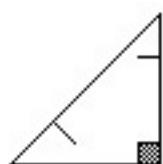


## Three Mirror Kaleidoscopes

1. The kaleidoscope made of two mirrors generates finite patterns with the symmetries of the regular polygons.
2. There are also kaleidoscopes whose patterns appear to be infinite in extent. Three mirrors joined to form a prism are used.
  - Use three mirrors to form a prism whose base is an equilateral triangle.
  - Place colored patterns in the base of the kaleidoscope.
  - *Can the regular tessellations be generated by placing patterns in an equilateral 3 mirror kaleidoscope? If so, show the patterns.*
  - *How many of the semi regular tessellations can be generated by placing patterns in an equilateral three mirror kaleidoscope? Show the patterns.*
3. Kaleidoscopes that produce infinite patterns can also be obtained with triangles other than the equilateral.
  - The angles for one or these kaleidoscopes are  $30^\circ$ ,  $60^\circ$ , and  $90^\circ$ . For the other the angles are  $90^\circ$ ,  $45^\circ$ , and  $45^\circ$ .
  - The tessellation in Figure 1 was generated by placing the indicated pattern in the base of the kaleidoscope with angles  $90^\circ$ ,  $45^\circ$ ,  $45^\circ$ .



Basic pattern

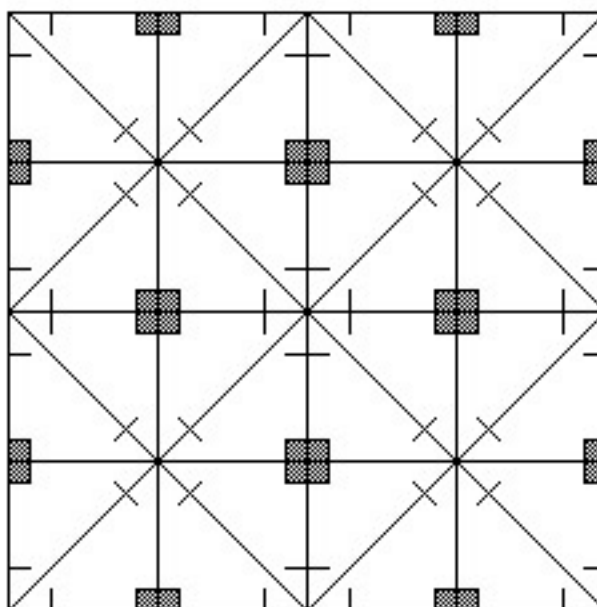


Figure 1

4. Each of the patterns in Figure 2 when placed in the base of a  $90^\circ$ - $45^\circ$ - $45^\circ$  three-mirror kaleidoscope generates a tessellation.

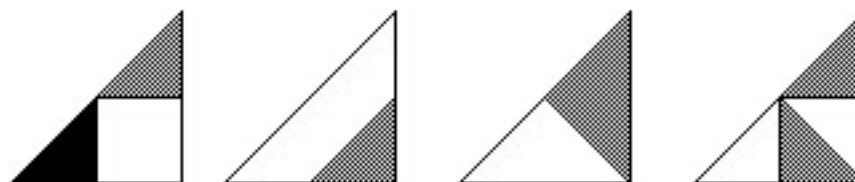


Figure 2

For each pattern guess what the tessellation will look like. Check your guess with a kaleidoscope.