

Background to the ISS Education Kit

The European Space Agency (ESA) wants to have an active role in supporting education in Europe. Over the last couple of years several new initiatives have been carried out so that ESA can now offer a range of educational products and activities for all age groups. The ISS Education Kit is part of Education Activities for the International Space Station (ISS) Programme.

It would not have been possible to make this ISS Education Kit without the help of many people: ESA experts and astronauts contributed by sharing their scientific knowledge and experience from space; education experts throughout Europe helped us find common elements of European curricula, common methods and material used in European schools. They also assessed the didactical content of draft versions of this kit. A journalist, an illustrator, editors and designer have been involved.



Teachers working on the draft of the Kit.

Other products developed under the ISS Education Programme are the "Mission Possible" website for primary schools, an ISS Education Kit and a series of DVD lessons for secondary schools. Two computer-based products for secondary schools are currently under development: the ISS

Education Kit on the Web and the 3D Education Tool. At University level, students are invited to propose experiments for parabolic flights, sounding rockets and the ISS. For more information about the ISS Education Programme, visit our website: www.esa.int/spaceflight/education



Pupils in action.

Target groups

The target groups for this kit are primary school teachers throughout Europe and their pupils, aged 8-10.

General objectives

- To foster the pupils' interest in science and technology using space as an attractive context.

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- To raise the awareness of space science and technology.
- To stimulate children to use their curiosity and creativity to gain knowledge and develop a variety of skills.
- To highlight the importance of international cooperation and research for the benefit of people on Earth.

How to use the kit

The ISS Education Kit is a resource for teachers with ideas on how to use the International Space Station as a thematic frame for teaching a wide variety of topics that are part of European curricula.

The kit can be used as a whole or in part; it is as useful for single lessons as for topic-based project work or a roleplay/storyline project. As the kit is made for a wide audience, the teacher might have to adapt the content, e.g. by making links to the pupils' existing knowledge, other topics taught in class, the pupils' special interest or their age level.

Any part of the kit is **free to copy** for educational purposes.

Content of the kit:

The ISS Education Kit is divided into four chapters. Each chapter starts with the sections for the pupils with texts and worksheets and is followed by a "Teacher's Guide". Both the Teacher's Guide and the Pupils' Text and Worksheets are based on the following structure:

Chapter 1 Being an astronaut

- 1.1 What is an astronaut
 - 1.2 Gravity
 - 1.3 Weightlessness
- Teacher's guide

Chapter 2 A mission to space

- 2.1 The training of an astronaut
 - 2.2 Space Suits
 - 2.3 Travelling to space
- Teacher's guide

Chapter 3 On board the Space Station

- 3.1 What is a Space Station?
 - 3.2 Building the International Space Station
 - 3.3 Getting things there and back
- Teacher's guide

Chapter 4 Living in Space

- 4.1 Living on board the International Space Station
 - 4.2 Working on the International Space Station
 - 4.3 Coming home
- Teacher's guide

Glossary

Acknowledgements

Introduction

Pupils' Text and Worksheets:

For each chapter, there is a Pupils' Text and several Pupils' Worksheets.

The **Pupil's Text** provides the pupils with background information on a topic – read this text aloud in class or let them read it silently. You can also use it as background information for your own presentation or introduction to a topic.

The **Pupils' Worksheets** contain a variety of exercises to do in the class or at home, in groups, individually or in collaboration with the whole class. In the top right corner of each Worksheet, the **level of difficulty** is indicated by a 'empty / filled circle system' – for further information, please see the section "A note about level of difficulty". In the top right corner of both the Pupils' Text and Worksheets, the **type of exercise** the page contains is indicated (reading, writing, experiment etc.) – for further information, please see the table overleaf.

Both in the Pupils' Text and Worksheets, there are questions for reflection under the heading "**Think about it!**". These sections can be used to link the current topic to other topics, to further explore or to discuss certain elements.

List of icons and resources:

Icons:



Reading text



Writing or drawing



Performing an experiment



Creative activity

Teacher's Guide:

The Teacher's Guide gives a per-chapter overview of the **core elements** of the Pupils' Text and Worksheets and indicates which **subjects** the activities can be related to.

You will find more **background information** for the teacher on the topic described in the Pupils' Text, as well as a section with **ideas and hints for the worksheet activities**. In the section "**Further ideas and explorations**" there are more ideas on how you can link the topics to other topics in the kit – or to other topics in the curriculum. You will also find concrete ideas for activities to perform in class, as well as lists of websites for more information.

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A drawing of the Space Station.



Additional material:

At the end of the kit there are **posters** that can be used to discuss elements from the Pupils' Text and Worksheets – for instance to look more closely at the International Space Station together, to summarise an exercise or maybe to discuss a problem that was raised while solving

the exercises. – Of course you can simply use the posters to decorate the classroom!

There are worksheets that provide you with pictures for **playing cards** or **paper dolls** – these should be glued onto cardboard or copied onto thicker paper.

Lesson suggestions:

Suggestions on preparations for and introduction to a topic:

Decide whether you would like to introduce the subject of the kit for project work, background for role play or for a single lesson. The Worksheets can be used as part of an “astronaut training programme” where the Worksheets have to be collected in a “Mission log folder”.



Schoolchildren in astronaut suits being interviewed.

Decide which activities you want to do with the pupils and how you would like to organise them (in groups, individually, at home, at school etc.). Collect the material needed for the activities.

Astronaut André Kuipers explaining an experiment.



Use the questions under the heading “Think about it!” to introduce a topic and let the pupils list what they already know about this topic. Use a brainstorming session to map what the pupils already know.

Use elements from the Worksheets as basis for discussion before or after the activity proposed in the worksheet.

Suggestions for working with experiments:

When you do the experiments proposed in the worksheets, we suggest you

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first ask the pupils what they expect to happen before they perform the experiment. Afterwards, they should describe what happened, before analysing and coming up with an idea why it happened. They will use a strictly scientific method if they follow this procedure.

In some cases we have provided you with pictures of what similar experiments look like in space. Ask the students to compare the examples “from space” with their own experiments.



Astronaut André Kuipers giving a lecture in a school.

We encourage you to use the exercises in this kit in such a way that the pupils use their curiosity and imagination and develop their scientific skills by observing, analysing, measuring and recording data.

A note about level of difficulty:

The Worksheets have been marked with circles to indicate the level of difficulty of the tasks. There are three different levels: 1, 2 and 3, where 1 filled circle is easiest and 3 filled circles most difficult. We hope this will help you plan your lesson.

● ○ ○ easy
● ● ○ moderate
● ● ● difficult

You may still have to adapt the level of difficulty to make the most out of this kit. We suggest that you use parts of the exercises even when they are too advanced; if the exercises are too basic, make them more challenging by adding our suggestions for further exploration or connecting them to other topics relevant to your curriculum.

Some of the Pupils’ Text and Worksheets might have too much text for your pupils. Both the Pupils’ Text and Worksheets can be used individually, but you can always decide to use the Pupils’ Text or Worksheets as background information and tell a story for the pupils instead of letting them read it all themselves. You might also want to explain the exercise rather than letting the children read the instructions on their own.

Suggestions on how to share the knowledge and closing a theme:

In the first chapter we suggest to make a “Mission log folder” as one of the activities. This can be used to collect all the worksheets, drawings and essays completed. In the last chapter all interviews could be collected and made into a newspaper.

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You could also prepare an exhibition of all models, posters, newspapers and experiments the pupils have made. Don't forget captions explaining what the object is used for and from which materials it is made, the date it was made and the name of the one who created it – like in a real museum.

Some of it may also be used for a performance. This could be done in connection with the event we propose in chapter “What is the International Space Station” (to watch the ISS passing above you on a clear night). Use the opportunity to dress up as an astronaut!

Resources:

In the following pages you will find the following extra resources:

“Astronaut log”: can be used for any written exercises – when extra space is needed or you would like the students to summarise discussions etc.

“Mission diary – report form”: can be used for self-assessment for the pupils. There are two pages – one to be used before and one to be used during or after a defined period. The first sheet includes: ‘I already know...’, ‘I would like to find out...’ and ‘To do that, I will...’, while second sheet includes ‘What I have done’, ‘What I have learnt...’ and ‘What I still would like to know more about or improve...’.

“Astronaut certificate”: can be handed out at the end of a project or when the pupils have performed a certain amount of Worksheets/tasks.

Posters: There is one poster for each Chapter at the very end of the Education Kit. Mostly, the posters are enlarged images from the respective Chapter and can be used to illustrate the corresponding topics. They can also be copied and handed out to the pupils or simply hung up in the classroom for decoration.

Contact the ISS Education Team:

The ISS Education Team encourages you all to send us highlights of your pupils' work (e.g. their best essays or drawings). Please send it to:

ISS Education Team
European Space Agency, ESTEC
P.O. Box 299
2200 AG Noordwijk
The Netherlands

E-mail: isseducationteam@esa.int

For more information on our other products and upcoming events, please visit: www.esa.int/spaceflight/education

Or: www.esa.int/education

Mission diary – report form

page 1

I already know that ...

I am going to learn more about ...

To do that, I will ...

Mission diary – report form

page 2

What I have done ...

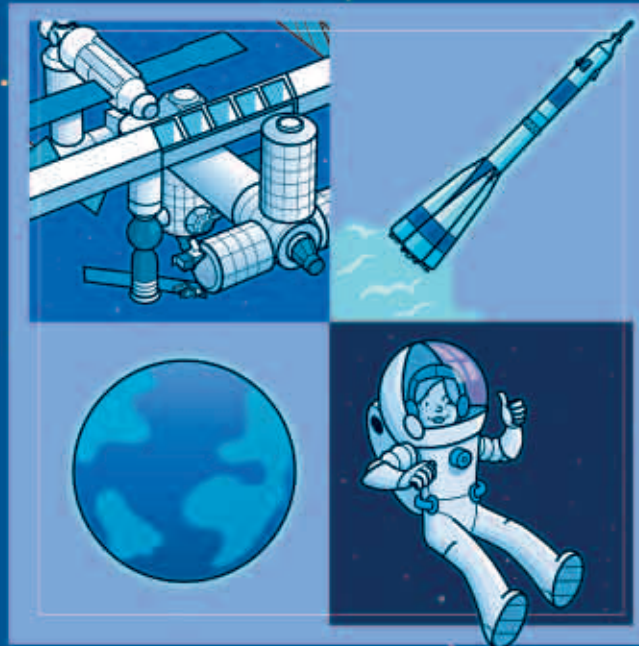
What I have learnt ...

What I would like to find out more about or improve ...

Primary Education Kit



Certificate



To: _____

In reward for having completed the Primary Education Kit tasks successfully.

Date: _____

International Space Station

