Lesson 1

TOPIC/ASPECT - Diversity of Matter - Introduction to Integrated Science

SUBTOPIC - Pure and Applied Science

OBJECTIVES: By the end of the lesson, the pupil will be able to

(i) Define science.
(ii) Explain the term observation as it applies to science.
(iii) Give at least 3 examples each of fields under pure science and applied science.
(iv) Explain the term Integrated Science

INTRODUCTION

Review pupils RPK by questioning to explore pupils perception of Science as a subject.

ACTIVITIES

1. Explain what science is and let pupils discuss the concept of observation and experimentation.
2. Emphasize the fact that observation does not only involve using the eye to perceive things but rather employing one’s senses to collect information. Indicate the fact that machines may be used for observation as well.
3. Guide pupils to list and define the major aspects of pure science. Use pupils understanding of the fields under pure science to infer corresponding area of applied science. Example one who studies
Biology (Pure) and Chemistry (Pure) can apply his or her knowledge in Agriculture Science (Applied).

4. Explore the interwoven nature of the aspects of Science through discussion and let pupils brainstorm the meaning of Integrated Science.

CLOSURE

Review the lesson by using word cards to review pupil’s knowledge on the fields of science and their meaning.

Summarize the salient points. Give exercise pupils for pupils to copy and complete.

TLM

Word Cards containing names of fields of Science.

Dictionary

CONTENT

Science is a method of obtaining knowledge through observation and experimentation.

Observation: This is the skill of using our senses to gather information about objects or events. This also includes the use of instruments to extend the range of our senses.

Pure science is an aspect involving fields of science that attempt to
understand nature so that it can be used in practical situations. Examples include Physics, Chemistry and Biology.

**Applied Science** involves the use of knowledge and working principles of pure science. Examples include Medicine, Pharmacy, Engineering, Agriculture, and Biochemistry.

**ASSIGNMENT**

Ask pupils to make more lists on fields of science and present them for discussion in the next class.
Lesson 2

TOPIC/ASPECT - Diversity of Matter - Introduction to Integrated Science

SUBTOPIC - Natural and Social Science

OBJECTIVES: By the end of the lesson, the pupil will be able to

(i) Differentiate between natural science and social science
(ii) Classify given fields of science under natural and social sciences.
(iii) Identify other fields of science.

INTRODUCTION

Use keywords from previous lesson for dictation.

Review pupils RPK through questioning.

ACTIVITIES

1. Let pupils come out with their findings on the fields of science that had not been mentioned in previous lesson. Discuss relatively unfamiliar fields of science. Reinforce pupils understanding with pictures.
2. Explain to pupils that science can further be classified into natural and social science.
3. Guide pupils to define natural science social science and provide examples to support the definition.
4. Guide pupils to differentiate between social and natural science.
CLOSURE

Review the lesson by using word cards to review pupil’s knowledge on the fields of science and their meaning.

Summarize the salient points. Give exercise pupils for pupils to copy and complete.

TLM

Word Cards containing names of fields of Science.

Dictionary

Pictures (of people who work in various fields of science)

CONTENT

Natural Science: deals with objects, phenomena, laws of nature and the physical word. It is the use of scientific knowledge to study nature. It is the bases of natural science. Natural science fields include Biology, Chemistry, Physics, Astronomy, Botany, and Zoology.

Social Science: deals with study of human behavior and society. It emphasizes the study of humanity using quantitative and qualitative data. Examples include sociology, anthropology, psychology, economics, history and politics.

ASSIGNMENT

Ask pupils to tabulate 3 differences and 2 similarities between natural and social sciences and present them for discussion in the next class.
Lesson 3

TOPIC/ASPECT - Diversity of Matter - Introduction to Integrated Science

SUBTOPIC - The way of Scientist (Scientific method)

OBJECTIVES: By the end of the lesson, the pupil will be able to

(i) Explain what the scientific method is.
(ii) Arrange the steps in the scientific method correctly.
(iii) Explain the terms associated with the scientific method
(iv) Use the scientific method to explain how a given problem can be solved.

RPK

Pupils have been performing experiments in the primary school.

INTRODUCTION

Use keywords from previous lesson for dictation.

Review pupils RPK through questioning. Ask pupils about how an experiment was done from the primary school.

ACTIVITIES

1. Give a short narrative to explore a common problem in the society and solicit for pupils suggestions on how it can solved.
2. From pupils suggestions, Help them to explore how suggestions can be verified as a better solution. Guide pupils to define what the scientific method.
3. Guide pupils to list the steps of the scientific method. Insist on the need to list it in the right order.
4. Discuss the terms hypothesis, experiment, conclusion, analysis, deduction and conclusion as it applies to the scientific method.

5. Refer to a topic from the primary six text book and help pupils to identify the parts of the experiment. Example Title, Aim, Apparatus, Method, Observation and Conclusion.

6. Relate the scientific approach to other methods of acquired knowledge such as magic (superstition) and indicate the advantages of the scientific approach over them.

CLOSURE

Summarize the salient points. Give exercise pupils for pupils to copy and complete.

TLM

Dictionary

CONTENT

Scientific method refers to the systematic approach used by scientist to solve problems.

Steps

(i) Identify problem (clearly defined)
(ii) Hypothesis (make intelligent guess based on experience)
(iii) Carry out experiment (test hypothesis)
(iv) Record and analyze observation (refine data)
(v) Making deduction and conclusion.

Advantages of Scientific Methods

(i) Can be verified
(ii) Empirical (based on observation and experimentation)
(iii) Tentative (can be updated)
(iv) Replicable (under similar conditions knowledge can be reproduced)
(v) Unique
(vi) Humanistic

ASSIGNMENT

Ask pupils to write 4 advantages of scientific knowledge over other forms of knowledge and present them for discussion in the next class.
FORM 1 - INTEGRATED SCIENCE

Lesson 4

TOPIC/ASPECT - Diversity of Matter - Introduction to Integrated Science

SUBTOPIC - Science and Society

OBJECTIVES: By the end of the lesson, the pupil will be able to

(i) Explain at least 3 problems scientist face in their studies
(ii) Mention at least three distinguished Ghanaian scientist and indicate their fields of expertise
(iii) Mention at least 2 distinguished foreign scientist
(iv) List at least 3 ways by which scientific knowledge is misused

RPK

Pupils can mention some importance of scientific knowledge to the society.

INTRODUCTION

Use keywords from previous lesson for dictation.

Review pupils RPK through questioning

ACTIVITIES

1. Explain to pupils that scientific knowledge though has many advantages over other forms of knowledge; scientists worldwide face some common problem. Discuss these points as in content.
2. Discuss the contributions of some distinguished Ghanaian scientist. Towards society. Use pictures to reinforce understanding and
interest. Discuss a few international scientist including Faraday, Isaac Newton, Pascal, Alexander Fleming (Source : Encarta)

3. Explain to pupils that as much as scientific knowledge is meant to good things, some people may displace the intent with technology is be forged. Some people may use it for equally bad things.

4. Let pupils brainstorm and come out with examples of applications that show misuse of scientific knowledge.

CLOSURE

Summarize the salient points. Give exercise pupils for pupils to copy and complete.

TLM

Dictionary

Digital or printed images (Ghana and abroad showing their areas of expertise)

CONTENT

Problems scientist face in the society with respect to their work

1. Ridicule e.g. Galileo in his time about the solar system
2. Lack of support for research work e.g. *Jatropha* (bio diesel proposal) by some Ghanaian scientist.
3. Lack of appreciation and motivation for scientific achievement
4. Cost of science education
5. Cost of technology for research work

Ghana
1. Prof. F.K.A Allotey – Mathematics and Physics
2. Dr. Frimpong Boateng - Cardio Surgeon
3. Mrs. Millicent A Cobblah – Ecologist
4. Pro. Ewurama Addy – Biochemistry
5. Foreign Scientist

Other nations

1. Archimedes – Floatation and Density
2. Sir Isaac Newton – Motion Laws
3. Pascal – Theories on pressure
4. Galileo – Astronomy
5. Alexander Fleming – Penicillin

Misuse of Scientific knowledge

1. Bombs used in wars and terrorism e.g. Hiroshima (August 6th), World Trade Center bombings.
2. Sophisticated guns for killing and depleting wildlife.
3. Destruction of forest with heavy machinery e.g. Excavators in mining
4. Cyber fraud
5. Excessive use of fertilizer and DDT in farming.

ASSIGNMENT

Ask find out more about useful applications of scientific knowledge that improve the quality of life and present them for discussion in the next class.
FORM 1 - INTEGRATED SCIENCE

Lesson 5

TOPIC/ASPECT - Diversity of Matter - Introduction to Integrated Science

SUBTOPIC - Science and Society

OBJECTIVES: By the end of the lesson, the pupil will be able to

(i) Explain the terms superstition and taboo
(ii) State at least 3 usefulness of taboos to our communities
(iii) State at least 3 disadvantages of taboos over scientific knowledge
(iv) Explain at least 3 common taboo practices with scientific bases

RPK

Pupils are aware of some common believe systems in their communities

INTRODUCTION

Use keywords pupils’ text book for dictation.

Review pupils RPK through questioning

ACTIVITIES

1. Guide pupils to brainstorm and come out with the meaning of superstition and mention some examples of practices and belief from their communities deemed superstitious.
2. Let pupils brainstorm and come out with the meaning of taboo. Discuss specific taboos in their communities and help them to explore the scientific explanations behind their enforcement.
3. Discuss the importance of these taboos in making the community and people safe using the examples from the activities in (2).
4. Discuss some negative effects taboos and superstition the society and scientific research.

CLOSURE

Summarize the salient points. Give exercise pupils for pupils to copy and complete.

TLM

Dictionary

CONTENT

Superstition means irrational fear of the unknown. It involves practices where people attribute occurrence as signs of good and bad luck. Examples include: use of numbers as lucky and unlucky numbers; black cats, volcanoes, hurricane draught and famines; magic, witchcraft, taboos.

Taboos are forbidden practices with traditional bases.

Reasons for taboos

1. Personal hygiene
2. Personal safety
3. Control of spread of communicable diseases
4. Prevent people from being wicked rare animal species
5. Instill good social habits in people

Negative Influence of Superstition

1. It impedes research into natural occurrences.
2. Negative psychical effects.
3. People may take undue advantages of others using superstitious bases

ASSIGNMENT
Ask pupils in groups to prepare debates on the topic “science blessing or curse?” for discussion in the next class.
FORM 1 - INTEGRATED SCIENCE

Lesson 6

TOPIC/ASPECT - Diversity of Matter - Introduction to Integrated Science

SUBTOPIC - Science and Society

OBJECTIVES: By the end of the lesson, the pupil will be able to

(i) Define technology
(ii) State at least 3 similarities between science and technology
(iii) State at least 3 differences between science and technology
(iv) State and explain at least four benefits of science and technology to the society

RPK

Pupils use the various inventions of science and technology

INTRODUCTION

Use keywords pupils’ text book for dictation.

Review pupils RPK through questioning

ACTIVITIES

1. Let pupils brainstorm and come out with the meaning of technology by exploring some technological inventions and their uses.
2. Revise the meaning of science and help them to establish the similarities between science and technology in terms of definition.
3. Emphasize the fact that science and technology are integrated yet there are differences. Guide pupils to differentiate between science and technology in terms of
- Reproduction
- Purchase
- Update of method and knowledge

4. Discuss the benefits of technology as in content

**CLOSURE**

Summarize the salient points. Give exercise pupils for pupils to copy and complete.

**TLM**

Dictionary

Pictures and real inventions of technology and science

**CONTENT**

**Technology** is the *practical use* of scientific discovery in industry.

Differences between science and Technology

<table>
<thead>
<tr>
<th>Science</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be demonstrated</td>
<td>Can be bought and used</td>
</tr>
<tr>
<td>Can be understood</td>
<td>Can be used without understanding</td>
</tr>
<tr>
<td>Product (laws and Principles)</td>
<td>Products can be seen and felt</td>
</tr>
<tr>
<td>Changes occur gradually</td>
<td>Changes occur within a short time</td>
</tr>
</tbody>
</table>

**Science** is a method of obtaining knowledge through *observation* and *experimentation*

**Benefits of Science and technology**

1. Improved Health
2. Improved Education
3. Improved Agriculture
4. Improved Communication
5. Improved Transportation
6. Improved Shelter
7. Improved Energy
8. Improved clothing

ASSIGNMENT

Ask pupils to list one use of technology each associated with the benefits of science and technology as in content. (BECE 2012 Qu 2a)