

## ALWAYS PERFECT

$$2 \times 3 \times 4 \times 5 + 1 = 11 \times 11$$

$$21 \times 22 \times 23 \times 24 + 1 = 505 \times 505$$



Pick your own four consecutive numbers, find their product and add one. Is your answer a perfect square?

Show that if you add 1 to the product of four consecutive numbers the answer is ALWAYS a perfect square

## Help

It will help you to learn how to factorize the difference of two squares.

$$(a + b)(a - b) = a^2 - ab + ba - b^2 = a^2 - b^2$$

so we call  $a^2 - b^2$  'the difference of two squares' and factors are given by  $a^2 - b^2 = (a + b)(a - b)$

See: Difference of Squares: <https://aiminghigh.aimssec.ac.za/grades-8-to-10-differences-of-squares/>

## Extension

Work out the sequence of answers you get when you find the square roots of

$$1 \times 2 \times 3 \times 4 + 1$$

$$2 \times 3 \times 4 \times 5 + 1$$

$$3 \times 4 \times 5 \times 6 + 1 \dots \text{etc.}$$

What do you notice about this sequence? Can you find a formula for the  $n$ th term?

[The sequence of results is given by the formula  $2n + 4$  for the  $n$ th term.]

**Also see:** Take Three from Five <https://aiminghigh.aimssec.ac.za/grades-8-to-12-take-three-from-five/>