Republic of the Philippines
Department of Education
CORDILLERA ADMINISTRATIVE REGION
Schools Division of Benguet

DIVISION MEMORANDUM
No. 296 s. 2024

28 Aug 2024

2024 DIVISION SCIENCE AND MATHEMATICS FESTIVAL

To: Assistant Schools Division Superintendent
Public Schools District Supervisor/ District In-Charge
Elementary and Secondary School Heads and Teachers
All Others Concerned

DepEd-Benguet Division
AUG 29 2024
RELEASED

1. Pursuant to the annual conduct of the Regional and National Science and Technology Fair, the Schools Division of Benguet will conduct the Division Science and Mathematics Festival for the School Year 2024-2025 on October 24-25, 2024 with the theme "**Rebuilding Resilient Communities: Embracing Science and Technology for a Sustainable Future**" at Tublay School of Home Industries, Tublay, Benguet.

2. This festival is an annual academic competition to develop and strengthen the Science, Technology, Engineering, and Mathematics (STEM) skills of learners that address local, national and/or global issues, concerns, and problems. This also aims to identify learners who shall represent the division in the higher level of competition. **Schools and districts are therefore encouraged to conduct not only activities included in the memorandum to celebrate Science and Mathematics and are advised to conduct the district fair on or before September 27-28, 2024.**

3. Participants to the said festival are the **first-place winners** from each district for board games (Damath and Sci-Dama) and STEMAZING (Junior and Senior High Category) while **top two winners** (individual and team categories) from each district for Mathematical Investigation (Problem-based and Research-based) and Tuklas (Research Project Fair)- 1) Life Science IP and 2) Physical Science IP, 3) Robotics and Intelligent Machines and 4) Mathematics and Computational Sciences.

4. Submission of write-ups **(in 3 copies)** for Mathematical Investigation and Tuklas and **the list of expected participants per district** (with the name of school and corresponding event) will be on or before **October 3 at the CID Office**, SDO-Benguet duly received at the Records Section. Failure to comply will mean disqualification.

4. Arrival of the participants and registration will be on **October 24 (8:30 to 10:30 AM).** The opening program will take place at **10:30 AM** and some of the contested events will start at 1 PM while closing program will be **October 25 at 3:00 PM onwards.**

5. A **registration fee of Php 300.00** shall be collected from learner-participants (with official receipt upon payment) to cover materials and office supplies needed, honoraria, meals and snacks of judges, prizes and other incidental expenses that will be incurred during the affair.

6. **Technical Working Group (consisting of DBAMT and DBAST officers plus private school representatives) meeting** will be on October 5 (Saturday) at 8:30 AM at Buyagan Elementary School, Buyagan, La Trinidad, Benguet. Participants will be entitled of one day Service Credit/ COC for the service that they will render on that day.

7. Travel and meal expenses, registration fee and other incidental expenses of participants during the planning and the activity proper shall be charged against local funds or other sources subject to the usual accounting and auditing rules and regulations.

8. The following are enclosed for information and guidance of all concerned:

Enclosure 1: Steering Committee and List of Contested Events
Enclosure 2: Participants for the Planning Meeting
Enclosure 3: Guidelines for the Mathematical Investigation (Research and Problem-based)
Enclosure 4: Guidelines for TUKLAS projects
Enclosure 5: Guidelines for STEMAZING
Enclosure 6: Guidelines for Damath and Sci-DAMA

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

SALLY L. BANAKEN-ULLALIM CESO V
Schools Division Superintendent

/CID/RAG/jsb/mood/ffp

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Enclosure 1 to DM No: 296 s. 2024

Steering Committee and Contest Events

Over-all Chairperson: Schools Division Superintendent
Co-Chairperson: Assistant Schools Division Superintendent
CES-CID: Rizalyn A. Guznian EdD
Members: Jardson S. Onio, EPS-Mathematics
Merlyn Conchita O. de Guzman, EPS-Science
Public Schools District Supervisors/ In-charge

Contest Areas	Category	Grade Level
A. DAMATH		
Elementary	Whole Numbers	Grade 3
	Whole Numbers	Grade 4
	Fractions	Grade 5
	Fractions	Grade 6
Secondary	Integers	Grade 7
	Fractions	Grade 8
	Radicals	Grade 9
	Polynomials	Grade 10
B. SCI-DAMA		
Elementary	Water Patrol	Grade 3
	Water Patrol	Grade 4
	Power Patrol	Grade 5
	Power Patrol	Grade 6
Secondary	Electro	Grade 7
	Sci-Notation	Grade 8
	THI	Grade 9
	Thermodynamics	Grade 10
C. MATHEMATICAL INVESTIGATION	Research-based	Grades 11-12 (Individual and Team)
	Problem-based	Grades 9-10 (Individual and Team)
D. TUKLAS		
Research Project Fair	Life Science	Grades 9-12 Individual Event Team Event
	Physical Science	
	Robotics and Intelligent Machines	
	Mathematics and Computational Sciences	
E. STEMAZING	Junior High School	Grades 7-10
	Senior High School	Grades 11-12

Enclosure 2 to DM No: 296 s. 2024

PARTICIPANTS IN THE PLANNING MEETING

Coordinators: Jardson S. Onio, EPS-Mathematics (1)
Merlyn Conchita O. de Guzman, EPS-Science (1)
Science or Math District Coordinators (14)

List of Officers (60):

Math Elementary	Math Secondary	Science Elementary	Science Secondary
Michelle Ngala	Alvin Guaki	Ryan Jay V. Salamat	Amor Parista
Gabriel Ganawed	Joseph Bacani	Efagenia P. Paing	Nelia Depaynos
Janice Bilalay	Alicia Mendoza	Cesar S. Martin	Janice Bagiw
Vincent Depayso	Afler Carino	Jocelyn Langbis	Veralyn Pudos
Joanna Pontino	Clifford Daduya	Joan Pantaleon	Loida Boslay
Felicitas Pangdew	Wilma Coilan	Sharon Lamagan	Julius Puguon
June Winver Joaquin	Jim Alberto	Carlyn Bacasen	Glinah Batnag
Primalyn Inso	Nerie Guzman	Venelyn Ventura	Rachel Tubal
Juliet Balanggoy	Cherilyn Evangelista	Jassyl Osting	Jonathan Busilac
Deseryl Aniban	Herjalin Balisto	Sheryl Mino	Clyde Sanone
Cesar Medon	Franco Agadan	Marijun Lucio	Daryl Joy Galupe
Randal Napeek	Rubelyn Paltican	Amy Agwiking	Jefferson Kisim
Leah Sab-it	Glory Lee	Arlette Bistuyong	Michael Dave Dallapas
Lorna Garoy	Harold Moncion	Ellaine Besitan	Josephine Sab-it
Aries Dave Budong		Mara Jane Bendanillo	Christine Joy Alicnas
John Paul Kidsolan			

Enclosure 3 to DM No: 296 s. 2024

Guidelines on Problem-Based Mathematical Investigation

1. A problem is given for you to explore and prove in 3 hrs.
2. Below is the format in solving following its process in investigating the problem:
   A. Title:
   B. Focus of Investigation / Objectives:
   C. Definition (s) and Representation:
   D. Exploration:
      - Systematic listing/drawing
      - Organizing relationships in tables or graphs
      - HOTS: Organizing, comparing – identifying similarities/differences
        Classifying – grouping into categories
        Ordering – sequencing according to criterion
        Representing – changing in form to show how critical elements are related.

   E. Conjecture (s):
      - Making general statements about patterns or relationships observed in the cases considered
      - A conjecture is generalization obtained inductively, which has not been validated or proven true.
      - HOTS: Synthesizing – involves putting together the relevant parts or aspects of a solution, understanding or principle.

   F. Testing / Verifying Conjectures:
      - Checking consistency of conjectures using existing cases
      - Predicting results for untried cases for which data are available

   G. **Explaining/Justifying Conjectures**
      - Explaining why the conjectures made will work for new or all cases
      - Proving the conjectures (by mathematical induction, direct/indirect proof, visual proof)
      - HOTS: Evaluating – involves assessing the reasonableness of ideas.

   H. Justification (s), Proof(s) and Explanation:

3. Criterion on Mathematics Investigation

A) Use of Notation (5 pts)

Achievement Level	Descriptor
1	The student does not use appropriate notation and terminology
3	The student uses some appropriate notation and terminology
5	The student uses appropriate notation and terminology in a consistent manner and does so through the work.

B) Communication (5 pts)

Achievement Level	Descriptor
1	The student neither provides explanations nor uses appropriate forms of representation.
2	The students attempt to provide explanations or use some appropriate forms of representations.
3	The student provides adequate explanations or arguments, and communicates then using appropriate forms of representation.
5	The student provides complete, coherent explanations or arguments, and communicates then clearly using appropriate forms of representation.

C) Patterns (10 pts)

Achievement Level	Descriptor
1	The student does not attempt to use a mathematical strategy.
2	The student uses a mathematical strategy to produce data.
4	The student organizes the data gathered.
6	The student attempts to analyze data to enable the formulation of a general statement.
8	The student successfully analyzes the correct data to enable the formulation of general statement.
10	The student tests the validity of the general statement by considering further examples.

D) Generalization (10 pts)

Achievement Level	Descriptor
1	The student does not produce any general statement consistent with the patterns and/or structures generated.
2	The student attempts to produce a general statement that is consistent with the patterns and/ or structures generated.
4	The student attempts to produce a general statement that is consistent with the patterns and /or structures generated.
6	The student expresses the correct general statement in appropriate mathematical terminology.
8	The student correctly states the scope or limitations of the general statement.
10	The student give a correct, formal proof of the general statement.

E) Use of Technology (5 pts)

Achievement Level	Descriptor
1	The student uses a calculator or computer for only routine calculations.
2	The student attempts to use a calculator or computer in a manner that could enhance the development of the task.
3	The student makes limited use of a calculator or computer in a manner that enhances the development of the task.
5	The student makes full and resourceful use of a calculator or computer in a manner that significantly enhances the development of the task.

F) Use of Work (5 pts)

Achievement Level	Descriptor
1	The student has shown a poor quality of work.
3	The student has shown a satisfactory quality of work.
5	The student has shown an outstanding quality of work.

4. **Oral Defense (10 pts)**
5. **Total Points 50 points**

Guidelines for Mathematical Investigation (Research-Based)

Participating secondary learners need to prepare powerpoint presentation to facilitate presentation before the judges for research-based mathematical investigation while contest materials for the problem-based mathematical investigation will be provided.

Mathematical Investigation Format

I. Title /Topic for Investigation

The title page is the first page of the paper and includes:

- the title of the paper
- name of the researcher

name of the Adviser

II. Abstract

This section includes only the essence of the other sections.

" Give me a birds-eye-view of what you have done."

- it should be as brief as possible
- telling the reader what the goal of the investigation was
- what was found
- the significance of the findings

The abstract is often placed at the beginning of the paper rather than at its end.

III. Introduction

A. Background of the study

This may include the following:

1. Information about its origin, how you arrive to it
2. Purpose
3. Reason why there's a need to undertake the study

B. Statement of the Problem

Called the HEART of a research study

C. Definition of Terms

i. Operational Definition

ii. Conceptual Definition

D. Significance of the Study

- This part of the report highlights the possible contributions of the investigation findings.
- It describes

(a) the relevance of the research to felt needs

(b) how the investigation output maybe directly useful

(c) how the research contributed to the advancement of mathematics

E. Scope and Limitation or Delimitation

IV Exploration

a. Diagrams showing the figures drawn from the cases considered
b. Table or list showing the results obtained from the observations
c. Patterns observed

V Conjectures

Is a tentative generalization which is not known whether or not it is true for all possible instances

VI Testing Conjectures

A support for a conjecture is sought by checking (testing) whether it holds for the instances for which data are available.

VII Justification for Conjectures

It is a proof of a conjecture which deals with instances in general and does not depend on particular instances.

It is an explanation why the conjecture holds and a way to convince yourself and possibly someone else that you understand why the conjecture holds.

VIII Conclusion

This answers the question " What is the meaning of what you found out in the study?" It starts with a ***brief summary*** of the study (i.e. from the problem to the results), followed by the ***conclusions*** and, finally, the ***recommendations.***

IX Recommendation

This section contains the implications of the investigation findings.

1. Based on specific findings. If a directly relevant finding cannot be cited, the recommendation is not acceptable.

2. Present two implications of investigation findings:
   a. implication for action (what should be done)

      This gives the reader a good justification for the study or research.

   b. implication for further investigation (what improvements can be done on the present study; how the present study may be expanded; etc.)

References:

- *International baccalaureate organization (2004). Teacher training workshop (Mathematics HL). & Myrna Bermudo Libutaque: Hand outs on: Workshop on the Development of Learning Resource Package for Mathematical Investigation, Pasig City, Aug. 6-8, 2019*

PROJECT EVALUATION FORM FOR MATHEMATICAL INVESTIGATIONS

Title of Research Project: _____ CODE: _____

Category: ___ Individual ___Team

Analytic Scoring Rubric for Mathematical Investigation

Criteria	Excellent (4)	Very Good (3)	Fair (2)	Poor (1)
I. Foundational Knowledge				
A. Concepts, Facts and Definitions				
1. Use of correct concepts, facts and definitions	Uses correct and appropriate concepts, facts and definitions	Makes 1 or 2 minor errors in the use of concepts, facts and definitions	Makes a major error/ 3 or more minor errors in the use of concepts, facts and definitions	Extensive errors in concepts, facts and definitions which makes the entire investigation questionable and irrelevant
B. Procedures and Algorithms				
2. Selection of correct performance of appropriate procedures and algorithms	Selects appropriate procedures and perform all of the correctly	Selects appropriate procedures; makes 1 or 2 minor errors in computations	Makes one major error or 3 to 4 errors minor errors in doing procedures or algorithms	Errors in carrying out procedures or algorithms makes the whole investigation questionable and irrelevant
C. Misconceptions				
3. Absence of misconceptions	Has no misconception	Has one (1) misconception	Has two (2) misconceptions	Has three (3) or more misconceptions
II. Investigation Process				
A. Analysis				
4. Range and depth of problem(s) investigated	Investigates at least 3 problems with commendable depth and rigor	Investigates at least 2 problems with satisfactory depth and rigor	Investigates at least 1 problem with satisfactory depth and rigor	Investigates one (1) problem
5. Originality and complexity of problems investigated	At least 2 problems are not typical: shows originality and complexity	At least 1 problem are not typical: shows originality and complexity	Investigates only those problems that are simple and typical	Investigates those problems that are exactly some as those of others
6. Systematic study of the problems	Explores the situation or problem systematically; uses tables and diagrams	Explores the situation or problem in an organized manner	Explores the situation or problem with some ineffective system	Explores the situation or problem in a random and disorganized manner
7. Verifications of solution and conjecture	Verifies the solution and conjecture by applying to several cases; include unusual cases	Verifies the solution and conjecture by applying to several cases	Verifies the solution and conjecture by applying to one (1) cases	Makes no or incorrect verification of the solution or conjecture

B. Reasoning				
8. Validity and depth of reasoning	Uses correct and valid reasoning and shows depth in mathematical understanding	Uses correct and valid understanding	Has some minor flows in reasoning	Has major flows in reasoning
9. Quality of proof presented	Proves the conjecture convincingly using algebraic /analytic or correct and effective arguments	Proves the conjecture satisfactorily using correct augments	Proves the conjecture using examples, diagrams and drawings	Fails to prove the conjectures
10. Ability to see connections	Make significant connections with other problems and conjectures Extend the problems	Makes satisfactory connections with other problems and conjectures Extend the problems minimally	Makes minimal connections with other problems and conjectures	Makes no connections or extension to the problem
Criteria	**Excellent (4)**	**Very Good (3)**	**Fair (2)**	**Poor (1)**
III. Communication				
A. Language				
11. Clarity of statements of problem(s) and conjecture(s)	States the problem(s) and conjecture(s) clearly using precise and concise language	States the problem(s) and conjecture(s) clearly	States the problem(s) and conjecture(s) in a vague and incomplete manner	Does not state the problem(s) or the conjecture(s)
12. Clarity of written outputs of the investigations	Presents a complete, well-organized and clearly written outputs that includes a complete work trial	Presents an organized written output with an incomplete work trial	Presents a not so well- organized written output that shows an incomplete work trial	Presents a disorganized and incomplete written output
13. Clarity of oral report of the investigation	Reports the processes and results of the investigation clearly and comprehensively	Reports the processes and results of the investigation clearly - for the most part	Reports the processes and results of the investigation in a disorganized manner	Does not report many of the processes and or results
B. Symbols and Notations				
14. Correctness of symbols, notations and labels	Uses correct and appropriate symbols, notations and labels	Makes minor errors in the use of symbols, notation and labels	Makes a major error in the use of symbols, notations and labels	Makes extensive errors in the use of symbols, notations and labels
C. Arguments				
15. Use of arguments in written and oral report	Provides sufficient, concise and valid to support their reasoning and conclusion	Provides valid to support their reasoning and conclusions	Uses some illogical and irrelevant arguments	Uses mostly illogical and irrelevant arguments or fails to provide arguments to support their reasoning and conclusions

Enclosure 4 to DM No: 296 s. 2024

Guidelines for Tuklas

A Research Project Fair

ELIGIBILITY

- The competition is open to Grades 9-12 learners of both public and private high schools in the Philippines who have not reached the age of 20 on or before May 1 of the current school year.
- Learners may work individually or in teams with 2-3 members from the same school. Each learner is only allowed to submit one (1) research project in one (1) of the four (4) research categories: Life Science, Physical Science, Robotics and Intelligent Machines, and Mathematics and Computational Sciences. The project should include no more than 12 months of continuous research and should not include research activities performed before January of the previous school year. (e.g., For school year 2023-2024 with the target opening of classes on August 2023 and ISEF on May 2024, research projects may be accomplished within 1-12 month/s starting from January 2023 to January 2024).
- The top three (3) winners in each category of TUKLAS will be screened by the division Scientific Review Committee (SRC) and qualifiers will advance to the Division Science and Technology Fair (DSTF).
- First placers in each category in the Regional Science and Technology Fair (RSTF)will be screened by the national SRC. The qualifiers will advance to the National Science and Technology Fair (NSTF).
- First and second placers in each category in the Regional Science and Technology Fair (RSTF)will be screened by the national SRC. The qualifiers will advance to the National Science and Technology Fair (NSTF).

RESEARCH CATEGORIES

The STEM research competition is divided into four (4) categories. The student researchers and advisor should carefully consider which category best describes the research project. They may enter the competition as an individual or as a team.

Life Science

This category deals with living organisms such as plants, microorganisms, and animals including humans and their life processes. Projects that involve systematic observation, development, experimentation, and understanding of living things and biological processes belong to this category. Subcategories include Animal Sciences, Biomedical and Health Sciences, Cellular and Molecular Biology, Microbiology, Plant Sciences, and Translational Medical Science.

Physical Science

This category deals with the nature and properties of non-living matter, energy and systems. Projects that involve systematic observation, development, experimentation, and understanding of materials and phenomena belong to this category. Subcategories include Astronomy, Chemistry, Earth and Environmental Sciences, Energy, Engineering Technology, Statics and Dynamics, Sustainable Materials and Design, Environmental Engineering, Materials Science, and Physics.

Robotics and Intelligent Machines

This category deals with the design, implementation, and use of prime technologies and machine intelligence in providing a wide range of innovative solutions and

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advancements across multiple disciplines to reduce reliance on human intervention. Subcategories include Biomechanics, Cognitive Systems, Control Theory, Machine Learning, and Robot Kinematics.

Mathematics and Computational Science

Mathematics deals with the measurement, properties, and relationships of quantities and sets using numbers and symbols. Subcategories include Algebra, Analysis, Combinatorics, Graph Theory, Game Theory, Geometry and Topology, Number Theory, and Probability and Statistics.

Computational Science deals with the development and implementation of mathematical models and simulations to understand natural systems and processes, and solve STEM problems using computers. Subcategories include Computational Biology and Bioinformatics, Computational Chemistry, Computational Mechanics, and Theoretical, Computational and Quantum Physics.

Note: *For the full description of the sub-categories, visit the official website of ISEF category selection and sample project titles.*

GENERAL PROCEDURES AND GUIDELINES

A. School Level Science & Technology Fair (SSTF)

Before:

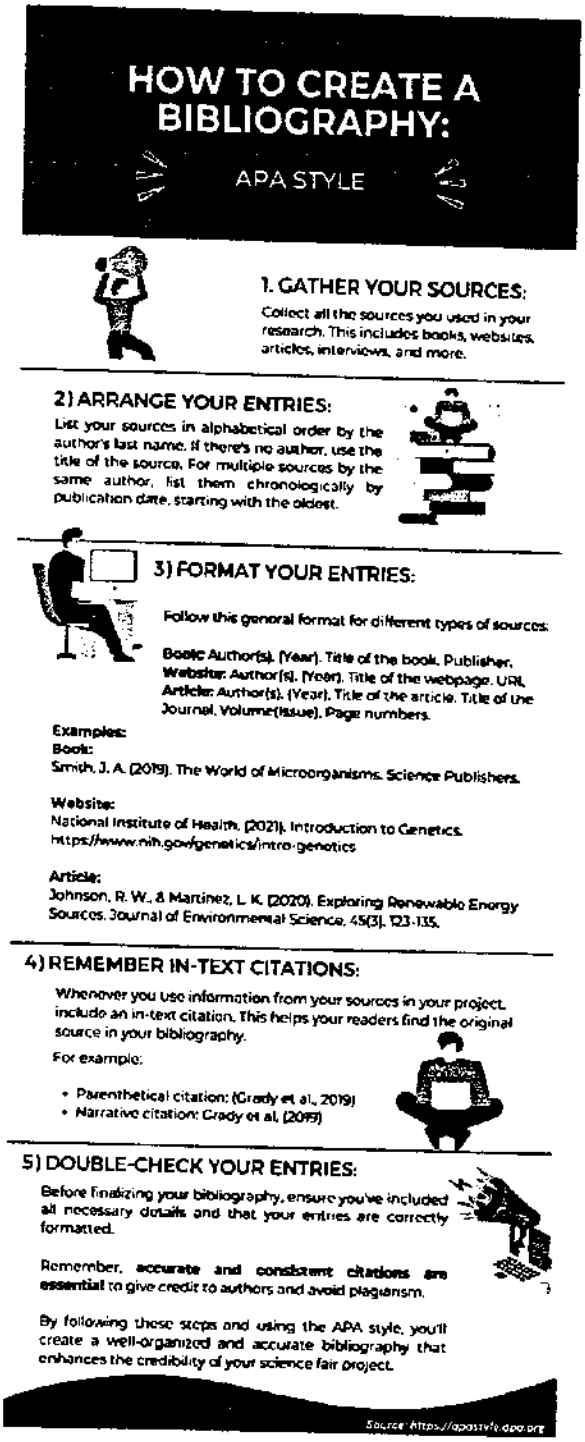
1. Orientation of learners regarding the processes and guidelines in planning and conducting STEM investigations.
2. Identification of the school level Scientific Review Committee (SRC) which will evaluate project proposals, required forms, certifications/ pre-approvals, data logbooks, and research manuscripts. Orientation of SRC members regarding the national laws, safety and ethical considerations, and the rules and regulations set by NSTF and ISEF needed to be adhered in conducting STEM research project.
3. Writing of the research proposal and completion of the data logbook entries for the planning of the project.
4. Identification of the research category that best describes the project and presentation of research proposals for further revision and approval.
5. Orientation and agreements with parents/ guardians on the responsibilities of learners and supervisory adults in the specific arrangements during the research activity engagement.
6. Communication with the preselected qualified scientist/designated supervisor and Regulated Research Institution (RRI).
7. Submission of Memorandum of Agreement/ Understanding and other documentary requirements (if applicable) to the research institution prior to experimentation.
8. Completion of the required ISEF forms and certifications/pre-approvals before experimentation.
9. Conduct of the research and completion of required ISEF forms and data logbook entries for the accomplished research activities.
10. Writing of research manuscript and preparation for project display and oral defense.
11. Meeting of the department head/chairman and Technical Working Group (TWG) for the planning of the conduct of the School Science and Technology Fair (SSTF).
12. Issuance of school memorandum regarding the conduct of SSTF which includes the mechanics, guidelines, criteria, schedule of activities, and TWG anchored on the Division, Region and National Science and Technology Fair Memorandum.
13. Signing of non-disclosure agreements with the adult sponsor, SRC and TWG members.
14. Submission of three (3) hard and digital copies of properly color-coded and sequenced (as indicated in the memorandum) manuscripts, ISEF forms, data logbook, and other entry requirements (student media release forms, project evaluation forms, medical certificate, etc.) to the TWG on or before the deadline.
15. Forwarding of submitted manuscripts to the SRC/ Board of Judges (BOJ) for project pre-evaluation guided by the attached criteria.
16. Issuance of school memorandum regarding the results of the SRC review and the list of qualifiers for the SSTF and final judging.
17. Returning of the qualified SSTF manuscripts and other entry requirements for further revisions based on the listed comments and suggestions by the SRC in the Review and Recommendation Report (RRR).
18. Final meeting of the TWG for the preparations needed for the conduct of the SSTF.
19. Online resubmission of the digital copies manuscripts, other entry requirements PowerPoint presentation for the STEM Congress to SSTF focal person.

During

1. Registration of participants and submission of the three (3) softbounded hard copies of color-coded manuscripts with tags to identify the revisions done based in the RRR.
2. It is also suggested for the student researchers to be in their smart casual during the conduct of SSTF.
3. Set-up for the project display that conforms with the display and safety regulations.
4. Project Display inspection by the assigned TWGs to ensure adherence to the prescribed project display rules and guidelines.
5. Conduct of the SSTF opening program and on-site judging of the entries.
6. SRC/BOJ final evaluation of the qualified research entries through the STEM Congress.
7. Deliberation of the SRC/BOJ and awarding of the Top 5 winners for the individual and team projects in each research category. Other special awards (e.g., Best Poster, Best Presenter/s, Peers' Choice Award, Best Shoutout) and sponsored honorable awards by institutions/organizations may also be given to learners and advisors.
8. Orientation of the student researchers and advisors of the Top 3 entries for the individual and team projects in each research category for further comments, suggestions and other preparations needed as school representatives to the Division Science and Technology Fair (DSTF).

After

1. Issuance of school memorandum regarding the winners of the SSTF.
2. Final revision of the manuscripts and other entry requirements incorporating the recommendations by the SRC/BOJ.
3. Re-submission of the revised manuscripts and other entry requirements to the school SRC for final quality assurance.
4. Submission of the Top 3 Entries to the Division Level Science Fair Technical Working Group
5. Conduct of STEM clinicing to improve learners' presentation skills and preparation of Poster Displays.



TUKLAS Research Paper Format

I. Research Plan:

This is to be written prior to experimentation following the instructions below to detail the rationale, research questions, methodology, and risk assessment of the proposed research. (This is compiled separately from the rest of the research manuscript.)

All projects should include the following:

a Rationale: Include a brief synopsis of the background that supports your research problem and explain why this research is important and if applicable, explain any societal impact of your research.

b Research Question or Problem being addressed

c Goals/Expected Outcomes/Hypotheses

d Procedures: Detail all procedures and experimental design to be used for data collection.

e Risk and Safety: Identify any potential risks and safety precautions needed.

f Data Analysis: Examine, organize, and interpret data to answer research questions, or either accept or reject hypotheses.

g Bibliography: List at least five (5) major references (e.g., science journal articles, books, internet sites) from your literature review using the APA style formatting and citation. If you plan to use vertebrate animals, one of these references must be an animal care reference.

II. Project Data Logbook:

A project data logbook is an organizational tool used by student researchers to organize and record narrative and evidence of the research activities including the planning, research design, drawings/ illustrations, procedures, data collection, analysis and presentation, inferences, and conclusions.

a Detailed and accurate notes in paragraphs or bullets show consistency and thoroughness which will be helpful when writing the research paper.

b It is also recommended to use hardbound record notebooks instead of spring notebooks to avoid tearing out pages, write entries using permanent pens, and minimize erasures.

c Procedures are to be presented in flow charts and data in organized tables. Each data entry (qualitative and quantitative) should also be accurately recorded, dated and signed by the supervising adult (if applicable) during the research activity.

d Each data logbook entry should also be dated and signed by the supervising adult (if applicable) during the research activity.

If erasures cannot be avoided, strike the word, phrase, sentence, or figure or numbers once and countersign each. Avoid using correction tapes and the likes.

III. Research Paper Format:

Science Project

1 INTRODUCTION - What relevant background information supports your research problem/ questions?

✓ Explain what is known or has already been done in your research area. Include a brief review of relevant literature. If this is a continuation project, a brief summary of your prior research is appropriate here. Be sure to distinguish your previous work from this year's project.

✓ Include a brief description on how your project will address an issue, concern or problem. Explain why this research is important and any societal impact of your research.

2 METHODS – What procedures were carried out for the experimentation?

- ✓ Explain in detail what you did. What data did you collect and how did you collect those data? Discuss your control group and the variables you tested.
- ✓ Discuss your control group, the variables you tested, and the statistical treatment used. Handling and disposal of wastes may be included if necessary.
- ✓ DO NOT include a list of materials.

3 RESULTS - What were the result(s) of your project?

- ✓ Include tables and figures which illustrate your data.
- ✓ Include relevant statistical analysis of the data.

4 DISCUSSION - What is your interpretation of these results?

- ✓ What do these results mean? Compare your results with theories, published data, commonly held beliefs, and expected results.
- ✓ Discuss possible errors. Did any questions or problems arise that you were not expecting? How did the data vary between repeated observations of similar events? How were results affected by uncontrolled events?

5 CONCLUSIONS - What conclusions did you reach?

- ✓ What do these results mean in the context of the literature review and other work being done in your research area? How do the results address your research question? Do your results support your hypothesis/hypotheses?
- ✓ What application(s) do you see for your work?

6 REFERENCES-What are your sources?

- ✓ This section should not exceed one page. Limit your list to the most important references.
- ✓ List the references/documentation used which were not of your own creation (i.e., books, journal articles).
- ✓ Your reference list should be written based on the APA (American Psychological Association) style formatting and citation.

Engineering Project

1 INTRODUCTION - What is your engineering problem and goal?

- ✓ What problem were you trying to solve? Include a description of your engineering goal.
- ✓ Explain what is known or has already been done to solve this problem, including work on which you may build. You may include a brief review of relevant literature.
- ✓ If this is a continuation project, a brief summary of your prior work is appropriate here. Be sure to distinguish your previous work from this year's project.

2 METHODS – What are your methods and procedures for building your design?

- ✓ Explain what you did. How did you design and produce your prototype? If there is a physical prototype, you may want to include pictures or designs of the prototype.
- ✓ If you tested the prototype, what were your testing procedures? What data did you collect and how did you collect that data?
- ✓ DO NOT include a separate list of materials.

3 RESULTS - What were the result(s) of your project?

- ✓ How did your prototype meet your engineering goal?
- ✓ If you tested the prototype, provide a summary of testing data tables and figures that illustrate your results.
- ✓ Include relevant statistical analysis of the data.

4 DISCUSSION - What is your interpretation of these results?

- ✓ What do these results mean? You may compare your result
commonly h
- ✓ Did any que
not expecti
uncontrolled
- ✓ How is your prototype an improvement or advancement over what is currently available?

5 CONCLUSIONS - What conclusions did you reach?

- ✓ Did your project turn out as you expected?
- ✓ What application(s) do you see for your work?

6 REFERENCES – What are your sources?

- ✓ This section should not exceed one page. Limit your list to the most important references.
- ✓ List the references/documentation used which were not of your own creation (i.e., books, journal articles).
- ✓ Your reference list should be written based on the APA (American Psychological Association) style formatting and citation.

Mathematics and Computer Sciences Project

1 INTRODUCTION - What is your research question?

- ✓ Explain what is known or has already been done in your research area. Include a brief review of relevant literature.
- ✓ If this is a continuation project, a brief summary of your prior work is appropriate here. Be sure to distinguish your previous work from this year's project.

2 FRAMEWORK – What is your framework?

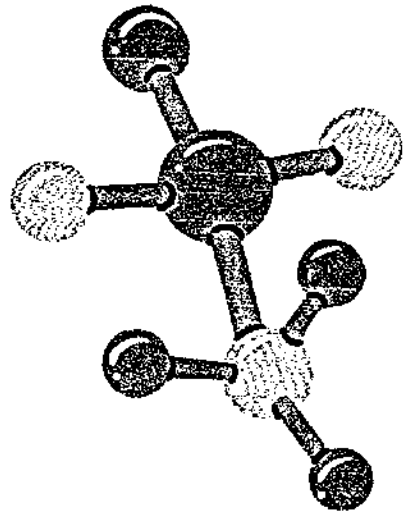
- ✓ Introduce the concepts and notation needed to specify your research question, methods, and results precisely.
- ✓ Define relevant terms, and explain prior/ background results. (Novel concepts developed as part of your project can be presented here or in Section 4, as appropriate.)

3 FINDINGS – What are your findings and supporting arguments?

- ✓ What did you discover and/or prove? Describe your result(s) in detail. If possible, provide bot' formal and intuitive/verbal explanations of eac major finding.
- ✓ Describe your methods in general terms.
- ✓ Present rigorous proofs of the theory results – or, if the arguments are long, give sketches of the proofs that explain the main ideas.
- ✓ For numerical/statistical results, include tables and figures that illustrate your data. Include relevant statistical analysis. Were any of your results statistically significant? How do you know this?

4 CONCLUSIONS - What is your assessment of your findings?

- ✓ How do the results address your research question? And how have you advanced your readers' understanding relative to what is already known?
- ✓ Discuss possible limitations. Did any questions or problems arise that you were not expecting?



What challenges do you foresee in extending your results further?

- ✓ What application(s), if any, do you see for your work?

5 REFERENCES – What are your sources?

- ✓ This section should not exceed one page. Limit your list to the most important references.
- ✓ List the references/documentation used which were not of your own creation (i.e., books, journal

IV. Abstract:

The abstract should be 250 words or less. Do not discuss specific aspects of the researchin great detail, including experimental procedures and statistical methods. Anyinformation that is unnecessary to include In a brief explanation should be saved for thewritten research paper or the project exhibit board.

If the project is a continuation from a previous year, the abstract should only summarizethe current year's work . If it is necessary to mention supporting research from previousyear(s) , it must be minimal.

If the abstract text includes special characters, such as mathematical symbols, which can'tbe translated electronically, spell out the symbol.

Do not include acknowledgements in the abstract. There should be no references tomentors, institutional facilities, and awards or patents received.

Title
Finalist's Name (or names, if a team project)
School Name, City and Region

Purpose

- An introductory statement providing background or the reason for investigating the project topic.
- A statement of the problem the research is looking to solve or the questions being tested.

Procedure

- A brief overview of how the investigation was conducted, highlighting key points, and including methods and resources used.
- Do not provide details about materials used in the research unless they greatly influenced the procedure or were needed to conduct the investigation.
- An abstract should only include procedures done by the finalist. Do not include work done by a mentor (such as surgical procedures) or work done prior to the Finalist's involvement.

Observations/Data/Results

- This section should provide key results that lead directly to the conclusions.
- Do not include unnecessary data or observations about the results, nor tables, charts, graphs or other images. While these belong in the research paper or the project board, they do not belong in the formal ISEF abstract.
- Unless significant, do not include any of the experimental design difficulties encountered in research.

Conclusions

- This section should be confined to a short summary in 1-2 sentences. It is a reflection on the research process and results, which may include conclusive ideas, important applications, and implications of the research.
- The ISEF abstract does not include a bibliography. ISEF requires the bibliography as part of the research plan to be provided on Form 1A.

Ethics Statement. Scientific fraud and misconduct is not condoned at any level ofresearch or competition. Plagiarism, use or presentation of other research's work as one'sown and fabrication of data will not be tolerated. Fraudulent projects are disqualifiedfrom the competition.

APPENDIX 3:

TUKLAS Display Board Format and Safety Guidelines

Display Guidelines

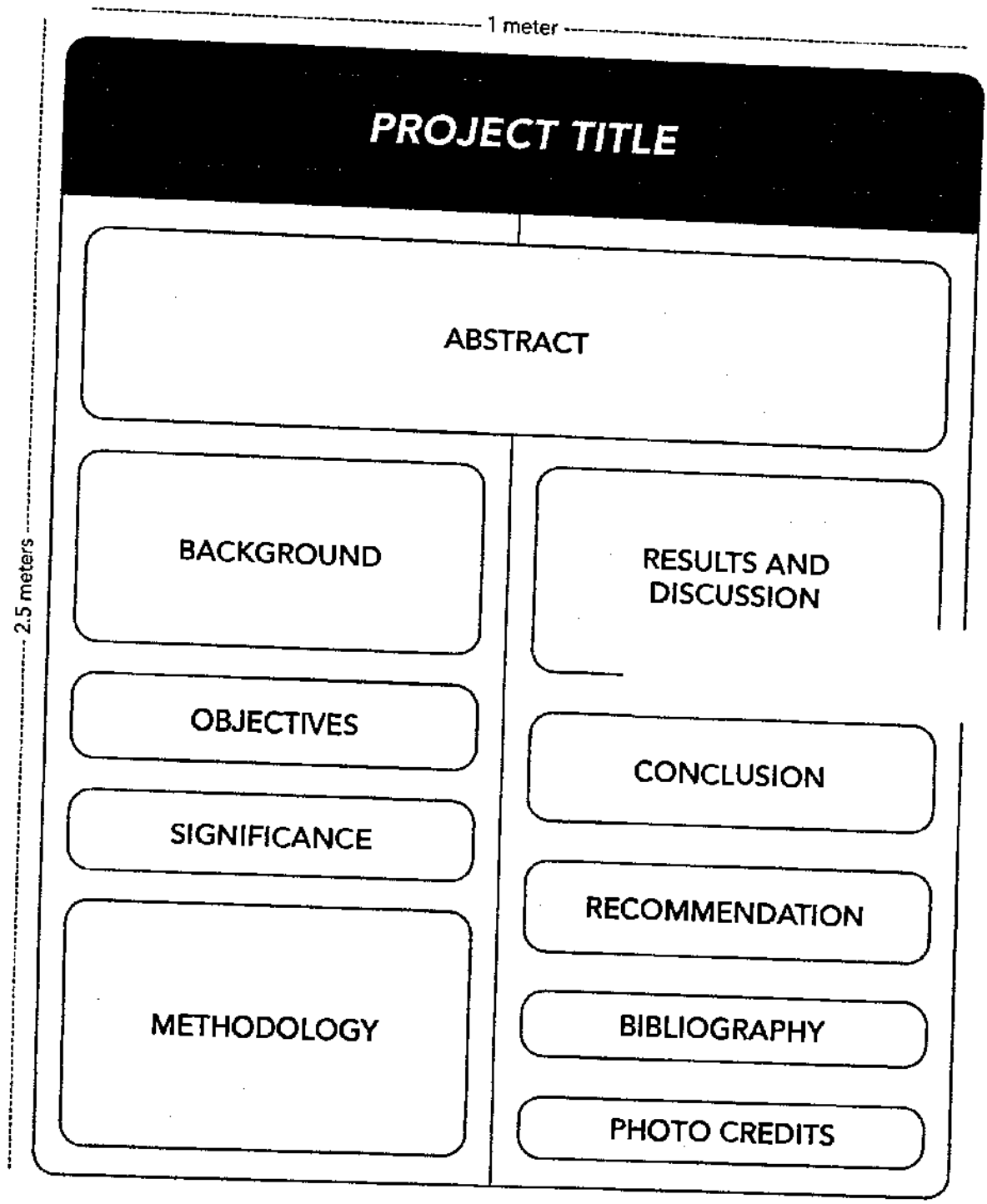
The project display using photo paper summarizes the research project and must focus on the proponent's work for this year's study, and if applicable, with only minimal reference to previous research. Tarpaulins will not be used in any level of Science Fair competition in support of the environmental advocacy of the government in reducing the consumption of non-biodegradable or non-recyclable materials.

The safety regulations that must adhere to or should be consistent with the guidelines set by the International Science and Engineering Fair (ISEF).

The following items should be seen in the project display: Abstract, Background, Objectives, Significance, Methodology, Results and Discussion, Conclusion, Recommendations, Bibliography and if applicable, Photo Credits (including illustrations and graphics).

Physical Project Board Dimension:

The dimensions of the project board may not exceed 2.5 m high and 1m wide.



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Research Logbook:

These forms do NOT need to be in this particular order, just present in the logbook.

1. Signed ISEF Abstract
2. Signed Checklist for Adult Sponsor Form 1
3. Student Checklist Form 1A
4. Research Plan
5. Signed Approval Form 1B
6. All other pertinent ISEF forms

Photography/Images:

Display of photographs other than that of the learner/s MUST have a photo release signed by the subject, and if under 18, also by the guardian of the subject.

Any photographs, visual image, chart, table and/or graph is allowed if:

1. It is not deemed offensive or inappropriate (which included images/photos showing vertebrate animals/ humans in surgical, necrotizing or dissection situations) by the SRC, Display & Safety Committee
2. It has a credit line of origin.
3. If it is from the Internet, magazine, newspaper, journal, etc. and a credit line is attached.
4. It is a photograph or visual depiction of the finalist.
5. It is a photograph or visual depiction for which a signed consent form is at the project.
6. Images used as backgrounds must also be credited.

Items NOT Allowed to be Displayed with the Project:

1. Awards, medals, business cards, flags, logos, CDs, DVDs, flash drives, brochures, booklets, endorsements, giveaway items and/or acknowledgements (graphic or written) unless the item(s) are an integral part of the project.
2. Postal addresses, Internet, email, and/or social media addresses, QR codes, telephone, and/or fax numbers of a student.
3. Active internet or email connections as part of the display or operating the project.

Safety Guidelines

Items NOT Allowed at the Project Display:

1. Living organisms, including plants
2. Soil, sand, rock, and/or waste samples, even if permanently encased in acrylic
3. Taxidermy specimens or parts
4. Preserved vertebrate or invertebrate animals
5. Human or animal food
6. Human or animal parts or body fluids
7. Plant materials (living, dead or preserved) that are in their raw, unprocessed or non-manufactured state (Exception: manufactured construction materials used in building the project or display)
8. All chemicals including water
9. All hazardous substances or devices (i.e.: poisons, drugs, firearms, weapons, ammunition, reloading devices, lasers, etc.)
10. Dry ice or other sublimating solids
    Sharp items (i.e.: syringes, needles, pipettes, knives, etc.)
11. Flames or highly flammable materials
12. Batteries with open-top cells
13. Glass or glass objects unless deemed by the Display
14. & Safety Committee to be an integral and necessary part of the project
15. Lasers or laser pointers
16. Any apparatus deemed unsafe by the Scientific Review Committee, the Display & Safety Committee of the Fair

Other Safety Restrictions:

1. Any inadequately insulated apparatus producing extreme temperatures that may cause physical burns is not allowed.
2. Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points must be for display only.
3. Project sounds, lights, odors or any other display items must not be distracting.
4. The Display & Safety Committee, and/or the Scientific Review Committee in various level of the Science Fair reserve the right to remove any project for safety reasons or to protect the integrity of the NSTF and its rules and regulations.

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Title of Research Project: _____ **Code:** _____

Fair Division: [ ] Life Science [ ] Physical Science [ ] Robotics and Intelligent Machines
[ ] Mathematics and Computational Science **Category:** [ ] Individual [ ] Team

CATEGORY	SCORE
1. CREATIVE ABILITY (30) 1. Does the project show creative ability and originality in the: a. questions asked? b. approach to solving the problem? c. analysis of the data? d. interpretation of the data? e. use of equipment? f. construction or design of new equipment 2. Creative research should support an investigation and help answer a question in an original way. 3. A creative contribution promotes an efficient and reliable method for solving a problem. When evaluating project, it is important to distinguish between gadgeteering and ingenuity.	
2. SCIENTIFIC THOUGHT (30) (If an engineering project, please see 2b Engineering Goals.) 1. Is the problems stated clearly? 2. Was the problem sufficiently limited to allow plausible approach? Good scientists can identify important problems capable of solutions. 3. Was there a procedural plan for obtaining a solution? 4. Are the variable clearly recognized and defined? 5. If controls were necessary, did the student recognize their need and were they used correctly? 6. Are there adequate data to support the conclusions? 7. Does the finalist/team recognize the data's limitations? 8. Does the finalist/team understand the project's ties to related research? 9. Does the finalist/team have an idea of what further research is warranted? 10. Did the finalist/team cite scientific literature, or only popular literature (e.g. local newspapers, Readers Digest)? **ENGINEERING GOALS** 1. Does the project have a clear objective? 2. Is the objective relevant to the potential user's needs? 3. Is the solution: workable? Acceptable to the potential user? Economically feasible? 4. Could the solution be utilized successfully in design or construction of an end product? 5. Is the solution a significant improvement over previous alternatives or application? 6. Has the solution been tested for performances under the conditions of use?	
3. THOROUGHNESS (15) 1. Was the purpose carried out to completion within the scope of the original intent? 2. How completely was the problem covered? 3. Are the conclusions based on a single experiment or replication? 4. How complete are the project notes? 5. Is the finalist/team aware of other approaches or theories?	

6. How much time did the finalist or team spend on the project?
7. Is the finalist/team familiar with scientific literature in the studied field?
8. Are the relevant details (including the pages and dates) of the experiment recorded in the research data logbook?

4. SKILL (15)

1. Does the finalist/team have the required laboratory, computation, observational and design skills to obtain the supporting data?
2. Where was the project performed (i.e. home, school laboratory, university laboratory) Did the student or team receive assistance from parents, teachers, scientists or engineers?
3. Was the project completed under adult supervision, or did the student/team work largely alone?
4. Where did the equipment come from? Was it built independently by the finalist or team? Was it obtained on loan? Was it part of a laboratory where the finalist/team worked?

5. CLARITY (10)

1. How clearly does the finalist or team discuss his/her/their project and explain the purpose, procedure, and conclusions? Watch out for memorized speeches that reflect little understanding of principles.
2. Does the written material reflect the finalist's or team's understanding of the research?
3. Are the important phases of the project presented in an orderly manner?
4. How clearly is the data presented?
5. How clearly are the results presented?
6. How well does the project display explain the project?
7. Was the presentation done in a forthright manner, without tricks or gadgets? Did the finalist/team perform all the project work, or did someone help?

TOTAL

Signature Over Printed Name of Judge

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Enclosure 5 to DM No:_____ s. 2024

Guidelines for STEMAZING

(A Competition of Science, Technological, and Mathematical Outputs)

COMPONENT AREA	**Science, Technology, and Mathematics**
KEY STAGE	Key Stage Three (3): Grades 7 to 10; Key Stage Four (4): Grades 11 to 12
EVENT TITLE	**STEM Processes and Practices Exhibition**
NO. OF PARTICIPANT/S	A team composed of two to three (3) learner-participants per district
TIME ALLOTMENT	3 Hours (Creation of Outputs) 1 Minute Presentation, About 5 Minute Q and A
PERFORMANCE STANDARD	Obtain scientific and technological information from varied sources about global issues that have impact on the country. Acquire scientific attitudes that will allow them to innovate and/or create products useful to the community or country. Process information to get relevant data for a problem at hand
21ST CENTURY SKILL/S	Critical thinking, Communication skills, Creativity, Problem solving, Collaboration. Information literacy, Technology and Engineering skills and digital literacy.
CREATIVE INDUSTRIES DOMAIN	Technology and Engineering
DESCRIPTION	**STEM Processes and Practices Exhibition** is an NFOT event category of STEMAZING that allows learner-participants to apply science and mathematics thinking skills to solve problems that have local, national, and global impact. It allows them to become problem solvers by addressing social, scientific, and environmental issues through the application of STEM and 21st century skills. In this activity, participants will be presenting oral and written proposed solution to a given scenario.
CRITERIA FOR PRESENTATION	

Criteria	Percentage
Written Proposal	
Content/Organization/Thematic Relevance Content - 25% Organization - 10% Feasibility of the proposed solution - 15% (Based on scientific, technological, and other valid assumptions, Feasibility of the proposed solution)	50%
Relevance of data used	15 %
Oral Presentation	

	Discussion/Arguments/Delivery (Based on scientific, technological, and other valid assumptions, Feasibility of the proposed solution)	20%
	Ability to answer the questions	15%
	Total	**100%**

EVENT RULES AND MECHANICS:

General Guidelines

1. The competition shall consist of proposal writing and a One-Minute Presentation. The teams shall develop and present their proposal to the panel of judges of their solution to a real-world problem/scenario of local or global importance. The situation containing the problem shall be given on-site during the showcase.
2. The participants are given 3 hours to conceptualize and prepare their written description of the proposed solution for the oral presentation. All entries submitted shall not bear any markings that identify their districts. The participants may use the internet and other printed resources in developing their written solution, however, the teams are not allowed to confer with their coaches while the activity is on – going. Any form of communication between the participants and other parties (coach, parents, classmates, teachers, etc.) shall warrant automatic disqualification.
3. The proposed solution shall have the following components:

   Title

   Summary (100 – 200 Words)

   Background and Problem (200 – 300 Words)

   (Describe the challenges and haw the proposed solution addresses the problem presented. Scientific Principles and Technology applicable to the resolution of the problem.)

   Beneficiaries

   Proposed Solution to the Problem Presented (300 – 500 words)

   Methods/Details of the proposed solution including the Cost -Analysis as applicable.

   Include illustrations, figures, and charts.

   References: May use any format as long as consistency is observed
4. The teams shall encode their proposals in word processing software, double-spaced using Bookman Old style font size eleven set in A4 size paper. Margins shall

be 1 inch on all sides of the paper. Within the 3 hours, the teams shall submit their outputs (electronic copy) to the facilitators.

5. The proposals shall be subjected to a plagiarism check. Any proposals which exceed 15% similarity index (uncited) shall be deducted 2 points from the total score for every percent in excess. However, cited references shall be excluded from the 15% tolerance.
6. The submitted proposals shall be evaluated by the assessors before the oral presentation.
7. A timer board shall be shown to the public as well as to the participants.
8. At the end of one minute, a buzzer shall signal that the time for presentation is up and the participants shall immediately stop presenting.
9. After the presentation, the assessors will ask questions for clarifications.
10. The participants will be ranked based on the combined scores in the written and the oral presentation where the highest scorer will be ranked first and so on.

Enclosure 5 to DM No: 296 s. 2024

RULES of DAMATH/SCI-DAMA

1. Set the starting position of the chips.
2. The two players alternately will take turns in moving a piece (Pass is not allowed).
3. Touch move shall be observed in the games. A player who touches a chip is required to move that chip unless it is an illegal move.
4. After making a move, a player shall record his/her move in the score sheet.
5. Only one score sheet will be used by the player in a game.
6. Each player is allowed one minute to move, record the move and score.
7. A warning is given to player by the arbiter if no move is made in one minute, and consequently, is forced to move a chip.
8. Continuous violation of rule #7 will mean disqualification (after 3 warnings) of the player even if he is leading in the score sheet.
9. All moves should be in the forward direction except when taking a chip or the chip is "dama".
10. A chip is declared "dama" if it reaches and stop in any of the following opponent's square:
    (1,0) (3,0) (5,0) (7,0)
    Similarly, if an ordinary opponent's chip reaches the following squares, it is declared as "dama". (0,7) (2,7) (4,7) (6,7)
11. Once a piece/chip is declared as a "dama", it could slide diagonally forward or backward in any vacant square. If a "dama" takes a chip, the score is doubled; similarly if a chip takes a "dama" the score is also doubled. If the "dama" takes a "dama", the score is quadrupled.
12. In taking chip/chips, the following shall prvail
    "Mayor dama"
    "Mayor dalawa"
    "Mayor tatlo", etc.
13. "Dama" chip should be encircled in the score sheet to identify the "dama".
14. Games duration should not exceed twenty minutes (20 min.).
15. The game also ends if:
    - The moves are repetitive
    - A player has no more chips to move
    - A player has no chips
    - A player resigns

"Save by the belt" is not applicable in the end game. Continuation of move shall be enforced when taking a chip/s.

16. The remaining chip/s of a player is/are added to his total score algebraically.
17. If the remaining chip is a "dama", the value is doubled.
18. The player with greater total score wins the game except in the sci-dama when the player with lesser score wins.
19. Only players are allowed to raise questions during the game through the arbiter and questions should be settled immediately. No questions will be entertained after the game.
20. Arbiter's decision is final.

Starting Chips Position

Whole Number DaMaths

	9	6	1	4
0	3	10	7	
	11	8	5	2

Fraction DaMaths

	10/10	7/10	2/10	5/10
1/10	4/10	11/10	8/10	
	12/10	9/10	6/10	3/10

Integers Damath

	-9	6	-1	4
0	-3	10	-7	
	-11	8	-5	2

Rational Damath

	-9/10	6/10	-1/10	4/10
0	-3/10	10/10	-7/10	
	-11/10	8/10	-5/10	2/10

Radical Damath

$-9\sqrt{2}$	$-\sqrt{8}$	$4\sqrt{18}$	$16\sqrt{32}$	
$-49\sqrt{8}$	$-25\sqrt{18}$	$36\sqrt{32}$	$64\sqrt{2}$	
$-121\sqrt{18}$	$-81\sqrt{32}$	$100\sqrt{2}$	$144\sqrt{8}$	

Polynomials

$-3X^2y$	$-xy^2$	$6x$	$10Y$	
$-21xy^2$	$-15x$	$28y$	$36x^2Y$	
$-55x$	$-45y$	$66x^2Y$	$78xy^2$	

Water Patrol Sci-dama (in Cu.m)

90	65	10	45	
5	30	105	70	
110	85	50	25	

Power Patrol Sci-dama (in Kwh)

95	70	15	50	
10	35	110	75	
115	90	55	30	

Electro Sci-dama

P10	7kwh	P2	5kwh	
1kwh	P4	11kwh	P8	
P12	9kwh	P6	3kwh	

Dama Sci-Notation

$1.01x10^{10}$	$7.7x10^{-7}$	$2.2x10^{2}$	$5.5x10^{-5}$	
$1.1x10^{-1}$	$4.4x10^{4}$	$1.111x10^{-11}$	$8.8x10^{8}$	
$1.212x10$	$9.9x10^{-9}$	$6.6x10^{6}$	$3.3x10^{-3}$	

THI Sci-dama (Temperature Humidity Index)

	25%		70 °F		30%		75 °F
80 °F		35%		85 °F		40%	
	45%		120 °F		50%		110 °F

Thermo Sci-dama

	29 g		17 °C		3 g		11 °C
2 °C		7 g		31 °C		19g	
	37 g		23 °C		13 g		5 °C

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Ground Rules

1. The first player is determined by table of pairings.
2. A player forfeits his/her game after he/she commits any of the following violations and fails to observe the **third warning** by any of the tournament officials
   2.1 Wrong position of the chips.
   2.2 Annoying/causing disturbing acts such as, tapping the chair, table or whistling.
   2.3 Eating or drinking while game is in progress.
   2.4 Exceeding the 1 minute move
3. Players, coaches and spectators are not allowed to make post-game analysis or play against other players/coaches/spectators and discuss finished or unfinished games within a 10 – meter radius of the playing area. Coaches are only allowed within the playing area. Coaches are only allowed within the playing are if requested by the arbiter/tournament manager.
4. In taking a chip, pass is not allowed. If a player has an option, then he may use 1 minute but has to take the chip/chips anyway. If a player has no option, then he has to take the chip/s right away without consuming the 1-minute time.
5. No save by the bell in the last minute of the game. Continuation of moves will be observed when chip or chips is to be taken.
6. A player records his/her own move, computation of score is **running score** for all levels **except Grade 10 Damath.**
7. In moving a chip, touch move should strictly be observed except when the move contradicts the general guidelines on the Damath/Sci-Dama Games.
8. Defaulting time is 5 (five) minutes.
9. No complaints will be entertained after the player have signed the score sheets.
10. Tie-breaking rules:
    10.1 win over the other (for simple tie)
    10.2 SB System
    Sonneborn-Berger System
    - The sum of the scores of the opponents a player has defeated and half the scores of the players he has drawn with.

    10.3. 10-minute knockout game.