



SCIENCE LABORATORY



THAMES & KOSMOS



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This section provides a quick explanation of all the parts in the kit. You will find ideas for using the kit, inspiration for games and more in-depth projects, and suggestions for how to be creative in shaping an optimal learning environment for your child.



Important Information

All the materials in this kit are safe for children. Still, there is always the possibility for injury. So please do not let your child experiment alone. Take the opportunity to teach your child that nothing from the experiment kit should be eaten and that there should be no eating or drinking while experimenting.

Never leave the magnifying glass in the sun — it could cause a fire! Make sure that your child never looks directly into the sun, either with the naked eye or with the magnifying glass. He or she could blind himself or herself!

To clean and care for the parts, it is best to rinse them by hand under running water. Handle the magnifying glass carefully so it does not get scratched. This way, your child can continue to have fun with it for a long time. Keep the packaging and instructions, as they contain important information.





How Your Child Sees the World



DEAR PARENTS,

On the following pages we will explain the educational philosophy behind this experiment kit. Each element in this kit has been intentionally designed to accomplish specific educational goals.

HOW A CHILD LEARNS

The preschool years are a particularly intensive learning period for a child. Children have the urge to learn about their surroundings with all of their senses. They want to perceive, discover, understand, and explore their environment.

Natural curiosity is the driving force for learning.

The motivation for learning is especially strong during the kindergarten years. This is what drives their development.

The child's brain changes quickly in this period. It grows and forms networks faster and faster. Learning happens automatically. Monitoring and **encouraging all areas of development**

(motor skills, language, thinking, and emotion) is therefore of the utmost important, both in the kindergarten classroom and at home.

The current prospective is that children shape their own process of development through an **active interaction with their environment**. Parents and preschool teachers have an active role to play, one of observing the child and modeling the child's learning environment. In this process, it is important to start with the child's interests and everyday needs. The important thing is to **encourage the child's strengths** rather than focusing on deficits.

During the preschool years, children learn by **playing**. In play, children grapple with their surroundings, explore them, and conquer them.





INVESTIGATION THROUGH PLAY

“Play is not just fooling around; it has a serious and deep meaning.”

(Friedrich Wilhelm August Fröbel, 1782-1852, creator of kindergarten)

Unstructured play enables the autonomous discovery of natural phenomena. **Observations give rise to questions that are answered through experiments.** The **frequent repetition of experiments** is an important part of the process. That’s what helps a child recognize and remember principles.

Your child needs time and stimulating surroundings for exploration and play to happen. His or her own **home environment and natural surroundings** are important experiential realms that offer countless possibilities for learning. They offer a direct connection to the familiar, allowing your child a way to learn in a meaningful context.

WHAT THIS EXPERIMENTAL KIT HAS TO OFFER

This kit will help you support your child in an especially sensitive phase of their development. All of its materials are durable so that they can be used over and over again, making it possible for this experiment kit to accompany your child through his or her **entire kindergarten period** to

stimulate independent exploration in the home environment and outside.

In choosing these materials, special attention was paid to include materials that stimulate development in a **variety of fields of development:**



• Movement and experiences in nature strengthen a sense of balance and the locomotor system



• Hand-eye coordination



• Fine motor skills, and familiarization with the properties of materials



• Handling quantities and first experiences with time

• Powers of perception, concentration, persistence, and problem-solving



You will find more detailed information about these materials and abilities in the second chapter. You will also find information about

how to shape your child's learning environment in a stimulating way.

COMBINATIONS

The objects in this kit can be combined with one another in many different ways. In the second chapter, you will find illustrations of a few examples. These are not requirements, but merely suggestions. Keep trying new variations and see what your child creates and learns from them. **Continue to encourage your child's strengths by making appropriate new materials available.**



SELF-DETERMINED AND MOTIVATED

In the second chapter, there are no traditional experiments. Instead, you will find an assortment of ideas and tips for shaping a variety of activities using the different materials along with suggestions for combining them to create new learning opportunities. These creative suggestions will allow your child to come up with lots of other play ideas.

The goal is to let your child explore and discover without strict instructions, in order to help them have their own unique insights.

The outcome of your child's own investigations are not predetermined. Preschool children still learn in a playful manner and are drawing insights from a wide variety of situations. **Strict instructions would only restrict what they learn.**

In order to avoid overtaxing your child, it may make sense to start by offering just a **few objects** from the kit that are in line with your child's age and interests.

If you think that extra stimulation would make sense, bring more objects into play as the prior activities are mastered or if they no longer seem interesting to your child.

There are no strict rules for combining the objects — everything is compatible.

The **relevance of what they do with the objects to everyday life** is especially important for learning. It helps your child recognize the meaning in an activity and feel motivated to



experiment. So it is good to make **additional objects available**, from the kitchen or bathroom for example, to keep him or her busy in a safe manner. There are no limits to the ideas that you might come up with. Let your child's own interest guide you. That's the best way to support the development of his or her unique strengths.

The most successful approach with children is to promote their strengths rather than to focus on their weaknesses. Always keep the child's joyful engagement in mind.

This way, your child will provide their own motivation and will learn more effectively than they would if prodded by someone else. It is particularly important to let your child learn **in their own way and at their own pace.**

Feel free to invite other children into the game as well, since **exploring together** can promote even more abilities and help your child learn rules of social interaction. Communication will come into play and your child will be given the opportunity to perceive the way that other children feel and handle things.

PROMOTING INDEPENDENCE

Children learn when they are free to play and use all their senses — at home and on the go, everywhere and at all times. Take your child to the playground or into **nature** whenever you can and try collecting play materials together.

Learning in everyday settings and in other environments is of special importance to a child, helping them to develop self-sufficiency in problem-solving and in everyday life. These abilities are important building blocks for their ongoing learning in later years. When a child

learns how to get along on their own, they will be more motivated to learn and they will show more persistence in doing so.

This first experiment kit will help to empower your child in their learning and can make an important contribution to helping them develop their own **independent personality**.

We hope that preschool and kindergarten are very special times for you and your child.

Have fun playing and exploring!





Materials and Suggestions



DEAR PARENTS,

On the following pages, we will introduce you to the materials in this kit and give you tips and ideas for supporting your child in their investigations.

Magnifying glass

WHAT IS IT AND WHAT'S IT FOR?

A hand-held magnifying glass is an indispensable tool for little explorers. Children these days are often exposed to an overabundance of stimuli, which can make it difficult to perceive and focus on details. A magnifying glass is an invitation to make detailed observations of little things and to pause for a moment of focus. It encourages an appreciation of the astonishing qualities of the objects being viewed. The magnifying glass is a powerful motivational tool in awakening and encouraging a child's natural curiosity.

Training in visual perception is particularly important during the kindergarten years, partly because the sense of sight is not fully developed until around age 6.

SUGGESTIONS AND EXAMPLES

Consider the magnifying glass the constant companion of your child in everyday life, on nature trips and on the playground. Encourage your child to study things at home and outside, and join your child in looking at objects. Help your child to formulate questions and conjectures, so you can search for explanations together.



Provide suggestions for various ways to handle the magnifying glass. For example, how does the observed object respond when the magnifying glass is moved up and down?

You might set search-and-compare tasks for your child. It's fun and promotes the development of thinking skills.

A few examples:

- Find and compare three different leaves.
- Contrast the consistency and appearance of flour, sugar, and salt.
- Look for articles of clothing made of various materials and compare the fabrics.

There is no limit to what your imagination can come up with.



Magnetic Rings and Stand

WHAT ARE THEY AND WHAT ARE THEY FOR?

The natural scientific phenomenon of magnetism is very exciting to preschoolers. The four magnetic rings on the stand will enable your child to learn about the properties of magnets in a fun way.

First, the four magnetic rings will allow him or her to perform experiments investigating the attracting and repelling forces of magnets. The rings look the same on both sides, but they have different poles. Which sides attract and which ones repel each other?

SUGGESTIONS AND EXAMPLES

Accompany your child on an expedition through the house to see where magnets are used in everyday life (for example, to attach notes to the refrigerator). Encourage your child to experiment with a variety of objects.



The questions below can form the basis for various guessing games. For example, you could pick out three test objects and have all of the players offer suggestions. Then check your results together:

- Which things are attracted?
- For things that are attracted, what kinds of materials are they made of?
- What happens to the same kinds of things made of different materials (for example, plastic spoons and metal spoons)?
- From how great a distance are objects attracted to the magnet?
- A magnet can attract objects through materials. How many layers of paper (for example) can the magnet penetrate?
- Can an obstacle stop the magnet's force of attraction?
- How close can the stand get to a magnetic ring before it is attracted or repelled?

Come up with your own games with magnets. Here's an example:

Take a kitchen tray, a table, or other flat, smooth surface and check whether the magnetic rings can penetrate through the surface to move the stand. Then construct a maze made of building blocks or other objects on the surface together with your child. Let your child's creativity run free while constructing it. Now, who can manage to guide the stand through the maze using only the magnet from the underside and without hitting anything or knocking anything over?



Be careful when using magnets near data storage media, credit and debit cards, and the like. The data stored in them might get damaged and lost.

Experiment Cards

WHAT ARE THEY FOR?

This set of ten experiment cards allows you to present science experiments to your child in a format they can understand, with simple visual instructions and minimal text.

One side of each experiment card has illustrated instructions for the child to follow. The other side of each card has information for the parent or adult helper to read to the child: the materials needed from the kit, additional materials you will also need, the scientific concept that the experiment addresses, and simple instructions for performing the experiment.

These cards give you and your child an opportunity to practice following visual and spoken instructions — an important part of the science experiment process.



! Encourage your child to follow the visual instructions on the experiment cards and help with explanations as needed:

- Ask your child to pick a card that looks interesting to him or her.
- Make sure you give your child all of the additionally required materials for the experiment.
- Ask your children questions during each step of the experiment procedure: Before you have started, ask them what they think will happen in the experiment (in other words, to form a hypothesis). When they are performing the experiment, ask them to explain to you what they are observing and what they are doing. At the end, ask them what happened and what they learned.



***The cards feature Ty and Karlie Omega, the main characters in the Thames & Kosmos Kids First Engineering kits.**



Measuring Spoons and Test Tubes with Stand

WHAT ARE THEY AND WHAT ARE THEY FOR?

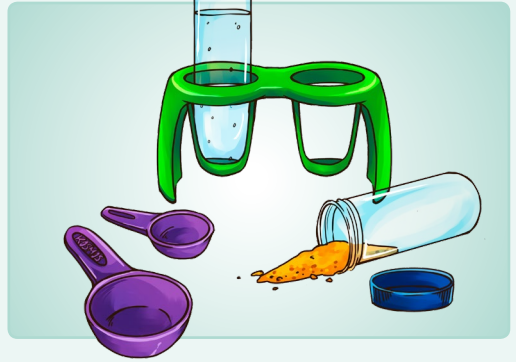
Handling containers is an important field of activity. Filling them, pouring things out of them and from one container to another are things that children enjoy and that help to teach important skills.

Filling and pouring are important things to practice for everyday activities. This is an activity that we perform on a daily basis in many different contexts, such as watering plants, pouring drinks, or measuring ingredients in the kitchen.

This fosters skills in the following areas:

- **Learning about** various materials (such as water, rice, beans, sand, or fine grit for bird cages) and their different flow properties
- **Sensing** the materials with your hands
- **Recognizing** physical laws (such as gravity)
- **Dealing with quantities** and comparing different quantities by handling containers of different types and sizes (such as pitchers, watering cans, or funnels)
- **Concentration and reaction** is required to stop pouring at the right time to avoid spilling anything

Older children can have fun with these experiments too. Activities such as these often aid learning and relaxation in equal portions.



SUGGESTIONS AND EXAMPLES

Expand the possibilities by providing containers from around the house and by making various materials available for pouring and filling.



Suggest some comparative tasks:

- How many large or small measuring spoonfuls will fit into the large or small test tube?
- How many test tubes will fit into other bowls or cups?
- What results do you get when you perform the experiments with different materials?

TIP!

These experiments can make quite a mess. Integrate sweeping-up activities into the game, which also promotes manual skills.





Pipette

WHAT IS IT AND WHAT'S IT FOR?

Experimenting with the pipette provides an initial approach to thinking about and working with real laboratory equipment.

Handling the pipette promotes fine motor skills and offers training in visual perception because it requires precise observation. Concentration and reasoning skills are promoted too. It also provides an opportunity to learn about counting and dealing with numbers.

SUGGESTIONS AND EXAMPLES

The pipette is an invitation for experimenting with liquids. How do you get water into it and back out again? Provide some water for your child to find out. What other kinds of things might be drawn up into the pipette?



One option is to use colored water, which can easily be made by mixing food coloring or watercolor paints with water. It's fun to mix colors or create water drops. This will also elicit your child's creative impulses.

You can also set up a few little tasks:

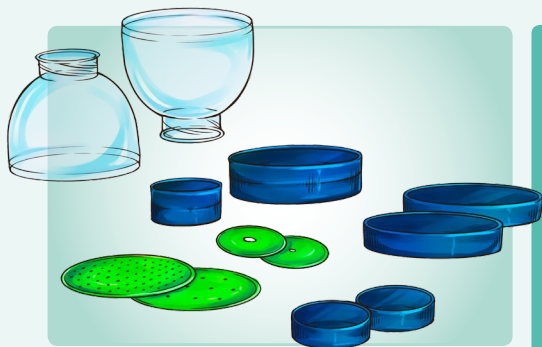
- Mix one color with another. What new colors does this produce?
- Try making purple from other colors. What colors do you need for that?
- How many drops of water will fit into the small measuring spoon or test tube lid?

Under your supervision, you can also have your child experiment with soap or bubble bath liquid. Just make sure that they do not drink any of these substances.



CLEVER COMBINATION!





Multipurpose Container System

WHAT IS IT AND WHAT'S IT FOR?

With its many individual modular parts including funnels, lids, and disks, the multipurpose container system offers plentiful options for exploration and discovery. It can be assembled and used in many different ways.

It promotes all the skill areas that have been described on the previous pages. The difference lies in the degrees of challenge and the possibilities for variety, with demands placed on manual dexterity and concentration.

SUGGESTIONS AND EXAMPLES

Provide your child with sufficient water, sand, rice, flour, small beans (or lentils), peas, and whatever else comes to mind.

Encourage your child to combine the parts in different ways. Try to gauge how much input your child needs and provide him or her with the appropriate amount of material.



Set some general little tasks:

- How much material is needed to fill the containers?
- Which materials pass easily through the perforated disks?
- How do the materials compare? What do they have in common and what are their differences?
- What happens if you first pour peas into the container and then sand? How about vice-versa?

You will be able to come up with lots of creative experiments using the container system. And you will be astounded how many your child will be able to think of too!

The next page will give you one of many examples showing how the system can be used.



CLEVER COMBINATION!



MANY POSSIBILITIES: HOURLASS EXAMPLE

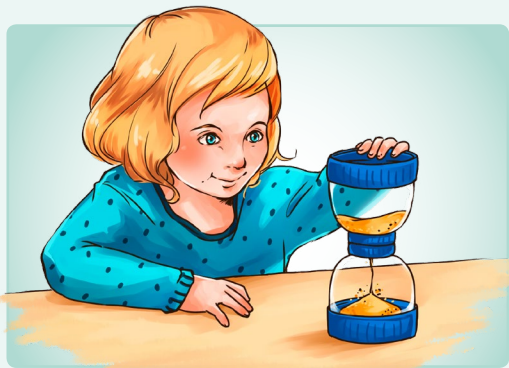
You can create various instruments for measuring time by inserting a variety of disks between the two funnels. When experimenting with this kind of hourglass, new kinds of challenges will arise, involving observations regarding time and speed.

During the preschool years, **a child's sense of time is still very subjective**, meaning that the perceived passage of time is more important than any objective measurement using a clock. A period of time will be perceived as long if something boring or unpleasant is happening. Pleasant experiences make the time seem to pass quickly. The hustle and bustle of everyday life hardly leaves room for this kind of subjective sense of time. Even children have to orient their everyday activities toward objective time measurements — in other words, toward clock times. So it's all the more important to give them opportunities to experience their subjective sense of time.

SUGGESTIONS AND EXAMPLES

! Invent games and suggest tasks to do with the hourglass:

- Let your child do something while the hourglass is running — first something fun, and then something boring. Which took longer?
- Which materials flow faster and which flow slower? Why? Do some things just appear to be slower or faster? Are some materials more interesting to observe while flowing though?



Children have a lot of fun with games involving time. An hourglass can also offer opportunities to gather early experiences distinguishing subjective from objective time measurements.

! What is a unit of time? Your child can start to tackle this complex question with the help of these exciting experiments.

- How many times can your child run around a chair before the sand runs out?
- Have another person try it. Why is it that he or she can do it more or fewer times?
- How many rounds are possible are when using lentils or water?
- Why does the number vary?

These examples can be changed in many different ways — and not just with regard to time. The container system can be used as a funnel or collection vessel, a sieve, a bug jar, a flower pot, or part of a laboratory station. Watch your child and respond to his or her own ideas with new suggestions or tasks.

CHECK IT OUT



Document It

What?

Documentation of **findings** can be an important building block to encourage learning. This can be done in very different ways depending on your child's age.

Children can prepare **drawings or pictures of objects and experiments**. With your support, they can also take **photos**. Whether they are observing objects under the magnifying glass, playing with things hanging from the magnet, or doing different experiments with the multipurpose container system, documentation helps the process of **remembering an insight**.

How?

There are many ways to use the drawings or photos. **Assemble** them into a wall poster or help your child create a book out of them. Documentation gives extra meaning to games and experiments. They are turned into important **research results**. Documentation helps to **organize the knowledge** obtained. In addition, documentation makes it easy to determine whether there are still any remaining **open questions**. And last but not least, it encourages the process of coming up with new ideas for more games and experiments.

And then what?

By looking through the created documents together, especially when other people are present, it encourages your child learn to develop **verbal expression** of the experimental relationships, thus teaching a further important type of competency. In addition, it strengthens **self-awareness and self-confidence**. **Your child becomes the expert** who is presenting his or her insights. You can provide your own support in this process.



EVERYDAY APPLICATIONS

The next step is to apply the acquired skills to everyday life. Provide your child with opportunities to do this **around your home**.

The experiments with pouring and filling can be applied to helping you in the kitchen, such as when measuring ingredients in measuring cups. The fine motor skills developed when handling the pipette and magnifying glass can help with crafts, drawing, writing, and lots of other activities.

An interest in **temporal processes** may have been awakened in your child during the experiments with the hourglass. Try integrating this into your **daily planning**. For

example, the two of you together could make entries on a poster showing what you plan to do in the morning, afternoon, and evening.



In any event, it is always important to **acknowledge your child's efforts and accomplishments** and to make sure that the tasks can be performed by your child, so he or she **learns to experience success**.



Kosmos Quality and Safety

More than one hundred years of expertise in publishing science experiment kits stand behind every product that bears the Kosmos name. Kosmos experiment kits are designed by an experienced team of specialists and tested with the utmost care during development and production. With regard to product safety, these experiment kits follow European and US safety standards, as well as our own refined proprietary safety guidelines. By working closely with our manufacturing partners and safety testing labs, we are able to control all stages of production. While the majority of our products are made in Germany, all of our products, regardless of origin, follow the same rigid quality standards.

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