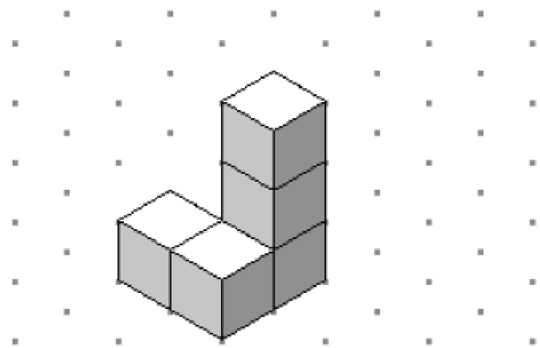
Unit Eight

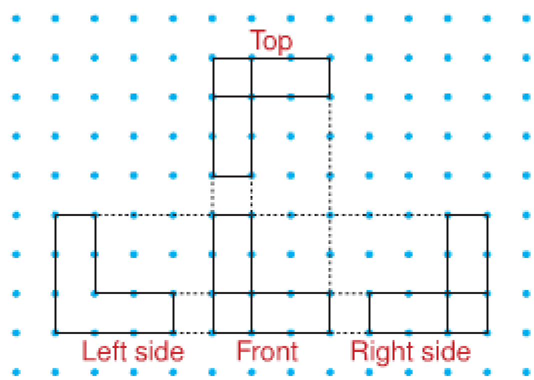
Geometry Name: ___________________________

8.1 Sketching Views of Objects

When a photo of an object is not available, the object may be drawn on triangular dot paper. This is called isometric paper. **Isometric means “equal measure”.** The line segments joining two adjacent dots in any direction are equal.



We can use square dot paper to draw each view (top, front, and sides) of the three dimensional objects:



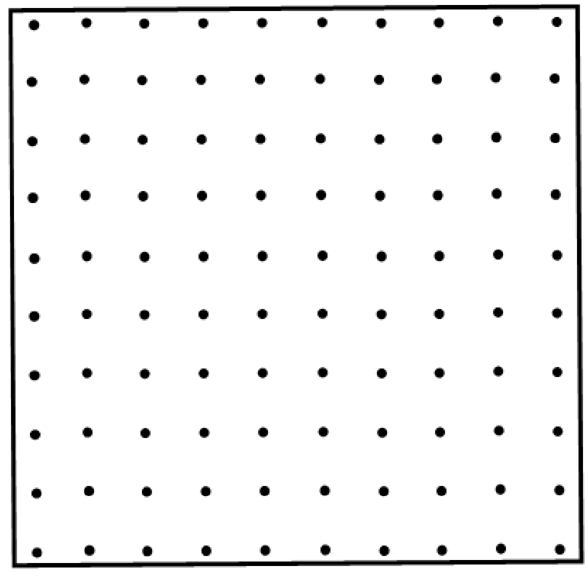
To draw views of the object:

- Place the top view above the front view, and the side views beside the front view (right view on the right; left view on the left)

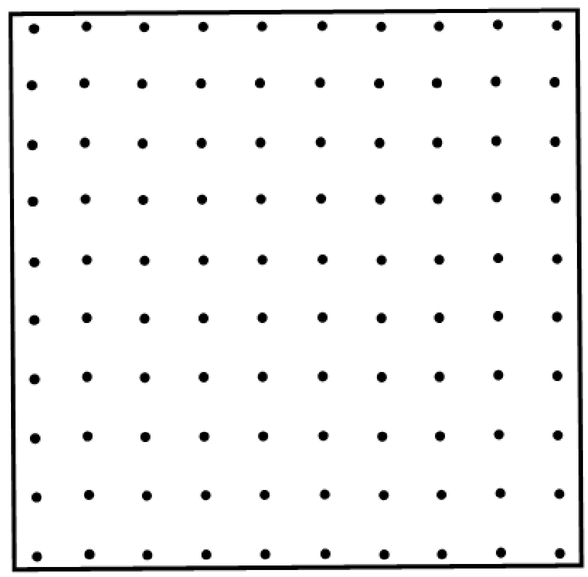
- Show internal line segments only where the depth or thickness of the object changes.

Draw top, front, left and right side views for each of the following:

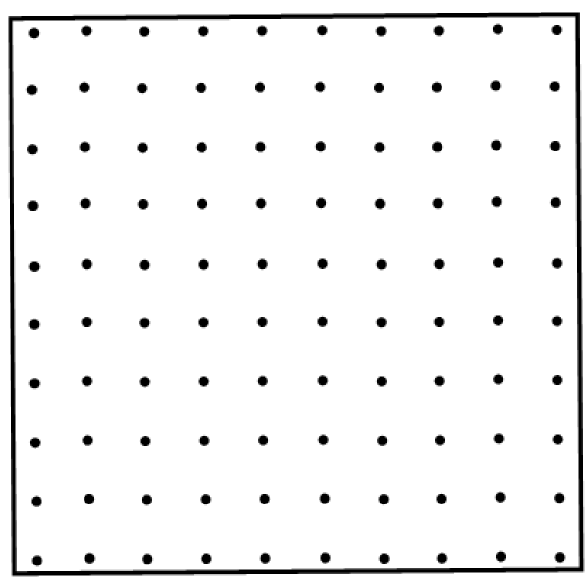
A)



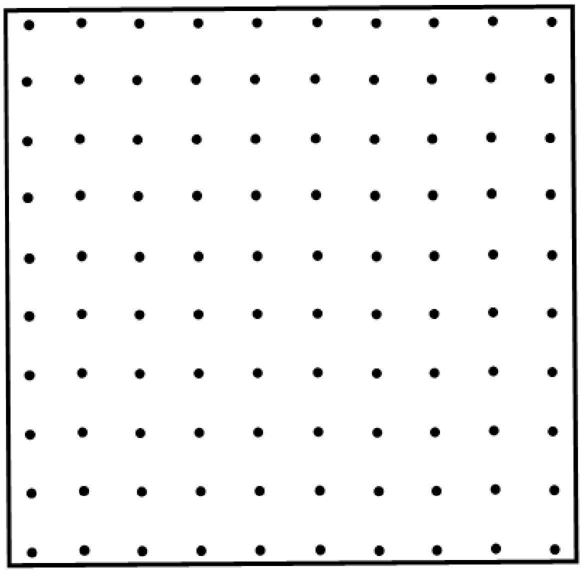
B)

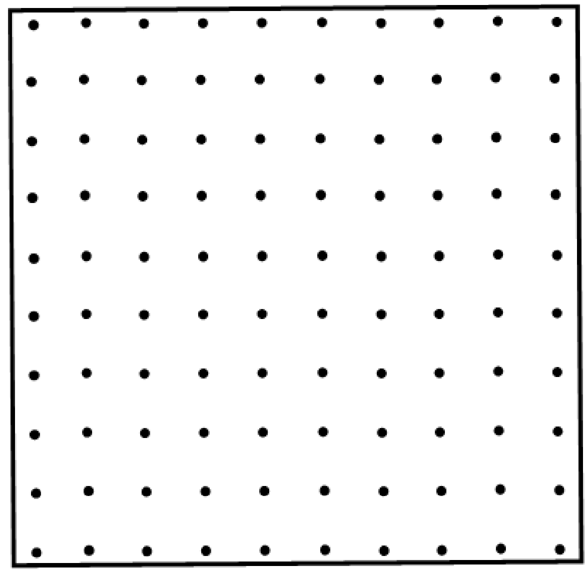


C)



To complete on loose leaf: p.437- 438 # 4 5, 8 & 9

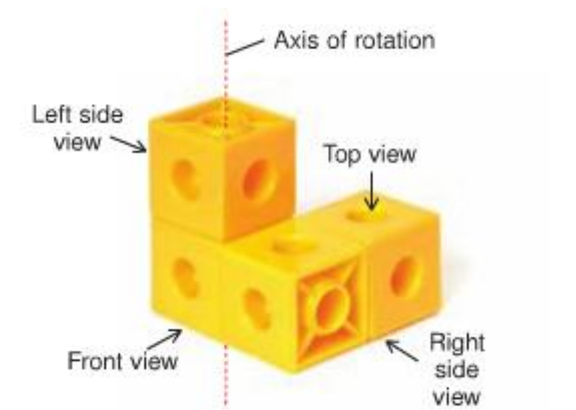


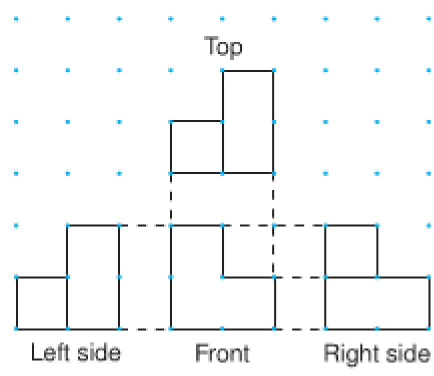


Section 8.2: Drawing Views of Rotated Objects

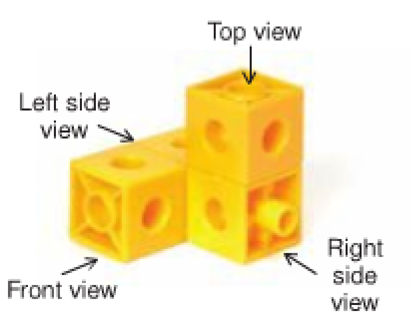
An object can be rotated **horizontally** (clockwise or counter clockwise), or **vertically** (toward you or away from you).

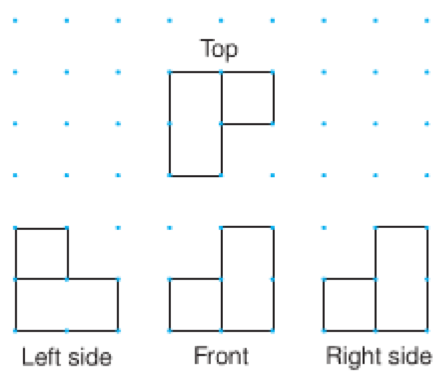
Ex:



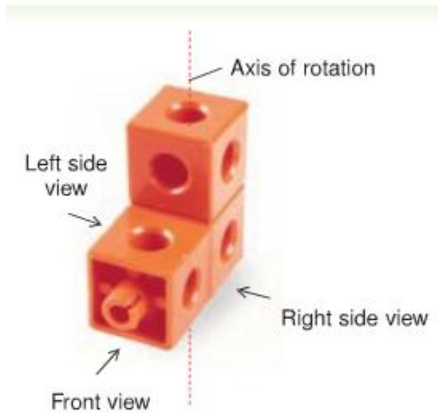


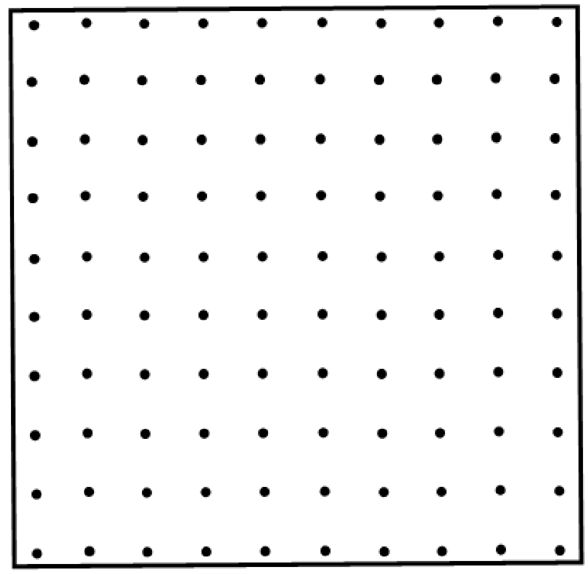
If the object were rotated horizontally 180º (about the vertical axis), the views would be:



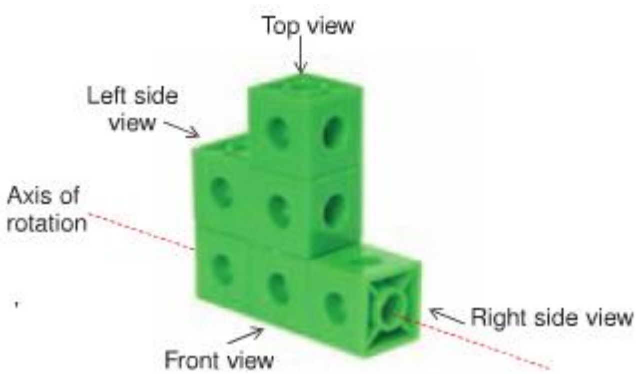


Rotate this object 270◦ clockwise about the axis shown, then sketch the top, front, left and right side vies of the resulting object.

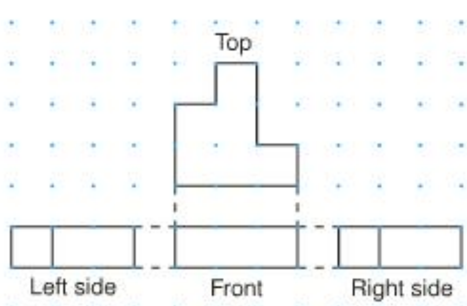


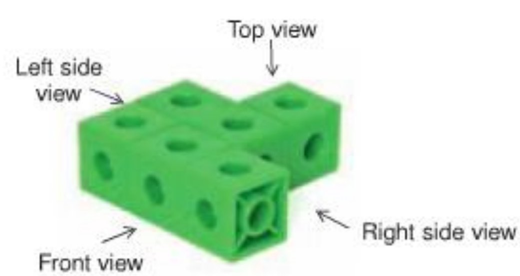


In this example, the axis of rotation is <u>horizontal</u>, so we will rotate vertically

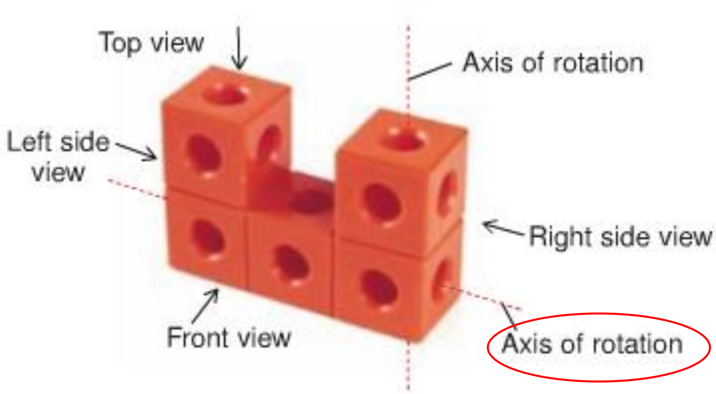


After a vertical rotation of 90º away from you, the object and its views are as follows:





Rotate this object 90◦ toward you about the horizontal axis shown, then sketch the top, front, left and right side vies of the resulting object.



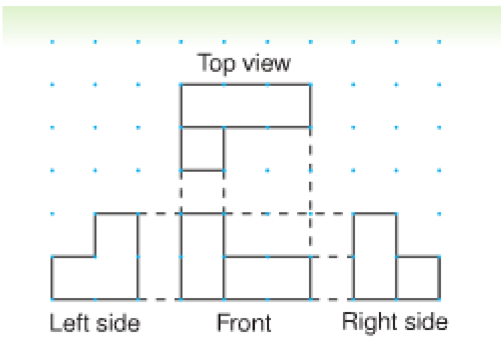
To complete on loose leaf: p.444-446 # 3, 4, 9B

Section 8.3: Building Objects from Their Views

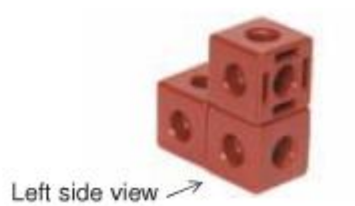
Each view of an object provides information about the shape of the object. The front, top, and side views often provide enough information to build the object.

Remember that, when you look at views of an object, internal line segments show changes in depth.

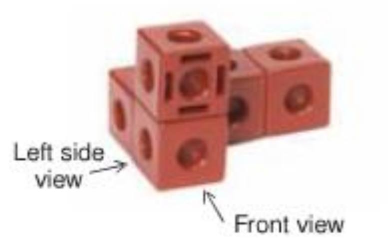
Example: Use linking cubes. Build an object that has these views.



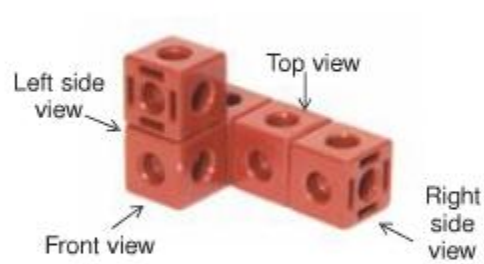
The left side view shows no change in depth. So, use linking cubes to build the left side first. The left side is shaped like a backward L.



Compare the front view. There is a change in depth in the object. To match that change, add 2 cubes to the back of the object.

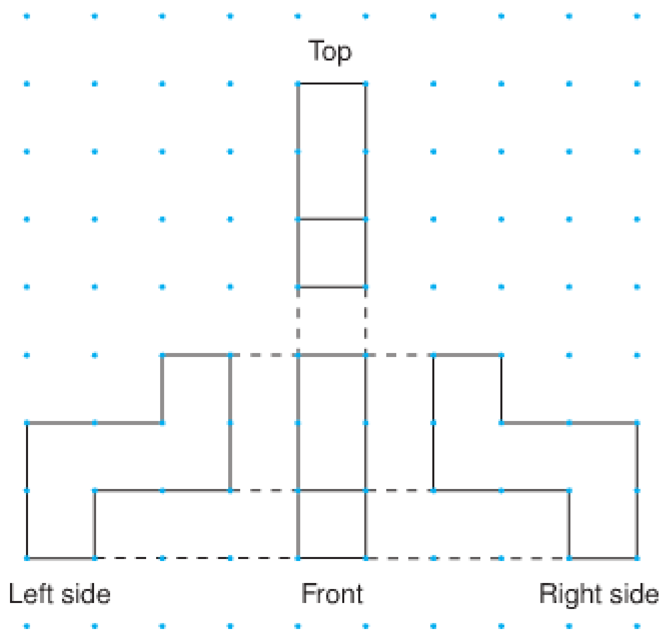


Check the top and the right views of the object. The views match the given views. So, the object is correct.

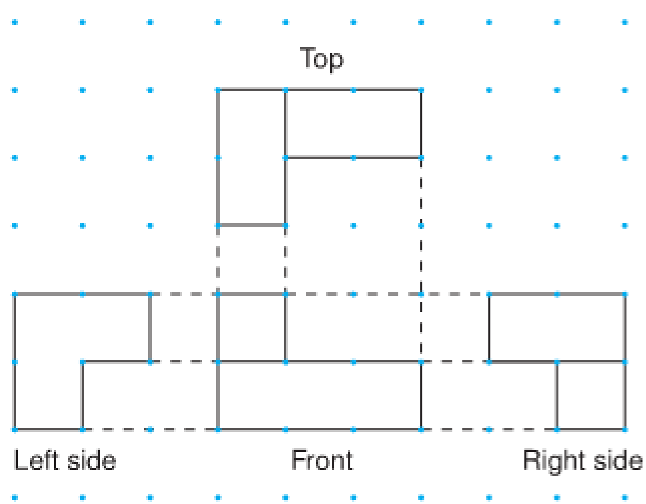


Use these views and build the object:

A)



B)

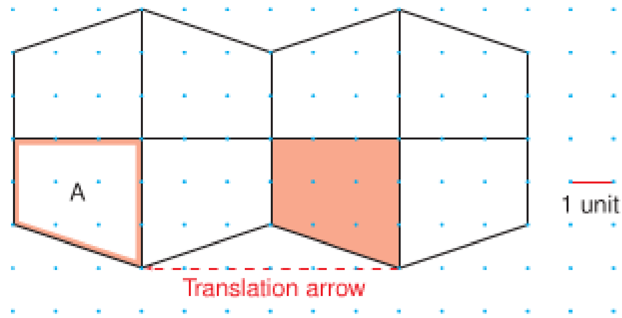


To complete on loose leaf: p.450# 4

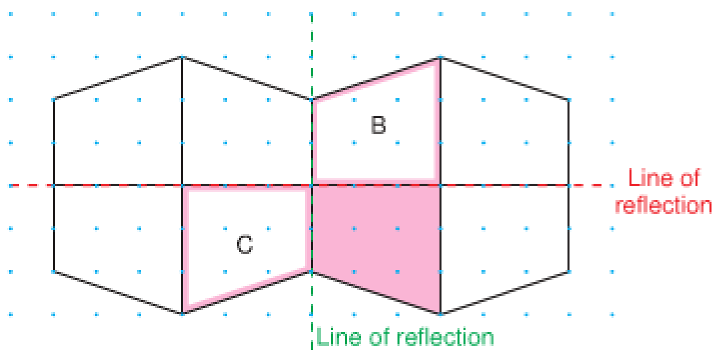
<u>Section 8.4: Identifying Transformations</u>

Here is a design that shows 3 different transformations:

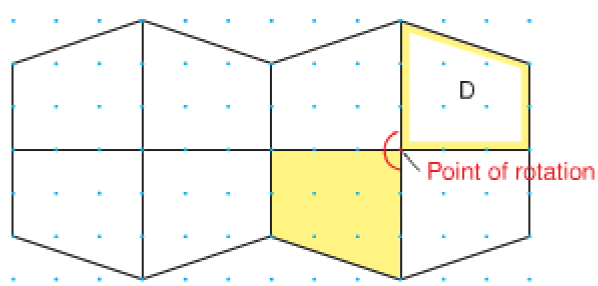
Translation:
The shaded shape is translated 6 units left. Its translation image is shape A. The translation arrow shows the movement in a straight line. The translation image and the shaded shape are **congruent** and have the **same orientation**.



Reflection:
The shaded shape is reflected in the horizontal line of reflection. Its reflection image is shape B. The shaded shape is reflected in the vertical line of reflection. Its reflection image is shape C. The shaded shape and each reflection have **opposite orientations**. Each reflection image and the shaded shape are **congruent**.



Rotation:
The shaded shape is rotated 180º clockwise about the point of rotation. The rotation image is shape D. We get the same image if we rotate 180º counterclockwise about the point of rotation. The rotation image and the shaded shape are **congruent** and have the **same orientation**.



Under any transformation (translation, reflection, or rotation), the original shape and its image are always congruent.

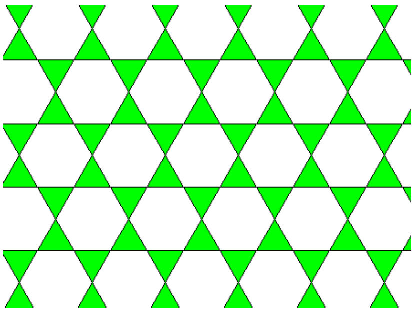
To complete on loose leaf: p.460# 5 - 7

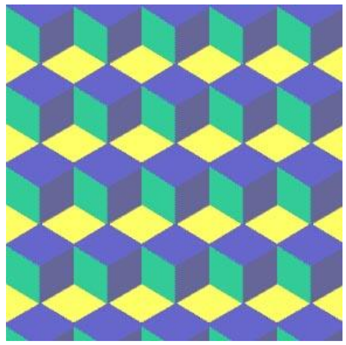
<u>Section 8.5: Constructing Tessellations</u>

A **tessellation** is created when a shape is repeated over and over again covering a plane without any gaps or overlaps. Another word for a tessellation is tiling.

Real-Life Examples of Tessellations:

- Floor tiles
- Quilting
- Fencing patterns
- Wall paper patterns
- Bricklaying patterns
- Company logos



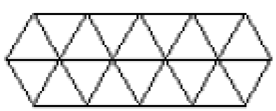


In order for a shape to tessellate, the sum of the angles at any point where vertices meet must be 360º. We say that the *polygons surround a point*.

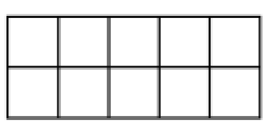
A regular polygon is a simple closed figure that has all sides congruent and all angles congruent. A **regular tessellation** means a tessellation made up of congruent regular polygons.

In a plane, only three regular polygons tessellate: triangles, squares or hexagons. This is because at any point where vertices meet, the sum of the angles is 360 degrees.

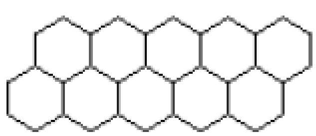
Triangles



Squares



Hexagons



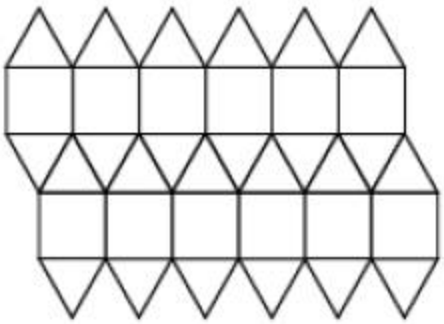
Here are the measures of the interior angles of several regular polygons:

Polygon	Interior angle measure
Triangle	$60°$
Square	$90°$
Pentagon	$108°$
Hexagon	$120°$
Octagon	$135°$
Decagon	$144°$
Dodecagon	$150°$

It is also possible to tessellate using combinations of regular polygons. When we combine two or more shapes together, we create a **composite shape.** Again, the sum of the angles at any point where vertices meet must still be 360 degrees.

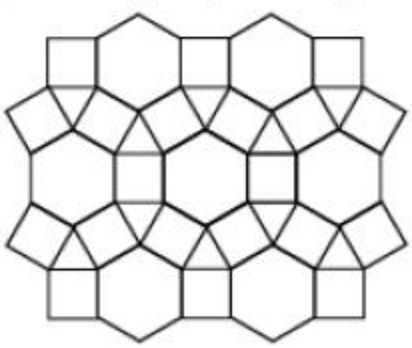
Examples:

- Three triangles and two squares at each vertex point



$$(60°+60°+60°)+(90°+90°)=360°$$

- Square, triangle, square, hexagon at each vertex point



$$90°+60°+90°+120°=360°$$

Notes:

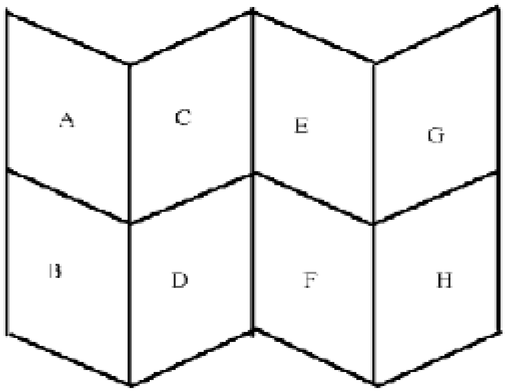
- **All triangles tessellate**
- **All quadrilaterals (4-sided figures) tessellate**
- **A polygon with more than 6 sides will not tessellate**

To complete on loose leaf: p.467-468# 6, 11

Unit 8.6: Identifying Transformations in Tessellations

We can describe a tessellation in terms of transformations.

For example:



- Shape A can be transformed into shape E through translation to the right.
- Shape A can be transformed into shape C by reflection in the side that is shared between them.
- Shape A can be transformed into shape B by rotating 180 degrees around the midpoint of their shared side.
- Shape A can be transformed into shape F if it is translated to the right to position E and then rotated 180 degrees around the midpoint of the shared side between E and F.
- Shape A can be transformed into shape D by being rotated 180 degrees around the midpoint of the side shared between A and B and then reflected in the side shared between B and D.

***Note: There are multiple ways to describe these translations.**

To complete on loose leaf: p.476# 3 & 4