What shape is created when 2 cylinders intersect?

Investigation Brief

Think about two hollow cylinders, like paper towel rolls or PVP pipe, intersecting at right angles, so that air or water could flow through each tube.

What is the shape created in the space of the intersection?
Sketch what you imagine it looks like.

Now create a model of the intersection. You may need to create an intersection of the cylinders and then think of ways to cross-section it so you can see what shape is "inside" the intersection space.

- Does this shape have a name or names?
- Has it been used in any practical form on its own?
- What are the strengths and weaknesses of the shape from a structural point of view?
- Can you find a way to estimate the volume or surface area of the shape?

Resources

- Towel roll tubes
- scissors/craft knife
- glue/wire
- geometry or drawing programme or internet access.

Prompts and Suggestions

How would the intersection shape change if you used 3 cylinders all intersecting at right angles?

If you are stuck for a model you could look at square food umbrellas (the folding netted things that people put over food to protect it from insects).
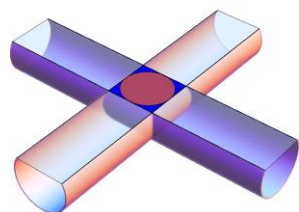
Have you seen this shape occurring in natural or human-made structures or designs?

How would the shape change if the cylinders intersected at angles other than 90 degrees?
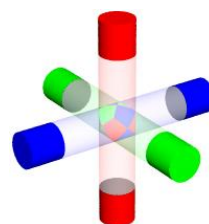
Extension

Investigate the intersection spaces/shapes created by other prism shapes, such as two triangular prisms.

Images and Links

http://www.math.illinois.edu/igl/projects-spring2013.html

http://www.mathmos.net/puzzles/calculate.html