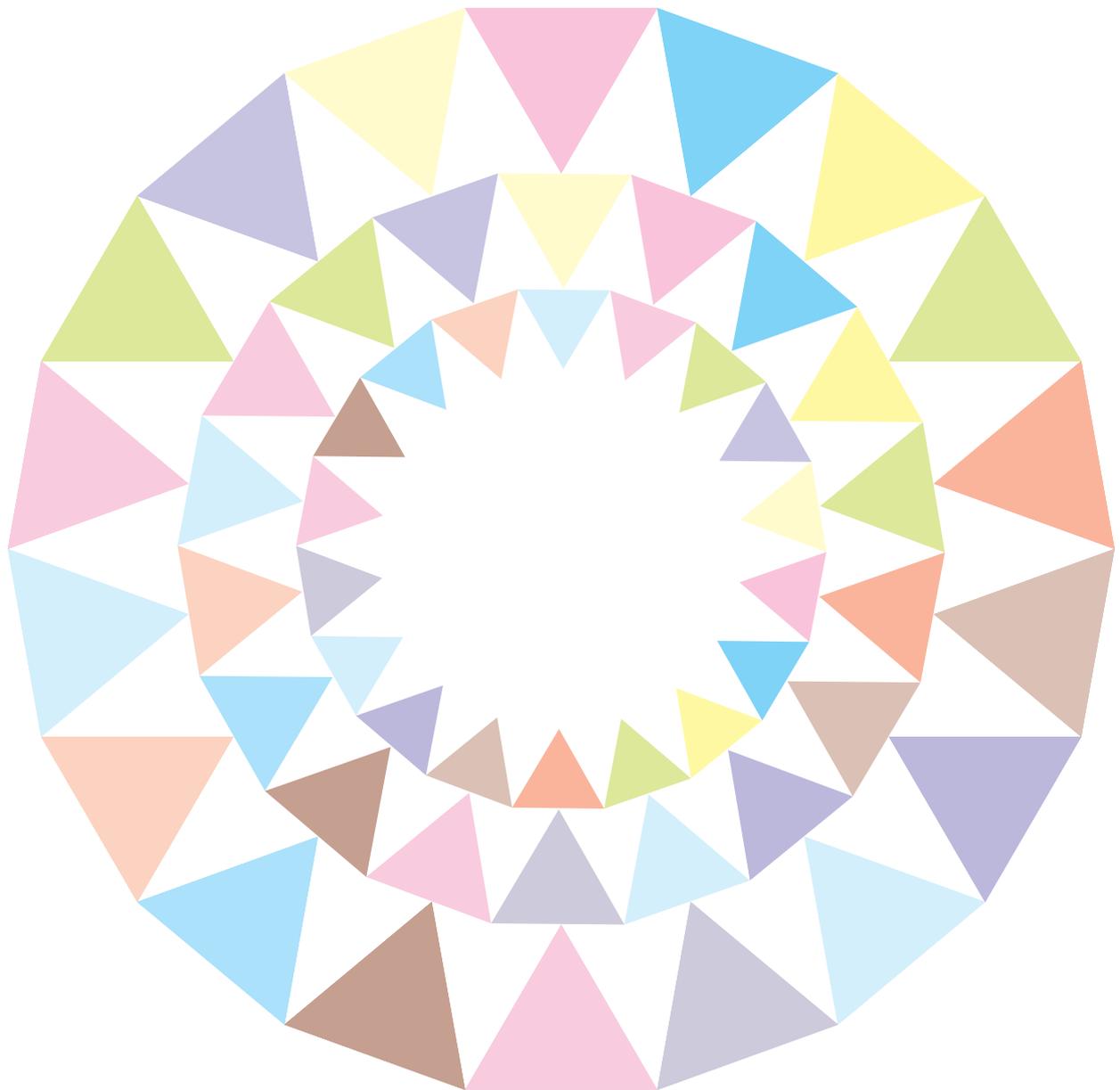


Touching Triangles

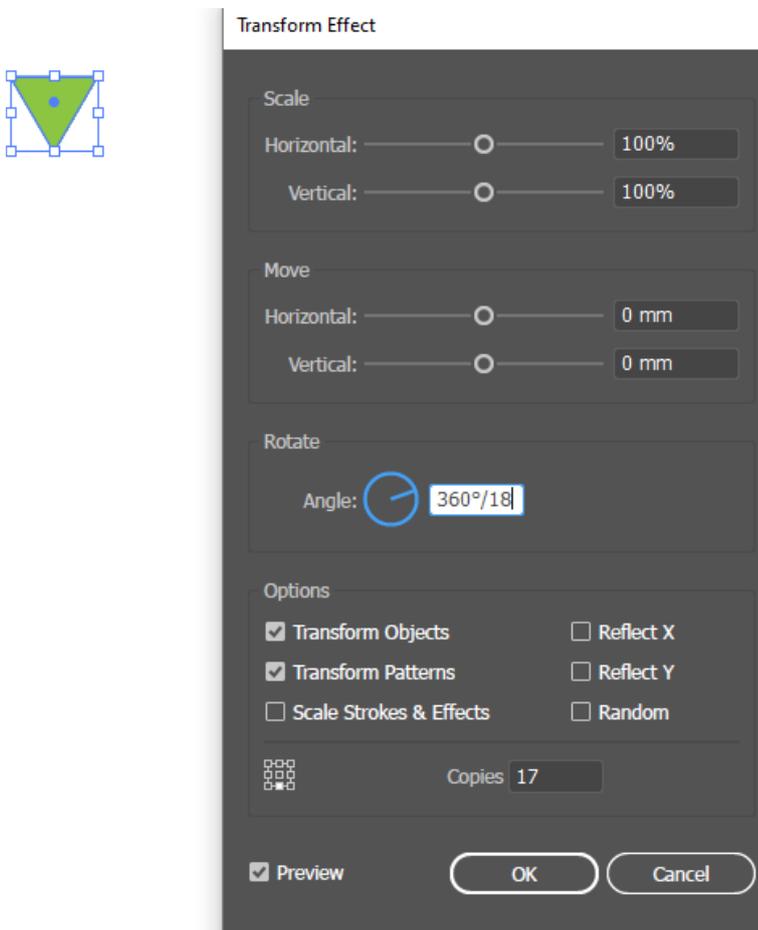
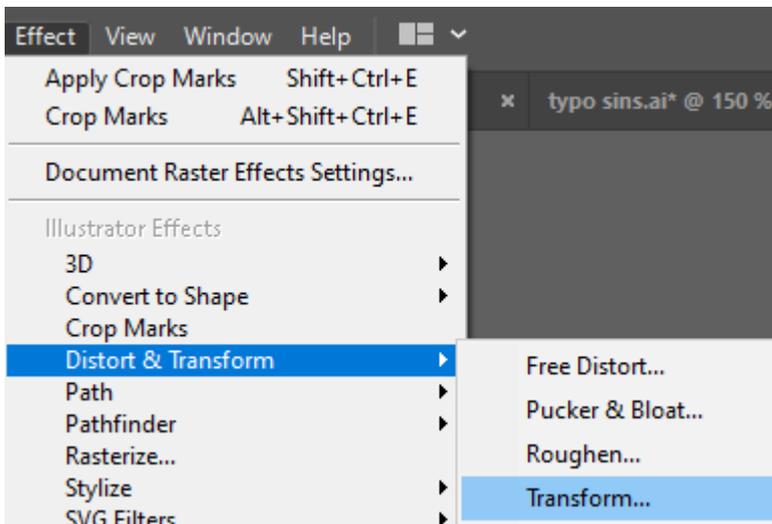
Not Overlapping

Not Gapping



The problem: You want to create a circle of triangles all pointing towards the centre. You want them to touch but not overlap.

Normally, you'd select the triangle and go to Effect>Distort & Transform>Transform:



In this example, I want 18 triangles so:

$360^\circ / 18$ will produce a rotation of 20° for 17 copies of the original triangle.

You'll notice I also selected the middle bottom square for its orientation.

But, it's a crap result. The triangles overlap.



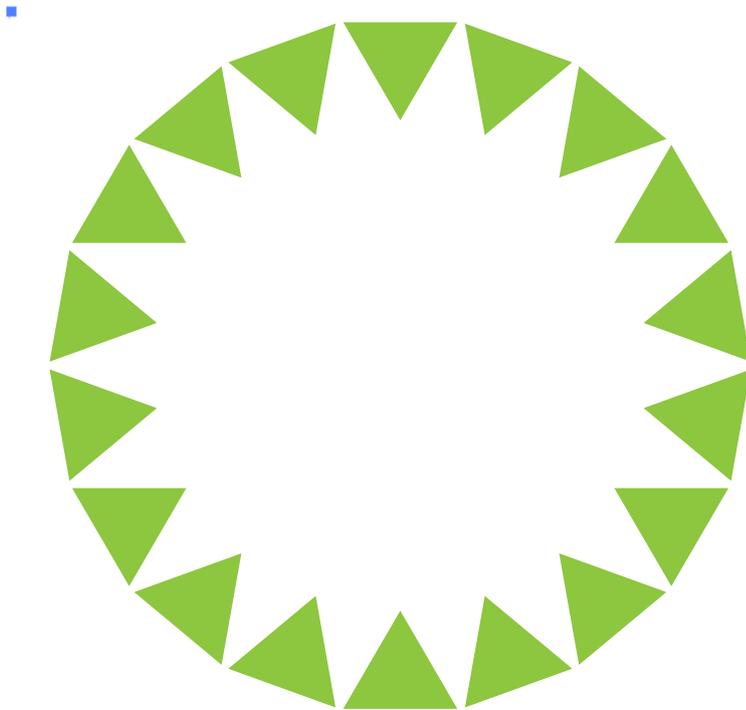
Creating a 'pivot' point helps but doesn't totally resolve the issue of overlapping or spaces between triangles. They won't touch.

See what I mean:



Make a single point with the Pen Tool (Select the Pen Tool, click once then hit Escape. This creates a point with no height or width). Select the point and the triangle, go to Align>Horizontal Align Centre then Group them, Ctrl+G.

Go to Effect>Apply Transform (It will have kept the settings from the previous attempt).



But the result isn't perfect.

The Solution?

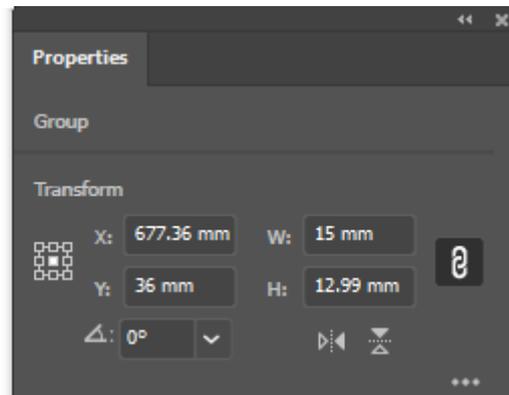
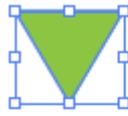
Trigonometry.

This is the perfect way but it's maths. Okay? Take it step-by-step and you'll be fine.

Or jump to the easy way on page 6.

1. Select your triangle then note down the following values from the Properties Panel: Height, Width and its 'y' coordinate (the vertical position of the triangle on the screen).

My triangle:



Width = 15mm

Height = 12.99mm

y coordinate = 36mm

From these values we can calculate the distance the point needs to be from the triangle so that Transform will create a circle of just-touching triangles.

2. Halve the width (15) of the triangle: $15/2 = 7.5\text{mm}$

3. Divide 180 by the total number of triangles you want. I want 18:

$$180 / 18 = 10$$

4. $7.5 / \tan 10$

(the value from step 2, divided by the Tan of the value from step 3)

* I used the calculator on my phone and the way to get the Tan is :

Select Tan, then 10, then =

$$7.5 / 0.1763 = 42.54$$

5. Take 42.54 and subtract half the Height ($12.99 / 2 = 6.49$) of the triangle and add the y coordinate (36) of the triangle:

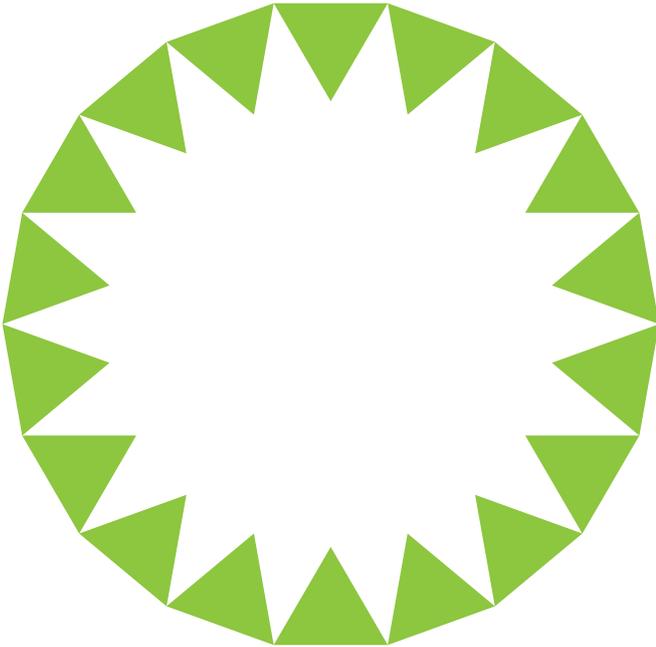
$$42.54 - 6.49 + 36 = 72.05.$$

We got there. 72.05 gives us the y coordinate for the Pen Point.

Select the Pen Point and change its Y coordinate to 72.05 in the Properties Panel.

Select the triangle and Pen Point, centre them vertically as before and Group them.

Now go to Effect>Apply Transform:



PERFECT! :)

They literally just touch.

9. Go to Object>Expand

10. Ungroup (Ctrl+Shift+G) to change the colours or make other mods to individual triangles.

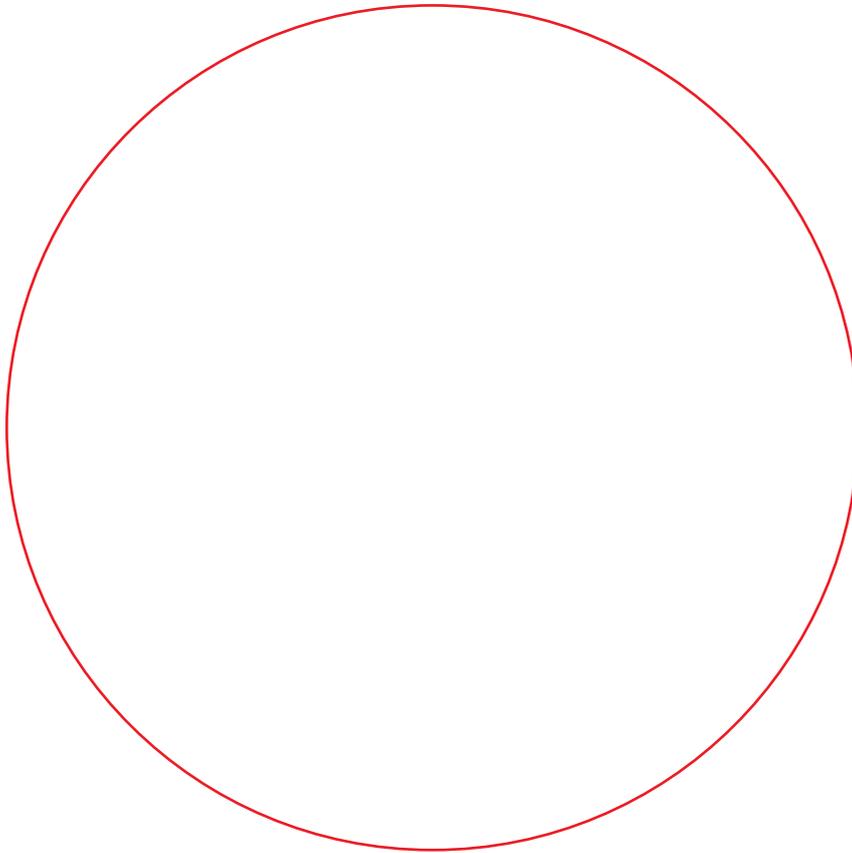
Is it a faff? Kind of. But isn't it nice to just work it out and get it right first time?

Once they've been created, scale them up and down to your heart's content.

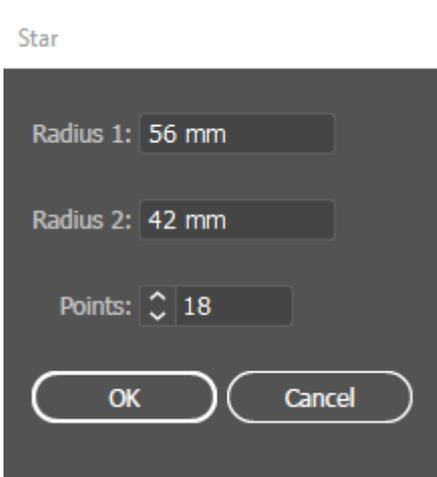
But is there an easier way?

Oh God, yes.

1. Create a circle. This one has a diameter of 112mm.

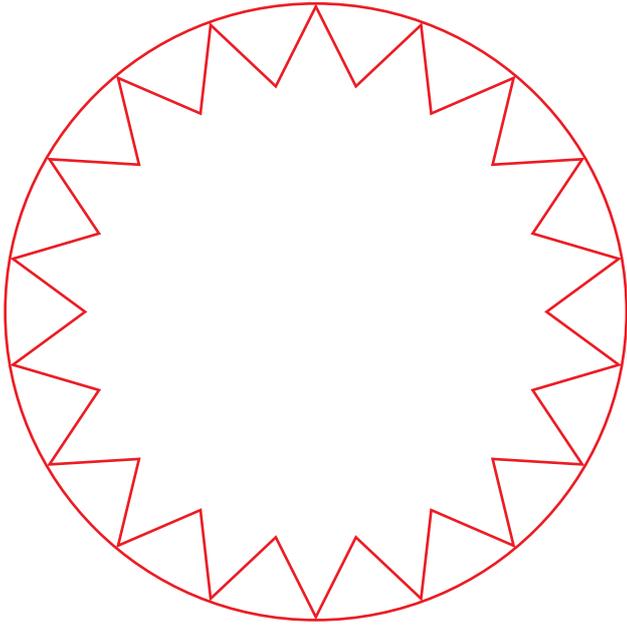


2. Select the Star Tool—Double click to display the options:



Enter the diameter of the circle in the Radius 1 field (the radius is half of the diameter).

3. Centre them vertically and horizontally:



4. Select the Star and go to the Stroke options in the Properties Panel. Select Align Stroke to Inside.

5. Select the Circle and Star then go to Object>Live Paint>Make.



6. Use the Live Paint Bucket (K) to select individual triangles to fill them in / change stroke, etc.

7. When you've finished, go to Object>Expand Appearance. Simple! :)

