Algebraic proof

1

Prove that an odd number, the even number after it and the odd number after that add to a multiple of 6.

write the numbers using n

$2n+1$ + ☐ + ☐

collect like terms

= ☐

factorise to show it

= ☐

So it is _____

2

Prove that the sum of two consecutive multiples of 6 is a multiple of 6.

write the numbers using n

☐ + ☐

collect like terms

= ☐

factorise to show it

= ☐

So it is _____

3

Prove that the sum of three consecutive multiples of 4 is a multiple of 12.

write the numbers using n

☐ + ☐ + ☐

collect like terms

= ☐

factorise to show it

= ☐

So it is _____

4

Prove that the sum of four consecutive even numbers is a multiple of 4.

☐ + ☐ + ☐ + ☐

= ☐

= ☐

So it is _____

5

Prove that $(n + 4)^2 - n^2$ is a multiple of 8 for every whole number n.

So it is _____

6

Ravi wants to prove that the sum of four consecutive odd numbers is a multiple of 8. He writes $1 + 3 + 5 + 7 = 16$, $3 + 5 + 7 + 9 = 24$ and $9 + 11 + 13 + 15 = 48$, so it is true. Explain why this is not a proof. Then prove it.

So it is _____

7

Prove that $(n + 5)^2 - (n + 4)^2$ is odd for every whole number n.

So it is _____

8

Prove that the difference between the squares of two consecutive even numbers is a multiple of 4.

So it is _____

Algebraic proof *further practice*

9

Prove that the sum of six consecutive numbers is a multiple of 3.

So it is _____

10

Prove that $3(n + 5) - (n + 3)$ is even for every whole number n.

So it is _____

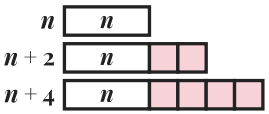
11

Zara picks a whole number. She adds 4, multiplies by 3, takes away the number she picked, then takes away 2.
Prove that her answer is always even.

So it is _____

12

The picture shows n, $n + 2$ and $n + 4$ as rows. Use it to explain why their sum is always a multiple of 3.
Then prove it with algebra.



So it is _____

13

Ella proves that the sum of any two odd numbers is even.
She writes
$(2n + 1) + (2n + 1) = 4n + 2 = 2(2n + 1)$.
What is wrong with her proof?
Write a correct proof.

So it is _____

14

Prove that the product of any two odd numbers is odd.

So it is _____

15

Prove that the sum of the squares of two consecutive numbers is always odd.

So it is _____

16

Kai says $n^2 + n$ is always even, for every whole number n.
Explain why Kai is right.

So it is _____