REPUBLIC OF TRINIDAD AND TOBAGO

MINISTRY OF EDUCATION

Secondary School Teacher's Guide

Integrated Science

Curriculum Development Division

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Part 1: Introduction

Introduction

The Integrated Science Teacher's Guide has been developed together with the Curriculum Document to provide support for the implementation of the curriculum as envisioned. All information and material provided can be used as provided or adapted to best suit the needs of the practitioners. All selected materials will support the development of concepts and skills required for solving problems in society and application to everyday life. They will also assist teachers to prepare students for relevant assessment tasks. Additionally, there is a focus on the infusion of Information and Communications Technology (ICT) into both teaching and assessment to transform learning experiences for the students to meet the technological advancements of society. The student activities suggested also promote opportunities for collaboration, sharing of responsibilities and making group decisions.

Rationale

The Teacher's Guide is meant to assist teachers with the implementation of the revised Lower Secondary Integrated Science Curriculum. It provides suggested teaching, learning and assessment strategies together with samples of lesson plans and suggested templates for preparation of schemes of work than can guide teachers in the implementation of the curriculum.

Included also, are examples of main strategies demonstrating real applications to classroom practice. Teachers are also provided with links to appropriate and relevant internet resources and software to enhance their pool of resources for effective curriculum implementation. Teachers are strongly advised to actively involve students in the learning process during implementation of the curriculum to encourage conceptual understanding.

Applicable Learning Theories and Principles

The following learning theories and principles can be considered for ongoing planning for implementation of the curriculum

1. **Active Learning: Learn by Doing**

Active learning is a set of strategies that allows the student to take an active role in his/her learning. Discovery learning, problem-based learning, experiential learning, and inquiry-based instruction are examples of active learning. Discussion, debate, student questioning, think-pair-share, quick-writes, polling, role playing, cooperative learning, group projects, and student presentations are a few of the many activities that are learner driven. It should be noted, however, that even lecture can be an active learning event if students processes and filter information as it is provided.

2. **Constructivism: Helping Students Build Their Understanding of Science**

Constructivism is particularly applicable to the teaching and learning of Science. Constructivism is a process in which students learn actively by constructing or building new ideas and concepts based upon prior knowledge and new information. The constructivist teacher is a facilitator who encourages students to discover principles and construct knowledge within a given framework or structure. In the most general sense, it usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and discuss what they are doing and how their understanding is changing. Activities are guided to incorporate students' pre-existing conceptions and then build on them.

3. **Teaching to Multiple Learning Modalities**

Students learn through any of the five senses but the three most valuable are vision, hearing, and touch. Research suggests that learners have a preference for one learning style over

another. Visual learners learn best by watching, while auditory learners learn best by verbal instruction and kinesthetic learners learn best by manipulation.

4. **Teaching to Multiple Intelligences**

Intelligence includes the capacities to reason, plan, solve problems, comprehend language and ideas, learn new concepts and think abstractly. The theory of multiple intelligences suggests that people learn better through certain modalities. The following list shows seven primary intelligences which can be considered when planning for teaching and assessment.

- Logical /Mathematical Intelligence is used when thinking conceptually, computing, looking for patterns and classifying.
- Linguistic/ Naturalist Intelligence is used to question, observe, investigate and experiment.
- Visual / Spatial Intelligence is used when learning with models, photographs, videos, diagrams, maps and charts.
- Bodily Kinesthetic Intelligence is used to process knowledge through bodily sensations, movements, physical activity (hands-on practical activities) and manipulation.
- Interpersonal Intelligence is used when learning through cooperative learning experiences, group games, group lab work and dialogue.
- Intrapersonal Intelligence is used when learning through self-dialogue, journals and reflections, studying and self-assessment.
- Musical Intelligence is used when learning through rhythm, melody and non-verbal sounds in the environment.

5. **Metacognition: Teaching Students to Think About Their Thinking**

Studies suggest that learning is maximized when students learn to think about their thinking and consciously employ strategies to maximize their reasoning and problem solving capabilities. A metacognitive thinker knows when and how he learns best and employs strategies to overcome

barriers to learning. As students learn to regulate and monitor their thought processes and understanding, they learn to adapt to new learning challenges.

Students as problem solvers, first seek to develop an understanding of problems by thinking in terms of core concepts and major principles. Teachers should prepare students to be flexible for new problems and settings.

6. Developing Higher Order Reasoning

As identified by Benjamin Bloom and his team of researchers, there are six basic levels of cognitive outcomes.

1. Knowledge - remembering or recognizing something previously encountered without necessarily understanding, using or changing it.
2. Comprehension - understanding the material being communicated without necessarily relating it to anything else.
3. Application - using general concept to solve a particular problem.
4. Analysis - breaking something down into parts.
5. Synthesis - creating something new by combining different ideas.
6. Evaluation - judging the value of materials or methods as they might be applied in a particular situation.

Bloom's taxonomy is hierarchical with knowledge, comprehension and application as fundamental levels and analysis, synthesis and evaluation as advanced. Higher order reasoning, refers to analysis, synthesis and/or evaluation.

Five basic objectives in the affective domain are:

1. Receiving - being aware of or attending to something in the environment.
2. Responding - showing some new behaviour as a result of experience.
3. Valuing - showing some definite involvement or commitment.
4. Organization - integrating a new value into one's general set of values, giving it some ranking among one's general priorities.

5. Characterization by value - acting consistently with the new value.

Six basic objectives in the psychomotor domain:

1. Reflex movements - actions that occur involuntarily in response to some stimulus.
2. Basic fundamental movements - innate movement patterns formed from a combination of reflex movements.
3. Perceptual abilities - translation of stimuli received through the senses into appropriate movements.
4. Physical abilities - basic movements and abilities essential to the development of more highly skilled movements.
5. Skilled movements - more complex movements requiring a certain degree of efficiency.
6. Non-discursive movements - ability to communicate through body movement.

7. Differentiated Instruction

In differentiated instruction, students are provided with several learning options or different paths to learning which help students take in information and make sense of concepts and skills. Teachers also consider appropriate levels of challenge for all students, including those who lag behind, those who are advanced and those in the middle.

Four Ways to Differentiate Instruction:

1. Content/Topic: what we teach and what we want students to learn.

2. Process/Activities: opportunities for students to process the content, ideas and skills to which they have been introduced.

3. Product: ways of assessing students' knowledge, understanding and skill.

4. Manipulating the Environment to Accommodate Individual Learning Styles.

Framework for Topics for Integrated Science Curriculum

Form 1	Form 2	Form 3
• Science and Scientific Processes • Scientific Measurement and International System (SI) of units 💻 • Safety in Science • Characteristics of Living Things • Classify Life According to Cellular Structure • Levels of Organization in Living Things 💻 • Processes in cellular structures • Properties of Matter • Atoms, Elements and Compounds 💻 • Compounds and Mixtures • Forces • Energy transformations	• Diet and Health 💻 • Human Body Systems: The Circulatory System • Human Body Systems: Respiratory System • Physical and Chemical Processes 💻 • Separating Mixtures 💻 • Motion • Thermal Energy • Energy in Ecosystems	• Human Body Systems: The Reproductive System • Communicable Diseases of the Reproductive System • Environmental Impact of Human Activities 💻 • Electricity • Magnetism • Light 💻 • Chemical Bonding • Acids and Alkalis 💻

💻 - Online resources provided on pages 57 and 58.

PART 2:

Teaching and Learning Strategies

Teaching and Learning Strategies

Introduction

Science provides an abundance of opportunities for teachers to explore a range of appropriate teaching strategies to meet the needs of the learners. These include inquiry-based, project –based and problem-based approaches, scientific report writing, researching and the use of Information and Communications Technology (ICT). These should allow students to be engaged in fun and authentic tasks that allow them to understand and use fundamental scientific concepts. The strategies can be modified to the individual needs and characteristics of learners.

Planning for instruction

Strategies for implementation

Below is a list of suggested teaching strategies that are appropriate for learning in the 21st century. Teachers are requested to use all appropriate teaching strategies in their teaching according to the:

- Learning outcomes being taught (see the Science Curriculum Guide)
- Needs and learning styles of the students

Such strategies facilitate the modelling of skills necessary for learners to be creative, innovative, critically assess and problem solve in order to satisfy the workforce demands in a competitive, knowledge-based global economy.

Suggested Teaching Strategies

- Demonstrations
- Drill and practice
- Lecture
- Questioning technique
- Circus/workstations
- Conducting experiments
- Field observations
- Field trips
- Jigsaw

- Role playing
- Think, pair, share
- Discussion – group, panel
- Debates
- Case studies
- Problem-based learning
- Project-based learning
- Computer assisted instruction
- Portfolio
- Games
- Model building
- Simulations
- Storytelling
- Peer instruction
- Concept mapping

Exemplar

1. **Science Circus**

A Science Circus is a series of activities or mini-experiments to introduce the different aspects of a concept or topic. The classroom is divided into activity centers at which students spend approximately the same amount of time, rotating from one to the next until all centers are visited. Separate sets of materials are provided for each group at each center. Within the time allotted to visit each center, students must follow instructions provided to complete the assigned task, discuss observations or results and summarize findings or conclusions. Science circuses can also be used when resources are limited.

The design of the circus, like a lesson plan has the same basic components:

a. A set induction to stimulate interest in the topic
b. The activities which should be aligned with the curriculum objectives
c. The forum or presentation used to convey the main outcomes or conclusions derived from completing the circus.

More information for science circus can be accessed at:
http://learningcenter.nsta.org/files/sc0402_50.pdf

Topic: Separating Mixtures

Learning Outcome: Explain methods of separating mixtures

a. Brainstorm suggestions for techniques to separate:

- particulates from oil, gasoline and air from an automobile
- pure fresh water and salt from seawater
- compounds from the air or water
- the water from the clothes when washing them
- moisture from clothes when drying
- trash at a recycling plant

OR

Provide a flow chart of processes used in a water treatment plant and let students suggest the separation technique used at each stage. Responses are recorded but not corrected.

b. Students conduct experiments (or observe demonstrations for safety or lack of resources) of a range of separation activities. As they move from one station to next, they perform the experiment following the instructions provided and must identify the property of matter that allows for each of the components of the mixtures to be separated.

i. coffee grounds from brewed coffee
ii. oil and vinegar mixture
iii. ethanol from fermented fruit pulp (distillation of homemade wine)
iv. coconut oil from milk (centrifuge)
v. mixture of iron and zinc screws

c. Students must complete the table (after visit to each station) and correct any incorrect responses for the brainstorm session:

Components of mixture	Separation technique	Physical property

Examples of Planning Documents

1. Scheme of Work Template

Schemes of work must be prepared on a termly basis. A template for preparing a required scheme of work is as follows:

Week Number	Topic	Syllabus reference	Learning Outcomes	Teaching Strategies	Assessment Strategies
1	Science and Scientific Processes	1.1.1	Define the terms science and technology Distinguish between the scientific and technological approaches Discuss characteristics of scientific knowledge: - incomplete - limited - economic imperatives - social influence	Power point presentation on scientists, their research and technological applications Classroom discussion with reference to pictures depicting everyday applications of science Brainstorm questions and issues scientists have no definite answers or solutions for.	• Brochure: in groups students create brochures on different aspects of the topic covered: o profiles of scientists, o science at work in everyday situations, o technological advances in various contexts eg medicine, engineering, industry…. • Conduct debate contemporary scientific issues: evolution vs creation, herbal medicines vs pharmaceuticals, benefit vs destruction of scientific inventions, innovations or discoveries
2					
3					

Please Note:

- All assessments must be aligned to the learning outcomes from the science curriculum guide.
- Assessments which are used to contribute towards the students' continuous assessment component of NCSE must be indicated in the scheme. These assessments must be marked using a suitable scoring rubric and relevant feedback must be indicated on the students' submission.

2. Lesson Plan Format

Lesson plans must have the following core components:

- Lesson objectives- derived from the learning outcomes from the science curriculum guide.
- A set induction – focuses students' attention.
- Teaching strategies specific to the lesson objectives and characteristics of learners.
- Assessment strategies- explicit strategies to evaluate that learning outcomes are achieved.
- Reflection/evaluation – teacher reviews lesson and records necessary adjustments.

Other necessary information can also be included.

An example of a lesson plan template is as follows:

DATE: _____ SUBJECT: _____ TEACHER: _____
LEVEL_____ TIME_____

TOPIC	
LESSON	
PREVIOUS KNOWLEDGE/ SKILLS	
LEARNING OUTCOMES	
RESOURCES	
SET INDUCTION **TEACHING/ LEARNING STRATEGIES (in detail)** **SUMMARY**	
ASSESSMENT STRATEGIES	
REFLECTION/ EVALUATION OF LESSON	

Curriculum Adaptations

Implementation of the curriculum should take into account the needs of all learners. Teaching/ learning strategies and assessment strategies may be adapted for special needs, gifted and talented students and underachieving students. Adaptations occur when teachers use differentiated instruction, assessment and materials in order to create a flexible learning environment.

In order to determine suitable adaptations the following can be considered:

- identify students' interests, strengths, learning styles and preferences
- create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- use diagnostic tools (e.g., Know Wonder Learn charts, journal)

Adaptations can allow for gifted and talented students to allow them to work at higher instructional levels, at a faster pace and with a variety of materials. Such students may be provided with anchor activities suited to their needs

Exemplar of curriculum adaptations for special needs students when measuring volume:

Special needs students when measuring volume using a measuring cylinder:

- Visually impaired students can use a magnifying glass to read the meniscus.
- Where direct reading of measuring cylinder by the student is not possible, an aide or teacher can read measurements for the student.
- Students who cannot crouch or stand can sit at the desk and bring the measuring cylinder up to their eye level to read the volume, once it rests on a flat and level surface.

On line resources provided on page 60

Gifted and non-gifted students:

Learning Outcome	Instructional Strategy	Assessment Strategy	Gifted	Non-Gifted
Demonstrate the use of measuring instruments- •Length – metre rule •Mass – laboratory balance •Volume – measuring cylinder •Time – stop clock •Temperature – thermometer	Students provided with guided instructions and demonstrations on the use of instruments to measure length, mass, volume, time and temperature – errors due to parallax noted. Students are guided on the identification of units used in each instrument and the abbreviated term used in measurement. Possible barriers : too many tasks and	Students are provided with specific tasks on the use of measuring instruments: -Metre rule – e.g. lengths of 10, 11.7 cm. Measuring cylinder – 50 ml: volumes of 10 ml. 17 ml. Ask students to identify the units used in each instrument and the abbreviated term used in measurement.	Numbers of tasks may be increased per instruments Increase level of difficulty of task: Use of different sizes of measuring cylinders e.g.: 10 ml measuring cylinders: smaller the volume of measuring cylinder the more difficult it is to measure accurately. Use burette to measure e.g. 7.3 mls	Students may work in groups, pairs or as individuals. Time allotted for tasks may be extended. Simplify tasks – measure whole numbers only (no fractions or percentages) Peer tutoring

	instruments, time constraints.			

PART 3:

Assessment Strategies

Introduction

The main purpose of any assessment strategy is to improve students' learning in addition to playing a vital role in instruction. Assessment can include a variety of strategies and can be selected based on:

- Learning outcomes being taught (Science Curriculum Guide)
- Needs, abilities and interests of the students

When properly designed and appropriately used, assessment strategies can also contribute to more effective instruction and greater student learning. Assessment strategies are most effective when:

- They assess the intended learning outcomes.
- When students are provided with timely feedback for improvement.
- Student results are used to guide future instructional strategies.

For the purposes of the NCSE, continuous assessment must be ongoing and varied and the approach used must be reliable and valid. The activities/tasks should include appropriate scoring rubrics that are unambiguous and transparent. Teachers of classes at the same level should conduct common assessments. Marking and feedback should also be an integral part of the assessment process reflective of work done by students during and at the end of the term.

Guidelines for Teachers

The Continuous Assessment Component of the NCSE must be completed each term effective from Form One onward and the score should be derived from a minimum of the following per term:

- Two practical activities
- One project
- Three pencil and paper tests

Computing Final Marks for NCSE

<table>
<tr><th>Form</th><th colspan="3">End of year continuous marks</th><th colspan="2">Contribution to final marks for certification</th></tr>
<tr><td rowspan="2">Form 1</td><td>Course Assessments</td><td rowspan="2">100%</td><td rowspan="2">15%</td><td rowspan="5">60%</td></tr>
<tr><td>Internal School examinations</td></tr>
<tr><td rowspan="2">Form 2</td><td>Course Assessments</td><td rowspan="2">100%</td><td rowspan="2">30%</td></tr>
<tr><td>Internal School examinations</td></tr>
<tr><td rowspan="2">Form 3</td><td>Course Assessments (up to Term 2)</td><td>100%</td><td>15%</td></tr>
<tr><td colspan="3">National Examinations</td><td>40%</td></tr>
</table>

Continuous Assessment Plan(60%)

FORM LEVEL	TERM 1		TERM 2		TERM 3		TOTAL NUMBER REQUIRED
	Course work mark	Exam mark	Course work mark	Exam mark	Course work mark	Exam mark	
1	√	√	√	√	√	√	6
2	√	√	√	√	√	√	6
3	√	√	√	√	-----	----	4
							16

Source: Division of Educational Research and Evaluation, Ministry of Education.

Assessment Strategies

Suggested Assessment Strategies include:

- Examinations – Final and mid - term
- Pen/pencil and paper test
- Essays
- Research reports
- Quizzes
- Questioning
- Field reports
- Written presentations
- Oral presentations
- Simulations
- Role play
- Formal and informal observations
- Debates

- Projects
- Laboratory work
- Group work
- Models
- Songs, jingles
- Poems
- Stories
- Videos
- Laboratory report
- Exhibitions
- Portfolios

Exemplars:

Scientific Reporting

A scientific report concisely and comprehensively communicates both the planned and unplanned experiences of a laboratory activity. In a scientific report, the students:

- outline the applicable theoretical principles, laws or facts
- describe the most appropriate method or procedure for investigating the proposed aim of the experiment
- outline the applicable treatment of the data or results collected to allow for the analysis or interpretation of findings
- conclude with a commentary of the significance of the findings in relation to the proposed aim with due consideration for the limitations or constraints experienced and recommendations for improvements where possible.

The report will have slight variations in terms of what must be emphasized given the level of guidance provided to students. For **structured or guided inquiries**, students would be provided with detailed instruction to follow allowing emphasis to be placed on the skills for manipulating the equipment, obtaining accurate and precise data as well as processing of raw data to present findings. On the other hand, for **open-ended inquiries**, students would have to plan or design

their own investigation. This involves the student selecting the appropriate procedures and treatment of data in order to evaluate the validity of the approach to solving the problem posed to them. Thus, more emphasis would be placed on evaluating the suitability of their choices and decisions rather than the actual implementation of the activities.

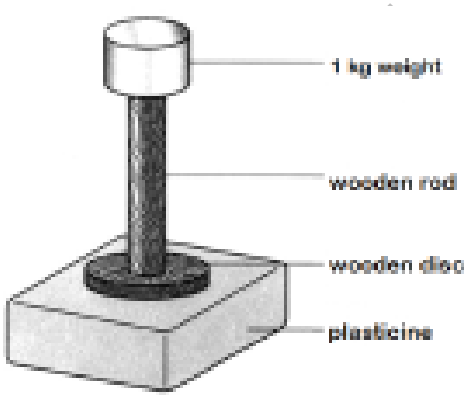
The necessary components of a scientific report can be summarized into categories as follows:

- Logical and properly sequenced **layout or format** that guides the organization of the report.
- Concise but comprehensive **description** of series of essential actions carried out to generate and collect data(method or procedure)
- Clearly headed tables or lists of quantitative (measurements) and or qualitative (observations) **data** collected.
- **Treatment** of raw data, consistent with theory- calculations, graphical and statistical analyses.
- **Summary** of understandings gained from the experiment conducted – expected and unexpected outcomes, proposed explanations and recommendations.

Scientific Report

Aim: To investigate the relationship between surface area and pressure

Apparatus and materials: Plasticine, 1kg mass, wooden rod, wooden disc of different areas ($2cm^2$, $4cm^2$, $6cm^2$, $8cm^2$, $10cm^2$), 15cm ruler.



Procedure:

(1) Plasticine was taken and formed it into a rectangular block of dimensions 10cm x 12cm x 2cm as shown in the diagram above.

(2) The smallest size disc of $2cm^2$ was placed on the top in the center of the plasticine (not pressed). The wooden rod was then placed in the middle on top of the wooden disc as shown in the diagram above.

(3) Without applying any sort of pressure (force) to the wooden rod while holding it, a 1kg mass was placed on top of the wooden rod For 30 seconds as shown in the diagram.

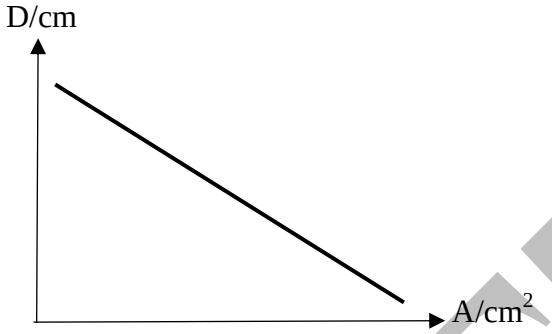
(4) The 1kg mass and wooden rod was then removed and the wooden disc was carefully lifted out of the plasticine. The depth (D/cm) of the impression of the wooden disc that was left in plasticine when the disc was removed was measured using the 15cm ruler. Results were recorded in a table.

(5) The experiment (steps 1 to 4) was repeated using the different sizes discs ($4cm^2$, $6cm^2$, $8cm^2$, $10cm^2$) all results were recorded in a table.

Results:

D/cm					
A/cm^2	2	4	6	8	10

Analysis: Sketch of a graph of D/cm (y-axis) against A/cm^2 (x-axis) using the data that recorded in the results.



Discussion: The pressure produced when the 1 kg mass is placed on top of the wooden rod depends on the surface area in contact with the plasticine, because the bigger the surface area the lesser is the pressure and the smaller the surface area the larger is the pressure. This relation was derived based on the observation that the depth of the impression measured from the wooden disc sinking into the plasticine depended on the surface area of the disc used.

Conclusion: It can be concluded that the pressure exerted on the plasticine depended on surface area of the disc used.

Exemplars of Lesson Plans demonstrating Teaching and Assessment Strategies

1. **Building a model of an atom using computer software**

Topic	Structure and Properties of Matter
Level	Form 1
Subject	Integrated Science
Previous knowledge	The basic structure of an atom. The chemical symbols of elements of atomic numbers 1-10
Objectives	Students should: 1. Build a model of an atom using computer software 2. Draw a labelled diagram to illustrate the structure of the atom 3. Build the models of the structure of elements of atomic number 1-10 4. Compare atoms based on the relative numbers of its sub-atomic components 5. Deduce the electronic structure of atoms of atomic numbers 1-10
Materials, resources	Computer for internet research and use of MSWord
Time required	90 minutes
Activities and procedures	
ICT Skills and resources	The use of search engines, basic literacy skills, use of MS Word to summarize information.
Teaching strategies	Set: Show students video clip or model of solar system as an analogy of the structure of the atom
	1. Teacher will recap the definition of the atom and list its sub-atomic components asking relevant questions to assess prior knowledge. 2. Using the laptop, students will open the website: http://phet.colorado.edu/en/simulation/build-an-atom 3. Using the sites students will build atoms and move around the protons, neutrons and electrons. 4. Students will build atoms. 5. Using MSWord students will create a table with the following headings for the first 10 elements: **Element No. of protons No. of neutrons No. of electrons** 6. Students will define atomic number and mass number using the web page: http://www.ndted.org/EducationResources/HighSchool/Radiography/atomicmassnumber.htm
Assessment	Students will remain on the site and access the games relating to building atoms. There are 4 levels and students can do a self-assessment or peer assessment.
Evaluation	
	Write some evaluative comments about the successes and shortcomings of the lesson. Why do you think it did/did not go according to plan? What would you do differently next time you implement this same lesson?

2. **Use of ICT/student laptops - research using the internet, downloading from internet, MS Excel, e mail, blog**

TOPIC	Human Body Systems
PREVIOUS KNOWLEDGE	Organisms are made up of interconnected organ systems that work together for them to function efficiently **ICT knowledge/skills:** **For teacher :** research using the internet, downloading from internet, MS Excel, MS power-point, e mail, blog, **For student**: research using the internet, downloading from internet, MS Excel, e mail, blog, **For lesson:** research, teaching strategy, assessment, teacher and student feedback.
OBJECTIVES	At the end of the lesson, the student will be able to: -Explain what is meant by a balanced diet. - Outline the constituents of a balanced diet. -Outline the constituents of a balanced diet for the following persons: vegetarian, non-vegetarian, athlete, elderly persons and pregnant woman.
MATERIALS	Teacher: laptop computers (with internet connectivity), multimedia projector, email and blog, power point presentation(ppt) on a balanced diet Students: laptop computers (with internet connectivity), email and blog.
TIME	Two 35 minute periods
SET INDUCTION **METHOD** **SUMMARY**	Teacher begins lesson showing pictures of undernourished, over-nourished and properly nourished persons obtained from the internet Teacher and Students discuss the pictures and create a definition for the term balanced diet. **OR** Students read article from Guardian newspaper. http://www.guardian.co.tt/node/19714 Teacher and Students discuss and create a definition for the tern balanced diet. www.worldofteaching.com/**powerpoint**s/biology/nutrition.**ppt** Teacher then presents **edited** ppt. on balanced diet. Teacher and Student discuss the information presented and determine the constituents that should make up a balanced diet for the following persons: 1. vegetarian, 2. non- vegetarian, 3. athlete, 4. elderly persons, 5. pregnant woman. Teacher summarizes by recapping main points. Teacher places Students into groups of four and each group has 30 minutes to prepare 5 pie-charts using MS Excel showing constituents of a balanced diet for the following persons: 1. vegetarian, 2. non- vegetarian, 3. athlete, 4. elderly persons, 5. pregnant woman.

ASSESSMENT STRATEGIES	Students prepare 5 pie-charts using MS Excel showing constituents of a balanced diet for the following persons: 1. vegetarian, 2. non- vegetarian, 3. athlete, 4. elderly persons, 5. pregnant woman. Assignment is emailed to teacher as an excel document for assessment Teacher and Students visit teacher blog and provide feedback on lesson.
EVALUATION OF LESSON	Teacher evaluates effectiveness of teaching, assessment, feedback strategies and students' competence with the use of ICT to make adjustments to lesson.

3. **Use of ICT/student laptops – use of MS Word**

DATE:_____TEACHER:_____

TOPIC	Photosynthesis
PREVIOUS KNOWLEDGE	The shoot system of a plant comprises leaves on a stem, flowers, buds, fruits and a root system which anchors the plant to the ground and absorbs water and mineral salts. **ICT knowledge/skills:** **For teacher and students:** research using the internet, downloading from internet, MS word, MS power-point. **For lesson:** research, teaching strategy, assessment.
TIME	
OBJECTIVES	At the end of the lesson the student will be able to: (taken from curriculum document) Define the term photosynthesis. Outline the process of photosynthesis Explain that photosynthesis takes place in the green parts of the plant. Identify the products of photosynthesis
MATERIALS	Teacher and student laptop computers, multimedia projector, whiteboard and markers, photosynthesis song and pictures of variegated and non- variegated leaves downloaded from the internet.

SET INDUCTION	Photosynthesis song : http://www.youtube.com/watch?v=C1_uez5WX1o Students and teacher discuss song. Students come up with definition of photosynthesis which is recorded on whiteboard.
METHOD	Teacher places students in groups of three and they discuss the purpose of the following: water, sunlight and carbon dioxide (for five minutes). On their laptops, students then prepare a word table with two columns: raw material and functions. Groups then present a power-point presentation (5 slides) to the class using multimedia projector. Teacher then shows Students pictures of variegated and non- variegated leaves. Teacher and students discuss the importance of the green parts of the plant. In groups of threes, students discuss the end products of photosynthesis for five minutes. Using their student laptops, students prepare a word equation/picture equation/ power-point presentation(3 slides) for photosynthesis which is shared with the class using the multimedia projector
SUMMARY	Teacher summarizes by recapping the definition of photosynthesis, where and how it takes place in a plant, the raw materials and end products.
ASSESSMENT STRATEGIES	Students complete individual worksheets prepared using MS Word that have been loaded onto their laptops. Students email word document to teacher for assessment.
EVALUATION OF LESSON	Teacher evaluates lesson by determining the effectiveness of the teaching strategies used, resources used and the students ability to effectively use MS word for the student activities.

4. Use of websites for self-assessments

Topic	Physical and Chemical Changes
Level	Form 2
Subject	Integrated Science
Previous Knowledge	Characteristics of solids, liquids and gases
Objectives	1. Differentiate between physical and chemical changes 2. Identify physical and chemical properties.
Materials, resources	Bunsen burner, magnesium ribbon, ice ,beaker,
Time required	90 minutes
Activities and procedures	
ICT Skills and resources	The use of search engines, basic literacy skills. Students should use MS Word to construct a table and use power point presentation for self - assessment.
Learner activity	Learner-centred and self-paced
Teaching Strategies	Set: Students view documentary clip on rising sea levels (NASA website) or read aloud article ("The Big Thaw"- National Geographic)
	1. Teacher will set up a demonstration of some cubes of ice in a beaker and leave to stand. 2. Next the teacher will burn a piece of magnesium ribbon and then question the students' observations and possible explanations. 3. Teacher will ask for observations and explanations for the ice melting. 4. The teacher should spend 15-20 minutes brainstorming and discussing the difference between physical and chemical change with students 5. Other examples of changes are posed or offered by students 6. Students should construct a table with appropriate headings using MS Word. Headings: **Physical Change Chemical Change** 7. Each time a change is discussed and understood, students will put into the table. 8. Students will be directed to the website for **self-assessment**: http://vital.cs.ohiou.edu/steamwebsite/downloads/ChangeLab.swf 9. The teacher will discuss the assessment activities, especially with those that students had problems. 10. Students can return to the site and redo the assessment
Follow-up activities	
Assessment	Teacher will note the improvement from the self- assessment.
Evaluation	
Student Follow-up	Students can work on those questions which they are having problems. Explanations are given for each question so that students can follow.

5. Lecture/presentation Using Resource Person

DATE: _____ SUBJECT: _____ TEACHER: _____ LEVEL_____

TOPIC	Communicable Diseases of the Reproductive System
PREVIOUS KNOWLEDGE / SKILLS	• What is reproduction • Structure of the human male and female reproductive systems • Function of the parts of the human male and female reproductive systems. • What is a communicable disease **ICT knowledge/skills:** **For teacher :** research using the internet, downloading from internet, blog **For lesson:** research, teaching strategy, assessment, teacher and student feedback. **For student:** Use of the internet and a blog.
TIME	2 periods
LEARNING OUTCOMES	At the end of the lesson, students will be able to: • Identify the different types of Communicable Diseases of the Reproductive System
RESOURCES	Resource person from any of the Regional Health Authorities. Teacher: laptop computers, multimedia projector, blog Students: unlined paper 8 ½" x 11", coloured markers, coloured pencils blog.
SET INDUCTION	Teacher shares global and local statistics on communicable diseases of the reproductive system with students: http://www.cdc.gov/std/ http://www.health.gov.tt/sitepages/default.aspx?id=122
TEACHING/ LEARNING STRATEGIES (in detail)	Classroom discussion on the topic. Teacher introduces resource person and outlines the format of the lecture and discussion. Content of lecture can include: http://fhsphysicaleducation.wikispaces.com/Communicable+Diseases+%26+Reproductive+System+Unit
SUMMARY	Teacher, students and resource person discuss the types of communicable diseases of the reproductive system and how to identify them based on symptoms

ASSESSMENT STRATEGIES	In groups of four, students use information provided by resource person and classroom discussions to prepare pamphlets on the different types of communicable diseases of the reproductive system. Pamphlets are distributed to the student body. Pamphlets assessed using teacher created rubric. Teacher and students visit teacher's blog and provide feedback on lesson.
REFLECTION/ EVALUATION OF LESSON	Teacher evaluates effectiveness of teaching, assessment and feedback strategies to make adjustments to lesson.

6. Classroom discussion (strategy can be modified to use Think, Share, Pair)

DATE: _____ SUBJECT: _____ TEACHER: _____ LEVEL_____

TOPIC	Communicable Diseases of the Reproductive System
PREVIOUS KNOWLEDGE **SKILLS**	• What are communicable diseases of the reproductive system • What is HIV **ICT knowledge/skills:** **For teacher :** research using the internet, downloading from internet, blog **For student**: research using the internet, downloading from internet, MS word, MS power-point. **For lesson:** research, teaching strategy, assessment, teacher and student feedback.
TIME	2 periods
LEARNING OUTCOMES	At the end of the lesson, students will be able to: • Explain the transmission of HIV (Human immunodeficiency virus).
RESOURCES	Teacher: laptop computers, multimedia projector, Students: laptop or unlined paper, coloured markers and coloured pencils or material for making puppets.
SET INDUCTION **TEACHING LEARNING STRATEGIES (in detail)** **SUMMARY**	Teacher: Puts up the 'STRONGLY AGREE' and 'STRONGLY DISAGREE' sheets on the wall at opposite ends of the room. Explain to the students that a series of statements will be read out loudly, one at a time. Each student is to think about whether they agree or disagree with it and move to the appropriate side of the room. Students can stay in the middle if they are uncertain. Teacher: Reads the first statement. Students move to their chosen place. Ask students to choose one person near them and discuss why they are standing where they are. Then asks students to choose one person standing as far away from them as possible and to discuss the statement with them, explaining why each has chosen to be where they are. Teacher repeats the procedure with as many statements as time allows.

	Class reassembles as a group and each student is asked to identify one piece of information they are confused or unclear about. Teacher and students discuss to clarify the issues involved. (adapted from: http://www.avert.org/lesson-and-activity-plans-learning-about-transmission.htm#sthash.yLAZVNu4.dpuf) Teacher may use information from: http://www.poz.com/archive/2008_Mar_2168.shtml http://www.cdc.gov/hiv/basics/transmission.html http://www.aids.org/topics/aids-faqs/how-is-hiv-transmitted/ Sample HIV statement sheet: • HIV can be spread by direct exposure to infected blood. • HIV can be spread from an HIV-infected woman to her offspring during pregnancy, childbirth or breastfeeding • Injecting drugs will give you HIV. • You can get HIV from toilet seats. • If you are fit and healthy you won't become infected with HIV. • Married people don't become infected with HIV. • If you stick with one partner you won't become infected with HIV. • Women are safe from HIV as long as they use a contraceptive. • You can become infected with HIV from sharing toothbrushes. • You can become infected with HIV from kissing. (adapted from: http://www.avert.org/lesson-and-activity-plans-learning-about-transmission.htm#sthash.yLAZVNu4.dpuf)
ASSESSMENT STRATEGIES	In groups of four, students: • Design a brochure on the transmission of HIV for dissemination to the student body. • Perform a puppet show/ design a cartoon strip on the dissemination of HIV for use in HIV education within the school. Products to be assessed using teacher created rubric. Teacher and students visit teacher blog and provide feedback on lesson.
REFLECTION/ EVALUATION OF LESSON	Teacher evaluates effectiveness of teaching, assessment, feedback strategies and students' competencies with the use of ICT to make adjustments to lesson.

7. Jigsaw technique of Cooperative Learning

DATE: _____ SUBJECT: Integrated Science. TEACHER:_____

LEVEL: Form 2

TOPIC	2.2 Human Body Systems: The Circulatory System.
LESSON	2.2.2 Structure and Functions of The Heart and Blood Vessels.
PREVIOUS KNOWLEDGE/ SKILLS	Components of the circulatory system.
TIME	80 minutes
LEARNING OUTCOMES	Students will be able to relate the structure of the main parts of the circulatory system.
RESOURCES	A computer per student with internet access and a word processing program.
SET INDUCTION **TEACHING/ LEARNING STRATEGIES (in detail)**	Teacher: Lub-dub, lub-dub! Under pressure! Blood flowing through! Students suggest which system in the human body the teacher referred. Teacher uses the Jigsaw technique of Cooperative Learning as follows: 1. Class is divided into groups of five students. Teacher assigns one topic (heart/ artery/ capillary/ vein) to each student in the group and instructs students to research its structure and function. (10 mins.) 2. Each student researches the assigned topic and writes approximately two lines each on its structure and function. (15mins.)

SUMMARY	3. Students with the same topic group together to discuss the information they gathered and relate structure to function. (10 mins.) 4. Students return to their original group and each student informs the others about their topic. (10 mins.) Teacher draws a table on the board, listing the parts of the Circulatory System. Students who did not research that topic are asked to describe the structure and relate it to the function on the table. When this is completed, other students are allowed to make necessary corrections. After the information on the table is approved by the teacher, students record table on their computer. (20 mins.)
ASSESSMENT STRATEGIES	Each student uses the computer to prepare a graphic organiser which shows the structure of the main parts of the circulatory system and the functions. (15mins.)
REFLECTION/ EVALUATION OF LESSON	

8. Practical Activity

DATE: **SUBJECT: Integrated Science** **TEACHER:_____**

LEVEL: Form 2

TOPIC	2.2 Human Body Systems: The Circulatory System.
LESSON	2.2.3 To Investigate the Effect of Activity on Pulse Rate.
PREVIOUS KNOWLEDGE/ SKILLS	Structure and function of parts of the Circulatory System. Working knowledge of Microsoft Excel.
TIME	80 minutes
LEARNING OUTCOMES	Students will determine the effect of activity on pulse rate.
RESOURCES	• Computer with Microsoft Excel Program. • 1 stop watch per group • 1 projector
SET INDUCTION **TEACHING LEARNING STRATEGIES (in detail)**	Teacher: Why do nurses sometimes place their fingers on the inner part of patient's wrist? Students suggest reasons. Teacher demonstrates where the pulse on the wrist is felt. Students feel their pulse. Students are divided into groups of four, working as two pairs. Students locate the pulse point on their partner's wrist by placing their index and middle finger on the palm side of the left wrist. The number of pulse beats per minute is counted with the student at rest. The student then jogs on the spot for one minute and the pulse beat per minute is counted. This is repeated after jogging for two and three minutes. Students then exchange roles and the procedure is repeated. (20 mins.) The data for the group is tabulated and the average number of pulse beats per minute is calculated and a graph drawn, using excel. Students use the graph

SUMMARY	to determine whether pulse rate is affected by activity. (30 mins.) Graph is used to determine the effect of activity on pulse rate. Students suggest the link between pulse rate and heartbeat. (10 min.) Teacher uses projector to show students' graphs on the board. Students interpret the graph and record this on the board.(10 mins.)
ASSESSMENT STRATEGIES	Structured questions: How does your pulse rate change after exercising? What is the link between pulse rate and heart beat? How does good physical fitness affect a person's pulse rate? (10 mins)
REFLECTION/ EVALUATION OF LESSON	

9. Use of a Laboratory Model and Charts with Independent Learning

DATE:_____ SUBJECT: Integrated Science TEACHER:_____

LEVEL:Form 3

TOPIC	3.1 Human Body Systems: The Reproductive System.
LESSON	3.1.1 Outline the Structure of the Female Reproductive System and the Functions of the Parts.
PREVIOUS KNOWLEDGE/ SKILLS	The importance of reproduction.
TIME	40 minutes
LEARNING OUTCOMES	Students will be able to name the parts of the female reproductive system and outline the functions.
RESOURCES	• Life size model of female reproductive system. • Computer with internet connection. • Chart of female reproductive system
SET INDUCTION **TEACHING LEARNING** **STRATEGIES (in detail)**	Teacher introduces the model. Students examine the internal reproductive structures. Teacher demonstrates the internal structure of the female reproductive system, using the model and introduces the names of the parts. Students are allowed to work independently to search for a labelled diagram of the female reproductive system and the functions of the parts ref.http://kidshealth.org/mis/movie/bodybasics/bodybasics_female_repro.html Teacher places unlabelled chart on the board and a box of labels on the desk.

SUMMARY	Class is divided into two teams. One member of a team pulls a label of structure or function and places it at the appropriate position on the chart. The other team then completes the label, for example places the function if the structure was placed by the first team.
ASSESSMENT STRATEGIES	Worksheet with a diagram of the female reproductive system. Students label the names and functions of the structures.
REFLECTION/ EVALUATION OF LESSON	

10. **Use of simulations, online research**

ICT INTEGRATED SCIENCE LESSON

SUBJECT: Integrated Science CLASS: Form 1

TOPIC: Energy Conversion TIME: 2 periods

PRE-KNOWLEDGE: Students should know:

- Energy enables work to be done.
- Energy exists in different forms.
- Energy is produced from different sources

OBJECTIVES: At the end of this lesson, students should be able to:

- Distinguish between different types of energy.
- Identify energy conversion in simple situations in everyday life.
- Recognize that heat is produced in during energy conversion.
- State the law of conservation of energy.

SET INDUCTION: https://www.youtube.com/watch?v=Z9I4QMoiPt8 or http://www.pakfiles.com/watch-video/NDk3Nw==/funny-commerical-with-an-energy-bar

Teacher uses multimedia projector and laptop to show 'Chocolate' video to generate interest and introduce the concept of energy conversion.
Teacher poses questions to students to elicit response from the video on what possessed energy and also what energy conversion took place.

Questions	Expected Responses
What was the purpose of the video?	
What forms of energy were highlighted?	
Why was each form of energy important?	
Was the video convincing or believable?	

TEACHING STRATEGIES:

Teacher refers to simulation to discuss the principle of conservation of energy
http://phet.colorado.edu/sims/energy-skate-park/energy-skate-park_en.jar

Next students are given the opportunity to explore energy conversion in simple situations. The class is divided into groups to work on different activities moving from one to the other until all activities are visited. They may refer to the following for help in identifying each type of energy: http://www.eia.gov/kids/energy.cfm?page=about_forms_of_energy-basics OR http://www.ftexploring.com/energy/enrg-types.htm

Activities (model/ICT alternative)	Energy Conversion
Newton's Cradle http://www.myphysicslab.com/beta/Newtons-cradle.html OR http://www.schoolforchampions.com/science/newtons_cradle.htm	Potential to Kinetic and Back to Potential
Ecosystem: • rotting fruit, bread or cheese: http://www.fi.edu/tfi/units/life/habitat/habact4.html www.marietta.edu/~biol/102/ecosystem.html OR • Terrariums: http://www.instructorweb.com/lesson/maketerrarium.asp	Chemical energy to heat energy Solar energy to Chemical to Heat energy
Cooking: Outdoor camp fire: http://www.learnnc.org/lp/multimedia/6761 Solar oven: http://www.sacredheartsjm.org/html/uganda.html	
Model of Steam Engine http://www.haworth-village.org.uk/steam-trains/video/video.asp?pic=8	Chemical to Heat to Kinetic & Sound
Electrical devices: http://www1.curriculum.edu.au/sciencepd/energy/chem_flow.htm	Chemical to Electrical to Heat + Light

Each group must create a presentation on one of the activity using flow maps (http://office.microsoft.com/en-us/templates/flowchart-simple-layout-TC001018440.aspx)

Each group gives its presentation and the class discusses.

Teacher consolidates lessons by recapping the main points.
http://www.sciencemuseum.org.uk/onlinestuff/games/energy_flows.aspx

Teacher invites students to visit his / her wiki page and view additional reference materials (see below) on the topic and give feedback. In addition, download the worksheet on Energy Conversion and attempt. http://www1.curriculum.edu.au/sciencepd/energy/energy.htm

ASSESSMENT:

- Oral questioning (primary energy source, identify and define main types of energy, significance of heat, principle of conservation of energy) http://answers.yahoo.com/question/index?qid=20080415181333AAMFY3q

- Rubric to assess presentation (accuracy, usage of ICT tool, group dynamics, creativity) http://edweb.sdsu.edu/triton/tidepoolunit/Rubrics/collrubric.html

- Worksheet http://www1.curriculum.edu.au/sciencepd/energy/energy.htm

Additional references:

Energy flow in communities: http://www.learner.org/vod/vod_window.html?pid=1961

Thinking maps: http://www.paisd.org/Curriculum/Webpage%20for%20C%20&%20I/Outstanding%20Practices/Examples%20of%20Thinking%20Maps.ppt

Quiz: http://www.quiz-tree.com/Energy_main.html

Rubrics: http://www.accesswave.ca/~hgunn/computedu/sciencerubrics.htm

11. Role Play and Questioning

Topic: Electricity Time: 2 periods

Pre-knowledge:

- Current flows through a closed path from source to load.
- Components in series circuit are connected to allow the same current to flow through each component
- Components in parallel circuit are connected such that the current is shared among the components

Lesson Objectives: Students should be able to:

- Construct series and parallel circuit arrangements
- Map the flow of current in each case.
- Predict the effect of changing the number and or position of lamps in each case.
- Suggest advantages and limitations of each type of circuit arrangement.

Materials:

Christmas lights, cardboard, markers

Set: 6

Teaching Strategies: Teacher intersperses questions during conduct of following tasks:

- Students are presented with sets of Christmas lights that are not working properly (eg. one row of bulbs not lighting, one or more bulbs in a row not lighting but others are). A set that is properly working is plugged in and students make observations which the teacher records. Next the damaged sets are plugged in, one at a time and students are to note the problem(s) in each case and suggest a reason.Students break up into groups of eight (Q#1)
- Each group member is assigned a label to identify which circuit component each represent: Battery, Battery, Light bulb, Light bulb, Light bulb, Wire, Wire.
- Two teams are invited to the front of the classroom. (Q#2)
- Teacher calls out a type of circuit and then each team will try to race to configure the correct circuit. For example: "I want a series circuit with two cells or a parallel circuit with three light bulbs."

- The team that configures the circuit first, joining hands to represent the connecting wires will gain a point. (Q#3 & 4)
- The winning team will then compete against the next team as the teacher calls out other circuits to be constructed. (Q#5)

Some other circuit arrangements:

i. Create a series circuit with 2 cells and one bulb (Q#6)
ii. Create a series circuit with 3 bulbs and one cell (Q#7)
iii. Create a parallel circuit with 2 cells and one bulb (Q#8)
iv. Create a parallel circuit with 3 bulbs and one cell (Q #9)

Questions

1. What are the two things a circuit needs in order for electricity to flow?
2. Which type of circuit is one in which the circuit elements are connected in sequence?
3. What type of materials can be used to make connecting wires?
4. What materials are used to ensure safety of users when handling connecting wires?
5. What circuit arrangement will allow each of two bulbs to receive only part of the current supplied?
6. What difference, if any, would be observed in the brightness of the bulb if one cell was removed?
7. What would be observed if one bulb blew but the lamp remained connected? Would any differences be observed if the lamp was also removed?
8. How different is the brightness of the bulb in this arrangement as compared to when the cells were in series?
9. Would there be any differences if one of these bulbs stopped working as compared to when they were connected in series

Summary:
Teacher then asks students to return to their initial responses to the problems posed to them in the Set.

After they review their responses, the class revisits each of the Christmas lights scenario and discusses their reasons for the problems identified.

Assessment:
Students:
1. Complete worksheets on series and parallel circuits:
www.superteacher**worksheets**.com/electricity/**series-parallel-circuits**.pdf

2. Design their own electrical device that is powered by a battery and has some practical application http://www.tryengineering.org/lesson-plans/series-and-parallel-circuits

Variation: Actual circuits can be constructed and students record the current flow through each lamp from which they can compose responses to the questions.

Reference: http://www.thetech.org/exhibits/online/topics/10b.html#cirext

Curriculum Adaptations

Adaptations in assessment can be made as follows:

- Provide opportunities for student participation in a variety of authentic assessments
- Teach students proper test-taking strategies.
- Assess students in multiple ways 💻
- Have a repertoire of anchor activities for students to work on individually or in groups.

💻: On line resources provided on page 60

Part 4

Useful Resources

Appendices

1. Web quests

Purposes of Web Quests:

- Infuses ICT into teaching and learning opportunities. Web quests has internet usage as a fundamental requirement but designed to optimize the benefits of internet (access to variety of information sources and formats) while minimizing the limitations (time consuming, unsuitability and inaccuracy of sites, cyber safety- inappropriate, predatorily sites).
- Focuses student research to allow them to use information constructively to solve the presented problem.
- Reduces time spent on basic research skills and instead give more time for developing higher order analysis, critical thinking and synthesis skills.

Design of Web quests:

The essential components are:

Introduction – Task – Process – Evaluation - Conclusion

1. Introduction:
   Orient learners to the purpose and value of the webquest. Inspires interest.
2. Task:
   Outlines goals and identifies the focus question or problem.
3. Process:
   Describes the steps to be followed and allocation of roles and responsibilities where applicable.
4. Evaluation:
   Indicate the means for assessing the products or findings presented.
5. Conclusions:
   Summarizes the findings in relation to the problem posed or focus question, and recommendations.

More information available at http://www.teach-nology.com/teachers/lesson_plans/science/

2. Rubrics

More information available at http://www.rubrics4teachers.com/science.php

Sample Rubrics

Powerpoint Appearance and Content : PowerPoint Rubric

CATEGORY	4	3	2	1
Sequencing of Information	Information is organized in a clear, logical way. It is easy to anticipate the type of material that might be on the next slide.	Most information is organized in a clear, logical way. One slide or item of information seems out of place.	Some information is logically sequenced. An occasional slide or item of information seems out of place.	There is no clear plan for the organization of information.
Content - Accuracy	All content throughout the presentation is accurate. There are no factual errors.	Most of the content is accurate but there is one piece of information that might be inaccurate.	The content is generally accurate, but one piece of information is clearly flawed or inaccurate.	Content is typically confusing or contains more than one factual error.
Use of Graphics	All graphics are attractive (size and colors) and support the theme/content of the presentation.	A few graphics are not attractive but all support the theme/content of the presentation.	All graphics are attractive but a few do not seem to support the theme/content of the presentation.	Several graphics are unattractive AND detract from the content of the presentation.
Spelling and Grammar	Presentation has no misspellings or grammatical errors.	Presentation has 1-2 misspellings, but no grammatical errors.	Presentation has 1-2 grammatical errors but no misspellings.	Presentation has more than 2 grammatical and/or spelling errors.
Text - Font Choice and Formatting	Font formats (e.g., color, bold, italic) have been carefully planned to enhance readability and content.	Font formats have been carefully planned to enhance readability.	Font formatting has been carefully planned to complement the content. It may be a little hard to read.	Font formatting makes it very difficult to read the m

Please note that if one criterion is not relevant to the presentation being assessed, the rubric can be modified as necessary and marks can be pro-rated.

Oral Presentation Rubric

CATEGORY	4	3	2	1
Posture and Eye Contact	Stands up straight, looks relaxed and confident. Establishes eye contact with everyone in the room during the presentation.	Stands up straight and establishes eye contact with everyone in the room during the presentation.	Sometimes stands up straight and establishes eye contact.	Slouches and/or does not look at people during the presentation.
Props	Student uses several props including timeline that show considerable work/creativity and which make the presentation better.	Student uses 1 prop that shows considerable work/creativity and which make the presentation better.	Student uses 1 prop which makes the presentation better.	The student uses no props OR the props chosen detract from the presentation.
Content	Shows a full understanding of the topic.	Shows a good understanding of the topic.	Shows a good understanding of parts of the topic.	Does not seem to understand the topic very well.
Preparedness	Student is completely prepared and has obviously rehearsed.	Student seems pretty prepared but might have needed a couple more rehearsals.	The student is somewhat prepared, but it is clear that rehearsal was lacking.	Student does not seem at all prepared to present.
Time-Limit	Presentation is ----- Minutes long.	Presentation is ----- Minutes long.	Presentation is ----- Minutes long.	Presentation is ----- Minutes long.
Speaks Clearly	Speaks clearly and distinctly all (100-95%) the time, and mispronounces no words.	Speaks clearly and distinctly all (100-95%) the time, but mispronounces one word.	Speaks clearly and distinctly most (100-95%) of the time. Mispronounces more than one word.	Often mumbles or cannot be understood OR mispronounces more than one word.
Loudness	Could be heard by members throughout the presentation.	Could be heard by members at least 75% of the time.	Could be heard by audience members at least 50% of the time.	Could be heard by less than 50% of audience members.

Please note that if one criterion is not relevant to the presentation being assessed, the rubric can be modified as necessary and marks can be pro-rated

Rubric for assessing drawing skill

General Criteria and Percentage of Overall Mark (%)	Specific Criteria	Possible Mark Allocation
Clarity – 30	• Clean continuous lines of even thickness in pencil • Reasonable size (½ sheet occupied) • No shading or unnecessary details	1 1 1
Accuracy – 20	• Faithfulness of reproduction (looks like specimen**)** • Reasonable proportions (relative thickness of different parts correct)	1 1
Labelling and Label lines – 50	• Neat, drawn with a ruler, lines straight and do not cross one another, parallel to each other and no arrowheads. **(**lines must be justified) • Correct magnification - calculated (Calculation must be shown and be accurate. Magnification can be placed anywhere on drawing page,) • Title (Preferable at bottom in capitals, but can be placed at top end. Should be underlined. Upper or lower case letters. Name of specimen and view must be present. Title must state "Drawing of ") • Accurate/correct/ appropriate labels and annotations (Label on right but no penalty if labels are on the left. Equally distributed on either side also accepted. All lower case or upper case labelling. Annotations: brief description of structure or as function.)	1 1 1 1(label) 1(annotation) **Total: 10**

3. Online Resources

TOPIC	RESOURCE NAME AND LINK
Atoms, elements and Compounds	National Geographic http://science.nationalgeographic.com/science/space/solar-system/
Environmental impact of human activities	Bucco Reef Trust Coral Cay Conservation http://www.buccooreef.org/coralcay.html
Levels of Organization in Living Things	Fact monster http://www.factmonster.com/ipka/A0774536.html
Diet and Health	Food Facts http://www.foodafactoflife.org.uk/activity.aspx?siteId=5&sectionId=34&contentId=55
Physical and Chemical Processes	Chem for kids http://www.chem4kids.com/files/matter_chemphys.html
Separating mixtures	Separation of mixtures http://antoine.frostburg.edu/chem/senese/101/matter/separation.shtml
Light	How stuff works http://www.howstuffworks.com/light2.htm
Environmental impact of human activities	Rainforests http://rainforests.mongabay.com/deforestation/2000/Trinidad_and_Tobago.htm
Acids and alkalis	Fun Sci http://www.funsci.com/fun3_en/acids/acids.htm
Scientific Measurement and International System (SI) of units	http://www.mathworksheetscenter.com/mathtips/whymeasurement.html http://www.mindbites.com/lesson/4483-physics-physical-quantities-measurement-units http://www.historyworld.net/wrldhis/PlainTextHistories.asp?historyid=ac0

	7 http://www.k12math.com/math-concepts/measurement/length.jpg http://www.physics.ucla.edu/k-6connection/Mass,w,d.htm http://lamar.colostate.edu/~hillger/pdf/Teaching_SI_slide_show.pdf http://sciencespot.net/Media/metriccnvsn2.pdf http://www.neok12.com/Measurements.htm http://www.beaconlearningcenter.com/weblessons/measuringtools/default.htm

General On Line Resources

Lesson Plans and Content:	1.) Lesson Plans Page http://lessonplanspage.com/science/ 2.) Discovery Education http://school.discoveryeducation.com/ 3.) NASA for Educators www.nasa.gov/audience/foreducators/index.html 4.) IEEE http://www.tryengineering.org/lesson-plans
PHET Interactive Simulations	http://phet.colorado.edu/en/simulations/category/new
Science Kids	http://www.sciencekids.co.nz
Bill Nye, The Science Guy	http://www.billnye.com/for-kids-teachers/home-demos/
I Know That	http://www.iknowthat.com/com/L3?Area=Science%20Lab
Virtual Labs	http://www.golabz.eu/labs

Access Excellence Resource Center	http://www.accessexcellence.org/RC/
biology4kids	http://www.biology4kids.com/files/micro_main.html#theTop
Catch the Science Bug	http://sciencebug.org/
General Atomics Sciences Education Foundation	http://www.sci-ed-ga.org/modules/
Library.thinkquest	http://library.thinkquest.org/CR0212089/micr.htm
Science Fair - THE SCIENCE CLUB	http://scienceclub.org/proj/kidproja.html
Women's Adventures in Science	http://iwaswondering.org/
American Chemical Society	http: //portal.acs.org/portal/acs/org/content
How stuff works	http: //science.howstuffworks.com
The Physics Classroom	http: //www.physicsclassroom.com
Enchanted Learning	http: //www.enchanted learning.com
Flashcards Exchange	http: //www.flashcardsexchange.com
Do Science ScienceNetLinks:	http: //www.doscience.com http: //www.sciencelinks.com
Science-General/investigations	www.scienceteachers.com http: //www.teachingideas.com
Science project ideas	http://www.ressants.org

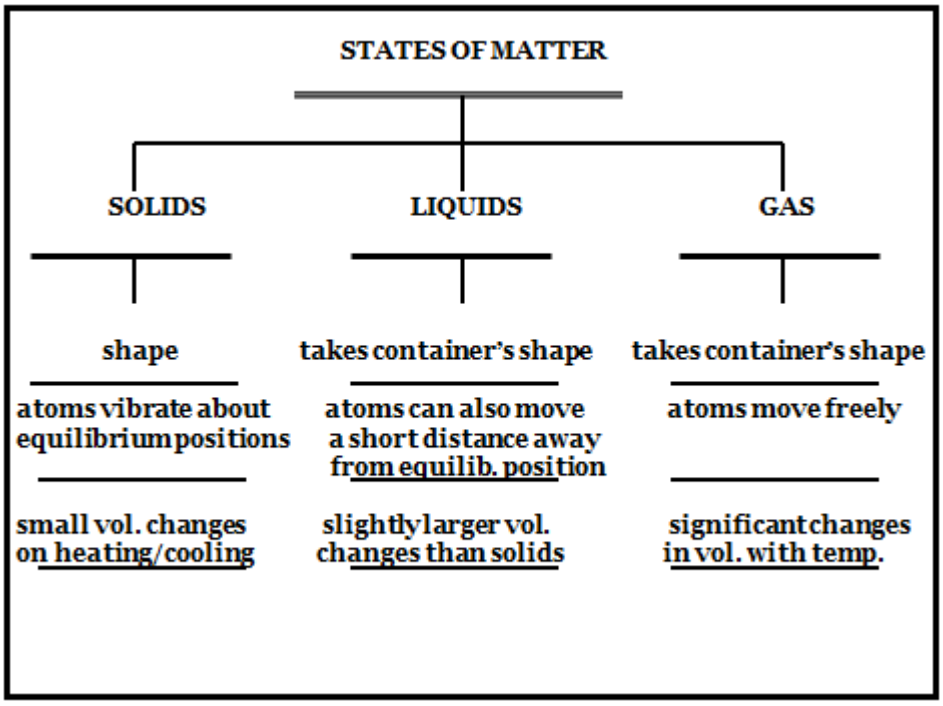
The Science Explorer	http: //www.exploratorium,edu/science_explorer
Science activities	http: //fiedu/tfi/activity
BBC Science and nature	http://www.bbc.co.uk/sn
Weird science kids	http://wierdsciencekids.com
Rubrics Ministry of Education Website	http://rubistar.4teachers.org/ http://moe.edu.tt/

On Line Resources for Curriculum Adaptations

Types of curriculum adaptations	http://www.snipsf.org/wp-content/uploads/2011/08/NineTypes.pdf
Learning activities that connect with multiple intelligences	http://www.scholastic.com/teachers/article/clip-save-checklist-learning-activities-connect-multiple-intelligences
Strategies for students with specific learning needs	http://www.do2learn.com/disabilities/CharacteristicsAndStrategies/SpecificLearningDisability_Strategies.html
Adaptations of assignment and instruction	http://www.bced.gov.bc.ca/specialed/adhd/app4.htm

4. Graphic Organisers

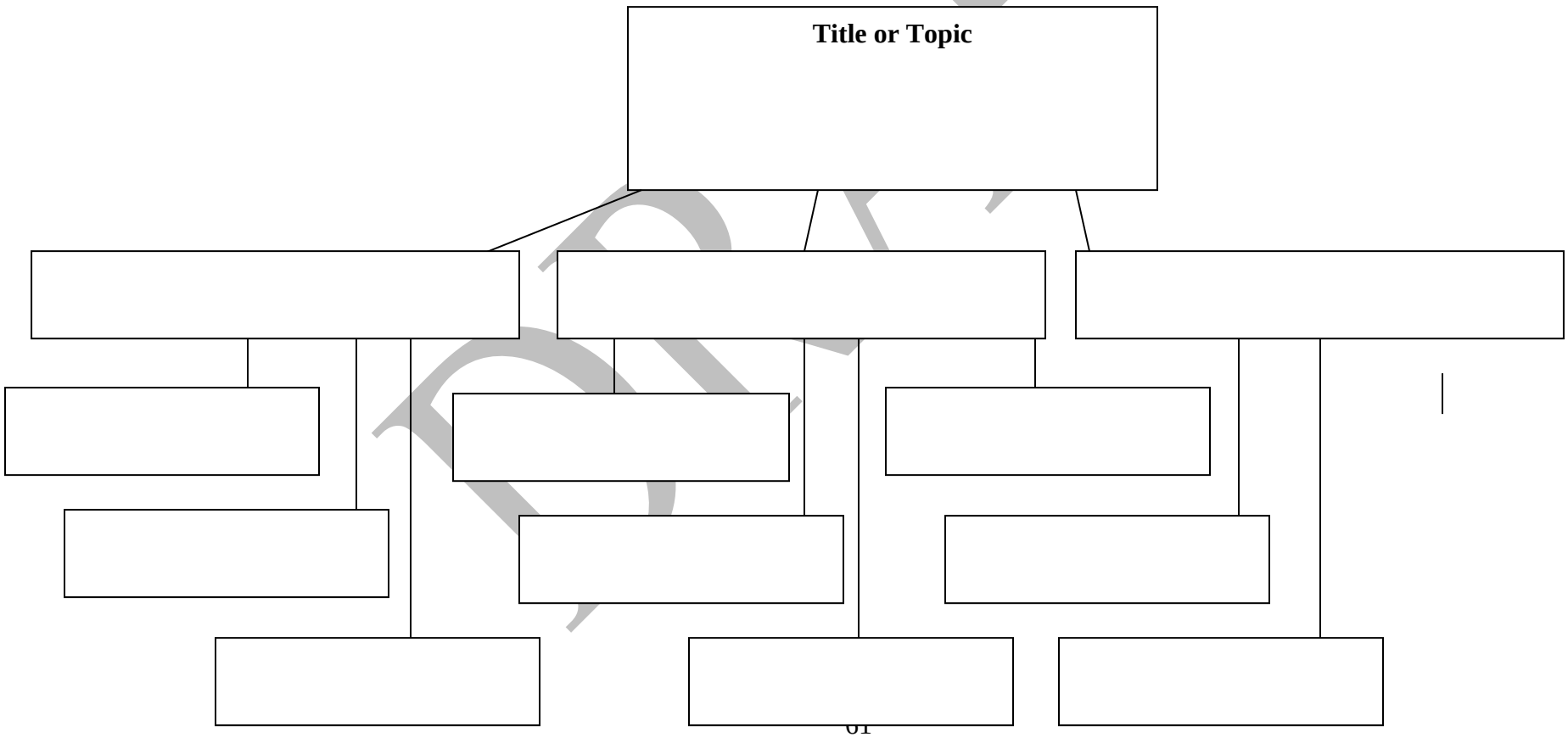
Tree Map



Tree Graphic Organizer

Name _____ Date _____

Class/Subject _____ Teacher _____



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