Algebraic Proof Exam Style Questions

ane says that the product of any two prime numbers is alway xplain why.	rs odd. Jane is wrong.
 	(1 mark)
ackson thinks that n^2+5n+1 is always a prime number foe correct?	or all integer values of n . Is
Yes No	
ason to support your answer.	
	(2 marks)

3. n is a positive in Explain why Aria		ession $n^2 + 3n + 2$ car	n never be prime.	
			(2 marks)	
4. Susan says that the product of a square number and a cube number is always even. Give an example to prove that Susan is wrong.				
	×			
			(1 mark)	
5. A is a positive even integer. B is a negative integer. Complete the following table.				
	Sometimes true	Always true	Never true.	
AB is odd				
A + B is positive.				
A^3B is negative.				
			(2 marks)	

6. Match up the following descriptions to expressions:

Any two numbers
Two consecutive numbers
Two consecutive even numbers
Two consecutive odd numbers
Any two even numbers
Any two odd numbers
Two square numbers
Two multiples of 8

n^2 , m^2
2n + 1, 2n + 3
n, n+1
n, m
2n, 2m
8n, 8 m
2n, 2n + 2
2n + 1, 2m + 1

(3 marks)

7. Prove algebraically that the sum of any odd integer and any even integer is always odd.

(2 marks)

8.	Prove algebraically that the sum of any two consecutive even integers is two more than a multiple of four.
	(2 marks)
9.	Prove algebraically that the product of any two consecutive even integers is always a multiple of four.
	(2 marks)

10. Prove that the product of any two consecutive odd integers is three more than a multiple of four.				
	(2 marks)			
11. Prove that the sum of any two even integers is always even.				
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12. Prove that the sum of any two consecutive numbers is odd.	
	(2 marks)
13. Prove that the sum of the squares of any two consecutive odd numbers is two rethan a multiple of eight.	more
	(3 marks)

14. Prove the sum of the squares of two consecutive multiples of four is always a multiple of 16.
15. Prove that the difference of the squares of any two consecutive integers is the same as
the sum of those two integers.
(3 marks)

16. Prove that the sum of any three consecutive even integers is always a multiple of six.				
(2	marks			
(2	marks			
17. Prove that the sum of $n(n+3)$ and $3n+9$ is always a square number for integer values of n .				

18. Prove that $4(x + 2)^2 + 2(x - 1)^2$ is always a multiple of six for all integer values of x.

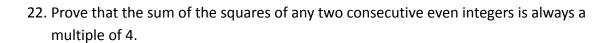
(3 marks)

19. Prove that $(7x + 1)^2 - (3x + 1)^2$ is always a multiple of 8 for all integer values of x.

20. Prove that $(5x + 1)^2 - (3x + 1)^2$ is always a multiple of 4 for all integer values of x.

(3 marks)

21. Prove that the sum $\frac{1}{2}n(n+2)$, $\frac{1}{2}n(n+10)$ and 4n+25 is always a square number for all integer values of n.



(3 marks)

23. Prove that $(n + 1)^2 + 3n(n + 2) + 10$ is always even for all integer values of n.

24.	Below	are the	first five	e terms	of an	arithmetic	sequence
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3, 7, 11, 15, 19

Prove that the difference of the squares of any two consecutive terms is always a multiple of 8.

25. x is an integer. Jasmine says that $x^2-(x+3)(x+5)$ is always negative. Jasmine is wrong. Explain why.	
	••
	••
(2 mar	ks

26. Prove that the sum of $\frac{1}{2}n(n+6)$, $\frac{1}{2}(n+2)(n+4)$ and 2(3n+16) is always a square number for all integer values of n.