

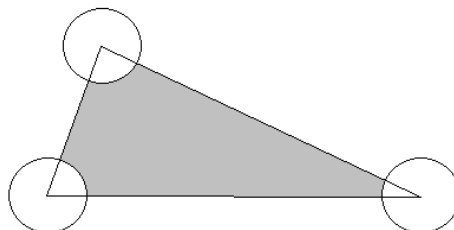


Stage 4 ★★

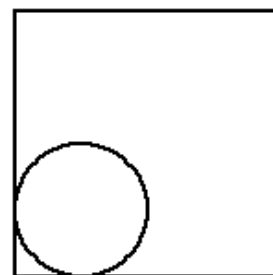
Mixed Selection 1

1. **Circled corners**

The diagram shows a triangle and three circles whose centres are at the vertices of the triangle. The area of the triangle is 80cm^2 and each of the circles has radius 2cm . What is the area in cm^2 of the shaded area?

2. **Rolling inside**

A circle of radius 1 rolls without slipping round the inside of a square of side length 4. Find an expression involving π for the exact number of revolutions the circle makes by the time it returns to its original position.

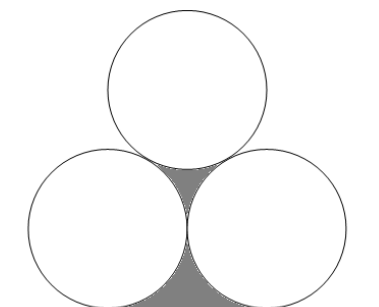
3. **Sticky tape**

A roll of adhesive tape is wound round a central cylindrical core of radius 3cm . The outer radius of a roll containing 20m of tape is 4cm . What is the approximate outer radius of a roll containing 80m of tape?

4. **Wood pile perimeter**

The diagram shows three touching circles each of radius 5cm and a line which touches two of them.

Find the total length of the perimeter of the two shaded shapes.



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