

**IMPROVING MULTIPLICATION AND DIVISION FACT RECALL
USING DOT ARRAY MODEL IN GRADE 3**

An Action Research Presented to the Department of Education

As Grantee of Basic Education Research Fund 2018

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August 2019

ACKNOWLEDGEMENT

First and foremost, the researcher is thankful to God Almighty for answering her prayers, for giving her the strength and capability to complete this action research satisfactorily. Without His grace, this achievement would not have been possible.

The researcher would like to express her deep appreciation and gratitude to several people for their assistance and support to complete this action research.

To **Dr. Francita B. Agustin**, school head, for her encouragement and understanding in allowing the researcher to conduct the research.

To **Dr. Arnel L. Poja**, for his steady guidance, bright ideas, and enthusiasm for his kindness and patience. His constant support, encouragement, and tireless efforts in assisting the researcher from start to finish made the completion of this research possible;

To **the grade three teachers** for their understanding and cooperation in the study.

To **the grade three pupils** of Luis Francisco Elementary School, for giving their valuable time and great cooperation in participating in the study;

Again, to **God** whom the researcher owes her life and who continuously provides enough strength and wisdom. She accomplished this intellectual piece for His glory and honor.

ADG

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USING DOT ARRAY MODEL IN GRADE 3**



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ABSTRACT

This study attempted to probe how the dot array model affects the pupils' retention level in multiplication and division facts. An experimental method was employed using the pretest-posttest design. The selected pupils who participated in this study were the enrolled pupils of Luis Francisco Elementary School for the school year 2018-2019. They were the ones who could hardly retain the multiplication and division facts. They went through a 20-day classroom instruction that focused on the conceptual development and proficiency of multiplication and division. Statistical tools used were mean, paired t-test and independent t test. Using the pretest-posttest experimental design, the experimental group had significant increase in their posttest mean after they gathered a mean score of 26.02 compared to control group's mean score of 21.28 who simply underwent the traditional way of teaching. Results of the study showed that dot array model helped the pupils strengthen their comprehension skill with confidence.

Based from the data gathered, a significant improvement in the class performance was exhibited on respondents' posttest with a mean difference of 4.74. It also registered a p-value of 0.00 which is less than the 5% level of significance. This suggested that having a deeper sense of the underlying concepts of multiplication using dot array model contributed to the improvement of the pupils' retention level in multiplication and division facts. The researcher concluded that this instructional material if consistently used, the pupils would improve their retention level in multiplication facts which is the very foundation of higher-level mathematics topics, like division. This will definitely make them appreciate Mathematics. For this reason, there is a need for educators to introduce multiplication strategies using arrays in order that the underlying concepts of multiplication would be mastered.

Keywords: *Dot Array, multiplication and division facts, retention level*

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Chapter 1 Introduction

Rationale

Multiplication fact fluency is an essential ability that pupils need to develop as they move forward throughout their elementary education, particularly on operations with larger numbers. It serves as a foundation of higher-level mathematics topics, like division, ratio, fraction, decimal, and others. Hence, in order to adequately make the pupils ready for more difficult mathematical concepts in the secondary level, every pupil must be competent with mathematical fact recall (Bauer,2013). For them to be competent with multiplication fact recall, the pupils need to learn appropriate multiplication strategies. Normally, multiplication is introduced as repeated addition of equally sized groups which is considered as a natural way to familiarize pupils with multiplication but this is inadequate. Others may benefit from this way of teaching but for struggling learners to cope up, it needs visualization in order to have a deeper sense of the multiplication facts especially to the pupils in the primary grade.

Based on the experiences of the researcher in teaching Mathematics, she encountered that pupils have really difficulty in mastering basic multiplication and division facts. The pretest on multiplication and division revealed a very low Mean Percentage Score of 39.8. She also found out that 36 out of 43 pupils got a grade of 75-79 during their previous grade especially in the second quarter where multiplication and division were taken up. Hence, it was deduced that the pupils have no mastery of the multiplication and division facts. The fundamental concepts of multiplication and division were not properly grasped.

Through further investigation, the researcher identified some reasons why pupils struggle with the basic multiplication fact. One of the root causes of why there is poor retention of multiplication facts is less time to master the basics leading to poor number sense. According to Pierce (2019), number sense is the ability to manipulate and comprehend numbers like how to use them in flexible manners when adding, subtracting, multiplying, and dividing. In order for pupils to obtain a strong foundation in Math, they need to spend more time practicing math skills like basic addition and subtraction along with the multiplication times tables. Pupils must practice their basic math facts as often as possible for it to become automatic. However, the curriculum in Mathematics articulated plenty of competencies to be accomplished within the school year, thus, pupils lack enough time in practicing the basic operations. Likewise, the skills that need to be acquired were not honed comprehensively and with much depth simply because of the scarcity of time. There were even times that teachers seem to be in a hurry to cover all the competencies stated in the curriculum guide. That is why, in this study, each competency was given enough time to explore through the different activities prepared.

The design of the K to 12 curriculum follows a spiral progression approach by building on the same concepts developed in increasing complexity and sophistication starting from the elementary. Thus, the lessons on multiplication and division were unpacked from the curriculum guide of Grade 1 and Grade 2. It is therefore expected that pupils master the basic facts of multiplication and division especially the easy ones like 1s, 2s, 5s, and 10s. However, it was not always the case. As experienced by the researcher through an individual assessment and

interview from the respondents, it was found out that the basic skills were not well understood. It was observed that in multiplication, many of the pupils attempted to add the factors instead of multiplying them or at least performing the repeated addition. When asked about the product of a multiplication fact, they cannot provide the answer right away. When asked the meaning of a multiplication fact, they cannot also explain. This means that the concept was not taken well. These observations were verified by the result of the pretest that registered a mean percentage of 39.8.

Another concern that was given attention is the way multiplication was taught. Usually, the pupils are given the multiplication tables and then asked to practice the facts by writing down the series of numbers, looking at them, reciting them, or listening to tapes, in order to memorize the facts. However, only few pupils benefitted from this kind of instruction. Pupils must be taught the strategy first. Memorization of the multiplication facts is very important in multiplication. However, if we begin with memorization before we teach strategy, many of our pupils will struggle with fact retention. Others may develop a fear and lack of confidence, too. Mental math strategies can be integrated along with techniques for memorization, but we have to be strategic about it. It is better to begin by teaching the pupils the strategies for each set of facts. Then, allow them the time they need to understand each strategy before moving onto a new one. Once pupils really understand the process of the multiplication strategy, then, begin to incorporate memorization. Our goal is to increase the pupils' retention level by understanding how fact families were derived. This helps the pupils master their multiplication and division facts. Hence, in this study, the commutative property of multiplication was its priority.

In light of the problems mentioned above, the researcher utilized the dot array to teach multiplication and division. Considering that there were numerous techniques in teaching multiplication and division, it was found out that the dot array was far better in understanding the multiplication and division fact families. That is why it is the strategy used that matters. The dot array is a great contributor in enhancing the pupils' comprehension on multiplication and division facts.

Researches proved that from the dot array, the pupils can have a clear understanding about multiplication and division as the inverse, or opposite of multiplication. It is also a good visual representation where several multiplication strategies can be elicited such as the commutative property and repeated addition. The Dot Array Model which was crafted and then manipulated to discuss and illustrate the number fact families was very effective and powerful tool in conceptual development because its visual representation of rows and columns helped the pupils to develop their proportional reasoning (Parrish 2010). Similarly, pupils benefited from activities with models to focus on the meaning of the operation and the associated symbolism (Walle, 2013).

Furthermore, the dot array is a highly effective thinking tool that even the struggling learners could build multiplication and division facts in a more meaningful way. The visual representation not only assists in understanding the process, but provides a visual image for pupils to draw upon as they begin to use and memorize the number basic facts. It is widely regarded as a key model for developing an understanding of multiplication. It can provide insight into the structure of multiplication making its commutative and distributive properties very

visible (Syifaa, 2016). Whereas, using flashcards in drilling everyday but without understanding how those facts were derived, is harmful and useless. Learners must first understand how the multiplication and division facts are constructed, so they could recall the facts efficiently and accurately.

According to Bruner (1961), he posited that human learning moves through a continuum of three phases. These phases are the enactive stage (concrete), iconic stage (pictorial) and the symbolic stage (abstract). In Mathematics, the phase that is most often ignored by educators is the iconic phase. This pictorial stage acts as a bridge between the concrete and the abstract. Thus, the Dot Array Model would act as an intermediary activity that would activate the iconic phase of learning of the pupils. In this case, by strengthening their knowledge of fact families of related multiplication and division problems using the Dot Array Model will definitely improve their retention of the basic facts and their ability to comprehend and represent real-life problems.

Finally, when the foundation of using the Dot Array Model is established in the elementary level, teachers are not only providing strong understanding of multiplication and division to aid mental and written computation but they also lay the foundations for easier connections to be made when pupils encounter secondary mathematics (Day& Hurrell,2015).

Hence, the researcher was challenged to conduct classroom-based research on the effectiveness of the Dot Array Model.

Research Questions

This action research aimed to improve the pupils' retention level in multiplication and division facts. It sought answers to the following questions:

1. Is there a significant difference in the Pretest and Posttest mean scores between the control group and the experimental groups?
2. Is there a significant difference between the posttest mean scores of the control and experimental groups?

Chapter 2 Methodology

Participants

The study was participated by 43 pupils from Grade 3 section B and 43 pupils from Grade 3 section G of Luis Francisco Elementary School for the school year 2018-2019. The 43 pupils from Grade 3 section B served as the control group while the other 43 pupils from Grade 3 section G served as the experimental group who were taught utilizing the Dot Array Model. The respondents were those who got a grade of 75-79 during their previous grade especially in the second quarter where multiplication and division were taken up. At present, these respondents were the ones who could hardly understand multiplication and division facts.

Data Gathering Procedure and Instruments

The initial data collection process started first by asking permission from the school principal. Then, an application for permission to conduct the study was sent to the Office of the Schools Division Superintendent of the City Division of Valenzuela through the Research Planning Committee for its approval. Upon its approval, the researcher started to prepare the materials like the multiplication fact family flashcards, activity sheets, and the pretest-posttest. The test was evaluated by the mathematics coordinator before it was administered to the respondents.

Meanwhile, the main source of data was the pretest and posttest which is composed of a 30-item multiple-choice test. The instrument used was subjected to content validation. In the content validation, the test questionnaires were read and analyzed by the mathematics coordinator who gave feedback, and suggestions that were taken into considerations. Also, the test questions were pilot- tested using other pupils who were not included in the original group of respondents. This pilot test process was meant to determine the strengths and weaknesses of the questionnaire, in terms of question variation, meaning, item difficulty, and to establish relationships among items and item responses, and to check item response reliability. This was done to see if this group of pupils could finish the test in 50 minutes and to determine what test item should be retained, rejected, and revised.

The validated pretest which was administered to the respondents measures their baseline learning performance on the topics about multiplication and division of numbers. The items constructed were meant to visualize multiplication and division facts using the Dot Array Model, create multiplication and division facts from the model, assess their awareness on the concept of division as the inverse of multiplication, and test their knowledge on commutative property of multiplication. Conversely, after the implementation of the Dot Array Model, the same test was administered to the respondents as a posttest to measure the learning improvement in the topics of multiplication and division facts.

Thereafter, a pretest was given to the two groups of respondents. The result of the pretest was recorded, analyzed, and found out that data was normally distributed. After the pretest, a 20-

day of classroom instruction was given to both groups of respondents. The control group was taught using the traditional way of teaching multiplication and division of numbers. Teaching strategies used like the singing of multiplication table; reciting them every day using flashcards; and doing the repeated addition were used to memorize the multiplication table. On the other hand, the experimental group was taught using the Dot Array Model as the instructional materials. During the classroom instruction, the pupils taught how to use the rows and columns of the dot array to understand the multiplication facts. It used to provide visualization of the multiplication and division facts. In the course of teaching, concurrent formative assessments were also given to monitor the comprehension of the pupils in the multiplication and division facts. All formative assessments were recorded to keep track on the progress of the pupils' performance. After the four-week classroom instruction, the pupils were given a posttest similar to the pretest to measure the learning improvement of the respondents on the topics about multiplication and division. The posttest result was then recorded, analyzed and interpreted.

The data gathering was done during the first week of November 2018 to the first two weeks of January in 2019.

Data Analysis

The data collected from the above mentioned respondents were analyzed through quantitative approach. It employed statistical tools such as mean to describe the scores of the respondents. A paired t-test samples was used to compare the means of the pretest and posttest within each group to see if the means showed significantly different. At the same time, an independent t-test was also used to determine the significant difference between the posttest results of the control and experimental groups.

Chapter 3 Results and Discussion

This chapter presents the interpretation of various results of the study drawn from the data being gathered and analyzed. The problems enumerated in chapter 1 were answered with the following findings:

1. Is there a significant difference in the Pretest and Posttest mean scores between the control group and the experimental group?

Table 1:

Test of Significant Difference between the Pretest and Posttest Mean Scores of the Respondents

Groups	Mean	Mean Diff	Std. dev	P value	Decision	Interpretation
Control						
Pretest	14.30	6.98	3.24	.000	Rejected	Significant
Posttest	21.28					
Experimental						
Pretest	13.86	12.16	3.00	.000	Rejected	Significant
Posttest	26.02					

Table 1 shows the test of significant difference between the scores of the pretest and posttest of the two groups. The pretest of the control group is 14.30 while its posttest registers 21.28. On the other hand, the pretest of the experimental group is 13.86 while its posttest is 26.02. The means imply that the pupils' scores are a bit higher or lower than the computed mean. The computed mean difference of 6.98 and 12.16 of the control and experimental group respectively conveys that there was statistical evidence that the mean difference between the two means was significantly different. It also connotes that there was a significant improvement in the performance of the control group and the experimental group. However, the great increment in the experimental group's posttest showed that the Dot Array Model used as instructional material was more effective than the traditional way of teaching. The result reveals that the pupils who used the dot array approach to learn multiplication and division facts have better understanding of the concept that help improved their retention level. The respondents are said to be heterogeneous in group as shown by its average standard deviation of 3.12.

Moreover, it can be seen that the group means are statistically significantly different because the value in the obtained p-value of 0.00 is less than the 5% level of significance. Thus, the hypothesis of having significant difference between the control and experimental group is accepted. From this result, it could be concluded that both groups showed significant difference which means that both groups improved their performance in terms of understanding the concept of multiplication regardless of the teaching strategy used.

2. Is there a significant difference between the Posttest Mean Scores of the Control and Experimental Groups?

Table 2:

Test of Significant Difference Between the Posttest Mean Scores of the Control and Experimental Groups

Groups	Posttest Mean	Mean Diff	Df	P value	Decision	Interpretation
Control	21.28	4.74	84	0.00	Rejected	Significant
Experimental	26.02					

Table 2 shows the comparison of the posttest mean scores of the control and experimental group. The results revealed that the posttest mean score of the experimental group were significantly higher than the posttest mean score of the control group with a mean difference of 4.74. It means that the experimental group performed better than the experimental group. Additionally, the obtained p-value is 0.00 is less than the 5% significance level which showed a strong evidence that the null hypothesis is rejected. It means that there is a significant difference between the posttest mean scores of the control and experimental groups. It further implied that the significant increase in the mean score of the pupils who were taught using the Dot Array Model was likely due to the use of the Dot Array Model in teaching multiplication and division of numbers.

It was also observed that the pupils displayed interest in each lesson and exhibits positive attitude towards multiplication and division. They developed in them confidence because they learned strategy on how to decipher answers from the multiplication and division facts. They are not scared to ask questions anymore. Likewise, the tool gave them the opportunity to translate the dot array into mathematical sentences while capturing the meaning of each multiplication fact.

Chapter 4

Conclusions and Recommendations

Summary of Findings

This chapter presents the summary of findings, implications, and recommendations of the study.

1. Test of Significant Difference between the Pretest and Posttest Mean Scores of the Respondents

The computed mean difference of 6.98 and 12.16 of the control and experimental group respectively conveys that there was statistical evidence that the mean difference between the two means was significantly different. However, the great increment in the experimental group's posttest showed that the Dot Array Model used as instructional material was more effective than the traditional way of teaching.

2. Test of Significant Difference between the Posttest Mean Scores of the Control and Experimental Groups

The obtained p-value is 0.00 which is less than the 5% significance level showed strong evidence that there is a significant difference between the posttest mean scores of the control and experimental groups.

The current study concluded that dot array is a very effective strategy in teaching multiplication and division fact families. The results showed that pupils did make improvements on their multiplication and division facts throughout the study. This statement was supported by the mean difference of the control and experimental group. It means that using the dot array made easier for them to understand the concept of multiplication and division. The visualization also helped them to retain in their memory what is being learned. The researcher observed too that the pupils were very articulate and expressive during class discussions. They freely asked questions if they did not know what to do. It could mean that they demonstrate confidence and understanding of the lesson.

Dot Array Model serves as a tool in enhancing the multiplication and division fact recall of the pupils. One of the salient features of dot array that affects the retention level of the pupils is the visual representation. Another is the arrangement in rows and columns that promotes an in-depth comprehension of the basic multiplication and division facts. Hence, it could be concluded that Dot Array Model is a very effective tool to enhance the retention level of the pupils. In as much as the Dot Array Model itself elicited other effective strategies like the concept of commutative property and the picture of the knowledge that multiplication and division are inverse operations.

Reflections

My discoveries throughout the duration of this study have been beneficial especially in the teaching and learning process. I learned that to increase the retention level, basic multiplication and division fact must be developed in an environment that concentrates instruction on the deeper meaning of these operations. Although at first, it's a bit difficult because you had to explain the relationship of the dot array to multiplication but it's all worth it. The pupils were now equipped with the knowledge about commutative property and the division as the inverse of multiplication. They could now use this knowledge or strategies to figure out answers to multiplication and division facts. The researcher also discovered that the pupils displayed positive attitude towards multiplication and division lessons unlike before that they were so quiet whenever they were asked to give the product and quotient. This means that they learned strategies that helped them to improve their retention level. That is the essence of consistently using the dot array strategy to understand the relationship between multiplication and division. I also learned that it is best to teach multiplication and division simultaneously and not separately.

The Dot Array Model which was used in this study had great influence in the learning process of the pupils. First, it made easy for them to visualize multiplication problems which can be used later to understand division. Well, hands-on is great in introducing multiplication but they can be a bit tedious when working with larger numbers. Second, the dot array helped the pupils use strategies/patterns and not rote memorization to find for the answers. Giving those strategies make it faster and easier for them to master multiplication and division facts. Lastly, dot array made it easy for the pupils to see the commutative property in action. Technically, when they understand well the commutative property, they already learned half of the multiplication table. These made learning the multiplication table easier for the pupils because they knew that they need only to master like 49 multiplication facts.

Similarly, the researcher observed how teaching and learning went smoothly because of the completeness of instructional materials. The pupils were provided with laminated dot array flashcards and plenty of activity sheets to work on. Individual instruction, small group activity and peer teaching were employed to facilitate learning. Instructional materials were well planned and prepared. The completeness of instructional materials also increases the pupils' engagement. It was apparent from their maximum participation in every activity. Then, I realized that if only teachers have the fund to provide quality instructional materials, activity sheets and have the ample time to do research to discover more effective strategies, it is guaranteed that teaching and learning will become easier and interesting. However, as the famous saying goes "where there's a will, there's a way." And, I believe that teachers always make a way for the welfare of their pupils.

Recommendation

From the reflections, the Dot Array Model proved to be very effective that improved the multiplication and division fact recall of the pupils. Although, it actually takes time and patience

before they will master the multiplication, the great progress in their performance declares their understanding of the underlying concepts. Teachers across all levels should see the numerous benefits of using this strategy and make use of them as instructional materials. It's a great tool to use in the visualization process. However, it must be used with consistency so that it will be successful. Strategy instruction promotes thinking, reasoning, and problem solving. While the strands of proficiency cannot be mastered in a short time, they can certainly be developed through strategy instruction.

Dot Array Model must also be used in other topics in mathematics like multiplication of fraction as a sense-making tool as this allows for counting, splitting and making of groups. It gives awareness for the mathematics teacher of improving pupils' understanding of multiplication of two fractions so that the mathematics teacher can expound it in the learning activity inside the classroom.

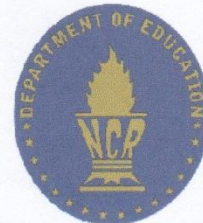
Finally, the contribution of this research to knowledge would be an easier way to understand multiplication and division by utilizing the Dot Array Model. It is a great contributor to the mathematical progress of the learners. Hence, there is a need for teachers to use educational materials like dot arrays to introduce multiplication strategies in order that the underlying concepts would be mastered.

References

- Bauer, B. J. (2013). Improving multiplication fact recall; Interventions that lead to proficiency with mathematical facts. *Graduate Research Papers*. Retrieved at <https://scholarworks.uni.edu/grp/11>
- Bruner, J.S. (1961). *The act of discovery*. Harvard Educational Review, 31, 21-32. Retrieved at [https://www.scirp.org/\(S\(i43dyn45teexjx455qlt3d2q\)\)/reference/ReferencesPapers.aspx?ReferenceID=1412275](https://www.scirp.org/(S(i43dyn45teexjx455qlt3d2q))/reference/ReferencesPapers.aspx?ReferenceID=1412275)
- Day, L., & Hurrell, D. (2015). *An explanation for the use of arrays to promote the understanding of mental strategies for multiplication*. Australian Primary Mathematics Classroom. Retrieved at https://researchonline.nd.edu.au/cgi/viewcontent.cgi?article=1158&context=edu_article. Accessed on July 8, 2018
- Parrish, S. (2010). *Number talks helping children build mental math and computation strategies* p.235 Victoria State Government (2016). Fact families (multiplication and division): Level 3 Retrieved at <https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/continuum/Pages/factfamilies275.aspx> Accessed on July 8, 2018
- Pierce, Rod. (2018) Definition of number sense. Math is Fun. Retrieved 19 May 2019 from <http://www.mathisfun.com/definitions/number-sense.html>
- Syifaa, I. R. A. (2016). *Introducing multiplication strategies using arrays*. State University of Surabaya, Mathematics Education .Retrieved 19 May 2019 from http://www.fisme.science.uu.nl/en/impome/theses_group_2012/thesis_Ismi.pdf
- Walle, V.J., Karp, K.S. & Bay-Williams, J.M. (2013). *Elementary and middle school mathematics teaching developmentally*. 8th edn. Pearson: Allyn and Bacon. Retrieved at <https://www.pearson.com/us/higher-education/program/Van-de-Walle-Elementary-and-Middle-School-Mathematics-Teaching-Developmentally-plus-My-Lab-Education-with-Enhanced-Pearson-e-Text-Access-Card-Package-10th-Edition/PGM2359265.html>



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Misamis St. Bago Bantay, Quezon City



DENCR18-PPRD2.1-010

2018 BASIC EDUCATION RESEARCH FUND

MEMORANDUM OF AGREEMENT

This Memorandum of Agreement (MOA) is entered into in Quezon City, Metro Manila, Philippines by and between:

Agnes D. Garrote of Luis Francisco Elementary School, Division of Valenzuela City, National Capital Region, hereinafter referred to as **GRANTEE**.

DEPARTMENT OF EDUCATION - NATIONAL CAPITAL REGION with office address at **Misamis St., Bagobantay, Quezon City**, represented by Tolentino G. Aquino, **OIC- Assistant Regional Director**, hereinafter referred to as **DEPED**.

WITNESSETH

WHEREAS, DEPED aims to promote an environment conducive to the ideal of evidence-based decision-making through the conduct of various research initiatives across all governance levels;

WHEREAS, DEPED has instituted the Basic Education Research Fund (BERF) as a funding facility for potential research studies to be conducted by eligible DepEd SDO Valenzuela personnel;

WHEREAS, DEPED has evaluated and approved all submitted research proposals to ensure the quality and relevance of potential research studies and has informed the research proponents of the result of the evaluation;



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Section 1.2 The implementation of the research study will last for six months as approved.

Section 1.3 Any deviation from the original and approved research proposal will be immediately communicated to the **Regional Research Innovation, and Development Committee (RRIDC)** by the GRANTEE. All major changes warrant the approval of the Research Committee. The approved research topic cannot be changed by the GRANTEE at any point during the study.

Section 1.4 In the event that the GRANTEE sees the need for an extension, a letter of request for extension with justification will be submitted to the **RRIDC**. Valid reasons for extension which will be decided by the Schools Division Research Committee include illness of the grantee, calamities, disasters, and other extenuating circumstances. The request of extension will be approved provided there will be no additional cost to DEPED. The GRANTEE will be allowed six months, as per Schools Division Research Management Guidelines.

Section 1.5 In cases where unforeseen circumstances force the cessation of the implementation of the research, the GRANTEE shall write a letter to the Schools Division Research Committee with justification and documentary support.

ARTICLE II

OBLIGATION OF THE PARTIES

Section 2.1 The total cost of the approved research proposal is **Eighteen Thousand Nine Hundred Fifty-five Pesos (PhP18955.00)**. DEPED will release payment to the GRANTEE in **two (2)** tranche/s provided that the GRANTEE will submit all the expected outputs. The table of deliverables per tranches is outlined in Annex A of this MOA.

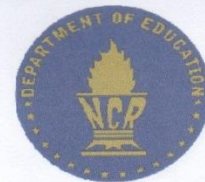
Section 2.2 The GRANTEE will be responsible for the following:

- (a) conduct the research as approved in his/her research proposal;
- (b) submit all the required output to DEPED as per approved timeline;
- (c) ensure that the conduct of research will follow the highest standards of ethics to protect the learners and the community;
- (d) disclose any conflict of interest (possible or actual) that may arise during the conduct of the research;
- (e) ensure that all funds provided will be spent as per approved cost estimates; and
- (f) disseminate completed research on appropriate venues.

Section 2.3 DEPED will be responsible for the following:



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- (b) evaluate thoroughly the submitted deliverables of the GRANTEE;
- (c) provide technical assistance to the GRANTEE as per monitoring and evaluation results and as requested by the GRANTEE;
- (d) monitor the progress of the research proposal;
- (e) conduct due diligence in evaluating and approving deliverables; and
- (f) assist in providing venues for dissemination of the completed research.

ARTICLE III

SPECIAL PROVISIONS

Section 3.1 **Authorship and Ownership.** The GRANTEE will be the sole author of the research. (The study funded under BERF will be co-owned by the author/s and DepEd.) Written permission from the **RRIDC** is required when the research will be presented in research conferences, forums, and other related events, or be published in research journals and bulletins. Also, in these presentations or publications, the GRANTEE must duly acknowledge the funding source/s for the study.

Section 3.2 **Plagiarism, Fraud, and Conflict of Interest.** The GRANTEE will ensure that the research proposal and final report submitted are original works. Appropriate referencing and citation must be included in the submitted deliverables. Further, the GRANTEE will ensure that there will be no conflict of interest during the conduct of the research through the submitted declaration of anti-plagiarism and absence of conflict of interest (please see attached).

Any act of fraud and plagiarism will be dealt with accordingly. Further, if the GRANTEE committed plagiarism or any form of fraud, s/he will be blacklisted from availing any other research grant mechanism in the Department.

Section 3.3 **Failure to Complete Research Proposal.** In the event that the GRANTEE failed to complete and submit the deliverables, the research proponent will be required to return the total amount of research fund s/he has received during the course of the implementation.

Section 3.4 **Effectivity and Termination of MOA.** The MOA will take effect on the date of signature of both the GRANTEE and DEPED, and will end upon the submission of all deliverables and release of the funds. This MOA shall also be terminated under section 1.5, 3.2, and 3.3 or any circumstances that will lead to the non-completion of the research.



**REGIONAL RESEARCH, INNOVATION AND
DEVELOPMENT COMMITTEE**
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IN WITNESS WHEREOF, the parties have affixed their signatures on **October 30, 2018** at Valenzuela City.

GRANTEE

DEPED

Agnes D. Garrote
AGNES D. GARROTE

Teacher, (School/Office)

[Signature]
TOLENTINO G. AQUINO

OIC-Office of the Assistant Regional Director
Chair, RRIDC

WITNESSED BY:

[Signature]
FRANCITA B. AGUSTIN, Ph.D.

Signature over printed name

School Principal

[Signature]
CYNTHIA L. AYLES, CESE

Signature over printed name

SDS/ ASDS

Chair, SDRC

ACKNOWLEDGMENT

BEFORE ME, a Notary Public for and in **MEYCAUAYAN, BULACAN**, Philippines, this **AUG 16 2019**, personally appeared: **TOLENTINO G. AQUINO & AGNES GARROTE**, showing their respective competent evidence of identity.

Names	Competent Evidence of Identity
1. TOLENTINO G. AQUINO	Government ID No. 0168903 Teacher's License (PRC)
2. AGNES D. GARROTE	Government ID No. 0578393 Teacher's License (PRC)

who represented to me to be the same persons who executed the foregoing Memorandum of Agreement consisting of FOUR (4) pages including the page on which this acknowledgment is written and she acknowledged to me that the same is her free and voluntary act and deed and that of the DepEd.

WITNESS MY HAND AND SEAL.

Doc. No. 395 ;
Page No. 80 ;
Book No. ✓ ;
Series of 2019.

[Signature]
ATTY. FERNANDO C. CUNANAN
Notary Public
Until Dec. 31, 2020
PNC No. 12-MB-2019
IBP O.R. No. 058447, Malolos City, Bul/1-3, 2019
PTR No. 1663051, Baling, Bulacan/1-4-2019
Roll No. 51616
MCLE Compliance No. V-0013091, 1-12-2016
Brgy. Banga, Meycauayan City, Bulacan



Republic of the Philippines
DEPARTMENT OF EDUCATION
National Capital Region
REGIONAL RESEARCH, INNOVATION AND DEVELOPMENT COMMITTEE
Misamis St. Bago Bantay, Quezon City



ANNEX 1 Research Proposal Application Form and Endorsement of Immediate Supervisor

A. RESEARCH INFORMATION

RESEARCH TITLE	
IMPROVING MULTIPLICATION AND DIVISION FACT RECALL USING DOT ARRAY MODEL IN GRADE 3	
SHORT DESCRIPTION OF THE RESEARCH	
<p>The proposed action research aims to help the pupils to have an in depth understanding of the underlying concepts of multiplication and division using the dot array model. This model will also help the pupils to become proficient with mathematical fact recall specifically in multiplication and division. The proposed intervention will also lay the foundations for easier connections to be made as they progress in the secondary level.</p>	
RESEARCH CATEGORY (check <u>only one</u>) <input type="radio"/> National <input type="radio"/> Region <input type="radio"/> Schools Division <input type="radio"/> District <input checked="" type="radio"/> School (check <u>only one</u>) <input checked="" type="radio"/> Action Research <input type="radio"/> Basic Research	RESEARCH AGENDA CATEGORY (check <u>only one</u> main research theme) <input checked="" type="radio"/> Teaching and Learning <input type="radio"/> Child protection <input type="radio"/> Human Resource Development <input type="radio"/> Governance (check <u>up to one</u> cross-cutting theme, if applicable) <input type="radio"/> DRRM <input type="radio"/> Gender and Development <input type="radio"/> Inclusive Education <input type="radio"/> Others (please specify): _____
FUND SOURCE (e.g. BERF, SEF, others)	AMOUNT
BERF	
TOTAL AMOUNT	PhP18955.00

**indicate also if proponent will use personal funds*

B. PROPONENT INFORMATION

LEAD PROPONENT/ INDIVIDUAL PROPONENT

LAST NAME: GARROTE	FIRST NAME: AGNES	MIDDLE NAME: DIMACHE
BIRTHDATE (MM/DD/YYYY) 12/25/1974	SEX: FEMALE	POSITION/ DESIGNATION: MASTER TEACHER 1
REGION / DIVISION / SCHOOLS (whichever is applicable) LUIS FRANCISCO ELEMENTARY SCHOOL, DIVISION OF VALENZUELA CITY		

EDUCATIONAL ATTAINMENT (DEGREE TITLE) Enumerate from bachelor's degree up to doctorate degree	TITLE OF THESIS/ RELATED RESEARCH PROJECT
COLLEGE	BACHELOR IN ELEMENTARY EDUCATION
GRADUATE STUDIES	MASTER OF ARTS IN EDUCATIONAL MANAGEMENT
SIGNATURE OF PROPONENT:	

PROPONENT 2

LAST NAME:	FIRST NAME:	MIDDLE NAME:
BIRTHDATE (MM/DD/YYYY)	SEX:	POSITION/ DESIGNATION:
SCHOOL/ OFFICE ADDRESS:	DIVISION/REGION	
CONTACT NUMBER 1:	CONTACT NUMBER 2:	EMAIL ADDRESS:
EDUCATIONAL ATTAINMENT (DEGREE TITLE) Enumerate from bachelor's degree up to doctorate degree	TITLE OF THESIS/ RELATED RESEARCH PROJECT	
SIGNATURE OF PROPONENT:		

PROPONENT 3

LAST NAME:	FIRST NAME:	MIDDLE NAME:
BIRTHDATE (MM/DD/YYYY)	SEX:	POSITION/ DESIGNATION:
SCHOOL/ OFFICE ADDRESS:	DIVISION/REGION	

EDUCATIONAL ATTAINMENT (DEGREE TITLE) Enumerate from bachelor's degree up to doctorate degree	TITLE OF THESIS/ RELATED RESEARCH PROJECT
SIGNATURE OF PROPONENT:	

IMMEDIATE SUPERVISOR'S CONFORME

I hereby endorse the attached research proposal. I certify that the proponent/s has/have the capacity to implement a research study without compromising his/her office functions.

Name and Signature of Immediate Supervisors

Position/Designation: _____

Date: _____

Name and Signature of Immediate Supervisors

Position/Designation: _____

Date: _____


Name and Signature of Immediate Supervisors

Position/Designation: _____


Date: _____

High

Date received of _____



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Morales St. Roge Barrios, Quezon City



ANNEX 3: Declaration of Anti-Plagiarism and Absence of Conflict of Interest

DECLARATION OF ANTI-PLAGIARISM

1. I, **AGNES D. GARROTE**, understand that plagiarism is the act of taking and using another's ideas and works and passing them off as one's own. This includes explicitly copying the whole works of another person and/or using some parts of their work without proper acknowledgment and referencing.
2. I hereby attest to the originality of this research proposal and has cited properly all the references used. I further commit that all deliverables and the final research study emanating from this proposal shall be of original content. I shall use appropriate citations in referencing other works from various sources.
3. I understand that violation from this declaration and commitment shall be subject to consequences and shall be dealt with accordingly by the Department of Education and (insert grant mechanism).

PROPOSANT: AGNES D. GARROTE

SIGNATURE: *Agnes D. Garrote*

DATE: 8/19/2019

PROPOSANT: _____

SIGNATURE: _____

DATE: _____

PROPOSANT: _____

SIGNATURE: _____

DATE: _____



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DECLARATION OF ABSENCE OF CONFLICT OF INTEREST

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Misamis St. Bago Bantay, Quezon City

DECLARATION OF ABSENCE OF CONFLICT OF INTEREST

1. I, AGNES D. GARROTE, understand that conflict of interest refers to situations in which financial or other personal considerations may compromise my judgment in evaluating, conducting, or reporting research.
2. I hereby declare that I do not have any personal conflict of interest that may arise from my application and submission of my research proposal. I understand that my research proposal may be returned to me if found out that there is conflict of interest during the initial screening as per (insert RMG provision).
3. Further, in case of any form of conflict of interest (possible or actual) which may inadvertently emerge during the conduct of my research, I will duly report it to the research committee for immediate action.
4. I understand that I may be held accountable by the Department of Education and (insert grant mechanism) for any conflict of interest which I have intentionally concealed.

PROPOSER: AGNES D. GARROTE
SIGNATURE: *Agnes D. Garrote*
DATE: 8/19/2019

PROPOSER: _____
SIGNATURE: _____
DATE: _____

PROPOSER: _____
SIGNATURE: _____
DATE: _____



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 REGIONAL RESEARCH, INNOVATION AND
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Morona St. Pasig, Quezon City



**IMPROVING MULTIPLICATION AND DIVISION FACT RECALL
 USING DOT ARRAY MODEL IN GRADE 3**

Title of the Study

INFORMED CONSENT FORM (RRIDC07)

I agree to participate in the pilot interview and survey for the study Improving Multiplication And Division Fact Recall Using Dot Array Model in Grade 3 which was supported by the School Research Committee. This study will be used mainly for continuing professional development activities, improvement of student's performance and inputs for School Improvement Plan. Moreover, the data from this study may be used to advise officials regarding planning and policy making towards continuous improvement in the Department of Education.

Permission to conduct the survey has already been obtained from the Chairman of Regional Research, Innovation and Development Committee (RRIDC) of DepEd-NCR, Schools Division Superintendents, and principal of your school.

I understand that if I agree to participate it will mean the following:

1. I will accomplish the survey that requests information about myself.
2. My participation in this study is completely voluntary and I can stop my participation at any time.
3. I do not have to respond to any items that I am not comfortable to answer.
4. Anonymity will be observed at all stages of data recording and analysis. There are no known risks associated with accomplishing the survey questionnaire.
5. I can ask the researcher to share the findings of the study in a forum or discussion.
6. I can ask the lead researcher (Agnes D. Garrote) for any questions and clarifications regarding the study (agnes.dinache@deped.gov.ph).

Name: GRACEV ALCANTARA

Designation: _____

Signature: Gracev Alcantara

Date: 11-14-2018

This informed consent form was administered by:

Name: AGNES D. GARROTE

Signature: Agnes D. Garrote

Date: 11-14-2018

Note: This informed Consent Form will be detached from the survey and interview questionnaire you will accomplish.



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PARENT INFORMATION AND INFORMED CONSENT FORM

(INFORMASYON SA MAGULANG AT KASULATAN NG MAY KAALAMANG PAHINTULOT)

Your child is being invited to participate voluntarily in the study entitled “IMPROVING MULTIPLICATION AND DIVISION FACT RECALL USING DOT ARRAY MODEL IN GRADE 3” under the supervision of AGNES D. GARROTE . *(Kayo po ay aking inaanyayahan na kusang loob na pahintulutan ang inyong anak na lumahok sa pananaliksik na pinamagatang IMPROVING MULTIPLICATION AND DIVISION FACT RECALL USING DOT ARRAY MODEL IN GRADE 3 sa pamamahala ni AGNES D. GARROTE .)*

Before you agree to join in this study, you need to know the risks and benefits so you can make an informed decision. This process is known as “informed consent”. *(Bago po kayo pumayag na sumali ang inyong anak sa pag-aaral na ito, kailangan po ninyong malaman ang mga panganib at mga benepisyo para kayo ay makagawa ng isang may kaalamang desisyon. Ang prosesong ito ay kilala bilang “may kaalamang pahintulot”.)*

This consent form tells you about the study that you may wish to join. Please read the information carefully and discuss it with anyone you want. This may include a friend or a relative. If you have questions please ask the Principal Investigator or study staff to answer them.

(Ang kasulatan ng pahintulot na ito ay magsasabi sa inyo tungkol sa pag-aaral na maaaring nais ninyong salihan ng inyong anak. Pakibasa pong mabuti ang impormasyon at pag-usapan ninyo ng sinuman na gusto ninyo. Maaari pong kabilang dito ang isang kaibigan o isang kamag-anak. Kung mayroon po kayong mga katanungan mangyaring hilingin sa Pangunahing Imbestigador o tauhan ng pag-aaral na sagutin ang mga ito.)

The objective of the study is to improve the retention level in multiplication and division fact using the dot array *(Ang layunin ng pananaliksik ay alamin ang to improve the retention level in multiplication and division fact using the dot array)*

The participant in this study is/are the grade three pupils section G from Luis Francisco ES. *(Ang kasali sa pananaliksik na ito ay ang grade three pupils section G from Luis Francisco ES.)*

Your child has been chosen to participate in this study because he/she is one of the pupils who hardly comprehend multiplication and division.. *(Ang inyo pong anak ay napiling sumali sa pag-*

aaral na ito dahil siya ay kabilang sa mag aaral nakatala o naka enrol bilang mga batang nahihirapan intindihin ang multiplication and division sa kasalukuyang taon.)

The participation of your child in this study will last for 30 minutes to 1 hour in answering the survey questionnaire. *(Ang paglahok ng inyong anak sa pagaaral na ito ay tatagal ng tatlung minuto hanggang isang oras sa pagsagot sa survey o mga katanungan.)*

In this study your child will answer a survey questionnaire on the multiplication and division. *(Sa pag-aaral na ito, ang inyong anak ay sasagot sa ilang katanungan sa survey ng multiplication and division.)*

In this study, the responsibility of your child is to answer as honestly as possible the statements in the survey questionnaire/ checklist on the multiplication and division.

(Sa pag-aral na ito. Ang inyo pong anak ay inaasahan na sagutin ng tapat ang mga pahayag sa nasabing survey sa multiplication and division.)

The Principal Investigator may remove you from this study for any justified reason according to the protocol. *(Ang Pangunahing Imbestigador ay maaari po na tanggalin tanggalin ang inyong anak mula sa pag-aaral na ito sa anumang makatwirang dahilan ayon sa protokol.)*

You may withdraw your consent from participation in this study at any time. It is important that you inform the Principal Investigator in writing. The Principal Investigator will continue to retain and use any research results that have already been collected for the study evaluation. No further study-related activities will take place. The choice to withdraw from research participation will have no repercussions. *(Maari ninyo pong bawiin anginyong pahintulot mula sa partisipasyon ng inyong anak sa pag-aaral na ito. Mahalaga po na ipaalam ninyo ito sa inyong Pangunahing Imbestigador sa pamamagitan ng sulat. Ang Pangunahing Imbestigador ay patuloy na itatago at gagamitin ang anumang mga resulta ng pananaliksik na nakolekta na para pagpasiyahan ang pag-aaral. Wala nang karagdagang mga gawain na may kaugnayan sa pag-aaral ang magaganap. Ang kagustuhang bumitiw mula sa partisipasyon sa pananaliksik ay hindi makaka-apekto sa grado ng inyong anak.)*

In terms of benefits, this research may have no direct benefit for you as an individual participant. However, the data from interviews will greatly benefit efforts toward a more comprehensive documentation on management of guidance services on students. *(Sa pakinabang sa pagsali sa pagaaral na ito, walang anumang direktang benepisyong ang makukuha subalit ang mga interbiyu o pagsagot sa ilang katanungan ay maaaring makatulong sa pagbuo ng mas komprehensibong pagaaral at katibayan sa pamamahala sa serbisyo ng tagapamatnupay (management of guidance services).)*

There will be no monetary costs to you for participating in this study. In cases where unanticipated costs are incurred by the respondent, however, such costs will be reimbursed by the researcher. *(Walang magiging gastos na pera sa inyo sa pakikilahok sa pag-aaral na ito. Kung may pagkakataon na may mga hindiinaasahang gastos ang naibahagi ng kalahok, ito ay babayaran o ibabalik ng nananaliksik o researcher.)*



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Unless required by law, your name will not be disclosed outside the research clinic. Your name will be available only to the following people or agencies: the Principal Investigator and staff; and authorized representatives of the Principal Investigator; ethics committees and health authority inspectors. While participating in this study, the Principal Investigator will replace your name with a special code that identifies you. *(Maliban kung kinakailangan ng batas, ang inyong pangalan ay hindi ibubunyag sa labas ng klinika ng pananaliksik. Ang inyong pangalan ay makukuha lamang ng sumusunod na mga tao o mga ahensya: ng Pangunahing Imbestigador at ng tauhan at awtorisadong mga kinatawan ng Pangunahing Imbestigador; ethics committees o ng mga inspektor ng awtoridad na pangkalusugan, Habang kasali sa pag-aaral na ito, papalitan ng Pangunahing Imbestigador ang inyong pangalan ng isang espesyal na pantukoy na kikilala sa inyo.)*

Your participation in this study is voluntary and you may cancel this consent at any time and without any reason. If you do so, your participation in the study will end and the study staff will stop collecting information from you. *(Ang inyong partisipasyon sa pag-aaral na ito ay kusang loob at maaari ninyong kanselahin ang inyong pahintulot sa anumang oras at nang walang anumang dahilan. Kung gawin nyo ito, ang inyong partisipasyon sa pag-aaral ay magtatapos at ang tauhan ng pag-aaral ay titigil sa pagkolekta ng impormasyon mula sa inyo.)*

You have the right to review your Study Information and request changes to the Study Information if it is not correct. However, please note that during the study, access to Study Information may be limited if it weakens the integrity of the research. You may have access to the Study Information held by the Principal Investigator at the end of the study. *(May karapatan kayong pagbalik-aralan ang inyong Impormasyon ng Pag-aaral at mga medikal na tala at humiling ng mga pagbabago sa Impormasyon ng Pag-aaral kung ito ay hindi tama. Gayunpaman, pakitandaan na sa panahon ng pag-aaral, ang pagtingin sa Impormasyon ng Pag-aaral ay maaaring limitado kung ito ay nagpapahina sa integridad ng pananaliksik. Maaari ninyong matingnan ang Impormasyon ng Pag-aaral na hawak ng Pangunahing Imbestigador sa katapusan ng pag-aaral.*

You can call or ask questions anytime regarding this study. The contact person for further information or for consultation on diverse events is AGNES D. GARROTE (name) agnes.dimache@deped.gov.ph (e-mail address)(Maaari kang magtanong ng kahit anong oras hinggil sa pag-aaral na ito. Ang tatawagan at kakausapin ay si AGNES D. GARROTE.

This study has been approved for implementation by the RRIDC and DRC. If you have questions related to your rights as a research subject, please contact:



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Misamis St. Bago Bantay, Quezon City



(Ang pag-aaral na ito ay inaprubahan ng RRIDC. Kung mayroon kayong mga katanungan kaugnay sa mga karapatan ng inyong anak bilang isang kalahok sa pananaliksik, paki-kontak):

Regional Research, Innovation and Development Committee (RRIDC) Secretariat:

Dr. Warren A. Ramos

Address: DepEd-NCR, Policy, Planning and Research Division (PPRD) Room 205

Misamis St. Bago Bantay, Quezon City, Philippines

Email: profwarrenramos@gmail.com

Telephone No. 928-01-04

Cellphone No: 09430393897

I have read this document/had its contents explained to me. I understand the purpose of this study and what will happen to me in this study. I do freely give my consent to join in this study, as described to me in this document. I understand that I will receive a copy of this document as signed below. *(Nabasa ko ang dokumentong ito naipaliwanag sa akin ang mga nilalaman nito. Naiintindihan ko ang layunin nitong pag-aaral at kung ano ang mangyayari sa akin sa pag-aaral na ito. Malaya kong ibinibigay ang aking pahintulot na sumali sa pag-aaral na ito, gaya ng inilarawan sa akin sa dokumentong ito. Naiintindihan ko natatanggap akong kopyang dokumentong ito na pinirmahan sa ibaba.)*



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Ateneo de Manila University - Quezon City



By signing this consent form, I authorize the use, access, and sharing of my personal information as described in the section "Confidentiality and Authorization to collect, use and disclose Personal Information". This consent is valid unless and until I revoke it.

(Sa pag-signa ng kasulatan ng pakikiusap na ito, pinapalibutan ko ang paggamit, pagtingin, at pagbabahagi ng aking personal na impormasyon gaya ng inilalarawan sa seksiyon "Pagiging Likas at Papatid na Makalibit, paggamit at mababangang ang Personal na Impormasyon". Ang pakikiusap na ito ay magiging walang kahatuna at katanggap-tanggap sa buong buhay ko.)

Grace Mabel A. Nicodem
Student / Magaaral
type/print name (isulat ang pangalan)

Grace Mabel A. Nicodem 11-14-2018
Signature / Pirmas Date / petsa

GRACE ALVANTARA
Legally acceptable representative
(Pangalan ng kinatawanang legal)

Grace Alvantara 11-14-2018
Signature / Pirmas Date / petsa

(legally authorized to act as personal representative to sign for [name of student]) type/print name
(legal na akawatidhang ginawa bilang personal na kinatawan ng paggamit para kay [pangalan ng mag-aaral] / kasintang/pangalan)

AGNES D. GARROTE
Investigator / Pangalan ng Inibestigador
type/print name / (isulat ang pangalan)

Agnes D. Garrote 11-14-2018
Signature / Pirmas Date / petsa

Name of presenter / Pangalan ng nagpapakita
(who presented/explained the document)
type/print name
(nagpahayag/nagpapaliwanag ng dokumento)
(isulat ang pangalan)

Signature / Pirmas Date / petsa

LIQUIDATION REPORT OF BERF GRANTEE



DENC18-PPRD02.1-008

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National Capital Region
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DEVELOPMENT COMMITTEE
Misamis St. Bago Bantay, Quezon City



Liquidation Report of BERF Grantees

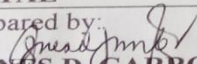
Title of Research: **IMPROVING MULTIPLICATION AND DIVISION FACT RECALL
USING DOT ARRAY MODEL IN GRADE 3**

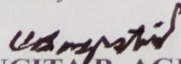
Researcher/s: AGNES D. GARROTE

Division: VALENZUELA CITY

Approved Fund: **Php18955.00** Tranche: 1st **Php15164.00** 2nd **Php3791.00** 3rd _____

Expenses	Cost Estimates	Actual Cost	Means of Verification
Report Materials and Supplies ink for printer ink for marker	P1200.00 P85.00	P266.00	Official Receipt
		P343.00	OR#. 105463
		P272.50	OR# 085943
		P881.50	
Data Storage/ Computer use - usb	P520.00	P350.00	Official Receipt
Photocopy	P390	P209.00	OR#. 104360
		P250.00	OR#. 104359
		P161.25	RER
		P970.25	
Lamination of fact family dot array flash cards	P11760.00	P10290	OR#. 24197
		P2565	OR#. 24204
		P12855.00	
Food	P5000	P3130	OR#. 004901101786061
Notary Fee		P200	RER
Transportation		P300	RER
		P250	RER
		P80	RER
		P80	RER
		P104	RER
		P104	RER
TOTAL		P918.00	
		P18954.75	

Prepared by:

AGNES D. GARROTE
BERF – Grantee

Checked by:

FRANCITA B. AGUSTIN
Principal IV

ABACUS BOOK AND CARD CORP.
 NATIONAL BOOK STORE
 SM City Marilao Mc Arthur
 Highway Brgy. Ibayo Marilao Bulacan
 VAT Registered TIN: 000-299-299-045
 NIN : 110227665

Serial No. : 41-DK127
 ACCREDITN : 43B-208117451-000086
 12/11/2018 15:21:43

TrxNo : 12112018008100021021192

Clerk : 182623 Term No.:0002

1 2917175090003 @ 83.00 83.00

* DELI STPLR SET NO.35

1 2917173040000 @ 61.00 61.00

PILT WHTRD MRKR REG

1 2917173040000 @ 61.00 61.00

PILT WHTRD MRKR REG

1 2917176370005 @ 61.00 61.00

PILT WHTRD MRKR REG

No. of Items 4

Amount Due **266.00**

Change -> 234.00

Cash 500.00

Tax Info

Non-Vatable 0.00

Vatable 237.50

VAT Zero-Rated Sale 0.00

VAT Exempt Sale 0.00

VAT(12%) 28.50

Total Sales 266.00

BUYER'S NAME :

ADDRESS :

TIN :

NATIONAL BOOK STORE, INC.
 NATIONAL BOOK STORE
 G/F 610 Old Victory Rizal Ave.
 Monumento, Caloocan City
 VAT Registered TIN: 000-325-972-039
 NIN: 110242633

Serial No. : 4113724
 ACCREDITN : 43B-208117451-000086
 12/13/2018 16:13:49

TrxNo : 12132018012400031223801

Clerk : 085943 Term No.:0003

1 2911642290002 @ 109.75 109.75

STORAGE BOX PURPLE P

1 2917456730000 @ 33.00 33.00

BBUY PKG TAPE CLEAR

1 2911905050008 @ 129.75 129.75

STORAGE BOX STRIPES

No. of Items 3

Amount Due **272.50**

Change -> 27.50

Cash 300.00

Tax Info

Non-Vatable 0.00

Vatable 243.30

VAT Zero-Rated Sale 0.00

VAT Exempt Sale 0.00

VAT(12%) 29.20

Total Sales 272.50

BUYER'S NAME :

ADDRESS :

TIN :

In settlement of the following:	
Invoice No.	Amount
Total Sales (VAT Inclusive)	
Less: VAT	
Total:	
Less: SC/PWD Discount	
Total Due	
Add: VAT	
Total Amount	
Less: Withholding Tax	
Total Amount Due	
Vatable Sales	
AT-Exempt Sales	
Zero Rated Sales	
VAT Amount	
Total Sales	
Form of payment	
th	Check

CJO COPYTRADE - SM Marilao Branch

1168A-1170A G/F SM City Marilao KM 21 Mc Arthur Highway, Ibayo, Marilao Bulacan
 CESAR J. ORBE JR. - Prop.
 VAT Reg. TIN: 117-157-716-075

OFFICIAL RECEIPT

No 105463

Date 11/19/18

Received from _____ with TIN _____

with address at _____

the sum of pesos 1 Long Answer / 83

1 Plus E copy / 60 234.00

In partial / full payment of _____

Sr. Citizen TIN _____
 OSCA/PWD No. _____ Signature _____

By: red
 Authorized Representative

500 Bkts. (100x2) 90,001-140,000
 BIR Authority to Print No. 1A10001869658
 Date Issued: 10-02-17 Valid Until: 10-01-22

LOVELY PRINTING PRESS
 Palanca St. Lungsod, Laguna
 TIN: 139-022-221-000 NON-VAT
 Tel. No. 022-75861051

Printer's Accreditation No. 05FMP201300000000
 Date Issued: 12-26-13

THIS OFFICIAL RECEIPT SHALL BE VALID FOR FIVE (5) YEARS FROM THE DATE OF AT

Octagon Computer Superstore

TIN: 004-780-008-062 VAT
Owned & Operated By:
Proton Microsystems,
MIN: 050041182
SM City Marilao
Ibaya, Marilao, Bulacan
Ph: 044 8156503 Fax: 044 8156503

Sale

Served By JACQUELYN CAPANGYARIHAN

Description	Ext.
FBI U849L 8GB BLACK USB2.0 FLASH DRIVE	
350.00 x 1	P350.00 VATable Sale
OCTAGON PAPER BAG - SMALL	
0.00 x 1	P0.00 VATable Sale

VATable Sale	P350.00
VAT Zero-Rated Sale	P0.00
VAT Exempt Sale	P0.00

***** VATable Sale *****

Subtotal	P350.00
VAT	P37.50
Total inc. VAT	P350.00
No. of Items (2)	

Payment Details:

Cash	P500.00
Change:	
Cash	P150.00

Docket No.	Date	Time
234025	9/14/2018	17:43

ID NO. 71151

Accreditation No.: 038-227471337-000028

***** OFFICIAL RECEIPT *****

Customer Name: _____
 Address: _____
 TIN: _____
 Business Type: _____
 POS S/N: W/CAMC2786142
 Permit No.: 0905-025-03592-062

BCS Systems and Technologies, Inc.
 #13 Linaw St. Quezon City
 TIN: 227-471-337-000
 Accreditation No. 038-227471337-000028

In settlement of the following:	
Invoice No.	Amount
Total Sales (VAT inclusive)	209
Less: VAT	
Total	
Less: SCPWD Discount	
Total Due	
Add: VAT	
Total Amount	
Less: Withholding Tax	
Total Amount Due	
VATable Sales	
VAT-Exempt Sales	
Non-Rated Sales	
Total Amount	209
of Sales	
Form of payment	<input type="checkbox"/> Cash <input checked="" type="checkbox"/> Check

CJO COPYTRADE-SM Marilao Branch
 1168A-1170A G/F SM City Marilao KM 21 Mc Arthur Highway, Ibayo, Marilao Bulacan
 CESAR J. ORBE JR. - Prop.
 VAT Reg. TIN: 117-157-716-075 **No 104360**

OFFICIAL RECEIPT

Received from _____ with TIN _____
 with address at _____
 the sum of pesos Xerox 209.00

Sr. Citizen TIN	
OSCA/PWD No.	Signature

By: [Signature]
 Authorized Representative

500 Bills (100x2) 90,001-140,000
 BIR Authority to Print No. 1A10001898858
 Date Issued: 10-02-17 Valid Until: 10-01-22
 LOVELY PRINTING PRESS
 Palanca St. Lungsod, Laguna
 TIN: 139-022-226-000 NON-VAT
 Tel No. 09215581051
 Printer's Accreditation No. 055MP2013000000007
 Date Issued: 12-26-13
THIS OFFICIAL RECEIPT SHALL BE VALID FOR FIVE (5) YEARS FROM THE DATE OF ATP.

In settlement of the following:	
Invoice No.	Amount
Total Sales (VAT inclusive)	250
Less: VAT	
Total	
Less: SCPWD Discount	
Total Due	
Add: VAT	
Total Amount	
Less: Withholding Tax	
Total Amount Due	
VATable Sales	
VAT-Exempt Sales	
Non-Rated Sales	
Total Amount	250
of Sales	
Form of payment	<input type="checkbox"/> Cash <input checked="" type="checkbox"/> Check

CJO COPYTRADE-SM Marilao Branch
 1168A-1170A G/F SM City Marilao KM 21 Mc Arthur Highway, Ibayo, Marilao Bulacan
 CESAR J. ORBE JR. - Prop.
 VAT Reg. TIN: 117-157-716-075 **No 104359**


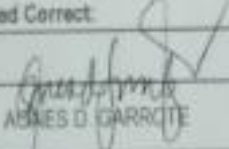
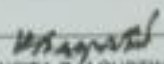
OFFICIAL RECEIPT

Received from _____ with TIN _____
 with address at _____
 the sum of pesos Xerox 250.00

Sr. Citizen TIN	
OSCA/PWD No.	Signature

By: [Signature]
 Authorized Representative

500 Bills (100x2) 90,001-140,000
 BIR Authority to Print No. 1A10001898858
 Date Issued: 10-02-17 Valid Until: 10-01-22
 LOVELY PRINTING PRESS
 Palanca St. Lungsod, Laguna
 TIN: 139-022-226-000 NON-VAT
 Tel No. 09215581051
 Printer's Accreditation No. 055MP2013000000007
 Date Issued: 12-26-13
THIS OFFICIAL RECEIPT SHALL BE VALID FOR FIVE (5) YEARS FROM THE DATE OF ATP.

 Department of Education National Capital Region Division of City Schools - Valenzuela City Pio Valenzuela St., Marulas, Valenzuela City 			
ANNEX A			
CERTIFICATION OF EXPENSES NOT REQUIRING RECEIPTS Pursuant to CDA Circular No. 2017-001 dated June 19, 2017			
Name of Employee	AGNES D. GARROTE	Employee No.	4240565
Office	Luis Francisco Elementary School, Venta Realas		
Division	Valenzuela City		
Particulars			Amount (₱)
Photocopy			₱161.25
TOTAL			₱161.25
Purpose Photocopies of Informed Consent			
I hereby certify that the above expenses are incurred as they are necessary for the above cited purpose that above goods and services were acquired from parties not issuing receipts. And that I am fully aware that willful falsification of statements is punishable by law.			
	Certified Correct:	Noted By:	
Signature:			
Printed Name:	AGNES D. GARROTE	FRANCITA B. AGUSTIN, Ph.D.	
	Employee	Immediate Supervisor	
Date	8-15-2019	Date	8-15-2019



PMP PC Options

44 214 Green Ave. Bldg. Valencia, CA 91355
PETER ANDERSON, Prop. 661 255 7911 (24/7) FAX 661 255 7912

N^o 04127

OFFICIAL RECEIPT Date 9-24-2016
Sent to Agave Service
TIN _____ OCCASION ID No. _____
Business Style SCUPWD
Address _____ Signature _____

Qty	Unit	ARTICLE #	Unit Price	Amount
304	PC	Laminator	35	10740.00

Taxable Total: _____
Less: VAT _____
VAT Exempt Total: _____
Less: 10% PWD - Standard _____
Less: Retail Sales _____
Less: Return _____
TOTAL RECEIPT: 10740.00

44 214 Green Ave. Bldg. Valencia, CA 91355
PETER ANDERSON, Prop. 661 255 7911 (24/7) FAX 661 255 7912
PMP PC Options
Peter Anderson, Proprietor
661 255 7911 (24/7) FAX 661 255 7912

THIS OFFICIAL RECEIPT SHALL BE VOID IF NOT IN FULL PAYMENT FROM THE DATE OF SALE

PMP PC Options

44 214 Green Ave. Bldg. Valencia, CA 91355
PETER ANDERSON, Prop. 661 255 7911 (24/7) FAX 661 255 7912

N^o 04128

OFFICIAL RECEIPT Date 9-26-2016
Sent to Agave Service
TIN _____ OCCASION ID No. _____
Business Style SCUPWD
Address _____ Signature _____

Qty	Unit	ARTICLE #	Unit Price	Amount
45	PC	Laminator	57	2565.00

Taxable Total: _____
Less: VAT _____
VAT Exempt Total: _____
Less: 10% PWD - Standard _____
Less: Retail Sales _____
Less: Return _____
TOTAL RECEIPT: 2565.00

44 214 Green Ave. Bldg. Valencia, CA 91355
PETER ANDERSON, Prop. 661 255 7911 (24/7) FAX 661 255 7912
PMP PC Options
Peter Anderson, Proprietor
661 255 7911 (24/7) FAX 661 255 7912

THIS OFFICIAL RECEIPT SHALL BE VOID IF NOT IN FULL PAYMENT FROM THE DATE OF SALE

M. Agres (Pink)

McDonald's Food
McDonald's Development
L.L. Pankratz & Arthur M. W.
McDonald's, Inc.
Accreditation No. 75-0000000-000000
McD 000 750 000-000-000

For Delivery Service Mail to 2-26
Call us about your McDonald's experience.
www.mcdonalds.com
www.mcdonalds.com
+1 800 245 7000
Circle 26 on Questionnaire
879 side 2

Official McDonald's Development
McDonald's Development
Circle 26 on Questionnaire
McD 000 750 000-000-000



- **Area Sales**
- **Area Manager**
- **Area Supervisor**
- **Area Trainer**
- **Area Developer**
- **Area Coordinator**
- **Area Representative**
- **Area Assistant**
- **Area Support Staff**
- **Area Office Staff**
- **Area Field Staff**



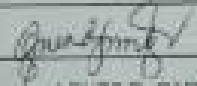

McDonald's Development
Circle 26 on Questionnaire



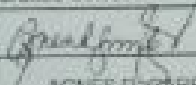

There are eleven (11) ways
this survey is an OFFICIAL survey



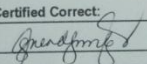
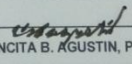
McDonald's
McDonald's Development
1700 W. Century Center, Bldg.
Circle 26 on Questionnaire, Bldg.
Circle 26 on Questionnaire
Circle 26 on Questionnaire
Circle 26 on Questionnaire
Circle 26 on Questionnaire
Circle 26 on Questionnaire
Circle 26 on Questionnaire
Circle 26 on Questionnaire
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Circle 26 on Questionnaire
Circle 26 on Questionnaire



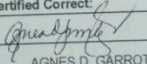
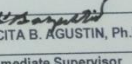
Name _____
Address _____
City _____
State _____

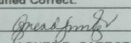
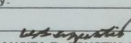
 	
Department of Education National Capital Region Division of City Schools - Valenzuela City P/O Valenzuela St., Marulas, Valenzuela City	
ANNEX A	
CERTIFICATION OF EXPENSES NOT REQUIRING RECEIPTS Pursuant to COA Circular No. 2017-001 dated June 19, 2017	
Name of Employee	AGNES D. GARROTE
Employee No.	424266
Office	Luis Francisco Elementary School, Vanda Rasales
Division	Valenzuela City
Particulars	
Notary Fee	
Amount (P)	
Php200	
TOTAL	
Php200	
Purpose	
Notarized the Memorandum of Agreement Document	
I hereby certify that the above expenses are incurred as they are necessary for the above cited purpose that above goods and services were acquired from parties not issuing receipts. And that I am fully aware that willful falsification of statements is punishable by law.	
Signature:	<i>Agnes D. Garrote</i>
Printed Name:	AGNES D. GARROTE
Noted By:	<i>Francita B. Agustin</i>
	FRANCITA B. AGUSTIN, Ph.D.
Employee	
Date	8/16/2017
Immediate Supervisor	
Date	8/16/2017

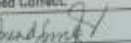

 Department of Education National Capital Region Division of City Schools - Valenzuela City P/O Valenzuela St., Marulas, Valenzuela City				ANNEX A
CERTIFICATION OF EXPENSES NOT REQUIRING RECEIPTS Pursuant to COA Circular No. 2017-001- dated June 19, 2017				
Name of Employee		AGNES D. GARROTE		Employee No.
				4240565
Office	Luis Francisco Elementary School, Vinitas Reales			
Division	Valenzuela City			
Particulars				Amount (P)
fare from residence (Marilao) to NCR Office				Php300
TOTAL				Php300
Purpose The researcher attended the Research Jamboree last October 30, 2018.				
I hereby certify that the above expenses are incurred as they are necessary for the above cited purpose that stove goods and services were acquired from parties not issuing receipts. And that I am fully aware that willful falsification of statements is punishable by law.				
		Certified Correct:		Noted By:
Signature:				
Printed Name:		AGNES D. GARROTE		FRANCITA B. AGUSTIN, Ph.D.
		Employee		Immediate Supervisor
		Date	10/30/2018	Date
				11/15/2019

 Department of Education National Capital Region Division of City Schools - Valenzuela City P/O Valenzuela St., Marulas, Valenzuela City				ANNEX A	
CERTIFICATION OF EXPENSES NOT REQUIRING RECEIPTS Pursuant to COA Circular No. 2017-001 dated June 19, 2017					
Name of Employee		AGNES D. GARROTE		Employee No.	4240565
Office	San Francisco Elementary School, Verville Routes				
Division	Valenzuela City				
Particulars				Amount (P)	
fare from NCR Office to residence (Marulas)				Php250	
TOTAL				Php250	
Purpose The researcher attended the Research Jamboree last October 30, 2018.					
I hereby certify that the above expenses are incurred as they are necessary for the above cited purpose that above goods and services were acquired from parties not issuing receipts. And that I am fully aware that wilful falsification of statements is punishable by law.					
		Certified Correct:		Noted By:	
Signature:					
Printed Name:		AGNES D. GARROTE		FRANCITA B. AGUSTIN, Ph.D.	
		Employee		Immediate Supervisor	
		Date	10/30/2018	Date	8/15/2019

 Department of Education National Capital Region Division of City Schools - Valenzuela City Pio Valenzuela St., Marulas, Valenzuela City				 ANNEX A	
CERTIFICATION OF EXPENSES NOT REQUIRING RECEIPTS Pursuant to COA Circular No. 2017-001- dated June 19, 2017					
Name of Employee	AGNES D. GARROTE		Employee No.	4240565	
Office	Luis Francisco Elementary School, Veinte Reales				
Division	Valenzuela City				
Particulars			Amount (P)		
Feb. 7, 2019 - Fare from school (LFES) to the Division Office - Valenzuela			Php80		
(Tricycle-Jeep-Tricycle)					
TOTAL			Php80		
Purpose Met with Dr. Arnel Poja for checking of final paper.					
I hereby certify that the above expenses are incurred as they are necessary for the above cited purpose that above goods and services were acquired from parties not issuing receipts. And that I am fully aware that wilful falsification of statements is punishable by law.					
		Certified Correct:		Noted By:	
Signature:					
Printed Name:		AGNES D. GARROTE		FRANCITA B. AGUSTIN, Ph.D.	
Employee			Immediate Supervisor		
Date	2/7/2019		Date	2/7/2019	

 Department of Education National Capital Region Division of City Schools - Valenzuela City Pio Valenzuela St., Marulas, Valenzuela City				 ANNEX A	
CERTIFICATION OF EXPENSES NOT REQUIRING RECEIPTS Pursuant to COA Circular No. 2017-001- dated June 19, 2017					
Name of Employee	AGNES D. GARROTE		Employee No.	4240565	
Office	Luis Francisco Elementary School, Veinte Reales				
Division	Valenzuela City				
Particulars			Amount (P)		
Feb. 7, 2019 Fare from Division Office - Valenzuela to school (LFES)			Php80		
(Tricycle-Jeep-Tricycle)					
TOTAL			Php80		
Purpose Met with Dr. Arnel Poja for checking of final paper.					
I hereby certify that the above expenses are incurred as they are necessary for the above cited purpose that above goods and services were acquired from parties not issuing receipts. And that I am fully aware that wilful falsification of statements is punishable by law.					
		Certified Correct:		Noted By:	
Signature:					
Printed Name:		AGNES D. GARROTE		FRANCITA B. AGUSTIN, Ph.D.	
Employee			Immediate Supervisor		
Date	2/7/2019		Date	2/7/2019	

Department of Education National Capital Region Division of City Schools - Valenzuela City Pio Valenzuela St., Marulas, Valenzuela City			
		ANNEX A	
CERTIFICATION OF EXPENSES NOT REQUIRING RECEIPTS Pursuant to COA Circular No. 2017-001- dated June 19, 2017			
Name of Employee	AGNES D. GARROTE	Employee No.	4240565
Office	Luis Francisco Elementary School, Veinte Reales		
Division	Valenzuela City		
Particulars		Amount (₱)	
May 23, 2019 Fare from Division Office - Valenzuela to school (LFES)		Php104	
(Tricycle-Jeep-Tricycle)			
TOTAL		Php104	
Purpose			
Met with Dr. Arnel Poja for checking of final paper.			
I hereby certify that the above expenses are incurred as they are necessary for the above cited purpose that above goods and services were acquired from parties not issuing receipts. And that I am fully aware that willful falsification of statements is punishable by law.			
		Certified Correct:	Noted By:
Signature:			
Printed Name:	AGNES D. GARROTE	FRANCITA B. AGUSTIN, Ph.D.	
Employee		Immediate Supervisor	
Date	5/23/2019	Date	5/23/2019

Department of Education National Capital Region Division of City Schools - Valenzuela City Pio Valenzuela St., Marulas, Valenzuela City			
		ANNEX A	
CERTIFICATION OF EXPENSES NOT REQUIRING RECEIPTS Pursuant to COA Circular No. 2017-001- dated June 19, 2017			
Name of Employee	AGNES D. GARROTE	Employee No.	4240565
Office	Luis Francisco Elementary School, Veinte Reales		
Division	Valenzuela City		
Particulars		Amount (₱)	
May 23, 2019 Fare from school (LFES) to the Division Office - Valenzuela		Php104	
(Tricycle-Jeep-Tricycle)			
TOTAL		Php104	
Purpose			
Met with Dr. Arnel Poja for checking of final paper.			
I hereby certify that the above expenses are incurred as they are necessary for the above cited purpose that above goods and services were acquired from parties not issuing receipts. And that I am fully aware that willful falsification of statements is punishable by law.			
		Certified Correct:	Noted By:
Signature:			
Printed Name:	AGNES D. GARROTE	FRANCITA B. AGUSTIN, Ph.D.	
Employee		Immediate Supervisor	
Date	5/23/2019	Date	5/23/2019

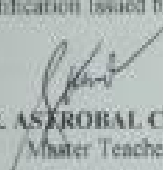


LUIS FRANCISCO ELEMENTARY SCHOOL
St. Rafael Ave., Luis Francisco Subd., Valente Road, Valenzuela City


CERTIFICATE OF CONTENT VALIDATION

This is to certify that I have reviewed and validated the contents of the lesson plans and teacher-made test questions that were used in the study entitled *Improving Multiplication and Division Fact Recall Using Dot Array Model In Grade 3*. I made sure that the elements are appropriate and accurate to answer the research questions stated in the study.

Certification issued by:


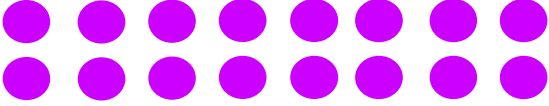

MR. ASTEROBAL C. NARIDO
Master Teacher 3

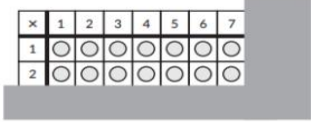
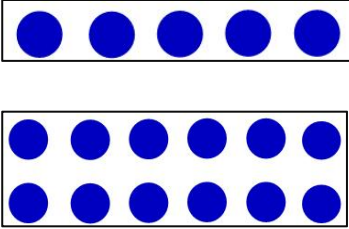
Noted:

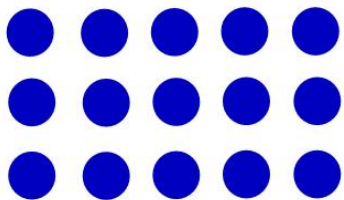

FRANCISCA B. AGUSTIN, Ph.D.
School Head

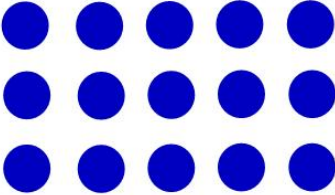
LESSON PLANS USED

Grades 1 to 12 DAILY LESSON LOG	School	LUIS FRANCISCO ELEMENTARY	Grade Level	THREE
	Teacher	AGNES D. GARROTE	Learning Area	MATHEM ATICS
	Teaching Dates and Time	MONDAY Nov. 19, 2018	Quarter	THIRD

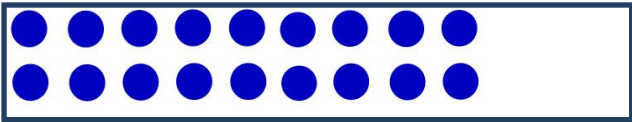
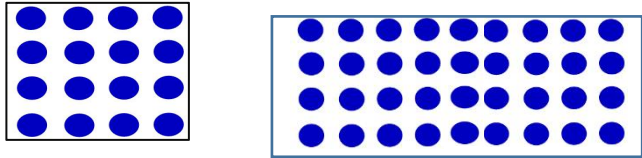
I. OBJECTIVES	
A. Content Standards	Demonstrates understanding of subtraction and multiplication of whole numbers up to 1000 including money.
B. Performance Standards	The learner is able to apply subtraction and multiplication of whole numbers up to 1000 including money in Mathematical problems and real-life situations.
C. Learning Competencies	Visualizes multiplication of numbers 1 to 10 by 2,3,4,5 and 10 M2NS-IIIh-41.1
II. CONTENT	use the dot array model to visualize multiplication fact - table 1 and 2
III. LEARNING RESOURCES	
A. References	
1. Teacher's Guide pages	Curriculum guide
2. Learner's Materials pages	
3. Textbook pages	
4. Additional Materials from Learning Resource (LR) portal	
B. Other Learning Resources	Activity sheets, dot array flashcards, charts, powerpoint presentation
IV. PROCEDURES	
A. Reviewing previous lesson or presenting the new lesson	Have a review about skip counting by 2s
B. Establishing a purpose for the lesson	Show them twenty popsicle sticks. Let two pupils count them. One will count by ones and the other will count it by twos. Ask: Who finished counting first? Why?
C. Presenting examples/instances of the new lesson	Show them the dot array pictures of ones and twos. 
D. Discussing new concepts and practicing new skills #1	Draw an array with 8 rows of 2 dots. You may need to remind pupils that rows go across. What is the total number of dots in the array? Pupils will probably skip count by 2 to find the answer, 16. 

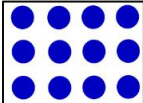
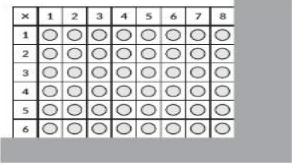
E. Discussing new concepts and practicing new skills #2	<p>What multiplication sentence describes the array? Have a volunteer write the multiplication sentence on the board and label the numbers. multiplication sentence.</p> 
F. Developing mastery (leads to Formative Assessment 3)	<p>Show them also an array with 5 rows of 1 dot. Let them write the multiplication of this. Do the same with other multiplication table of 1 and 2.</p> 
G. Finding practical applications of concepts and skills in daily living	Where do we mostly see arrays of things? Why are they arranged in array?
H. Making generalizations and abstractions about the lesson	What did we use to visualize the multiplication table of 1 and 2? How do we write the multiplication sentence of dot arrays?
I. Evaluating learning	<p>Visualize the following.</p> <p>1. $1 \times 6 =$ 4. $2 \times 5 =$ 2. $7 \times 1 =$ 3. $2 \times 4 =$ 5. $8 \times 2 =$</p>
J. Additional activities for application or remediation	Do exercise 1
V. REMARKS	
VI. REFLECTION	
A. No. of learners who earned 80% in the evaluation	
B. No. of learners who require additional activities for remediation	
C. Did the remedial lessons work? No. of learners who have caught up with the lesson	
D. No. of learners who continue to require remediation	
E. Which of my teaching strategies worked well? Why did these work?	
F. What difficulties did I encounter which my principal or supervisor can help me solve?	

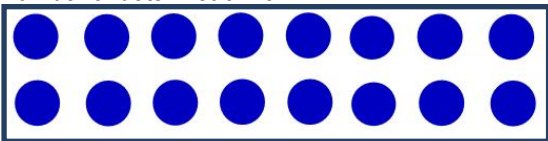
G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				
Grades 1 to 12 DAILY LESSON LOG	School	LUIS FRANCISCO ELEMENTARY	Grade Level	THREE
	Teacher	AGNES D. GARROTE	Learning Area	MATHEMATICS
	Teaching Dates and Time	Nov. 20, 2018 TUESDAY	Quarter	THIRD
I. OBJECTIVES				
C. Content Standards	Demonstrates understanding of subtraction and multiplication of whole numbers up to 1000 including money.			
D. Performance Standards	The learner is able to apply subtraction and multiplication of whole numbers up to 1000 including money in Mathematical problems and real-life situations.			
C. Learning Competencies	Visualizes multiplication of numbers 1 to 10 by 2,3,4,5 and 10 M2NS-IIIh-41.1			
II. CONTENT				
use the dot array model to visualize multiplication fact - table 5 and 10				
III. LEARNING RESOURCES				
C. References				
1. Teacher's Guide pages	Curriculum guide			
2. Learner's Materials pages				
3. Textbook pages				
4. Additional Materials from Learning Resource (LR) portal				
D. Other Learning Resources	Activity sheets, dot array flashcards, charts, powerpoint presentation			
IV. PROCEDURES				
B. Reviewing previous lesson or presenting the new lesson	Have a review about skip counting by ten and 5			
B. Establishing a purpose for the lesson	Have them watch a short video What did the kids do with the fruits?			
C. Presenting examples/instances of the new lesson	Show them chips of dots. Ask volunteers to arrange them in columns and rows. 			

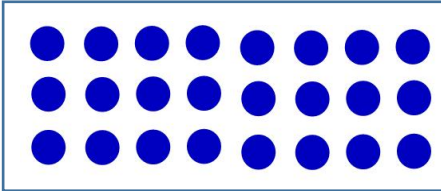
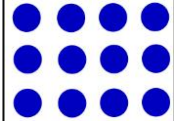
D. Discussing new concepts and practicing new skills #1	<p>Help them to write the multiplication sentence by writing the number of rows then the columns. Count all the dots. Then write the multiplication fact.</p>  <p style="text-align: right;">3 X 5 =15</p> <p>Let them count the number of dots using skip counting.</p>
E. Discussing new concepts and practicing new skills #2	<p>Try to reverse the dot arrays. (commutative property) Ask: Do we get the same answer? Let them explore on the dot arrays of 5 and 10.</p>
F. Developing mastery (leads to Formative Assessment 3)	<p style="text-align: center;">Let them do Exercise 2</p>
G. Finding practical applications of concepts and skills in daily living	<p>Why arranging in arrays important?</p>
H. Making generalizations and abstractions about the lesson	<p>How do we visualize multiplication table 5 and 10?</p>
I. Evaluating learning	<p>Answer Exercise 3.</p>
J. Additional activities for application or remediation	
V. REMARKS	
VI. REFLECTION	
A. No. of learners who earned 80% in the evaluation	
B. No. of learners who require additional activities for remediation	
C. Did the remedial lessons work? No. of learners who have caught up with the lesson	
D. No. of learners who continue to require remediation	
E. Which of my teaching strategies worked well? Why did these work?	
F. What difficulties did I encounter which my principal or supervisor can help me solve?	

G. What innovation or localized materials did I use/discover which I wish to share with other teachers?	
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Grades 1 to 12 DAILY LESSON LOG	School	LUIS FRANCISCO ELEMENTARY	Grade Level	THREE
	Teacher	AGNES D. GARROTE	Learning Area	MATHEMATICS
	Teaching Dates and Time	Nov. 21, 2018 Wednesday	Quarter	THIRD
I. OBJECTIVES				
E. Content Standards	Demonstrates understanding of multiplication and division of whole numbers including money.			
F. Performance Standards	The learner is able to apply multiplication and division of whole numbers including money in Mathematical problems and real-life situations.			
C. Learning Competencies	Visualizes multiplication of numbers 1 to 10 by 2,3,4,5 and 10 M2NS-IIIh-41.1			
II. CONTENT				
Use the dot array model to visualize multiplication fact - table 9 and 4				
III. LEARNING RESOURCES				
E. References				
1. Teacher's Guide pages	Curriculum guide			
2. Learner's Materials pages				
3. Textbook pages				
4. Additional Materials from Learning Resource (LR) portal				
F. Other Learning Resources	Activity sheets, dot array flashcards, chart, powerpoint presentation			
IV. PROCEDURES				
C. Reviewing previous lesson or presenting the new lesson	Use dot array flash cards to recall answers of table 5 and 10			
B. Establishing a purpose for the lesson	Let them watch a short video about finding answers through dot array.			
C. Presenting examples/instances of the new lesson	<p>Give each pupil a dot array flash cards under 4 and 9 multiplication table. Let them count the number of rows and columns.</p>  <p>How many rows are there? How many dots are there in each row? How many are there in all? Did it increase in number?</p>			
D. Discussing new concepts and practicing new skills #1	<p>Let them work by pairs and practice making multiplication sentences from the dot arrays.</p> 			

E. Discussing new concepts and practicing new skills #2	<p>Draw an array to find the answer to each multiplication fact below. Be sure you draw your symbols in neat, straight rows and columns.</p> <p>Let them do it by pairs.</p> <div style="display: flex; align-items: center; gap: 20px;">  <div style="border: 1px solid black; padding: 5px;"> $3 \times 4 = 12$ $4 \times 3 = 12$ </div> </div> <p>e.g. Do the same with the following: $4 \times 9 =$ 4×7 $9 \times 2 =$ 5×9</p>
F. Developing mastery (leads to Formative Assessment 3)	<p>Using this dot array chart, Let them find and show multiplication table mention by the teacher. E.g.</p> 
G. Finding practical applications of concepts and skills in daily living	
H. Making generalizations and abstractions about the lesson	Remember that they can find the answer to basic multiplication facts by making a symbol picture called an array.
I. Evaluating learning	Answer Exercise number 4
J. Additional activities for application or remediation	Do Exercise number 5
V. REMARKS	Solve the problems on Assessment (TG p. 55).
VI. REFLECTION	
A. No. of learners who earned 80% in the evaluation	
B. No. of learners who require additional activities for remediation	
C. Did the remedial lessons work? No. of learners who have caught up with the lesson	
D. No. of learners who continue to require remediation	
E. Which of my teaching strategies worked well? Why did these work?	
F. What difficulties did I encounter which my principal or supervisor can help me solve?	

G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				
Grades 1 to 12 DAILY LESSON LOG	School	LUIS FRANCISCO ELEMENTARY	Grade Level	THREE
	Teacher	AGNES D. GARROTE	Learning Area	MATHEMATICS
	Teaching Dates and Time	Nov. 22, 2018 Thursday	Quarter	THIRD
I. OBJECTIVES				
G. Content Standards		Demonstrates understanding of multiplication and division of whole numbers including money.		
H. Performance Standards		The learner is able to apply multiplication and division of whole numbers including money in Mathematical problems and real-life situations.		
C. Learning Competencies		Visualizes and state basic multiplication facts for numbers up to 10 M3NS-IIa-41.3		
II. CONTENT		use the dot array model to visualize multiplication fact - table 6 and 7		
III. LEARNING RESOURCES				
G. References				
1. Teacher's Guide pages		Curriculum Guide		
2. Learner's Materials pages				
3. Textbook pages				
4. Additional Materials from Learning Resource (LR) portal				
H. Other Learning Resources		Activity sheets, dot array flashcards, chart, powerpoint presentation		
IV. PROCEDURES				
D. Reviewing previous lesson or presenting the new lesson		Use dot array flash cards to recall answers of table 3 and 8 through a game.		
B. Establishing a purpose for the lesson		Provide an array of eight dots. Let them count. Add another set of 8 dots. Let them add. Then add another.		
C. Presenting examples/instances of the new lesson		Provide an array of eight dots. Let them count. Add another set of 8 dots. Let them add. Then add another. Let them write the number of rows and the number of dots in each row?		
				
		(This representation not only aid in understanding the process, but provides a visual image for pupils to draw upon as they begin to use and memorize the basic number facts.)		

D. Discussing new concepts and practicing new skills #1	<p>Let them work by pairs. Let them match the dot array and the multiplication sentences found in their boxes. (They will exchange boxes with other pairs)</p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="border: 1px solid black; padding: 5px; margin-right: 20px;">$3 \times 8 = 24$</div> <div style="border: 1px solid black; padding: 5px;">$3 \times 8 = 24$</div> </div>																																																															
E. Discussing new concepts and practicing new skills #2	<p>Show them how to construct division sentence from this array.</p> <p>e.g.</p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="border: 1px solid black; padding: 5px; margin-right: 20px;">$3 \times 4 = 12$</div> <div style="border: 1px solid black; padding: 5px;">$4 \times 3 = 12$</div> </div> <p>Looking at the array differently, what does it reveal? Show them that $12 \div 3 = 4$ or $12 \div 4 = 3$ put into 3 rows makes 4 columns - or 4 in each row.</p>																																																															
F. Developing mastery (leads to Formative Assessment 3)	<p>Using this dot array chart, Let them find and show multiplication table mention by the teacher and give also the equivalent division sentence. E.g. 3×8</p> <div style="text-align: center;"> <table border="1" data-bbox="992 940 1230 1087"> <thead> <tr> <th>\times</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> </tr> </thead> <tbody> <tr> <th>1</th> <td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td> </tr> <tr> <th>2</th> <td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td> </tr> <tr> <th>3</th> <td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td> </tr> <tr> <th>4</th> <td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td> </tr> <tr> <th>5</th> <td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td> </tr> <tr> <th>6</th> <td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td> </tr> </tbody> </table> </div>	\times	1	2	3	4	5	6	7	8	1	○	○	○	○	○	○	○	○	2	○	○	○	○	○	○	○	○	3	○	○	○	○	○	○	○	○	4	○	○	○	○	○	○	○	○	5	○	○	○	○	○	○	○	○	6	○	○	○	○	○	○	○	○
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G. Finding practical applications of concepts and skills in daily living	Ask them to arrange their bags in a row of 3 with 8 bags each row.																																																															
H. Making generalizations and abstractions about the lesson	Remember: basic multiplication and division facts can be mastered by making a symbol picture called an array to know how the multiplication and division sentences derived.																																																															
I. Evaluating learning	Answer Exercise number 6																																																															
J. Additional activities for application or remediation	Do Exercise number 7																																																															
V. REMARKS																																																																
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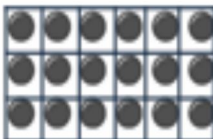
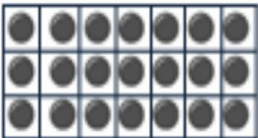
remediation	
E. Which of my teaching strategies worked well? Why did these work?	

Pretest

Pangalan: _____ Score: _____ Pretest

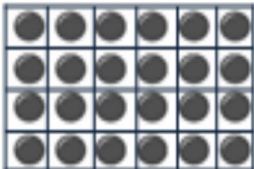
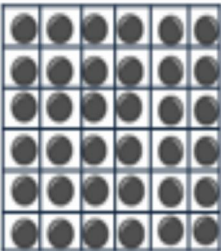
Sagutin ang mga sumusunod na tanong .

A. Piliin ang tamang multiplication number sentence para sa mga sumusunod na dot array model.

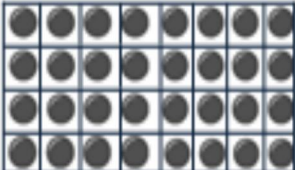
1.  2.  3. 

A. $2 \times 5 = 10$ A. $3 \times 6 = 18$ A. $3 \times 6 = 18$
 B. $3 \times 6 = 18$ B. $2 \times 6 = 16$ B. $2 \times 5 = 10$
 C. $2 \times 9 = 18$ C. $2 \times 4 = 8$ C. $2 \times 4 = 8$
 D. $4 \times 3 = 12$ D. $4 \times 3 = 12$ D. $3 \times 7 = 21$

Piliin ang tamang division number sentence para sa mga sumusunod na dot array model.

4.  5. 

A. $24 \div 8 = 3$ A. $16 \div 8 = 2$
 B. $12 \div 3 = 4$ B. $27 \div 9 = 3$
 C. $24 \div 6 = 4$ C. $48 \div 8 = 6$
 D. $14 \div 2 = 7$ D. $36 \div 6 = 6$

6.  A. $32 \div 8 = 4$
 B. $30 \div 3 = 10$
 C. $24 \div 6 = 4$
 D. $18 \div 2 = 9$

B. Piliin ang titik ng tamang sagot.

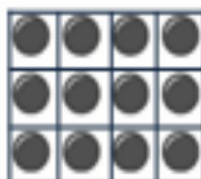
7. $5 \times 9 =$ _____ a. 40 b. 45 c. 50 d. 35
 8. $7 \times 4 =$ _____ a. 28 b. 40 c. 42 d. 44
 9. $12 \times 4 =$ _____ a. 36 b. 42 c. 48 d. 56
 10. $9 \times 8 =$ _____ a. 65 b. 68 c. 72 d. 75
 11. $42 \div 7 =$ _____ a. 6 b. 7 c. 8 d. 9
 12. $35 \div 5 =$ _____ a. 5 b. 6 c. 7 d. 8
 13. $48 \div 6 =$ _____ a. 5 b. 6 c. 7 d. 8

14. $63 \div 7 = \underline{\quad}$ a. 8 b. 9 c. 10 d. 11

15. $81 \div 9 = \underline{\quad}$ a. 7 b. 8 c. 9 d. 10

C. Magsulat ng multiplication at division fact family para sa mga sumusunod na dot arrays.

16-17.



$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ \div _ = _ \\ _ \div _ = _ \end{array}$$

18-19.



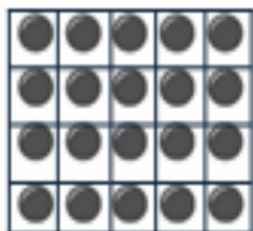
$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ \div _ = _ \\ _ \div _ = _ \end{array}$$

20-21.



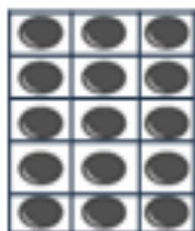
$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ \div _ = _ \\ _ \div _ = _ \end{array}$$

22-23.



$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ \div _ = _ \\ _ \div _ = _ \end{array}$$

24-25.



$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ \div _ = _ \\ _ \div _ = _ \end{array}$$

D. Ibigay ang sagot.

26. $3 \times 12 = \underline{\quad}$

28. $48 \div 6 = \underline{\quad}$

27. $23 \times 3 = \underline{\quad}$

29. $42 \div 7 = \underline{\quad}$

30. $56 \div 7 = \underline{\quad}$

Pangalan: _____ Petsa: _____ Posttest

Baitang: _____

A. Piliin ang tamang multiplication number sentence para sa mga sumusunod na dot array model.

1.



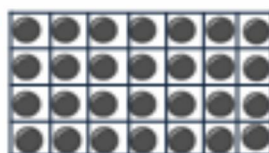
- A. $2 \times 5 = 10$
 B. $3 \times 4 = 12$
 C. $3 \times 5 = 15$
 D. $4 \times 7 = 28$

2.



- A. $7 \times 2 = 14$
 B. $2 \times 6 = 16$
 C. $3 \times 6 = 18$
 D. $7 \times 3 = 21$

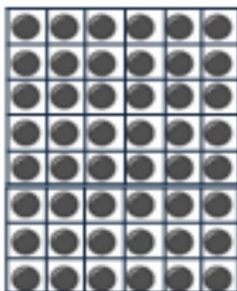
3.



- A. $2 \times 6 = 12$
 B. $5 \times 5 = 25$
 C. $7 \times 4 = 28$
 D. $5 \times 7 = 35$

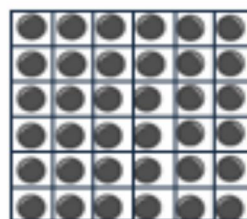
B. Piliin ang tamang division number sentence para sa mga sumusunod na dot array model.

4.



- A. $24 \div 8 = 3$
 B. $12 \div 3 = 4$
 C. $36 \div 6 = 6$
 D. $48 \div 6 = 8$

5.



- A. $16 \div 8 = 2$
 B. $27 \div 9 = 3$
 C. $48 \div 8 = 6$
 D. $36 \div 6 = 6$

C. Piliin ang titik ng tamang sagot.

6. $8 \times 7 =$ _____ a. 40 b. 48 c. 52 d. 56
 7. $7 \times 9 =$ _____ a. 63 b. 45 c. 34 d. 30
 8. $7 \times 7 =$ _____ a. 28 b. 40 c. 42 d. 49
 9. $63 \div 7 =$ _____ a. 6 b. 7 c. 8 d. 9
 10. $64 \div 8 =$ _____ a. 5 b. 6 c. 7 d. 8
 11. $48 \div 8 =$ _____ a. 5 b. 6 c. 7 d. 8

D. Magsulat ng multiplication at division fact family para sa mga sumusunod na dot arrays.

12-13.



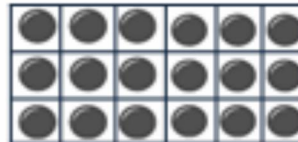
$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ + _ = _ \\ _ + _ = _ \end{array}$$

14-15.



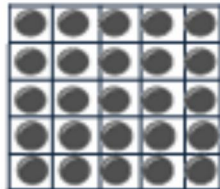
$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ + _ = _ \\ _ + _ = _ \end{array}$$

16-17.



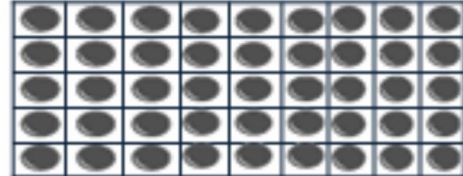
$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ + _ = _ \\ _ + _ = _ \end{array}$$

18-19.



$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ + _ = _ \\ _ + _ = _ \end{array}$$

20-21.



$$\begin{array}{l} _ \times _ = _ \\ _ \times _ = _ \\ _ + _ = _ \\ _ + _ = _ \end{array}$$

E. Ibigay ang sagot.

22. $13 \times 4 = \underline{\quad}$

23. $5 \times 12 = \underline{\quad}$

24. $23 \times 3 = \underline{\quad}$

25. $32 \times 4 = \underline{\quad}$

26. $48 \div 8 = \underline{\quad}$

27. $72 \div 8 = \underline{\quad}$

28. $56 \div 7 = \underline{\quad}$

29. $63 \div 9 = \underline{\quad}$

30. $81 \div 9 = \underline{\quad}$




LUIS FRANCISCO ELEMENTARY SCHOOL
VALENZUELA NORTH DISTRICT
PRETEST AND POSTTEST SCORES OF RESPONDENTS


No.	CONTROL GROUP		EXPERIMENTAL GROUP	
	PRETEST	POST TEST	PRETEST	POST TEST
1	16	24	17	30
2	13	20	11	30
3	14	17	19	28
4	15	16	18	30
5	12	15	14	29
6	17	21	15	30
7	16	18	17	23
8	14	16	13	26
9	15	19	14	28
10	10	19	14	24
11	13	19	12	26
12	14	20	13	29
13	15	20	14	27
14	12	20	17	25
15	13	28	12	23
16	14	21	17	30
17	17	24	15	30
18	15	26	16	30
19	12	22	14	27
20	15	24	15	29
21	11	20	11	29
22	14	22	17	29
23	18	21	16	23
24	14	27	14	28
25	15	22	15	26
26	17	21	13	25
27	13	24	13	19
28	14	26	14	25
29	14	22	14	26
30	12	24	12	23
31	13	19	13	24
32	14	21	14	22
33	17	24	17	27
34	12	21	15	26
35	17	21	9	23
36	15	21	15	22


37	16	20	11	24
38	16	25	14	26
39	15	19	12	22
40	11	18	8	23
41	17	22	11	21
42	16	22	10	24
43	12	24	11	28
Mean	14.30	21.28	13.86	26.02

Pangalan Aaron Steeve P. Sayson Score 29 Pretest
 Sagutin ang mga sumusunod na tanong

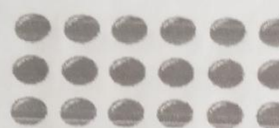
A. Piliin ang tamang multiplication number sentence para sa mga sumusunod na dot array model

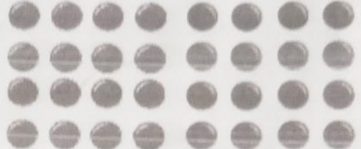
1.  A. $2 \times 5 = 10$
 B. $5 \times 4 = 20$
 C. $2 \times 10 = 20$
 D. $4 \times 5 = 20$

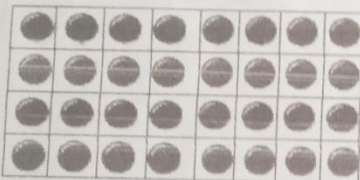
2.  A. $4 \times 6 = 24$
 B. $8 \times 3 = 24$
 C. $6 \times 4 = 24$
 D. $3 \times 8 = 24$

3.  A. $3 \times 8 = 24$
 B. $6 \times 4 = 24$
 C. $4 \times 6 = 24$
 D. $8 \times 3 = 24$

Piliin ang tamang division number sentence para sa mga sumusunod na dot array model.

4.  A. $24 \div 8 = 3$
 B. $18 \div 3 = 6$
 C. $18 \div 6 = 3$
 D. $14 \div 2 = 7$

5.  A. $32 \div 4 = 8$
 B. $32 \div 8 = 4$
 C. $48 \div 8 = 6$
 D. $36 \div 6 = 6$

6.  A. $32 \div 8 = 4$
 B. $30 \div 3 = 10$
 C. $24 \div 6 = 4$
 D. $18 \div 2 = 9$

B. Piliin ang titik ng tamang sagot.

7. $6 \times 9 = \underline{54}$ a. 40 b. 45 c. 54 d. 35
 8. $7 \times 4 = \underline{28}$ a. 28 b. 40 c. 42 d. 44
 9. $9 \times 4 = \underline{36}$ a. 36 b. 42 c. 48 d. 56
 10. $9 \times 8 = \underline{72}$ a. 65 b. 68 c. 72 d. 75
 11. $42 \div 7 = \underline{6}$ a. 6 b. 7 c. 8 d. 9
 12. $40 \div 5 = \underline{8}$ a. 5 b. 6 c. 7 d. 8
 13. $42 \div 6 = \underline{7}$ a. 5 b. 6 c. 7 d. 8

14. $63 \div 7 = \frac{9}{10}$ a. 8 b. 9 c. 10 d. 11
 15. $80 \div 9 = \frac{10}{10}$ a. 7 b. 8 c. 9 d. 10

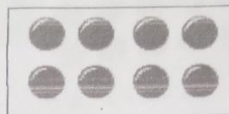
C. Magsulat ng multiplication at division fact family para sa mga sumusunod na dot arrays.

16-17.



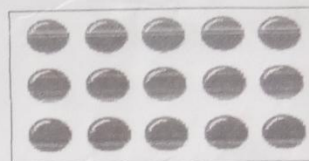
$$\begin{array}{l} 6 \times 3 = 18 \\ 3 \times 6 = 18 \\ 18 \div 3 = 6 \\ 18 \div 6 = 3 \end{array}$$

18-19.



$$\begin{array}{l} 4 \times 2 = 8 \\ 2 \times 4 = 8 \\ 8 \div 2 = 4 \\ 8 \div 4 = 2 \end{array}$$

20-21.



$$\begin{array}{l} 5 \times 3 = 15 \\ 3 \times 5 = 15 \\ 15 \div 3 = 5 \\ 15 \div 5 = 3 \end{array}$$

22-23.



$$\begin{array}{l} 5 \times 4 = 20 \\ 4 \times 5 = 20 \\ 20 \div 4 = 5 \\ 20 \div 5 = 4 \end{array}$$

24-25.



$$\begin{array}{l} 6 \times 5 = 30 \\ 5 \times 6 = 30 \\ 30 \div 5 = 6 \\ 30 \div 6 = 5 \end{array}$$

D. Ibigay ang sagot.

26. $3 \times 12 = 36$

27. $23 \times 3 = 69$

28. $48 \div 6 = 8$

29. $42 \div 7 = 6$

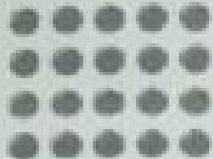
30. $56 \div 7 = 8$

Pretest

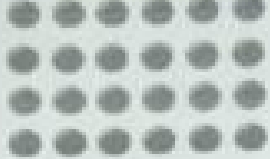
Pangalan: Gheby Arabel E. Almabayo Score: 24

Sagutin ang mga sumusunod na tanong

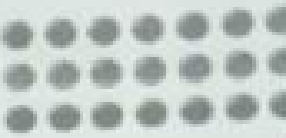
A. Piliin ang tamang multiplication number sentence para sa mga sumusunod na dot array model

1. 

A. $2 \times 5 = 10$
 B. $5 \times 4 = 20$
 C. $2 \times 10 = 20$
 D. $4 \times 5 = 20$

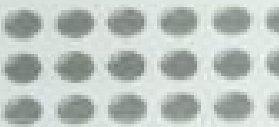
2. 

A. $4 \times 6 = 24$
 B. $6 \times 3 = 24$
 C. $6 \times 4 = 24$
 D. $3 \times 8 = 24$

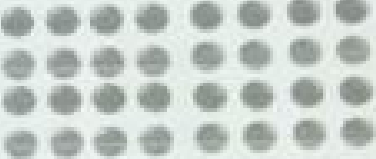
3. 

A. $3 \times 8 = 24$
 B. $6 \times 4 = 24$
 C. $4 \times 6 = 24$
 D. $8 \times 3 = 24$

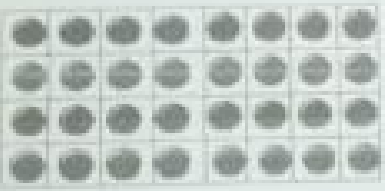
Piliin ang tamang division number sentence para sa mga sumusunod na dot array model

4. 

A. $24 \div 8 = 3$
 B. $18 \div 3 = 6$
 C. $18 \div 9 = 2$
 D. $14 \div 2 = 7$

5. 

A. $32 \div 4 = 8$
 B. $32 \div 8 = 4$
 C. $48 \div 6 = 8$
 D. $30 \div 6 = 5$

6. 

A. $32 \div 8 = 4$
 B. $30 \div 3 = 10$
 C. $24 \div 6 = 4$
 D. $15 \div 2 = 5$

B. Piliin ang titik ng tamang sagot

7. $6 \times 9 = \underline{54}$	a. 40	b. 45	c. <u>54</u>	d. 35
8. $7 \times 4 = \underline{28}$	a. <u>28</u>	b. 40	c. 42	d. 44
9. $9 \times 4 = \underline{36}$	a. <u>36</u>	b. 42	c. 48	d. 56
10. $8 \times 8 = \underline{72}$	a. 65	b. 68	c. <u>72</u>	d. 75
11. $42 \div 7 = \underline{7}$	a. 6	b. <u>7</u>	c. 8	d. 9
12. $40 \div 5 = \underline{8}$	a. 5	b. 6	c. 7	d. <u>8</u>
13. $42 \div 6 = \underline{7}$	a. 5	b. 6	c. <u>7</u>	d. 8

Shelvi Arabel R. Alcantara

14. $63 \div 7 =$ B a. 8 b. 9 c. 10 d. 11

15. $80 \div 8 =$ C a. 7 b. 8 c. 9 d. 10

C. Magsulat ng multiplication or division fact family para sa mga sumusunod na dot arrays.

18-21



$$\begin{array}{l} 3 \cdot 6 = 18 \\ 6 \cdot 3 = 18 \\ 18 \div 6 = 3 \\ 18 \div 3 = 6 \end{array}$$

19-23



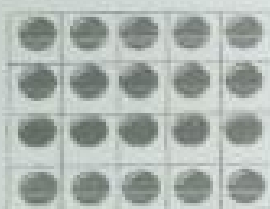
$$\begin{array}{l} 2 \cdot 4 = 8 \\ 4 \cdot 2 = 8 \\ 8 \div 4 = 2 \\ 8 \div 2 = 4 \end{array}$$

20-25



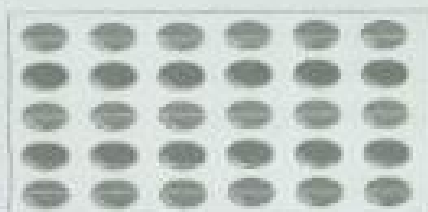
$$\begin{array}{l} 2 \cdot 5 = 10 \\ 5 \cdot 2 = 10 \\ 10 \div 5 = 2 \\ 10 \div 2 = 5 \end{array}$$

22-24



$$\begin{array}{l} 4 \cdot 5 = 20 \\ 5 \cdot 4 = 20 \\ 20 \div 5 = 4 \\ 20 \div 4 = 5 \end{array}$$

24-25



$$\begin{array}{l} 5 \cdot 6 = 30 \\ 6 \cdot 5 = 30 \\ 30 \div 6 = 5 \\ 30 \div 5 = 6 \end{array}$$

D. Ibigay ang sagot.

26. $3 \times 12 =$ 36

27. $23 \times 3 =$ 69

28. $48 \div 6 =$ 8


29. $42 \div 7 =$ 6


30. $56 \div 7 =$ 8


Grade 5
 Pangalan: h. B. K. w. d. c. l. p. y. m. b. o. Score: 24 / 30 Pretest

Sagutin ang mga sumusunod na tanong


A. Piliin ang tamang multiplication number sentence para sa mga sumusunod na dot array model.


1.  A. $2 \times 5 = 10$
 B. $5 \times 4 = 20$
 C. $2 \times 10 = 20$
 D. $4 \times 5 = 20$

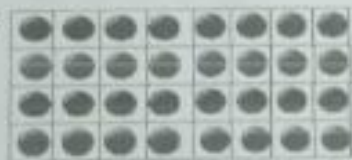
2.  A. $4 \times 6 = 24$
 B. $8 \times 3 = 24$
 C. $6 \times 4 = 24$
 D. $3 \times 8 = 24$

3.  A. $3 \times 8 = 24$
 B. $6 \times 4 = 24$
 C. $4 \times 6 = 24$
 D. $8 \times 3 = 24$

Piliin ang tamang division number sentence para sa mga sumusunod na dot array model.

4.  A. $24 \div 8 = 3$
 B. $18 \div 3 = 6$
 C. $18 \div 6 = 3$
 D. $14 \div 2 = 7$

5.  A. $32 \div 4 = 8$
 B. $32 \div 8 = 4$
 C. $48 \div 8 = 6$
 D. $36 \div 6 = 6$

6.  A. $32 \div 8 = 4$
 B. $30 \div 3 = 10$
 C. $24 \div 6 = 4$
 D. $18 \div 2 = 9$

B. Piliin ang titik ng tamang sagot

7. $6 \times 9 = 54$ a. 40 b. 45 c. 54 d. 35

8. $7 \times 4 = 28$ a. 28 b. 40 c. 42 d. 44

9. $9 \times 4 = 36$ a. 36 b. 42 c. 48 d. 56

10. $9 \times 8 = 72$ a. 65 b. 68 c. 72 d. 75

11. $42 \div 7 = 6$ a. 6 b. 7 c. 8 d. 9

12. $40 \div 5 = 8$ a. 5 b. 6 c. 7 d. 8

13. $42 \div 6 = 7$ a. 5 b. 6 c. 7 d. 8

14. $63 \div 7 =$ 9 a. 8 (b) 9 c. 10 d. 11
 15. $80 \div 9 =$ 8 (a) 7 b. 8 c. 9 d. 10

C. Magkulat ng multiplication at division fact family para sa mga sumusunod na dot arrays

16-17



$$\begin{array}{r} 5 \cdot 3 = 15 \\ 3 \cdot 6 = 18 \\ 18 \cdot 3 = 6 \\ 18 \cdot 6 = 3 \end{array}$$

18-19



$$\begin{array}{r} 4 \cdot 2 = 8 \\ 2 \cdot 4 = 8 \\ 8 \cdot 2 = 4 \\ 8 \cdot 4 = 2 \end{array}$$

20-21



$$\begin{array}{r} 5 \cdot 3 = 15 \\ 3 \cdot 5 = 15 \\ 15 \cdot 3 = 5 \\ 15 \cdot 5 = 3 \end{array}$$

22-23



$$\begin{array}{r} 5 \cdot 4 = 20 \\ 4 \cdot 5 = 20 \\ 20 \cdot 4 = 5 \\ 20 \cdot 5 = 4 \end{array}$$

24-25



$$\begin{array}{r} 6 \cdot 5 = 30 \\ 5 \cdot 6 = 30 \\ 30 \cdot 5 = 6 \\ 30 \cdot 6 = 5 \end{array}$$

Ibigay ang sagot.

26. $3 \times 12 =$ 36

27. $23 \times 3 =$ 69

28. $48 \div 6 =$ 8

29. $42 \div 7 =$ 6

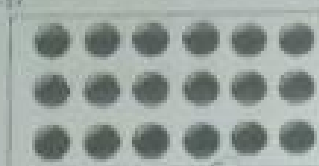
30. $56 \div 7 =$ 8

Zoom in the sign below.

14. $63 \div 7 = 9$ a. 8 b. 9 c. 10 d. 11
 15. $48 \div 9 = 10$ ✓ a. 7 b. 8 c. 9 d. 10

C. Magnalat ng multiplication at division fact family para sa mga sumusunod na dot arrays.

16-17



$$\begin{array}{r} 3 \cdot 6 = 21 \\ 6 \cdot 3 = 21 \\ 21 \div 6 = 3 \\ 21 \div 3 = 6 \end{array}$$

18-19



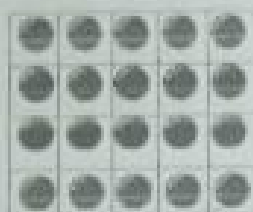
$$\begin{array}{r} 2 \cdot 4 = 8 \\ 4 \cdot 2 = 8 \\ 8 \div 2 = 4 \\ 8 \div 4 = 2 \end{array}$$

20-21



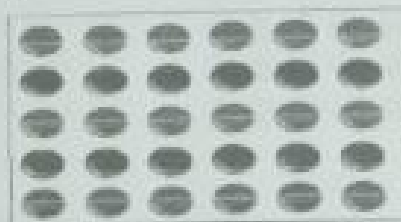
$$\begin{array}{r} 3 \cdot 5 = 15 \\ 5 \cdot 3 = 15 \\ 15 \div 3 = 5 \\ 15 \div 5 = 3 \end{array}$$

22-23



$$\begin{array}{r} 4 \cdot 5 = 20 \\ 5 \cdot 4 = 20 \\ 20 \div 5 = 4 \\ 20 \div 4 = 5 \end{array}$$

24-25



$$\begin{array}{r} 5 \cdot 6 = 30 \\ 6 \cdot 5 = 30 \\ 30 \div 6 = 5 \\ 30 \div 5 = 6 \end{array}$$

D. Ibigay ang sagot.


26. $3 \times 12 = 36$
 27. $23 \times 3 = 69$


28. $48 \div 6 = 9$ ✓
 29. $42 \div 7 = 6$
 30. $56 \div 7 = 8$


Pangalan Zeamir R. Disabelle Score 25 Pretest

Sagutin ang mga sumusunod na tanong.


A. Pilin ang tamang multiplication number sentence para sa mga sumusunod na dot array model.


1.  A. $2 \times 5 = 10$
 B. $5 \times 4 = 20$
 C. $2 \times 10 = 20$
 D. $4 \times 5 = 20$


2.  A. $4 \times 6 = 24$
 B. $6 \times 3 = 24$
 C. $6 \times 4 = 24$
 D. $3 \times 8 = 24$

3.  A. $3 \times 8 = 24$
 B. $6 \times 4 = 24$
 C. $4 \times 6 = 24$
 D. $8 \times 3 = 24$

Pilin ang tamang division number sentence para sa mga sumusunod na dot array model.

4.  A. $24 \div 8 = 3$
 B. $18 \div 3 = 6$
 C. $18 \div 6 = 3$
 D. $14 \div 2 = 7$

5.  A. $32 \div 4 = 8$
 B. $32 \div 8 = 4$
 C. $48 \div 8 = 6$
 D. $36 \div 6 = 6$

6.  A. $32 \div 8 = 4$
 B. $30 \div 3 = 10$
 C. $24 \div 6 = 4$
 D. $18 \div 2 = 9$

B. Pilin ang titik ng tamang sagot.

7. $6 \times 9 = \underline{54}$ a. 40 b. 45 c. 54 d. 38

8. $7 \times 4 = \underline{28}$ a. 28 b. 40 c. 42 d. 44

9. $9 \times 4 = \underline{36}$ a. 36 b. 42 c. 48 d. 56

10. $8 \times 8 = \underline{72}$ a. 65 b. 68 c. 72 d. 75

11. $42 \div 7 = \underline{6}$ a. 6 b. 7 c. 8 d. 9

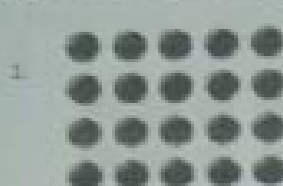
12. $40 \div 5 = \underline{8}$ a. 5 b. 6 c. 7 d. 8

13. $42 \div 6 = \underline{7}$ a. 5 b. 6 c. 7 d. 8

Pangalan: Shaine S. Sorong Score: 3 Pabalot

Segutin ang mga sumusunod na tanong

A. Piliin ang tamang multiplication number sentence para sa mga sumusunod na dot array model.

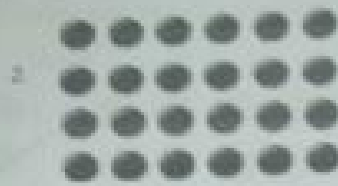


A. $2 \times 5 = 10$

B. $5 \times 4 = 20$

C. $2 \times 10 = 20$

D. $4 \times 5 = 20$

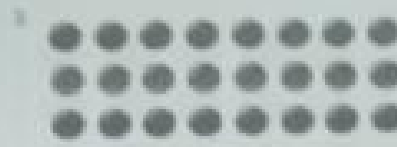


A. $4 \times 6 = 24$

B. $6 \times 3 = 24$

C. $6 \times 4 = 24$

D. $3 \times 8 = 24$



A. $3 \times 8 = 24$

B. $6 \times 4 = 24$

C. $4 \times 6 = 24$

D. $8 \times 3 = 24$

Piliin ang tamang division number sentence para sa mga sumusunod na dot array model.

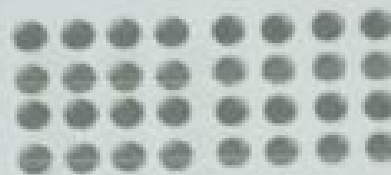


A. $24 \div 6 = 3$

B. $18 \div 3 = 6$

C. $18 \div 6 = 3$

D. $14 \div 2 = 7$

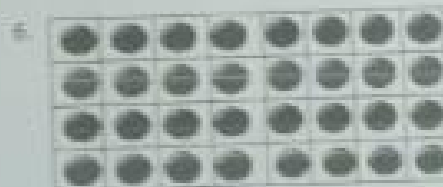


A. $32 \div 4 = 8$

B. $32 \div 8 = 4$

C. $48 \div 8 = 6$

D. $30 \div 6 = 5$



A. $30 \div 6 = 4$

B. $30 \div 3 = 10$

C. $24 \div 6 = 4$

D. $18 \div 2 = 9$

B. Piliin ang titik ng tamang sagot.

7. $6 \times 9 =$ C a. 40 b. 45 c. 54 d. 36

8. $7 \times 4 =$ a a. 28 b. 40 c. 42 d. 44

9. $9 \times 4 =$ a a. 36 b. 42 c. 48 d. 56

10. $9 \times 8 =$ C a. 65 b. 68 c. 72 d. 75

11. $42 \div 7 =$ a a. 6 b. 7 c. 8 d. 9

12. $40 \div 5 =$ d a. 5 b. 6 c. 7 d. 8

13. $42 \div 6 =$ C a. 5 b. 6 c. 7 d. 8

14. $63 \div 7 =$ b a. 8 b. 9 c. 10 d. 11
 15. $80 \div 8 =$ c a. 7 b. 8 c. 9 d. 10

C. Magsulat ng multiplication at division fact family para sa mga sumusunod na dot arrays

16-17



$$\begin{array}{r} 3 \cdot 6 = 18 \\ 6 \cdot 3 = 18 \\ 18 \cdot 6 = 3 \\ 18 \cdot 3 = 6 \end{array}$$

18-19



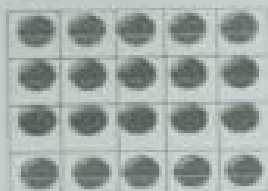
$$\begin{array}{r} 2 \cdot 4 = 8 \\ 4 \cdot 2 = 8 \\ 8 \cdot 4 = 2 \\ 8 \cdot 2 = 4 \end{array}$$

20-21



$$\begin{array}{r} 3 \cdot 5 = 15 \\ 5 \cdot 3 = 15 \\ 15 \cdot 5 = 3 \\ 15 \cdot 3 = 5 \end{array}$$

22-23



$$\begin{array}{r} 4 \cdot 5 = 20 \\ 5 \cdot 4 = 20 \\ 20 \cdot 5 = 4 \\ 20 \cdot 4 = 5 \end{array}$$

24-25



$$\begin{array}{r} 5 \cdot 6 = 30 \\ 6 \cdot 5 = 30 \\ 30 \cdot 6 = 5 \\ 30 \cdot 5 = 6 \end{array}$$

D. Ibigay ang sagot

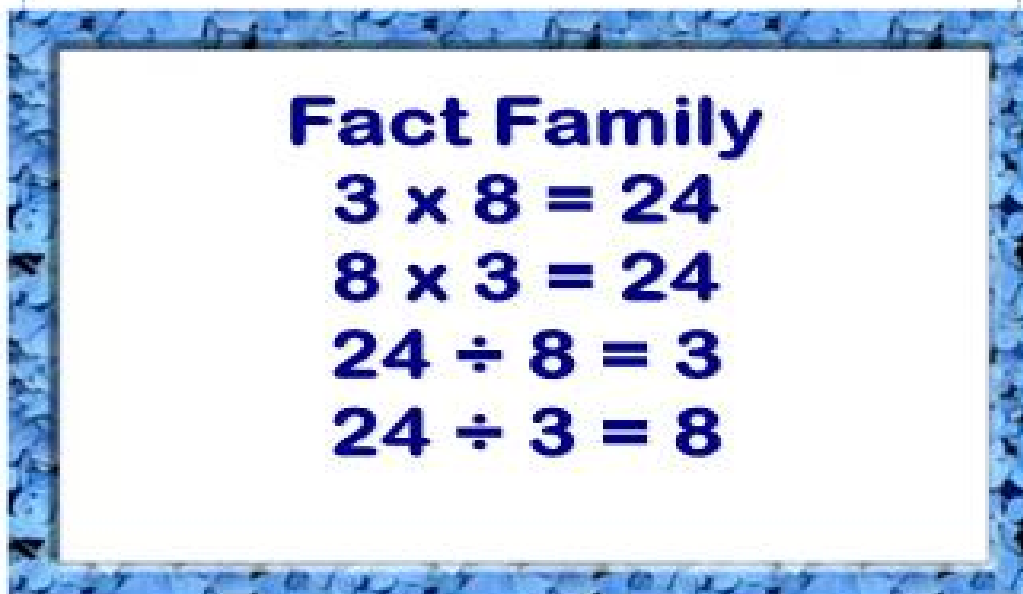
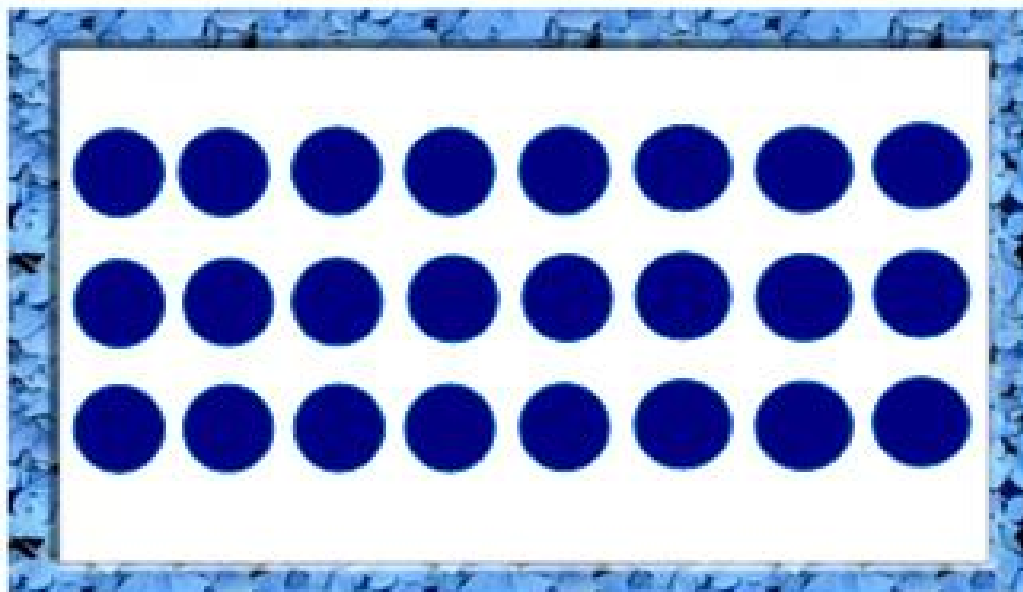
26. $3 \times 12 =$ 36

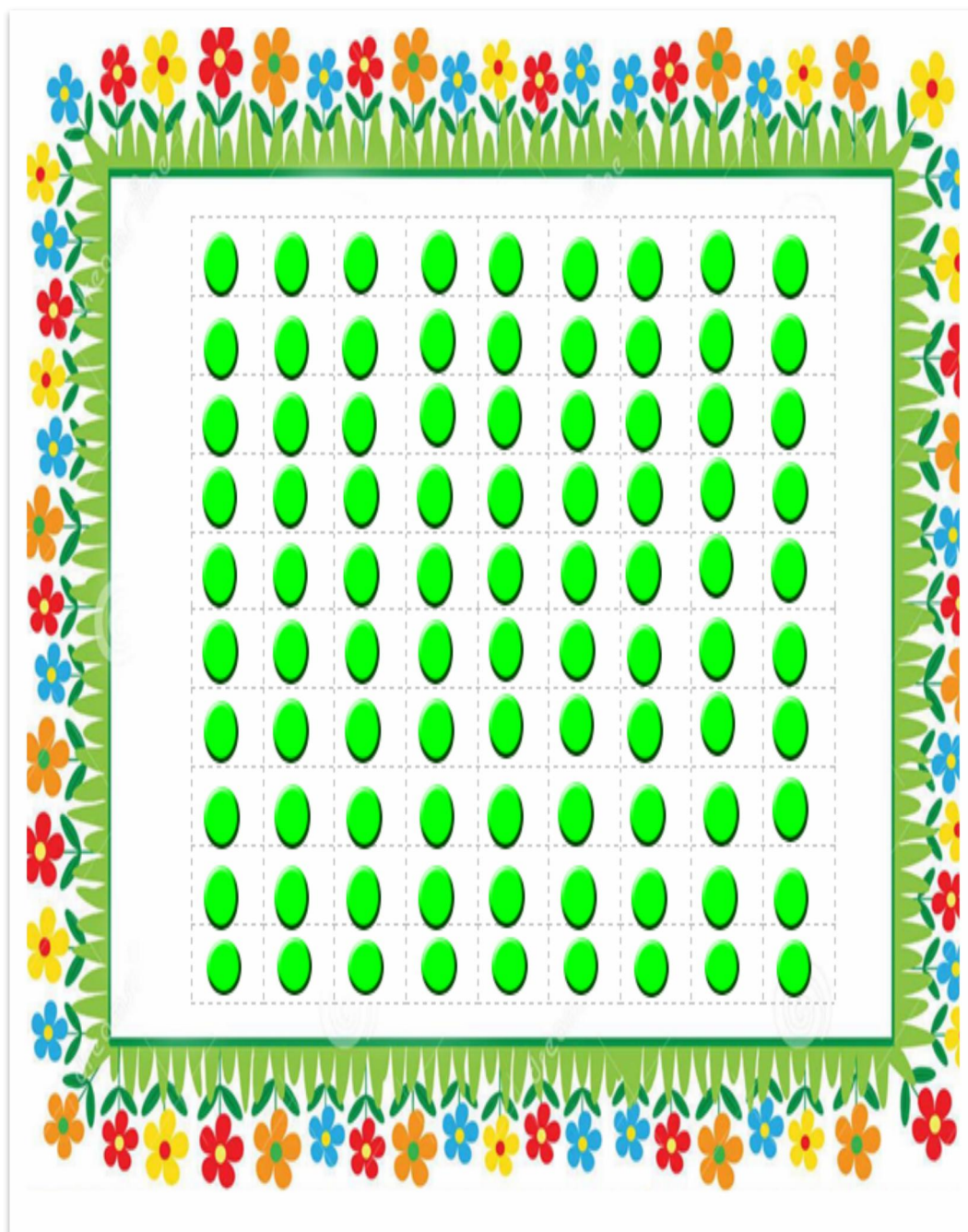
27. $23 \times 3 =$ 69

28. $48 \div 6 =$ 8

29. $42 \div 7 =$ 6

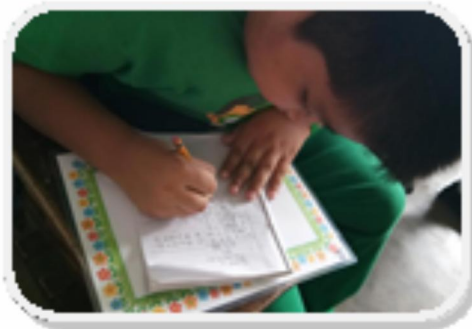
30. $56 \div 7 =$ 8

LAMINATED DOT ARRAY CARDS



SOME PHOTOS TAKEN DURING THE IMPLEMENTATION

Some of the photos taken during the implementation of the study



The pupils used the dot array to construct multiplication sentences. From there, they can visualize that when you multiply, you increase the first by the same number that's specified by the second



Teacher explained explicitly the use of the rows and columns that would aid the pupils in making multiplication sentences.



Working by pair was mostly used to increase pupils' engagement.



NATIONAL CAPITAL REGION
Policy, Planning and Research Division
BERF-COMPLIANT ACTION RESEARCH PROPOSAL

**TITLE: IMPROVING MULTIPLICATION AND DIVISION
FACT RECALL USING DOT ARRAY MODEL IN GRADE 3**

Proponent: AGNES D. GARROTE
LUIS FRANCISCO ELEMENTARY SCHOOL
Schools Division Office of Valenzuela

RATIONALE OF THE ACTION RESEARCH	CONTEXT	<p>Multiplication fact fluency is an important ability for pupils to develop as they move forward throughout elementary school, particularly with estimation skills and operations with larger numbers. Although some pupils are good enough with fact recall, others often struggle throughout high school. Hence, in order to adequately make the pupils ready for a more difficult mathematical concepts in the secondary level, every pupil must be competent with mathematical fact recall (Bauer,2013).</p> <p>Based from the experience of the researcher in teaching Mathematics, she encountered that pupils have really difficulty in mastering basic multiplication and division facts. Based from the pretest the teacher gave about multiplication and division, it was revealed that the respondents got a Mean Percentage Score of 39.8 which is very low. She also noticed that 36 out of 43 pupils got a grade of 75-79 during their previous grade especially in the second quarter where multiplication and division were the taken up. Hence, it was shown that there is no mastery of the multiplication and division facts. The fundamental concepts of multiplication and division were not properly grasped.</p>
	PROPOSED INTERVENTION, INNOVATION, STRATEGY	<p>This challenged the researcher to introduce the Dot Array model to teach multiplication and division so that the pupils could combine visual component of arrays with the conceptual component of fact families. The Dot Array model which will be crafted and then manipulated to discuss and illustrate the number families is a very effective and powerful tool. In as much as, visual representation of rows and columns will help the pupils to develop their proportional reasoning (Parrish 2010: p.233). Pupils also will benefit from activities with models to focus on the meaning of the operation and the associated symbolism (Walle, 2013, p. 162).</p> <p>According to Bruner (1961), he posited that human learning moves through a continuum of three phases. These phases are the enactive stage (concrete), iconic stage (pictorial) and the symbolic stage (abstract). In mathematics, the phase most often ignored by educators is the iconic phase. This "pictorial" stage acts as a bridge between the concrete and the abstract.</p>

		<p>Thus, the Dot Array model would act as an intermediary activity that would activate the iconic phase of learning of the pupils. In this case, by strengthening their knowledge of fact families of related multiplication and division problems using the Dot Array model, their retention of the basic facts and their ability to comprehend and represent real life problems will definitely improve.</p> <p>Similarly, the dot array is a highly effective thinking tool to help the learners develop an in-depth understanding of the concept of multiplication and division making sure that even the struggling learners could build multiplication and division facts in a more meaningful way. Using flashcards in drilling everyday but without understanding how those facts are derived, is harmful and useless. Learners must understand first how the facts are derived so they could recall the facts efficiently and accurately. Hence, dot array is recommended especially to struggling learners who can understand the multiplication and division facts using concrete and pictorial technique.</p> <p>Finally, when the foundation of using the Dot Array model is established in the elementary level, teachers are not only providing strong understandings of multiplication and division to aid mental and written computation but they also lay the foundations for easier connections to be made when pupils encounter secondary mathematics (Day& Hurrell,2015).</p> <p>To verify the theory– that using the Dot Array model as a powerful tool in teaching multiplication and division- a study is necessary.</p>
ACTION RESEARCH QUESTION		<p>How does the array model affect the pupils' retention level in multiplication and division facts?</p>
ACTION RESEARCH METHODS	<p>PARTICIPANTS SOURCES OF DATA INFORMATION DATA GATHERING METHODS DATA ANALYSIS</p>	<p>The study will be participated by 43 pupils from Grade 3 section B and 43 pupils from Grade 3 section G of Luis Francisco Elementary School for the school year 2018-2019. The 43 pupils from Grade 3 section B will serve as the control group while the other 43 pupils from Grade 3 section G will be the experimental group who will be utilizing the Dot Array Model. Both groups will undergo a 20 day session in multiplication and division lessons.</p> <p>The researcher will design a 30-item teacher-made test for both pretest and posttest. This will assess the mastery level of the pupils in multiplication and division facts. An interview also with the pupils and their parents will be done to gather information about their perception and experiences in using the Dot Array model to enhance their multiplication and division fact recall. The researcher will do data triangulation using the data sources identified above to validate the effectiveness of the strategy used.</p> <p>Data will be analyzed using mean to describe the scores of the respondents. Moreover, a paired t-test samples will also be used to compare the means of the pre-test and posttest within each group and an independent t-test to determine the significant difference between the pretest and posttest results of the two groups.</p>

ACTION RESEARCH WORK PLAN AND TIMELINES		ACTIVITIES	TIMELINE	
	PRE-IMPLEMENTATION	<ol style="list-style-type: none"> 1. Identifying respondents based from their Second quarterly grade in Grade two Mathematics. 2. Secure approval from the principal and parent consent. 3. Orientation of identified students. 4. Administration of the validated test as pre-test. 	November 12 - 16	
	IMPLEMENTATION PROPER	<ol style="list-style-type: none"> 5. For the second week, use the family fact array model to visualize multiplication. 6. For the third week, pupils will learn how to write multiplication and division number sentence with simple problems using the array model. 7. For the fourth week, pupils will learn how to illustrate the multiplication and division number sentence with simple problems using array model. 8. For the fifth week, pupils will learn how to multiply numbers with 2-3 digits by 1-digit without regrouping. 	November 19 - 23 November 26 - 29 December 3 - 7 December 10 - 14	
	POST-IMPLEMENTATION	<ol style="list-style-type: none"> 9. Administration of the post test 10. Conduct focus group discussion on how the pupils find the lesson. 11. Teacher will display the pupils' illustration in a bulletin board. 12. Submitting my papers for free publication in the Schools Division Office and DepEd-NCR 	December 17 - 18	
COST ESTIMATES				
	Item	Cost Per Unit (P)	Number	Total Cost (P)
	Report materials and supplies <ul style="list-style-type: none"> • ink for printer • ink for marker 	1200 85	1 set 1 bottle	1200.00 85.00 PhP1285.00
	Data Storage/ Computer use USB <ul style="list-style-type: none"> • 	520	1 (16GB)	520 PhP520.00

	Photocopy <ul style="list-style-type: none"> • Pretest and posttest • Activity Sheets • Letter for parent consent 	0.65 0.65 0.65	160 pcs 400 pcs 40 pcs	104.00 260.00 26.00 PhP390.00
	Lamination of fact family dot array flash cards	30	49 pcs (8 sets)	11760 PhP11760.00
	<ul style="list-style-type: none"> • Food 	25.00 per head	40 (5 days)	5000 PhP5000.00
	TOTAL: PhP18955.00			
REFERENCES	<p>Bauer, B. J. (2013), Improving multiplication fact recall; Interventions that lead to proficiency with mathematical facts. Graduate Research Papers. 11. https://scholarworks.uni.edu/grp/11</p> <p>Bruner, J.S. (1961). The act of discovery. Harvard Educational Review, 31, 21-32.</p> <p>Day, L., & Hurrell, D. (2015). An explanation for the use of arrays to promote the understanding of mental strategies for multiplication. Australian Primary Mathematics Classroom. Retrieved at https://researchonline.nd.edu.au/cgi/viewcontent.cgi?article=1158&context=edu_article. Accessed on July 8, 2018</p> <p>Parrish, S. (2010). Number talks helping children build mental math and computation strategies p.235 Victoria State Government (2016). Fact families (multiplication and division): Level 3 Retrieved at https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/continuum/Pages/factfamilies275.aspx Accessed on July 8, 2018</p> <p>Walle, V.J., Karp, K.S. & Bay-Williams, J.M. (2013). Elementary and middle school mathematics teaching developmentally. 8th edn. Pearson: Allyn and Bacon.</p>			



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CERTIFICATION

This is to certify that the Action Research listed below was read and checked for editing by the undersigned. This further certifies that the corrections and suggestions for revision were made by the researcher/s before final submission.

IMPROVING MULTIPLICATION AND DIVISION FACT RECALL USING DOT ARRAY MODEL IN GRADE 3

Action Research Title

AGNES D. GARROTE

Author/s

August 2019

Date

SARA P. TEJADA
 Division Research Editor

CURRICULUM VITAE

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Date of Birth : Dec. 25, 1974
 Height : 5'0
 Weight : 100lbs
 Civil status : Married
 Nationality : Filipino
 Religion : Roman Catholic

EDUCATIONAL ATTAINMENT

Graduate Studies : Doctor of Philosophy
 Major in Educational Management
 Bulacan State University, Malolos Bulacan
 2015-2019

:Master of Arts in Education
 Major in Educational Management
 Pamantasan ng Lungsod ng Valenzuela, Valenzuela City
 2008 – 2011

College : Bachelor in Elementary Education
 St. Mary's University, Bayombong, Nueva Vizcaya
 1991 – 1995

High School : Ifugao Academy, Kiangan Ifugao
 1987 – 1991

EXAMINATIONS TAKEN AND PASSED

Licensure Examination for Teachers	1998
Civil Service Sub-professional	1994

WORK EXPERIENCES

Private School

St. Louis College Valenzuela, Valenzuela City 1996 – 2003
Address: Maysan Road Valenzuela City

San Isidro Labrador Academy 2003 – 2004
Address: Sta. Maria Bulacan

Public School

P.R. San Diego Elementary School 2005 – 2015 *Address:*
Arkong Bato Valenzuela City
 Position: Teacher 111

Luis Francisco Elementary School 2016 - Present
Address: Veinte Reales, Valenzuela City
 Position: Master Teacher 1

SEMINARS ATTENDED:

Research Kamustahan 2.0
DepEd- Valenzuela

Research Kamustahan 3.0
DepEd-Valenzuela

2018 International Seminar-Training on Research & Innovation for School Leaders and Managers
Barcie International Center, Malolos Bulacan

Qualitative Research Using Nvivo
Manila Grand Opera Hotel, Sta. Cruz Manila

National Workshop on Action Research and Data Analysis
Manila Grand Opera Hotel, Sta. Cruz Manila

Statistical Analysis from Beginners Using SPSS
Orchid Garden Suites, Manila