Family
Tinker Kit

Everyday Tools for
Play and Learning

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The Family Tinker Kit: Everyday Tools for Play and Learning Guide and Kit have been developed by the Boston Children's Museum with funding from National Grid of Massachusetts (2016) and an Institute of Museum and Library Services National Leadership Grant (2015).

The goal of the Kit and Guide is to provide tools, information, and resources to families; to early care and education professionals; and to museum, library, and other community educators about early learning science, technology, engineering, and math (STEM) strategies to support school readiness through tinkering. The Guide explores what tinkering is and why it's important to our early learners (children ages 3–6). It also provides 12 activities suitable for tinkering at home; in any museum, library, or other community setting; and in the classroom. The activities help to develop STEM skills through open-ended as well as guided learning experiences. The activities are simple to set up, and they use common, household objects that are easy to find and inexpensive to replicate. Each activity content area, developed through Boston Children's Museum's extensive work with children, is designed to provide experiences that are deeply engaging and generative of further investigation.

We hope this Guide and Kit will support your work with young children and families across Massachusetts.

Contents

What is Tinkering?

Tinkering is open-ended exploring and creating using the objects and materials in our everyday lives. We are all natural tinkerers. If you have ever experimented with a recipe, fixed something with glue or nails, or made a gift for a friend—then you have been tinkering! There is often a sense of accomplishment that goes along with tinkering. This experience of self-initiated exploration, discovery and accomplishment for our youngest learners, is what we'd like to share through this guide and kit.

Why Tinker?

In her book, *Tinkerlab: A Hands-On Guide for Little Inventors*, Rachelle Doorley says,

> ***At its core, tinkering begins with … problem solving and a curiosity about how something works. When children are encouraged to solve problems on their own, they learn a great deal through questions and hands-on experiments that lead to a solution. Even preverbal children pose questions and identify problems—think of a baby who works hard to grasp an out-of-reach toy.*** **p. XII**

Encouraging children to tinker gives them the skills to be creative learners, thinkers, doers, and problem solvers. Tinkerers are inspired by interesting materials, personally compelling questions, or a problem they want to solve. These "tinkering moments" can range from a 4-year-old discovering that by putting two funnels over her ears, she can "hear the ocean," to a 5-year-old wondering, "Which of these things will make the best 'soup'?" while playing with shoelaces, paper clips, and rubber bands, to an 18-year-old starting college with the goal of finding a better way to clean up oil spills.

Children who are encouraged from an early age to engage in self-directed, open-ended materials exploration and play with positive adult support learn how to observe, reflect, experiment, and try again if their experiment fails.
A child who tinkers:

- Does not give up easily when a challenge gets difficult
- Thinks creatively
- Is self-sufficient
- Can fix broken things and invent new ones

Tinkering Skills

When children tinker, the key point is not what they are making, but the *skills* they are developing and using as they create. These process skills, or *skills of doing*, are important to children of every age and are particularly important in the preschool years. Many of these skills are cornerstones for school readiness. They are also foundational skills for STEM learning. As children mature, they grow more sophisticated in their use of these skills and can apply them to more complex problems. In addition, these skills are transferable across a range of disciplines and circumstances throughout a child's life.

SCIENCE AND GENERAL PROCESS SKILLS: SUPPORTING SCHOOL READINESS

SCIENCE/STEM SKILLS

- Experiment
- Observe
- Describe
- Compare
- Categorize
- Estimate/ count
- Measure
- Predict
- Problem solve
- Generalize

GENERAL PROCESS (SCHOOL READINESS) SKILLS

- Use tools/develop fine motor coordination
- Think creatively
- Relate to personal (current or prior) experience
- Develop resiliency
- Collaborate
- Communicate
- Follow instructions
- Plan ahead (executive function skills)

CHILD DEVELOPMENT: STAGES RELATING TO TINKERING AND TOOL USE

Physical Development	Social/Emotional Development	Cognitive Development	Communication
2–3 years			
Manipulate small objects with increased control; string large beads; hold crayon with thumb and fingers; draw a circle; run; jump; stand on one leg; kick a ball.	Begin to experience themselves as more creative, powerful "doers"; explore everything; show stronger sense of self; enjoy parallel play.	Learn through exploration; respond to simple directions; group objects by category; stack items in order of size; observe and imitate more complex adult actions.	Point to common objects when they are named; name objects based on their description; respond to "what" and "where" questions.
3–4 years			
Push, pull, and steer toys; build a tall tower of blocks; drive pegs into holes; run around; balance; throw and catch a ball.	Improve dexterity and self-help skills; follow a series of simple directions; complete simple tasks without assistance; show more interest in other children; share toys; initiate or join in play with others; make up games.	Understand concepts like grouping and matching; organize materials on their own; actively seek information through "why" and "how" questions; learn both by observing and listening to adults' explanations.	Understand size comparisons such as "big" and "bigger"; understand relationships expressed by "if … then" or "because" sentences; follow a series of two to four related directions.
4–5 years			
Use scissors; cut on a line continuously; copy squares and crosses; walk backward; jump on one foot; turn a somersault.	Grow more aware of individual identity; compare themselves with others; develop friendships; work with others to accomplish a task.	Point to and name many colors; understand order and process; draw, name, and describe pictures; count to 5.	Ask "when," "how," and "why" questions; understand comparisons like "big, bigger, biggest"; understand sequencing of events when clearly explained.
5–6 years			
Run in many directions; continue developing hand- and foot-eye coordination; tie knots and make bows; manage buttons and zippers; begin to use fork and knife to cut soft foods; start to print name; trace and copy shapes.	Are more confident; like to show off talents; display increasing awareness of their own and others' emotions; enjoy sharing toys and snacks with friends, although conflicts among peers remain frequent.	Typically can count up to 200 and backward from 20; understand odd and even numbers; can represent numbers on a number line or with written words; can go between make-believe and reality,	Rapidly increase vocabulary; move beyond simple communication to foundation for independent reading skills; begin to write stories, notes, and descriptions.

What Tinkering Looks Like

Tinkering is an *active* process—it is all about doing, discovering, and creating. This level of creativity and activity can help shift the relationship that children have with learning, as they view learning as engaging and enjoyable. Tinkering encourages children to use their hands, senses, tools, and skills to investigate, understand, and even change their world. It builds children's capacity and enthusiasm about using their own ingenuity to create and use tools.

- **Tinkering requires tools.** Children often have little exposure to tools, even simple ones. But they *can* be introduced to a range of tools and interesting materials at an early age, and should continue to be offered more complex tools and challenges as their skill levels increase.

- **Tinkering requires support.** Children benefit from the enthusiastic adults in their lives who expose them to new experiences using tools and who guide them while they learn to handle and use these tools. However, the adult also needs to remember that it is as important to know when to step *away* as it is to know when to step *in* and help. If you are ever unsure of which to do, it is usually better to let children figure something out on their own than for you to do it for them. Stepping in too soon can stop children's creativity in its tracks. If children are focused, there is no need to interrupt. If they are clearly struggling, are frustrated, or look like they're not clear about how to continue, then you can step in, but try to be *thoughtfully* intrusive.

- **Tinkering requires space and time.** Children need room to tinker. They need both physical space to build in, and emotional and intellectual space to try things out.

Tools

A tool is an object that helps you accomplish a goal. Hammers and saws are tools, but so is a stick when you use it to pry a stone from the soil.. A pen is a tool used to create a written message. Rulers, clocks, computers, glue guns, and even the glasses you wear are all tools that help you accomplish goals. And, most importantly, your *hands* are your first (and most useful) tools.

This Kit has been carefully stocked with tools that serve as a starting point for young children's exploration and practice. Some of these tools are building blocks to others—using these simple tools gets children ready to use more complex tools. Some may not even seem like tools at all. Goggles, for instance, are safety tools used to accomplish a very important goal: protecting children's eyes. Here are some of the tools included in this Kit:

- Clothespins
- Goggles
- Hammers
- Rulers
- Paper clips
- Pliers
- Rubber bands
- Screwdrivers
- Shoelaces
- Tongs

As you use this Family Tinker Kit with children, think of other tools that you might introduce. Pay attention to the tools that *they* ask for—and include them if you can.

The Adult's Role in Tinkering:

Questions Instead of Answers

As their children's first teacher, parents and caregivers* have a unique opportunity to expand their children's learning by leading them toward discovery and encouraging their natural curiosity on a daily basis. You don't need to be a scientist to actively support science learning with your preschooler. This is true for all early education professionals in childcare centers, libraries, and museums. Actively supporting science learning can be done by noticing how children play—with water, shadows, or sand—and then encouraging them to observe their world more and deepen their play and exploration by asking them about their observations and inventions. Modeling curiosity about everyday occurrences—"I wonder what will happen when I put the water into the pancake mix" or "I wonder how my shadow will look if it's raining"—can be a big help to children's learning. As children get older, caregivers can build on their interests by asking open-ended questions such as "What are you working on now?," "What do you notice about how that bug is moving?," "What else have you seen other kids try?"

Asking these types of questions, also known as *productive* questions, is the key to adult engagement with and support of children's learning. Asking children good questions helps them to move to their next level of exploration and understanding. In childhood education, this idea is called *scaffolding*; it literally means building a cognitive structure for your child to climb *on their own*. And when a child is the driver of their own learning processes, the deepest learning can happen.

In the book *Primary Science: Taking the Plunge*, contributor Jos Elstgeest suggests that there are "right" and "wrong" questions to ask children. Wrong questions are wordy and seem to have only one answer found in a textbook. "Why" questions can also be wrong when they imply that there is a correct answer and that the child is being tested. For example, if you ask, "Why is the magnet sticking to that kind of metal?" you may be just as unable to answer as the child is.

** We use the words parents and caregivers in the most inclusive way, encompassing mothers and fathers as well as grandparents and relatives, foster parents, and other guardians and caregivers.*

PRODUCTIVE QUESTIONS TO ASK CHILDREN

Sometimes it seems as if no one person could have all the answers to children's questions. But here is some good news: you don't need to have all the answers to create important learning moments. In fact, the key to effective STEM learning at the preschool level is asking great questions right along with the kids!

Caregivers and educators can ask questions that are stimulating, pique children's curiosity, and invite them to look closer, explore more, or try something again. "The right question leads to where the answer can be found: to the real objects or events under study, there where the solution lies hidden," Elstgeest says. "The right question asks children to *show* rather than to *say* the answer: they can go and make sure for themselves." These are what Elstgeest calls "productive" questions.

The Adult's Role in Tinkering:

Questions Instead of Answers

CATEGORIES OF PRODUCTIVE QUESTIONS TO MODEL FOR FAMILIES AND EDUCATORS:

Attention-focusing questions. These are questions of observation: "Have you seen … ?" and "Did you notice … ?" types of questions. Children frequently take care of these questions themselves when they say, "Look here!" The "what" questions closely follow: "What is it?" "What does it do?" "What happens when … ?" "What do I see, feel, hear … ?" Simple observation questions are the route to the first simple answers, which will be followed by more complicated questions.

Measuring and counting questions. Questions like "How many?," "How long?," and "How often?" are measuring and counting questions. Older children can check their answers themselves. You can ask, "How many cotton balls fit around your foot? Is it the same number as paper clips?"

Comparison questions. "Is it longer/stronger/heavier/more?" These are the comparison questions that come naturally after the measuring questions. Objects can differ in many respects, such as shape, color, size, texture, structure, and markings. Comparison questions can help young children begin to classify and assign attributes to things: "What is the same about the sugar and pepper? What is different?"

Action questions. These are the "what happens if" questions that can always be definitively answered. Action questions involve a simple experiment, and then you have your answer. "What happens if you scoop more rubber bands into the measuring cup? Will it fill up? Will they spill out?" An exciting addition to solving "what happens if" questions is the challenge to predict the outcome. Initially, children will guess, but with more experience, their ability to predict the actual outcome improves, and they will become increasingly able to tackle more complicated problem-solving questions.

Problem-solving questions. After practicing the above questions, children are ready for a new type of question: the more sophisticated "can you find a way to" question. This type of question sets up a real problem-solving situation to which children enthusiastically respond, provided it makes sense to them. For young children learning that air moves things, this question is appropriate after they have explored the materials for some time. "Can you find a way to move the cotton balls without using your fingers?" "What can you do with the straws to help you?" These questions are appropriate when children's curiosity is going strong and their science understanding begins to make real progress.

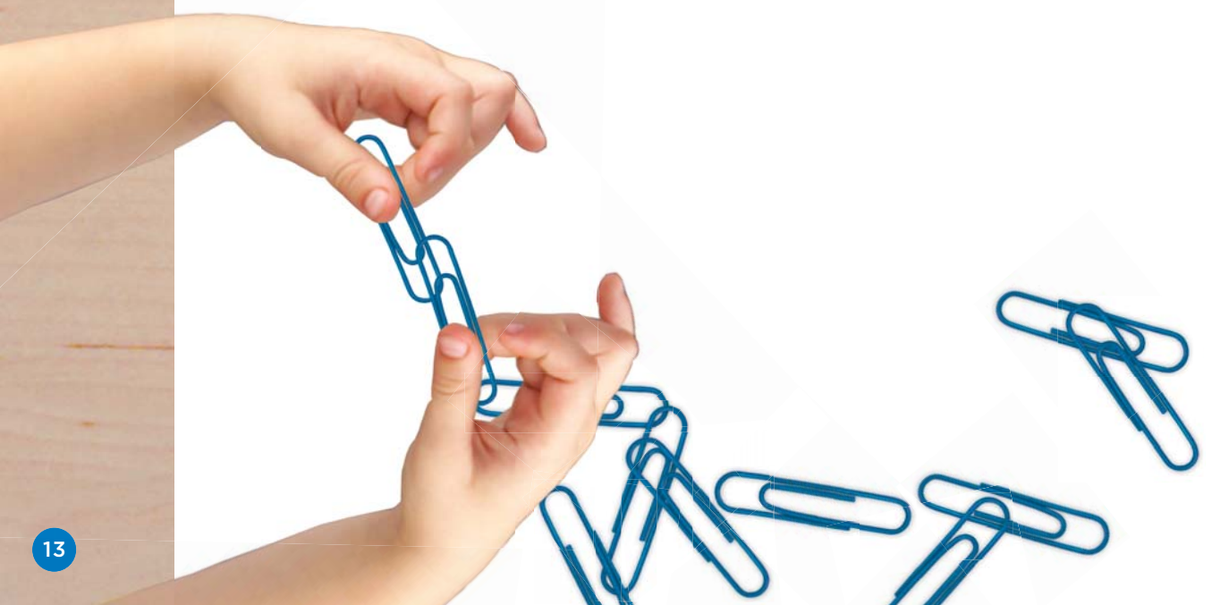
> ***"It is important for adults to facilitate, rather than direct, a child's investigations; quality science experiences develop out of a child's own interest, not the agenda of an adult."***
>
> —Kelly K. Twibell and Diane Harkins, *Beyond Nature Hikes and Butterflies: Expanding Children's Capacity for Scientific Inquiry,* Children's Scientific Inquiry Exchange November/December 2013 p. 41

How to Use the Tinker Kit and Activities

The Family Tinker Kit was designed with three goals in mind. First, it has been developed as a resource for *everyone* who works with young children. We are hoping that the materials and activities are adaptable for many different settings, including homes; preschool and early care environments; and museums, libraries, and other community centers. Tinkering happens everywhere!

Second, the activity content areas each include two *different* ways of engaging with the materials: the *open lab* style, which supports child-led, open-ended exploration with very little adult direction (although adult presence and support is still necessary and very important), and a more-focused *adult-led* activity style, with clear descriptions for delivery and follow-through, directed by an adult.

Third, the materials provided in this Family Tinker Kit should look as familiar as the contents of a kitchen drawer or household tool kit. We are providing users with a "tinkering tool kit" that is as easy to create and purchase as a trip to a local supermarket or dollar store. The idea is that tinkering/STEM-based activities are already all around us every day; this Kit is simply a guide to help us recognize that what we are already doing *is* STEM. We help to create more focused learning using everyday materials from how we *engage* with the materials and the kinds of questions we ask.



LOCATION, SPACE AND ORGANIZATION

The best location for tinkering is on tables and in a location where it's OK to be somewhat noisy. Make sure the tools and other materials are laid out so they are all easy to reach. Putting small items into flat trays makes it easier for young children to see what's available and to be able to reach in to get what they'd like. There are no special space requirements; this will depend on your group size and the type of space available. If your group is large, make sure there are enough of each kind of tool and material so that children are able to use what they'd like to try. Labeled storage containers are helpful for keeping your tinkering materials organized—and they also make it easier for children to help clean up.

OPEN ENDED AND ADULT GUIDED ACTIVITIES

Each activity begins with an Open Lab section, which allows for child-led engagement with the materials. The second and third activities in each set, which are the Adult-Guided ones, have a more specific learning focus and a set of guided steps to support implementation. Keep in mind that these are suggestions for how to use the materials and concepts. Between (and outside) of the open-ended and adult-guided approaches, a wide range of levels of and types of adult interaction, support, and guidance are possible. Within each of these approaches, an adult can provide a model to guide children into their own best way to explore and learn about the concepts and materials. (As an aside: Keep in mind that children are *very* finely tuned to cues from adults, so what an adult models really counts!)

The goal of the adult engagement with the activities is for adults to *notice* which experiences are most engaging and generative of further investigation by the children, and then *support* the children to move forward on their own.

> ***"Ok, I'm not ever going to get you kids toys anymore, I'm just going to throw some paper clips in a bowl!"***
>
> — Mom of 4 and 6 year olds

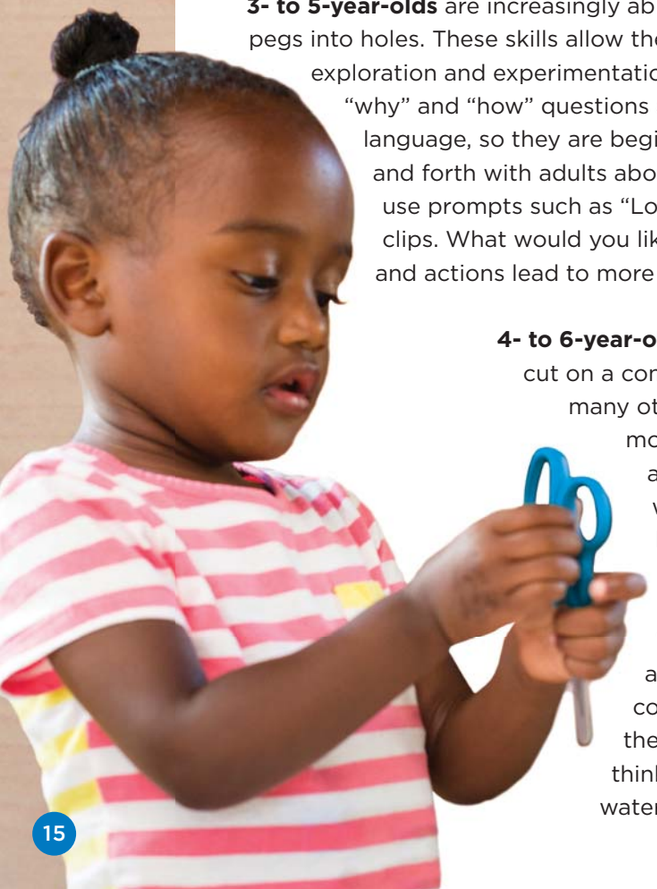
How to Use the Tinker Kit and Activities

ACTIVITIES BY AGE RANGE

As the parent, educator, or facilitator for each activity, you can support children's investigations in different ways depending on their ages and abilities. If you are working with a new group, you can refer to the Child Development Stages Chart on page 6 for specific ideas. If you're working with your own child or children you know well, you can rely on previous knowledge about skill levels and interests.

2- to 3-year-olds are great at observing and learning through exploration. They are also beginning to manipulate objects with increased control. You can put something in a 2-year-old's hand and say, "Look at this! Feel it! Tell me what you see or feel." You can model by touching the object or putting it against your cheek, and add to children's rapidly increasing vocabulary by using words such as *smooth, soft, or bumpy* to describe it.

3- to 5-year-olds are increasingly able to push and pull objects and to drive pegs into holes. These skills allow them to dig much more deeply into materials exploration and experimentation. They actively seek information through "why" and "how" questions and have increasingly more-developed language, so they are beginning to be able to engage in lots of back and forth with adults about where their exploration can go. You can use prompts such as "Look at that bowl of rubber bands and paper clips. What would you like to try/do with them?" Let their answers and actions lead to more questions.



4- to 6-year-olds can use scissors more confidently, can cut on a continuous line, and can more easily master many other types of tools. They can also be given more complex prompts or directions, and they are beginning to ask "when" questions as well as "how" and "why" questions, which leads to an understanding of past events, of series, and of how the past or patterns could impact the future. For example, "Remember when we mixed the sugar and pepper together and put them into the colander? What did we need to do to get them to go through the holes? What do you think would have happened if we had added water to the mix?"

LEARNING GUIDELINES: MASSACHUSETTS PRE-K STE STANDARDS

The Massachusetts Pre-K STE (Science, Technology, Engineering) Standards were developed for Massachusetts preschool teachers to support early learning that provides a foundation for the STE standards in elementary school. It is a way to help teachers and children start thinking like "scientists"; i.e., using science process skills as part of everyday play and learning.

The traditional areas of the early childhood classroom—the water table, the block corner, and the playground—are important for both science content and dramatic play. These are the places where young children gain valuable, new, early science experience, especially when the adults playing with them have enough knowledge to encourage their investigation, ask productive questions, and guide their discovery. The overall goals of children's development in science are to deepen their conceptual understandings of the world around them, to increase their comprehension of how science is practiced, and to develop their abilities to conduct scientific investigations. Adults can help children achieve these goals with a supportive environment. Familiarity with STE standards can help guide the adult's coaching.

ACTIVITY INTRODUCTION

Start with a short introduction to the activity, and ground it in experiences the children have had or things they have wondered about. For example, if the activity is about measuring, ask them if they have ever used a measuring cup to help cook from a recipe. If the activity is about using tools like hammers and screwdrivers, ask them if they have ever used a tool before, or hold up a nail and ask them what tool they could use to nail it into a piece of wood.

DO IT MORE!

This section takes the activity further by suggesting other materials and/or approaches to the investigation. In this section, the adult, having noticed, for example, that a child is passionate about funnels, can offer other types of funnels, suggest the child try making funnels out of other materials, or introduce a water-based funnel activity in a bucket or sink.

How to Use the Tinker Kit and Activities

REFLECTION AND DOCUMENTATION

With every activity, adults and educators are encouraged to engage the children in reflecting on and documenting their tinkering. Documentation and reflection provide a way for children and adults to look back on and think about their learning, and to communicate their learning to others (other children, caregivers, and the wider community). Reflection is as simple as asking children, "Tell us about what you did. Was there anything challenging about that? What did you find out?" Adults can support documentation by guiding children to represent their discoveries on paper with a simple drawing or notes, or with photos. Sharing the documentation with other children, parents and caregivers, and educators helps everyone understand more about and evaluate what the children are learning. These concepts are also reflected in the Massachusetts Pre-K STE Standards under Inquiry Skills #4. Record observations and share ideas through simple forms of representation such as drawings.

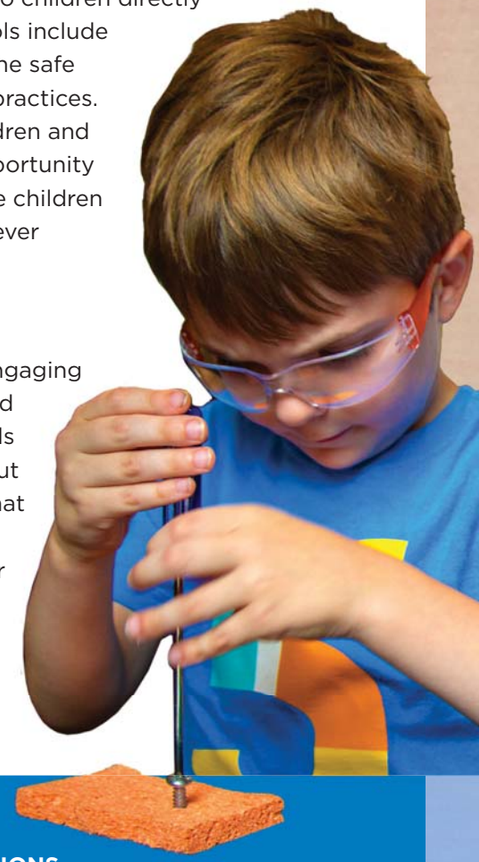
To learn more about reflection and documentation, see www.wheelock.edu/about/centers-and-institutes/documentation-studio.

BUILD IN CLEANUP TIME

Tinkering requires lots of tools and materials; having children help clean up not only makes it easier on you, but also teaches children responsibility and the important skill of organization.

TOOL SAFETY

Tool safety is an important skill to teach children because tool use can involve some level of risk. Although it is important for children to engage in some risk taking, it should be at a sensible level with safety precautions preventing harm. Introduce the most potentially dangerous tools to children directly before they use them for the first time; these tools include screwdrivers, pliers, hammers, and nails. Model the safe way to use the tools, and emphasize these safe practices. Supervise and monitor the tools' use by the children and call attention to any unsafe use as a learning opportunity for everyone in the group. And *always* encourage children to use safety equipment, like the goggles, whenever appropriate.



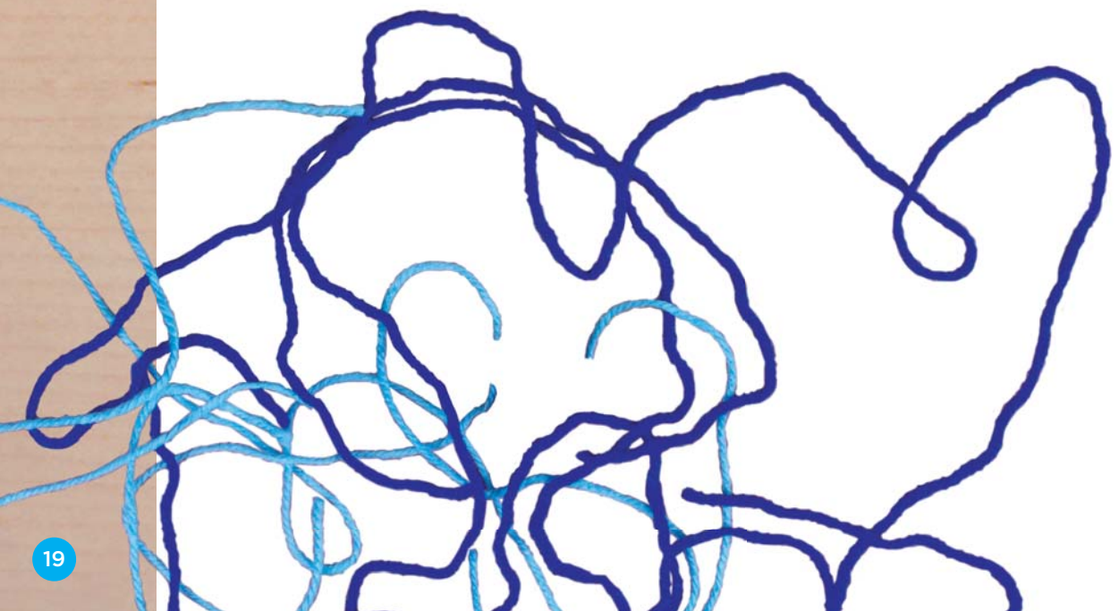
TAKE OFF!

The Family Tinker Kit is a great foundation for engaging children in creative thinking, problem solving, and tool use. But it is just the beginning. The materials and tools in this Kit will get your group rolling, but the tinkering will really take off when you see what the children are interested in and introduce your own additional materials and tools to follow their lead *and* introduce new concepts. Tinkering is about open-ended creativity, and in that regard, almost any materials and tools can be used to engage children to create.

FOLLOW THESE SAFETY PRECAUTIONS WHEN USING TOOLS WITH CHILDREN:

- Always have an adult present when children are using tools.
- Use your judgment about which tools to use and how independently they can be used based on your knowledge of the children's skill levels.
- Use safety equipment as needed (goggles when using hammers and things that could fly up, gloves for objects with potentially sharp edges).
- Talk with participants/parents/caregivers about tinkering and the safety rules you have in your setting.

Activities



Move It! Activity Set

When children first learn to move things, they start with their own bodies. As newborns they learn to lift their heads and open and shut their hands, stretch, and kick their legs, quickly moving on to the milestone of turning over at around four to six months. As they grow and develop their gross motor skills, they roll around, stand, jump up and down, and then walk and run. Meanwhile, children learn that they can move other things: they use their hands, feet, and even their breath to explore how they can reorder their worlds. Finally, they learn that there are tools that can help them move things. Learning how to use these tools and their own bodies to manipulate materials is an important part of children's tinkering and school readiness. The following activities provide an introduction for children to some of the different ways we move and manipulate things in the world around us.

Move It!
Open Lab

MATERIALS:
Clothespins, colander, cotton balls, felt squares, floor tile samples, index cards, measuring cups, measuring spoons, paper bags, paper clips, paper cups, paper plates, pliers, rubber bands, scoops, shoelaces, straws, tongs.

SKILLS AND LEARNING CONCEPTS:
Children have an opportunity to experience self-directed, open-ended play and discovery while exploring many types of tools and objects.

LEARNING GUIDELINES:
Physical Sciences #20—Investigate and describe or demonstrate various ways that objects can move.
Physical Development #10—Use a variety of tools and materials to develop grasp-and-release skills. For example, use tongs to move objects from one container to another.

DO IT!
Introduce the activity by explaining to the children that this is an activity about tools and moving things with tools, and let them know that they are free to play with, explore, and use all of the materials however they would like. If they are having trouble starting this open-ended exploration (which can be overwhelming if some of the objects are unfamiliar or if the children are not used to self-guided play), you can offer prompts such as, “Does anyone know what a tool is?” and “Can you pick out the tools and put them all into one pile?” Such questioning can also be a nice way for the children to demonstrate their knowledge and for them to engage as a group. If needed, you can follow with other prompts such as, “Why doesn’t everyone choose a tool and an object and try picking up the object using the tool,” or “What can you do with the clothespins?”

DO MORE OF IT!
Have the children create their own self-directed activity by collecting any materials and objects from their environment (indoors or outdoors) that they would like to use as tools and objects to pick up. This collecting can be an ongoing activity; the children can keep a personal box or classroom collection going over time.

REFLECTION AND DOCUMENTATION
Have each child share their experience of the open-ended activity. Was there something specific the child really enjoyed doing? Did they have favorite tools or objects to handle? What did the children discover? Would they like to demonstrate anything they tried out or created for the group? You can help very young children share by noting what they had been working on, for example, “I see that Charlotte used a lot of cotton balls. Charlotte, can you show us/tell us what you did with them?”

READ IT!
The Construction Alphabet Book by Jerry Pallotta

Move It!
Moving Things with Tools

MATERIALS:
Clothespins, colander, cotton balls, felt squares, floor tile samples, index cards, measuring cups, measuring spoons, paper bags, paper clips, paper cups, paper plates, pliers, rubber bands, scoops, shoelaces, straws, tongs.

SKILLS AND LEARNING CONCEPTS:
Children have an opportunity to explore and make discoveries about many types of tools, and they can explore how to use those tools to manipulate and move a variety of objects.

LEARNING GUIDELINES:
Physical Sciences #20—Investigate and describe or demonstrate various ways that objects can move.
Inquiry Skills #3—Identify and use simple tools appropriately to extend observations. (The tools can include funnels, tubes, and sieves with varying characteristics.)

DO IT!
Explain to the children that they are going to be exploring different types of tools and how to move objects with those tools. Ask if anyone knows what a tool is, and ask children to take turns identifying what they think the tools on the table might be. Remind them that their first tools are actually their fingers! Start the activity by having each child pick up some of the objects with their fingers. Encourage them to have fun trying out different ways to use their fingers as “picking-up” tools.

Have each child pick a tool and then an object they’d like to move. Let them play and experiment with their tool and objects. They may move into a more open-ended style of trying lots of different kinds of picking up; it will be up to you to decide how directed versus how exploratory you would like this activity to be. You can guide and inspire greater exploration and learning with productive directions and questions such as, “Show me what you can put into the colander,” “Can you use something else besides your fingers to move the cotton balls?” and “What is different about the plastic tongs versus the pliers? What is the same?”

DO MORE OF IT!
Have the children choose or find different containers and/or locations to move objects to. Ask, “How would you get cotton balls or rubber bands into a plastic soda bottle?” Or suggest, “Try putting paper clips into a measuring spoon, how far can you move them without dropping some?” This question could be turned into a relay race with a group of children in a larger area or outdoors. Other questions could include, “What if you try moving more than one thing at a time?” and “Can you use a tool in a way you wouldn’t expect (for example, use the red handle end of the pliers)?”

REFLECTION AND DOCUMENTATION
Have the children show one of their tool-and-object moving combinations. Did they try other tools as well, and was there a difference in how they worked to move the objects? Do they have any thoughts about what might happen with other objects or types of tools?

READ IT!
Tools Rule by Aaron Meshen

Move It!
Cotton Ball Race

MATERIALS:
Cotton balls, felt squares, index cards, paper clips, paper bags, rulers, straws, sugar and pepper packets. Note: Painter's tape is helpful for the indoor activity.

SKILLS AND LEARNING CONCEPTS:
Children explore the properties of air and wind to learn how air can move things while they practice their fine motor skills and blowing skills in a cotton ball race.

LEARNING GUIDELINES:
Physical Sciences #20—Investigate and describe or demonstrate various ways that objects can move.
Earth and Space Sciences #6—Explore and discuss what air is or does. For example, feel air blown through a straw and/or try to move objects of varying weights by blowing on them.

DO IT!
For outdoor play, let the children feel the wind on their hands and bodies, and ask them if they can see the wind. Ask them, "How do you know it's blowing?" and "What does it do to objects and the people around you?"

For indoor play, ask the children to blow on their hands and wave them in the air. Ask them what they feel. Suggest, "Blow hard, and then blow gently. Wave hard, and then wave gently. Does that change what you feel?" Talk about what air is, "Can you see air? Can you hold it?" Let them experiment with blowing on the different objects and observing what happens. They can also blow on the objects using the straws. Discuss how air becomes wind when you blow it and about how wind can push things.

Make a cotton ball race game by setting up the children up with straws and cotton balls at a start line, then see how fast they can blow their cotton balls to finish line and how far they can blow them in one breath. You can also change the length of the straws by cutting them with scissors; see if the children notice a difference in how fast or far the balls travel.

DO MORE OF IT!
Expand this activity by blowing the cotton balls on a different type of surface, such as the felt squares, or on surfaces not included in the Kit, such as grass, cement, or a carpeted floor. Ask the children, "Do the cotton balls go faster or slower on the new surface?" Suggest that they try out other materials, such as the sugar and pepper. Have them share their ideas on why different objects move differently in wind.

Experiment with making different kinds of wind. Have the children explore moving the cotton balls with the index card, a feather, or a paper fan. See if they can come up with other materials from inside or outdoors to create wind.

REFLECTION AND DOCUMENTATION
Ask the children about their experience, making, and using the wind to push objects. Did anything surprise them? What else would they like to try with wind?

READ IT!
Face the Wind by Vicki Cobb

Pour It! Activity Set

Experimenting and thinking creatively are cornerstone skills for tinkering and engineering. When children have the freedom to conduct open investigations, they begin to understand that problems can have multiple solutions. When this understanding is combined with opportunities to try out tools and observe materials, you have a multidimensional tinkering opportunity. Learning how to use tools for pouring, sifting, and scooping, and then taking the learning a step further into inventing is an important part of tinkering and school readiness. The following activities provide an introduction for children to the skills of pouring, sifting, and scooping, and then taking the concepts further to create their own tools.

Pour It!
Open Lab

MATERIALS:
Colanders, cotton balls, felt squares, funnel sets, index cards, measuring cups, measuring spoons, paper bags, paper clips, paper cups, paper plates, rubber bands, scoops, screws, straws, sugar and pepper packets.

SKILLS AND LEARNING CONCEPTS:
Children have an opportunity to experience self-directed, open-ended play and discovery while exploring concepts of estimating, size comparisons, and making predictions, through using pouring, sifting, and scooping tools.

LEARNING GUIDELINES:
Inquiry Skills #3—Identify and use simple tools appropriately to extend observations. (The tools can include funnels, tubes, and sieves with varying characteristics.)
Physical Sciences #18—Manipulate a wide variety of familiar and unfamiliar objects to observe, describe, and compare their properties using appropriate language.

DO IT!
Introduce the activity by explaining to the children that they are going to be playing with all kinds of tools that can funnel, sift, and scoop the materials in the trays, and let them know that they are free to explore and use all of the materials in any way they would like. If the children are having trouble starting this open-ended exploration, you can hand out sets of funnels and ask the children, "Who knows what these are? Who knows what we use them for?" Give the children a few minutes to answer and explore just the funnels, and they will soon be exploring the other materials as well.

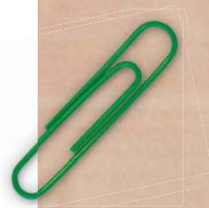
DO MORE OF IT!
Carefully observe the children as they explore, and offer supportive guidance if they seem ready to move to another level of investigation or if they seem stuck, frustrated, or confused about how to engage with the materials. You can step in with questions based on your observations, such as, "I see you like pouring the sugar and pepper into the colander; why don't you try gently shaking it to get the granules to go through the holes?" Or, "You've got a great flow of sugar coming out of your colander. How do you want to try stopping it from coming out? Is there anything you could do with the felt squares to help with that?"

REFLECTION AND DOCUMENTATION
Have each child share their experience of the open-ended activity. Did the child discover anything they could share with the group? Was there anything that would have made it easier to engage with the materials or move to new levels of exploration? What is something else they would like to try? You can help very young children reflect by noting what they had been working on, for example, "Henry liked mixing the two packets. Do you remember what each of them are called?"

READ IT!
Cloudy with a Chance of Meatballs by Judi Barrett

Pour It!
Funnels and Colanders: What Fits?

MATERIALS:
Colander, cotton balls, funnel sets, index cards, paper clips, paper cups, paper plates, rubber bands, scoops, sugar and pepper packets.



SKILLS AND LEARNING CONCEPTS:
Children have an opportunity to explore the uses of funnels and colanders while they practice making estimations and predictions about what can fit, and explore how to help move materials through the holes.

LEARNING GUIDELINES:
Inquiry Skills #3—Identify and use simple tools appropriately to extend observations. (The tools can include funnels, tubes, and sieves with varying characteristics.)
Physical Development #11—Build finger dexterity.

DO IT!
Hold up a set of funnels and ask, "Who knows what these are? What do we use them for? Does anyone know what pouring is?" You can give the example of "pouring rain" to help them imagine what pouring is. Ask them, "What happens if you put the big paper clips into the funnels? Do they slide through? What about the small ones?" Next, let them open their sugar and pepper packets; this by itself can be a challenging fine motor learning activity. Ask them to describe what happens when they pour the sugar and pepper mix through their funnels; ask them to compare the action with that of the paper clips. Did the granules move faster or slower?

Pass out the colanders and ask the children if they can tell just by looking at them if the colander holes are larger or smaller than the funnel holes. Then have them check their guesses by testing it out. Will the paper clips fit? What about the sugar and pepper mix? Introduce the words *sift* and *stir*, as the children figure out how to move the granules through the holes. Have them try using the shoelaces, which will need to be pushed or pulled through the colander holes rather then poured or sifted.

DO MORE OF IT!
Add other types of tools—wire mesh sifters, colanders of different sizes, bottles, scoops—and ask the children to make predictions about which objects can be poured or sifted using which tools. Then let them test their guesses. Are there other tools or materials they would like to try?

Introduce water for another pouring activity. Make sure the work area is "water-friendly"; use a water table or large plastic tub, or set up the activity outside. Ask the children to use the funnels, sifters, and other tools to pour water into the different containers. How does the water move differently through the colanders and funnels? What is different about them?

REFLECTION AND DOCUMENTATION
Have each child describe or show which combination of tool and material they liked playing with the most. What made it fun? What did they notice or learn?

READ IT!
Baking Day at Grandma's by Anika Denise

Pour It!
Make it Yourself!

MATERIALS:
Colanders, cotton balls, felt squares, funnels, index cards, measuring cups, measuring spoons, paper bags, paper clips, paper cups, paper plates, rubber bands, scoops, screws, straws, sugar and pepper packets.

SKILLS AND LEARNING CONCEPTS:
Children have an opportunity to explore concepts of estimating, comparing size, and making predictions while they create their own pouring, scooping, and sifting tools.

LEARNING GUIDELINES:
Inquiry Skills #3—Identify and use simple tools appropriately to extend observations. (The tools can include funnels, tubes, and sieves with varying characteristics.)
Physical Sciences #18—Manipulate a wide variety of familiar and unfamiliar objects to observe, describe, and compare their properties using appropriate language. For example, describe the attributes—such as size, shape, color, weight, and texture—of common objects.

DO IT!
Let the children explore the funnels, colanders, scoops, and other Kit objects. Ask them if they can identify any of the tools or objects or say what they are used for, and ask them to share their ideas with the group. Have them spend enough time playing with the materials so that they get a feel for what the different concepts of pouring, sifting, and scooping are. You can support their exploration with questions such as, "What do you notice that's different about what you can do with the scoop versus the funnel?"

Next, explain to the children that they are going to make their own funnels out of the paper plates. Hold up the plate and ask if anyone has an idea of how it could be used to pour paper clips. After everyone has shared, hand out plates to each child and let them experiment on their own. Support their investigation by asking questions such as, "Can you bend or fold the plate? How could you make this into a tube? What objects would you like to 'pour'?"

DO MORE OF IT!
Once they have got the basic idea of using funnels, colanders, and scoops, have the children use their own engineering and design imaginations to create tools using all of the Kit materials. Ask them to try scooping the screws and then the sugar and pepper mix with an index card. Ask, "What do you notice? Does one scoop more easily then the other? Does the shape or weight of the items make a difference?" Suggest that the children use the felt as a funnel for these two items. Let them tell you what they notice about how the weight and shape of the two items respond differently to the rough cloth surface and the smooth surface of the index card.

REFLECTION AND DOCUMENTATION
Have each child demonstrate one of his or her tool inventions. Encourage the children to use any new words they have learned, such as sift, twist, or fold to describe how their tool works.

READ IT!
Beautiful Oop! by Barney Salzberg

Measure It! Activity Set

For young children, measuring includes making comparisons of sizes, temperatures, and weights, as well as using numbers to quantify measurement. Measurement can also rely on nonstandard units such as straws, cotton balls, or clothespins, not just feet and inches. Very early learning activities can include all kinds of comparison and categorization—such as sorting objects by different characteristics, including color, shape and size—which are the precursors for the numeracy skills needed to understand measuring and use measuring tools.

Measure It!
Open Lab

MATERIALS:
Cotton balls, craft sticks, felt squares, floor tile samples, index cards, measuring cups, measuring spoons, paper clips, rubber bands, rulers, shoelaces, straws.

SKILLS AND LEARNING CONCEPTS:
Children have an opportunity to experience self-directed, open-ended play and discovery while exploring many ways to estimate, measure, and familiarize themselves with measuring tools.

LEARNING GUIDELINES:
Measurement #14—Use nonstandard units to measure length, weight, and amount of content in familiar objects.
Number Sense #2—Connect many kinds/quantities of concrete objects and actions to numbers.

DO IT!
Introduce the activity by explaining to the children that this is an activity about measuring things with tools, and let them know that they are free to play with, explore, and use all of the materials in any way they would like. If they are having trouble starting this open-ended exploration (which can be overwhelming if some of the objects are unfamiliar or if the children are not used to self-guided play), you can offer prompts such as, "What is measuring? How can you tell if something is bigger or smaller than something else? Does anyone know what you would use to help you measure?" You can also show the ruler or measuring cup and ask if anyone knows what it is and/or what it's for. Such questioning can also be a nice way for the children to demonstrate their knowledge and for them to engage as a group. If needed, you can follow with other prompts such as, "Why doesn't everyone choose a few objects and line them up or sort them any way you would like."

DO MORE OF IT!
Have the children create their own self-directed activity by collecting and/or sorting any materials and objects from their environment (indoors or outdoors) that they would like to use as measuring tools and objects to measure. This collecting can be an ongoing activity; the children can keep a personal box or classroom collection going over time.

REFLECTION AND DOCUMENTATION
Have the children share their experience of the open-ended activity. Was there something specific they really enjoyed doing? What did they discover? Would they like to show the group what they measured or how? You can help very young children share by noting what they had been working on, for example, "I see that Kenyon lined up a lot of straws; can you use your fingers to show us how many straws there are?"

READ IT!
Super Sandcastle Saturday by Stuart Murphy

Measure It!
Measuring Things With Tools

SKILLS AND LEARNING CONCEPTS:
Children have an opportunity to explore and make discoveries about many types of measuring tools, and to practice how to use those tools to make comparisons about and measurements of different objects.

LEARNING GUIDELINES:
Measurement #14—Use nonstandard units to measure length, weight, and amount of content in familiar objects.
Number Sense #2—Connect many kinds/quantities of concrete objects and actions to numbers.

DO IT!
Ask the children what they know about measuring and tools. Does anyone knows what measuring is? See if they can identify any of the tools on the table. Hold up the measuring spoons and ask, "Does anyone have these at home? What do you use them for?" You can encourage them to put the same objects into different-sized containers; seeing what's left over is an important step in the beginning of learning number and volume sense. Children can also fill the smallest measuring cups with paper clips, then empty them into bigger cups. What do they notice; is there extra space in the cup?

Introduce concepts of comparison such as bigger and smaller by asking them to line up a set of objects on the table and notice which line is longer. Ask them to look and compare, "Which is longer, the paper clip line or the rubber band line?" Ask older children if they can come up with their own comparison word sets such as *more/less* or *wider/narrower*.

DO MORE OF IT!
Play a comparison game where one child thinks of two objects and asks the other children a question such as: "What is bigger, an egg or an apple?" Check the answers with the real objects. You can ask more complex questions that include concepts of volume and dimension, such as, "What takes up more room, an apple or a slice of bread?" Let them guess and then figure out a way to test their guesses.

For older children, you can ask them to find something in the room that they think is bigger or smaller than an object from the Kit. Then they can take the Kit object (for example, the felt square) and test their guess by holding it up against the room object (for example, a book).

REFLECTION AND DOCUMENTATION
Ask the children about their experience estimating amounts, volume, and measuring, "What were the biggest and smallest things you compared—do you remember the new comparison words"?

READ IT!
Actual Size by Steve Jenkins

MATERIALS:
Cotton balls, felt squares, floor tile samples, index cards, measuring cups, measuring spoons, paper clips, rubber bands, rulers, shoelaces, straws.

Measure It!
How Big Am I?

MATERIALS:
Cotton balls, craft sticks, felt squares, floor tile samples, index cards, measuring cups, measuring spoons, paper clips, rubber bands, rulers, shoelaces, straws.

SKILLS AND LEARNING CONCEPTS:
Children have an opportunity to explore the concept of linear measurement by using standard and nonstandard linear measuring tools to make comparisons about and measurements of different kinds of objects.

LEARNING GUIDELINES:
Measurement #14—Use nonstandard units to measure length, weight, and amount of content in familiar objects.
Number Sense #2—Connect many kinds/quantities of concrete objects and actions to numbers.

DO IT!
Have the children look at and handle the rulers. Ask if anyone knows what they are and what they're used for. Point out the numbers and section marks and discuss what they might be for. This is a great opportunity to introduce and repeat the word measure as the children begin to associate the word with size and numbers. Explain that the ruler is a tool that helps us figure out whether things are longer or shorter than each other. Demonstrate this idea by holding a felt square against the ruler and then a filing card. As you do this say, "See, the felt is 12 inches long, it takes up the whole ruler, and the filing card is 6 inches, and that takes up one-half of the ruler."

Have the children all measure the same straight edge (for example, a table or book) with materials from the Kit and then share the different measurements. You can help by showing them as you count out loud, "This table edge is four felt pieces, or eight index cards." Visualizing amounts while hearing the numbers is an important step in early math literacy. Let the children make up their own games lining objects up against each other and see what they notice.

DO MORE OF IT!
Using large sheets of newsprint and crayons, have each child lie down on a body-sized piece of paper and trace their outline. Older children can trace each other. Then let them "measure" using the ruler, or any other objects they would like. They can try this out by lining up the straws so they equal their leg, or you can ask, "How many cotton balls fit around your hand?" This concept of body metrics is a very effective springboard to learning early measuring skills.

Help children find all the measuring tools they have at home or in their classroom and use them to measure objects in their house, yard, classroom, or other space. These tools can include rulers, yardsticks, meter sticks, and flexible measuring tapes.

REFLECTION AND DOCUMENTATION
Find out from the children what they learned about measuring. "Tell me something about something you used to measure. What would you like to measure at home?"

READ IT!
Ladybug on the Move by Richard Fowler

Change It! Activity Set

Change is a constant and evolving process going on all around us, all the time. In order to be part of making change, or innovating, a child begins by learning about the characteristics and capabilities of a wide variety of materials and how to use tools to manipulate these materials. Feeling comfortable experimenting with tools and materials as a part of play is a great way for children to integrate early engineering, tinkering, and school readiness skills. The following activities provide an opportunity for them to explore and experiment with the properties of many types of materials while learning to handle tools to extend and implement their ideas.

Change It!
Open Lab

MATERIALS:
Clothespins, colander, cotton balls, floor tile samples, goggles, hammers, index cards, nails, paper bags, paper clips, paper cups, paper plates, Play-Doh, pliers, rubber bands, screwdrivers, screws, shoelaces, sponges, straws, tongs.

Please follow tool safety precautions

SKILLS AND LEARNING CONCEPTS:
Children have an opportunity to experience self-directed, open-ended play and discovery while exploring how they can change the shape, size, texture, or purpose of materials using different kinds of tools.

LEARNING GUIDELINES:
Physical Sciences #18—Manipulate a wide variety of familiar and unfamiliar objects to observe, describe, and compare their properties using appropriate language. For example, observe and describe the attributes (size, shape, color, weight, texture) of common objects, and sort, group, or classify objects in meaningful ways based on one or more properties.
Physical Sciences #19—Explore, describe, and compare the properties of liquids and solids found in children's daily environment. For example, explore the ways materials can be changed by physical force (by pushing, pulling, pounding, or stretching materials such as Play-Doh or clay).

DO IT!
Introduce the activity by explaining to the children that this is an activity about changing the shapes of things with tools, and let them know that they are free to play with, explore, and use all of the materials however they would like. If they are having trouble starting this open-ended exploration (which can be overwhelming if some of the objects are unfamiliar or if the children are not used to self-guided play), you can offer prompts and questions such as, "Who knows what tools are? Can anyone name one and tell us what it's used for?" and "You can pick up any of the things from the tray. Would you like to see if you can bend, mash, break apart, or poke a hole in it?"

DO MORE OF IT!
Have children create their own self-directed activities by collecting any materials and objects from their environment (indoors or outdoors) that they would like to use as tools and objects to change or manipulate. This collecting can be an ongoing activity; the children can keep a personal box or classroom collection going over time.

REFLECTION AND DOCUMENTATION
Have the children share their experience of doing the open-ended activity. Was there something specific they really enjoyed working on? Did they notice anything about their objects as they changed them with the tools? What did they discover? Would they like to demonstrate or show what they created? You can help very young children share by noting what they had been working on, for example, "I see that Nick played with the Play-Doh. Did you make a pie?"

READ IT!
All About Matter by Darlene R. Stille

Change It!
Change It!

SKILLS AND LEARNING CONCEPTS: Children explore the idea of using tools to change the shape, size, and form of different materials while they increase their descriptive and action vocabulary words.

LEARNING GUIDELINES:
Physical Sciences #18—Manipulate a wide variety of familiar and unfamiliar objects to observe, describe, and compare their properties using appropriate language. For example, observe and describe the attributes (size, shape, color, weight, texture) of common objects, and sort, group, or classify objects in meaningful ways based on one or more properties.
Physical Sciences #19—Explore, describe, and compare the properties of liquids and solids found in children's daily environment. For example, explore the ways materials can be changed by physical force (by pushing, pulling, pounding, or stretching materials such as Play-Doh or clay).

DO IT!
Talk with the children about how taking something apart or smashing it changes its shape. Show them how to push together, pull apart, squeeze, or bend the materials with their fingers. Let the children explore on their own, using only their fingers as tools. You can support their exploration with questions such as, "What can you do to make the cotton ball smaller? Bigger? How many pieces can you tear the index card into?" As you go through this activity, introduce lots of rich descriptive vocabulary such as squeeze, twist, poke, and flatten.

Have the children repeat the above activity using the tools. Ask them to notice what is different about using tools versus just their fingers, "Is it easier or more difficult to break things apart? Can you twist or bend anything more easily?

DO MORE OF IT!
Explore the concept of making holes in objects. Ask the children, "Where do we find holes? Are there holes in nature? In a building? How do holes get there?" Introduce styrofoam or wood, and supervise their use of the hammer and nails (or screws and screwdrivers) as they experiment with making holes in these objects. Ask them, "Can you use the paper clips or shoelaces to make holes in the paper cups or plates? Is there another tool that might work better?" Now try pulling them out to reveal the holes, which is an equally challenging and interesting activity. It also becomes clearer how making the hole has changed the object.

REFLECTION AND DOCUMENTATION
Have the children talk about the tools they used and what they used them for. Did some tools work better for pulling apart, mashing, or making holes? Which were they? Did they discover something interesting to share about making changes to their materials?

READ IT!
My Hands by Aliki

MATERIALS:
Cotton balls, floor tile samples, goggles, hammers, index cards, nails, paper bags, paper clips, paper cups, paper plates, Play-Doh, pliers, rubber bands, screwdrivers, screws, shoelaces, sponges, straws, tongs.

Please follow tool safety precautions

Change It!
What is It?

MATERIALS:
Clothespins, colander, cotton balls, floor tile samples, goggles, hammers, index cards, nails, paper bags, paper clips, paper cups, paper plates, Play-Doh, pliers, rubber bands, screwdrivers, screws, shoelaces, sponges, straws, tongs.

Please follow tool safety precautions

SKILLS AND LEARNING CONCEPTS:
Children explore the properties of an assortment of tools and materials to find out how tools can change an object into something with a different use or purpose.

LEARNING GUIDELINES:
Inquiry Skills #2—Make predictions about changes in materials or objects based on past experience.
Physical Sciences #19—Explore, describe, and compare the properties of liquids and solids found in children's daily environment. For example, manipulate and describe materials such as water, sand, clay, and Play-Doh, and explore the ways materials can be changed by physical force (by pushing, pulling, pounding, or stretching materials such as Play-Doh or clay).

DO IT!
Talk with the children about how, by using tools and their imaginations, they can transform an object into something different. Hold up a paper clip and let them call out what it is and what it's used for. Then, string a number of the paper clips onto the shoelace and hold it up again: it's a necklace! Let the children explore the materials and tools to experiment with transforming objects.

Ask the children to pick one base material and see how many different objects they can change it into. They could start with a paper plate, use the nails to poke holes into a pattern, and then weave shoelaces into the edges for a mask. They could also roll up the paper plate and secure it with the rubber bands for a play telescope. This activity encourages them to stretch their inventive thinking. You can support this process by asking questions such as, "If you tear the paper plate in half, what tools could you use to make it into a book?" This kind of inventive play also promotes fine motor development while children work hard to reach a "design and construct" goal.

DO MORE OF IT!
Have the children look around their home, the classroom, or outdoors to find materials that they can use for this activity. Cookie cutters can shape Play-Doh into stars; rolling pins or glass jars can flatten it out to be a pancake. Shoe boxes can become little houses with sponge beds and cotton ball pillows. You can include new materials such as cardboard boxes, packing Styrofoam, toothpicks, or Popsicle sticks.

REFLECTION AND DOCUMENTATION
Have the children show one of their "changed objects" to the group and talk about the process of creating it. What parts of the activity were challenging? Surprising? Is there something they didn't get to try, or other materials they would like to use?

READ IT!
It's Not a Box by Antoinette Portis

What's Next?
Resources for Taking It Further

Tinker Kit Contents

- Clothespins
- Colander
- Cotton Balls
- Felt Square
- Floor Tile Samples
- Funnels
- Goggles
- Hammer
- Index Cards
- Measuring Cups
- Measuring Spoons
- Nails
- Paper Bag
- Paper Clips
- Paper Cups
- Paper Plates
- PlayDoh
- Pliers
- Rubber Bands
- Ruler
- Scoop
- Screwdriver
- Screws
- Shoelaces
- Sponge
- Straws
- Sugar and Pepper Packets
- Tongs

Additional Materials

- Aluminum foil
- Blue tape
- Buttons
- Cardboard boxes, paper towel tubes, packing sheets
- Corks
- Craft (popsicle) sticks
- Glue sticks
- Golf tees
- Mixing spoons (wood, metal, plastic)
- Paper – all types
- Sandpaper
- Scissors
- Stickers
- String, twine, yarn
- Styrofoam – packing and craft
- Toothpicks
- Wire

Supply Sources

The following sources are great places to purchase materials to replenish/add to your Tinkering supplies:

- Local hardware stores, Home Depot
- Craft and unfinished furniture stores
- All-purpose and grocery stores: Target, Leows, WalMart
- Discount stores: Ocean State Job Lot, Dollar Stores
- Upholstery, wallpaper, flooring and tile stores: free samples and surplus materials

- www.orientaltrading.com
- www.amazon.com
- www.discountschoolsupply.com
- www.discountsafetygear.com (goggles)
- www.pjtool.com (hammers)
- www.lakeshorelearning.com

What's Next?
Resources for Taking It Further

Make Your Own PlayDough

Use edible ingredients:

- 2 cups flour
- 1 cup warm water
- ½ teaspoon cream of tartar
- ½ cup salt
- 3 teaspoons cooking oil
- 3-4 drops food coloring

Let's begin!

1. Mix food coloring, oil, and water.
2. In a separate bin, mix flour, salt, and cream of tartar.
3. Add water slowly into the bin, keep stirring until mixture turns into dough.
4. Pat both hands with flour and squeeze the dough.
5. Once the dough is smooth and non-sticky, let it sit for about 10 minutes before using.

The many uses of PlayDough:

- Multi-sensory: Add some spices for the smell, or sand for rough texture.
- Safe kitchen activity: Your child can help measure and mix the ingredients. They can even decide what color or smell the dough will be!
- Strengthen fine motor skills: You can roll, pound, break, squeeze, and poke the PlayDough. Let your child explore it freely and find out what they see in the dough!

Haz tu propia Plastilina

Utilizar ingredientes comestibles:

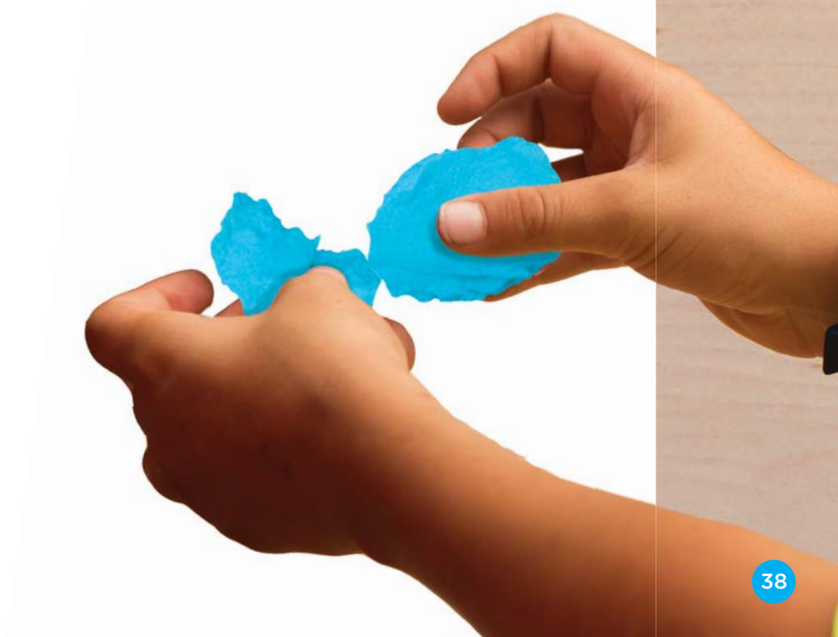
- 2 tazas de harina
- 1 taza de agua tibia
- ½ cucharadita de crema de tártaro
- ½ taza de sal
- 3 cucharaditas de aceite de cocinar
- 3-4 gotas de colorante de alimentos

¡Vamos a empezar!

1. Mezcla el colorante de alimentos, aceite y agua.
2. En un recipiente separado, mezcla la harina, sal y crema de tártaro.
3. Añade agua lentamente en el recipiente sin dejar de remover hasta que la mezcla se convierte en una masa.
4. Sécate las manos con harina y exprime la masa.
5. Cuando la masa este suave y no pegajosa, deja que repose durante unos 10 minutos antes de usarla.

Los multiples usos de la plastilina:

- Es multi-sensorial: añade algunas especias para darle olor, o arena para textura áspera.
- Es una actividad de la cocina segura: su hijo/a puede ayudar a medir y mezclar los ingredientes. ¡Incluso puede decidir qué color o olor tendrá la masa!
- Fortalece las destrezas de motricidad fina: se puede rodar, golpear, romper, apretar, empujar la plastilina. Deje que su niño/a explore libremente y descubra lo que ve en la masa!



What's Next?
Resources for Taking It Further

Suggested Readings

Chesloff, J. D. "STEM Education Must Start in Early Childhood." Education Week online (edweek.org), March 5, 2013. Available on the web at **www.edweek.org/ew/articles/2013/03/06/23chesloff.h32.html**. Published in print March 6, 2013, as "Why STEM Education Must Start in Early Childhood."

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Tinkering Books

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Walker, Lester. "Block Building for Children: Making Buildings of the World with the Ultimate Construction Toy" The Overlook Press; 1995.

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Tinkering Picture Books

ENGLISH

A Day in the Life of a Builder by Linda Hayward
Block City by Robert Louis Stevenson
Building a House by Byron Barton
Changes, Changes by Pat Hutchins
Extra Yarn by Mac Barnett
Guess How Much I Love You? by Sam McBratney
How Long or How Wide? A Measruing Guide by Brian P. Cleary
Length by Henry Pluckrose
Measuring Penny by Loreen Leedy
Michael Recycle by Ellie Bethel
My First Book of Cutting (Kumon Workbook)
Press Here by Herve Tullet
I Can Do It Myself by Emily Perl Kingsley
I Wonder Why the Wind Blows? By Anita Ganeri
Roll, Slope, and Slide by Michael Dahl
Round is Tortilla by Roseann Thong
The Clothespin by Miley Smiley
The Three Little Javelinas by Susan Lowell

BILINGUAL

Fix It/A Reparar by Georgie Birkett
One Nose, Two Hands; Wiggle Like a Puppy, Hand in Hand: Multicultural Experiences for Young Children series (Toddler Board Books each in English, Spanish, Chinese and French) Addison-Wesley Publishers
My Numbers/Mis Numeros; My Shapes/Mis Formas by Rebecca Emberly (Toddler Board Books in English and Spanish)
Tools; Opposites; Jobs (Toddler Board Book series in 12 – 20 languages)
www.Milet.com

What's Next?
Resources for Taking It Further

Websites

Boston Children's Museum
www.bostonchildrensmuseum.org/learning-resources/race-to-the-top

Department of Early Education and Care
www.mass.gov/edu/government/departments-and-boards/department-of-early-education-and-care

United Way of Massachusetts Bay and Merrimack Valley,
Brain Building in Progress public service campaign
http://brainbuildinginprogress.org

PBS
www.pbs.org/parents/child-development
www.pbs.org/parents/education/science

WGBH
www.peepandthebigwideworld.com
www.resourcesforearlylearning.org

Pinterest
- Look up any of the tools and you'll find lots of related activities
- Rachelle Doorley: TinkerLab Art Activities for Kids

Tinkergarten
https://www.tinkergarten.com/

Massachusetts Pre-K STE Standards

To simplify connecting one standard to each activity in the Tinker Guidebook, we used the Massachusetts Guidelines for Preschool Learning Experiences (the green book). However, you can click on the "Crosswalk" document below to see how these standards align with the newly adopted Massachusetts Pre-K STE Standards.

Crosswalk between Draft Massachusetts Pre-K Science, Technology and Engineering Standards and Guidelines for Preschool Learning Activities
http://www.mass.gov/edu/docs/eec/2014/20140307-crosswalk4prek-ste-standards.pdf

http://www.eec.state.ma.us/docs1/curriculum/20030401_preschool_early_learning_guidelines.pdf

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Family Tinker Kit

Everyday Tools for Play and Learning

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