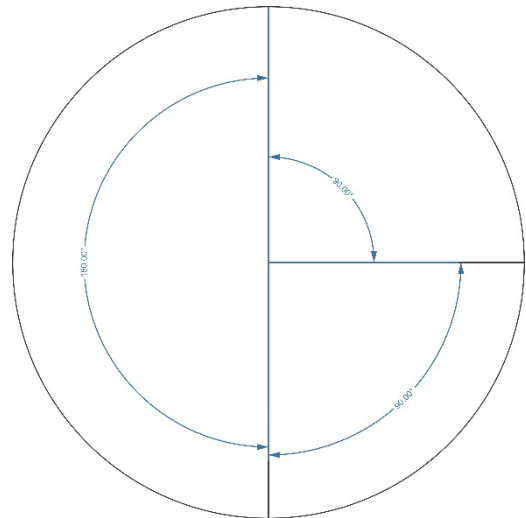


**Properties of a circle**

- A = Area
- D = diameter
- R= Radius
- C = Circumference
- $A = \pi r^2$
- $\pi = \text{Pi}$

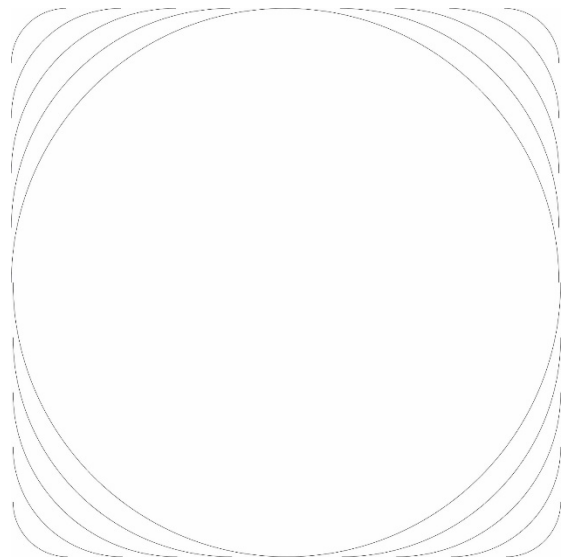
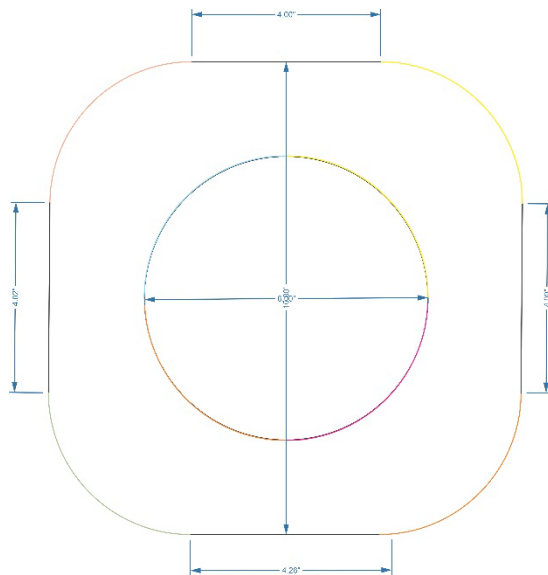


**Formulas:**

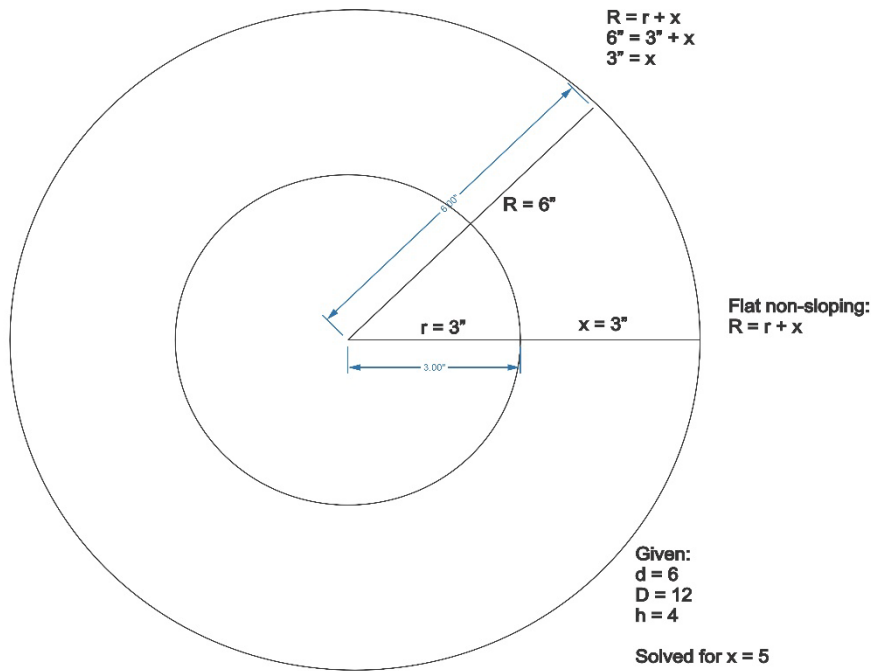
- $D = 2r$
- $R = D/2$
- $A = \pi r^2$
- $C = 2\pi r$

**Radius of a square with rounded corners**

1. Find circumference for four corners that form a circle when placed end to end. For example 3” arcs, when placed end to end, for a 6” diameter circle. The circumference for the circle is found by solving  $C = 2\pi r$ .  $C = 2 * 3.14 * 3 = 18.84$  or  $18 \frac{7}{8}$
2. Find length for four connecting lines:  $4” \times 4 = 16”$
3. Sum arc circumferences with line segments:  $18 \frac{7}{8}” + 16” = 34 \frac{7}{8}”$

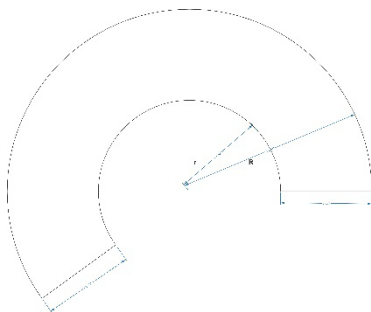
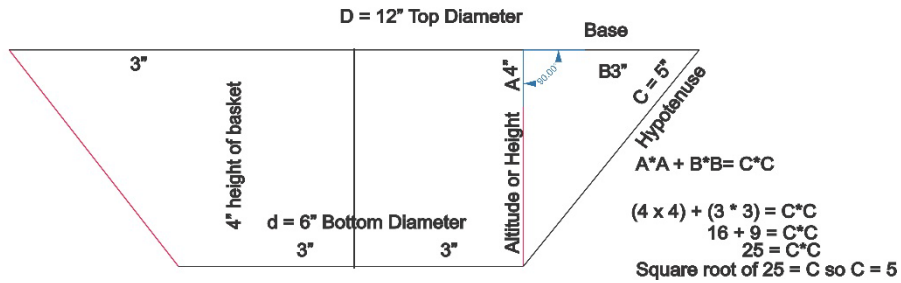


**Creating baskets with sloping sides**



Sloping sides: Find r, R, and a  
 $R = r + x$   
 $A = d / (2 * r)$   
 $r = (d * x) / (D - d)$

Solve for  $r = (6 * 5) / (12 - 6) = 30 / 6 = 5$   
 Solve for  $R = 5 + 5 = 10$   
 Solve for  $a = 6 / (2 * 5) = 6 / 10 = .6$   
 a is .6 of 360 degrees, or 216 degrees



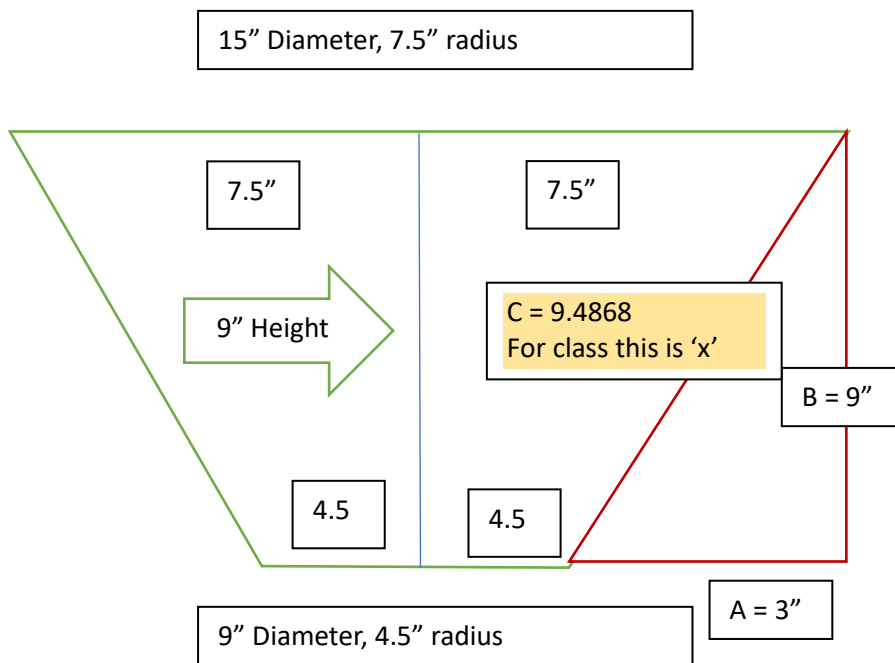
**Challenge Project Creating a basket with sloping sides:**

- Diameter of top is D = 15"
- Diameter of bottom is d = 9"
- Height of basket is h = 9"

	Top	Bottom
Radius D/2	15"/2 = 7.5"	9"/2 = 4.5"
Diameter 2r	7.5" x 2 = 15"	4.5" x 2 = 9"
Circumference 2πr	2*π * 7.5" = 47.123889	2*π * 4.5" = 28.2743334
Area πr <sup>2</sup>	π * 7.5 <sup>2</sup> = 176.71458375	π * 4.5 <sup>2</sup> = 63.61725015

**Assumption: pi = 3.1415926**

**Finding 'x' for sloping sides**



To find hypotenuse of a right triangle:  
 $A^2 + B^2 = C^2$

Assume height bisects top and bottom rings which is the radius for each ring: 7.5" top and 4.5" bottom.

The base of the right triangle is the difference between the 2 radius values: 7.5" - 4.5" or 3"  
 Therefore **A = 3"**

Drop a perpendicular line to the base. This is the given height of 9".  
 Therefore **B = 9"**

To find C:  $A^2 + B^2 = C^2$   
 $3^2 + 9^2 = C^2$   
 $9 + 81 = C^2$   
 $90 = C^2$   
**9.4868 = C**

$$r = (d \cdot x) / (D - d)$$

$$r = (9 \cdot 9.487) / (15 - 9)$$

$$r = 85.3836$$

$$r = 14.231$$

$$R = r + x$$

$$R = 14.231 + 9.487$$

$$R = 23.718$$

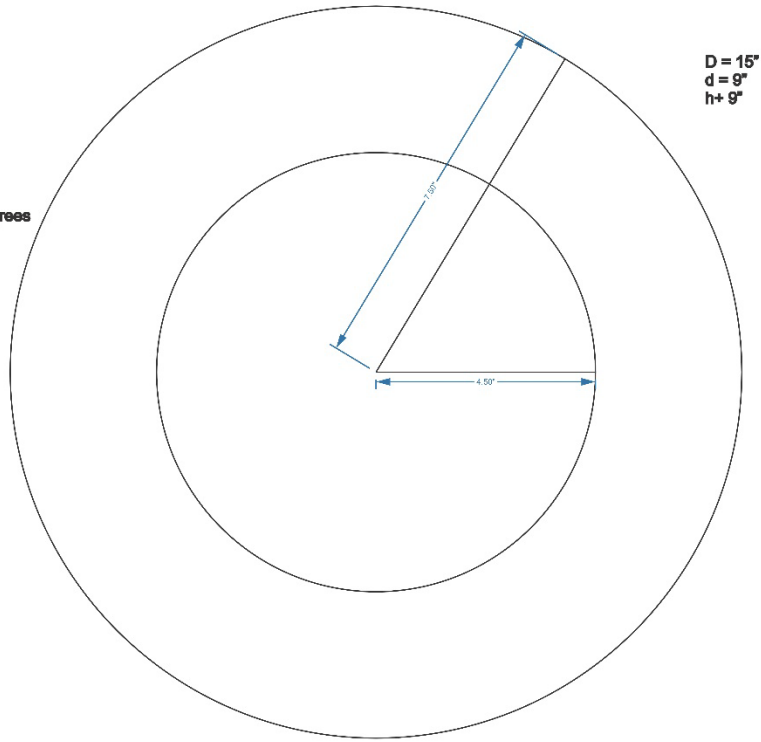
$$a = d / (2 \cdot r)$$

$$a = 9 / (2 \cdot 14.231)$$

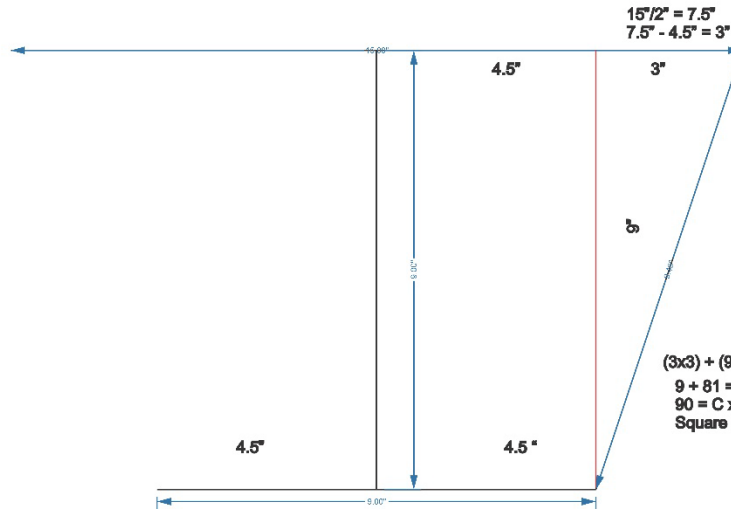
$$a = 9 / 28.462$$

$$a = .32$$

.32 of 360 degrees equals : 115.2 degrees



D = 15"  
d = 9"  
h = 3"



**Solving for basket with sloping sides:**

**Given:**

- $d = 9''$
- $D = 15''$
- $H = 9''$
- $X = 9.4868$

**Find:**

- $r = (d * x) / (D - d)$
- $R = r + x$
- $a = d/2r$  where angle is  $a * 360$  degrees

**Solve:**

- $r = (9 * 9.4868) / (15 - 9) = 14.2302$
- $R = 14.2302 + 9.4868 = 23.717$
- $a = 9 / (2 * 14.2302) = .31622$
- Angle  $360 * .31522 = 113.8392$

	Top Sloping sides	Bottom Sloping sides
Radius D/2	<b>23.717</b>	<b>14.2302</b>
Diameter 2r	$23.717 \times 2 = 47.434$	$14.2302 \times 2 = 28.4604$

**Math Check:**

- Top Circumference for **15” diameter**:  $2r\pi = 15\pi = 15 * 3.1415 = 47.123$  or **47 1/8**
- Base Circumference for **9” diameter**:  $2r\pi = 9\pi = 9 * 3.1415 = 28.274$  or **28 1/4**

**Outside edge of sides is 113.84 degrees of 360 degree circle (arc measurement)**

- Top diameter of arc solve  $aD\pi = .31622 * 47.434 * 3.1415 = 47.12117$  or **47 1/8**
- Bottom diameter of arc solve  $aD\pi = .31622 * 28.4604 * 3.1415 = 28.2727$  or **28 1/4**

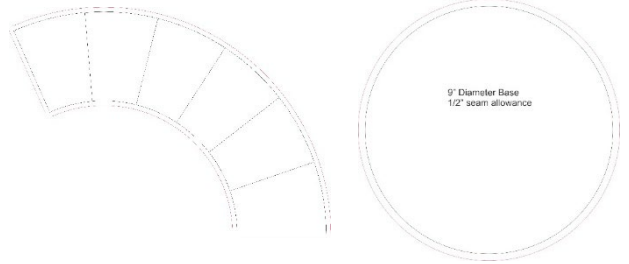
**To create sides of circular basket: (C + seam allowance ) x height**

- For seam allowances, added 1/2” seams
  - Top diameter add 1” making cutting line at **48.434**
  - Bottom base decreases 1” making cutting line at **27.4604**
- Break each of seamlines into arcs
  - 0 degrees to 113.8392 degrees
  - Add 1/2” to each end of the side panel
- Segment sides into 6 sections
  - Transform 9.4868 end rotating around the page center

**Note: Lesson learned - On page when creating circle to convert to arcs:**

**Create the rim and base for the sloping basket:**

- Create a circle for the top at 47.434 diameter
- Create a circle for the bottom (base) at 28.4604 diameter
- Center both circles on the page

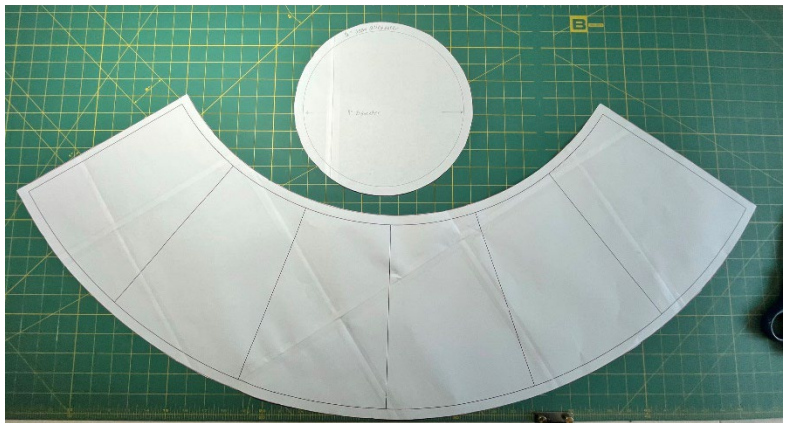


**Change circles to arcs:**

- For top rim, change circle to an arc from 0 degrees to 113.8392 degrees
- For bottom rim, change circle to an arc from 0 degrees to 113.8392 degrees
- **DO NOT MOVE THE ARCS OR CENTER ON THE PAGE**

**Segment the basket sides just created:**

- Find the angle for each of the 6 segments
- Divide the **113.8392** degrees of the arc by 6
- The rotation angle will be **18.9732 degrees**



**On the Transform rotation tab in Corel Draw:**

- Click on the end of arc (this length should be the value of 'x' for this project **9.4868**)
- Choose rotation angle – enter **18.9732**
- For center – enter center of page, for this example the page is 50 square so the center is **(25,25)**
- For copies – enter **5** to create 6 segments

**For the base:**

- Create a 9” diameter circle which will be the seam line for the base
- Create a 10” circle which will be the cutting line for the base

**Now the pattern for the planter is complete. Next, move on to digitizing in Hatch**

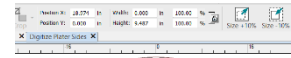
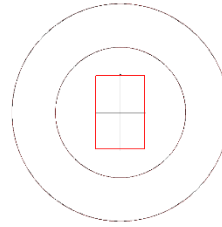
- For base create a mandala
- For sides create an alternating, mirrored design



**Create Digitized Version in Hatch**

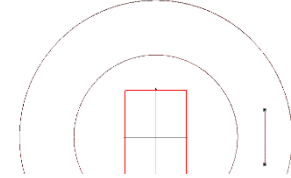
**Create main circles for arcs**

- Create a circle with diameter of **47.434"**
- Create a circle with diameter of **28.4604**
- Align circles to center

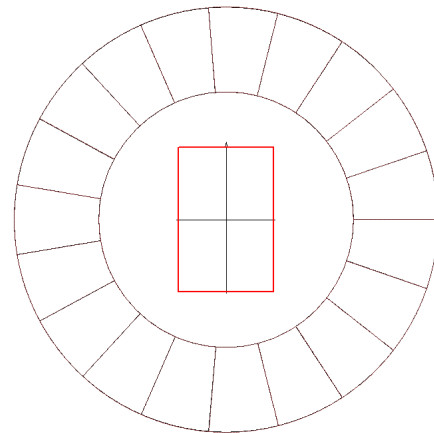


**Create the 6 segments**

- Create a line that is the sloped dimension = **X= 9.4868**
- Position this line at X = 18.9736 and Y=0
- Rotate the line 90 degrees
- 360 degrees divided 18.9732 degrees (rotation for segments) rounds to **19**
- Create circle layout with 19 segments



***Note:** To find the value of 'x' find the midpoint between the radius of the outer rim (R) and the bottom (base) outer rim (r). For this example 23.717 and 14.2302 respectively. To find the midpoint, sum the radii, and divide by 2.  $23.717 + 14.2302 = 37.9472/2 = 18.9736$*



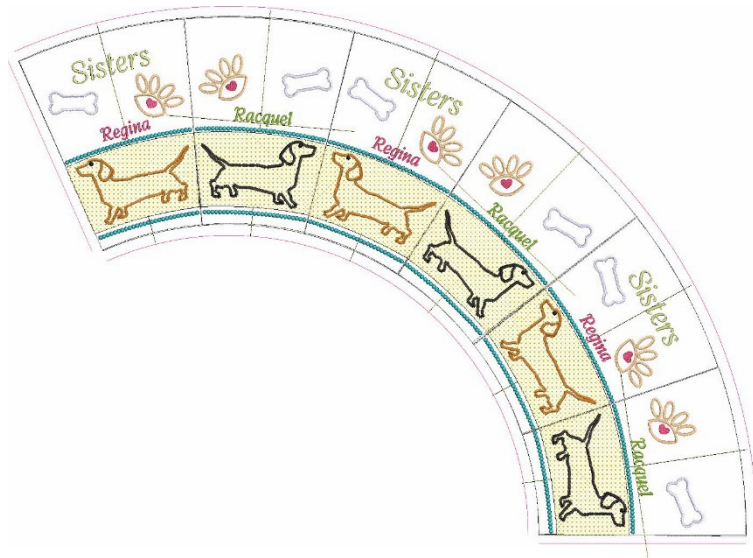


## Creating Designs

### Exterior sides

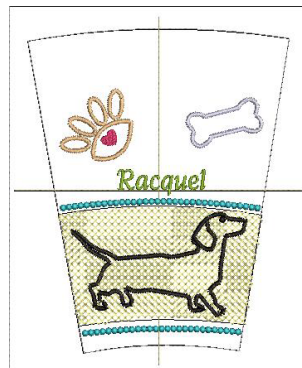


Figure 1 Regina and Racquel



### Created the 6 segments in Corel.

- Next, I exported from Corel, then imported the artwork to Hatch.
- Traced a single wedge in Hatch for my basic side.
- Next, I digitized 'Regina' then kept a second copy as Racquel.
- Did basic updates to 'Racquel' and mirrored the designs.
- Next, I placed the segments around my full 6 segments to see how they would align,
- Printed it out and pinned it together.

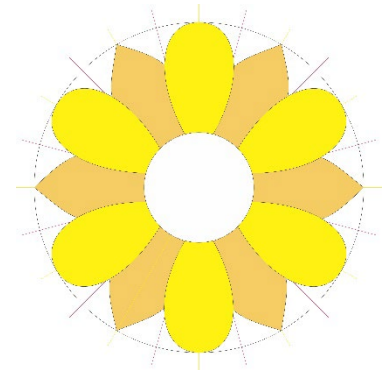
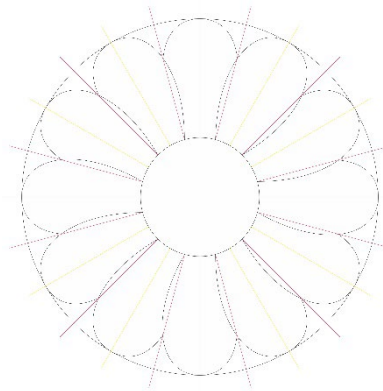




**Interior Base** Created the base mandala using Corel Draw.

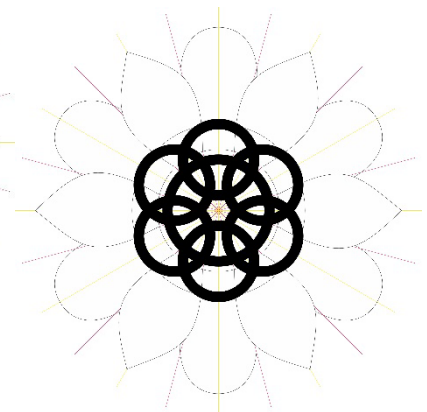
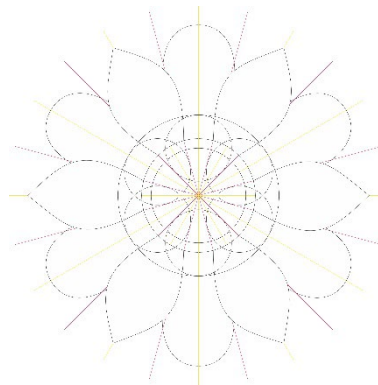
**Petals**

- First created alternating lines at 30 degrees and 15 degrees
- Next, I created a petal at 12 o'clock, then rotated the design around 30 degrees.



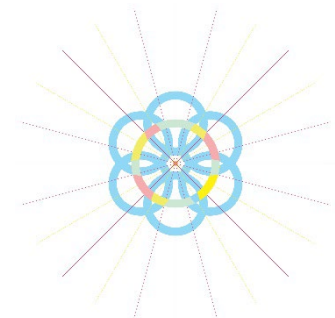
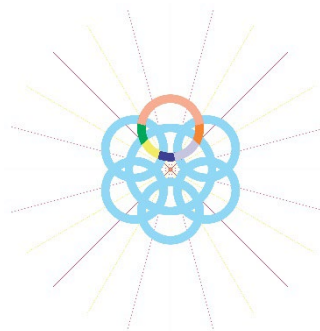
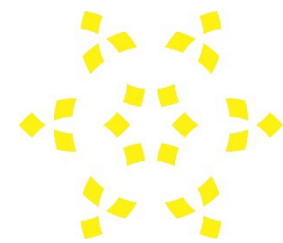
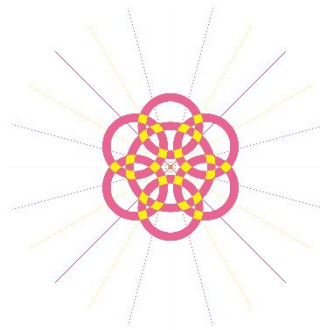
**Interlocking Rings**

- Created an inner circle as a path for my rings.
- Created my 6 rings.
- Placed my 6 rings around the circle path.
- Selected my inner ring and the 6 outside rings changing their width to 18 points.
- Next, I selected my rings and inner circle, converting the outlines to objects.
- Finally, selected a 'fill color' and made sure that 'pen was not active.'



**Intersections & Break Apart**

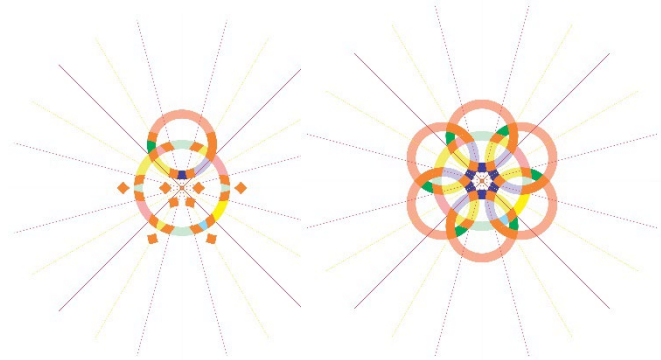
- Using the shape tool, I found all the intersections where all rings overlapped.
- Duplicated and then saved only the intersections.
- Using the rings that were broken when finding the intersections, used the shape simplify tool to break an outer circle apart. This created a 6-part outer ring.
- Next, I broke the inner circle apart creating a 12-part inner ring.



**Building the woven rings**

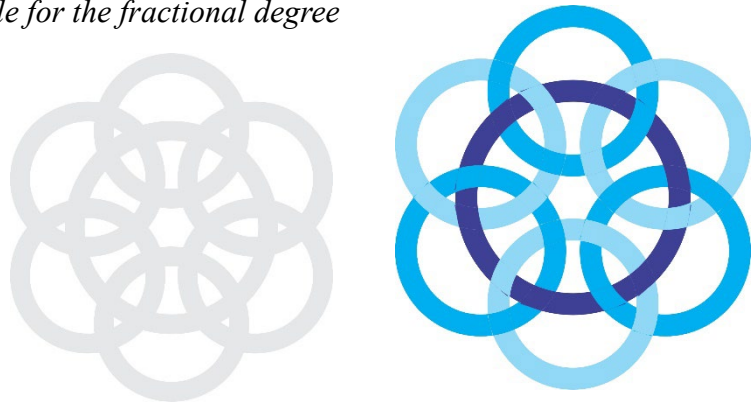
The basic components to begin weaving the rings:

6-part outer ring, 12 part inner ring, and 24 intersections



*Note: Lesson learned. I originally had an odd number of rings for the outside (7 rather than 6) I was unable to transform the single circle for the fractional degree of measurement.*

- Using transform and rotate, built up the 72 piece rings
- Next filled the whole design with 10% black
- Then working clockwise, wove the pieces together using an over/under pattern with color



- Next, I combined my petals with the interlocking rings, my next step will be taking the design into Hatch to digitize.



I will be stitching this project out.... first, I want to finish up my digitizing in Hatch. I plan to construct this very similar to the month 04 challenge. It will be fully lined, have grommets and webbing handles, and inner pockets to store snacks, training treats, little bags, etc. The plan is to use this when traveling with the pups. It will be a convenient place to drop harnesses, leads, etc.

**Materials:**

- Pellon [808 Craft-Fuse®](#)
- Pellon [FF79F2 Flex-Foam™ 2-Sided Fusible](#)
- Dritz Home Curtain Grommets 1" Inner Diameter Plastic 8/Pkg
- 6 – Fat Quarters
- 1.5 yards background interior & exterior
- 1-yard interior pockets
- 1-yard 1" webbing

**Cutting Pieces**

- Fabric 1 – Cut 1 piece 43" x 20" – exterior 6-sided segment (to embroider)
- Stabilizer – Cut 1 piece 43" x 20"
- Fabric 2 – Cut 1 piece 43" x 20" – interior 6-sided segment 43" x 20."
- Fabric 3 – Cut 1 piece 43" x 20" – flex foam for 6-sided segment.
- Fabric 2 – Cut 1 piece 12" x 12" – interior Mandala Base (to embroider)
- Fabric 4 – Cut 1 piece 12" x 12"-craft fuse 808 for interior mandala base
- Fabric 1 – Cut 1 piece 12" x 12" – exterior Mandala Base
- Fabric 3 – Cut 1 piece 12" x 12" – flex foam for mandala exterior base.
- Fabric 1 – Cut 2 pieces 36" x 14" – interior 6-sided pocket segment.
- Fabric 4 – Cut 1 piece 36" x 14" – craft fuse 808 for 6-sided pocket segment.

**Preparing sides, pockets, and bases**

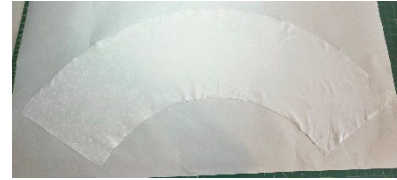
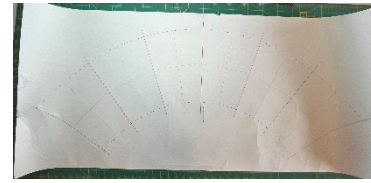
- Press fusible headliner to wrong side of 6-sided segment lining and zigzag outer edges.
- Press fusible headliner to wrong side of lining mandala base and zigzag outer edges.
- Press fusible interfacing to wrong side of pocket lining and zigzag outer edges.



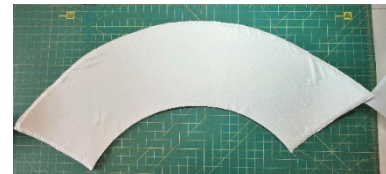


**Exterior sides: Prepare exterior segment for multi-hooping.**

- Stabilizer 43" x 20"
  - Trace 6-sided segment markings on stabilizer
  - Mark upper seamline
  - Mark lower seamline
  - Mark vertical segment divisions
  - Mark crosshairs for each segment
- Background fabric
  - Tape exterior 6-sided segment to unmarked side of stabilizer.
  - Line up edges and tape in place
- Baste background to stabilize using grid markings.
  - Load bobbin thread with color that will be easily seen on background fabric.
  - Set stitch length to 5mm.
  - With marked stabilizer right side up, stitch along all markings.
  - The bobbin thread should show on the right side of background fabric.
  - Remove tape from background fabric once basted.

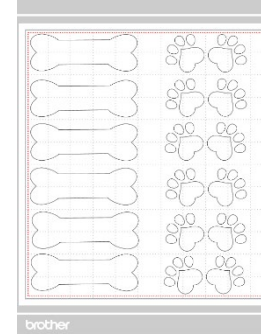
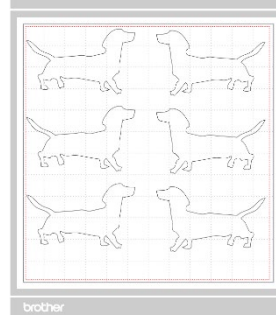
**Interior pockets**

- Prepare pocket and pocket lining.
  - Press fusible interfacing to wrong side of one pocket.
  - Place wrong sides together and pin along top edge
  - Stitch ¼" seam along top to join both sides.
  - Turn the right side out and press flat.
  - Top stitch along top edge in ¼" seam
- Attach inside pocket to interior 6-sided segment lining.
  - On the outside pocket, mark the five dividing lines for each segment.
  - Pin the pocket, right side up to the 6-sided interior lining also right side up.
  - Stitch in ¼" seam on both sides and along aligned bottom edges.
  - Next, triple stitch along the 5 dividing segments



### Applique Pieces

- Cut applique fabrics to measurements noted below.
- Press each fabric well with Best Press.
- Cut a piece of Heat 'n Bond for each of the applique fabrics.
- Press Heat 'n Bond to each of the applique fabrics to be cut.



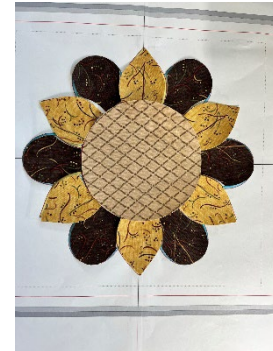
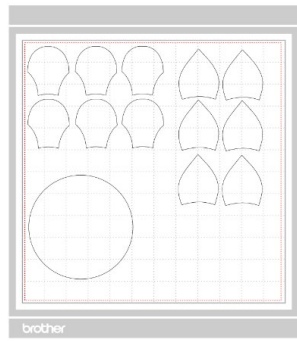
### Module 5 Caldwell Puppy cutting pieces.

- Puppy: 6 pieces 6" x 3.5"
- Bone: 6 pieces 5" x 2"
- Paws: 6 pairs 4" x 2.5"



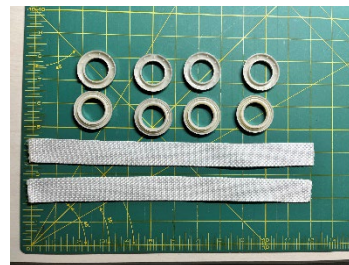
### Module 5 Caldwell Mandala cutting pieces

- Round petals: 1 piece 7" x 5"
- Pointed petals: 1 piece 4" x 7.5"
- Center circle: 1 piece 5" x 5"



### Other materials

- Grommets: 4 – 1 inch
- Webbing 2 – 1" x 12" pieces



### Embroidery Design Files

- Module 5 Caldwell Final Regina
- Module 5 Caldwell Final Raquel
- Module 5 Caldwell Final Mandala Base
- Module 5 Caldwell Basket Grommets

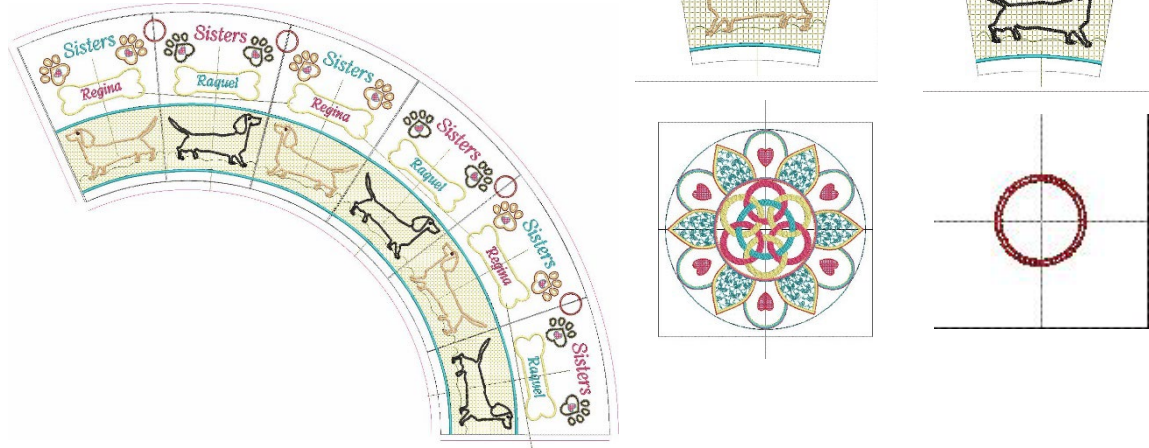


Figure 1 Grommet placements

### Threads used: Sulky Rayon 40 weight

1001 white

1005 black

1126 Tan

1169 bayberry red

1070 gold

0521 nutmeg

1021 Maple

1059 dark tawny brown

1176 med dk avocado

### Fat Quarters used: Moda "Country Road" by Holly Taylor

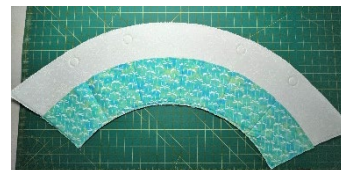
#### Mandala Base (Hoop 272 mm x 408 mm)

- Cut 12" x 12" of fusible interfacing and press on interior base.
- Mark centers all four sides and at center
- Place stabilizer in hoop
- Embroider mandala base on interior base fabric.
- Last stitch is the circular seamline.
- Trim ½" out to provide seam allowance



#### Interior Side Grommets (Hoop 100 mm x 100 mm)

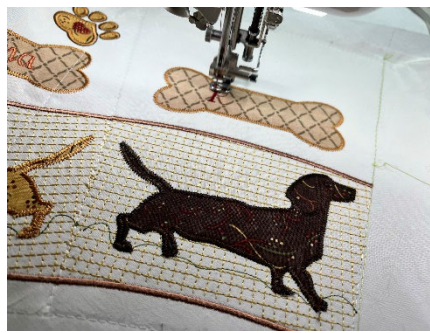
- Mark, from left to right, top edge and 1.5" from top edge.
  - Segment line 1 of 5
  - Segment line 2 of 5
  - Segment line 4 of 5
  - Segment line 5 of 5
- Embroider grommet placement lines.





### Exterior Sides

- Embroider designs on background using grid marks to align each design.
- Embroider grommet placement lines.





## Assembling

### Exterior

- Exterior 6 sides, with right sides together, sew side seams together forming an outer ring.
- Attach exterior sides to exterior base and sew!



### Interior

- Interior 6 sides, with right sides together, sew side seams together forming an inner ring.
- Attach exterior sides to exterior base and sew.



### Webbing & Grommets:

- Trim grommet openings in both the first inside stitched ring.
- Place wrong side of lining to the wrong side of the outer bin
- Align and pin the grommet areas
- Align and pin the top of bag to the bag lining
- Zigzag the top of bag in at ¼"
- Cut 2 pieces of 1" webbing each seal.
- Follow manufacturer instructions grommets.
- Insert straps through the grommet inside.
- Align cut edge of strap with top edge of bin
- Edge stitch top of the webbing to the bin for only the inside strap



outer and inner sides to



12" long. Melt ends to  
for inserting the  
openings from outside to

### Binding and finishing

- Cut 3 pieces of fabric, 2.5" x 20" from a fat quarter
- Stitch together in 45 degree angles to create upper binding
- Fold binding in 1/2 and press well
- Attach binding to top of exterior with raw edges together
- Stitch in 1/4" seam along the outside top
- Turn binding to inside
- Pin and stitch in the ditch on the exterior of basket
- Press well



### Finished project!!!

