UNICEF Education Kit Handbook

Science Kit Guidance
INTRODUCTION

The UNICEF Education in Emergencies (EiE) Handbook is a tool that provides training and curricular guidance in support of UNICEF pre-packaged education kits. This is the first version of the handbook and it has only been partially field tested. As such, all feedback is critical and welcome to help inform the planned revision. Please contact the Education Unit at UNICEF Supply Division with all relevant input, criticism and suggestions.

The handbook is available in French and English. Each education kit shipped from Supply Division will contain the relevant module. Module One, the overall guidance module, is available upon request, or on the UNICEF website, along with all the other modules.

ACKNOWLEDGEMENTS

The Handbook was developed over eighteen months by UNICEF staff from the Programme Education sections in New York and Geneva and from Supply Division in Copenhagen. This document was developed through a consultative process led by a consultant that was guided by a reference group composed of UNICEF staff from Country Offices, Regional Offices and HQ locations. It was also independently reviewed at various stages by other UNICEF staff. A special thank you goes to all those who supported this project.

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KEY TERMINOLOGY

Definition of Child: The terms child and children refer to all children and young people from birth to 18 years of age, as specified in the UN Convention on the Rights of the Child. If a particular age group of children is intended, this will be made clear in the text.

Age groups: It is important to highlight that age groups can vary according to context and culture. Indicatively the Handbook targets the age groups below:

1) Infants, toddlers and pre-school children approximately from birth to seven/eight years.
2) Young adolescents between ten and fourteen years.
3) Older adolescents between fifteen and nineteen years.
4) Youths are adolescents and young adults between the ages of fifteen and twenty-four years.
   (Reference: United Nations definitions)

Definition of Pupil(s) and Student(s): Terms pupil(s) and student(s) refer to children taught by a teacher. They are interchangeable.

Definition of Instructor(s), Caregiver(s) and Teacher(s): The term instructor(s) refers to the personnel implementing the semi-structured recreational activities (Module Two). The term caregiver(s) refers to the personnel implementing early childhood education activities (Module Three). The term teacher(s) refers to the personnel implementing basic primary education and primary mathematics and science education (Module Four, Module Five and Module Six).

NOTE Volunteers are non-paid members of the local community who voluntarily help in the implementation of the activities. They are not members of staff but they should sign a Code of Conduct.

Definition of Trainer(s): The term trainer(s) refers to the personnel delivering the training to instructors, caregivers and teachers (Module One).

Definition of Trainee(s): The term trainee(s) refers to those who receive training. They can be (1) the trainers during the Training of Trainers (TOT) or (2) the instructors, caregivers and/or teachers receiving the training from the trainers.

Definition of Child-Friendly Spaces/Environment(s): The term Child-Friendly Spaces/Environment(s) (CFS/Es) is used in a broad sense. It is important to highlight that there is a broad and developing literature on the definition(s) of CFS/Es that involves different disciplines. Also the terminology used to indicate CFS/Es can vary among agencies. In the Handbook the term CFS/Es can refer to:

- CFS/Es, which are ‘places designed and operated in a participatory manner, where children affected by natural disasters or armed conflict can be provided with a safe environment, where integrated programming including play, recreation, education, health, and psychosocial support can be delivered and information about services/supports is provided. Generally Child-Friendly Spaces refer to relatively short to medium term programme responses. They are very often operated from tents and/or temporary structures (e.g. in schools, under a tree or a vacant building).’ UNICEF, 2009, A Practical Guide for Developing Child-Friendly Spaces', p.9.
• Temporary Learning Spaces (TLS), which are set up in the immediate aftermath of an emergency.
• Alternative Learning Spaces (ALS), which can be ‘set up just about anywhere according to the context. Alternative learning spaces can be churches, mosques, temples, community halls, rooms within the community chief’s office, libraries, a compound, allocated land and an unused room in a private house or even a boat’. UNICEF, 2009, ‘Child Friendly Schools Manual’, Chapter 4, p.22.
• Existing or rehabilitated schools.
• Child Friendly Schools (CFS) as defined in the UNICEF, 2009, ‘Child Friendly Schools Manual’.


KEY GRAPHIC MARKS:
The following icons aim at facilitating the comprehension of the text:

1. **KEY MESSAGE** summarises important learning content in a nutshell.
2. **TRAINING** provides indications on how to convey the KEY MESSAGES during the training session.
3. **NOTE** indicates a suggestion, tip, encouragement, clarification and idea.
4. **THINK** invites readers to reflect on their own experience and context.
5. **LEARNING OUTCOMES** indicates what is expected to be learned. It can help in monitoring and evaluating the progress of learning.
6. **TABLES** are lists of items.
7. **PICTURES** are visual examples of key concepts described in the text.
8. **BOX** summarises general contents and helps to visualise them all together.
9. **SAMPLES** are examples of what teachers and caregivers are expected to do.
10. **YOUR ROLE** summarises what is expected from the trainer in Module One and from the instructors, caregivers and teachers in Modules Two, Three, Four, Five and Six.
11. **CASE STUDY** are examples of education interventions already implemented.
12. **CHECK LIST** indicates important points to consider before and during the implementation of the activities.
13. **ACTIVITY** indicates the beginning of a new chapter in a unit.
INTRODUCTION TO TEXT

1. Rationale of the EiE Handbook

The right to education is most at risk during emergencies and during the transition period following a crisis. In conflict-affected countries, 28 million children of primary school age were out of school in 2011 – 42 per cent of the world total. Only 79 per cent of young people are literate in conflict-affected countries, compared with 93 per cent in other poor countries. Moreover, children living in conflict are twice as likely to die before their fifth birthday as children in other poor countries.

The Core Commitments for Children in Humanitarian Action – the CCCs – constitute UNICEF’s central humanitarian policy to uphold the rights of children affected by humanitarian crisis. They are a framework for humanitarian action, around which UNICEF seeks to engage with partners. The updated CCCs continue to promote predictable, effective and timely collective humanitarian action and to clearly outline the areas in which UNICEF can best contribute to results including education.

In addition, the Inter-Agency Network for Education in Emergencies (INEE) has developed the Minimum Standards Handbook. The Handbook is designed to give governments and humanitarian workers the tools they need to address the Education for All movement and the UN Millennium Development Goals (MDGs). It is the first step toward ensuring that education initiatives in emergency situations provide a solid and sound basis for post-conflict and disaster reconstruction. Both instruments have been complementary and critical in the preparedness and response of the Inter-Agency Standing Committee (IASC) Humanitarian Reform launched in 2005 that established the education cluster approach.

UNICEF believes that education is not only a basic human right; it is an instrumental strategy for supporting recovery. It not only restores schooling and all its related benefits to affected people, it also helps countries transform and rebuild the institutions and systems destroyed during the emergency. Re-establishing education after an emergency not only safeguards children’s fundamental right to education, it also plays a critical role in normalising their environment. This helps them overcome the psychosocial impact of disasters and conflict.

**Back-to-School (BTS) Initiatives:** a strategy to put into action the CCCs

UNICEF and partners coordinate with Ministries to provide safe temporary learning spaces; teaching and learning materials; and training of teachers, parents, education officials and others to provide quality education, reduce drop-out and promote student retention. In essence, the BTS initiative offers a way to put the CCCs into practice.

With the introduction of the first UNICEF-supported BTS Initiative after the Rwandan genocide in 1994, these initiatives have become a powerful first response and strategy in facilitating access to protective learning environments for approximately 27 million children affected by conflict and natural disasters. These initiatives have been implemented with great success in over 55 countries in the period 1994-2012, including Afghanistan, Côte d’Ivoire, Haiti, Lebanon, the State of Palestine, South Sudan, and Uganda. BTS Initiatives are characterised by 1) the establishment of robust targets for numbers of children to return to some form of education as quickly as possible after the onset of the emergency, 2) rapid deployment of education supplies in the form of kits as well as teaching and learning materials to aid in resumption of education, 3) establishment of some form of temporary learning infrastructure as needed, combined with the rapid
repair of damaged schools, and 4) intensive advocacy, communication and social mobilization efforts with governments, communities, donors and partner organizations.

The Handbook aims at providing training and curricular guidance related to existing pre-packaged materials or kits. It is intended to strengthen the impact of UNICEF from the initial first response of pedagogical supplies to one of fostering learning, growth and development. With the Handbook, the education kits, and proper teacher training, it will be possible to extend the utility of the individual kits, improving the quality of the initial education response in BTS initiatives.

2. Objectives of the Handbook

a) To provide curricular guidelines and instructions on how to use the teaching aids contained in the kits for teachers, caregivers and instructors working in emergency contexts. A printed copy of each curriculum is contained in the related kit.

b) To provide training guidelines for the trainers involved in the emergency response.

The complete Handbook is available for download via the UNICEF website.

3. Overview of the Handbook

BOX 1: Overview

<table>
<thead>
<tr>
<th>MODULE</th>
<th>CURRICULUM</th>
<th>KIT</th>
<th>TARGET GROUP(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module One</td>
<td>Guidelines for Training of Trainers</td>
<td>No specific kit</td>
<td>Trainers</td>
</tr>
<tr>
<td>Module Two</td>
<td>Recreation Kit Guidance</td>
<td>Recreation Kit</td>
<td>Instructors</td>
</tr>
<tr>
<td>Module Three</td>
<td>Early Childhood Development Kit Guidance</td>
<td>Early Childhood Education (ECD) Kit</td>
<td>Caregivers</td>
</tr>
<tr>
<td>Module Four</td>
<td>School in a Box Kit Guidance</td>
<td>School-in-a-Box (SiB) Kit</td>
<td>Teachers</td>
</tr>
<tr>
<td>Module Five</td>
<td>Mathematics Kit Guidance</td>
<td>Primary Mathematics Kit (PMK)</td>
<td>Teachers</td>
</tr>
<tr>
<td>Module Six</td>
<td>Science Kit Guidance</td>
<td>Primary Science Kit (PSK)</td>
<td>Teachers</td>
</tr>
</tbody>
</table>

4. Target groups of the Handbook

The Handbook targets three groups:

a) **The actors involved in the preparedness and coordination of the education response to emergencies.** These actors are responsible for purchasing the teaching aids, identifying and setting up the learning spaces and providing the training of trainers and of teachers, caregivers and instructors according to the contextual needs and priorities. They are UNICEF personnel from HQ, Regional and/or Country Offices and Focal Points and representatives of the Ministry of Education (MOE) or other Education Authorities involved in the preparedness and coordination of the education response in emergencies. They can be members of staff of Implementing Partners (IP) such as International Non-Governmental Organizations (INGOs), National Non-Governmental Organizations (NGOs) and local Community Based Organizations (CBOs) and/or practitioners.
b) The trainers involved in the training of teachers, caregivers and instructors before (pre-service training) and possibly also during (in-service training) the response to the emergency according to the specific contextual needs. Usually the EiE/C trainers are trained in advance and are strategically positioned, for example in Regional Offices, in order to provide a rapid response to emergencies.

c) The teachers, the caregivers and the instructors who directly implement the EiE curricula with the support of the teaching aids contained in the related education kit.

5. Overview of the UNICEF Education Response in Emergencies

The UNICEF education response in emergencies takes a ‘phased-approach’. Box 2 below provides an overview by phase. It is important to highlight that the Handbook can also be used in non-emergency settings.

BOX 2: Overview of the UNICEF Education Response in Emergencies

<table>
<thead>
<tr>
<th>PHASE</th>
<th>TIME-LINE</th>
<th>ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHASE ZERO:</td>
<td>Preparedness:</td>
<td>• Trainers are identified and trained.</td>
</tr>
<tr>
<td></td>
<td>Before the emergency.</td>
<td>• The UNICEF education kits are strategically pre-positioned.</td>
</tr>
<tr>
<td>PHASE ONE:</td>
<td>Rapid Response:</td>
<td>• CFS/Es are identified and set-up according to the context.</td>
</tr>
<tr>
<td></td>
<td>The first eight weeks from the</td>
<td>• Education kits are distributed.</td>
</tr>
<tr>
<td></td>
<td>onset of the emergency. Acute</td>
<td>• Semi-structured recreational activities are implemented and are</td>
</tr>
<tr>
<td></td>
<td>phase of the emergency.</td>
<td>linked to non-formal education programmes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Teachers, caregivers and instructors are recruited and trained.</td>
</tr>
<tr>
<td>PHASE TWO:</td>
<td>Early Recovery:</td>
<td>• Non-formal education is implemented while the national education system</td>
</tr>
<tr>
<td></td>
<td>Approximately between eight</td>
<td>is rehabilitated.</td>
</tr>
<tr>
<td></td>
<td>weeks and six months from the</td>
<td>• The national curricula and the related textbooks in use before the</td>
</tr>
<tr>
<td></td>
<td>onset of the emergency. Acute</td>
<td>emergency are recovered.</td>
</tr>
<tr>
<td></td>
<td>phase of the emergency.</td>
<td>• If it is not possible to recover the national curricula and the related</td>
</tr>
<tr>
<td></td>
<td></td>
<td>textbooks, new national curricula are developed in collaboration with the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ministry of Education (MOE) or other Education Authorities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Textbooks related to the new curricula are developed and printed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In the case of refugees, links are established with the education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>curricula of the country of origin.</td>
</tr>
<tr>
<td>PHASE THREE:</td>
<td>Transition Phase:</td>
<td>• Children resume formal schooling.</td>
</tr>
<tr>
<td></td>
<td>After approximately six to eight</td>
<td>• The formal curriculum is introduced.</td>
</tr>
<tr>
<td></td>
<td>months from the onset of the</td>
<td>• Textbooks are distributed.</td>
</tr>
<tr>
<td></td>
<td>emergency.</td>
<td></td>
</tr>
</tbody>
</table>

• Types of Education provided by the EiE Non-Formal Curriculum

The EiE/C Non-Formal Curriculum provides different types of education according to the specific context and needs.

**Formal Education** refers to the national education system of a country implemented and managed by the Ministry of Education (MoE) or other Education Authorities. Formal education implies the existence of national curricula and related textbooks. UNICEF EiE/C Primary Mathematics Education (Module Five) and Primary Science Education (Module Six) are intended as an extra support to existing curricula and reference textbooks.

**Non-Formal Education (NFE)** targets specific disadvantaged groups who due to their circumstances need ad-hoc, tailored educational programmes. Alternative Learning Programmes (ALP) for Refugees and Internally Displaced People (IDPs) are an example of NFE. NFE programmes are not an alternative to formal education. Early Childhood Development Education (Module Three) and Basic Primary Education (Module Four) are also NFE programmes.

**Informal Education** is complementary to Formal and Non-Formal education programmes. Informal Education provides extra-curricular activities in informal settings, such as youth clubs or informal groups. Informal Education activities are not implemented during Formal or Non-Formal Education hours. Informal Education is not a substitute for Formal or Non-Formal Education. Recreational Activities (Module Two) provide Informal Education activities.

**BOX 3: Types of Education provided by the UNICEF EiE/C Curriculum**

<table>
<thead>
<tr>
<th>CURRICULUM AND KIT</th>
<th>TARGET GROUP</th>
<th>TYPE OF EDUCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Childhood Education – ECD Kit</td>
<td>Approximately 0 – 6 year-old infants, toddlers and pre-school children</td>
<td>Non-formal Education</td>
</tr>
<tr>
<td>Basic Primary Education – School-in-a-Box (SIB) Kit</td>
<td>Approximately 7/8 – 19 year-old children and adolescents</td>
<td>Non-Formal Education for Beginners (B) and Non-beginners (N).</td>
</tr>
<tr>
<td>Primary Mathematics Education – PMK</td>
<td>Approximately 7/8 – 19 year-old children and adolescents</td>
<td>Formal Education</td>
</tr>
<tr>
<td>Primary Science Education – PSK</td>
<td>Approximately 7/8 – 19 year-old children and adolescents</td>
<td>Formal Education</td>
</tr>
</tbody>
</table>
• Deployment of the UNICEF Education Kits

The deployment of the UNICEF education kits is in line with the different phases of the emergency. BOX 4 below provides an indicative overview of the deployment of the kits by phase.

BOX 4: Deployment of the Education Kits according to the Phase of the Emergency

<table>
<thead>
<tr>
<th>PHASE ONE:</th>
<th>Rapid Response</th>
<th>Recreation – Kit</th>
<th>Early Childhood Development Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHASE TWO:</td>
<td>Early Recovery</td>
<td>Recreation Kit</td>
<td>Early Childhood Development Kit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>School-In-a-Box Kit</td>
<td></td>
</tr>
<tr>
<td>PHASE THREE:</td>
<td>Transition Phase</td>
<td>Recreation Kit</td>
<td>Early Childhood Development Kit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>School-In-a-Box Kit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Primary Mathematics Kit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Primary Science Kit</td>
<td></td>
</tr>
</tbody>
</table>

• Training related to the implementation of the Handbook

The Handbook requires two sets of training:

- **Training of Trainers (TOT).** Trainers are trained on how to set-up and deliver the training to instructors, caregivers and teachers. Module One provides the training guidelines related to the EiE/C Curricula. Trainers are identified and trained on the Handbook during the preparedness phase.

- **Training of Instructors, Caregivers and Teachers.** Instructors, caregivers and teachers implementing the EiE/C Curricula should receive a pre-service training, which can be followed-up by an in-service training according to their specific needs and context. Instructors, caregivers and teachers are trained on the specific Module they are going to implement. Instructors will be trained on Module Two, caregivers will be trained on Module Three and teachers will be trained on Modules Four, Five or Six.
Welcome to Module Six of the **UNICEF Education in Emergencies (EiE) Handbook**. In this module you will learn how to plan and deliver science lessons using the materials of the UNICEF Primary Science Kit (PSK) in a context of emergency and crisis or in a setting with limited educational resources.

You are about to play a major role in the lives of many children who have survived a natural disaster or conflict and/or live in settings with limited resources. Many of these children have experienced traumatic and distressing events that suddenly changed their lives. It is highly likely that you have experienced the same events.

This module aims at providing practical guidelines and tools that can help you in your tasks as an instructor. The UNICEF EiE Primary Science Curriculum requires teaching experience and knowledge of primary level sciences. The UNICEF Primary Science Kit (PSK) was designed to meet the needs of science teaching in primary schools based on existing curricula and textbooks.

The success of the activities provided will be determined by your engagement with the families, the local community and authorities, your capacity to deal positively with the challenges you will be facing, and your dedication to the well-being of the children in your care.

You will be working closely with other teachers, and with parents, caregivers, community members, local authorities and other support staff, to facilitate the good management of a Child-Friendly Space/Environment (CFS/E). In addition, you will be collaborating with UNICEF personnel and/or with the Implementing Partners (IPs) appointed by UNICEF.

It is likely that many of the challenges you encounter will not be solved immediately—therefore, your patience, creativity and initiative will go a long way toward ensuring that your efforts are successful.

Please use the following guidelines in your best capacity and use your best judgment in applying them to your context. Thank you for your valuable contribution!
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UNIT ONE:

DESCRIPTION OF THE TEACHING AIDS CONTAINED IN THE PRIMARY SCIENCE KIT (PSK)

In this Unit you will learn to identify the different science teaching aids contained in the UNICEF PSK, and how to use them in the implementation of the learning activities. Some of the teaching aids may be new to you—therefore, it is very important that you take the necessary time to familiarize yourself with them.

**LEARNING OUTCOMES**

At the end of Unit One you will be able to

1. Identify the teaching aids contained in the UNICEF PSK
2. Explain how to store and restock the UNICEF PSK

**YOUR ROLE** is to familiarize yourself with the teaching aids contained in the UNICEF PSK, and understand how to use them in the implementation of the activities.

The **objective** of Unit One is to provide an overview of the teaching aids contained in the UNICEF PSK.
**ACTIVITY ONE:**
What teaching aids can I find in the UNICEF Primary Science Kit?

The following table provides a list of the materials contained in the UNICEF PSK. It includes a picture, the quantity, and a short description of each of the materials. Read it carefully and check to ensure that all of the materials are present in the box you received. Take the time to count the materials and familiarize yourself with the contents.

**TABLE 1: List of the materials contained in the UNICEF Primary Science Kit (PSK)**

<table>
<thead>
<tr>
<th>#</th>
<th>ITEMS</th>
<th>PICTURES</th>
<th>QUANTITY in each box</th>
<th>DESCRIPTION AND USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spring Scale</td>
<td><img src="image1" alt="Spring Scale" /></td>
<td>1 item</td>
<td>1 0.5N spring scale with a hanging loop and an aluminium frame. <strong>Use:</strong> It can be used together with the weights or separately to measure the weight and force of an object.</td>
</tr>
<tr>
<td>2</td>
<td>Lever</td>
<td><img src="image2" alt="Lever" /></td>
<td>1 item</td>
<td>Lever consisting of 30 cm rod with metal base. <strong>Use:</strong> To demonstrate the conditions of force balance.</td>
</tr>
<tr>
<td>3</td>
<td>Hanging Weights</td>
<td><img src="image3" alt="Hanging Weights" /></td>
<td>1 kit</td>
<td>1 plastic case containing 10 pieces of 50 g weight. <strong>Use:</strong> The weights can be used with the Spring Scale and the lever to measure force and the weight of force.</td>
</tr>
</tbody>
</table>
| 4  | Turbine Wheel                | ![Turbine Wheel](image4) | 1 kit                 | 1 plastic turbine wheel consisting of:  
  • 1 U shape handle  
  • 1 axle with 8 gears to hold the plastic blades  
  • 10 plastic blades (2 are spare blades) with round top  
  **Use:** To demonstrate wind and water power. |
| 5  | Simple Mechanical kit        | ![Simple Mechanical Kit](image5) | 1 kit                 | 1 plastic case containing:  
  • 1 vertical shank  
  • 1 lever  
  • 1 Ø60 large wheel  
  • 1 Ø30 small wheel  
  • 1 large gear  
  • 1 small gear  
  • 2 fixed pulleys  
  • 1 movable pulley  
  • 1 rotating wheel  
  • 1 piston with connecting rod  
  • 1 fixing piece  
  • 2 long bolts  
  • 3 short bolts  
  • 1 small bolt  
  • 1 driving belt  
  • 3 strings with hooks  
  • 1 rotating handle  
  • 1 long rod  
  • 1 brake rod  
  **Use:** To demonstrate simple mechanical movements. |
| 6  | Simple Pulleys               | ![Simple Pulleys](image6) | 4 items               | 4 items consisting of:  
  • 2 single pulleys of Ø40mm  
  • 2 double pulleys of Ø40mm  
  **Use:** In experiments of mechanics. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Kit Name</th>
<th>Description</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Experiment Trolley</td>
<td>1 item 1 plastic trolley. <strong>Use:</strong> In experiments of mechanics.</td>
<td></td>
</tr>
</tbody>
</table>
| 8   | Floating & Sinking Kit         | 1 kit 1 plastic case containing:  
- 1 mini pressure gauge  
- 1 cylinder  
- 1 hanging bucket  
- 4 cylinders (1 iron, 1 aluminium, 1 plastic, & 1 wood)  
- 1 submarine model  
- 1 rubber tube  
- 1 gasbag,  
- 1 plasticized piece  
- 1 foam piece  
**Use:** To demonstrate the existence of pressure and buoyancy in water. |
| 9   | Overflowing Cup                | 1 item 1 transparent plastic cup. **Use:** To demonstrate liquid buoyancy (floating) property. |
| 10  | Sound Kit                      | 1 kit 1 plastic case containing:  
- 2 axles for strings adjusting,  
- 2 terminals for fixing strings  
- 1 triangle piece  
- 2 strings (thin & thick)  
- 2 supporters for strings  
- 1 loudspeaker  
- 1 loudspeaker cover  
- 1 film sheet  
- 2 bases for sheet inserting  
- 1 pair of phones  
- 1 bell  
- 1 small hammer  
- 2 whistle pipes (1 thin & 1 thick)  
**Use:** To demonstrate the production and delivery of sound. |
| 11  | Heat Kit                       | 1 kit 1 plastic case containing:  
- 1 red copper wire  
- 2 vertical rods  
- 1 wiring rod  
- 1 socket for white screen  
- 1 white screen  
- 1 plastic cylinder (transparent)  
- 2 bases  
- 1 tube  
- 2 plastic tubes (transparent)  
- 1 pin axle  
- 2 rubber stops (1 large & 1 small)  
- 1 plastic rod  
- 1 aluminium rod  
- 2 simple thermometers  
- 1 copper rod  
- 1 Vaseline tube  
- 1 candle  
- 1 tightening screw  
**Use:** To demonstrate laws of expansion and contraction in solids. |
| 12  | Solids Expansion Kit           | 4 items consisting of:  
- 1 handle ring with plastic handle  
- One Ø25.4mm copper ball with plastic handle  
- 1 copper bar  
- 1 iron bar  
**Use:** To demonstrate expansion in solids. It can be used with the heat kit. |
<table>
<thead>
<tr>
<th><strong>Kit Name</strong></th>
<th><strong>Quantity</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
</table>
| **Electricity Kit** | 1 kit | 1 plastic case containing:  
• 3 bulb holders  
• 3 bulbs (2.5v)  
• 3 switches  
• 1 plug socket  
• 2 battery holders  
• 3 conducting materials  
• 1 electromagnet  
• 2 insulating materials  
• Several wires  
**Use:** To demonstrate general laws of electricity. |
| **Static Electricity Kit** | 1 kit | 1 plastic case containing:  
• 2 Plexiglas strips  
• 2 plastic strips  
• 1 piece of silk material  
• 1 piece of fur material  
• 1 electroscope  
• 1 small electrophorus  
• 1 square electrophorus  
• 1 support with rotating piece  
• 1 neon tube  
• 1 electricity test foils  
• 2 hooks  
• 2 strings  
• 2 foam balls  
• 1 hanging rod  
**Use:** To demonstrate laws of static electricity. |
| **Magnetic Kit** | 1 plastic case | 1 plastic case containing:  
• 1 U shape magnet  
• 2 bar magnets  
• 2 round bar magnets  
• 2 ring magnets  
• 1 box of iron filing  
• 2 transparent trolleys  
• 1 magnetized needle  
• 1 base for magnetized needle  
• 1 rotating piece  
• 1 compass  
• Several pieces of copper, iron, aluminium and plastic  
• 1 plastic rod  
**Use:** To demonstrate laws of magnetism. |
| **Optical Kit** | 1 item | 1 plastic case containing:  
• 1 bulb  
• 1 bulb holder  
• 3 sockets  
• 2 flat mirrors  
• 3 convex lens (1 thick, 1 thin, & 1 cylindrical)  
• 1 prism  
• 1 hole piece  
• 1 single slit piece  
• 1 three-slip piece  
• 1 white screen  
• 1 ground glass sheet  
• 1 little candle  
• 1 rod (or log screw)  
**Use:** To demonstrate laws of light. |
<p>| <strong>Prism</strong> | 1 item | Plated surface prism with handle. <strong>Use:</strong> To demonstrate the dispersion of light. |
| <strong>Periscope</strong> | 1 item | One 30 cm hard plastic tube. <strong>Use:</strong> To demonstrate the reflection of light. |</p>
<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>19. Battery Holder</strong></td>
<td>1 item</td>
<td>1 plastic battery holder that can hold 4D Type batteries. <strong>Use:</strong> Power source. Batteries can be used to demonstrate laws of magnetism.</td>
</tr>
</tbody>
</table>
| **20. Dissecting Kit** | 1 kit | 1 kit containing:  
- 1 sponge-rubber bag containing:  
- 1 dissecting scissors  
- 1 bent dissecting scissors  
- 1 straight tweezers  
- 1 bent tweezers  
- 1 dissecting needle  
- 2 dissecting cutters  
**Use:** To demonstrate dissection during biology lessons (e.g., insects & plants). |
| **21. Dissecting Tray** | 1 item | 1 stainless plate. **Use:** To place small animals when dissecting. It should be used with the dissecting kit. |
| **22. Magnifying Glass** | 1 item | Single lens of Ø60 mm glass with handle. **Use:** To magnify objects and observe small parts. |
| **23. Sun Height Gauge** | 1 item | 1 metal plate of 100 mm diameter on a plastic base. **Use:** To observe the changes of the sun height by measuring the angle of sunrise. |
| **24. Compass** | 1 item | 1 compass of 40 mm diameter. **Use:** To determine direction. It can also be used to demonstrate magnetic fields. |
| **25. Minerals, Rocks and Fossils Samples Kit** | 1 kit | 1 wooden box containing:  
- 1 Basalt rock  
- 1 Granite rock  
- 1 Andesite rock  
- 1 Rhyolite rock  
- 1 Sandstone rock  
- 1 Shale rock  
- 1 Conglomerate rock  
- 1 Limestone rock  
- 1 Shell (biological sample)  
- 1 Marble rock  
- 1 Magnetite mineral  
- 1 Muscovite mineral  
- 1 Chalcopyrite mineral  
- 1 Quartz mineral  
- 1 Animal fossil  
- 1 Plant fossil  
**Use:** To observe minerals, fossils and rocks. |
| **26. Thermometer** | 1 item | 1 glass thermometer measuring up to 100°C. **Use:** To measure temperatures. Suitable for lab experiments. |
| **27. Demonstrative thermometer** | 1 item | 1 demonstrative thermometer. **Use:** To demonstrate the use of a thermometer. |
### Storage of the UNICEF Primary Science Kit

The metal box is designed to store the PSK Kit materials safely.

If the Child-Friendly Space/Environment (CFS/E) or school is based in a tent or is a temporary learning space, it is recommended to carry the box with the contents to a safe place nearby when activities are over.

Sometimes teachers do not use the PSK Kit teaching aids for fear of spoiling the new items and prefer to keep them in the head teacher’s office or in the store. UNICEF Primary Science teaching aids are intended to stimulate learning processes—therefore, they are expected to be available to students at all times.

**YOUR ROLE** is to make sure that the PSK materials are used in the education and psychosocial activities regularly, that they are available to all children, and that they are not lost, stolen or intentionally damaged.

### Maintenance of the Primary Science Kit teaching aids

Primary Science teaching aids must be properly maintained to ensure safe and long use. To prolong the lifespan of the Primary Science teaching aids, make it a routine to check the items and keep a record of them. If something is missing, ask the students if they know where the items are located. Sometimes it is easy to misplace things, especially if you are in a hurry to tidy up the place. Make it a routine to ask students to return the teaching aids to the box after use. Appoint 1 or 2 students as managers of the Primary Science Kit. They can help you to ensure that all the teaching aids are returned and properly stored in the portable box after use.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Use</th>
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<tbody>
<tr>
<td>Plastic Transparent Basin</td>
<td>1 item</td>
<td>1 transparent plastic container with 1 white plastic supporter composed of 3 white plastic pieces.</td>
<td>To hold water during experiments.</td>
</tr>
<tr>
<td>Seed Germinating Unit</td>
<td>1 item of 4 elements</td>
<td>1 transparent plastic cup and 3 detachable shelves.</td>
<td>To demonstrate germination.</td>
</tr>
<tr>
<td>UNICEF EiE Handbook. Module Six: Primary Science</td>
<td>1 booklet</td>
<td>UNICEF EiE Handbook Module Six: Primary Science. The teacher will be using Module Six in the planning and delivery of the Primary Science Curriculum and adapting it to the local culture and context.</td>
<td></td>
</tr>
<tr>
<td>Metal-frame storage box</td>
<td>1 metal box</td>
<td>The metal box is provided with 2 toggle-locks.</td>
<td>To store and carry the Primary Science teaching aids.</td>
</tr>
</tbody>
</table>

**NOTE** Not all kits come in a metal box; occasionally PSK materials are contained in a carton box.

**NOTE** Storage and transport of the Primary Science box can be shared among the volunteers and the students.

**NOTE** Remember NOT to leave the box and the teaching aids outdoors, as rain, high temperatures and dew can cause damage.

**THINK:** Did you familiarize yourself with all the items of the UNICEF Primary Science Kit? Are there any teaching aids that you are not sure how to use in the learning activities? Discuss it with your colleagues and/or UNICEF staff or Implementing Partners (IPs).
Psychosocial well-being is about the child’s feelings, thoughts and perceptions, as well as his/her positive relationships and connections with individuals in his/her family, school or Child-Friendly Space/Environment (CFS/E), and community. These connections provide support and help the child to feel safe, healthy, protected, respected, heard, and happy. In emergencies and conflict situations, psychosocial support helps children to adjust to changes in their lives. It can help rebuild their confidence, sense of belonging, self-esteem and hopefulness about the future. Psychosocial activities also promote relaxation and better concentration during classes. Psychosocial activities are complementary to science activities.

YOUR ROLE is to focus on being especially patient and understanding with the students. Their reactions to the emergency are out of their control and their silence or anger is a way of trying to cope with their distress. Practice regular relaxation exercises at the beginning of the class.
The objective of Unit Two is to provide guidance on how to conduct simple and practical psychosocial support activities.

**Checklist 1: Involving parents and guardians**

- **Get to know the parents/guardians of the students.**

- When speaking to parents/guardians focus on the strengths and positive qualities of the student.

- Encourage parents/guardians to continue supporting their child’s play and expression at home. Explain that it is normal for the child to display changes in behavior after a stressful event. Children might experience difficulties sleeping, have bad dreams, become more attached to the parent/guardian, or reject them and display anger.

- Encourage parents/guardians to be supportive by showing understanding and patience, listen to their child’s concerns and confusion, allow them to cry and feel sad, and take time to explain why there are changes in their lives and what to expect next.

- You can also invite the parents to a meeting or workshop where you teach them relaxation exercises and discuss as a group how to help their children at home. The parents/guardians will also have experienced the emergency and will benefit from parent/guardian psychosocial activities too. Consider activities like inviting them to trace and decorate a hand and make a Circle of Parents/Guardians’ Hands.

- Speak to parents/guardians about the importance of routines and customs at home.

It is advisable to integrate the following psychosocial activities into the Primary Science Curriculum. These activities contribute to building safety, trust and teamwork in the class; they promote free expression, and support learning processes. They also support relaxation, and enhance the capacity to concentrate during classes.

Psychosocial activities should be implemented according to age-groups: 7 to 14 year old children and young adolescents and 15 to 18 year old adolescents.
ACTIVITY ONE:
Art and craft (a&c) psychosocial activities

<table>
<thead>
<tr>
<th>ART AND CRAFT (A&amp;C) PSYCHOSOCIAL ACTIVITIES</th>
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A&C – Psychosocial Activity One: Our Circle of Hands

Ages: 7 to 14 years and 15 to 18 years
Psychosocial Objective: To build community, belonging, safety, and connection among children and teachers. It also can be used as an ongoing ritual for including new students in the class.

Materials: White drawing paper, crayons, colored pencils, painting colors, scissors, glue and tape, according to what is available in your context.
Preparation: Before the students arrive to class trace the outline of your hand on a piece of white drawing paper. Use scissors to cut the drawing of the hand out of the paper so you have a life-sized paper hand. Use this as an example when explaining the activity to the students. Prepare a space for the class to sit in a circle together.

FIGURE 1: PRE-CUT HANDS

STEP 1: Invite the students to sit in a circle on the floor. Sit on the floor with them.
STEP 2: With excitement and positivity, explain that you are interested in getting to know the students as individuals and as a group.
STEP 3: Acknowledge that you know that they have been through a difficult, frightening and confusing event(s) and that there are changes in their lives at home and in their community.
STEP 4: Explain that this is a safe space where they can feel free to play, have fun, ask questions, make friends and be supported by adults and peers.
STEP 5: Explain that to begin to get to know each other we are going to make something together using our hands.

STEP 6: Using your paper hand as an example, ask each student to first trace the outline of his/her hand on the paper. Explain that they will next decorate it, and then cut out the decorated hand outline.

STEP 7: Once every student has a hand outline, invite them to decorate their hands any way they want. They can write their names, draw symbols, lines, fill the hands with color, etc. It is each student’s own unique hand and a way to introduce himself/herself to the class.

STEP 8: After decorating the hands, ask them to use scissors to cut out their hand outlines.

STEP 9: Once finished, begin the next step by sitting back in a circle. Say your name out loud while placing your decorated hand on the floor in front of you towards the center of the circle. Ask the student next to you to introduce his/her name by saying out loud, “My name is _____”, while placing his/her paper hand next to yours. Go around the circle with every child and teacher saying their names while connecting their paper hands to the circle of hands that is forming.

STEP 10: Once everyone has introduced their names, there should be a circle of connected paper hands. Ask the students: How does it feel to see all of our hands connected?

NOTE: Always encourage the students to share and use as many colors as they want while drawing. Give the group 30-40 minutes to finish their hands.

NOTE: Make sure that the hand cut outs overlap and are connected.

NOTE: It is important that you take care of the circle of hands, because it is now a symbol of connection, safety, community, empathy, and trust for the class.

NOTE: If a new student later joins the class, ask him/her to follow the above steps and create his/her own hand outline to decorate with his/her name, symbol, or design. To introduce the new student, ask all the students to sit in a circle around the circle of hands they created the first week and take turns introducing their names to the new child. Next, invite the new child to introduce his/her name while connecting his/her decorated hand to the circle of hands. Make sure to glue his/her hand to the Circle of Hands.

NOTE: Make sure that the hand cut outs overlap and are connected.

NOTE: It is important that you take care of the circle of hands, because it is now a symbol of connection, safety, community, empathy, and trust for the class.

NOTE: If a new student later joins the class, ask him/her to follow the above steps and create his/her own hand outline to decorate with his/her name, symbol, or design. To introduce the new student, ask all the students to sit in a circle around the circle of hands they created the first week and take turns introducing their names to the new child. Next, invite the new child to introduce his/her name while connecting his/her decorated hand to the circle of hands. Make sure to glue his/her hand to the Circle of Hands.

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Message to convey to the students: Like the circle of hands, we are all connected. We can use our hands to show care and kindness, and to give and receive help from others.

A&C Psychosocial Activity Two: Drawing With Themes and Directions

Ages: 7 to 14 years and 15 to 18 years

Psychosocial Objective: Using themes and directions for drawings is a way of encouraging the students to recognize their individual community strengths, stories of survival, and positive interactions.

Materials: White drawing paper, crayons, colored pencils and painting colors, according to what is available in your context.

Preparation: Review Checklist 2 below ‘How to positively interact and talk to students about their artwork’. Choose a theme for the students to draw that will encourage them to recognize their individual and community strengths, stories of survival, and positive interactions. Spend a few minutes first exploring the theme and asking questions that encourage their imagination and ideas. Give the students 30-40 minutes for their drawings. Bring the drawings together in a circle or display on the wall, and then facilitate a class reflection and story sharing about the drawings.
Examples of Themes for the children’s drawings:

- Myself as really strong. Include what helps me to stay strong. Example: food, family, friends.
- My favorite thing about myself. Example: I am really good at dancing/playing football/singing.
- My favorite thing about someone I like/love.
- My favorite game/animal/friend/food.
- Someone or something that helped me.
- How I can help someone. Example: I can hold my friend’s hand when she is sad.
- Draw a line in the middle of the paper. On one side draw a picture of a sad memory or experience. On the other side draw a picture of a happy memory or experience.
- My favorite place. What does my favorite place look like? How do I feel when I am there?
- A place where I feel safe. How does the place where I feel safe smell? What is the weather there like? What sounds do I hear when I’m there? Who or what is with me? Where is the safe place located?
- Draw a picture to a student somewhere else in the world who is also going through a difficult time in his/her life because of an emergency. What advice or support can I give to that child? What helped me through the most difficult day? Are there any people, words or actions that helped me to feel better?
- What my life was like before and after an emergency event. Fold a piece of paper in half and label column 1 “Before” and column 2 “After”. Make a list using words or drawings of the way things were before the event. Then, fill out the other side with the way things have been after the event. The “After” list may be long and sad. Help the students think of positive outcomes from the event, such as people helping each other and making new friends. This helps the students to process the event and realize what they still have.

A&C Psychosocial Activity Three: Helping Hands

Ages: 7 to 14 years and 15 to 18 years

Psychosocial Objective: This activity invites students to explore and reflect upon how they can make a positive difference during a difficult and painful time. It encourages them to see that they are playing an active role in helping their families and community. Through the activity they will see how they have been helped and how they can help others.

Materials: Paper, crayons, colored pencils and painting colors, according to what is available in your context.

Preparation: Each student will need 2 pieces of paper. Ask students to think of examples of how they have both received and given help to others during the emergency.

STEP 1: Begin by briefly discussing with the students how everyone needs and offers helping hands to one another, especially in troubled times. Ask the students: Can you give an example of how you received
or offered a ‘helping hand’ to someone?

**STEP 2:** Invite the students to draw the outline of 1 of their hands.

**STEP 3:** Explain: Inside each finger of your hand you can use symbols, drawings or words to represent the name of a person, thing, or organization that has helped you through the crisis. Each finger represents 1 example.

**STEP 4:** Next, invite the students to make a 2nd helping hand outline. Inside each finger, have the students draw or write 5 ways that they have helped or will help others.

### A&C Psychosocial Activity Four: Classroom Container of Worries

**Ages:** 7 to 14 years and 15 to 18 years

**Psychosocial Objective:** Children in emergencies have worries that may have solutions, as well as bigger worries that are not easily resolved. This activity helps children identify things that are troubling them, while also encouraging and providing them a way to remember what to do to feel better.

**YOUR ROLE** is to provide a safe container for their worries. It helps the students to know that their worries and fears are being heard and acknowledged, and that an adult they trust is holding their worries for them.

**Materials:** Colored or white paper, scissors, pens, colored pencils, and a container like a small box or bag.

**Preparation:** Cut the colored paper into smaller pieces.

**STEP 1:** Begin a discussion with the students about sharing things they are worried about. You can start the conversation by giving an example of a less severe worry, like being late for school. Ask the class: If you are worried about being late for school, what can you do to solve the problem? For example: I can wake up a bit earlier in order to have more time, or I can talk with my teacher and explain why I am late.

**STEP 2:** Ask the students to draw the problem on one side of the paper, and the solution on the other side.

**STEP 3:** Before each child puts their worry inside the container, discuss the worry and solution as a group. Explain: Some worries are bigger than others and not easily solved, but the container can take the worry away from you and do the worrying for you.

**STEP 4:** Take the container you have and as you put the paper with the worry inside the container explain to the group that the worry and solution is now going to be kept safe inside the Class Worry Container. Have the class choose where in the learning environment to keep the Worry Container for safekeeping.

**STEP 5:** Repeat this activity once a week. Students can add a worry/solution to the class container. They can also choose to take past worries out of the container.
**Message to convey to the students:** It is normal to have difficult thoughts, feelings and emotions, and it is important to be able to express them and think of solutions to feel better. Your worries and solutions are being heard and are being kept safe by an adult.

**Checklist 2: Tips on how to positively interact and talk to students about their drawings**

- Discuss and establish **ground rules** about how to feel safe and respected. Include the students’ ideas. This list can be displayed in the class. The list does not necessarily have to be written. Alternatively, it could be drawn or a collection of items can be used as symbols/reminders of these agreements. Possible agreements: Be nice to each other; Ask permission before drawing on someone else’s paper; Respect each other’s artwork and ideas; Listen when someone else is speaking; Help clean-up our work space after the activity is finished.

- **Explain** to the students that **there is no right or wrong way to draw** during art activities. (For example: It is acceptable for a student to draw a green sky, a blue tree, or a person with purple skin).

- **Do not correct a student’s drawing.** Accept and validate in your speech and actions his/her drawings and expression.

- **Do not assume that a student is done with his/her artwork.** Ask if he/she is finished. If needed, you can offer extra time or the opportunity to finish another day.

- **Listen without judgment.**

- **Do not pressure students to share or talk about their artwork.** Trust that the student will share when ready. Be patient. The more comfortable and safe the student feels, the greater the likelihood that he/she will express feelings.

- First ask **closed questions** about the artwork. This gives the students the opportunity to control when to share. For example: start by asking: “Is there a story about your drawing that you want to share?” If they say “Yes”, then you can begin asking more open questions about the details of the drawing and story.

- **Give students the opportunity** to focus on survival, courage, endurance, compassion, hope, joy, wishes, dreams and strengths in relation to the drawing.

- **Acknowledge expression of both negative and positive emotions.**

- It can be intimidating and overwhelming for students to share their stories with a large group. If more than 1 teacher is available, the students can be organized into **smaller groups** when discussing their drawings and stories.

- **Respect and take care of the artwork.** Keep it as clean and as protected as possible.

- **Encourage students to feel proud** of their artwork and write their names on the back of their drawings.

- **Display the artwork in class** by taping it on the walls or learning environment, BUT first ask the students for permission to display it.
ACTIVITY TWO:
Play, relax and assurance (pra) psychosocial activities

<table>
<thead>
<tr>
<th>#</th>
<th>Activity</th>
<th>Age-groups</th>
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<tbody>
<tr>
<td>1</td>
<td>Web of Connections</td>
<td>7-14 and 15-18 years</td>
</tr>
<tr>
<td>2</td>
<td>Exercises to Relax, Calm and Comfort</td>
<td>7-14 and 15-18 years</td>
</tr>
<tr>
<td>3</td>
<td>Rituals and Routines</td>
<td>7-14 and 15-18 years</td>
</tr>
</tbody>
</table>

PRA – Psychosocial Activity One: Web of Connections

Ages: 7 to 14 years and 15 to 18 years

Psychosocial Objective: Distressing experiences can cause students to feel uncomfortable or trapped in their bodies. They may also find it difficult to interact with people and their environment. This activity frees and loosens the energy in the learning environment, and helps promote the connection between students and teachers. It also provides an opportunity to learn and remember names.

Materials: A ball or a soft object that can be tossed or rolled, and space to sit or stand as a group.

STEP 1: Sit or stand together in a circle. Include yourself and any other teachers present.
STEP 2: While holding the ball say your name out loud. Then toss or roll the ball to any student in the circle while saying his/her name out loud.
STEP 3: That student will then repeat his/her name while holding the ball. The student will next toss or roll it to another student while saying the other student’s name out loud. Repeat this until every student has caught the ball—with each student only receiving the ball once—until the ball has been returned to you.
STEP 4: Do the exercise again—in the same order. Ask the students to try to repeat the pattern; to try to move the ball from student to student in the same order, while saying the names out loud.
STEP 5: Repeat the exercise a few more times, staying with the pattern. You can also add emotions or feelings to the ball, such as it is a slow, fast, hot, cold, sad, happy ball.

PRA – Psychosocial Activity Two: Exercises to Relax, Calm and Comfort

Ages: 7 to 14 years and 15 to 18 years

Psychosocial Objective: To facilitate and encourage students to feel present in their bodies and learn activities that will help them feel relaxed, calm and comforted. You can teach children to use these techniques when they feel scared, anxious, sad, angry, or worried. Teach 1 of these exercises to the students each week, and use at least 1 relaxation
They can be used before an art activity or when you notice that the students need to lower their energy or anxiety levels. You and the students can also choose 1 relaxation activity with which to end the day as a comforting ritual and to help them go home relaxed.

**Materials:** Open space within which to lie down or stand as a group. It can be done indoors or outdoors. If available, use plastic sheeting, a tarpaulin, or mats when lying on the floor.

**Preparation:** Try to practice each of these exercises before teaching them to the children.

### Exercise A: Deep Breaths

**Step 1:** Teach students how to become aware of their breath and to breathe deeply while also using their imaginations. You can use this quick deep breathing exercise daily.

**Step 2:** While sitting or standing, ask each student to make a fist with his/her left hand and imagine it is holding a sweet smelling flower, fruit, or favorite food.

**Step 3:** Next, ask each student to make a fist with his/her right hand and pretend it is holding a candle or fire.

**Step 4:** Direct the students to inhale deeply the smell of the flower/fruit/food in their left hands and then blow out the candle and fire in their right hands. Continue deeply breathing in the sweet smell through the nose and breathing out the fire from the mouth. Repeat the cycle of breathing in and out at least 3 times.

### Exercise B: Butterfly Hugs

**Step 1:** Cross your arms across your chest as if you were holding yourself, so your left hand is on your right shoulder and right hand on your left shoulder. Ask the students to imitate you.

**Step 2:** Keeping your arms crossed alternately tap your hand on the shoulder it is touching: tap the left hand on the right shoulder, then tap the right hand on the left shoulder, and then continue to repeat the 2 alternating motions. Tapping one side at a time is the most important part of the exercise.

**Step 3:** You can tell the students that the tapping of their hands is like the wings of a butterfly or bird moving up and down. One wing moves up and comes down, and then the other wing moves up and comes down. Ask the student to do the exercise for 1 minute, stop, take a breath, and notice how they are feeling. Ask the students: *How do you feel?*

**Step 4:** Continue to do the exercise. You can do it for as much or as little time as you and the students find comfortable, and as many times a day as needed.

### Exercise C: Belly Breathing

**Step 1:** Have the students lie on their backs and put their hands on their stomachs.

**Step 2:** Direct the students to take a slow deep breath in through the nose and let it out through the mouth with a gentle “a-h-h-h-h-h-h” sound. Tell them they should feel and see the hand on the stomach move...
up and down as they breathe in and out. Direct them to breathe in slowly through the nose and out through the mouth like they are trying to move a feather up in the air.

**Step 3:** Breathe in slowly to the count of 2, 3, 4, and out 2, 3, 4. Repeat several times.

**Step 4:** Ask the students how the exercise makes them feel. Practice the technique with them regularly. Talk to them about when to use it—for example, when they feel worried, angry or frightened. Encourage them to use this technique at home when going to sleep.

**Exercise D: Laughter**

Laughter is a way that students can naturally release stress, and relax. Think of games or ways to make students laugh. For example, sit or stand in a circle with the students and have them take turns trying to make each other laugh by making funny sounds or expressions with their faces and bodies or telling each other funny stories. Discuss with the students what makes them laugh.

**PRA – Psychosocial Activity Three: Rituals and Routines**

**Ages:** 7 to 14 years and 15 to 18 years

**Psychosocial Objective:** During emergencies, the familiar rituals and routines of children at home and in school are disrupted. It is important to introduce the structure of rituals and routines into the learning environment. The more predictable their day, the safer and more protected the children will feel. Help them to identify rituals or routines in their day at school or at home. Ask them to think of old and new rituals, customs, and routines that are meaningful, enjoyable and important to them.

**Examples:**

- Ask the students to decide on a ritual to begin and end the day at school. It can be a special song or game they sing or play together at the start of the day, and a relaxation activity before they go home.
- Students are full of energy and might find it difficult to focus on an art activity or class lesson. Start a new 2-minute ritual to release energy before doing a sitting activity or lesson. This could be dancing in a circle, stretching their arms towards the sky, tensing and releasing muscles, passing or rolling a ball to each other, or any other culturally relevant games. End the 1-2 minutes of physical activity with the students taking 2 deep breaths all together. By doing this you will help the students to release energy, as well as calm their bodies. Next, ask them to sit while you explain the art activity or lesson. This routine sequence of activities is a way of providing comfort and an understanding of the learning environment.
- Speak to parents/guardians about the importance of routines at home.
- Have discussions with the students about rituals and routines at home that make them happy or safe. Ask the students: **What time do you go to sleep? What are your morning or bedtime rituals and routines?**
Unit Three provides some guidelines and suggestions on how to plan and implement science lessons, using the teaching aids contained in the kit. It also gives an overview of the UNICEF EiE/C Primary Science Curriculum.

The objective of Unit Three is to provide an overview of the UNICEF EiE/C Primary Science Curriculum, and to provide practical examples of how to use the teaching aids in the implementation of the learning activities.

LEARNING OUTCOMES

At the end of Unit Three you will be able to:

1. Have an overview of the UNICEF EiE/C Primary Science Curriculum
2. Demonstrate how to use the teaching aids in the implementation of the learning activities
ACTIVITY ONE:
Overview of the UNICEF EiE/C Primary Science Curriculum

TABLE 2 provides an overview of the contents of the UNICEF Primary Science Curriculum, according to the teaching aids contained in the kit.

TABLE 2: Overview of the UNICEF EiE/C Primary Science Curriculum

<table>
<thead>
<tr>
<th>PHYSICS</th>
<th>TOPICS</th>
<th>OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORCES AND MOTION</td>
<td>• Weight • Force • Friction • Magnets</td>
<td>• To know that the force of gravity is responsible for the weight of an object • To know that when the force is stretched like an elastic band, it is increased • To know that a force exists between 2 magnets, and between magnets and magnetic materials • To know that when an object floats, the upthrust acting on it is equal to the force of gravity</td>
</tr>
<tr>
<td>MATERIALS</td>
<td>• Gases • Solids • Liquids</td>
<td>• To know that some materials dissolve in water • To know that all solids that do not dissolve in a liquid can be separated • To be able to separate insoluble solid from a liquid by filtering • To know factors affecting the speed of dissolving • To understand reversible and irreversible changes</td>
</tr>
<tr>
<td>ELECTRICITY</td>
<td>• Batteries • Circuits</td>
<td>• To know that electricity is made from non-renewable fuels • To know that the number of batteries and bulbs in a circuit can affect the brightness • To know about static electricity</td>
</tr>
<tr>
<td>LIGHT AND SOUND</td>
<td>• Transmission of light • Transmission of sound • Reflection and dispersion of light</td>
<td>• To know how light travels • To learn about shadows • To know that sound can travel through solids, liquids and gases • To know that mirrors can be used to change the direction in which light is travelling</td>
</tr>
<tr>
<td>OTHER NATURAL SCIENCES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANIMALS AND PLANTS</td>
<td>• Classification of plants • Photosynthesis • Classification of animals</td>
<td>• To know the basic classification of plants • To understand that plants need light, water and warmth to grow well • To know the classification between vertebrates and non-vertebrates</td>
</tr>
<tr>
<td>THE ENVIRONMENT</td>
<td>• Rocks • Minerals • Fossils</td>
<td>• To be able to distinguish rocks, minerals and fossils</td>
</tr>
</tbody>
</table>
ACTIVITY TWO: Primary Science Activities

The following activities provide some practical examples of how to use the teaching aids in the delivery of science lessons. The UNICEF Primary Science Curriculum is divided into LESSONS OF PHYSICS, which constitute the majority of the curriculum, and LESSONS OF OTHER NATURAL SCIENCES using the teaching aids contained in the Primary Science Kit.

YOUR ROLE is to adapt the lessons to the curriculum in use in your context. You will need to plan daily lessons in advance and use the teaching aids in the delivery of the primary science activities.

The objective of the Primary Science Curriculum is to stimulate students’ capacity to observe, reflect and analyze, and to develop scientific thinking and approaches.

TABLE 3: Overview of the primary science activities

<table>
<thead>
<tr>
<th>PHYSICS LESSONS</th>
<th>OTHER NATURAL SCIENCE LESSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. UNIT ONE: LEVER AND HANGING WEIGHTS</td>
<td>1. UNIT ONE: DISSECTING KIT, DISSECTING TRAY, MAGNIFYING GLASS AND GERMINATING UNIT</td>
</tr>
<tr>
<td>2. UNIT TWO: SPRING SCALE</td>
<td>2. UNIT TWO: ROCKS, MINERALS AND FOSSILS SAMPLE KIT</td>
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<tr>
<td>3. UNIT THREE: SIMPLE MECHANICAL KIT</td>
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<td>4. UNIT FOUR: FLOATING AND SINKING KIT</td>
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<td>5. UNIT FIVE: SOUND KIT</td>
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<td>6. UNIT SIX: HEAT KIT AND SOLIDS EXPANSION KIT</td>
<td></td>
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<tr>
<td>7. UNIT SEVEN: STATIC ELECTRICITY KIT</td>
<td></td>
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<tr>
<td>8. UNIT EIGHT: ELECTRICITY KIT</td>
<td></td>
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<tr>
<td>9. UNIT NINE: MAGNETIC KIT AND COMPASS</td>
<td></td>
</tr>
<tr>
<td>10. UNIT TEN: OPTICAL KIT, PRISM, PERISCOPE AND SUN HEIGHT GAUGE</td>
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</tbody>
</table>
UNIT ONE: LEVER and HANGING WEIGHTS

THEORY:
Mass is the quantity of matter in a body; weight is the force exerted on the mass by the gravitational field.

VOCABULARY:
Mass; weight; matter

LEARNING OUTCOMES
1. Identify different weights
2. Compare given weights
3. Describe weight and mass
4. Apply the terms 'heavier than' and 'lighter than' to refer to the weighed objects
5. Classify objects according to their weights
6. Estimate the weights of objects
7. Demonstrate enquiry skills

ACTIVITIES

ACTIVITY ONE: COMPARING WEIGHTS

STEP 1: Introduce the lesson. Set the lever and the weights in front of the pupils. Ask them: In your opinion what are the weights used for?

STEP 2: Demonstrate 'heavier than' and 'lighter than' by putting 1 weight on each side of the balance. Ask the students: What happens and why does this happen? Which is lighter and which is heavier?

STEP 3: Add 1 more weight to either side. What happens now? Which is lighter and which is heavier?

STEP 4: Now weigh the objects against each other.

ACTIVITY TWO: MASS and WEIGHT

STEP 1: Set the lever and the weights in front of the pupils. Use a 50 g mass on one side. Look for any objects used together with the balance and place them on the other side. Ask the students: What is the definition of mass? What is the definition of weight?

STEP 2: Demonstrate 'heavier than' and 'lighter than' by putting 1 weight on each side of the balance. Ask the students: What happens and why does this happen? Which is lighter and which is heavier?

STEP 3: Work out: Mass x Distance of 50 g on one side and Mass of Object x Distance of Object. Compare the two.

STEP 4: Repeat the same exercise for a 100 g mass. Repeat for 5 other objects. Record the findings. Explain the definitions of mass and weight.

Extension: Discuss with the students. Where do we find the usage of such weights? Why is it important to be accurate in your measurements?
UNIT TWO: SPRING SCALE

THEORY:
- Force; force of gravity; upthrust force; force of friction.

VOCABULARY:
- Spring scale; upthrust force; force of gravity; force of friction

LEARNING OUTCOMES
At the end of the lesson(s), the students will be able to:
1. Know parts of a spring scale
2. Read and use a spring scale
3. Know that rough surfaces increase the force of pull
4. Know that the force in water is called upthrust
5. Weigh objects in air and in water
6. Know the force of gravity

ACTIVITY ONE:
READING A SPRING SCALE

FIGURE 2: SPRING SCALE

STEP 1: Set up the spring scale as shown. Explain the different parts of the scale and their functions.

STEP 2: Put a weight or object on the spring scale and see how much it weighs. Repeat this for several objects.

STEP 3: Record your readings in a table and discuss with the students.

STEP 4: Explain the definition of force and how it is measured in Newtons (symbol N).

ACTIVITY TWO:
MASS and WEIGHT

STEP 1: Set up an object to be pulled on 2 different surfaces: 1 rough and 1 smooth.

STEP 2: Record the reading on the spring scale as the object is being pulled. Ask the students: What happens when an object is pulled on a rough surface? If the same experiment is performed on a smooth surface, repeat the experiment with different objects.

STEP 3: Record the readings on the spring scale in a table. Discuss with the students.

STEP 4: Explain the definition of force and how to measure it.

ACTIVITY THREE:
UPTHRUST FORCE

FIGURE 3: UPTHRUST FORCE

STEP 1: Set up the spring scale and prepare a container with water. You can use the basin contained in the kit.

STEP 2: Weigh the object in air. Record the reading. Now weigh the same object in the water container. Record the reading. What is the difference between these 2 readings? Discuss with the students.

STEP 3: Record the readings for other objects of different weights. How would the readings change if the liquid used was not water?
UNIT THREE: SIMPLE MECHANICAL KIT

THEORY: The concept of transfer of energy.

At the end of the lessons the students will be able to:
1. Identify the parts and functions of a lever.
2. Explore efficiencies of different machines.
3. Explain, using the correct terms, the advantages and disadvantages of different mechanical devices.

VOCABULARY: Fulcrum; lever; effort; load; pulley

ACTIVITY ONE: TYPES OF LEVERS

FIGURE 4: TYPES OF LEVERS

STEP 1: Set up a lever by using a book (load), a pencil (lever), and a ruler (inclined plane).
STEP 2: Place the pencil under the ruler. Try to raise the book by pressing down on the other end of the ruler.
STEP 3: Explain the different types of levers as shown in FIGURE 4.
STEP 4: Repeat the experiment with other loads. Ask the students: What lever would be easier to use? Why?
STEP 5: Discuss with the students. Were you able to lift the books with your little fingers? What happened when you created a lever with the pencils?

ACTIVITY TWO: LEVERS

STEP 1: Experiment. The purpose is to demonstrate how levers make our work easier. Materials: 4 heavy books and 2 participants.
STEP 2: Ask the students to stack the books in a pile. Ask the students to put their little fingers under the bottom book in the stack and try to lift the books. What happens?
STEP 3: Ask the students to place 1 pencil under the bottom book, and a 2nd pencil under the 1st pencil in the opposite direction. This will form a lever.
STEP 4: Ask the students to push down on the end of the pencil and try to lift the book. The pencil on the bottom should work as a fulcrum. What happens?
STEP 5: Discuss with the students. Were you able to lift the books with your little fingers? What happened when you created a lever with the pencils?

ACTIVITY THREE: MECHANICAL KIT

STEP 1: Set up the mechanical kit.
STEP 2: Use the pulleys to lift the 4 books.
STEP 3: Show the pupils the mechanics of the kit and discuss how the different parts work to lift weights.
## UNIT FOUR: FLOATING AND SINKING KIT

**THEORY:** The property of buoyancy in water; sinking and floating properties of aluminum, plastic, iron, and wood, and of different shapes of materials.

**VOCABULARY:** Floating; sinking; buoyancy

### LEARNING OUTCOMES ACTIVITIES

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>ACTIVITIES</th>
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</table>

At the end of the lessons the students will be able to:

1. Determine why objects float on water
2. Offer explanations for the sinking or floating of objects
3. Understand that the shape of a solid will determine whether or not it floats

### ACTIVITY ONE: SOLID SHAPES

**FIGURE 5: SOLID SHAPE**

**STEP 1:** Preparation: fill the bowl three-fourths full with cold tap water. Take a small piece of clay. Alternatively you can use plasteline.

**STEP 2:** Separate 2 walnut-size pieces of clay. **NOTE** The pieces should be of equal size.

**STEP 3:** Roll 1 of the clay pieces into a ball.

**STEP 4:** Carefully place the clay ball on the surface of the water in the bowl. What happens?

**STEP 5:** Repeat with different solid shapes: cuboid, flat, cylindrical, pellets, etc. **NOTE** Use the materials contained in the kit.

**STEP 6:** Repeat using as many other solid objects as possible: stones, sticks, paper, foam, etc.

**STEP 7:** Observe and record the results in 2 columns: 1 with floating objects and the other with sinking objects.

**STEP 8:** Discuss with the students the properties of the objects, and make comparisons.

### ACTIVITY TWO: CONCAVE SHAPES

**FIGURE 6: CONCAVE SHAPE**

**STEP 1:** Take the 2nd piece of clay and press it into a thin concave shape, like the inner side of a boat.

**STEP 2:** Gently place the clay, open side up, on the surface of the water in the bowl.

**STEP 3:** Ask the students: What happened? Is the clay sinking or floating?

**STEP 4:** Discuss with the pupils, and explain the property of buoyancy.
UNIT FIVE: SOUND KIT

THEORY: Sound is produced when vibrations are caused.

VOCABULARY: Vibration; volume

LEARNING OUTCOMES | ACTIVITIES
---|---

At the end of the lessons the students will be able to:

1. Determine how sound can be produced when vibrations are caused
2. Find out what causes vibrations
3. Know that sound travels through different mediums: solids, liquids, and gases
4. Find out which medium best supports sound travel

ACTIVITY ONE: HOW DOES SOUND TRAVEL?

STEP 1: Set up the phone contained in the kit. Experiment: investigate whether sound travels better through a solid or a gas. Invite 2 students to demonstrate the experiment to the class.

STEP 2: Ask the students to bang 1 end of the phone against a table or hard surface, and hold the phone by the string. How loud is the sound?

STEP 3: Ask the students to again bang 1 end of the phone against a table or hard surface, but this time without touching the rope. Ask students to put the 2nd phone to their ears while putting a finger in the opposite ear.

STEP 4: Repeat the experiment several times. Ask the students to listen to how loud the sound is. Ask the students: Is it louder than the first time? Why?

STEP 5: Explain. Sound travels better through a solid (string), than through a gas (air). **NOTE** Make sure that all of the students have a chance to listen to the phone. Set up learning-groups so that you can rotate the use of the teaching aids.

ACTIVITY TWO: HYDROPHONE

STEP 1: Make a hydrophone and examine whether or not sound can travel under water. Materials: basin filled with water, 1 plastic bottle, and 2 medium-sized stones.

STEP 2: Cut off the base of the plastic bottle and fill the basin with water, but not to the top.

STEP 3: Put the bottle to the water and ask a pupil to put her/his ear to the top of the bottle.

STEP 4: Ask a student to bang the stones together in the water.

STEP 5: Repeat the experiment above the water.

STEP 6: Ask the students: What did you experience? Did you hear the stones banging while in the water? What about above the water? Does sound travel better through air or water?
UNIT SIX: HEAT KIT and SOLIDS EXPANSION KIT

**THEORY:** Some materials conduct heat and others do not. Solids expand with heat. An expanding solid becomes bigger in size.

**VOCABULARY:** Conduction; expansion; heat; cooling

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>ACTIVITIES</th>
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</thead>
<tbody>
<tr>
<td>At the end of the lessons the students will be able to:</td>
<td><strong>ACTIVITY ONE:</strong> HEAT KIT</td>
</tr>
<tr>
<td>1. Understand that gas expands when heated</td>
<td><strong>STEP 1:</strong> Preparation. Set up the heat kit. Make sure that you have a matchbox and/or a lighter for the candle.</td>
</tr>
<tr>
<td>2. Identify materials that are conductors and those that are insulators</td>
<td><strong>STEP 2:</strong> Use the glass tube, the tightening screw and the handle.</td>
</tr>
<tr>
<td>3. Understand that heat has an effect on solids, and that they expand when subjected to heat</td>
<td><strong>STEP 3:</strong> Fill half of the glass tube with water. Close it with the screw. Use the handle to hold it, and heat the water with the candle.</td>
</tr>
<tr>
<td>4. Understand that solids contract when cooled</td>
<td><strong>STEP 4:</strong> Observe. Ask the students: What happens? The liquid (water) transforms into gas (vapor) and expands to fill the rest of the glass tube. If the screw is opened the gas exits.</td>
</tr>
</tbody>
</table>

**ACTIVITY TWO: COPPER ROD**

**STEP 1:** Put Vaseline into the holes of the copper rod.

**STEP 2:** Insert a matchstick upside-down (the igniting head down) into the hole.

**STEP 3:** Heat the end of the copper rod with a candle. Ask the students: What do you think will happen?

**STEP 4:** The heat should ignite the matchstick. Copper is a heat conductor.

**ACTIVITY THREE: EXPANSION KIT**

**STEP 1:** Preparation. You need a candle, matches and the Solid Expansion Kit.

**STEP 2:** Heat the copper ball with the candle.

**STEP 3:** Try to get the copper ball past the ring. Ask the students: Why isn’t the ball able to go through?

**STEP 4:** Discuss. Cool down the copper ball in cold water. Ask the students: What happens if you cool the copper ball in cold water?

**STEP 5:** Explain the theory of expansion of metals. The copper ball expanded with heat—therefore it was unable to pass through the ring bar. Cooling down the copper ball in water contracted it.
## UNIT SEVEN: STATIC ELECTRICITY KIT

**THEORY:** Conduction of current; induction of current.

**VOCABULARY:** Static; current; rubbing; charge; induction; conduction; neutralize

### LEARNING OUTCOMES

At the end of the lessons the students will be able to:

1. Understand how to create static electricity using different materials
2. Understand that 2 charged materials may deflect each other
3. Identify which charges belong to which materials
4. Understand that charges can be tested using an electroscope

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACTIVITY ONE:</strong> PROCESS OF INDUCTION AND CONDUCTION</td>
</tr>
<tr>
<td><strong>STEP 1:</strong> Preparation. Attach the foam balls to the string and tie the string to the hanging rod contained in the Static Electricity Kit. Alternatively, you can use a handful of cereals—such as cornflakes—and a thread.</td>
</tr>
<tr>
<td><strong>STEP 2:</strong> Invite a student to hold the hanging rod.</td>
</tr>
<tr>
<td><strong>STEP 3:</strong> Charge the plastic strip by rubbing it against the fur material. Observe. <em>What happens?</em></td>
</tr>
<tr>
<td><strong>STEP 4:</strong> Bring the plastic strip near to the foam ball. Observe. <em>What happens?</em> At first the ball will be attracted to the plastic strip through the process of induction. Once contact is made, the ball will be repelled.</td>
</tr>
<tr>
<td><strong>STEP 5:</strong> Touch the foam ball with your hand. Observe. <em>What happens?</em> Your hand will neutralize the foam ball. The excessive charge will be drained off through your hand by the process of conduction.</td>
</tr>
<tr>
<td><strong>STEP 6:</strong> Repeat the same experiment, but this time rub the plastic rod against the silk material. Observe. <em>What happens?</em></td>
</tr>
<tr>
<td><strong>STEP 7:</strong> Explain. Static electricity is electricity produced by friction.</td>
</tr>
</tbody>
</table>

| ACTIVITY TWO: SALT AND PEPPER SEPARATION |
| **STEP 1:** Preparation: salt, pepper and a plastic spoon |
| **STEP 2:** Sprinkle about 1 tablespoon of salt and 1 tablespoon of pepper onto a table or some other flat, dry surface. Mix the salt and pepper together. |
| **STEP 3:** Rub a plastic spoon with the piece of fur contained in the electricity kit. |
| **STEP 4:** Hold the spoon high above the salt and pepper and lower it down slowly. As the spoon gets near the mixture, the pepper will seem to jump out of the pile onto the charged spoon, while the salt stays on the table. If you want to capture the salt, simply move the spoon closer to the table. |
| **STEP 5:** Ask the pupils: *Why do you think this happens?* When the plastic spoon is rubbed against the fur it becomes electrically charged. Because the pepper is lighter than the salt, it will jump onto the charged spoon first. The salt—being heavier—will need to have the spoon closer to it before it can move off the table. |

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Science Kit Guidance
UNIT EIGHT: ELECTRICITY KIT

THEORY: Generation of electricity from a battery.

At the end of the lessons the students will be able to:
1. Understand that batteries give electric energy and can cause electric currents.
2. Differentiate between parallel and series circuits.
3. Understand the difference between renewable energy (e.g., Solar energy, wind energy, and ocean wave energy) and non-renewable energy (e.g., Petroleum, coal, and natural gas).

LEARNING OUTCOMES

ACTIVITIES

ACTIVITY ONE: CIRCUIT IN SERIES

STEP 1: Preparation: purchase 2 batteries that fit the battery holder. Consumable items such as batteries are not provided in the Primary Science Kit. You will need to purchase them locally.

STEP 2: Using the elements of the electricity kit, build a circuit in series. Components connected in series are connected along a single path. See FIGURE 7.

STEP 3: Ask the students to observe the brightness of the bulbs.

STEP 4: Insert 2 batteries into the circuit and ask the students to comment on the brightness of the bulbs. Is the bulb brighter or dimmer?

STEP 5: Reduce the length of the wire between the batteries. Observe. Ask the pupils: Does the length of the wire affect the brightness of the bulbs? Use the different types of wires contained in the kit and observe the differences.

ACTIVITY TWO: CIRCUIT IN PARALLEL

STEP 1: Preparation: purchase 2 batteries that fit the battery holder.

STEP 2: Using the elements of the electricity kit, build a circuit in parallel. Components connected in parallel are connected along different paths. See FIGURE 8.

STEP 3: Ask the students to observe the brightness of the bulbs.

STEP 4: Insert 2 batteries into the circuit and ask the students to comment on the brightness of the bulbs. Is the bulb brighter or dimmer?

STEP 5: Explain. In a parallel circuit, each bulb has its own independent route to the source of energy. Even if 1 bulb in the circuit is removed, the circuit will still work, as long as the other bulbs are still connected.

VOCABULARY: Circuit in parallel; circuit in series; bulb; switch; battery

FIGURE 7: CIRCUIT IN SERIES

FIGURE 8: CIRCUIT IN PARALLEL

continues on next page
UNIT EIGHT: ELECTRICITY KIT CONTINUED

ACTIVITIES

ACTIVITY THREE: RENEWABLE AND NON-RENEWABLE ENERGY

STEP 1: Explain. Sources of renewable energy are the sun, the wind and the ocean. Non-renewable energy is extracted from the soil. Petroleum, gases and coal are non-renewable energy. Once they are used up they cannot be replaced, because they were produced through processes that require specific conditions and a very long time (geological eras).

STEP 2: Ask the students: What sources of energy do we use in our everyday lives? (e.g., transport, cooking food, in the evening). Encourage students to give examples. Ask the students to make a list of the types of energy they use daily and to draw pictures about them.

STEP 3: Discuss. Ask the students: Is wood a source of renewable energy? Why yes, or why not? NOTE Encourage the students to explore different answers. Trees can be considered renewable energy only if regularly replanted and properly managed.
### UNIT NINE: MAGNETIC KIT and COMPASS

**THEORY:** Magnetism; properties of magnets.

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the end of the lessons the students will be able to:</td>
<td><strong>ACTIVITY ONE:</strong> THE POLES OF A MAGNET</td>
</tr>
<tr>
<td>1. Identify magnetic and non-magnetic materials</td>
<td><strong>STEP 1:</strong> Put the U-shaped magnet contained in the kit on a surface.</td>
</tr>
<tr>
<td>2. Identify different types of magnets</td>
<td><strong>STEP 2:</strong> Rotate the compass around the U-shaped magnet and observe what the needle of the compass does. Ask the students: <em>What happens? Why?</em> Encourage the students to explore possible answers.</td>
</tr>
<tr>
<td>3. Identify the different poles of a magnet</td>
<td><strong>STEP 3:</strong> Explain: The needle of a compass is itself a magnet, and thus it always points north, except when it is near a strong magnet. When you bring the compass near a strong bar magnet, the needle of the compass points in the direction of the south pole of the bar magnet. When you take the compass away from the bar magnet, it again points north. We can conclude that the north end of a compass is attracted to the south end of a magnet. <em>Repulsion</em> is the tendency of particles or bodies of the same electric charge or magnetic polarity to separate. <em>Attraction</em> is the tendency of particles or bodies of opposite electric charge or magnetic polarity to come together.</td>
</tr>
<tr>
<td>4. Understand what repulsion and attraction mean in physics</td>
<td><strong>STEP 4:</strong> Discuss. Ask the students: <em>What is the compass useful for?</em> Encourage the students to give examples.</td>
</tr>
</tbody>
</table>

| | **ACTIVITY TWO:** SEPARATE MAGNETIC AND NON-MAGNETIC MATERIALS |
| | **STEP 1:** Put a mixture of iron, aluminum, plastic and copper on a surface. Use the materials contained in the kit. |
| | **STEP 2:** Lower the U-shaped magnet to the materials on the surface. Ask the students: *What happens? Why?* |
| | **STEP 3:** Explain: plastic, aluminum and copper are not attracted to the magnet because they are not ferromagnetic. Only iron has the *property* to be attracted to the magnet. |
| | **STEP 4:** Invite the students to explore their environment. *What objects are attracted by the magnet? What objects are not? Why?* |

| | **ACTIVITY THREE:** CUT A MAGNET |
| | **STEP 1:** Cut the bar magnet into 2 pieces. |
| | **STEP 2:** Observe how the 2 different pieces react to the iron filing. Ask the pupils: *What happened?* |
| | **STEP 3:** Explain. When you cut or divide a magnet, the 2 poles regenerate. |

**VOCABULARY:** Magnets; compass; ferromagnetic; attraction; repulsion
UNIT TEN: OPTICAL KIT, PRISM, PERISCOPE AND SUN HEIGHT GAUGE

THEORY:
Light reflection; light refraction; formation of shades; dispersion of light.

VOCABULARY:
Bulb; light; reflection; refraction; shadows; dispersion

LEARNING OUTCOMES
At the end of the lessons the students will be able to:
1. Understand that a shadow is formed when an opaque object blocks the path of light
2. Understand that light travels in a straight line
3. Understand that light can change direction
4. Understand that the size of a shadow varies with the distance from the source of light
5. Know how to tell time using the sun height gauge
6. Know how rainbows are made

ACTIVITY ONE: LIGHT AND SHADOW

STEP 1: Preparation. Set up the experiment as in FIGURE 10. You can use a candle, or a torch if available. You can use a piece of white material to create a screen. You can use any solid object available in your environment (e.g., a book).

FIGURE 9: SHADOW AND LIGHT

STEP 2: Measure the length of the object and the length of its shadow. Move the object forwards and backwards from the source of light and observe the size of its shadow. Now move the screen forwards and backwards and again observe the size of the shadow. Finally move the source of light and observe the size of the shadow. Record the observations in a table.

STEP 3: Discuss. Ask the students:
- How big is the shadow?
- As you change the distances between the object, the source of light and the screen, ask the students: Is the shadow bigger? Is it smaller?

ACTIVITY TWO: SUN HEIGHT GAUGE

STEP 1: Take the students out of class and use the light of the sun and the shade of their bodies to calculate the length of their shadows. Repeat the experiment at different times of the day.

STEP 2: Use the Sun Height Gauge to observe the changes of the sun height by measuring the angle of the sun at different times of the day.

STEP 3: Ask the students: What did you see?

ACTIVITY THREE: PERISCOPE

STEP 1: Use the periscope to observe the reflection of light.

Make sure that all of the students participate in the activity.

STEP 2: Explain. Light can change direction. This property is called reflection. You can repeat the experiment using a mirror.

FIGURE 10: REFLECTION OF LIGHT
UNIT TEN: OPTICAL KIT, PRISM, PERISCOPE AND SUN HEIGHT GAUGE CONTINUED

ACTIVITIES

**ACTIVITY FOUR: HOW LIGHT TRAVELS**

**STEP 1:** Preparation. Take 3 cardboards labeled A, B, and C and make a pinhole in their centers like in FIGURE 12. Place a burning candle on 1 side of Cardboard A and arrange the cardboards in such a way that the 3 pinholes and the candle flame are in a straight line.

**STEP 2:** Ask the students. *What do you see?* The candle flame will be visible through the pinhole of Cardboard C.

**FIGURE 11: HOW LIGHT TRAVELS**

**STEP 3:** Now slightly displace any 1 of the cardboards. Ask the students: *What do you see?* The flame will not be visible because light travels in a straight line. This is one of the examples of rectilinear propagation.

**ACTIVITY FIVE: PRISM**

**STEP 1:** Use the prism to observe the dispersion of light. Make sure that all of the students participate in the activity. Ask the students: *What do you see?*

**STEP 2:** Explain. When rays of the sun are made to pass through a glass prism, we see the 7 different colors. The splitting of a ray into its component colors is known as *dispersion of light*, and the band of colors is known as a *spectrum*. See FIGURE 13.

**STEP 3:** Discuss. Ask the students: *Have you ever seen a rainbow? Can you describe it? What was the weather like when you saw a rainbow?*

**STEP 4:** Explain. Rainbows appear when raindrops (similar to a prism) reflect sunlight, thus breaking white sunlight into colors.

**FIGURE 12: DISPERSION OF LIGHT**
## OTHER NATURAL SCIENCE LESSONS

### UNIT ONE: DISSECTING KIT, DISSECTING TRAY, MAGNIFYING GLASS AND GERMINATING UNIT

**THEORY:** The classification of plants and animals.

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the end of the lessons the students will be able to:</td>
<td><strong>ACTIVITY ONE:</strong> CLASSIFICATION OF PLANTS</td>
</tr>
<tr>
<td>1. Understand how we classify plants</td>
<td><strong>STEP 1:</strong> Ask the students to collect different samples of plants that they can find in their environment.</td>
</tr>
<tr>
<td>2. Explain the process of photosynthesis</td>
<td><strong>STEP 2:</strong> Place the plants on the dissecting tray. Use the dissecting kit to identify the different parts of the plants. Use the magnifying glass to observe the details. Create a table on which you list the names of all of the plants collected and their characteristics (e.g., form of the leaves, description of the flower if present, local name, and use of the plant if known).</td>
</tr>
<tr>
<td>3. Understand how we classify animals</td>
<td><strong>STEP 3:</strong> Discuss. <em>How can we classify (form groups) the plants we collected?</em> Encourage the students to come up with their own ideas. Usually classification is done by identifying common characteristics.</td>
</tr>
<tr>
<td>4. Observe the process of germination</td>
<td><strong>STEP 4:</strong> Explain. Botanists (scientists who study plants) have classified all of the plants known to exist on earth into different groups according to their common characteristics. The classification of plants is useful in order to identify the different plants and to know their properties. Most of the foods we eat come from plants.</td>
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<td></td>
<td><strong>STEP 5:</strong> Invite the students to give examples of plants that they eat (e.g., beans, bananas, oranges, spinach, and potatoes). Ask the students to draw pictures of the plants that they eat. <em>NOTE</em> You can link this activity to lessons on nutrition.</td>
</tr>
</tbody>
</table>

**VOCABULARY:** Germination; photosynthesis; vertebrate; invertebrate

### ACTIVITY TWO: PHOTOSYNTHESIS

**STEP 1:** Explain. The major characteristic that connects plants is photosynthesis. Photosynthesis is the process that allows plants to take energy from the sun and use it to manufacture food for the plant (glucose/sugar). Humans and animals use the energy produced by plants by eating them.

**FIGURE 13: PHOTOSYNTHESIS PROCESS**

**STEP 2:** Explain. Through photosynthesis, plants produce oxygen, which is vital for human and animal life.

**STEP 3:** Ask the students to draw a picture of the photosynthesis process.

*continues on next page*
UNIT ONE: DISSECTING KIT, DISSECTING TRAY, MAGNIFYING GLASS AND GERMINATING UNIT CONTINUED

ACTIVITY THREE: CLASSIFICATION OF ANIMALS

STEP 1: Explain. There are many different types of animals in the world. Many animals are quite similar to each other. Others are quite different. Ask the students:

Can you give some examples of animals?

STEP 2: Animals, like plants, can be classified based on their similarities. The major characteristic that separates different types of animals from each other is whether or not they have a backbone:

vertebrate animals are those that have a backbone;

invertebrate animals are those that do not have a backbone.

STEP 3: Ask the students:

Can you give examples of invertebrate animals? (e.g., snakes, spiders, and starfish). Can you give examples of vertebrate animals? (e.g., horses, cows, dogs, and sheep). Ask the students: To which group do humans belong?

STEP 4: Ask the students to draw pictures of different vertebrate and invertebrate animals.

STEP 5: Use the dissecting tray and kit to study vertebrate and invertebrate animals (e.g., compare a snail to a frog). What are the differences? Make sure that the activities are safe at all times.

NOTE

Make sure that the activities are safe at all times.

ACTIVITY FOUR: GERMINATION

STEP 1: Preparation. Take a handful of seeds, such as beans. Dampen a piece of cloth or some cotton of a piece of paper with cotton and put it on the bottom of the germination unit. Place the seeds on the damp cloth and cover the unit. Leave it covered for 2 days.

STEP 2: Open the germination unit. Ask the students: What happened? Ask the students to note their observations. Leave the germination unit covered for another 2 days.

STEP 3: Open the germination unit. Ask the students: What happened? What color are the sprouts? Why?

STEP 4: Discuss with the students. What did you observe? What happened to the beans?

The sprouts are white, because they did not get any light during the germination process. It is through the process of photosynthesis that leaves become green.

Plant the sprouts in soil and follow their growth. Ask the students to observe the beans regularly and make notes of what they observe.
UNIT TWO: MINERALS, ROCKS AND FOSSILS SAMPLE KIT

THEORY: The classification of minerals, rocks and fossils

At the end of the lessons the students will be able to:

1. Identify minerals, rocks and fossils
2. Explain the differences between minerals, rocks and fossils

ACTIVITY ONE: Dividing the students into learning-groups. Allow each learning-group to observe the different samples contained in the Minerals, Rocks and Fossils Sample Kit.

Ask the students:

1. How can you group the samples contained in the kit? Why?
2. Allow some time for each learning-group to come up with its own answers.

ACTIVITY TWO: Explain. The whole earth is made of rocks and minerals. Inside the earth there is a liquid core of molten rock, and on the outside there is a solid crust. If you compare the earth to an egg, the shell on an egg is like the crust on the earth. The crust is made up of rocks and minerals. Much of the crust is covered by water, sand, soil and ice. If you dig deep enough, you will always hit rocks. There are many kinds of rocks, minerals and fossils.

ACTIVITY THREE: Explain. Ask the students:

1. Can you name some of the rocks you can see around you? (e.g., mountains, canyons and mountains). All rocks are made of minerals. A rock is made up of 2 or more minerals.

ACTIVITY FOUR: Experiment. Break a rock into small pieces. Observe it with the magnifying lens. Ask the students:

1. What do you see?

ACTIVITY FIVE: Explain. When rocks break down into smaller and smaller pieces, they eventually turn into sand. The sand is made up of the same minerals as the rocks from which the sand came. When plants start to sprout up in sand, the sand is turning from just being small bits of rock to being soil.

ACTIVITY SIX: Explain. A mineral is a material that is composed entirely of the same fundamental substance. If you were to cut a mineral sample, it would look the same throughout. There are about 3000 different minerals in the world. Look at the samples of minerals contained in the kit.

ACTIVITY SEVEN: Compare the samples of minerals and rocks to the samples of fossils. Ask the students:

1. What differences can you observe between the samples of minerals, rocks and fossils? Use the magnifying lens.

ACTIVITY EIGHT: Explain. Fossils are the remains or impressions left by plants or animals that lived a very long time ago. The fossils contain the same materials as the plant or animal was alive but have now changed into stone. Observe the fossils contained in the kit.