Age 14+ Level ★★
Worksheet 1

1. **Divisible Expression**
    Show that $(1 + x + y)^2 - (1 - x - y)^2$ is divisible by 4 for all integer values of x and y.

2. **Little Difference**
    Without using a calculator, or performing any long multiplication calculations, find the value of $2015 \times 2017 - 2016^2$

    What about $2016 \times 2018 - 2017^2$?

3. **Brian's Number**
    Brian chooses an integer, multiplies it by 4 then subtracts 30.
    He then multiplies his answer by 2 and finally subtracts 10.
    His answer is a two-digit number.

    What is the largest integer he could have chosen?

4. **Adding to 400**
    Find four integers whose sum is 400 such that the first integer is equal to twice the second integer, three times the third integer and four times the fourth integer.

5. **Order the Products**
    Without calculating the five products below, put them in order of size, from smallest to largest.

    210×190 195×205 198×202 186×214 200×200

6. **Square and Cube**
    The square of a positive number is twice as big as the cube of that number. What is the number?

These problems are adapted from UKMT (ukmt.org.uk) and SEAMC (seamc.asia) problems.