Tessellations of Regular Polygons

We are going to investigate which combinations of regular polygons can be used to form a tessellation.

First we need to know the interior angles of various regular polygons. Fill in this table:

Regular Polygon	Number of sides	Exterior angle	Interior Angle
Triangle	3		
Square	4		
Pentagon	5		
Hexagon	6		
Heptagon	7		
Octagon	8		
Enneagon	9		
Decagon	10		
Dodecagon	12		
Pentadecagon	15		

Regular Tessellations
These use just one regular polygon. Fill in the table below to show which regular polygons would fit together round a vertex, and how many there would be at each vertex.

Polygon	Angle	Number at each vertex

Semi-Regular Tessellations
These contain two or more types of regular polygon, with the same combination of polygons around each vertex. Complete the following table listing the different possible combinations of interior angles around each vertex.

Angles	Polygons
2×135 + 90	2 octagons, 1 square

But will all these possibilities actually form a tessellation? Use the ***Tessellate*** program to try out each possibility (in your group, you could divide up the combinations in the table between you).

[You will find that not all the possibilities actually form a tessellation. Also, there is one combination of polygons which can be used to form a tessellation in two different ways, depending on how they are arranged around each vertex.]

The Full Monty
I have simplified this investigation a little. To go for completeness, you need to add the following polygons to your first table: 18-sided, 20-sided, 24-sided, 42-sided. Then using their interior angles you will be able to add four extra possible combinations to the third table. But unfortunately none of them actually form a tessellation.