

KEY

Unit 1 – Logic – Practice Test

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. Emma works part-time at a bakery shop in Saskatoon. Today, the baker made 20 apple pies, 20 cherry pies, and 20 bumbleberry pies. Which conjecture is Emma most likely to make from this evidence?
- a. People are more likely to buy bumbleberry pie than any other pie.
 - b. People are more likely to buy apple pie than any other pie.
 - c. Each type of pie will sell equally as well as the others.
 - d. People are more likely to buy cherry pie than any other pie.

- _____ 2. Bradley gathered the following evidence.

$4(44) = 176$

$5(44) = 220$

$6(44) = 264$

Which conjecture, if any, is Bradley most likely to make from this evidence?

- a. When you multiply a one-digit number by 44, the first and last digits of the product form a number that is four times the original number. ✓ 16 is 4 times 4, 20 is 4 times 5, etc.
- b. When you multiply a two-digit number by 44, the first and last digits of the product form a number that is twice the original number. ✗
- c. When you multiply a one-digit number by 44, the sum of the digits in the product is equal to the original number. ✗
- d. None of the above conjectures can be made from this evidence.

- _____ 3. Which conjecture, if any, could you make about the product of two odd integers?

- a. The product will be an even integer.
 - b. The product will be an odd integer.
 - c. The product will be negative.
 - d. It is not possible to make a conjecture.
- $3 \times 5 = 15$ $(2n+1)(2m+1)$
 $7 \times 1 = 7$ $= 4nm + 2n + 2m + 1$
 $= 2(2nm + n + m) + 1$

- _____ 4. Jason created the following table to show a pattern.

Multiples of 27	54	81	108	135	162
Sum of the Digits	9	9	9	9	9

Which conjecture could Jason make, based solely on this evidence? Choose the best answer.

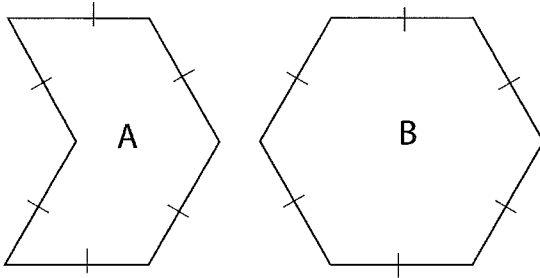
- a. The sum of the digits of a multiple of 27 is equal to 9. ✓
- b. The sum of the digits of a multiple of 27 is an odd integer.
- c. The sum of the digits of a multiple of 27 is divisible by 9.
- d. Jason could make any of the above conjectures, based on this evidence. Technically yes although a) is more specific.

5. Sasha made the following conjecture:

All polygons with six equal sides are regular hexagons.

regular

Which figure, if either, is a counterexample to this conjecture? Explain.



- a. Figure A is a counterexample, because all six sides are equal and it is a regular hexagon.
- b. Figure B is a counterexample, because all six sides are equal and it is a regular hexagon.
- c. Figure B is a counterexample, because all six sides are equal and it is not a regular hexagon.
- d. Figure A is a counterexample, because all six sides are equal and it is not a regular hexagon.

6. Henry made the following conjecture:

The square of a number is always greater than the number.

Is the following equation a counterexample to this conjecture? Explain.

$$0.4^2 = 0.16$$

- a. Yes, it is a counterexample, because 0.4 is less than 0.16.
- b. No, it is not a counterexample, because 0.16 is less than 0.4.
- c. No, it is not a counterexample, because 0.4 is less than 0.16.
- d. Yes, it is a counterexample, because 0.16 is less than 0.4.

7. All birds have backbones. Birds are the only animals that have feathers.
Rosie is not a bird. What can be deduced about Rosie?

- 1. Rosie has a backbone.
- 2. Rosie does not have feathers.

- a. Neither Choice 1 nor Choice 2
- b. Choice 1 only
- c. Choice 1 and Choice 2
- d. Choice 2 only

probably, but technically you could have a "non-animal" with feathers I guess?

8. Which of the following choices, if any, uses deductive reasoning to show that an odd number and an even number sum to an odd number?

- a. $(2x + 1) + 2y = 2(x + y) + 1$
 - b. $2x + 2y + 1 = 2(x + y + 1)$
 - c. $3 + 6 = 9$ and $4 + 5 = 9$
 - d. None of the above choices
-

9. What type of error, if any, occurs in the following deduction?

All swimmers can swim one kilometre without stopping. *← may not be true*
Joan is a swimmer.
Therefore, Joan can swim one kilometre without stopping.

- a. a false assumption or generalization
 - b. an error in reasoning
 - c. an error in calculation
 - d. There is no error in the deduction.
-

10. What type of error, if any, occurs in the following proof?

$$\begin{aligned} 3 &= 3 - 1 \quad \leftarrow \text{obviously not true} \\ 2(3) &= 2(3 - 1) \\ 2(3) + 1 &= 2(3 - 1) + 1 \\ 6 + 1 &= 4 + 1 \\ 7 &= 5 \end{aligned}$$

- a. a false assumption or generalization
 - b. an error in reasoning
 - c. an error in calculation
 - d. There is no error in the proof.
-

11. What type of error, if any, occurs in the following proof?

$$\begin{aligned} 3 &= 3 \\ 7(3) &= 7(2 + 1) \\ 7(3) + 6 &= 7(2 + 1) + 6 \\ 21 + 6 &= 14 + 7 \quad \leftarrow \text{mistake} \\ 27 &= 21 \end{aligned}$$

- a. a false assumption or generalization
 - b. an error in reasoning
 - c. an error in calculation
 - d. There is no error in the proof.
-

___ 12. Determine the unknown term in this pattern.

3, 6, 12, 24, ____, 96, 192

- a. 48
- b. 36
- c. 102
- d. 96

double each time

___ 13. Which number should appear in the centre of Figure 4?

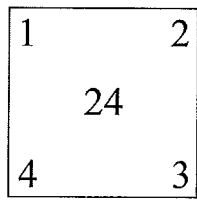


Figure 1

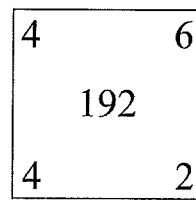


Figure 2

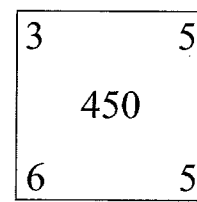


Figure 3

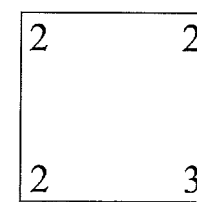


Figure 4

2x2x2x3

- a. 41
- b. 24
- c. 36
- d. 11

___ 14. Which number should go in the grey square in this Sudoku puzzle?

1		5		3	2	6	
7		3			8	4	
			9				
	1						2
		7	5		6	8	
4						9	
				3			
	4		2		7		1
	6	2		5	4		9

- a. 2
- b. 8
- c. 4
- d. 6

Written Section

1. Using inductive reasoning, what conjecture could you make about the product of two even integers and one odd integer? (1 marks for examples and 1 mark for conjecture) (2 marks)

$$2 \times 4 \times 1 = 8$$

$$6 \times 4 \times 3 = 72$$

$$4 \times 8 \times 5 = 160$$

Answer is ALWAYS even

2. While driving along the road one morning, Jenny noticed that all the cows in a field were standing up, with their heads pointing northward. In the afternoon, it started to snow. Jenny made the conjecture that when cows stand and face northward, it will likely snow. Is Jenny's conjecture reasonable? Briefly justify your decision.

(1 marks)

NO, based on only one example.

3. Ryan made the following conjecture:

Every even number can be written as the sum of two consecutive integers.

Do you agree or disagree? Briefly justify your decision with a counterexample if possible.

(2 marks)

$$\left. \begin{array}{l} 6 = 0+6 \\ 1+5 \\ 2+4 \\ 3+3 \end{array} \right\} \text{none are consecutive}$$

4. Prove, using deductive reasoning, that the product of an even integer and an odd integer is always even.

(3 marks)

$$2n(2m+1)$$

$$= 4nm + 2n$$

$$= 2(2nm + n)$$

QED

when you simplify
the answer has a
factor of 2!

5. A number trick states: Pick any number. Add 3. Double it. Subtract 2. Divide by 2. Subtract the original number. (5 marks)

a) Use inductive reasoning to make a conjecture about the answer

$$5 \rightarrow 8 \rightarrow 16 \rightarrow 14 \rightarrow 7 \rightarrow 2$$

$$0 \rightarrow 3 \rightarrow 6 \rightarrow 4 \rightarrow 2 \rightarrow 2$$

$$9 \rightarrow 12 \rightarrow 24 \rightarrow 22 \rightarrow 11 \rightarrow 2$$

Answer is ALWAYS
2!

b) Use deductive reasoning to prove why the trick 'works'

$$n \rightarrow n+3 \rightarrow 2n+6 \rightarrow 2n+4 \rightarrow n+2 \rightarrow (2)$$

6. Sir Arthur Conan Doyle wrote the mystery story "Silver Blaze". In this story, Sherlock Holmes investigates the theft of a famous race horse.

Holmes learns the following facts:

- The family dog did not bark when the crime happened.
- The crime happened at night.
- The family dog always barks at strangers at night.

What deduction could Holmes make about who committed the crime? Explain briefly.

(2 marks)

The crime was not committed by a stranger.

7. Do the following statements demonstrate inductive reasoning or deductive reasoning?

(1 mark each)

I

D For the past three years, a bush has produced roses.
Therefore, the bush will produce roses this year.

I

D Every Monday afternoon at 6:00 p.m., the news is broadcast on television.
Today is Monday, therefore, the news will be broadcast on television.

I

D

All reptiles have scales. Crocodiles are reptiles. Therefore, crocodiles have scales.

I

D

Every high school student in western Canada has to take math.
You are a high school student in western Canada, therefore you have to take math.

8. Draw the next figure in this sequence (as best as you can).

(2 marks)

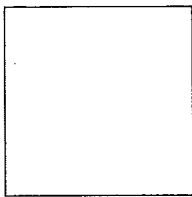


Figure 1

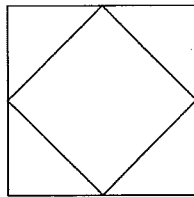


Figure 2

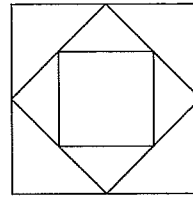
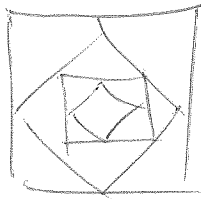


Figure 3



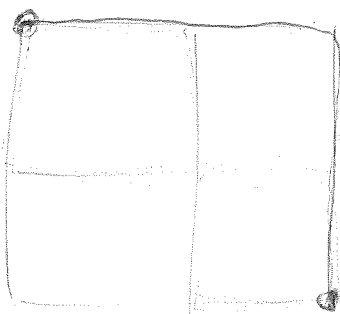
9. Andrew, Bertha, Carla, and Dixon all live on the same street. One is a chef, one is a police officer, one is an editor, and one is a travel agent. Use the statements below to determine which person is each profession. (4 marks)

- Dixon and Carla eat dinner with the editor.
- Andrew and Bertha carpool with chef.
- Carla watches soccer on television with the chef and the editor.
- Andrew is the travel agent.

Working Grid

	Chef	Police	Editor	Travel Agent
Andrew	X	X	X	✓
Bertha	X	X	✓	X
Carla	X	✓	X	X
Dixon	✓	X	X	X

10. A city centre is composed of 4 blocks. How many different ways could you drive from one corner to the opposite corner without going backwards? (2 marks)



6 different ways

