

**AUGUST 2023
EBS 371
PEDAGOGICAL CONTENT
KNOWLEDGE IN MATHEMATICS
2 HOURS**

Candidate's Index Number
Signature:

**UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
SCHOOL OF EDUCATIONAL DEVELOPMENT AND OUTREACH
INSTITUTE OF EDUCATION**

**COLLEGES OF EDUCATION
FOUR-YEAR BACHELOR OF EDUCATION (B.ED)
THIRD YEAR, END-OF-FIRST SEMESTER EXAMINATION, AUGUST 2023**

15TH AUGUST 2023

**PEDAGOGICAL CONTENT
KNOWLEDGE IN MATHEMATICS**

2:00 PM – 2:40 PM

This paper consists of two sections, A and B. Answer ALL the questions in Section A and TWO questions from Section B. Section A will be collected after the first 40 minutes.

**SECTION A
(20 MARKS)**

Answer ALL questions in this Section.

items 1 to 20 are stems followed by four options lettered A to D. Read each item carefully and circle the letter of the correct or best option.

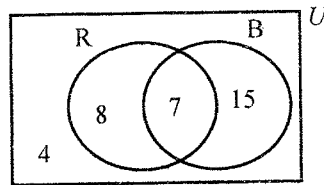
1. Which of the following teacher practices is linked to students' mathematics anxiety?
Teacher

 - A. being sensitive to students in class.
 - B. insisting on the use of cooperative learning groups.
 - C. showing imposed authority in teaching.
 - D. using a variety of teaching learning resources.

2. The mathematics teaching strategy that starts with posing a mathematics task to students and giving them about a minute to ponder as individuals, then to team up with a peer for discussion and then later discuss their solutions with the rest of class is termed strategy.
 - A. before-during-after
 - B. problem-three-part
 - C. think- before - share
 - D. think-pair-share

Use the information in the diagram below to answer questions 3 and 4.

The Venn diagram below shows the result of a survey on food preference of students in a class, Rice (R) and Banku (B).



3. The number of students who prefer Rice or Banku is the sum of
 - A. 15 and 8
 - B. 4, 8 and 15
 - C. 4, 8 and 7
 - D. 8, 7 and 15

4. The number of students who do **not** prefer Rice is the sum of
 - A. 4 and 15
 - B. 4 and 8
 - C. 7 and 15
 - D. 8 and 7

5. Which of the following statements are implications of constructivist teaching of mathematics?
 - I. Students rely on teacher's constructed knowledge and explanation.
 - II. Reflective thinking is a very important ingredient for effective learning.
 - III. Effective teaching is a student-centered activity.
 - A. I & II only
 - B. I & III only
 - C. I, II & III
 - D. II & III only

6. Which of the following refers to the first and initial state of a problem in mathematics?
 - A. Current state
 - B. Desired outcome
 - C. Relevant activities
 - D. Solution path

7. The aspect of a subject which provides an answer to the question of *what to teach* is referred to as
 - A. agogus
 - B. content
 - C. paidos
 - D. pedagogy

8. Mathematics tasks that have the main purpose of "enabling learners to practise procedural skills learnt in class" is known as
 - A. exercises.
 - B. investigation.
 - C. problem solving.
 - D. puzzles.

9. Which one of the following is/are regarded as a mathematical myth?
- I. A good mathematician is not necessarily good at calculating.
 - II. No one is born with a mathematics gene.
 - III. The males are better than females at mathematical thinking.
- A. I & II only
 - B. II & III only
 - C. II only
 - D. III only
10. What is the term used in Shulman's Model to describe *teacher's ability to change content knowledge into pedagogically powerful forms to fit the variety of student abilities*?
- A. Adaptation
 - B. Comprehension
 - C. Instruction
 - D. Transformation
11. Which of the following is a reason for advocating for teaching and learning mathematics through investigations? It
- A. deepens students' anxiety in mathematics.
 - B. encourages students to become autonomous learners.
 - C. exposes students' computational challenges.
 - D. improves students' instrumental learning skills.
12. An appropriate reason for employing large group work in teaching and learning mathematics is when the teacher believes that students
- A. are likely to benefit from student-to-student interaction in class.
 - B. are not likely to call for continuous guidance from the teacher.
 - C. can follow a sequence of presentation on their own.
 - D. possess same prerequisite for understanding the initial presentation.
13. Which of the following phrases describes the characteristics of an effective classroom manager?
- I. Less concerned about the design and implementation of classroom rules and procedures.
 - II. Capable of improving student learning even in highly ineffective schools.
 - III. Works with all students regardless of their achievement levels.
- A. I & II only
 - B. I & III only
 - C. I, II & III
 - D. II & III only
14. An end result of a student's inappropriate act is referred to as
- A. achievement.
 - B. consequence.
 - C. motivation.
 - D. transition.
15. Which of the following statements is **true**? mathematics knowledge.
- A. Conceptual mathematics knowledge is also known as imperative
 - B. Imperative mathematics knowledge is also known as procedural
 - C. Imperative mathematics knowledge is another name for logico
 - D. Procedural mathematics knowledge is also known as conceptual

16. The process of formulating new answers which involves *going beyond the simple application of previously learnt rules to achieve a goal* is a description of in mathematics.
- exercising
 - factorization
 - intuition
 - problem solving
17. Which of the following is described as a mathematics curriculum that is more directed towards following procedures for performing mathematics tasks? curriculum.
- Inductive-deductive
 - Inquiry oriented
 - Problem solving and investigation
 - Technique oriented
18. The term used to describe *a recognition for positive behaviour or for the timely cessation of negative behaviour* is
- abstraction
 - recreation
 - reinforcement
 - stimulus

Study the 6 by 6 number chart below and use it to answer questions 19 and 20.

11	14	5	2	29	4
13	15	24	18	8	26
16	20	12	10	28	30
23	17	19	6	22	5
22	21	7	12	3	19
1	6	25	27	9	31

19. Write down numbers in any **three** boxes that touch each other *diagonally* in a row containing numbers that sum up to **forty**.
- 6, 3, 31
 - 7, 21, 12
 - 13, 11, 16
 - 8, 10, 22
20. Which of the following three boxes *touch strictly by corners* that can form vertices of a triangle and contain numbers that sum up to **forty**?
- 6, 3, 31
 - 6, 7, 27
 - 14, 24, 2
- I and II only
 - I and III only
 - I, II, and III
 - II and III only

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SECTION B
[40 MARKS]

Answer any TWO questions from this Section.

1.
 - a. Explain how each of the following techniques is used to motivate students in mathematics.
 - i. Discover a pattern. (3 marks)
 - ii. Tell a pertinent story (3 marks)
 - iii. Call attention to a void in student's knowledge (3 marks)
 - b. Explain the *Three-Part Lesson Format* for teaching mathematics. Your explanation should include the principle underpinning the format. (11 marks)
2.
 - a. Explain **four** reasons why you would advocate for teaching mathematics through problem solving. (8 marks)
 - b. Explain the steps involved in using algebra tiles to guide SHS1 students to factorize the expression, $x^2 + 5x + 6$. (12 marks)

3.

- a. Outline **four** teacher practices that are very helpful in minimizing students' mathematics anxiety. (8 marks)
- b. Explain the steps involved in guiding high school students to find the **mode** and **mean** of the test scores displayed in the table below. (12 marks)

Score	7	8	9	10	12	15	16
Frequency	2	3	4	7	10	8	6

4.

- a. Explain **four** ways of structuring mathematics lessons to promote reflective thinking among students. (12 marks)
- b. i. What is the literal meaning of the Greek words *paidos agogus* with reference to teaching and learning mathematics. (2 marks)
- ii. Explain **three** definitions of pedagogical content knowledge in mathematics. (6 marks)