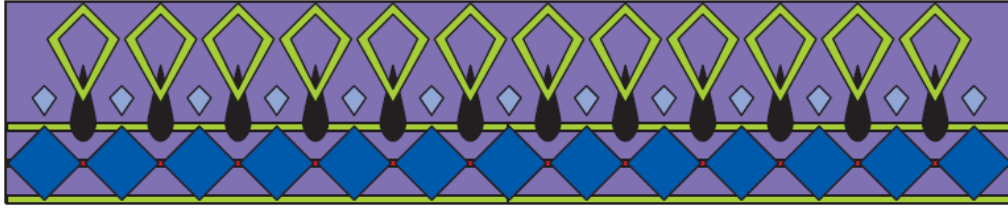
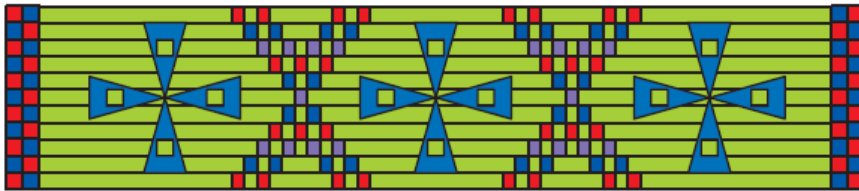


1. Use tracing paper to find all lines of symmetry in each design or figure.

a.



b.



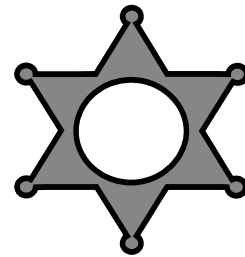
c.



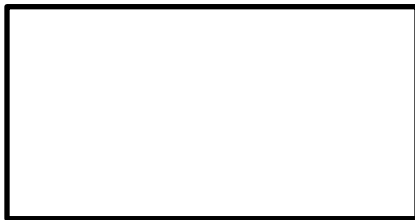
d.



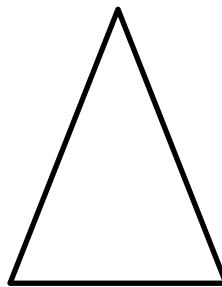
e.



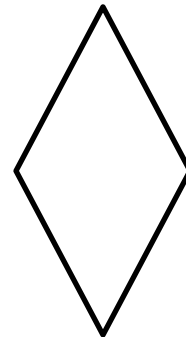
f.



g.



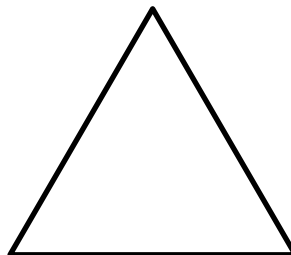
h.



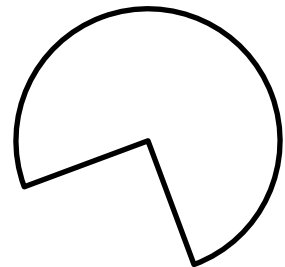
i.



j.

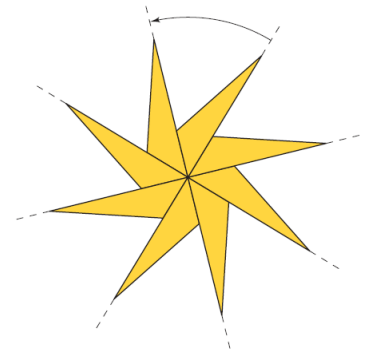


k.



To describe the rotation symmetry in a figure, you need to specify two things:

- The *center of rotation*. This is the fixed point about which you rotate the figure.
- The *angle of rotation*. This is the *smallest* angle through which you can turn the figure in a counterclockwise direction so that it looks the same as it does in its original position. There are several rotation angles that move this pinwheel design to a position where it looks like the original.



**2a)** List the INITIAL angle of rotation that will rotate the pinwheel design to a position in which it looks the same as what is pictured.

**b)** List all other turns of less than 360 degrees that will rotate the pinwheel to a position in which it looks the same.

**For each picture, give the INITIAL angle of rotation, then list all other turns of less than 360° that will rotate the object to a position in which it looks the same as what is pictured.**

**3. the windmill**



**Initial angle:**  
**Other angles:**

**4. the snowflake**



**Initial angle:**  
**Other angles:**

**5. the wagon wheel**



**Initial angle:**  
**Other angles:**

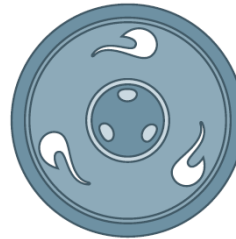
**6. How are the listed angles of rotation related to the initial angle of rotation?**

**The hubcaps below have rotation symmetry. Complete questions (7) and (8) for each hubcap.**

**7.** On a copy of the hubcap, mark the center of rotation. Then, find all the turns of less than 360° that will rotate the hubcap to a position in which it looks the same as what is pictured.



Hubcap 1



Hubcap 2

**8.** Tell whether the hubcap has reflection symmetry. If it does, draw all the lines of symmetry.