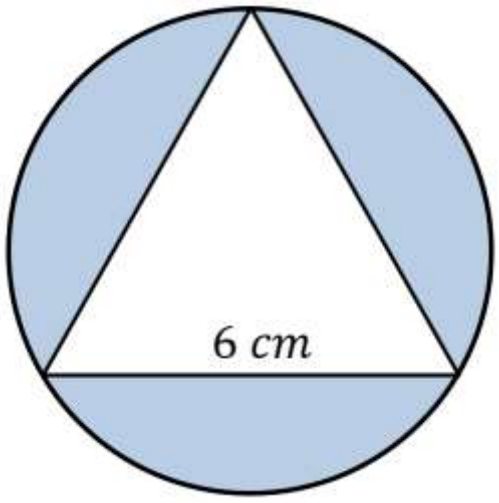
Mathematical Problem Solving
GCSE example

Example 14

The class have been studying trigonometry and have previously covered the formula for the area of a triangle. They have been set an exercise on the exact values of $\sin\theta$, $\cos\theta$ and $\tan\theta$ that includes the problem below.

- **know and apply formulae to calculate: area of triangles**
- **know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$, and the trigonometric ratios, $\sin\theta = \frac{opposite}{hypotenuse}$, $\cos\theta = \frac{adjacent}{hypotenuse}$ and $\tan\theta = \frac{opposite}{adjacent}$; apply them to find angles and lengths in right-angled triangles and, where possible, general triangles in two and three dimensional figures**
- **know the exact values of $sin\,\theta$ and $cos\,\theta$ for $\theta = 0°, 30°, 45°, 60°$ and $90°$; know the exact value of $tan\,\theta$ for $\theta = 0°, 30°, 45°$ and $60°$**
- **know and apply Area $= \frac{1}{2}ab\sin C$ to calculate the area, sides or angles of any triangle.**

DfE: Mathematics GCSE subject content and assessment objectives 2013



This diagram shows an equilateral triangle of side length 6 cm drawn inside a circle so that each corner touches the circumference of the circle.

What area of the circle is shaded?

Using this problem as part of an exercise on the exact values of $\sin\theta$, $\cos\theta$ and $\tan\theta$ would mean that the students are aware that there has to be some connection between those values and this problem.

The procedures from this guide can be applied:

- A question and answer session
  - What has to be done to find the areas?

- Where are the right-angled triangles?

- Engagement with the problem
  - The students try to work it out
- Student review
  - A check to see how and what they are doing
- Reflection
  - A summary of the best approach.