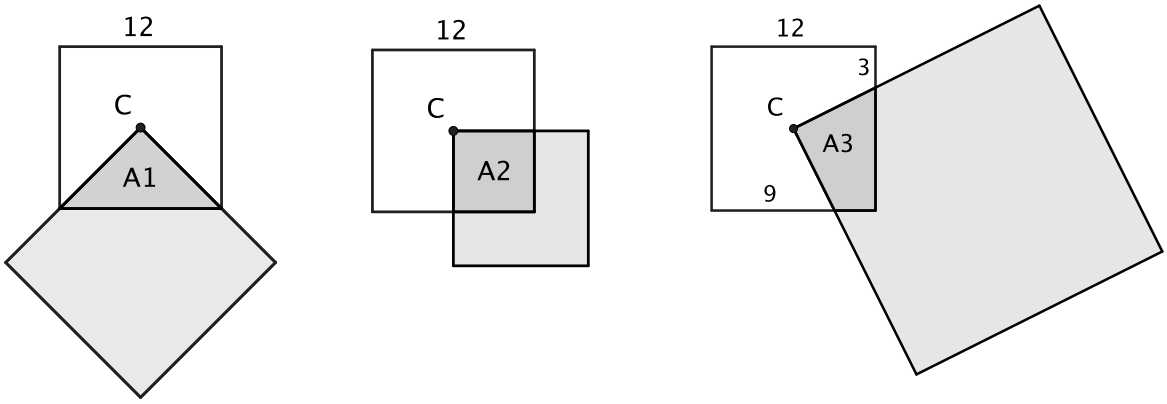
Problem of the Week
Problem B
Looks Can Be Deceiving

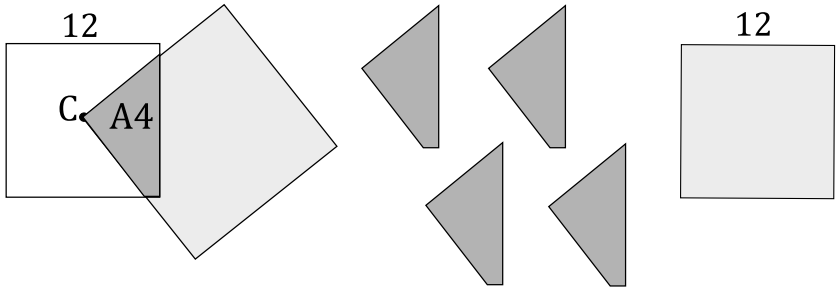
Using grid paper, you may wish to construct each of the diagrams shown below. This may be helpful as you work through the problem.

In each of the three diagrams below, there are two squares which overlap in various ways. The bottom square is fixed and has side length 12. The overlapping square has one vertex located at the centre C of the bottom square. The darker shaded regions are common to the two squares and are labeled $A1$, $A2$ and $A3$, respectively.



a) Determine the areas of $A1$, $A2$ and $A3$, the overlapping areas in each of the above diagrams. How is each of these areas related to the total area of the square of side length 12?

b) Below is a diagram in which the overlapping area, $A4$, is in an arbitrary position. Show that the blank square of side length 12 can be completely tiled by four copies of $A4$ and use this to determine the overlapping area, $A4$.



Extension: The above example shows us that the overlapping area of the two squares is 36 units^2, one-quarter of the total area. Would it make any difference if the overlapping figure were a rectangle? A right-angled triangle? Another polygon? Explain your thinking.