Chapter 12 Gifted and Enrichment Answers

1. Let x be the first consecutive number, that is, the number of the longest rectangles (12 by 2) used.

Then, $x + 2$ is the third consecutive number, that is, the number of the rectangles with the least difference between the length and width (4 by 6) used.

Then, $x + 1$ is the second consecutive number, that is, the number of the other rectangle (3 by 8) used.

The area of a rectangle is 24 square units (because 3×8, 4×6, and 2×12 all equal 24).

$$x + (x + 1) + (x + 2) = 24$$
$$3x + 3 = 24$$
$$3x + 3 - 3 = 24 - 3$$
$$3x = 21$$
$$3x \div 3 = 21 \div 3$$
$$x = 7$$

There are 7 of the 12 by 2 rectangles, 8 of the 3 by 8 rectangles, and 9 of the 4 by 6 rectangles.

Area of square region
$$= 7(12 \times 2) + 8(3 \times 8) + 9(4 \times 6)$$
$$= 7(24) + 8(24) + 9(24)$$
$$= 24(24)$$

The square is 24 units by 24 units. One possible tessellation of the square region is
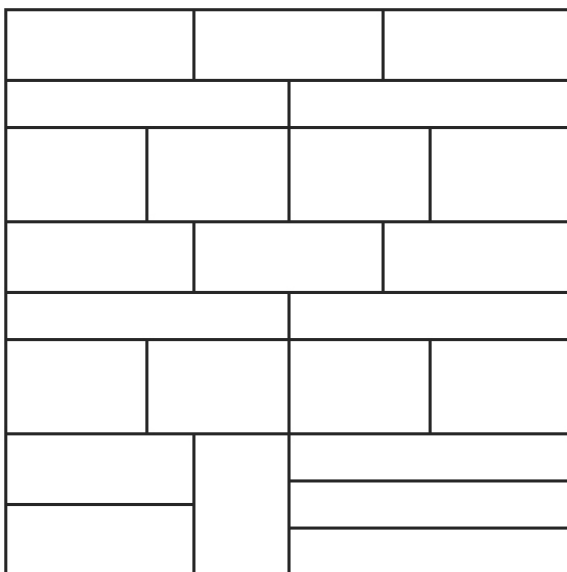
2. Pattern A is made of a quadrilateral that is rotated, reflected, and translated to cover an area without overlapping or leaving gaps. Pattern B is made of a one-dimensional shape that looks something like a G that is translated across an area but does not cover the area; it has gaps. Pattern A is a true tessellation because it meets the requirements of the definition of a tessellation, that is, it covers an area without overlapping or leaving gaps. Pattern B is not a true tessellation because it has gaps.

3. Answers will vary. The tessellation must cover an area without overlapping or leaving gaps. The non-tessellation might leave gaps or overlap.

4. Use trial and error.

5.
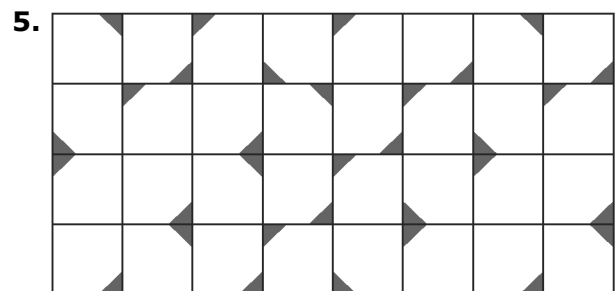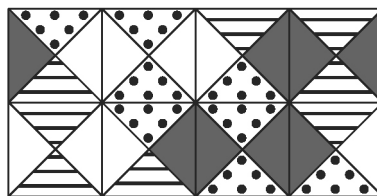
The greatest number of triangles sharing a corner is two. It happens six times.