	Republic of the Philippines Department of Education Cordillera Administrative Region **SCHOOLS DIVISION OF BENGUET** Wangal, La Trinidad, Benguet Tel.No.- 422 6570 Email Add- benguet@deped.gov.ph		Document Code: SDO-BENG-QF-OSDS-SDS-003 Revision: 00 Effectivity date: 09-03-2018
Division Memo No. 219 s. 2020			Name of Office: ***OSDS-SDS Office***

TO: Public Schools District Supervisors
Elementary and Secondary School Heads
Elementary and Secondary Math Teachers

FROM: **BENILDA M. DAYTACA, EdD, CESO VI**
Schools Division Superintendent

SUBJECT: **2020 Division Mathematical Investigation Competition**

DATE: October 19, 2020

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1. Pursuant to RM no. 266, s.2020 entitled "2020 Mathematical Investigation Competition" and RM no. 330, s. 2020 corrigendum to the RM 266, s. 2020, The Schools Division of Benguet will conduct a Division Mathematical Investigation Competition with the theme, **"Providing Quality Accessible, Relevant, and Liberating Mathematics Education for All in the New Normal"**

2. The activity aims to:
   a. facilitate the integration of learning outcomes in Mathematics and across curriculum area within the Basic Education K-to-12 Curriculum;
   b. provide learners with the opportunity to discover the practical applications of Mathematics;
   c. develop Mathematics learner research and communication skills; and
   d. support independent and collaborative learning.

3. The schedule of submission of entries at the division office will be on November 20, 2020. Submit the manuscripts in 3 copies.

4. Division Judging of Mathematical Investigation is scheduled November 23 to 24, 2020, while the due of online submission of entries at the Region Office will be on November 27, 2020.

5. Awarding of result will be on December 1, 2020 and it will be through DepEd Tayo Benguet.

6. The following are the contested categories

Key Stage	**Categories**	
	Individual	**Team**
Key Stage 2 (Grades 4 to 6) Elementary	Open for all	Maximum of 3 members Open for all
Key Stage 3 (Grades 7 to 10) Junior HS		
Key Stage 4 (Grades 11 to 12) Senior HS		

7. For the guidelines in the conduct of mathematical investigation, same guidelines as stated in RM 266, s. 2020 (see attached enclosure).

8. There will be three (3) winners in each category per stage: first place, second place and third place.

9. Expenses relative to the conduct of the activity shall be charged against local funds or other local source subject to the usual budgeting, accounting and auditing rules and regulations.

10. Immediate dissemination of and strict compliance with this memorandum is desired.

cid/wilfred 2020

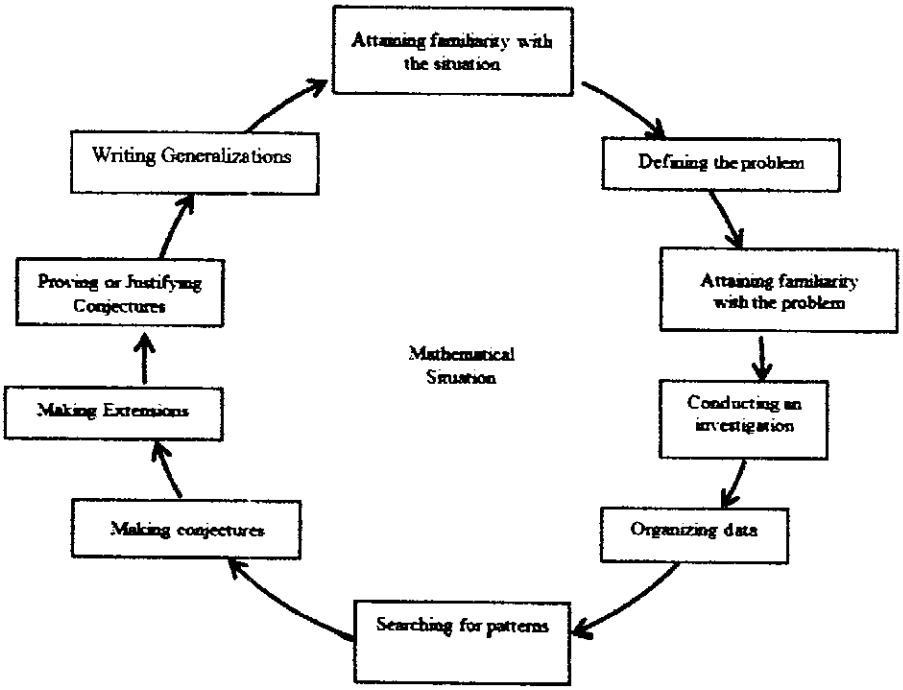

Figure 1

Stage 2: Defining the problem

After identifying the focus of investigation, the student should identify the purpose of the investigation. Again, reading the literatures helps the student to trim down the topics for investigation. Once the purpose of the investigation is identified, the student should express this purpose into specific problems that serve as the focus of investigation.

A clear statement of the problem guides the student in choosing later the approach to take in conducting the investigation.

Stage 3: Attaining familiarity with the problem

To attain familiarity with the problem, the student gathers relevant information about it. In this stage, the student is required to scan the literature to establish a better understanding of the problem. Mathematical concepts related to the topics are reviewed. All aspects of the topic should be known to the student. Talking to experts is another way of familiarizing one's self about the problem. This is a critical stage because the student cannot proceed to the next stage of investigation unless he has a full grasp of the problem. The success of the investigation depends on how he understands, and processes gathered information about the topic.

Stage 4: Conducting the investigation

To conduct the investigation, the student needs to identify the approach he should use. The student should be clear of the end goal of the investigation. Several approaches or paths should be considered to exhaust all possible outcomes and relevant data about the problem.

Simulation and conducting experiments are important strategies in investigation. They provide the necessary experiences that the student needs in order to understand the area of the mathematical situation being investigated.

Stage 5: Organizing the data

To understand the data, they should be organized through visual representations like graphs or tables. The data should be organized to allow the student to make correct interpretations, establish connections among data and concepts, and search for patterns.

Stage 6: Searching for patterns

After the data are organized into tables or visual representations, the student needs to search for patterns. A pattern is a consistent or recurring characteristic of the data that is observed after presenting them in tables or using visual representations. The pattern is used as an indicator or model for predicting future behavior of the phenomenon or problem. Thus, the student should be keen enough to observe a pattern.

Stage 7: Making conjectures

Based on the patterns observed, the student should be able to write generalizations. This can be done by trying several cases or continuing the process using the pattern observed to check if the pattern holds true for other cases. Because these generalizations are results of observations and their validity is not yet known, then they are called conjectures.

Stage 8: Making extensions

Under this step, the conjecture is being tested with other cases to determine if the observation is consistent with these cases. The student must be able to identify the cases which the conjecture holds true and not true. The purpose of making extension is to determine a more generalizing statement that captures all outcomes in a broader context.

Stage 9: Proving or Justifying the conjectures

After making conjectures, there is a need to proving these conjectures. A proof is a logical argument that establishes the validity of a statement to convince a doubtful reader that a given statement is true. When proving the validity of a conjecture, the student must be able to identify the most appropriate method of proof.

Stage 10: Writing Generalizations

The last step is to summarize the results of the investigation. In stating the results, the variables used in the statement should be defined properly. This allows the reader to have the same understanding of the variables used in the theorems.

III. Assessing Mathematical Investigation Outputs

The following criteria will be used to assess the mathematical investigation manuscript. These criteria were adapted from the National MTQ Rubric 2020.

Achievement Levels	Descriptors
4	Exceeds expectations of student's learning level
3	Meets expectations of student's learning level
2	Approaches expectations of student's learning level
1	Does not meet expectations of student's learning level
0	Not evident

Criteria	Indicators	Achievement Level
Mathematical Concept and Understanding	1. Investigates detailed mathematical content and concepts that are thought-provoking and challenge the student.	
	2. Completes a mathematical investigation that thoroughly examines all aspects of the subject.	
	3. Recognizes and makes relevant high-level mathematical connections with everyday experiences in and out of school.	
	4. Uses correct mathematical language, symbols and terminology.	

Mathematical Process	5. Uses correct and efficient strategies to achieve a solution. Monitors strategies and progress and/or considers alternative strategies as needed.	
	6. Consistently uses accurate mathematics and systematic reasoning to make decisions and reach conclusions.	
Presentation and Originality	7. A highly original investigation that displays evidence of student's personal ideas as well as other relevant information and resources.	
	8. A range of references together with acknowledgement of support (including the internet, teachers, parents, etc).	
Coherence	9. The investigation has explicit aims, a thorough plan and clearly stated generalizations.	
	10. Explanations are very clear and effectively detailed. Analyzes how and why solutions or generalizations are reached.	
	11. Presentation is very well-organized and captures the reader's interest.	
	Total Score (Maximum of 44 points)	

IV. Mathematical Investigation Manuscript

A. Elements

The following shall be the main parts of the mathematical investigation manuscript.

I. Endorsement from the SDO

II. Entry Form *(See attached document)*

III. Declaration of Anti-Plagiarism *(See attached document)*

IV. Title Page

V. Table of Contents

VI. Mathematical Situation
- Attaining familiarity with the mathematical situation

VII. Statement of the Problem
- Defining the problem
- Attaining familiarity with the problem

VIII. Investigation Proper
- Conducting the investigation
- Organizing the data

- Searching for patterns

IX. Statement and Justification of Conjectures
- Making conjectures
- Proving or justifying conjectures
- Making extensions

X. Summary of Results
- Writing generalizations

XI. References
- APA format

XII. Appendices

B. Typography

Font Style: Arial
Font size (text and headings): 12 pt. (key stage 2)/11 pt. (key stages 3-4)
Text alignment: Left
Paper size: A4
Margin: 1 inch in all sides
Spacing between lines of text: 1.0
Spacing between paragraphs and headings: 2.0
Page numbering: Right bottom of page

V. References

Hidalgo, B. (2018). *A simplified Guide in Doing Mathematical Investigation.* Manila, Philippines: Aklat at Dunong Publishing, Inc.

International Baccalaureate Organization (2004). *Teacher training workshop guide for Mathematics HL.*

Maths Talent Quest (2020). National MTQ Rubric 2020. Retrieved from https://www.mansw.nsw.edu.au/documents/item/393.

Republic of the Philippines

Department of Education

CORDILLERA ADMINISTRATIVE REGION

2020 Mathematical Investigation Activity – Entry Form

School Name: _____

Division: _____

Key Stage: ☐ Gr. 4-6 (KS-2) ☐ Gr. 7-10 (KS-3) ☐ Gr. 11-12 (KS-4)

Entry Category: ☐ Individual ☐ Group

MI Title: _____

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Individual or Group Entry: (For group entry, 2 or 3 members only)

Surname, Given Name, MI	Contact No.	Email Address

Coach Information: (One coach per entry)

Surname, Given Name, MI	Contact No.	Email Address

Note: Please ensure that the spelling of student and coach names are correct so that certificates are error free.

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DECLARATION OF ANTI-PLAGIARISM

1. I/We, Name of Proponent/s, 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 work of another person and/or using some parts of their work without proper acknowledgment and referencing.

2. I/We hereby attest to the originality of this mathematical investigation manuscript and have cited properly all the references used. I/We shall use appropriate citations in referencing other works from various sources.

3. I/We understand that violation from this declaration and commitment shall be subject to consequences (disqualification from the competition, etc.) and shall be dealt with accordingly by the Department of Education Cordillera Administrative Region.

_____

Proponent Name and Signature

DATE: _____

_____

Proponent Name and Signature

DATE: _____

_____

Proponent Name and Signature

DATE: _____