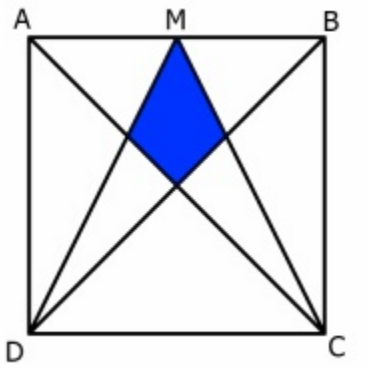
Problem Sheet 1

The following questions are all intended to help you to develop your problem-solving skills. It is not necessary to work through the problems in order; instead, choose the problems that appeal to you most, and tackle those first.

1. On my last birthday, my friend said to me: "In 15 years' time, your age will be the square of your age 15 years ago!" Can you work out how old I am?

2. ABCD is a square. M is the midpoint of the side AB. By constructing the lines AC, MC, BD and MD, the shaded quadrilateral is formed:



   What fraction of the total area is shaded?

3. Find the exact values of
$$\sqrt{2+\sqrt{3}}-\sqrt{2-\sqrt{3}}$$
   and of
$$\sqrt[3]{2+\sqrt{5}}+\sqrt[3]{2-\sqrt{5}}.$$

4. My phone number has seven digits: if the last four digits are placed in front of the remaining three you get one more than twice my number! What is the number?

5. What is the smallest perfect square that ends with the four digits 9009?

6. The positive whole numbers a, b and c are all different and $a^2+b^2+c^2=121$. What is the value of $a+b+c$?

7. Using each of the digits 1 to 9 once and once only, find two whole numbers one of which is double the other.