APRIL 2021 EMA 402SW TEACHING PROBLEM SOLVING IN MATHEMATICS 2 HOURS

Candidate's Index Number				
TELMATIKBILIF/0324				
Signature:				

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

FIVE-SEMESTER BACHELOR OF EDUCATION (SANDWICH) PROGRAMME SECOND YEAR, END-OF-THIRD SEMESTER EXAMINATION, APRIL 2021

APRIL 29, 2021

TEACHING PROBLEM SOLVING 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 (40 marks)

Answer ALL the questions in this Section.

		Answer ALL the questions in this Section.	
	1.	Identify two benefits students derive when they engage their teachers and mates in discussion in the mathematics classroom.	[2 marks]
	2.	Explain two reasons why as a prospective mathematics educator you would advocate for mathematics to be taught through problem solving.	[6 marks]
	3.	Distinguish between heuristics and strategy in problem solving.	[4 marks]
•	4.	When the famous German mathematician Carl Fredrich Gauss was a child, his teacher required the students to find sum of the first 100 natural numbers. The teacher expected this problem to keep the class occupied for some time. Gauss gave the answer almost immediately. Using Polya's model, explain how he went about solving the problem.	[8 marks]
5		Outline the steps involved in the Six-Step problem solving model.	[6 marks]
6.		Outline two traits possessed by good problem solvers.	[2 marks]
7.	t	Explain two principles that would guide you as a prospective mathematics teacher of teach your students how to solve problems.	[6 marks]
8.	th	arrange the numbers 1, 2, 3, 4, 5, 6, 7, 8 and 9 in a three-by-three square such nat any row, column and diagonal have the same sum of 15.	[6 marks]

APRIL 2021 EMA 402SW TEACHING PROBLEM SOLVING IN MATHEMATICS I HOUR 20 MINUTES

Candidate's Index Number

JE | MAT | 16 BI | 18 | 0324

Signature:

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

FIVE-SEMESTER BACHELOR OF EDUCATION (SANDWICH) PROGRAMME SECOND YEAR, END-OF-THIRD SEMESTER EXAMINATION, APRIL 2021

APRIL 29, 2021

1.

TEACHING PROBLEM SOLVING IN MATHEMATICS 2:40 PM - 4:00 PM

SECTION B [60 MARKS]

Answer any THREE questions from this section. Each question carries 20 marks.

a. Prove by mathematical induction that the numbers of the form 8" + 6 are divisible by 14 for all natural numbers n.

[6 marks]

b. One-fourth of a herd of camels was seen in the desert. Twice the square root of that herd had gone to the mountain slopes. After these 15 camels still remained at a riverbank located in the desert. What is the numerical measure of that herd of camels?

[12 marks]

c. An array of nine dots is arranged in a 3 × 3 square, as shown in figure below. Join all the dots with exactly four straight lines if you are not allowed to pick up your pencil from the paper and not tracing over a line that has already been drawn.

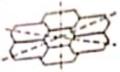
[2 Marks]

0 0 0

0 0 0

Figure 1

M



b. A man put a pair of rabbits in a cage. During the first month the rabbits produced no offspring, but each month thereafter produced one new pair of rabbits. If each new pair thus produced reproduces in the same manner, how many pairs of rabbits will there be at the end of one year?

[9 marks]

c. A teenager's age is increased by 2 gives a perfect square. Her age decreased by 10 gives the square root of that perfect. She is 5 years older than the brother. How old is her brother?

[5 marks]

a. Consider the series, (1) + (2 + 3) + (4 + 5 + 6) + (7 + 8 + 9 + 10) + (11 + 12 + 13 + 14 + 15) 3. + . . . Find an expression for the ith term in the rib bracket

b. A cat chases a mouse, which has a 160-meter head start. For every 7 meters the mouse runs, the cat runs 9 meters. How far must the cat run to catch the mouse?

[10 marks]

What is the main idea in VDW4?

[2 marks]

b. i. Identify the phases of the three-part lesson format for teaching through problem solving as proposed by Van de Walle.

[3 marks]

ii. Provide three likely agendas for the mathematics teacher in each of these phases in b(i).

[6 marks]

iii. Explain what the teacher actions must be for the effective implementation of each of these agendas.

[9 marks]

5. a. Use Mason's three phases of problem solving to solve the task below showing clearly all necessary actions taken in each of the stages:

A census taker comes to the house of a mathematician and asks how many children he has and what their ages are. The mathematician replies that he has three children and the product of their ages is 72. The census taker replies that he has not been given enough information to determine their ages. The mathematician adds that the sum of their ages is the same as his gate number. The census taker leaves to check the gate number but returns shortly to say that he still does not have enough information. The mathematician thinks and says the oldest one likes chocolate ice cream. The census taker replies that he now has enough information and leaves. What are the ages of the the constant taker replies that he now has enough information and leaves. What are the ages of the three children?

What are the ages of the three children?

ii. State the strategy you used.

[8 Marks] [2 Marks]

b. Use Polya's four phases of problem solving to solve the task below showing clearly all necessary actions taken in each of the stages:

Mary has a special package for large groups to attend their amusement park: an admission fee of GHe20 00 per second fee groups to attend their amusement park: an admission fee of GH¢20.00 per group and an additional fee of GH¢6.00 per person. Using George Polya's four principles of problem solving, if a club has GH¢100.00 to spend at the park,

the maximum number of people who can attend.

[8 Marks]

ii. problem solving strategy you employed in arriving at your answer in i above? [2 marks]