

$a, a+1, a+2, a+3$

PAIR PRODUCTS

Choose four consecutive whole numbers, for example, 4, 5, 6 and 7.

Multiply the first and last numbers together (28).

Multiply the middle pair together (30).

Choose different sets of four consecutive whole numbers and do the same.

What do you notice about the difference between the two products each time?

Choose five consecutive whole numbers, for example, 3, 4, 5, 6 and 7.

Multiply the first and last numbers together (21).

Multiply the second and fourth numbers together (24).

Choose different sets of five consecutive whole numbers and do the same.

What do you notice now about the difference between the two products?

What happens when you take 6 or 7 or 8, or ... n consecutive whole numbers and compare the product of the first and last numbers with the product of the second and penultimate numbers?

Explain your findings.

HELP

For the example of the 4 consecutive whole numbers 4, 5, 6 and 7

$4 \times 7 = 28$ and $5 \times 6 = 30$ and the difference $30 - 28 = 2$.

Take another example: 6, 7, 8, 9 then $6 \times 9 = 54$ and $7 \times 8 = 56$ and the difference $56 - 54 = 2$.

Try some more examples. Is the difference always 2? Why.

What happens with 5 consecutive whole numbers?

NEXT

This problem only operated on the end numbers and the 'end but one' numbers. Generalise further by looking at other pairs within the sequence.

For example, if you have an odd number of consecutive numbers, what's the difference between the product of the end numbers and the square of the middle number?

Also try the differences of pair products for:

4 consecutive even numbers

4 consecutive odd numbers

5, 6, 7, 8, ... x consecutive even or odd numbers

4 consecutive multiples of 3, 4, 5...

Decimals that differ by 1, such as 1.2, 2.2, 3.2, 4.2

Four numbers going up in 3s, such as 2, 5, 8, 11

Four numbers going up in $\frac{1}{2}$ s, such as 4, $4\frac{1}{2}$, 5, $5\frac{1}{2}$

Make up a few similar questions of your own. Impress your friends by giving them a calculator and 'predicting' what will happen!