



**United Kingdom
Mathematics Trust**

Mentoring Scheme

Supported by **Ox**FORD
ASSET MANAGEMENT

Archimedes

Sample questions

These questions are taken from the first sheet and give a good indication of the level of difficulty and prerequisite knowledge required at the start of the programme.

1. Is it possible to draw a triangle in which the sum of any two angles is less than 120° ? You must prove your answer.
2. We choose six (different) numbers out of the ten integers $1, 2, 3, \dots, 10$. Prove that their product is divisible by a perfect square greater than 1.
3. At the reading of a will, Prudence and Ravi are told that they will inherit one sixth of the total money between them. There are conditions. They are not allowed to inherit the same amount as each other but each amount must be a simple fraction of the money, that is a fraction with numerator 1. If Prudence inherits $\frac{1}{x}$ and Ravi inherits $\frac{1}{y}$ of the total money, show that $xy - 6x - 6y = 0$.

In how many ways can the money be split between them?