SAMPLE LESSON: MATHEMATICS

Class: Form 5

Additional Mathematics Form 5	**TOPIC:** PERMUTATIONS and COMBINATIONS
Title of Lesson: Permutations	**Duration of Lesson:** 50mins

Name of Authors: Fombin Sebastian, Nfor Samuel, Agwo Johnson Mbakwa, Etta Frida & Tabod Robert

CLASS: Form 4 ADDITIONAL MATHEMATICS **TERM:**ONE

TOPIC: PERMUTATIONS and COMBINATIONS

LESSON: PERMUTATIONS **DURATION:** 50 Minutes

OBJECTIVES: At the end of the lesson, students should be able to determine the number of arrangements of a given number of different objects

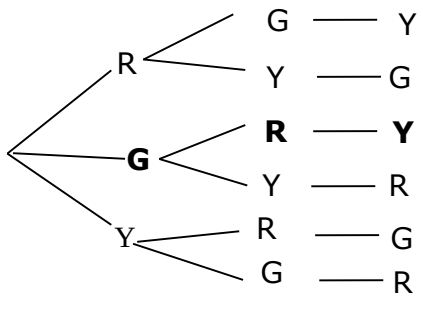
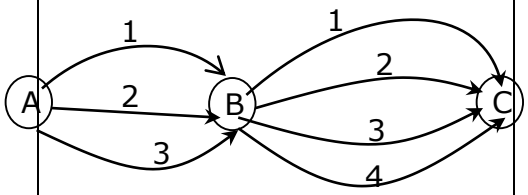
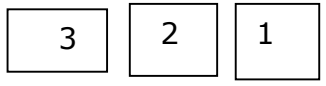
MOTIVATION: **-T**elephone companies use various arrangements of 9 digit numbers to attribute telephone numbers to their customers such that no two customers have the same number. It is possible to determine beforehand the number of people who can be served telephone numbers.

- Also**,** the registration of car number plates in the country uses an arrangement of letters and a 3-digit number. The number of cars that can be registered with this system can be determined.

PREPARATION: Prepare work sheet. Print and photocopy worksheet depending on the number of students in class.

Produce paper strips as many for each group to have at least 8

Acquire colour pencils at least the 3 colours Red, Green and Yellow. Equally ask students to bring these colours

STAGE/ DURATION	CONTENT	TEACHER'S ACTIVITY	STUDENT ACTIVITY	LEARNING POINT	OBSERVATION
INTRODUCTION 5Mins	Evaluate (a) 2×1 b) $3\times 2\times 1$ (c) $4\times 3\times 2\times 1$ d) 5! e) 7! f) 1! g) 0! The AFCON2016 is due in Cameroon next month. Some of the participating countries have three colours namely: Red(R), Green (G) and Yellow(Y) to produce the flag for their club. No two countries have the same flag. How many different countries can have flags with these three colours?	Teacher writes questions on the board. Teacher dictates problem and distributes paper strips and color pencils to students giving them instructions. (Each group shall start with a different color)	Students copy, discuss and calculate. Students discuss and colour strips as directed. Each colour in each box	Review multiplication. Arrangement of three colours	Captivates students' interest. Gets students thinking and involved
Lesson (Activity1) 20 Mins		Collects students work and use result to bring in the notion of arrangement using tree diagram and boxes. Consider arrangement of 2 items=2x1. Movement from A to C via B.	Students observe, perceive and copy	Obtaining number of arrangements of 3 different objects	Demonstrate multiplication in arrangements
	 3 × 2 × 1= 6	 Nº of ways from A to C via B = 3 × 4 = 12  3 × 2 × 1			
	Arrangement of 3 items from a set of 7 items.	Teacher dictates question	Students listen and		

STAGE/ DURATION	CONTENT	TEACHER'S ACTIVITY	STUDENT ACTIVITY	LEARNING POINT	OBSERVATION
(Activity 2)	In how many possible ways can the first, second and third prizes be awarded in a competition comprising 7 competitors? Generally, the number of ways of arranging r items at a time from a set of n items is represented by ${}^{n}P_{r}$ ${}^{n}P_{r} = \frac{n!}{(n-r)!}$ Now evaluate ${}^{9}P_{5}$, ${}^{12}P_{7}$, ${}^{3}P_{3}$ and ${}^{4}P_{0}$	and demonstrates the solution using boxes 1st prize = 7 possible ways 2nd prize = 6 possible ways 3rd prize = 5 possible ways Total = $7 \times 6 \times 5$ $= \frac{7\times6\times5\times4\times3\times2\times1}{4\times3\times2\times1} = \frac{7!}{4!}$ $= \frac{7!}{(7-3)!} = {}^{7}P_{3}$ Teacher copies problems on the board. Goes around to evaluate students' work.	determine number of possible ways in each box with teacher Students copy, discuss and solve	Facts, procedure and manipulations	Gives students time to copy and solve
CONCLUSION 5 Mins	Recall the number of ways of arranging *n* items in a line is given by *n*! The number of arranging r objects from a set of n objects is given by ${}^{n}P_{r} = \frac{n!}{(n-r)!}$	Teacher help students recapitulate knowledge learned	Students answer to teacher's questions to recapitulate facts.		Recapitulation of knowledge
Home work	**Exercise:** 1) Determine how many different numbers can be obtained from the digits 2, 3, 5, 7 given that no digit is repeated. 2) A test paper has 9 questions for students to answer any 6 only. In how many different ways can the answers be arranged?	Questions are copied on the board.	Students copy questions and discuss solutions		Reinforcement and consolidation of knowledge

Worksheet for Activity 1

Instructions

You are each going to produce as many different flags as possible as in the problem situation.

1. Make sure your group is having paper strips and color pencils (Green, Yellow and Red).
2. Make sure each strip of paper given to your group is divided into 3 regions.
3. The end of the strip with a mark is the flag pole
4. Start colouring with the region near the flag pole
5. Shade one region on the paper strip with one colour only
6. The 3 regions must be shaded by 3 different colours.