

This problem is in two parts. The first part (questions A, B, C and D) provides some building blocks which will help you to solve the final challenge. These can be attempted in any order. Of course, you are welcome to go straight to the Final Challenge without looking at the building blocks!

Question A

Choose any whole number.

What happens when you multiply the numbers either side of it?

For example, if you choose 7, work out 6×8 . Repeat several times.

Notice anything interesting? Convince yourself it always happens.

Question B

Write down three consecutive numbers, none of which is a multiple of 3. If you can't, explain why.

Question C

Choose two factors of 120 which are **coprime** (they have a highest common factor of 1).

Multiply them together and record the result. Repeat several times.

Notice anything about your results?

Start with numbers other than 120. Does the same thing always happen?

Convince yourself.

Question D

Choose any two consecutive even numbers.

Multiply them together and record the result. Repeat several times.

Notice anything interesting? Convince yourself it always happens.

FINAL CHALLENGE

Take any prime number greater than

3, square it and subtract one. Repeat several times.

Notice anything interesting? Convince yourself it always happens.