

Maths

Consecutive Number Proofs

Miss Davies

Please note some slides do have colour font on them



Consecutive number proofs

1. Prove that the sum of four consecutive odd numbers is a multiple of 8
2. Prove that the product of two consecutive even numbers is a multiple of 4



Consecutive number proofs

3. Prove that the sum of any 5 consecutive numbers is always a multiple of 5



Consecutive number proofs

4. Prove that the sum of any 3 consecutive odd numbers is not divisible by 6



Answers



Consecutive number proofs

1. Prove that the sum of four consecutive odd numbers is a multiple of 8

Let x be an integer $x \geq 0$

$$\begin{aligned} 2x + 1 + 2x + 3 + 2x + 5 + 2x + 7 &= 8x + 16 \\ &= 8(x + 2) \end{aligned}$$

2. Prove that the product of two consecutive even numbers is a multiple of 4

Let x be an integer $x \geq 0$

$$\begin{aligned} 2x(2x + 2) &= 4x^2 + 4x \\ &= 4(x^2 + x) \end{aligned}$$



Consecutive number proofs

3. Prove that the sum of any 5 consecutive numbers is always a multiple of 5

Let x be an integer $x \geq 0$

$$\begin{aligned}x + x + 1 + x + 2 + x + 3 + x + 4 &= 5x + 10 \\ &= 5(x + 2)\end{aligned}$$



Consecutive number proofs

4. Prove that the sum of any 3 consecutive odd numbers is not divisible by 6 Let x be an integer $x \geq 0$

$$\begin{aligned} 2x + 1 + 2x + 3 + 2x + 5 &= 6x + 9 \\ &= 6x + 6 + 3 \\ &= 6(x + 1) + 3 \end{aligned}$$

$6(x + 1)$ is a multiple of 6 so
 $6(x + 1) + 3$ is not a multiple of 6

