the base is wrong – fixes beak placement
 5:52 Hates Legos
 6:29 Starts on top
 7:06 Looks back at instructions to verify

7:50 Finishes base
 8:40 Starts building cargo area?
 9:56 Finishes cargo area
 10:23 Starts building smoke stack
 11:00 Puts black pieces in order shown in picture and makes column
 11:35 Finishes smoke stack
 11:55 Starts engine. Puts stuff in pile
 13:25 Finishes engine
 13:30 Starts penguin
 13:54 Looks at notes intently
 15:11 Finishes penguin
 15:30 Starts final
 16 Finishes whole thing

Comments: Didn't read instructions realized it was easier to pull out pieces first

Mike's Notes

1st Round

Max

(Mins)

0:10 Places pieces how we have on picture to get them arranged properly
 0:45 Pieces separated, read to start
 1:0 Confused by the flip with the base
 1:30 Started with wrong pieces (didn't notice yellow squares)
 1:35 Went to final picture to better understand
 2:1 Recognized needed to do more than just blue pieces
 2:3 Recognized messed up on first piece, put first blue triangle wrong
 3:0 Deconstruction and reconstruction
 3:2 Finished putting blue pieces back on
 (never looked at written steps)
 4:3 Finishes first sub assembly
 4:45 Separating pieces of next sub assembly (Smokestack)
 5 Begin assembly
 5:2 Finishes assembly
 5:3 Separates more pieces for next sub assembly
 6:2 Finishes engine
 6:3 Separates more pieces (wheezy)
 7:2 Struggles on back piece of wheezy
 7:4 Double-checks feet and white back while placing back on
 8:2 Finishes penguin
 8:3 Separates next sub assembly pieces
 9:1 Recognizes pieces are connected yet
 9:5 Finishes sub assembly
 10 Begins final construction

10:4 Finishes

Nick

(Mins)

0:2 Did not separate pieces, just picked piece by piece out of the pile

0:5 Didn't notice yellow squares

1:3 Finishes blue pieces

2:2 Finishes sub assembly

2:4 Starts piece by piece (looks at pile pieces then next steps) sees putting black pieces together gets them piece-by-piece recognizing how many by referring back to the pile picture

3:1 Finishes assembly

3:3 Starts next assembly

4:0 Finishes assembly

4:1 Starts wheezy assembly

4:4 Attaches white and black pieces to feet

5:2 Finishes wheezy

5:3 Begins next sub assembly

5:5 Recognizes rotation on house

6:1 Finishes assembly of house

6:2 Starts final assembly

7:3 Last photo didn't work still got it done. Didn't notice yellow boxes

Comments: Didn't use words once.

Lili

(Mins)

0:1 Pulls pieces out of pile

0:3 Chooses wrong blue pieces

1 Places pieces vertically instead of horizontally

2 Chooses wrong colored pieces

2:3 Searches pile for any piece that looks like one required

4:2 First piece struggling (having difficulty with horizontal versus vertical)

4:25 Stopped for help (need picture or beak shaped pieces) (yellow square noticed but unsure of its function)

4:3 After being told of beak shaped pieces restarts the assembly

5 Doesn't recognize to get last blue beak pieces

5:4 Goes back and gets blue beak

5:5 Continues to green piece assembly

6:5 Looking for correct green pieces

8:1 Completes first sub – assembly

8:3 Continues to next sub-assembly

8:5 Pulls out pieces needed from larger pile

9:3 Completes smoke –stack

10 Realizes she'll be putting sub-assemblies together at end

10:2 Pulls out pieces for sub assembly

11:4 Completes engine sub assembly

12:1 Begins assembly of wheezy after pulling pieces required out of pile.
 13:4 Recognizes extra piece in assembly of Wheezy's back
 15:2 Completes assembly of wheezy
 15:3 Begins assembly of cargo area (there is a black Lego in the pile of cargo area pieces which does not belong) (one step is missing a piece, maybe smokestack?)
 16:5 Completes cargo area with ease
 17 Notices she has 2 black "extra" pieces
 18 Reload last photo of total assembly (not working)
 19:2 Left 2 smoke stack pieces out. (Finishes)
Comments: Didn't notice yellow squares nor used text.

2nd Round

Katie

(Mins)

0:4 Technical issues with square box.
 1:3 Realizes beak pieces were not assembly right
 2 Correctly assembles beak pieces
 2:25 Finishes blue pieces
 3:5 Notes change in photo orientation for green pieces Ariel view
 4 Finishes base
 4:3 Screen zoom caused issues with finding next step button
 4:4 Begins work on smoke stack
 5:2 Finishes smoke stack
 5:4 Begins work on engine, creates engine piece pile
 6:5 Finishes engine
 7 Pulls pieces for wheezy
 8:2 Doesn't understand pieces needed for Wheezy's back / tail
 9 – 10 *Struggled disassembling back pieces* - user error
 11:4 Completes wheezy
 11:5 Begins cargo
 13 Completes cargo area
 13:1 Begins final assembly but does not continue to next step. Uses home screen display photo and completes
 13:5 Finishes
Comments: Didn't utilize yellow boxes or text.

Chelsea –visual learner, states never played with Legos before today

(Mins)

Issues with boxes on first picture of base
 0:4 Tries to figure out first pieces (places boxes not beaks)
 2:3 Recognizes she needs beaks but places them incorrectly
 3:4 Struggles with base
 4:4 Wants a different photo of the angle of the first pieces used
 5:5 Figures out how to place first piece
 6:2 Completes blue pieces

7:45 Finishes base

7:5 – 8:3 Difficulty navigating web page

8:45 Begins construction on cargo area. – Normally the last sub assembly

10 Finishes cargo area

10:1 Begins work on smoke-stack

11:4 Completes smoke stack

11:5 Begins work on engine

13:3 Completes engine sub assembly

13:45 Begins work on Wheezy

15:1 Finishes work on wheezy

15:45 Begins final assembly

16 Completes assembly!

Comments: Didn't read text, felt wheezy was easiest, didn't understand why boxes were popping up.