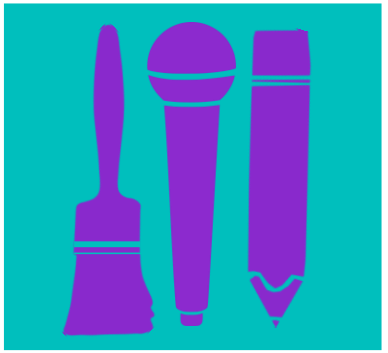
SPIRIT OF INNOVATION

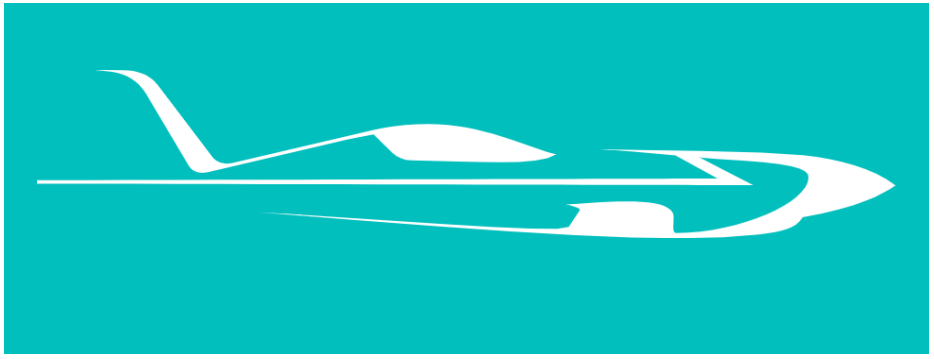
STEAM RESOURCES

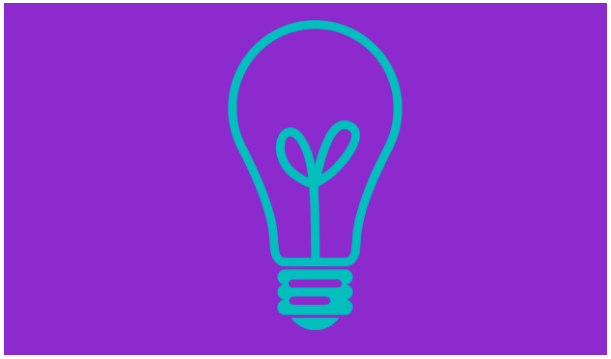


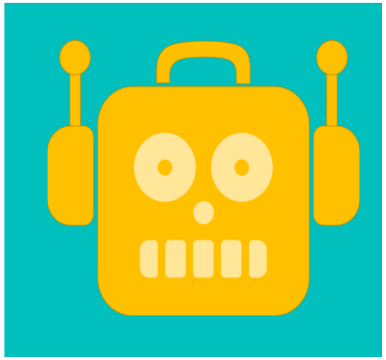
Spirit of Innovation

Year Four

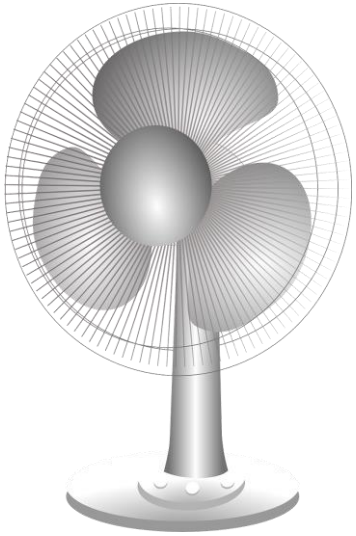
Presentation – How to make a windmill







The Science Behind the Propeller



This fan has something in common with The Spirit of Innovation plane. The blades of the Spirit of Innovation plane and the blades of fan work in a similar way.

So how do these spinning blades start the plane moving?

Think of a propeller as a spinning wing. Like a wing, it produces lift, but in a forward direction—a force we refer to as **thrust**.

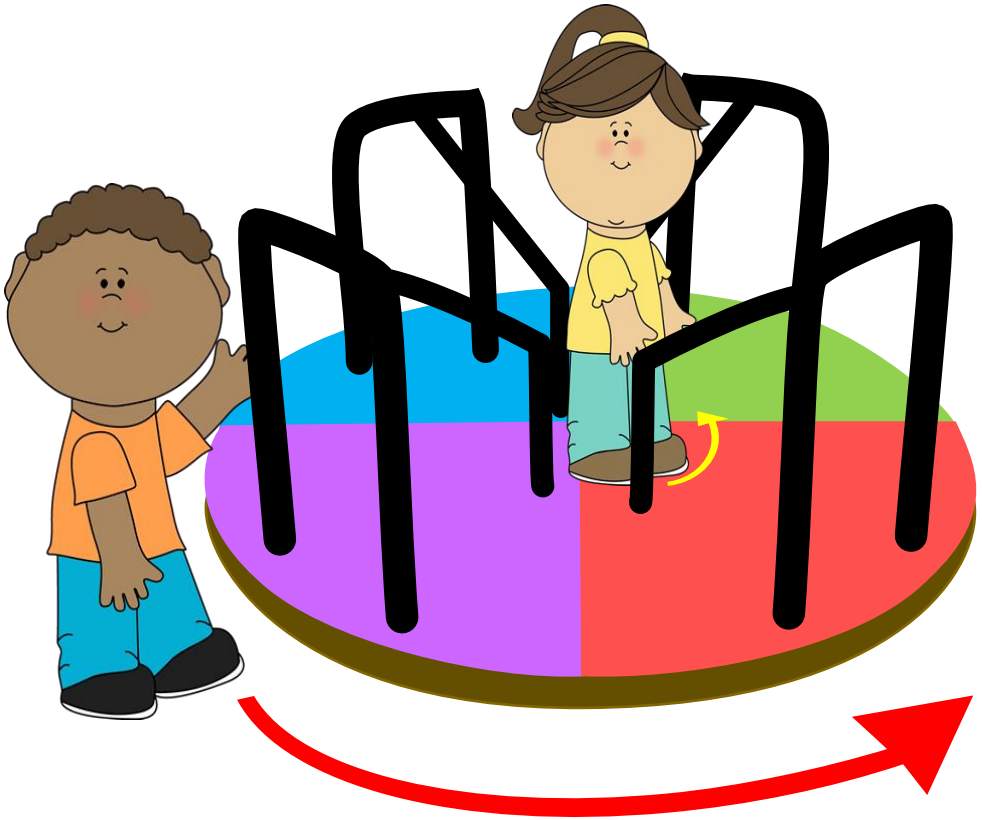
The air moving past the blades creates pressure that pushes the plane forward by hurling a mass of air behind - Newton's third law.

In very simple terms a propeller is two of more rotating wings that pull the aeroplane through the air, in the same way the thread of a screw pulls it into wood.

Its rotary motion through the air creates a difference in air pressure between the front and back surfaces of its blades. In order for a propeller blade to spin, it usually needs the help of an engine. In Spirit of Innovation's case this is battery powered.

A propeller blade looks similar to a wing. This is because the wings use the same science to give The Spirit of Innovation plane lift to get off the ground. The size and shape of the blade is very important, wider at the middle than at the tip.

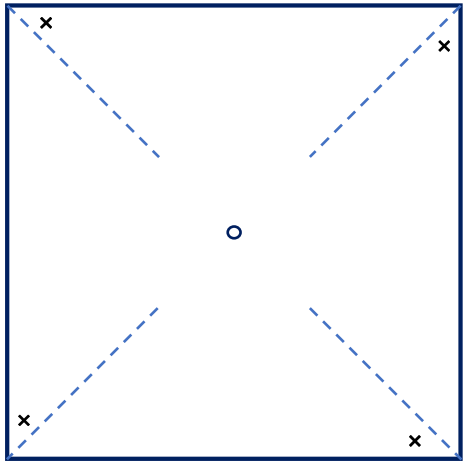
Imagine a roundabout; if you stand close to the middle you don't go that fast. But if you are the one pushing on the edge you really have to run fast. Both people go around in a circle, but the one on the outside has to go further and faster. Much harder work!



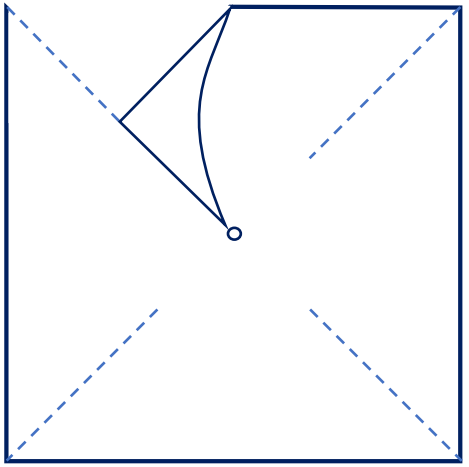
As a blade spins, its outer tip slices through the air faster than the part closest to the centre. Because the centre of the propeller travels less quickly it has to be much larger, as it has to catch more air.

So why is a propeller blade twisted? Twisting the blade makes it meet the air at about the same angle across its entire length. This provides the most thrust and the least drag.

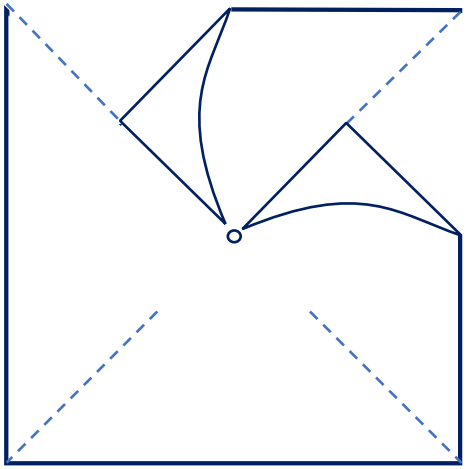
Windmill Investigation



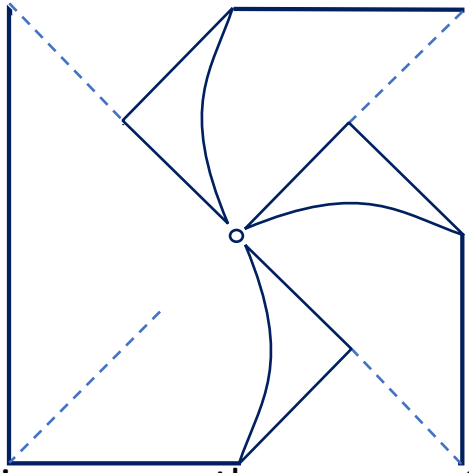
Using a square of paper, draw a cross as shown in the diagram above.



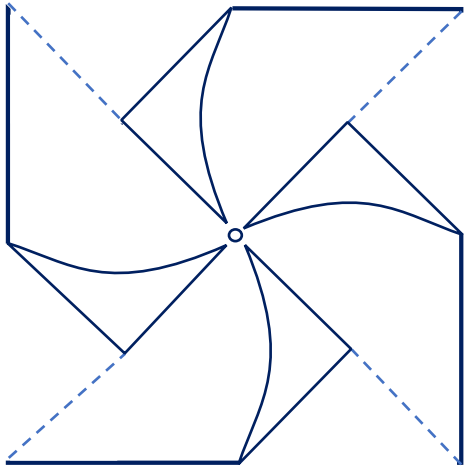
Using scissors, cut partway across each line, leaving about 1.5 cm at the centre.



Repeat for each diagonal line.



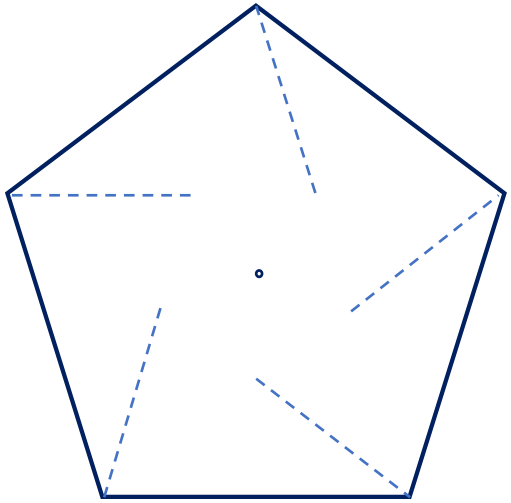
Bring every other corners to the centre of the windmill. Make sure that the corners overlap in the middle of the windmill.



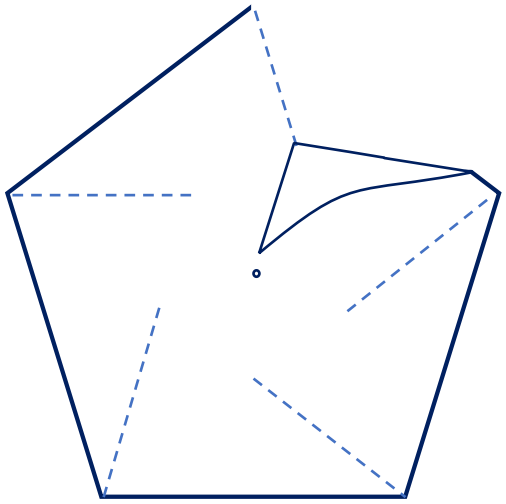
Push a large headed pin through them to hold them down.

Attach to a dowel.

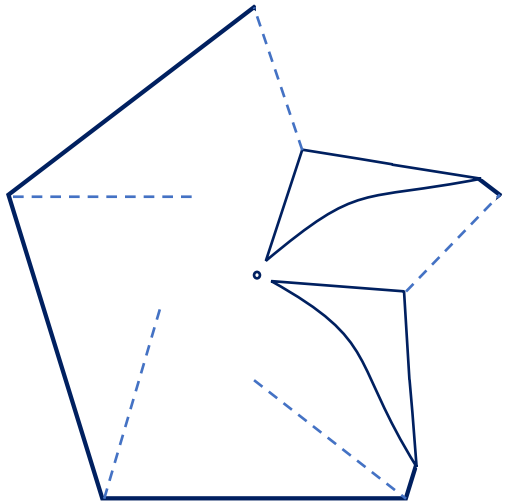
Regular Pentagon Windmill



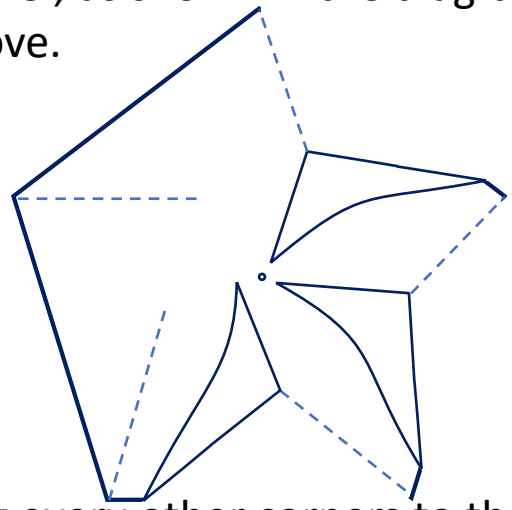
Cut out a regular pentagon from paper. Draw lines from each corner, as shown in the diagram above.



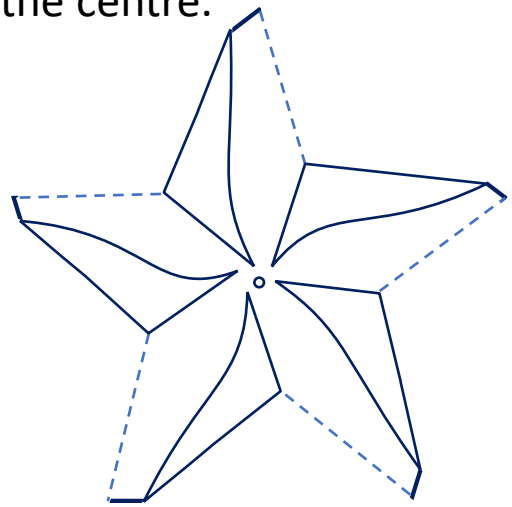
Using scissors, cut along each dotted line, leaving about 1.5 cm at the centre.



Repeat for each line.



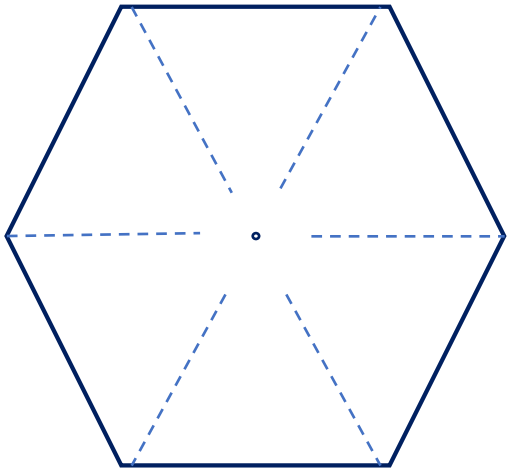
Bring every other corners to the centre of the windmill. Make sure that the corners overlap in the middle of the windmill.



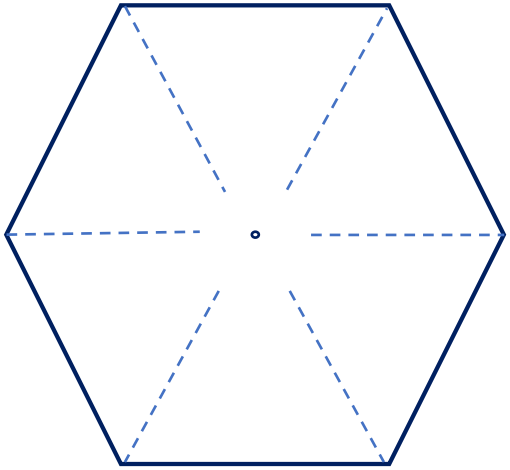
Push a large headed pin through them to hold them down.

Attach to a dowel.

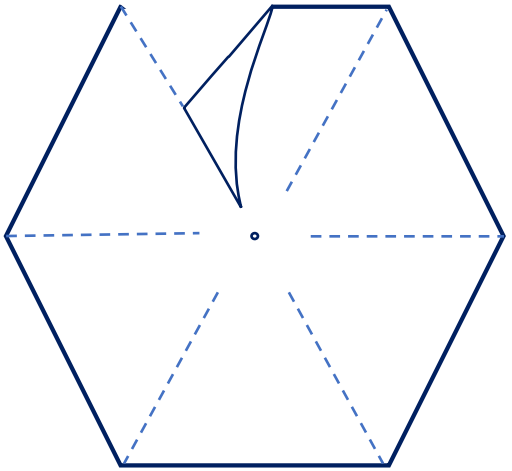
Regular Hexagon Windmill



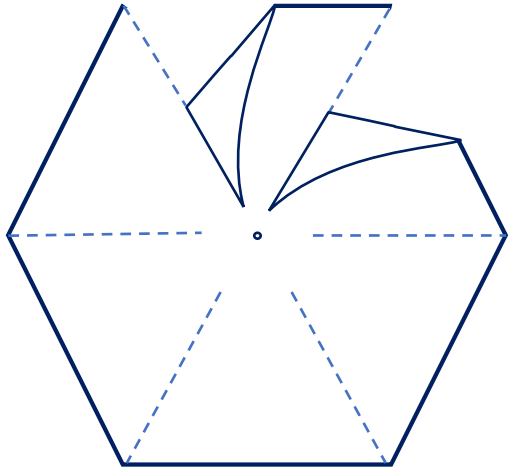
Cut a hexagon shape out of paper.



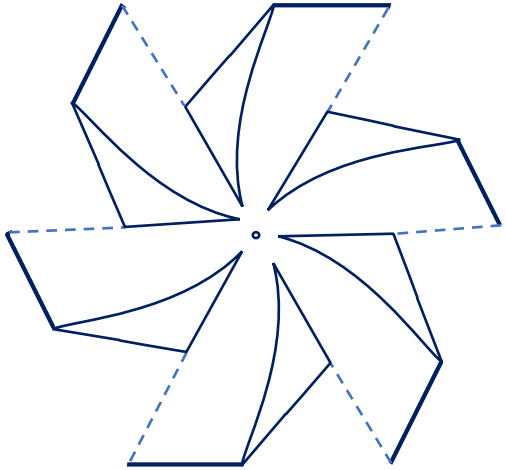
Draw a cross as shown in the diagram above.



Cut partway along each line. Stop when you are about 1.5cm away from the centre.



Fold every other corner to the centre. Make sure that the corners overlap in the middle of the windmill.

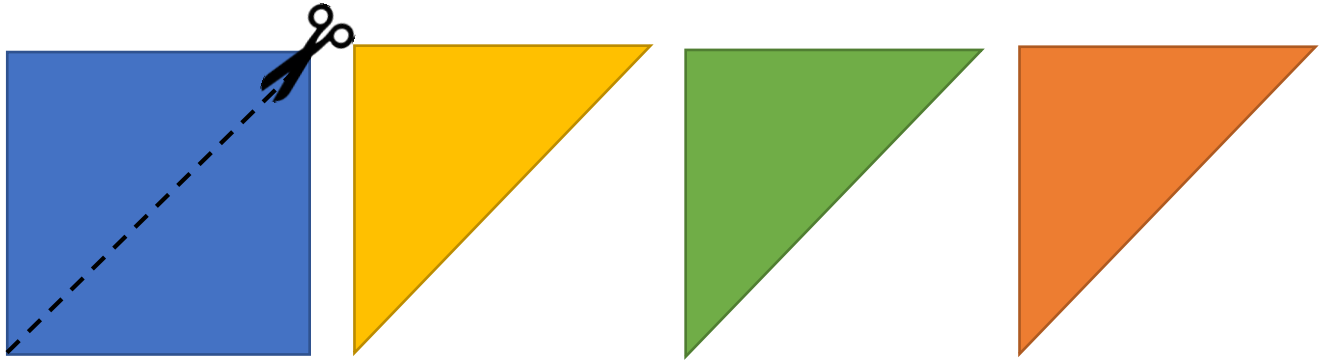


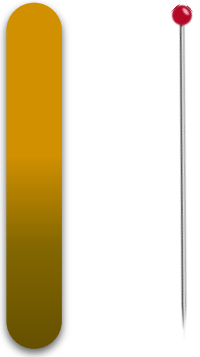
Push a large headed pin through them to hold them down.

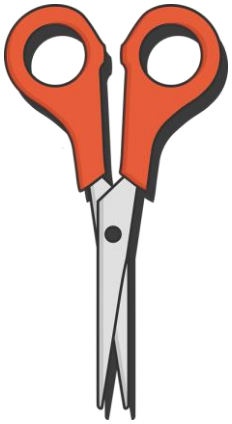
Attach to a dowel.

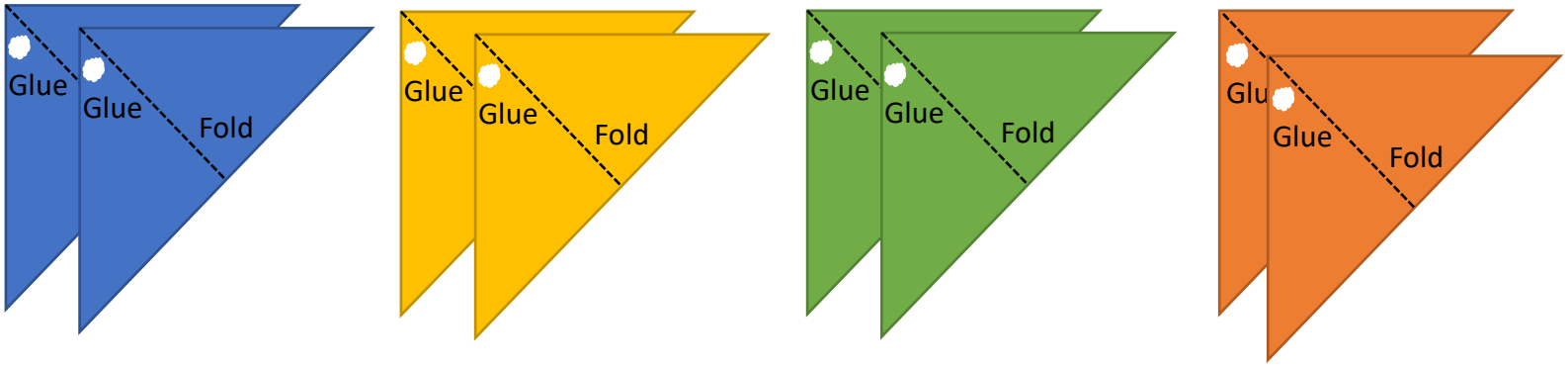
8 Pointed Paper Windmill

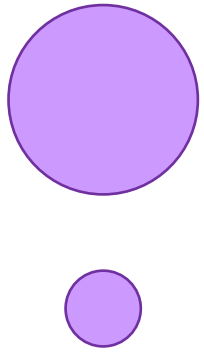
Online Instructions to help

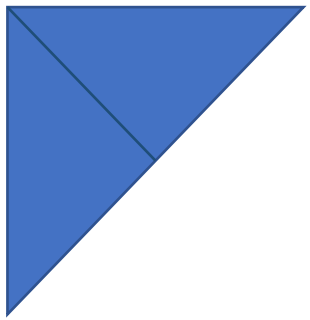


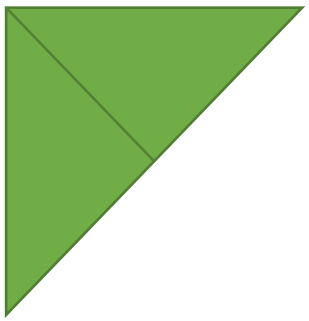


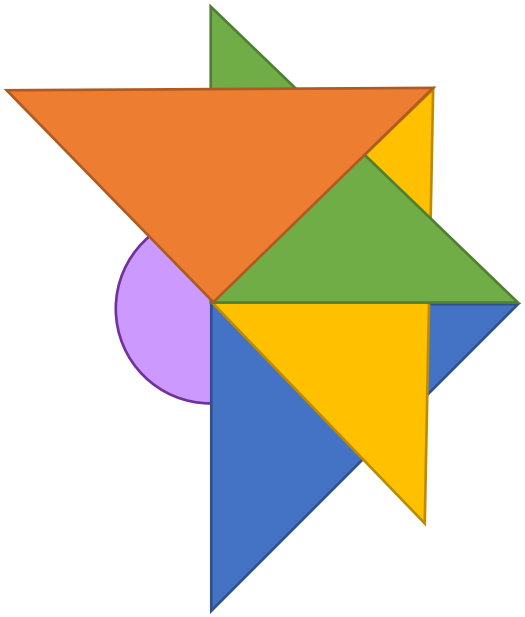


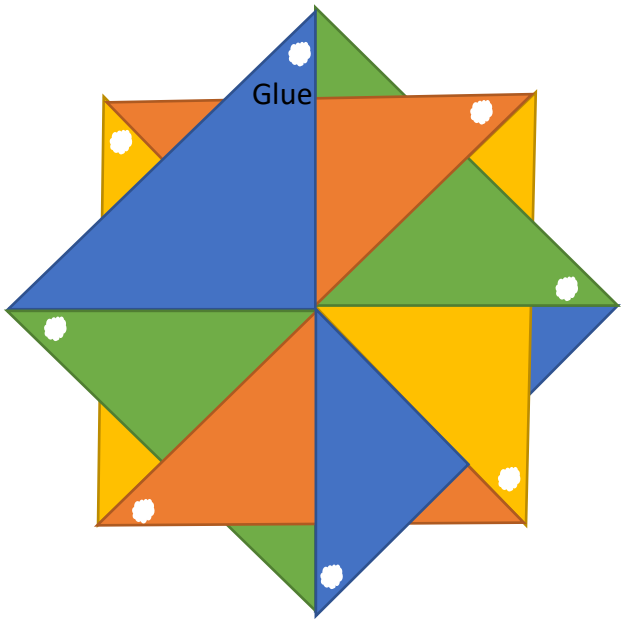


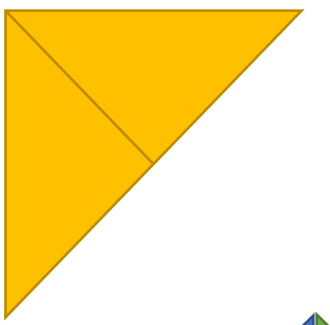


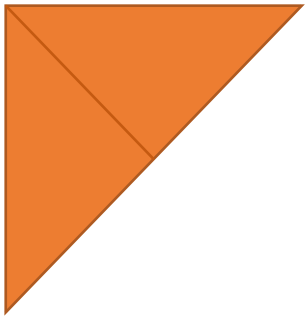


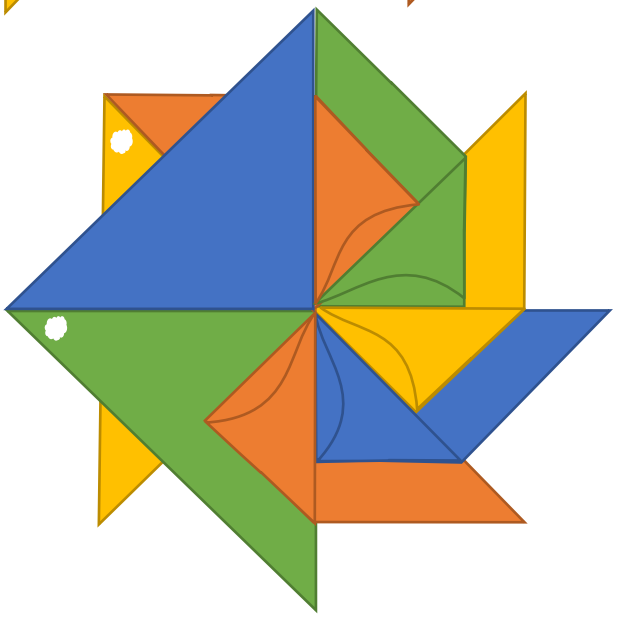


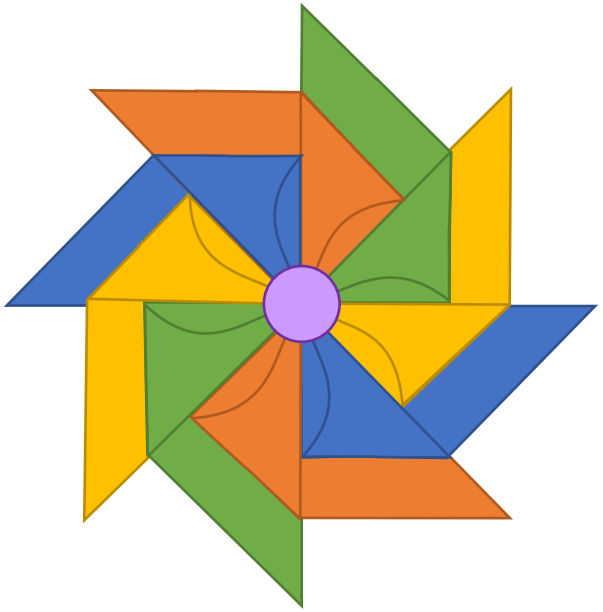


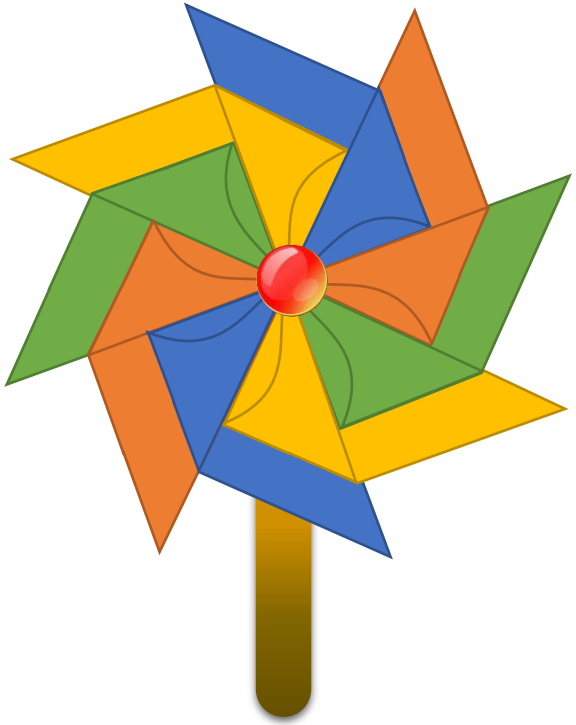

Glue











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