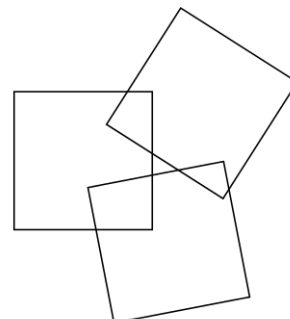**Stage 3** ★★
Mixed Selection 2

1. **Intersecting squares**
   Three congruent squares overlap as shown.

   The areas of the three overlapping sections
   are 2cm^2, 5cm^2 and 8cm^2 respectively.

   The total area of the non-overlapping parts of the
   squares is 117cm^2.

   What is the side length of each square?
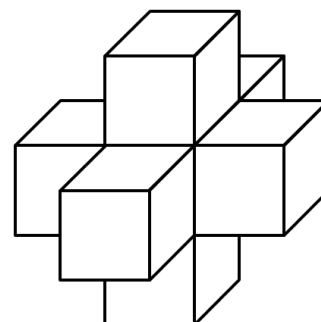
2. **Cubic masterpiece**
   A solid wooden cube is painted blue on the outside. The cube is then
   cut into 27 smaller cubes of equal size.

   What fraction of the total surface area of these new cubes is blue?

3. **Cubes on a cube**
   A cube has each of its faces covered by one face
   of an identical cube, making a solid as shown.
   The volume of the solid is 875cm^3.

   What, in cm^2, is the surface area of the solid?
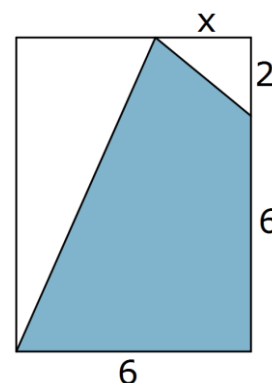
4. **Sideways ratio**
   A rectangle with area 125cm^2 has sides in the ratio $4:5$.

   What is the perimeter of the rectangle?

5. **Exactly three-quarters**
   Three-quarters of the area of the rectangle has been
   shaded.

   What is the length of x?

These problems are adapted from UKMT Mathematical Challenge problems (ukmt.org.uk)