

NB: Lego® person just for scale  
and not included in the kit.  
Handily the ball connectors  
fit in a Lego® person's hand.



#### WARNING

##### CHOKING HAZARD

*Contains small parts  
and shouldn't be  
used by children  
under 3 years old.*



# Preparing your straws



Print at 100% to ensure the cutting guide is accurate.

To make a 2v dome you need two sizes of straw, here's how many you need of each:

- 35 x Longs
- 30 x Shorts

The template to above right shows how to cut a single 195mm straw to create a Long and Short – quite neat as it halves the number of cuts and is an efficient use of the straws too.

The table to the right shows a few other sizes including one where a full straw is a Long.

## CUT A SINGLE STRAW INTO A LONG AND SHORT



DOMES DIAMETER	LONG	SHORT
300mm	60mm	49mm
400mm	90mm	76mm
448mm	105mm	90mm
500mm	121mm	103mm
600mm	152mm	131mm
740mm	195mm	169mm

*One cut to create a Long and a Short*

*A whole straw is a Long.*

### Using an online calculator

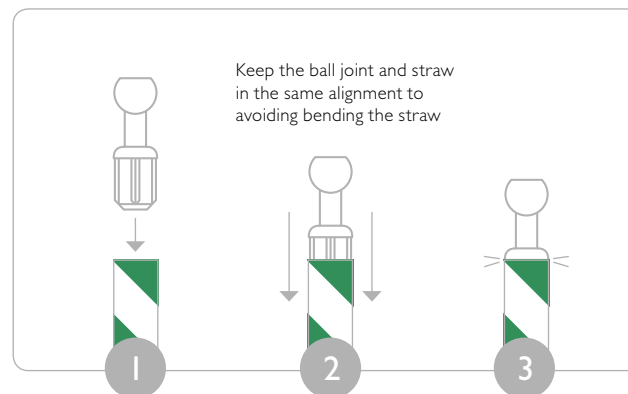
If you want to use an online calculator to create a specific diameter dome – subtract 33mm from each length to account for the hub.

### I need more straws!

Hubs mini ball connectors are designed to work with 6mm diameter paper straws. Buy a small number to test the fit before ordering larger quantities.



If your straws are longer or shorter than the template above, centre the straw such that there is an equal amount over (or under) at both ends to ensure that the single cut gives you the correct proportions.



### Inserting the ball connectors

Push the ball joint into the end of the straw. It may take a little force so try and keep the ball joint and straw in the same alignment (to avoid it bending) and watch that you don't squash the straw with the hand that's holding it!

Cutting the straw tends to flatten the cut end a bit. It's a good idea to roll it in your fingers a little to reshape it into a round before inserting the ball joint.

The ribs on the ball joint should provide a strong grip, but not so strong that you can't swap out a straw if you're testing adaptations.

If you want to create a more permanent join, just use some standard craft glue.

# Getting ready for the build

Before you start building it's probably worth laying out the different elements to speed up the build and to make it less likely that you'll use a Short where you should use a Long and vice-versa. It also looks quite nice too.

## To make your 2v hubs mini you should have:

30 x Shorts  
35 x Longs  
20 x 6-way hubs  
6 x 5-way hubs  
10 x base feet

Here's one ready to go:



You've also got four spare 6-way hubs and the ball connectors to go with them to help with testing adaptations.



LONG x 35



SHORT x 30



6-WAY  
x 20



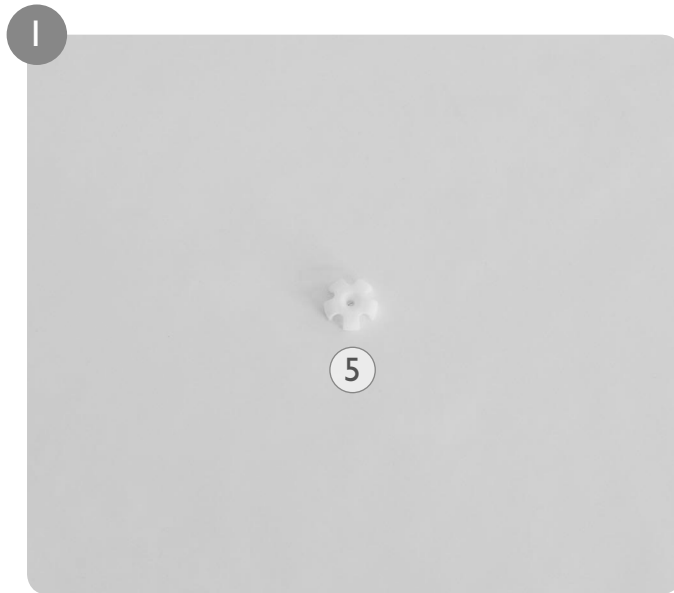
5-WAY  
x 6



BASE FEET  
x 10



# The build – 2v dome

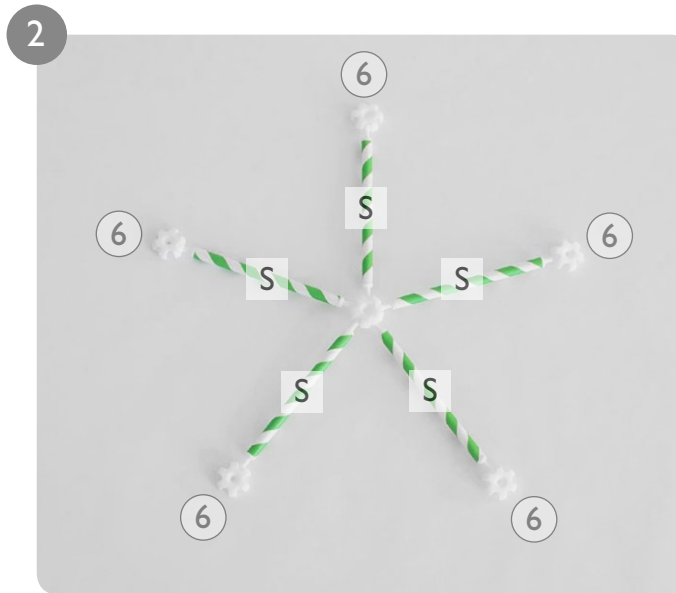


- Start with a 5-way hub in the middle.

*Thought we'd start out easy!*

*If you might stop the build part way through, it's worth marking the centre hub to help orientate yourself when you continue the build.*

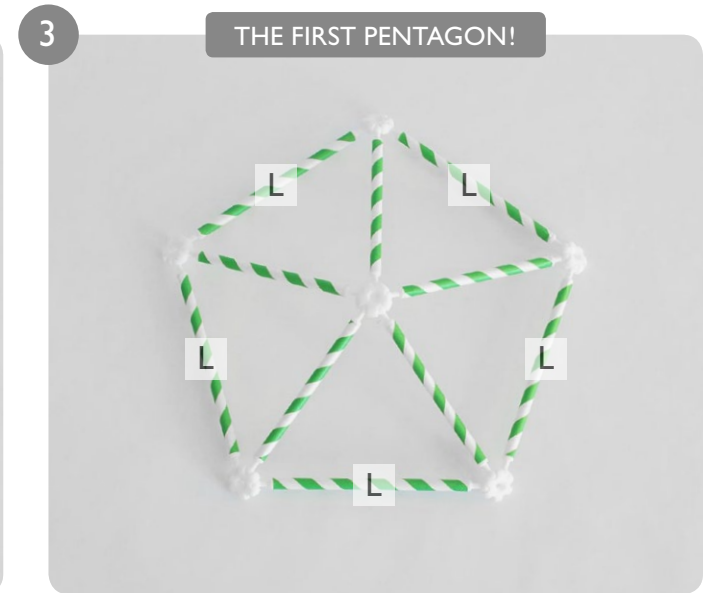
**5** = 5-way hub    **L** = Long straw  
**6** = 6-way hub    **S** = Short straw



- Connect five Shorts into the 5-way hub.
- At the ends of the Shorts, connect 6-way hubs.



*You might notice that the hubs are quite tight to begin with. Using the hubs will smooth off the finish of the print and also loosen up the plastic a little too, so it'll get easier in time.*



- Connect the 6-ways to each other with Longs.



*To make the last connection you'll need to lift the centre 5-way hub.*

*You'll also need to lift other hubs to make connections later on in the build.*

# The build – 2v dome

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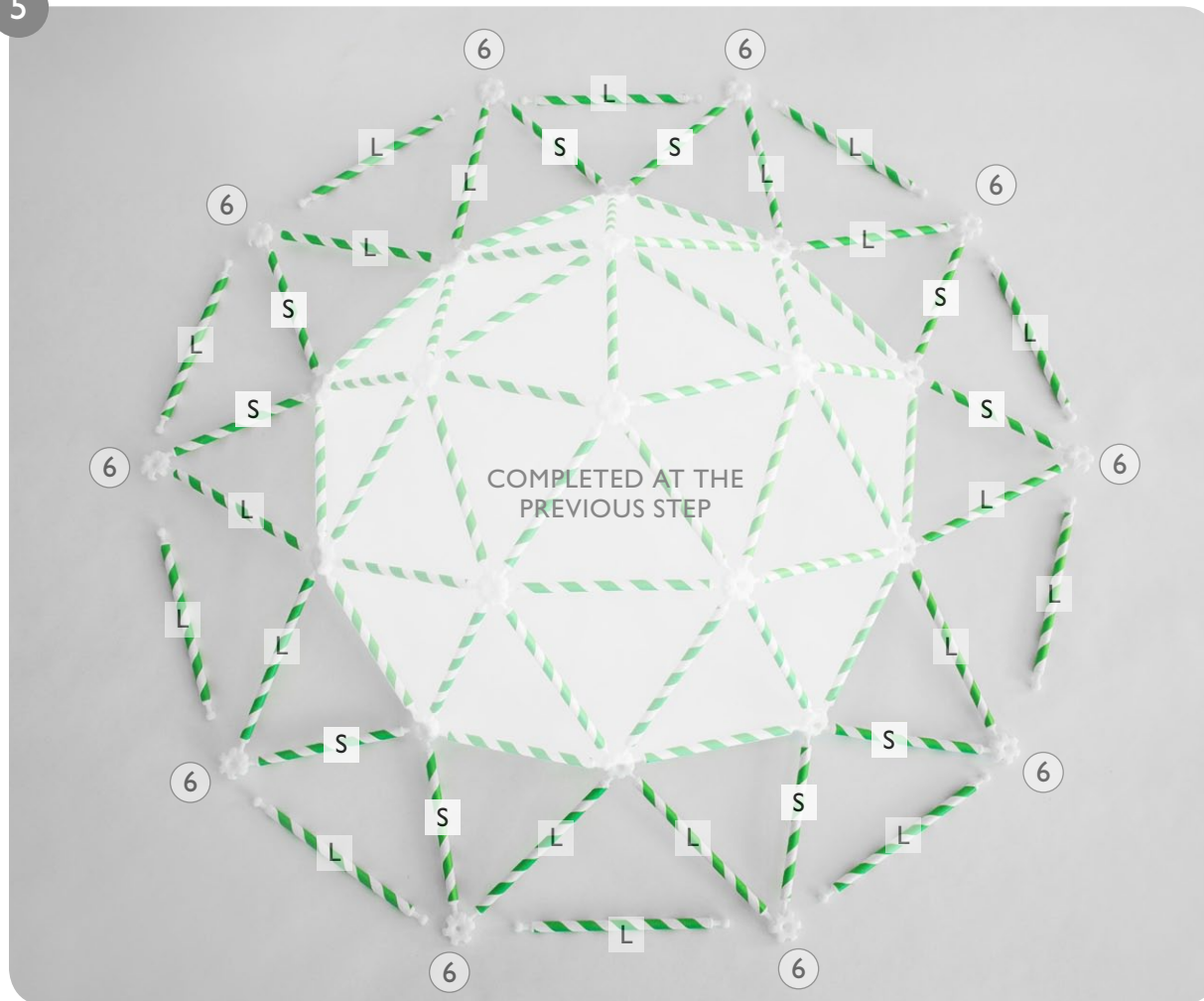
- At each 6-way hub on the outside of the pentagon:
  - Put a Long into the free socket on the left.
  - A Short into the middle free socket.
  - A Long into the free socket on the right.
- Draw Longs from adjacent hubs together to create triangles.
- Connect 6-way hubs at the point of each triangle.
- Connect 5-way hubs onto the end of each Short.
- Then place Shorts around the outside to create an outer ring. (10 Shorts in total)
- Connect the outer ring of Shorts into the hubs. (where necessary lift hubs to enable the connection to be made)

THE DOME BEGINS TO TAKE SHAPE



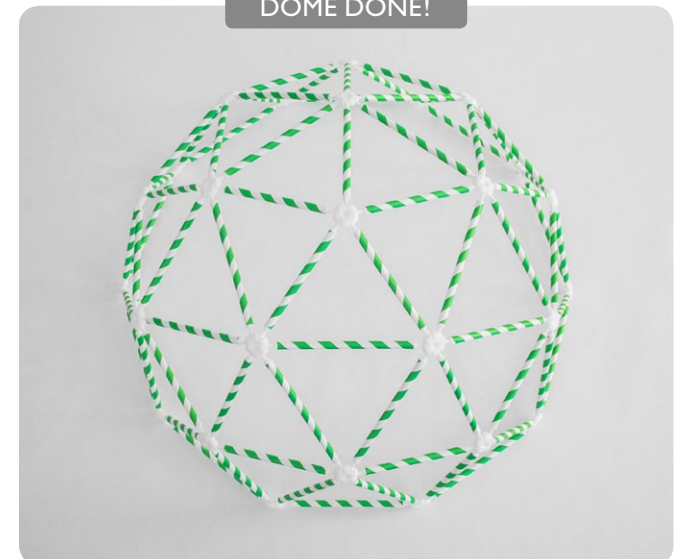
# The build – 2v dome

5



- At each 5-way hub on the outer ring from the last step: connect two Shorts.
- At each 6-way hub on the outer ring from the last step: connect two Longs.
- Draw Shorts and Longs from adjacent hubs together to create triangles.
- Connect 6-way hubs at the point of each triangle. (10 in total)
- Between the 6-way hubs place Longs to create an outer ring. (10 Longs in total)
- Connect the outer ring of Longs into the hubs. (where necessary lift hubs to enable the connection to be made).

DOME DONE!

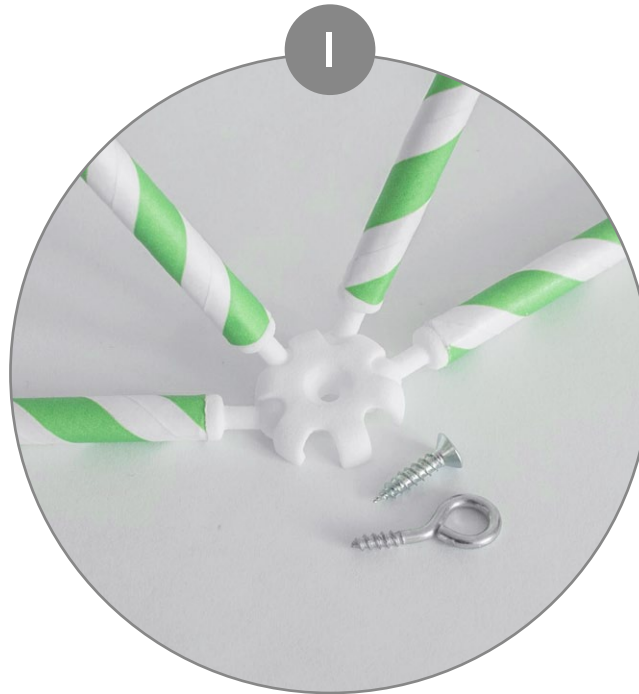


# Base options

There are two options for the base; you can lie the hubs flat on the surface, or use the base feet, shown far right.

It's fine to build the dome and not fix it to anything, but if you're using hubs mini to test a full dome adaptation you will need to fix the base hubs/feet in position to get a true sense of whether it is structurally sound.

To get a quick sense of this you could use sticky pads or white tack. Some other options are shown to the right.



## HUBS LYING FLAT

Rotate the hubs in the base ring so that they lie flat on the surface.

### Fixing the hubs in position

Hubs minis have small holes in the centre (like the full-size hubs). You can use a small screw or eyelet to fix them to a surface.

*We'd recommend a screw rather than tacks/small nails as the latter can be hard to get out and you might damage the hub trying to get them out.*



## BASE FEET

The two ball connectors integrated into the base feet simply click into the two free sockets in the 6-way hubs in the base ring.

### Fixing the base feet in position

The base feet have two smaller holes which you can use to tack them down with a map pin.

*You could use small tacks but it might be hard to get them out, so best to use something that you can grab easily.*

# Adaptations

Whether it's just for fun or to test possible full-size structures, simply take out existing straws and cut new straws to try different adaptations. It might take a bit of trial and error but the beauty is that you can just trim the straws a bit more or cut new ones to get it right.

If you are testing a potential full-size structure, make sure you secure the base – see 'Base options' page, to properly test the structural integrity of your adaptation.

We'd love to see what you create. You can post your pictures to our facebook page: [facebook.com/buildwithhubs](https://facebook.com/buildwithhubs)

## ? Scaling up a hubs mini model for a full-size build?

It might be that you want to test some ideas with hubs mini that you then intend to build with full-size hubs.

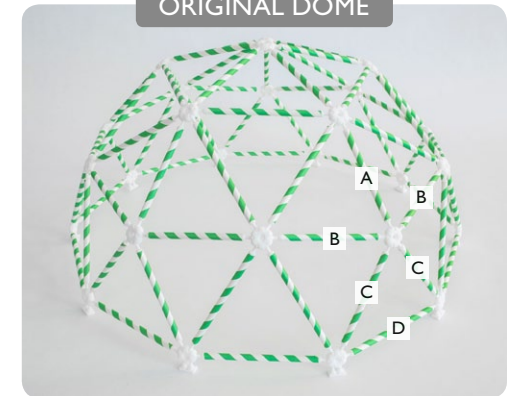
In time we'll have something on the website to help with this, but for now get in touch and we can advise on the best approach: [hubsmini@buildwithhubs.co.uk](mailto:hubsmini@buildwithhubs.co.uk)



ADAPTATION




ORIGINAL DOME



### To create a raised entrance:

- Straw A – shortened
- Straw B – Shorts replaced with Longs
- Straw C – lengthened
- Straw D – removed





Hope you have  
fun playing with  
hubs mini

Any questions, email us at:  
[hubsmini@buildwithhubs.co.uk](mailto:hubsmini@buildwithhubs.co.uk)

Thanks!  
Chris and Mike

