

# Telescope Setting Circles Plans and Use – First Thoughts

- Each setting circle will be placed over the appropriate telescope and placed around the top base disc:
  - For the smaller telescope the annular ring will rest on the lugs of the lower base disc
  - For the larger telescope suitable supports will be fitted to the lower base disc, protruding out, that the annular ring will rest upon
- In use the telescope is aligned North – South (using a compass) and the annular ring rotated until the  $0^\circ$  is under the pointer
  - The pointer will be fixed to the base using a magnet so that it can be removed and replaced easily whilst maintaining pointer alignment
- When the telescope is rotated the annular ring remains in situ hence showing the angle that the telescope is now pointing (Azimuth)
- The annular ring will have 360 degrees marked on it so that the telescope can be aligned to a single degree accuracy
- The inside diameter of the annular ring quoted for each telescope is the actual measurement therefore some tolerance is required to allow the telescope turntable to move without catching on the annular ring
  - I've allowed 2 mm all round for clearance
- The actual width of the annular ring is not vital as there is sufficient clearance once the ring is laid over the base
  - I have worked with 30 mm as that will allow sufficient space for the angle graduations to be placed easily – probably using a paper template
- 25 mm thick MDF for both annular rings is probably best to maintain strength
- Minimise any permanent changes to the telescopes or their mounts by reusing existing holes, mounts, etc.

# Resources

- The Smaller Telescope is a Skywatcher Heritage 130p D130mm F160mm on a Dobsonian Mount
- The Larger Telescope is a Skywatcher Skyliner 300p Flextube D305mm F1500mm on a Dobsonian Mount
- The wooden annular rings were sourced from this eBay company who were excellent and helped me work through the design, size, thickness, etc. I highly recommend them  
<https://www.ebay.co.uk/itm/Circle-MDF-400mm-diameter-25mm-thick-Custom-Made-Sizes-Available/233690753246?ssPageName=STRK%3AMEBIDX%3AIT&trksid=p2057872.m2749.l2648>
- I used the following website to prepare and print the scales to go on the annular rings
  - <https://www.blocklayer.com/circle-divider.aspx>
- I also looked at a number of other people's designs on a variety of websites and forums to get ideas

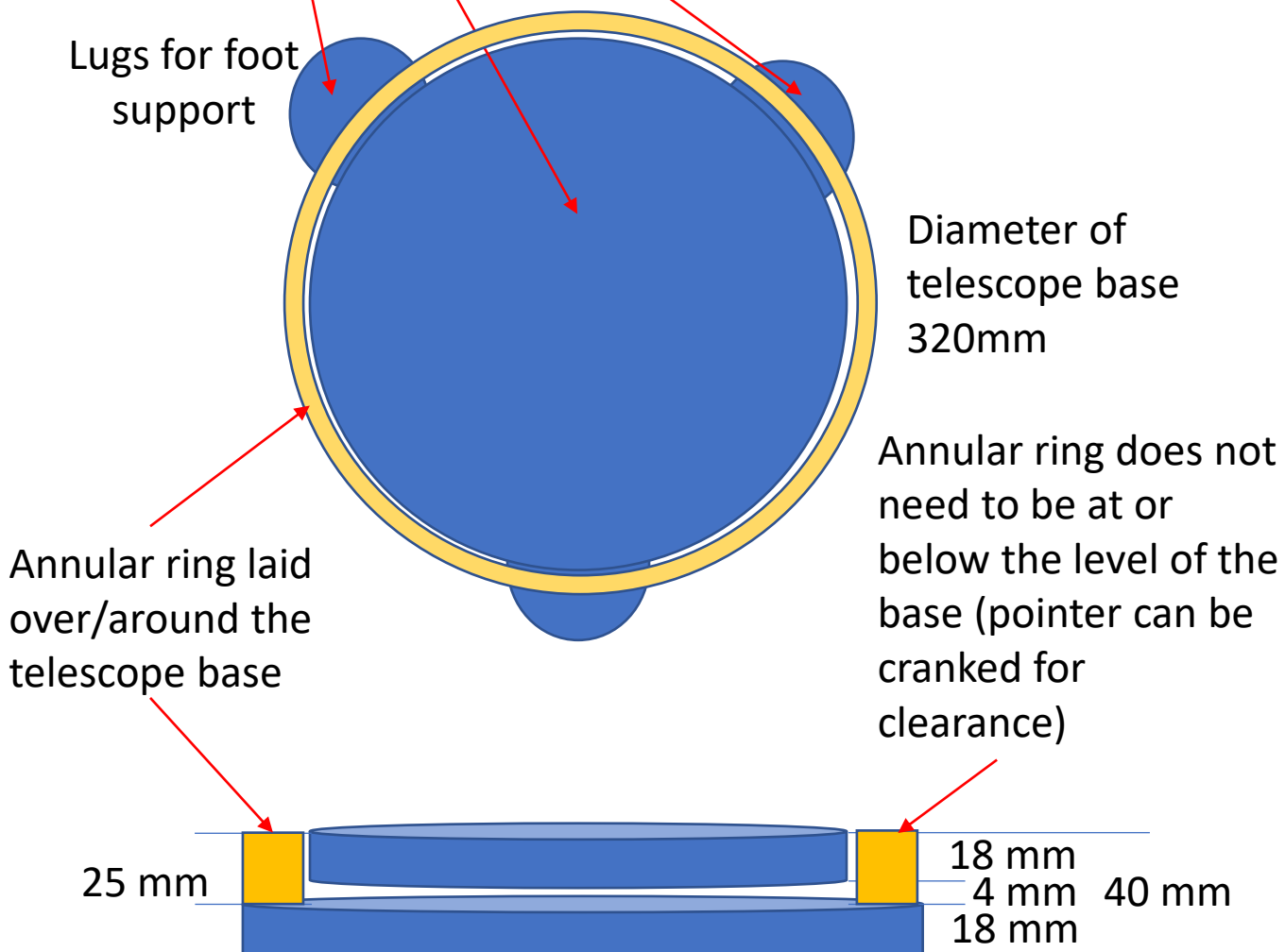




Smaller telescope has a base diameter of 320 mm and an optical tube length of 670 mm



Side view of support and turntable



# Larger Telescope



Larger telescope has a turntable base diameter of 640 mm and an optical tube length of 1500 mm



# Annular Ring Dimensions

## Smaller Telescope

Outside diameter 384 mm to  
maintain 30 mm width

## Larger Telescope

Outside diameter 704 mm to  
maintain 30 mm width

### Inside diameter:

- Actual: 320 mm
- With Clearance 324 mm

### Inside diameter:

- Actual: 640 mm
- With Clearance 644 mm

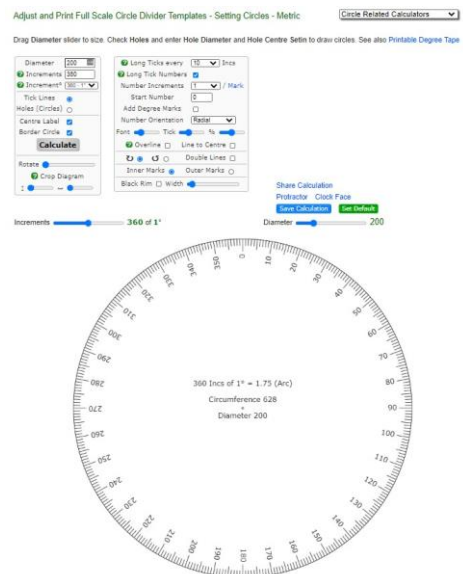
Annular Ring  
width 30 mm



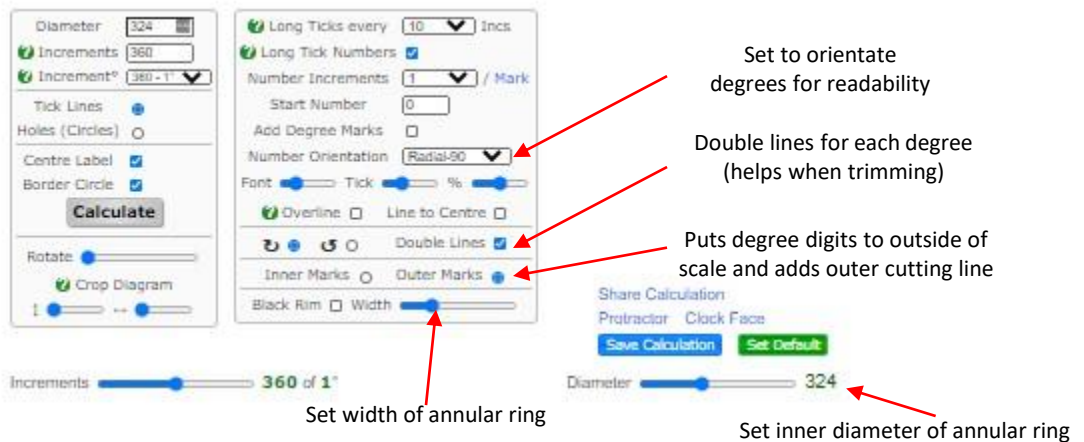
Annular Ring Thickness 25 mm

# Designing the Paper Scales

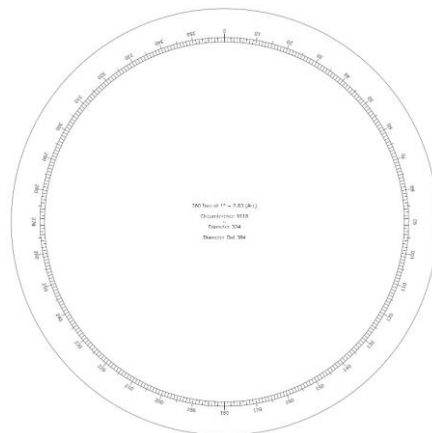
- Using the website mentioned in resources, I designed each scale as follows (diagrams shown for smaller scale):
- Website initial view



- Parameters I used

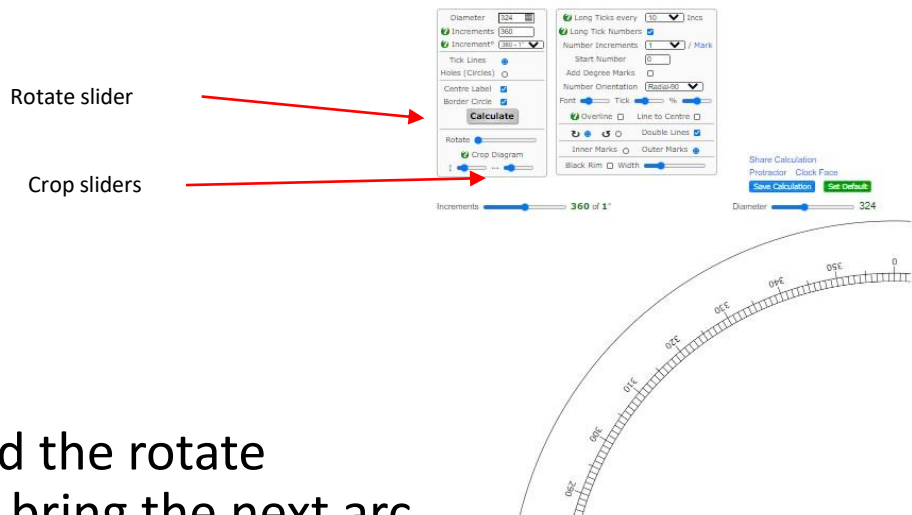


- Resultant Scale Produced



# Printing the Paper Scales

- Using the cropping slider I prepared each arc section and saved each one to a pdf file



- I then used the rotate feature to bring the next arc section to position for printing
- The website lets you save .pdf format files for subsequent printing
  - Make sure you check for paper size and landscape/portrait orientation before saving to pdf
- The smaller scale was printed in 4 sections – each arc section was just over 100°
- The larger scale was printed in 9 sections – each arc section was just over 40°



# Completing The Annular Rings

- The paper scale was glued onto the wooden annular ring with PVA glue
- The scale was sealed with Jigsaw Puzzle Conserver as I happened to have some handy. I believe an alternative would be Modge Podge although I've never used it myself
  - Although I am not planning to have the telescopes out in the rain there is a risk of damp when in use



# Assembling The Smaller Annular Ring



Annular Ring as delivered



Printed Scale on A4 Paper before cutting



Printed Scale Trimmed

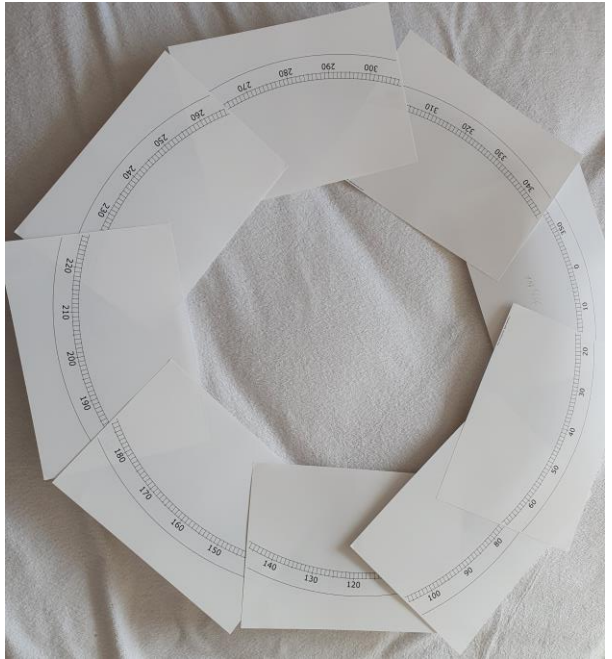


Printed Scale Trimmed and laid on Annular Ring – Approx 15° overlaps

# Assembling The Larger Annular Ring



Annular Ring as delivered



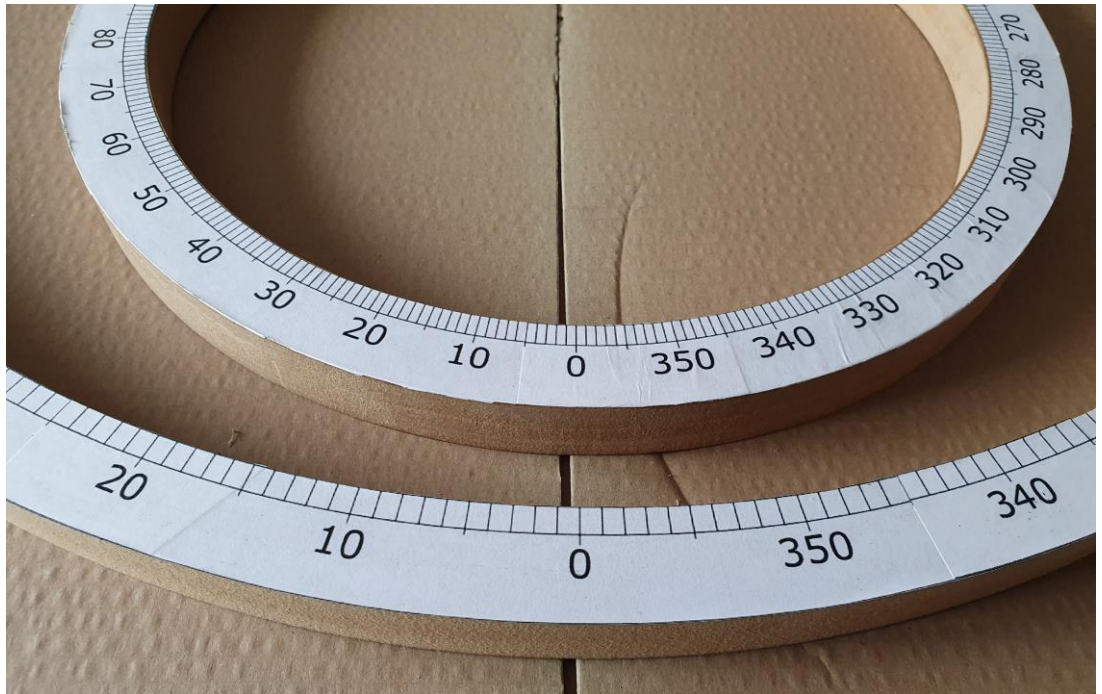
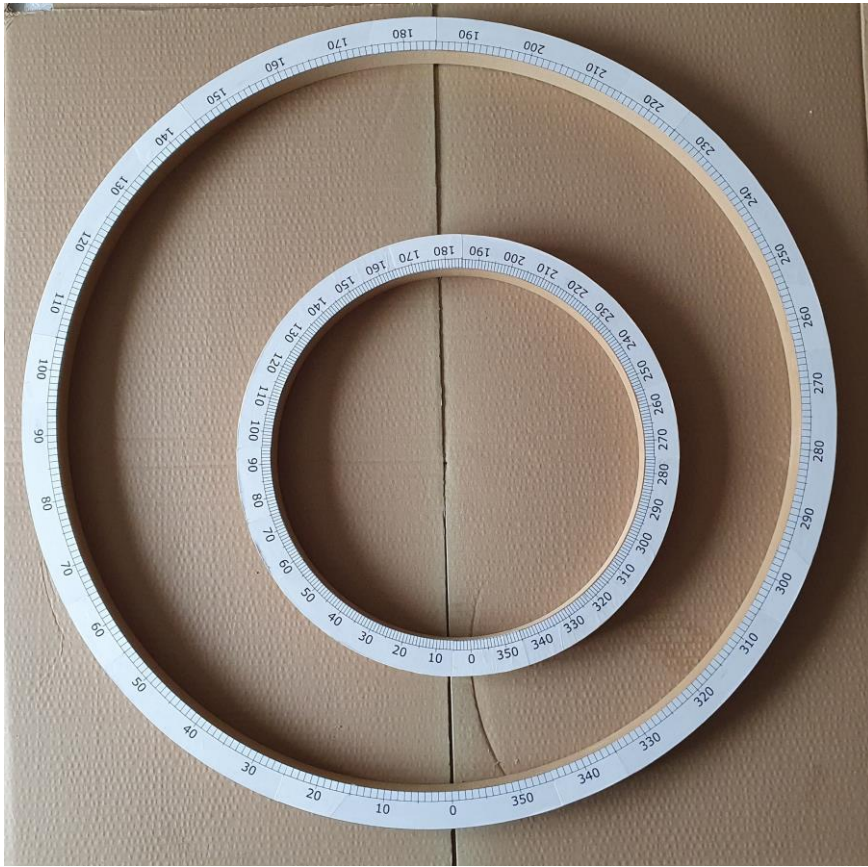
Printed Scale on A4 Paper before cutting



Printed Scale Trimmed and laid on Annular Ring – Approx 10° overlaps



# Finished Setting Circles



# Centralising and Supporting the Setting Circles

- I had some pieces of thin aluminium (old aerial dipole elements) which I used to attach under the support feet to provide pressure from three edge points to keep the Setting Circle centred



- This also has the advantage of holding the Setting Circle in place once aligned



# The Finished Smaller Telescope

- A shaped piece of masking tape was used as a simple arrow on the smaller telescope base as a pointer to determine the Azimuth
  - This was positioned for ease of use, so that it would be visible when using the eyepiece
  - There is no need for it to be removable as the setting circle fits over without interference



# The Finished Smaller Telescope



- Old Meade Tripod repurposed with 400 mm x 25 mm wooden circle for ease of use
- This telescope is my transportable one and also used for short quick sessions as it does not require much effort to set up

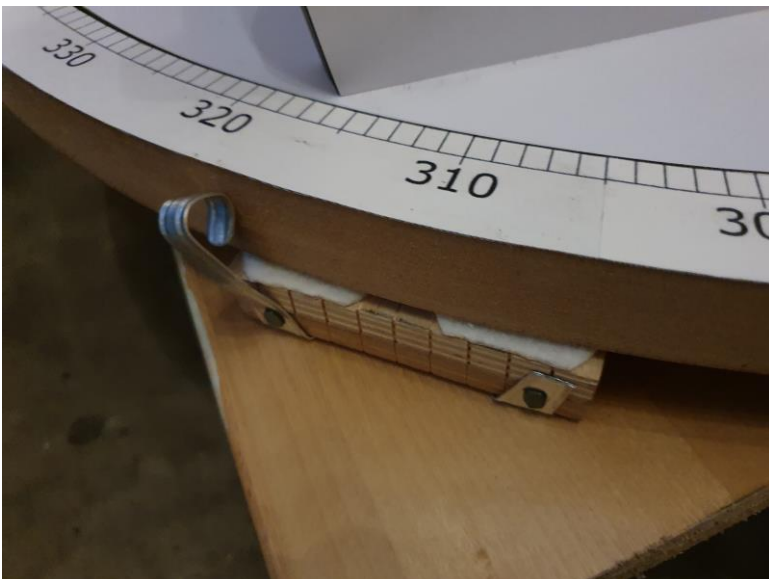


# The Finished Larger Telescope

- A shaped piece of masking tape was again used as a simple arrow telescope base as a pointer to determine the Azimuth
  - This was positioned for ease of use, so that it would be visible when using the eyepiece
  - There is no need for it to be removable as the setting circle fits over without interference



- I had previously build a trolley for the larger telescope so I was able to make the setting circle support simply slide between the base and the trolley. A couple of felt pads and shaped aluminium coil centralises the setting circle

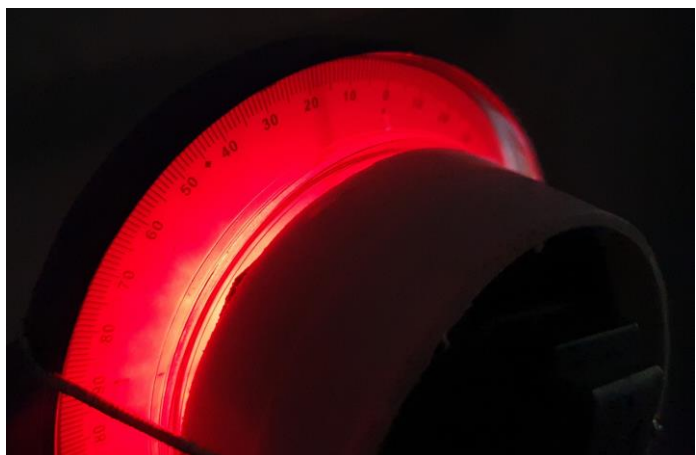


# Extras - 1

- The following are used between both telescopes
  - A magnetic inclinometer on the OTA is used to determine the Elevation

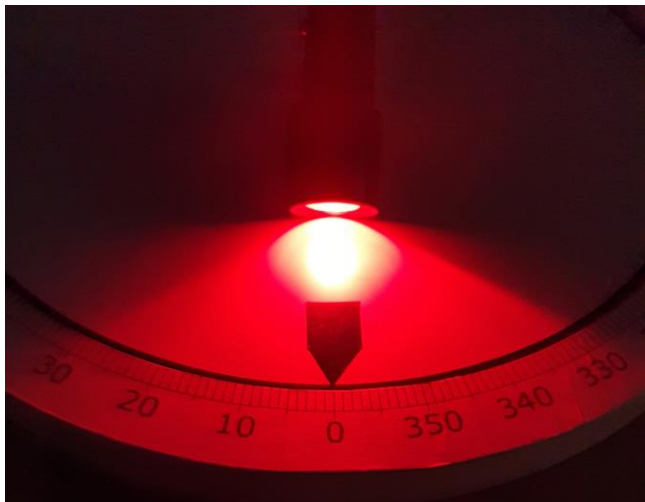


- A red light (old bicycle LED rear light) was mounted within a shroud to make it easier to read at night

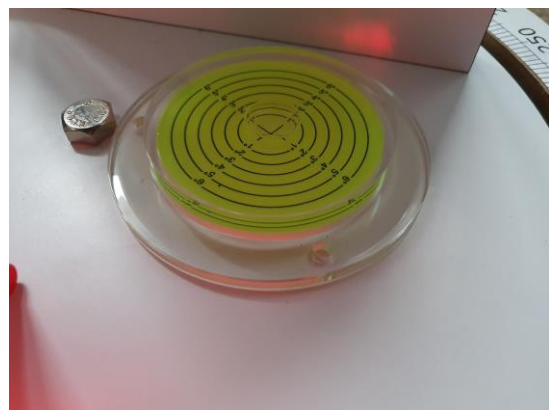


# Extras - 2

- The following are used between both telescopes
  - A simple red light (old bicycle LED rear light) was mounted on a plastic slope to make the Azimuth scale easier to read at night



- A circular bubble level was fitted to make initial telescope set up easier





# Lessons Learnt

- What I might do differently
  - The larger setting circle paper scale glued on the annular ring more easily and evenly. This might be due to the arcs being smaller and so I'd probably print the smaller setting circle scale in six sections of  $60^\circ$  plus appropriate overlaps rather than the four  $90^\circ$  sections that I did
  - Measure at least three times and then get someone to check your designs! I would have ordered the wrong size annular rings without the help of Applebridge who noticed my error of measurements despite my checking