**Problem of the Week: Week 4 (Sum2): Year 9:** Geometry

- Calculate and solve problems involving the perimeters and areas of 2-D shapes including circles, areas of circles and composite shapes.
- Interpret mathematical relationships both algebraically and geometrically
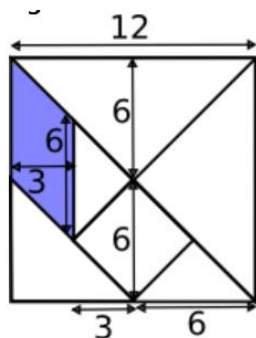
Tangram Area

The seven pieces in this 12 cm by 12 cm square make a Tangram set. What is the area of the shaded parallelogram?

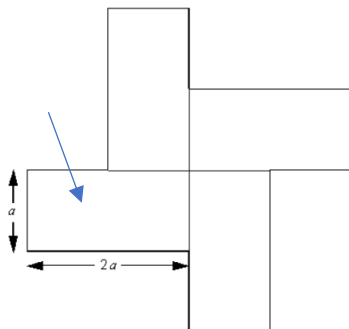https://nrich.maths.org/6254
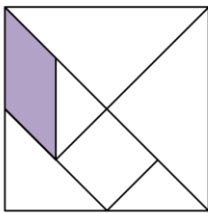
Solution

The point where the two diagonals meet is half way along which allows us to mark on some of the lengths.

The parallelogram has a base 6cm and height 3cm, so area 6cm x 3cm = 18cm^2

Shape

This shape is made of 4 congruent rectangles. Each rectangle has side lengths *2a* and *a*

Not drawn accurately

The perimeter of the shape is 80cm. Work out the area of the shape.

Solution

Counting around the sides there are 4 x length 2a but look carefully as there are 8 x length a
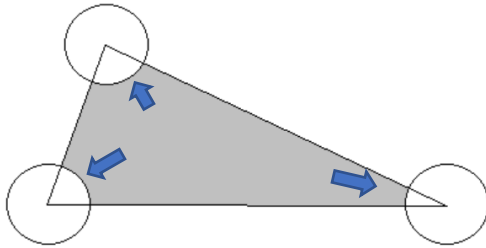
So (4 x 2a) + (8 x a) = 16a

80 ÷ 16 = 5 so a = 5

Each rectangle has an area of 5 x 10 = 50cm^2

So the total area is 50 x 4 = 200cm^2

Circle Corner

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 a radius *2cm*. What is the area, in cm^2, of the shaded area?

https://nrich.maths.org/7146

Solution

The three interior angles of the triangle add to 180° so looking at the three circles, the combined area of the three sectors of the circles (that are inside the triangle) add to 180° which is half a circle (with radius 2cm as given in the question):

Area of a circle is πr^2

$$\frac{1}{2} \times \pi \times 2^2 = \frac{4\pi}{2} = 2\pi.$$

So the grey area is $(80 - 2\pi)cm^2$.