SIR PATOO🍂

Instructions:
1. Provide your **EXAM CODE** at the front page of the answer booklet. Failure to write your **EXAM CODE** will result in a score of **zero (0)** for section A.
2. Answer ALL Questions in Section "A" in the answer booklet.
3. Answer *any two (2)* Questions in Section "B" in the answer booklet.

SECTION A   *[Answer ALL Questions in this Section]*   *(20 MARKS*

1. Which of the following statements are **true**?

    I. ∩𝕐||| = 𝅭𝅭𝅭𝅭𝅭𝅭 𝅭𝅭𝅭

    II. ∩|𝕐|| = 113

    III. 113 = 𝅭𝅭𝅭𝅭𝅭𝅭 𝅭𝅭𝅭

    A. I & II only
    B. I & III only
    C. II & III only
    D. I, II & III

2. When any two consecutive triangular numbers are added the result is a square number. This statement is _____.
    A. always false
    B. always true
    C. neither true nor false
    D. sometimes true

$\frac{n}{2}(n+1)$ 1, 2, 3, 4, 5,

3. A mathematics *postulate* is described as a _____.
   A. deduction which demonstrates the validity of a statement
   B. hypothesis whose truth value is not yet established
   C. self-evident truth with its basis in geometrical ideas
   D. statement which holds for an underlying algebraic concept

4. The mathematician who is known to have demonstrated that there are propositions that are *undecidable* is called _____.
   A. Betrand Russell
   B. Epimenides
   C. Kurt Gödel
   D. Richard Skemp

5. The assertion that "*All Cretans are liars*" associated with a Cretan philosopher refers to the paradox titled _____.
   A. Archilles and Tortoise Paradox
   B. Epimenides' Libel
   C. Lazy bones Paradox
   D. Russell's Paradox

6. Which one of the following statements **best** describes *square root* of a given natural number?
   A. One of the factors of the given natural number
   B. One of the two equal factors of the given number
   C. The product of two equal factors
   D. The result of multiplying a number by itself

7. When an object is repositioned and reflected but not resized, the resulting image is congruent to the original object. This statement is

   _____.
   A. always true
   B. always false
   C. sometimes true
   D. undecidable

8. The belief that truths in mathematics appear to be necessary and certain and almost independent of humankind is attributed to the _____.

    A. Absolutists
    B. Constructivists
    C. Fallibilists
    D. Formalists

9. Which one of the following statements is **true** about the natural number 9?
    A. It is an abundant and a polite number
    B. It is a deficient and a polite number
    C. It is a deficient and a feminine number
    D. It is an abundant and a masculine number

10. In *counting on* principle, the learner _____
    A. counts all objects for the first addend, and then finger counts for the second addend.
    B. counts objects for the first and the second addends and then counts all combined.
    C. makes all objects for the first addend, and all the objects for the second addend.
    D. states one of the addends and then "finger" counts to represent the second addend.

11. The central idea of Constructivism is that human learning is constructed and that learners _____.
    A. are tabula rasa on which new knowledge is etched
    B. build knowledge upon established formalized teacher given rules
    C. build new knowledge upon the foundation of previous learning
    D. passively receive information transmitted to them by the teacher

12. Because we can express 24 as a sum of two or more consecutive natural numbers, we say 24 is a/an _____ number.
    A. abundant
    B. friendly
    C. perfect
    D. polite

13. The smallest natural number that is divisible by two or more given numbers is known as the _____ of the given numbers.
    A. greatest common factor
    B. greatest common multiple
    C. lowest common factor
    D. lowest common multiple

14. Which one of the following philosophies of mathematics holds the belief that "*there is no authoritative source of knowledge and that we are all not perfect and so mathematical knowledge should be open to revision*"?
    A. Absolutism
    B. Fallibilism
    C. Formalism
    D. Platonism

15. The type of reasoning in which we start with a hypothesis and then use logic to fit in the specific cases is referred to as _____ reasoning.
    A. Deductive
    B. Inductive
    C. Sound
    D. Valid

16. A geometric figure having a *point symmetry* about a turn centre implies that the figure has _____.
    A. rotational or folding symmetry
    B. rotational symmetry of order 3

4

C. 120° rotational symmetry

Dₜ 180° rotational symmetry

17. Scaling uniformly in all directions, as used in scale drawing, **always** produces _____ figures.
    A. congruent
    Bₜ enlarged
    C. similar
    D. translated

18. The mathematician who made the statement "*Euclid is vindicated from all defects*" after failing several times to prove Euclid's 5ᵗʰ postulate is called _____.
    A. Bolyai
    B. Gauss
    C. Proclus
    Dₜ Saccheri

19. Which one of the following statements is **always true** about ***natural*** numbers?
    A. Even numbers are exactly divisible by odd numbers.
    B. Even numbers leave a remainder when divided by 2.
    C. The product of two odd numbers is an odd number.
    D. The sum of two odd numbers is a perfect number.

20. Which of the following statements are **true** about a *perfect* number?
    I.   The sum of its proper divisors is equal to the number itself.
    II. The sum of all its divisors is twice the number itself.
    III. It is less than the sum of all its proper divisors.
    Aₜ I & II only
    B. I & III only
    C. II & III only
    D. I, II & III

SECTION B

Answer any two (2) questions from this section.

1. a) i) Distinguish between *proper factors* and *factors* of a given natural number? Illustrate each with a suitable example.   [8 Marks]

   ii) Explain each of the following mathematics education terms, illustrating with **two** examples each: *deficient, abundant* and *perfect* natural numbers.   [12 marks]

2. a) Explain **three** definitions of mathematics.   [9 Marks]

   b) Explain how you would use *prime factorization* approach to find *the highest common factor of 72 and 120.*   [11 Marks]

3. a) Explain **two** main beliefs held by the Fallibilist philosophers of Mathematics.   [6 Marks]

   b) i) What is meant by an algorithm in mathematics education?   [2 Marks]

   ii) Explain, in sequence, how to use **HMMDIA** algorithm to solve the subtraction problem: $673 - 87 = ?$ [12 Marks]

4. a) Without using the *calculator* or *long division*, determine whether or not each of the following numbers is divisible by 9. Explain your reasoning.
   i)   33287600327   [4 marks]
   ii) 14720362814961   [4 marks]

b) Explain the following terms, illustrating each with an example:

   (i)   Direct and indirect isometry;   **[6 Marks]**

   (ii) Congruent figures;   **[3 Marks]**

   (iii) Similar figures.   **[3 Marks]**

UNIVERSITY OF CAPE COAST
COLLEGE OF DISTANCE EDUCATION
EXAMINATIONS UNIT

EXAM CODE 02

UNIVERSITY OF CAPE COAST
COLLEGE OF DISTANCE EDUCATION
SEMESTER I QUIZ I, 2020/2021
BACHELOR OF PRIMARY & JUNIOR HIGH SCHOOL EDUCATION
BPE & BJHSE YR 2
EBS 289: NATURE OF MATHEMATICS

EXAM CODE: 02

NAME: FRIMPONG ADDO PATRICK

REGISTRATION NO. DJHSE/GA/07/19/0078 SIGNATURE:

STUDY CENTRE: WASS ADENTA ACCRA TIME ALLOWED: 30 MINUTES

INSTRUCTION: *Answer all questions by circling the correct option in ink.*

1. The components of the *cycle of investigation* in mathematics are sequentially arranged as _____.
   - A. representation, manipulation and validation
   - B. representation, manipulation and variation
   - C. representation, validation and manipulation
   - D. representation, variation and manipulation

2. *The process that starts with an input in a particular state of affairs, goes through a transformation which results with an output in a final state of affairs,* is referred to as a/an _____ in mathematics.
   - A. algorithm
   - B. antinomy
   - C. conjecture
   - D. Operation

3. An *axiom* in mathematics is best described as a _____.
   - A. deduction to demonstrate that a process is true
   - B. proposition which holds for an underlying concept
   - C. proposition whose truth value has been established
   - D. statement whose truth value is unknown

4. The name of the mathematician associated with the demonstration that there are propositions that are *undecidable* is _____.

    A. Betrand Russell
    B. Epimenides
    C. Kurt Gödel
    D. Richard Skemp

5. Which of the following paradoxes concerns a Cretan philosopher asserting that "*All Cretans are liars*"?

    A. Epimenides' Libel
    B. Lazy bones Paradox
    C. Russell's Paradox
    D. Tortoise and Archilles Paradox

6. The statement that *the square of the hypotenuse is equal to the sum of the squares of the other two sides in any right-angled triangle*, is known as the _____.

    A. Pythagorean Theorem
    B. Fermat's Last Theorem
    C. Euclidian Theorem
    D. Binomial Theorem

7. Another name for the mathematics education term *antinomy* is _____.

    A. conjecture
    B. libel
    C. paradox
    D. proof

8. Which one of the following mathematician philosophers described mathematics as "*the most abstract and so the most powerful of all theoretical systems*"?

    A. Bertrand Russell
    B. Richard Skemp

C. James Rees
D. Morris Kline

9. Which of the earliest numeration systems was known to have employed only two wedge-shaped characters called *cuneiform*?
    A. Romans
    B. Hindu-Arabic
    C. Egyptians
    D. Babylonians

10. The letters of the acronym for HMMDIA algorithm stand for _____.
    A. How Many More Did I Add
    B. How Much Money Do I Add
    C. How Much More Do I Add
    D. How Much More Do I Apply

11. The historical book authored by Euclid is titled _____.
    A. Al-jabir
    B. Cuneiform
    C. Elements
    D. Papyrus

12. Which one of the following terms fits the description *"a number which has exactly two factors; the number itself and one"*?
    A. Composite number
    B. Odd number
    C. Perfect number
    D. Prime number

13. The assertion that "Nature's great book is written in Mathematical language" is attributed to _____.
    A. Sir James Jeans
    B. Morris Kline
    C. Galileo
    D. Bertrand Russell

14. The *counting on* principle stipulates that the learner _____.
    A. counts all objects for the first addend, and then finger counts for the second addend
    B. counts objects for the first and the second addends and then counts all combined
    C. makes all objects for the first addend, and all the objects for the second adden
    D. states one of the addends and then "finger" counts to represent the second addend

15. Any proposition, which off hand appears to be true but is actually false, or which appears to be false, but is actually true is referred to as _____.
    A. algorithm
    B. antinomy
    C. axiom
    D. conjecture

16. Which one of the following statements best describes *square root* of a given natural number?
    A. One of the factors of a given natural number.
    B. One of two equal factors of the given number.
    C. The product of two equal factors.
    D. The result of multiplying a number by itself.

17. Two primary sources of Egyptian mathematics were _____ papyri.
    A. Rhind and Reisner
    B. Rhind and Moscow
    C. Moscow and Leather Roll
    D. Leather Roll and Reisner

18. Which one of the following mathematics terms is best described as a *mathematical proposition whose truth value is yet to be known?*
    A. Antinomy
    B. Axiom
    C. Conjecture
    D. Theorem

19. The famous conjecture "The equation $x^n + y^n = z^n$, where x, y, z are integers is impossible when n is an integer greater than 2" is referred to as _____.
    A. Euclid's Infinity of Primes
    B. Fermat's Last Theorem
    C. Goldbach's Conjecture
    D. Russell's Paradox

20. The proposition that *any even number greater than 2 is the sum of two primes* is often referred to as _____.
    A. Goldbach's even number conjecture
    B. Fermat's Last Theorem
    C. Fermat's even prime number conjecture
    D. Euclid's infinity of even primes

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4. a. i. State the *principle of mathematical induction*. [2 marks]

   ii. Use the principle of mathematical induction to prove that "the sum of the first n even positive integers is $n(n + 1)$. [8 marks]

   b. Use implications to determine whether or not the following argument is valid. "If the teacher's explanation is too long, students get bored. But if students pay attention, they do not get bored. So no explanation is too long for students who pay attention". [10 Marks]

5. a. For each of the following,

   i. abundant number

   ii. deficient number [5 marks]

   α) explain what it is [5 marks]
   β) give an example of each
   θ) give a reason for your answer.

   b. Use implications to determine whether or not the following argument is valid. "If the teacher's explanation is too long, students get bored. But if students pay attention, they do not get bored. So no explanation is too long for students who pay attention". [10 marks]