

## **Recreational Mathematics – A Hands-on Activity to Encourage Interest in Learning Mathematics**

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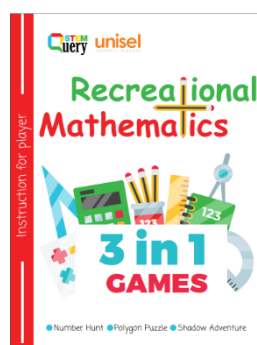
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**Abstract** : Students learn Mathematics in a variety of ways, and it is recommended that teachers and parents use a hands-on activity to encourage students' interest towards Science, Technology, Engineering and Mathematics (STEM) subjects. The Recreational Mathematics kit is designed to promote primary school students' interest towards the subject. This kit has been used in two programs, Mathematics and Science Day at SK La Salle, Sentul, and STEM Day at UNISEL in year 2019. Total of 100 participants between the age of seven to twelve years old were involved for both programs. Universiti Selangor's Mathematics lecturers and students participated as facilitators and mentors. This kit contained three hands-on activities: Number Hunt, Polygon Puzzle and Shadow Adventure. All the activities involved basic arithmetic concept and help to develop students' problem-solving skills, creativity skills and critical thinking skills. Each activity was guided by facilitators and mentors. Throughout this activity, findings show that 85% of the students agreed that they felt happy and enjoyed learning mathematics through games and activities, and it increases their interest to learn the subject. More than 80% of the students agreed on the systematic program management and are interested with the method guided. However, this kit only covers 3 activities related to basic Algebraic operations, polygon and ratio. More games covering other topics in Mathematics will be added into this kit in future to increase students' interest and awareness on the importance of STEM subjects, especially Mathematics.

**Keywords**: Recreational Mathematics, Fun Learning Mathematics, STEM Activity

## 1. Introduction

Recreational Mathematics Kit (Figure 1) was designed purposely to promote primary and secondary school students' interest towards the subject. Students will develop interest towards a subject if they can see the application of mathematics in their real life and they can appreciate what they are learning [1]. If they cannot see the value of the subject, they tend to feel that subject is difficult to understand, irrelevant and does not important in their future undertakings [2]. Eventually, this hands-on mathematics module is introduced to develop interest towards mathematics. Although it is not a straightforward teaching and learning process, it is one suggested way in helping students to nurture greater interest and understanding in mathematical subject. It is a learn through play activity to make students happy to learn and understand mathematical concept [3]. Learning mathematics via games or through hands-on activity which involved basic algebra can encourage the student's positive emotion to feel that mathematics is fun and interesting [4]. The hands-on activities gave a positive perception to students towards the subject because indirectly it shows the applications in daily life that enable students use the knowledge to solve the real-life problems [5].



**Figure 1: Manual Instruction for Player – Recreational Mathematics Kit**

## 2. Materials and Methods

The Recreational Mathematics kit have 3 in 1 games, which are Polygon Puzzle, Number Hunt and Shadow Adventure. This kit has been used in two STEM programmes, Mathematics and Science Day at Sekolah Kebangsaan La Salle, Sentul, and STEM Day at Universiti Selangor in year 2019.

### 2.1 Materials

The Recreational Mathematics kit was developed as a hands-on activity tools to increase interest towards Mathematics among students at primary school level. This kit involved basic operational mathematics topic which are algebraic operations (addition, subtraction, division and multiplication), shape and polygon, and ratio. The topics were chosen to strengthen student's fundamental understanding in this subject. In addition, this kit is also developed to improve student's problem solving skills, creativity skills, and logical thinking skills through out the activity.

### 2.2 Methods

There are 100 participants of primary school students joined the Recreational Mathematics programme from two programmes with 50 students from Mathematics and Science Day, SK La Salle, Sentul and the remaining 50 students from STEM Day at Universiti Selangor (UNISEL). Throughout the Recreational Mathematics programme, participants are divided into 10 groups and each group was given the route card stated the substations. Those substations provide the mathematical games listed as follows:

- Station 1: Number Hunt
- Station 2: Polygon Puzzle
- Station 3: Shadow Adventure

Each group were given an activity card. This card is to be carried by each team and they must ensure that their card is being stamped at each station as a prove that they have completed all the activities in that particular station. Briefing will be given before the game starts and participants will be asked to answer pre-test questions. At each station, there will be a facilitators to guide and teach them what to do and how to understand the concept. They are also allowed to ask any related questions. After they finished all the three stations, they will be asked to answer another post-test questions.

NUMBER HUNT is an activity that involves basic algebra operations; addition, subtraction, division and multiplication. There are four numbers given and students need to rearrange the number using the algebra operations. Each number can only be used once to get the answer stated in the middle of the card. This game was developed to strengthen the basic algebra knowledge and to help students in mastering the basic algebra concepts.

POLYGON PUZZLE involves student’s creativity skills to build an object or shape in two-dimension or three-dimension using sticks and playdough. Throughout this activity students will learn about shapes and polygons, together with vertex, edges and angles. This hands-on activity will help students to improve their motor skills and understanding on objects around them.

SHADOW ADVENTURE activity aims to help students to better understand the ratio and distance topic. Students will explore on how to calculate the height of big object using shadow. This activity will encourage students to increase their knowledge on the importance of Mathematics in their daily life.

### 3. Results and Discussion

Data was collected in two stages, before and after the students use the Recreational Mathematics Kit. The questions are about awareness on the importance of Mathematics in daily life among primary school students and their interest towards the subject. They are also asked on how well the program is conducted and do they enjoyed participating in the program. Before the program started, only 25% of students aware on the use and application of mathematics in their daily routine. However, after the program ended, 61% of students involved have the awareness on the significant of the mathematics’ application.

#### 3.1 Results

Data collected was analysed using Statistical Package for Social Science (SPSS) software. The questionnaire uses Likert Scale method from 1 to 5, where 1 represents strongly disagree and 5 strongly agree. Table 1 shows the mean score for pre and post test.

**Table 1: Mean Score for Pre and Post Test**

Item (Question)	Test	Mean Score
I know the importance of Mathematics in daily life?	Pre – test	3.1
	Post - test	4.2
I am interest towards Mathematics subject.	Pre- test	3.2
	Post - test	4.3

### 3.2 Discussions

Table 1 shows that there is a significant difference in the mean score between pre and post test. The mean score shows increment from before to after students went through the activities. After the program, students were given a few questions on the effectiveness of the program; which about their feeling towards learning mathematics through game and activities and does it helps to increase their interest on the subject. It is found that 85% of the students agreed that they were feeling happy and enjoyed learning mathematics through hands-on activity. Moreover, more than 80% of the students agreed on the systematic program management and are interested with the method guided.



**Figure 2: Student at STEM DAY solving the Polygon Puzzle game.**

Figure 2, shows the participant involved in solving one of the activity in Recreational Mathematics Kit at the STEM Day program at UNISEL. They were involved in all three sections and the results show that they enjoyed and felt happy to learn more on Mathematics.

### 4. Conclusion

Throughout this activity, the Recreational Mathematics kit has indirectly helped to increase primary school students' interest on mathematics, and they agreed that they were feeling happy and enjoyed learning mathematics through games and activities. In addition, this kit can also be used by parents at home as a mathematics teaching and learning tools for their kids.

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