**Inductive and Deductive Reasoning Final Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**A. Multiple Choice**

1) The sum of two even integers is even. This conjecture is best shown inductively by:

a) 2 + 2 = 4 b) 4 + -6 = -2

c) 103 + 3 = 106; 97 + 31 = 128; 346 + 121 = 467; 51 + 37 = 88

d) 2 + 4 = 6; 4 + 6 = 10; 102 + 24 = 126; 422 + 8 = 430

2) Most football players wear helmets. Helmets protect players from head injuries. The statement which

 follows logically is:

a) All football players are protected from head injuries.

b) Most football players are protected from head injuries.

c) No football players are protected from head injuries.

d) It is safe to play football without a helmet.

3) Which choice best shows deductive reasoning?

 a) Gravity makes things fall. The apple that hit my head was due to gravity.

b) Look at how all those people are behaving. They must be crazy.

c) I don’t like to speed so I drive the speed limit.

d) I have never seen Sally eat cake. Don’t give her a piece for dessert.

4) A counterexample can be used to:

a) Strengthen a conjecture. b) Prove a conjecture is false.

c) Complete a proof and show it’s true. d) Complete a proof and show it’s false.

5) Alice, Brittany, Carol, Dini, and Elise are on the school basketball team. All the following statements

 are true:

 There are at least 2 girls shorter than Alice.

 Dini is shorter than Carol.

 Brittany is not the shortest girl.

 Dini is taller than Alice.

The girls listed in order from **tallest** to **shortest** are:

 a) Dini, Alice, Elise, Brittany, Carol b) Elise, Carol, Alice, Brittany, Dini

 c)Elise, Alice, Carol, Brittany, Dini d) Carol, Dini, Alice, Brittany, Elise

6) A conjecture that most accurately describes the pattern seen in

 13 + 23 = 9, 13 + 23 + 33 = 36, 13 + 23 + 33 + 43 = 100 would be

 a) The sum of the cubes of consecutive natural numbers is a multiple of 9.

b) The sum of the cubes of consecutive natural numbers results in a perfect square.

c) The sum of the cubes of consecutive natural numbers is the sum of the consecutive numbers

 squared.

d) The sum of the cubes of consecutive natural numbers is divisible by 3.

**B. Short Answer**

**Show all the calculations and other work you used to determine the answer.**

7) The diagram shows the number of fence posts used to enclose square fields. The fence posts are

 placed **one metre apart**.

1 m



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Side length (m) | 1 | 2 | 3 | 4 |
| # of posts |  |  |  |  |

 a) Make a conjecture about the number of fence posts needed to enclose a square field with side length

 **m** metres.

 Conjecture: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 b) Provide one example that supports this conjecture.

8) Use the examples given below to make a conjecture. Write **2 more examples** that support your

 conjecture.

 22 = 4 Conjecture: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 222 = 484 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 2222 = 49 284

 22222 = 4 937 284 Examples: 1) 2)

|  |  |  |
| --- | --- | --- |
| **Conjecture** | **Supporting Example** | **Counterexample** |
| a) Multiples of 4 are divisible by 8 |  |  |
| b) All provinces of Canada share a border with the U.S. |  |  |

9) For each conjecture below, give **an example** that supports it, then give a **counterexample.**

10) Use deductive reasoning to **prove** that the sum of two odd integers is even.

11) Use deductive reasoning to prove that the sum of any three **consecutive** integers is a multiple of 3.

12) Below is the proof that the product of two odd integers is an odd number. Circle the error and

 correct it in the space below.

(2n + 1)(2m + 1) Choose 2 odd integers

4mn + 2n + 2m + 1 Multiplied the numbers using distributive property

4(mn + n + m) + 1 Factored out 4 from every term

13) Tom’s proof is supposed to prove that 7 = 8. Circle the error in his proof and explain why it is wrong.

Suppose that: a + b = c

 Written as 8a – 7a + 8b – 7b = 8c – 7c

 Rearranged as 7a + 7b – 7c = 8a + 8b – 8c

 Using distributive Property 7(a + b – c) = 8(a + b – c)

 Dividing both sides by (a + b – c) 

14) Zoey made the following conjecture: The difference between the squares of consecutive even numbers is even. Elita, and Candice presented their work to prove Zoey’s conjecture.

|  |  |
| --- | --- |
| Elita’s Work | Candice’s Work |
| 82 – 62 = 28122 – 102 = 44202 – 222 = 841002 – 982 = 396And so on…Zoey’s conjecture is valid | Let 2n and 2m be the even numbers(2n)2 – (2m)24n2 – 4m24(n2 – m2)Zoey’s conjecture is valid |

Which student had the strongest proof and explain why. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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15) Four people are running in a marathon. Max is 30 metres behind Maggie. Calvin is 20 m behind Thomas.

 Maggie is 75 metres ahead of Calvin. How far ahead of Thomas is Max? (Use a diagram)

16) Evans, Thompson, Smith, and Diaz are a teacher, plumber, artist, and banker. Use the clues below and

 state who is who.

* Thompson met the artist when he hired her to paint his portrait.
* The plumber and Diaz are friends who have never had any business dealings.
* Neither Evans nor the plumber has ever met Smith.

Teacher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Plumber \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Artist \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Banker \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Use the chart if you need it.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Teacher | Plumber | Banker  | Artist |
| Evans |  |  |  |  |
| Thompson |  |  |  |  |
| Smith |  |  |  |  |
| Diaz |  |  |  |  |