GOVERNMENT OF THE REPUBLIC OF ZAMBIA (GRZ)

MINISTRY OF EDUCATION (MoE)

Junior Engineers Technicians and Scientists (JETS)

JETS Guidelines

Directorate of National Science Centre

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Message from The Honourable Minister of Education

Zambia is an integral part of the global village, where rapid technological development has minimized the time lag for knowledge dissemination, innovation, productivity, and socialization. Ensuring that future generations have access to sufficient natural resources to meet their fundamental needs hinges on our current practices, particularly in the realm of education. The world has responded to this challenge through the Sustainable Development Goals, a global call to action to eradicate poverty, protect the planet, and foster peace and prosperity. At its core, this call advocates for future generations to thrive in a peaceful, equitable, and prosperous society, driving the imperative to conserve the environment, biodiversity, healthy ecosystems, and pristine oceans. The African Union has recognized the significance of this reality, setting a transformation deadline of 2063 for the continent. Education plays a critical role in this transformation, empowering young people with the confidence and skills to positively contribute to their communities and country.

Advancements in technology have revolutionized the global economy, introducing new products, skills, and job opportunities. However, they also present challenges and opportunities, notably the rise of Artificial Intelligence (AI), which reshapes the business landscape. In response to global and regional demands, Zambia has envisioned becoming a prosperous middle-income country by 2030. The Eighth National Development Plan (8NDP) emphasizes Social Economic Transformation to improve livelihoods, with a key focus on developing human resources through quality education. Within the education sector, the Junior Engineers, Technicians, and Scientists (JETS) platform harnesses the potential of young minds.

Recognizing the boundless possibilities that the future holds, it is essential to invest in this younger generation, fostering their ability to work innovatively, flexibly, and diversely.

This necessitates an education that nurtures creativity, resilience, resourcefulness, and innovation, precisely the ideals upheld by JETS. To realize this vision, the government has prioritized promoting science, technology, and innovation, while bolstering investment in research and development, as outlined in the 8NDP.

Central to this endeavour is the integration of information communication technology (ICT). Therefore, it is imperative to cultivate and apply digital skills to facilitate the transformation towards a digital economy. This preparedness ensures that our workforce can effectively address future challenges and seize forthcoming opportunities. I extend a resolute call to all stakeholders to collaborate with the government in promoting JETS activities across all education levels. This collaboration is a key driver of national development, given Zambia's abundance of natural resources. Let us collectively nurture emerging innovations, supporting their growth into fully realized products that benefit our nation and extend their impact beyond our borders. Together, we can foster an environment where innovation and education converge, empowering our youth to become the architects of a prosperous and sustainable future for Zambia and the world at large.

Hon. Douglas Munsaka Syakalima (MP)
Minister of Education

Message from The Permanent Secretary - Education Services

As we initiate the inauguration of yet another successful JETS fair in our trajectory, I am deeply gratified and humbled to extend my utmost commendations to each esteemed individual whose indispensable contributions have undeniably propelled the resounding triumph of our endeavours. Your consistent and unwavering support and commitment have not only enriched the lives of our students but also revitalized the spirit of learning within our educational community.

To our benevolent sponsors:

Your continued dedication to empowering our endeavours has been truly extraordinary. Your support has not only fuelled our initiatives but has also served as a wellspring of inspiration for all stakeholders. Your contributions have metamorphosed dreams into tangible realities, and for this, we are eternally appreciative. It is through your unshakable belief in our vision that we can continue to create an enduring impact in the lives of our young learners.

To our enthusiastic JETS participants:

You epitomize the core essence of our programs, being the eager minds that consistently remind us of the purpose behind our efforts. Your ardent thirst for knowledge and unyielding dedication to embracing novel challenges have been genuinely inspirational. Witnessing your growth and accomplishments fills us with immense pride, and we hold full confidence that you will continue to shine brilliantly in all your future pursuits.

To our devoted educators:

You are the guiding luminaries of our educational expedition, moulding young minds and nurturing talents with unwavering commitment. Your devotion to imparting knowledge, wisdom, and values transcends the confines of the classroom, leaving an indelible imprint on the lives of our students.

Your patience and resilience in the face of obstacles are commendable, and we are profoundly grateful for your steadfast pursuit of excellence.

To all our esteemed stakeholders:

Your constant backing, counsel, and encouragement have played a pivotal role in shaping the trajectory of our initiatives. Your commitment to the cause of education and active engagement have enabled us to surmount challenges and achieve significant milestones. Your partnership is of inestimable value to us, and we eagerly anticipate continuing our collaboration in our mission to forge a brighter future for the next generation.

As we celebrate our achievements, I earnestly urge each and every one of you to persist in your support of our noble cause. Together, we can pave the way for a more brilliant and promising tomorrow. Let us never lose sight of the transformative potential of education, for it is through the power of knowledge that we can alter lives and construct a better society.

In the spirit of innovation progress, let us remain united in our efforts, driven by a collective vision to furnish our young learners with every avenue for thriving and attaining success. Your unchanging support and active involvement will undoubtedly create a profound difference in the lives of countless individuals. Once again, I extend my heartfelt gratitude for being an integral part of our journey. Your resolute support makes all the difference. Together, let us embark on the subsequent chapter of our educational odyssey, united by a shared determination to leave an enduring legacy for generations to come.

With profound appreciation and warmest regards.

Joel Kamoko (Mr.)

Permanent Secretary - Education Services

Message from The Director—National Science Centre

JETS, an acronym for Junior Engineers Technicians and Scientists, serves as the exclusive and foremost science fair program in Zambia, specifically designed for the engagement of school learners, out-of-school youth, tertiary students, and teachers. This program serves as a vital avenue where individuals can showcase their intellectual prowess by presenting their own scientific investigations and innovative projects. JETS goes beyond being a mere event; it acts as a unifying force that brings together learners, teachers, professional organizations, and educational institutions from every corner of the country.

This collaborative platform empowers participants to demonstrate their creative ideas and remarkable advancements in the field of science. The significance of participating in JETS reaches far beyond a superficial level. By actively engaging in this program, learners not only augment their understanding of the marvels that science and engineering offer but also expand their knowledge base. Moreover, the participation fosters an environment conducive to exploring entrepreneurial opportunities, allowing individuals to broaden their scientific horizons and unlock their potential.

It is essential to note that the core objective of JETS extends beyond the traditional notion of winning. While securing an official award is undoubtedly prestigious, the program recognizes and celebrates the enduring rewards that participants can gain, regardless of their official ranking. Many individuals who have walked away from JETS without an official award have found invaluable prizes in the form of new mentors who guide and inspire them, a network of peers who share

their passion for scientific exploration, or even the development of professional aspirations that guide their future endeavours.

The 2024 - 2026 edition of the JETS Fairs, whose theme is *" Promoting Innovation, Engineering and Entrepreneurship: Accelerating STEM Growth and Development"*, will continue with the thematic approach where a sub-theme is chosen for all participants in a particular category to compete in.

As the program progresses, it is hoped that learners seize the opportunity to participate in JETS fairs, recognizing the profound impact it can have in addressing the challenges and issues faced by our communities. JETS acts as a dynamic platform, empowering participants to contribute their innovative solutions and breakthroughs towards building a better society. Therefore, heartfelt best wishes are extended to all potential participants, across various levels. May your enthusiasm and dedication drive you to reach new heights and make a lasting impact on the scientific landscape.

Dr. Benson Banda

Director—National Science Centre

Ministry of Education

1.1 Background

JETS, which stands for Junior Engineers, Technicians and Scientists, is an initiative organized by the Ministry of Education that offers a dynamic platform for students, teachers, and young people to come up with innovative, human-centered solutions to the challenges facing their communities. The program operates under the guiding principle of "Think Big Be Innovative," and its participants are encouraged to address a range of pressing issues, including climate change, medical and healthcare, renewable energy, water scarcity, and environmental pollution. Solving many of Zambia's major problems will require long-term, sustained efforts, particularly in the realm of science. As such, JETS empowers learners, youth, and teachers to develop innovative solutions that can be refined and showcased at JETS Fair activities held at various levels. These fairs provide a forum for young scientists to share ideas, identify best practices related to STEM, and learn from each other's experiences. Moreover, stakeholders with a strong interest in scientific research can choose to mentor, develop, and commercialize promising innovations, thereby promoting sustainable development .

1.2 JETS Mission Statement

To develop Human Capital of knowledgeable young scientists, mathematicians and technologists that will provide service and leadership to the nation and to pursue creative research and strive for new innovations in the fields of science, technology, engineering and mathematics in order to enhance sustainable development in Zambia.

2.0 JETS Objectives

The objectives of JETS are to:

(i) promote creativity and innovation in Science, Mathematics, Engineering and Technology among learners in schools, students in Colleges of Education and teachers;

(ii) help learners in Schools and Colleges of Education and out-of-school youth get a better foundation to meet the increasing demands of engineering and technical services;

(iii) give learners in Schools and Colleges of Education and youths an opportunity to learn and apply scientific principles in the design and construction of technical innovations and preparation of technical reports;

(iv) help learners in Schools and Colleges of Education and youths in discovering and appraising their own abilities, aptitudes and interests;

(v) provide a preview of engineering, technology and other sciences and an acquaintance with personnel in the field;

(vi) make learners in Schools and Colleges of Education aware of opportunities for careers in engineering, sciences and related technical fields in the public and private sectors of the commercial and industrial life; and

(v) cooperate with and affiliate to other associations and bodies with similar interests.

3.0 Role of a Teacher

The role of the teacher is that of a mentor. JETS depends on teachers to disseminate information about JETS to learners and display notices about fairs. Through their encouragement and support, teachers can inspire the learners to great achievements. A teacher guides learners through stages of scientific innovation and ensures their scientific approach.

The following are the steps required for one to carry out a research:

STEP 1 Choose a topic or question.

STEP 2 Researchers must submit their research plan to their instructors/ supervisors for approval before starting the innovation.

STEP 3 Do background search on the chosen topic to find out what has already been done on that particular topic. What does one need to know to answer the question?

STEP 4 Form a hypothesis/state the engineering goals. What can the answer possibly be?

STEP 5 Test the hypothesis/test the prototype/evaluate the prototype and redesign if necessary.

STEP 6 Draw conclusions based on the results of the testing.

3.1 Report format layout

All research work carried out should be presented as outlined:

(i) Abstract

It summarizes, usually one paragraph of 200 words or less, the major aspects of the entire innovation in a prescribed sequence that includes:

Aspect	Key parts
(a) Overall purpose	Reason (s) for innovating
(b) Problem	Description of the issue needing study
(c) Study design	Framework of research methods & techniques (*Explanatory, correlational, Diagnostic, Experimental, Descriptive*)
(d) Data analysis	Orderly application of logical/statistical techniques to describe, condense & evaluate data
(e) Major findings	Principal outcomes
(f) Implication (s)	Possible present and/or future effects
(g) Conclusion	Final thought (s)
(h) Keywords	Represent key concepts - *reflective collective understanding*

(ii) Introduction

It comprises two aspects: (a) Overview as focus of research study, showing importance of study and (b) In-depth as background on how research was conducted, what is known by others, general unique findings (gaps) and overall contribution to field; narrowing in on the research questions.

(iii) Hypothesis/Rationale (Possibility of separating?)

The initial building block in the scientific method. It is a clear, specific, testable & falsifiable expected relationship between variables or explanation of occurrence.

(iv) **Statement of the Problem**

It is the description of an issue which needs to be investigated and addressed. It provides the context for the innovation study and generates the questions which the innovation aims to answer. The statement of the problem is the focal point of any innovation/ research .

(v) **Aims/Objectives**

The aim is about what one hopes to achieve, the overall intention in the innovation. It signals what and/or where one aspires to be by the end. It is what one wants to know. It is the point of doing the research. An aim is therefore generally broad. It is ambitious, but not beyond possibility. It is what research hopes to achieve in long (aims) and short (objectives) terms respectively.

Objectives, on the other hand, should be specific statements that define measurable outcomes, e.g. what steps will be taken to achieve the desired outcome.

(vi) **Process/Methodology**

It is a blueprint (logic of inquiry) for measurement, collection and analysis of data. It comprises theoretical analysis of the body of methods and principles associated with a branch of knowledge. Consideration is made regarding detailed explanation of the reasons for research, determination of how data should be collected ethically and methods & procedures of data analysis.

(vii) **Findings/Results**

Only logical findings of the research, with explanations, are outlined here; in tabular and/or graphical format contextually. The results section end with overall synopsis.

(xiii) **Discussion**

This section explains the significance of results in relation to research questions or objectives. It ought to consist the following:

The most important goal is to interpret the results so that the reader is informed of the insight or answers that the results provide. The discussion should also present an evaluation of the particular approach taken.

S/n	Key parts	Information
1	Interpretation (s)	Giving results meaning
2	Implication (s)	Reasons for importance of results
3	Limitation (s)	What results couldn't reveal
4	Recommendation (s)	Suggested practical actions

(ix) **Conclusion**

Conclusions summarize how the results support or contradict the original hypothesis. It is a synthesis of pivotal points showing why the research matters. It involves restatement of the research problems, major findings and interpretations as well as a brief write up on implications.

(x) **Acknowledgements**

It is a way to publicly display the appreciation for the assistance and support. A simple, "Thank you to my teacher, friends, family, and mentor" is not sufficient. The reasons why one is acknowledging the individuals should be listed. For example, "This innovation would not have been possible without the support and encouragement of Mrs. Inambao.

(xi) **Citation and Reference**

It means acknowledging works of other scholars professionally. In-text citation is written as (name, year); for instance, (Mweemba, 2022) or MoE, 2022). Referencing means giving credit to the various sources used when writing a report. A reference list should include any documentation that is not one's own. The sources should be arranged alphabetically according to the surname of the authors. It should be written in the following order: Author's surname/ institution and initials , year of publication, title underlined or *italicized*, edition, place of publication, publisher. This is Harvard style of referencing. Example of online reference is given below,

Ministry of Education (2022). *Teachers and JETS – NSC http://www.gov.zm/NSC/pdf/journals/ed_lead el_146222_bluehead.pdf*

Other refereeing styles are also acceptable on condition that there is consistency.

3.2 Investigation

An investigation is the process where the problem is solved. When undertaking an investigation, a method is followed that allows for the testing of an idea, or finding a solution to a problem, which determines a clear conclusion. Innovations for JETS must have original work done by participants or modified and clearly stating the modification or improvement.

3.3 Innovation Approval

All innovations need to be approved for judging; i.e. checked for compliance to the rules of JETS Fair and to ensure that they do not violet any ethics.

3.4 Ethics

Ethics is concerned with what is right or wrong, good or bad, fair or unfair, responsible or irresponsible. Research on micro-organisms, human or animal subjects, including surveys, need a letter signed by a supervising scientist and the teacher giving approval for the innovation to be done. Any surveys (questionnaires) need another form of ethics giving consent or permission by parents or institutions.

Researchers are encouraged to check for ethical infringements before exhibiting innovations at any JETS Fair. Please note that the following are not allowed at any JETS Fair:

(i) Human or animal parts including tissues and body fluids (for example, blood)
(ii) Dangerous chemicals: poisons, drugs, medications, controlled substances, hazardous substances and devices (for example, firearms, weapons, ammunition, reloading devices).
(iii) Flammable substances.
(iv) Photographs or other visual presentations depicting humans or vertebrate animals in surgical techniques, dissections, necropsies or other laboratory procedures, or belittle people in any way, or show animals being harmed in any way.
(v) Any apparatus deemed unsafe by the JETS Fair organisers.

NB: Photographs will be sufficient for judging but it must state who took the photos, and, if permission has been given to display them.

3.5 Safety

It is being encouraged that safety guidelines are observed at all times. The safety guidelines here are general ones and other rules may apply to specific configurations. For example all electrical work must conform to the Electrical Code and Regulations. The on-site electrician may be requested to review any electrical work on any innovation.

3.6 Patents

Some participants display innovations that show innovative thinking and provide new products. JETS encourages the development of entrepreneurial products which may lead to the marketing of these products.

Researchers are therefore advised to obtain legal advice about patent applications before entering innovations at any JETS Fair as once a design or product has been on public display, it cannot be patented. However, if any exhibit is displayed for judges only, no patent rights will be lost.

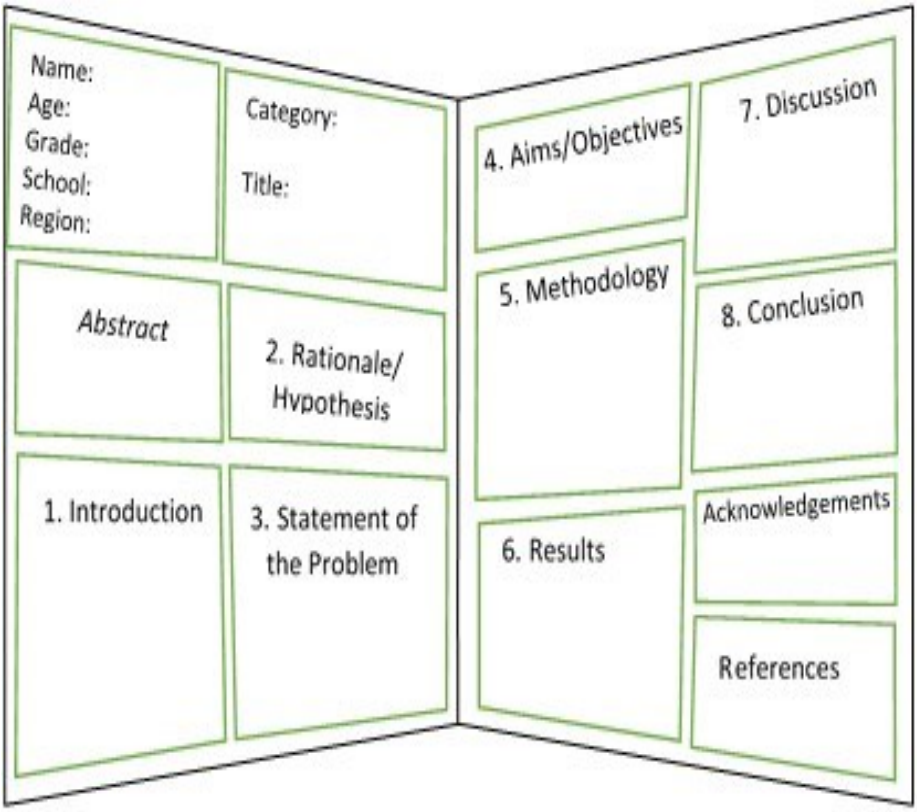
3.7 The presentation must include the Display Board:

All presentations must include a display format as it is a very important part of the exhibit. It should be easy to read and understand and it should explain what the researcher did, how it was done and what was found out. The presentation must be made interesting and attention-grabbing. The intention is to get visitors to stop and read what the innovation is all about. The summarised information must be laid out in a logical order. The detailed information will be in the innovation report.

(i) **Compulsory logical order for display boards**

For every JETS fair innovation, one needs to prepare a display board to communicate the work to others. In most cases a standard, three-panel display board that unfolds to be 1.0 meter tall by 1.2 meters wide is used as shown below.

(ii) **Organize the information like a newspaper** so that the audience can quickly follow the thread of the innovation by reading from top to bottom, then left to right. Include each step of the science fair innovation: Introduction, aim, hypothesis, procedure including variables, results (graphs & analysis), discussion and interpretation of results, conclusion and acknowledgment as well as photos or pictures must be included where applicable.



(iii) **Use a font size of at least 16 points** for the text on the display board, so that it is easy to read from a few meters away. It's okay to use slightly smaller fonts for captions on picture and tables.
(iv) **The title should be big and easily read from across the room**. Choose one that accurately describes the work, but also grabs peoples' attention.
(v) **A picture speaks a thousand words!** Use photos or draw diagrams to present non-numerical data, to propose models that explain the results, or just to show the experimental setup. But, don't put text on top of photographs or images. It can be very difficult to read.

4.0 Categories in JETS

The 2024 - 2026 JETS Fairs and beyond are set to continue with the thematic approach as was done in the previous year (2023). Under this approach, a specific theme will be selected for all participants within a given category to compete in. The tasks will be designed to encourage participants to develop an innovation that contributes to solving a practical problem or challenge at the community, regional, national, or global levels. For example, in the physics and renewable energy category, participants may be tasked with developing innovations aimed at addressing challenges related to renewable energy and climate change in Zambia. More information on the proposed themes for each category is provided in Section 6.

4.1 JETS Categories

The following are the categories for the 2024 - 2026 JETS Fairs. A total of 64 participants per region will be competing in the various categories as indicated in Table 1.

Table 1: Categories and Number of Participants per Region

Level	Categories	Participants
ECE & Primary (ECE & 1 to 7) **12**	1. Agricultural Science Innovations	1
	2. Chemistry Innovations	1
	3. Physics & Renewable Energy Innovations	1
	4. Computer Science and Software Development Innovations	1
	5. Mathematics Innovations	1
	6. Medicine & Health Innovations	1
	7. Robotics and Artificial Intelligent Innovations	1
	8. Food Science, Technology and Hospitality Innovations	1
	9. Environmental Sustainable Development Innovations	1
	10. Quiz and Olympiads (Mathematics 1, Science 1, CTS 1) *Note: Same candidates for both quiz & Olympiads - total 3.*	3
Junior Secondary (Grade/form 8/1 to 9/2) **11**	1. Agricultural Science Innovations	1
	2. Chemistry Innovations	1
	3. Physics & Renewable Energy Innovations	1
	4. Computer Science and Software Development Innovations	1
	5. Mathematics Innovations	1
	6. Medicine & Health Innovations	1
	7. Robotics & Artificial Intelligent Innovations	1
	8. Food Science, Technology and Hospitality Innovations	1
	9. Environmental Sustainable Development Innovations	1
	10. Quiz and Olympiads (Biology & Chemistry - 1), (Mathematics & Physics - 1) *Note: Same candidates for both quiz & Olympiads - total 2.*	2

Level	Categories	Participants
Senior Secondary (Grade 10 to 12) **11**	1. Agricultural Science Innovations	1
	2. Chemistry Innovations	1
	3. Physics & Renewable Energy Innovations	1
	4. Computer Science and Software Development Innovations	1
	5. Mathematics Innovations	1
	6. Medicine & Health Innovations	1
	7. Robotics & Artificial Intelligent Innovations	1
	8. Food Science, Technology and Hospitality Innovations	1
	9. Environmental Sustainable Development Innovations	1
	10. Quiz and Olympiads (Biology & Chemistry - 1), (Mathematics & Physics - 1) *Note: Same candidates for both quiz & Olympiads - total 2.*	2
Open Out-of-School Youth/College Students **09**	1. Agricultural Science Innovations	1
	2. Chemistry Innovations	1
	3. Physics & Renewable Energy Innovations	1
	4. Computer Science and Software Development Innovations	1
	5. Mathematics Innovations	1
	6. Medicine & Health Innovations	1
	7. Robotics & Artificial Intelligent Innovations	1
	8. Food Science, Technology and Hospitality Innovations	1
	9. Environmental Sustainable Development Innovations	1

Level	Categories	Participants
Teachers **09**	1. Agricultural Science Innovations	1
	2. Chemistry Innovations	1
	3. Physics & Renewable Energy Innovations	1
	4. Computer Science and Software Development Innovations	1
	5. Mathematics Innovations	1
	6. Medicine & Health Innovations	1
	7. Robotics & Artificial Intelligent Innovations	1
	8. Food Science, Technology and Hospitality Innovations	1
	9. Environmental Sustainable Development Innovations	1
Skills (Grade/form 8/1-12) **12**	*1.* Civil Engineering *(Wall & Floor Tiling, Landscape & Gardening, Bricklaying & Plastering).*	4
	2. Mechanical Engineering (Design & Construction of Auto machines - *Welding, Carpentry & Joinery, Electrical installations, panel beating and stray painting).*	4
	3. Electronics Services *(Wearable technology, Communication technology, Industrial & professional electronics, repair & maintenance).*	2
	4. Fashion Technology *(Design & innovation, Sustainable practices - customer specific fabrics, manufacturing & production).*	1
	5. Cosmetology *(hairstyling, skincare, nail care, and makeup application).*	1
Total number of categories		**64**

Regions expected to participate in JETS National Fair

S/n	Region	Participants
1	Central	64
2	Copperbelt	64
3	Eastern	64
4	Luapula	64
5	Lusaka	64
6	Muchinga	64
7	Northern	64
8	North Western	64
9	Southern A	64
10	Southern B	64
11	Western	64
Total		**704**

Table 2: Description and Characteristics of JETS Categories

Table 2, on page 25, shows the JETS categories, their description and the required number of participants for each. Innovation categories. Primary categories are for learners from ECE to Grade 7 only. Organizers should ensure strict adherence to these guidelines.

ECE & Primary: Categories for participants in ECE and Primary				
S/n	**Category**	**Description**	**Characteristics**	**Participants**
1	**Agricultural Science Innovations**	Agricultural Science concerns itself with the application of science to agriculture. It includes the practice of all kinds of farming and technologies involved.	Participants are expected to develop and showcase new or improved strategies and innovations for improving productivity and address challenges of climate change.	1
2	**Chemistry Innovations**	Chemistry involves studying the structure of atoms, combinations, and interactions with each other. It helps young ones develop a fundamental understanding of the world around them.	Expected traits include curiosity, observational skills, critical thinking, inquisitiveness, creativity, teamwork, safety consciousness, for product designs and creation	1
3	**Physics and Renewable Energy Innovations**	This category involves presenting innovations in Integrated Science as one whole area of knowledge while still maintaining the science processes.	Participants are expected to develop innovative solutions for utilizing the abundant energy for sustainable development	1
4	**Computer Sciences and Software Development Innovations**	Computer Science entails computational systems and information technology, comprising theory, design, development, and application of these systems	Participants are expected to develop innovative solutions that leverage computer science for economic development	1
5	**Mathematics Innovations**	Mathematics teaches how to use abstract language, work with algorithms, self-analyze computational thinking, and accurately model real-world solutions.	Participants develop innovative solutions that leverage mathematics to help drive the architectural space for economic development.	1

S/n	Category	Description	Characteristics	Participants
6	**Robotics and Artificial Intelligent Innovations**	Robotics involves building robots whereas AI involves programming intelligence. AI helps serve motions a robotic system makes. for automation.	Participants are expected to design and build systems to assist with improving tasks and focus on AI to optimize application processes	1
7	**Medicine and Health Innovations**	It focuses on studies designed to address human health and disease (*diagnosis, treatment, repair, maintain and epidemiology of disease and other damage to the human body or mental systems*).	Participants are expected to develop non-conventional innovative solutions to address healthcare challenges in Zambia .	1
8	**Food Science, Technology and Hospitality Innovations**	Food technology involves research and development of products through selection, preservation, processing, packaging and safe distribution.	Participants are expected to develop new and innovative food products and processes that are unique to Zambia's culinary traditions and resources	1
9	**Environmental Sustainable Development Innovations**	It involves controlling human impact on and interaction with the environment in order to preserve natural resources.	Participants are assigned to devise inventive, practical, and scalable solutions to environmental challenges for sustainable lifestyles.	1
10	**Quiz and Olympiads** *((Mathematics, Science, CTS))* *Note: Same participants for both quiz and Olympiads*	Quiz is competitive academic game having curriculum-based questions needing maximum 45 seconds to answer; encouraging preparation and research. Olympiads are examinations based on problem solving taken by an individual candidate within 3 hours.	Quiz questions are from Science, Mathematics and General Knowledge (based on mentioned learning areas). Olympiad questions are slightly higher than the level of the candidate and are challenging enough.	3 *(Mathematics 1, Science, 1, CTS 1)*

Secondary Categories: For participants in Grade/form 8/1 & 9/2 only				
S/n	**Category**	**Description**	**Characteristics**	**Participants**
1	**Agricultural Science Innovations**	Agricultural Science concerns itself with the application of science to agriculture. It includes the practice of all kinds of farming and technologies involved.	Participants are expected to develop and showcase new or improved strategies and innovations for improving productivity and address challenges of climate change.	1
2	**Chemistry Innovations**	Chemistry involves studying the structure of atoms, combinations, and interactions with each other. It helps young ones develop a fundamental understanding of the world around them.	Expected traits include curiosity, observational skills, critical thinking, inquisitiveness, creativity, teamwork, safety consciousness, for product designs and creation	1
3	**Physics and Renewable Energy Innovations**	This category involves presenting innovations in Integrated Science as one whole area of knowledge while still maintaining the science processes.	Participants are expected to develop innovative solutions for utilizing the abundant energy for sustainable development	1
4	**Computer Sciences and Software Development Innovations**	Computer Science entails computational systems and information technology, comprising theory, design, development, and application of these systems	Participants are expected to develop innovative solutions that leverage computer science for economic development	1
5	**Mathematics Innovations**	Mathematics teaches how to use abstract language, work with algorithms, self-analyze computational thinking, and accurately model real-world solutions.	Participants develop innovative solutions that leverage mathematics to help drive the architectural space for economic development.	1

S/n	Category	Description	Characteristics	Participants
6	**Robotics and Artificial Intelligent Innovations**	Robotics involves building robots whereas AI involves programming intelligence. AI helps serve motions a robotic system makes. for automation.	Participants are expected to design and build systems to assist with improving tasks and focus on AI to optimize application processes	1
7	**Medicine and Health Innovations**	It focuses on studies designed to address human health and disease (*diagnosis, treatment, repair, maintain and epidemiology of disease and other damage to the human body or mental systems*).	Participants are expected to develop non-conventional innovative solutions to address healthcare challenges in Zambia .	1
8	**Food Science, Technology and Hospitality Innovations**	Food technology involves research and development of products through selection, preservation, processing, packaging and safe distribution.	Participants are expected to develop new and innovative food products and processes that are unique to Zambia's culinary traditions and resources	1
9	**Environmental Sustainable Development Innovations**	It involves controlling human impact on and interaction with the environment in order to preserve natural resources.	Participants are assigned to devise inventive, practical, and scalable solutions to environmental challenges for sustainable lifestyles.	1
10	**Quiz and Olympiads** *(Mathematics and Science)* *Note: Same participants for both quiz and Olympiads*	Quiz is competitive academic game having curriculum-based questions needing maximum 45 seconds to answer; encouraging preparation and research. Olympiads are examinations based on problem solving taken by an individual candidate within 3 hours.	Quiz questions are from Science, Mathematics and General Knowledge (based on mentioned learning areas). Olympiad questions are slightly higher than the level of the candidate and are challenging enough.	2 *(Mathematics 1, Science, 1)*

Secondary Categories: For participants in Grade 10 - 12 only				
S/n	**Category**	**Description**	**Characteristics**	**Participants**
1	**Agricultural Science Innovations**	Agricultural Science concerns itself with the application of science to agriculture. It includes the practice of all kinds of farming and technologies involved.	Participants are expected to develop and showcase new or improved strategies and innovations for improving productivity and address challenges of climate change.	1
2	**Chemistry Innovations**	Chemistry involves studying the structure of atoms, combinations, and interactions with each other. It helps young ones develop a fundamental understanding of the world around them.	Expected traits include curiosity, observational skills, critical thinking, inquisitiveness, creativity, teamwork, safety consciousness, for product designs and creation	1
3	**Physics and Renewable Energy Innovations**	This category involves presenting innovations in Integrated Science as one whole area of knowledge while still maintaining the science processes.	Participants are expected to develop innovative solutions for utilizing the abundant energy for sustainable development	1
4	**Computer Sciences and Software Development Innovations**	Computer Science entails computational systems and information technology, comprising theory, design, development, and application of these systems	Participants are expected to develop innovative solutions that leverage computer science for economic development	1
5	**Mathematics Innovations**	Mathematics teaches how to use abstract language, work with algorithms, self-analyze computational thinking, and accurately model real-world solutions.	Participants develop innovative solutions that leverage mathematics to help drive the architectural space for economic development.	1

S/n	Category	Description	Characteristics	Participants
6	**Robotics and Artificial Intelligent Innovations**	Robotics involves building robots whereas AI involves programming intelligence. AI helps serve motions a robotic system makes. for automation.	Participants are expected to design and build systems to assist with improving tasks and focus on AI to optimize application processes	1
7	**Medicine and Health Innovations**	It focuses on studies designed to address human health and disease (*diagnosis, treatment, repair, maintain and epidemiology of disease and other damage to the human body or mental systems*).	Participants are expected to develop non-conventional innovative solutions to address healthcare challenges in Zambia .	1
8	**Food Science, Technology and Hospitality Innovations**	Food technology involves research and development of products through selection, preservation, processing, packaging and safe distribution.	Participants are expected to develop new and innovative food products and processes that are unique to Zambia's culinary traditions and resources	1
9	**Environmental Sustainable Development Innovations**	It involves controlling human impact on and interaction with the environment in order to preserve natural resources.	Participants are assigned to devise inventive, practical, and scalable solutions to environmental challenges for sustainable lifestyles.	1
10	**Quiz and Olympiads** *(Biology & Chemistry and Mathematics & Physics)* *Note: Same participants for both quiz and Olympiads*	Quiz is competitive academic game having curriculum-based questions needing maximum 45 seconds to answer; encouraging preparation and research. Olympiads are examinations based on problem solving taken by an individual candidate within 3 hours.	Quiz questions are from Science, Mathematics and General Knowledge (based on mentioned learning areas). Olympiad questions are slightly higher than the level of the candidate and are challenging enough.	2

Open Categories: For Out-of-school youth/College Students				
S/n	**Category**	**Description**	**Characteristics**	**Participants**
1	**Agricultural Science Innovations**	Agricultural Science concerns itself with the application of science to agriculture. It includes the practice of all kinds of farming and technologies involved.	Participants are expected to develop and showcase new or improved strategies and innovations for improving productivity and address challenges of climate change.	1
2	**Chemistry Innovations**	Chemistry involves studying the structure of atoms, combinations, and interactions with each other. It helps young ones develop a fundamental understanding of the world around them.	Expected traits include curiosity, observational skills, critical thinking, inquisitiveness, creativity, teamwork, safety consciousness, for product designs and creation	1
3	**Physics and Renewable Energy Innovations**	This category involves presenting innovations in Integrated Science as one whole area of knowledge while still maintaining the science processes.	Participants are expected to develop innovative solutions for utilizing the abundant energy for sustainable development	1
4	**Computer Sciences and Software Development Innovations**	Computer Science entails computational systems and information technology, comprising theory, design, development, and application of these systems	Participants are expected to develop innovative solutions that leverage computer science for economic development	1
5	**Mathematics Innovations**	Mathematics teaches how to use abstract language, work with algorithms, self-analyze computational thinking, and accurately model real-world solutions.	Participants develop innovative solutions that leverage mathematics to help drive the architectural space for economic development.	1

S/n	Category	Description	Characteristics	Participants
6	**Robotics and Artificial Intelligent Innovations**	Robotics involves building robots whereas AI involves programming intelligence. AI helps serve motions a robotic system makes. for automation.	Participants are expected to design and build systems to assist with improving tasks and focus on AI to optimize application processes	1
7	**Medicine and Health Innovations**	It focuses on studies designed to address human health and disease (*diagnosis, treatment, repair, maintain and epidemiology of disease and other damage to the human body or mental systems*).	Participants are expected to develop non-conventional innovative solutions to address healthcare challenges in Zambia .	1
8	**Food Science, Technology and Hospitality Innovations**	Food technology involves research and development of products through selection, preservation, processing, packaging and safe distribution.	Participants are expected to develop new and innovative food products and processes that are unique to Zambia's culinary traditions and resources	1
9	**Environmental Sustainable Development Innovations**	It involves controlling human impact on and interaction with the environment in order to preserve natural resources.	Participants are assigned to devise inventive, practical, and scalable solutions to environmental challenges for sustainable lifestyles.	1

Teachers' Categories				
S/n	**Category**	**Description**	**Characteristics**	**Participants**
1	**Agricultural Science Innovations**	Agricultural Science concerns itself with the application of science to agriculture. It includes the practice of all kinds of farming and technologies involved.	Participants are expected to develop and showcase new or improved strategies and innovations for improving productivity and address challenges of climate change.	1
2	**Chemistry Innovations**	Chemistry involves studying the structure of atoms, combinations, and interactions with each other. It helps young ones develop a fundamental understanding of the world around them.	Expected traits include curiosity, observational skills, critical thinking, inquisitiveness, creativity, teamwork, safety consciousness, for product designs and creation	1
3	**Physics and Renewable Energy Innovations**	This category involves presenting innovations in Integrated Science as one whole area of knowledge while still maintaining the science processes.	Participants are expected to develop innovative solutions for utilizing the abundant energy for sustainable development	1
4	**Computer Sciences and Software Development Innovations**	Computer Science entails computational systems and information technology, comprising theory, design, development, and application of these systems	Participants are expected to develop innovative solutions that leverage computer science for economic development	1
5	**Mathematics Innovations**	Mathematics teaches how to use abstract language, work with algorithms, self-analyze computational thinking, and accurately model real-world solutions.	Participants develop innovative solutions that leverage mathematics to help drive the architectural space for economic development.	1

S/n	Category	Description	Characteristics	Participants
6	**Robotics and Artificial Intelligent Innovations**	Robotics involves building robots whereas AI involves programming intelligence. AI helps serve motions a robotic system makes. for automation.	Participants are expected to design and build systems to assist with improving tasks and focus on AI to optimize application processes	1
7	**Medicine and Health Innovations**	It focuses on studies designed to address human health and disease (*diagnosis, treatment, repair, maintain and epidemiology of disease and other damage to the human body or mental systems*).	Participants are expected to develop non-conventional innovative solutions to address healthcare challenges in Zambia .	1
8	**Food Science, Technology and Hospitality Innovations**	Food technology involves research and development of products through selection, preservation, processing, packaging and safe distribution.	Participants are expected to develop new and innovative food products and processes that are unique to Zambia's culinary traditions and resources	1
9	**Environmental Sustainable Development Innovations**	It involves controlling human impact on and interaction with the environment in order to preserve natural resources.	Participants are assigned to devise inventive, practical, and scalable solutions to environmental challenges for sustainable lifestyles.	1

Skills Categories: Strictly for Junior and Senior Secondary school participants				
S/n	**Category**	**Description**	**Characteristics**	**Participants**
1	**Civil Engineering** *(Wall & Floor Tiling, Landscape & Gardening, Bricklaying and plastering)*	Engineering dealing with design, construction and maintenance of structures like roads, bridges, dams, airports	Participants are expected to design, construct and test any assigned structure (s) for specific purpose.	4
2	**Mechanical Engineering** (*Welding, Carpentry & Joinery, Electrical installations, panel beating and stray painting)*	Engineering concerned with designing, producing and operating machinery for sustainability and economic development.	Participants are expected to design, create, produce and operate an environmentally friendly auto mobile.	4
3	**Electronics Services**	It encompass a broad range of goods and services that utilize electronic technology to enhance communication, entertainment, productivity, and various aspects of daily life.	Participants are expected to engage in repair and maintenance, design and creation of wearable and hand held devices including medical devices and control systems.	2
4	**Fashion Technology**	A rapidly evolving intersection of fashion and technology and ways clothing and linen are designed, produced, marketed, and consumed.	Participants are expected to design, create and produce clothing and linen for entrepreneurship.	1
5	**Cosmetology**	It encompasses a range of beauty and grooming services (hairstyling, skincare, nail care, and makeup application).	Participants are expected to showcase their prowess and expertise in the beauty industry.	1
Total number of participants per region				64

N.B : **Changes to application of guidelines may vary from competition to competition as shall be announced by the Organizers.**

5.0 Coordination and Implementation Structure

The JETS activities and Fairs will be implemented at School, District, Regional and National levels as indicated in the Table 3.

Level	Coordination/ Implementing Structure	Roles and Functions
Primary School	**School Coordinating Committee** • The Deputy Head (Chair) • Senior Teacher • SIC • School JETS Organiser	* Stimulate creative and scientific instincts in learners * Direct and guide learners through the stages of a scientific process * Arrange for visits to factories, research institutions, farms etc. for learners to carry out their research * Arrange for talks by professionals in SMT fields, * Organise essay competitions on scientific and technological themes * Arrange inter class / school quiz competitions * Liaise with the zonal organising committee on the organisation of the zonal fairs
Secondary School	**School Coordinating Committee** • The Deputy Head (Chair) • HoD/HoS (NS) • HoD/HoS (M) • HoD/HoS (Practical Subjects) • School JETS Organiser	* Stimulate creative and scientific instincts in learners * Direct and guide learners through the stages of a scientific process * Arrange for visits to factories, research institutions, farms etc. for learners to carry out their research * Arrange for talks by professionals in SMT fields, * Organise essay competitions on scientific and technological themes * Arrange inter class / school quiz competitions * Liaise with the zonal organising committee on the organisation of the zonal fairs

Level	Coordination/ Implementing Structure	Roles and Functions
Zone	**Zonal Coordinating Committee** • The Zonal Deputy Head (Chair) • Zonal JETS Coordinator • 1 Representative from Subject Associations • Zonal INSET Coordinator • 1 HOS at Primary school • 1 HOD at Secondary school	∗ Organise schools to take keen interest in Science, Mathematics and Technology activities in the zone, ∗ Organise zonal fairs to select representatives for the district fair ∗ Responsible for inviting members of the public and educational leaders to the zonal fair ∗ Liaise with the district organising committee on the organisation of the district fairs
College	**College Coordinating Committee** • Vice Principal (Chair), • HoS (NS) • HoS (M) • HoS (Technology) • JETS Coordinator	∗ Organise College students to take keen interest in Science, Mathematics and Technology activities in the college, ∗ Organise College fair to select representatives for the district fair ∗ Responsible for inviting members of the public and educational leaders to the College fair ∗ Liaise with the district organising committee on the organisation of the district fairs
District	**District Coordinating Committee** • District Education Standards Officer (Chair), • Education Standards Officer- General Inspections/ODL, • District JETS Organiser • District JETS Secretary • College JETS Coordinator • DRCC • Rep - Heads Association • Rep - Subject Associations (Rotational)	∗ Organise schools and colleges to take keen interest in Science, Math and Technology activities in the district, ∗ Organise district fairs to select representatives for the regional fair ∗ Responsible for inviting members of the public and educational leaders to the district fair ∗ Lead winners of the district to the Regional Fair ∗ Liaise with the regional committee on the organising of district science fairs

Level	Coordination/Implementing Structure	Roles and Functions
Provincial	**Provincial Coordinating Committee** • Principal Education Standard Officer (Chair), • Provincial SMT Coordinator, • Senior Education Standards Officer - NS, • Senior Education Standards Officer- Math, • Senior Education Standards Officer - PS, • Education Officer- TE • Regional JETS Organiser • Rep - Vice Principal • Rep - Heads (Primary) • Rep - Heads (Secondary) • Rep - Subject Associations (Rotational)	∗ Organise schools and colleges to take keen interest in Science, Math and Technology activities, ∗ Organise regional fairs to select representatives for the national fair ∗ Lead winners of the region to the National Fair ∗ Liaise with NSC on organising of science fairs ∗ Responsible for inviting members of the public and educational leaders to the regional fair
National	**National Coordinating Committee** • Director (Chair) • Assistant Director – R & I • Assistant Director– T & CS • Assistant Director - P & M • Senior JETS Officer (Secretariat) • Senior Research & Innovation Officer, • Senior SMT Education & Training Officer, • Senior Product Development and Improvement Officer • JETS Officer (Secretariat) • Dean - PESOs • Dean - Vice Principals (Colleges)	∗ Make policy decisions, ∗ Approve work programs, ∗ Monitor, evaluate and review activities, ∗ Organise the annual National Fair, ∗ Source for funds, ∗ Supervise the regions ∗ In-charge of the day-to-day execution and management of the JETS programs and activities (Secretariat) ∗ Prepare the program of activities for each year (Secretariat) ∗ Liaise with the Regional Organisers (Secretariat) ∗ Prepare annual report for all JETS activities (Secretariat)

6.0 Sub-Themes for Categories

a) The sub-theme for the Agricultural Science category is "***Innovative Solutions for Sustainable Agriculture in a Changing Climate***." This theme will focus on encouraging participants to develop and showcase new or improved strategies and innovations for improving agricultural productivity, while also addressing the challenges posed by climate change. Areas of interest may include:

- Developing of products that are resilient to Zambia's changing climate such as drought-resistant crops that require less water.
- Promoting sustainable agricultural practices, such as conservation tillage, crop rotation, and inter-cropping, that can help improve soil health and reduce reliance on artificial fertilizers.
- Creating innovative solutions for improving access to weather and climate information, such as mobile apps, SMS alerts, or other digital tools that can help farmers make informed decisions about planting, irrigation, and other agricultural practices.
- Designing new technologies that can help small-scale farmers increase their productivity and income, such as low-cost irrigation systems, solar-powered drying machines, or improved seed storage methods

b) The "***Chemistry for Sustainable Solutions***" sub-theme invites participants from different educational levels. This sub-theme encourages individuals to harness the power of chemistry to develop innovative, human-centered solutions addressing the pressing challenges faced by their communities.

This theme will focus on encouraging participants to:

- Promote Chemistry Innovation by exploring the diverse applications of chemistry in addressing real-world challenges,
- Foster sustainable development and long-term solutions for Zambia's major problems by emphasizing the role of chemistry.

The participants will be invited to develop projects that showcase the application of chemistry in creating sustainable solutions. Projects can range from environmentally friendly chemical processes to novel materials with positive societal impacts.

c) The sub-theme for Physics & Renewable Energy category is ***"Solar Energy Innovative Solutions"***. This theme will focus on encouraging participants to develop innovative solutions for utilizing the abundant energy in Zambia to address the country's energy needs and promote sustainable development. Some potential areas of focus for the competition will include

- Designing and building solar-powered systems for off-grid communities, such as solar water pumps, solar home lighting systems, or solar-powered refrigeration units for storing vaccines and medicines
- Developing new technologies for large-scale solar power generation, such as concentrating solar power systems, floating solar arrays, or solar-powered desalination plants
- Creating innovative solutions for energy storage, such as battery technologies, flywheels, or thermal energy storage systems.

Designing and implementing energy efficiency measures, such as efficient lighting systems, building insulation, or smart energy management systems, to reduce energy consumption and promote sustainable development.

d) The sub-theme for Computer Science and Software Development Category is ***"Innovative Solutions for Digital Transformation"***. This theme will focus on encouraging participants to develop innovative solutions that leverage computer science to help drive digital transformation and promote economic development in Zambia. Possible areas of emphasis for the competition will include:

- Developing new software applications that can help address key challenges facing Zambia, such as improving access to healthcare, education, or financial services.
- Creating innovative solutions for data analytics and visualization, such as machine learning algorithms, data mining techniques, or interactive dashboards that can help decision-makers better understand complex data sets.
- Designing and implementing secure and resilient information systems, such as block chain-based solutions, that can help protect sensitive information and improve cybersecurity.
- Developing new approaches for promoting digital literacy and technology skills development, such as online learning platforms or coding boot camps, that can help build a more skilled and diverse workforce in Zambia

e) The sub-theme for Mathematics Category is ***"Innovative Solutions through Mathematical Modelling"***. This theme could focus on encouraging participants to develop innovative solutions that leverage mathematics to help drive the architectural space for economic development in Zambia. Focus may be on:

- Developing new insights in finding solutions to mathematical process using software applications that can help address key challenges facing Zambia, such as improving access to healthcare, education, or financial services.
- Creating innovative solutions for data analytics and visualization, such as machine learning algorithms, data mining techniques.

f) The sub-theme for Robotics and Artificial Intelligent Innovations is ***"Robotic Solutions for Sustainable Applications in Zambia"***. The competition will challenge participants to design and build robotic systems that can assist with improving tasks. This theme will be particularly relevant for Zambia, by increasing efficiency, reducing labour costs, and improving productivity. The competition will also focus on using artificial intelligence (AI) to optimize application processes. AI could also be used to analyze data collected by the robotic systems, providing valuable insights.

g) The sub-theme for this Medicine and Health Innovations is ***"Integrating indigenous medicines for Improved Healthcare in Zambia"***. In this category, the competition will challenge participants to develop non-conventional innovative solutions to address healthcare challenges in Zambia. Indigenous medicine has been used for centuries in Zambia and is often the primary form of healthcare for many people, particularly in rural areas. The focus will be on a range of healthcare issues in Zambia, such as infectious diseases, maternal and child health, and non-communicable diseases. Participants could be tasked with developing new diagnostic tools, treatment protocols, or preventive interventions that use indigenous medicine. Furthermore, the competition will encourage the use of modern technologies, such as mobile health (mHealth) and telemedicine, to support indigenous medicine. For example, participants could develop mHealth apps that provide information about indigenous medicines and their uses, or telemedicine platforms that enable indigenous healers to work collaborativelyy

h) The sub-theme for the Food Science, Technology and Hospitality Innovations is ***"Innovative solutions for value addition"***. This competition will focus on innovative ways to utilize Zambia's abundance of traditional and Western dishes, from the sourcing and cultivation of ingredients to the preparation and presentation of dishes. Participants will be judged on their use of local ingredients, sustainability practices, and creativity in developing new and exciting dishes. Participants will also be challenged to develop new and innovative food products and processes that are unique to Zambia's culinary traditions and resources. Participants will also be judged on the feasibility and scalability of their innovations, as well as their potential to enhance the country's food industry and contribute to economic growth .

i) The sub-theme for Environmental Sustainable Development Innovations is ***"Green Innovations for a Sustainable Future"***. The competition will invite participants to submit proposals for innovative, practical, and scalable solutions to environmental challenges in Zambia, with a particular focus on managing waste, conserving natural resources, and promoting sustainable lifestyles. The proposals will be judged on a range of criteria, including their potential impact on the environment, their feasibility and cost-effectiveness, their potential for replication and scalability, and their creativity and originality.

j) The sub-theme for Academics - *Quizzes and Olympiads* is ***"Exploring the Future of Zambia through Sustainable Solutions: Challenges and Opportunities in Science, Technology, Engineering, and Mathematics (STEM)"***.

j) The sub-theme under the skills categories is ***"Sustainable and Marketable Designs"***. This competition will enable participants to design and construct sustainable artefacts, items, landscaping, installations that incorporate environmentally friendly materials and energy-efficient technologies. Participants will be judged on their ability to balance aesthetics and functionality with sustainability, as well as their understanding of local building codes, artistic work and regulations as well as their creativity, functionality, and ability to address local needs and challenges .

k) **Academics** - *Quizzes and Olympiads (Primary, Junior Secondary and Senior Secondary)*

The sub-theme is ***"Exploring the Future of Zambia through Sustainable Solutions: Challenges and Opportunities in Science, Technology, Engineering, and Mathematics (STEM)"***.

The participants for the quiz will be required to write Olympiad tasks too. Biology and Chemistry shall be written by one (1) participant, Physics and Mathematics one (1) participant, making two (2) participants for Junior and Senior Quiz and Olympiads categories.

For Primary Quiz and Olympiads, there shall be three (3) participants, and each will write one of the three Olympiads in Mathematics, Science and Creative and Technology Studies.

l) **Skills Categories** – *(Civil Engineering, Mechanical Engineering, Electronics Services, Fashion Technology, Cosmetology)*

Skills create opportunities and connect societies. They are the foundation of economic progress. A skill is the learned ability to act with determined results with good execution often within a given amount of time, energy, or both. The sub-theme under the skills categories is ***"Skills for Sustainable Development"***. This competition will enable participants to design and construct sustainable civil, mechanical, electrical and electronics services, and artfacts that incorporate environmentally friendly materials and energy-efficient technologies. Participants will be judged on their ability to balance aesthetics and functionality with sustainability, as well as their understanding of local building codes, artistic work and regulations as well as their creativity, functionality, and ability to address local needs and challenges.

Civil Engineering *(Wall & Floor Tiling, Landscape & Gardening, Bricklaying and plastering)*

In Zambia, where practical applications by citizens often fall short of expectations, participants in Civil Engineering competitions are strongly encouraged to delve into the technical intricacies of Wall & Floor Tiling, Landscape & Gardening, Bricklaying, and Plastering. These specific categories provide a platform for individuals to showcase their skills in real-world applications, reflecting the demands of actual projects such as road construction, drainage design, and the construction of high-rise structures. Participants are challenged to demonstrate not only creativity but also technical proficiency in tasks requiring precise tiling techniques, innovative landscaping designs, meticulous bricklaying methods, and careful plastering applications. The ultimate goal is to inspire participants to contribute significantly to the improvement and advancement of practical Civil Engineering practices in Zambia, addressing the specific challenges faced in projects involving road construction, drainage systems, and high-rise structures. Benefits arising from this category include but not limited to the following:

i) Skilled Workforce Development

ii) Infrastructure Enhancement

iii) Increased Employment Opportunities

iv) Innovation and Economic Growth

v) Community Development and Sustainability

Mechanical Engineering *(Design & Construction of Auto machines: Welding, Carpentry & Joinery, Electrical installations, panel beating and stray painting)*

Establishing guidelines and criteria that accentuate authentic innovativeness aims to motivate participants in the Junior Engineers, Technicians & Scientists (JETS) competitions, with a specific focus on Mechanical Engineering. The designated areas of emphasis include the Design and construction of Auto machines, Welding, Carpentry and joinery, Electrical Installations, Panel Beating, and Spray Painting. The provided suggestions are presented to foster creativity and excellence within the category.

Originality and Creativity

Encourage participants to think without a box and come up with original ideas for their projects. Highlight the importance of incorporating creative solutions that set their projects apart from conventional designs; such as:

i) Problem-Solving Approach

ii) Integration of Multiple Disciplines

iii) Efficiency and Sustainability

iv) User-Friendly Design

v) Technological Integration

vi) Safety Measures

By focusing on these criteria participants would be encouraged to showcase true innovativeness in their projects, fostering a spirit of creativity, problem-solving, and forward-thinking within the Mechanical Engineering category of the JETS competitions.

Electronics Services

Electronic services encompass a broad range of goods and services that utilize electronic technology to enhance communication, entertainment, productivity, and various aspects of daily life. This industry is characterized by rapid innovation, constant evolution, and a diverse array of products and services. Here's an overview of key categories within electronics:

i) *Wearable Technology*

ii) *Communication Technology* (Networking, Telecomm Services)

iii) *Industrial and Professional Electronics (*Medical Devices, Industrial Automation, Professional Audio and Video Equipment)

iv) Repair and Maintenance Services

v) Services for fixing and maintaining electronic devices as well as assistance for troubleshooting and problem-solving.

The electronics industry continues to advance with emerging technologies like 5G, artificial intelligence, and the Internet of Things (IoT). The integration of smart technologies and the focus on sustainability are shaping the future of electronics products and services that JETS is promoting. As consumer demands evolve, the industry ought to respond with JETS innovative solutions to meet the needs of a connected and tech-savvy world.

Fashion Technology

Fashion technology, often referred to as "Fashtech," is a rapidly evolving intersection of fashion and technology that is transforming the way clothing and soft furnishing (linen) are designed, produced, marketed, and consumed. This innovative field leverages technological advancements to enhance various aspects of the fashion industry, from design and manufacturing to retail and consumer experience.

Key aspects of fashion technology and its impact on the industry:

i) Design and Innovation

Fashion designers use 3D printing technology to create intricate and customized designs. This not only accelerates the prototyping process but also allows for the production of unique and complex patterns. Therefore, JETS designers could employ advanced software and virtual reality tools to conceptualize and visualize their creations. This enhances efficiency in the design process and allows for more experimentation.

ii) Sustainable Practices

Technological advancements have led to the development of smart fabrics with embedded sensors and electronics. These fabrics can monitor body temperature, provide health-related data, or even change colour based on environmental factors, contributing to sustainable and functional fashion. Our participants in JETS are encouraged to research, design and develop customer-specific fabrics.

iii) Manufacturing and Production

Robotics and automation are increasingly being integrated into clothing manufacturing processes, leading to improved precision, efficiency, and reduced labour costs.

JETS participation is poised to evolve fashion technology among the learners and the youth, influencing trends and reshaping traditional practices within the industry. As technology advances further, the fashion landscape is likely to witness even more transformative innovations, ranging from sustainable practices to enhanced consumer engagement.

Cosmetology

Cosmetology plays a vital role in Zambia's economy, contributing significantly to both employment opportunities and the overall wellness of its citizens. Cosmetology encompasses a range of beauty and grooming services, including but not limited to:

i) hairstyling
ii) skincare
iii) nail care
iv) makeup application.

One of the primary contributions of cosmetology to Zambia's economy is through job creation. The beauty industry employs a diverse workforce, including hairstylists, aestheticians, makeup artists, and nail technicians. Many individuals, particularly women, find meaningful employment and entrepreneurship opportunities within the cosmetology sector. This, in turn, helps alleviate unemployment rates and fosters economic empowerment. Cosmetology is a significant contributor to Zambia's economy, providing employment opportunities, driving consumer spending, and fostering individual well-being. JETS would want to contribute to the industry by promoting the participation of individuals across the country. The beauty industry's multifaceted impact highlights its importance in the overall economic and social development of the country.

7.0 Adjudication

Adjudication is the process of acting as a judge in a contest, competition, court or tribunal according to laid down criteria acceptable to the contestants. In the contests at the JETS fairs, adjudication is the process of making and giving a decision on who should get the prize in a particular category.

What is Required of Adjudicators

Adjudication criteria on the adjudication sheets are based on the following:

i) Written Innovation report and its quality

ii) Knowledge, content and ability

iii) Oral Presentation

iv) Presentation (layout)

v) Research work involved

vi) Educational value of innovation

vii) Relevance and importance

Conduct of Adjudicators

Adjudicators are expected to conduct both themselves and the proceedings in a judicial manner. To this end, adjudicators should,

i) approach every exhibitor with an open mind with respect to every innovation and avoid comments or conduct that could cause presenter to think otherwise;
ii) listen carefully and respectfully to the views and submissions of the presenter and; and
iii) show respect for the presenter and for the proceeding process itself, through their conduct, timeliness, and dress throughout the adjudication process.

Impartiality:

An adjudicator must always maintain impartiality during the adjudication process towards the exhibitors involved in the competition. Impartiality means freedom from favoritism or bias in word or action towards an exhibitor. Furthermore, an adjudicator is not to play an adversarial role and must maintain an even-handed approach towards all exhibitors involved. An adjudicator should not become an adviser to any of them.

Neutrality:

If the adjudicator believes that his/her background or personal experiences or relationships would prejudice the adjudicator's role or detract from his/her impartiality, the adjudicator must withdraw from the adjudication, unless the Chief Adjudicator agree to proceed after full disclosure of all relevant facts relating to the issue of neutrality.

Objectivity:

In considering the submissions, accompanying supporting documents, information and comments of the exhibitor, an adjudicator must be objective. This entails the Adjudicator being free from subjective personal feelings, including notions of justice and fairness.

An adjudicator's decision must disclose proper analysis, objectivity and regard only to those limited matters referred in the Adjudication sheet.

Conscientiousness and Diligence:

An adjudicator should carry out his/her task in a diligent manner in order to do what is right at any particular time. All adjudicators in a category are bound by the same criteria to avoid disagreements. The role of a judge is not only to evaluate the merit of the innovations, but also to provide helpful, constructive feedback as an expert in the field.

Notes

JETS OF ZAMBIA
Adjudication Sheet

Part A: To be filled in by the exhibitor

Region | Category

Name of Candidate | Grade | Age | Sex

Name and address of School or Institution (Where applicable)

Theme:

Title of the Innovation:

Part B: For official use by adjudicator

	Criteria	Aspect Considered	Description	Total attainable marks	Marks scored	Comments
1	**Research Report (30%)**	Title	Availability	2		
		Table of contents	Availability of table of content	1		
			Sequencing	1		
		Abstract	The purpose of the study is clearly stated	1		
			Research gap defined	1		
			Word count between 100-250 words	1		
		Introduction	Background information provided	1		
			Problem statement stated	1		
		Research objectives/questions/ Hypotheses	Availability of research question(s) or objective(s)	1		
			Testable research question(s) or objective(s)/hypothesis	1		
		Problem statement	Availability of the problem statement	1		
			Clarity of the problem statement	1		
		Literature review	Availability	1		
			A clear indication of the research gap	1		
		Methodology	Availability of methodology	1		
			Mention on how the research was being done	1		
		Results/ Findings	Availability of results /findings	1		
			Presentation of results/findings	1		
		Discussions	Availability of discussions on findings	1		
			An attempt to explain the findings	1		
		Recommendations	Availability of recommendations	1		
			Appropriate suggestions made on the research	1		
		Conclusion	Availability of conclusion	1		
			The appropriate conclusion made on the research	1		
		References	Availability of reference	1		
			Traceable reference	1		
		Ideation	New knowledge	1		
			Improvement of existing knowledge	1		
		Scientific concepts involved	Availability of scientific concepts	1		
			Workability of concepts (theoretically)	1		
		Application of Scientific Concepts	Explanation of how the project operates	1		
	Subtotal			**32**		

Criteria		Aspect Considered	Description	Total attainable marks	Marks scored	Comments
2	**Defence (30%)**	Statement of the problem	Was there a problem to be addressed?	1		
		Scientific concepts	Ability to explain scientific concepts	1		
		Innovativeness	Uniqueness	1		
		Workability of the innovation	Ability to explain the innovation	1		
		Time management	Ability to present within the prescribed time	1		
		Response to questions	Ability to respond to questions	1		
		Assertiveness	Assertiveness	1		
	Subtotal			**07**		
3	**Product (40%)**	Nature of product	Novelty	1		
			Improved			
			Reverse engineered			
		Design	Use of appropriate materials	1		
			Functionality	1		
			Durability	1		
			Reliability	1		
			Performance/efficiency	1		
			Compatibility	1		
			Safety	1		
			Sustainability	1		
			Customizability	1		
			Environmental friendliness	1		
			Adaptability	1		
		Economic value	Suitability for commercialization	1		
		Scientific concepts	Application of concepts	1		
			Generation of concepts	1		
		Theme interpretation	None (0), fair (1), correctly (2)	0,1,2		
	Subtotal			**17**		

	Scientific Skills									
	Acquisitive	Comment	Organizational	Comment	Creative	Comment	Manipulative	Comment	Communicative	Comment
Report										
Defense										
Product										

Subtotal..... **15**

Grand total	**71**

Make any special comments and suggestions on any part of this innovation:

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Name of Adjudicator: ..... Signature: ..... Date: ……..

Designed and produced at the National Science Centre
by the National Coordinating Committee:

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