Multiple choice questions - Proof

Year: Year 12 · 10

Question 1 Which expression represents an odd number, where n is an integer?

- ◯ **A.** $2n$
- ◯ **B.** $2n + 1$
- ◯ **C.** $2n + 2$
- ◯ **D.** $n + 1$

Question 2 Which three expressions are consecutive integers?

- ◯ **A.** $n, 2n, 3n$
- ◯ **B.** $n - 1, n, n + 1$
- ◯ **C.** $n, n + 2, n + 4$
- ◯ **D.** $2n, 2n + 1, 2n + 3$

Question 3 A counter-example is used to

- ◯ **A.** prove a statement is true
- ◯ **B.** prove a statement is false
- ◯ **C.** check a calculation
- ◯ **D.** find a pattern

Question 4 Which is NOT a valid proof that a statement holds for all integers?

- ◯ **A.** Algebraic deduction
- ◯ **B.** Checking the first 100 integers
- ◯ **C.** Proof by exhaustion with all cases
- ◯ **D.** Showing the expression equals $3k$

Question 5 The sum of two even numbers $2a$ and $2b$ equals

- ◯ **A.** $4ab$
- ◯ **B.** $2(a + b)$
- ◯ **C.** $2a + b$
- ◯ **D.** $a + b$

Question 6 Which value of n is a counter-example to "$n^2 + n + 41$ is prime"?

- ◯ **A.** $n = 1$
- ◯ **B.** $n = 2$
- ◯ **C.** $n = 40$
- ◯ **D.** $n = 5$

Question 7 $(n+1)^2 - n^2$ simplifies to

- ◯ **A.** 1
- ◯ **B.** $2n$
- ◯ **C.** $2n+1$
- ◯ **D.** n^2+1

Question 8 To prove a result for all integers by exhaustion you can split them into

- ◯ **A.** positive and negative only
- ◯ **B.** even and odd
- ◯ **C.** primes and non-primes only
- ◯ **D.** squares only

Question 9 $x^2 - 4x + 5 = (x-2)^2 + 1$. This proves the expression is

- ◯ **A.** always zero
- ◯ **B.** always negative
- ◯ **C.** always at least 1
- ◯ **D.** sometimes negative

Question 10 A proof should end with

- ◯ **A.** a diagram
- ◯ **B.** a conclusion linking to the question
- ◯ **C.** a decimal answer
- ◯ **D.** nothing

Answer grid - Proof

Year: Year 12

Question	Answer	Explanation
1	**B**	Odd numbers are one more than an even number, so $2n+1$.
2	**B**	Consecutive integers differ by 1.
3	**B**	One counter-example disproves a statement.
4	**B**	Checking many cases is not a proof.
5	**B**	$2a+2b=2(a+b)$.
6	**C**	$40^2+40+41=1681=41^2$.
7	**C**	$n^2+2n+1-n^2=2n+1$.
8	**B**	Even and odd cover every integer.
9	**C**	A square is at least 0 so the whole expression is at least 1.
10	**B**	State what has been shown.