

Sensorial Materials Demonstrations

Maria Montessori realized that children learn best when they are able to absorb information using all their senses. Some Sensorial materials develop the child's ability to learn differences in pitch or to match sounds. Others develop the ability to perceive various tactile materials. Still others develop the sense of taste and smell.

When presenting any Montessori material the teacher strives to do the work perfectly to model the correct method of doing the activity. The material is always presented on the child's dominant side to maximize the child's ability to absorb the information.

Many sensorial materials are used to lay the basis for abstract mathematical concepts and to continue to develop the small muscle coordination necessary for learning to write.

The Sensorial materials also develops vocabulary for geometry and for an understanding of botanical classification.

The beautiful materials and the joy of manipulating them and developing fine sensorial perception makes learning fun, building the basis for a life long love of learning.

01 Knobbed Cylinders

The Knobbed Cylinders introduce the concepts and the language for the materials the Pink Tower, the Red Rods and the Brown Stair. The concept "large to small" is similar to the Pink Tower. The "thick to thin" cylinders are similar to the Brown Stair. This one is "short to tall" like the Red Rods. These concrete materials prepare the child's mind for the corresponding abstract concepts in mathematics. The child's senses are allowing the child to teach himself. The action of picking up each knobbed cylinder exercises the small muscles in the hand in preparation for writing.

This is the Knobbed Cylinders, or the Cylinder Blocks. The child is shown one and then after practice, they may use two cylinders at a time, three cylinders at a time, and then four cylinder blocks at a time. The extremes are taken out first and then the rest of the cylinders are taken out and the rest of the cylinders are taken out and mixed up in front of the cylinder block. There are four different cylinder blocks and this is the way that the child can already see the differences. They see the extremes, this one is actually small and large so that the child sees the extremes and knows what they're going to be looking for. Again, this is a visual and a lot of this deals with also depth perception because now they have to take the cylinder and fit it into the hole. And just one hole - doing a mixture of cylinders. When there's two, they're lined up left and right, when there's three, it makes a triangle, when there's four, it makes a square. This is the most difficult cylinder block because of the fact that all of the circumferences are the same. It's all about depth so the child is having to, when they choose a cylinder, they have to look into the hole

specifically and see the depth of the hole to see where it goes. There's no other clue, it's the depth of the hole that gives that perception of where it needs to go.

02 The Pink Tower

The Pink Tower shows the grading of large to small in three dimensions with 10 blocks. This material is done on the classroom floor. A rug is used to define the child's workspace. The child builds the tower taking care to place each block in the center of the preceding block. Like all Montessori materials, the Pink Tower is beautiful to see and touch. After building the Pink Tower the children are asked to stand back and view it to see the beauty of this material.

This is the Pink Tower. This comes after the cylinder blocks. This is the grading. Everything changes by an increment. I am lifting all of them with the pincer grip. The idea is the children are learning large and small through this material. They are actually seeing it, they are touching it so after the children have learned to build the Pink Tower often they get more creative with it. They start making designs with it or adding it with other materials because a lot of the materials have the dimensions in increments in the same way.

03 The Brown Stair

The Brown Stair follows the Pink Tower and continues the concept of thick and thin that was introduced with the knobbed cylinders. The 10 Brown Stairs are laid out one by one in descending order. The change in the height of each stair matches the change in dimension of each block of the Pink Tower. This material continues to develop muscle control as the child strives to pick up each block and line in up with the previous one. Children also use the Brown Stair and the Pink Tower together to experiment with how these dimensions can be combined to create new shapes. The Pink Tower and the Brown Stair have the same dimensions.

This is the Brown Stair. It is after the Pink Tower. Now we are looking at the dimensions of thick and thin from the cylinder blocks. Again as with the Pink Tower we are using that muscle control. Building a memory with the hand. It moves from thick to thin. After it is built, the children and I will stand back and notice the shades and the shadows of the material.

04 The Red Rods

Two rugs are usually necessary for the Red Rods. This material is more challenging than the Brown Stair. The child brings each rod from the shelf one at a time and carefully lays them out. During the presentation, the child sits on the far side of the rugs to better observe the workspace as the teacher demonstrates how the rods are laid out. The rods demonstrate the concepts of length moving from the longest rod to the shortest. Each rod is one unit smaller than the previous rod introducing the concept of one unit. The smallest rod represents the size of one unit. Comparisons can be done to determine

which rod is the next one in the sequence. This control of error allows the child to complete the activity successfully.

These are the Red Rods. The child and I have already brought all the Red Rods onto the right side of the rug and the idea is to go ahead and create the Red Rods while the child is on the far left of the rug and I begin by using my eyes, looking for that first red rod and then bringing it over. The idea of this material is about the length, that it is long and short. So, tracing the length, emphasizing the size. Again, comparisons can be done to make sure the child is seeing what I'm looking for. Of course, the child would be up a lot closer, would be able to see a little bit better. Again, doing the comparison, looking with the child. The idea is that I do it correctly so that the child sees how exactly it's done. I usually stay through the child's practice and just kind of watch to see if they have that visual because sometimes you will have to re-present if the child does not see the difference between everything. And it's one of those things, that when that happens, it kind of sets off a light bulb inside your head and you start thinking, you've got to keep an eye on that child's eyes. When they have that testing, visual testing, through the health department. And that's the Red Rods. The idea is that the shortest rod can fit at the end of each rod to make the equivalency of the rod before it.

05 Color Box

The Color Boxes teach the child color names starting with the primary colors in color box 1. The child learns to match the colors from the box while naming the color. Color Box 2 adds the secondary colors of green, purple and orange as well as brown, pink, white, black and gray.

Color Box 3 challenges the child to develop the ability to discriminate the fine shades of each color. Here we see a demonstration of one method of presenting color box 3.

This is Color Box 3. This is the actual last presentation where the child is taking all of the color tablets and putting them around a particular object. In this case, I have chosen the painted globe. The color box three is a gradation of the colors, they're going from dark to light. And the child already knows, has already done multiple practice of this material... again and again, the repetition. So we're just refining it, giving it a lovely center, making it look lovely. This is a stationary object, kind of making the center of this, set a layout. And a child could choose other items. Sometimes, it's the candle that represents the sun can be used. The first Color Box is Color Box 1, where it is just the initial matching of three colors only, the primary colors. And the idea is to introduce the beginning of how to do the Color Boxes, matching them. Also, this is such an early material that it's very important to make sure that the child also is learning those colors because they are the primary colors. And then the next box takes those primary colors and adds the fact that there are the rest of the colors that you see here in this box. It takes all the rest of them so that there are a total of nine colors that are the basic colors: the primary, the secondary and then black, white and brown are also added into it and in the third box, the black and the whites are incorporated into one gradation. The children kind of look at the fact that it's railroad tracks because the white actually go over and it's

like the colors are the slats that go on the railroad track. And in certain lights when the, when they're by the windows, the tablets will look different when they're farther away from the windows just getting a light from above. That kind of changes the colors so it's always interesting to watch a child when they have this material if they're able to complete it and exactly is it the darker colors, the lighter colors? Usually it's the shades that are in the middle that the children have the most difficulty with. So, when I give a presentation, again, that holding of two tablets together or right beside each other to look at them and see the difference between the shadings. Because it's so minute at times, when it is a particular light that the children have such a difficulty and as an adult, I have such a difficulty distinguishing between those minute little differences.

06 Knobless Cylinders

The Knobless Cylinders are similar in shape to the knobbed cylinders but add a level of abstraction. The cylinders are used to make comparisons and to develop the ability to discriminate large and small, thick and thin, short and tall and wide and narrow.

The four boxes of Knobless Cylinders can be assembled in various ways to illustrate mathematical relationships. In the elementary grades these cylinders help to introduce the concept of circumference and volume. Vertical assembly can be challenging. The box lid is used to stabilize the cylinder base as they are stacked.

These are the Knobless Cylinders. This is an initial presentation. It has two boxes. The red box is always supposed to be used in the presentation because it will be the most familiar. Again these pieces follow, just like the cylinder blocks, so they go through that progression of following the red rods, the brown stair. All of the pieces we're going to use are taken out of the box. The child would help me take the materials out. The red is always begun first. I always start with the thick. Again, this is a visual so checking, comparing. And take a look and then start the next set of cylinder blocks, leaving a space but lining them up with the other cylinders. Do your comparisons, the child's noticing what you're looking for, seeing that the eyes need to be used. Now this is a visual material, again following, like I said, the red rods, the brown stair but then this is also used for comparison. Two boxes are done then three boxes and then four boxes are done together. The child may choose any two boxes at this time.

07A Geometric Cards

The Geometric Cabinet contains a wide variety of geometric shapes in six drawers.

Drawer 1 contains six circles.

Drawer 2 contains six rectangles.

Drawer 3 contains six triangles of different types

Drawer 4 contains six polygons from pentagon to decagon.

Drawer 5 contains four curved figures including ellipse, oval, quatrefoil and curvilinear triangle.

And Drawer 6 contains four quadrilaterals including rhombus, parallelogram, trapezoid and right- angled trapezoid.

There are three sets of geometric form cards. Set “A” displays the shapes as solids. Set “B” displays the shapes with thick outlines and set “C” displays the shapes with thin lines making the activity increasingly challenging. Repeated practice with the geometric cabinet introduces the concepts of each shape and its name through the sense of sight and touch.

A stack of geometric form cards are laid out on a rug upside down in random order. A card is turned over and the child traces the shape with his or her finger. The child then walks over to the geometric cabinet, which is typically some distance away to challenge the child’s memory and concentration. Each drawer is opened until the correct shape is located. The shape is then placed on the card to confirm that the choice was correct. The next card is turned over and the process is repeated until all the cards in the stack are successfully matched with a geometric object.

07B. Geometric Tracing

This is the Geometric Cabinet. It’s about refinement of the senses for the shape, seeing the different shapes. Also, it’s an indirect preparation for writing because you are tracing the shapes with your finger.

Trace them and mix them up on the table. Some people use one finger, some people use two fingers so I’ll demonstrate with two fingers. Once they’re all out then you choose. Shape, trace and find it and set it in. Later on, the child will use this material to be given three period lessons on the names of the different shapes. There are also cards. There’s the completely filled in, then there’s the broad line and then the thin line, set A, set B and set C to continue that refinement of that visual sense.

08. Botany Cabinet

The purpose of the botany cabinet, they use an orange stick to trace the shapes and the idea is to refine the visual sense for the shape. Then the orange stick is used as a tracing mechanism so that when they go into the mechanics of writing, that they’re holding it more like pencil, training their hand for writing. The botany cabinet comes after the geometric cabinet. The geometric cabinet uses the fingers for tracing and then the botany cabinet is refining it by using the orange stick and if you look, the stems are a little bit more tricky for the hand to trace. There are a lot of different shapes that take just a little bit more perfection for the child to have to trace that. So refining that hand into the mechanics of writing.

This is the botany cards, set A. This is actually a spatulate leaf. And the idea is to turn the card and then I’m going to go to the cabinet, the botany cabinet, and actually get this shape, just with my visual memory. The cards were already visited in the geometric cabinet so this is just more of a refinement – a matching work... and there it is. Slide that

one up and take the next card. And then I'm going to go to the cabinet to get this card, this shape, this leaf shape.

Later the vocabulary of each leaf shape is introduced and the names are matched to the cards.

09. Constructive Triangles

There are five Triangle Boxes that contain sets of color-coded triangles that can be constructed into other regular geometric shapes. The child can see the geometric relationships between the triangle and the shape that is formed by combining two triangles. Eventually it can be shown that all regular geometric shapes can be constructed using triangles. A black line indicates the side of the triangle that is to be matched. The black line and the color-coding serves as a control of error.

The vocabulary of each triangle and constructed shape which was introduced through the Geometric Cabinet is reinforced.

This is the rectangular box. It's presented in a system where we just start with some of the triangles. They are mixed up. I am pointing out the lines to show that those are what the child is going to connect, because they will show how they will fit together, showing the child that they are the same triangles. Not only are they color-coded to be the same but that they are the same size. Usually, a child will exclaim; "rectangle." I'm not actually touching the material. The idea is just to point it out. I don't want to actually move the triangle, but I am still drawing attention to the line. The child would then go ahead and take those, mix them up, and try them on his own and then I would continue with the next three triangles. Again, as I am taking them out, I am mixing the triangles up. I always hint that there is one more triangle to come. I will even, a lot of times say, that when they have the material, they may take out all of the triangles, showing that parallelograms can actually be different sizes. It is a visual material. They realize that triangles can make many different shapes, they are one of the building blocks of geometry. In fact, I remember geometry class. This is always the one that gets them, they are always like; "It's not the same." And this one makes an isosceles trapezoid. All the others, in all the other boxes, are always the same, all except for the isosceles trapezoid. At this time then the child would go ahead and mix up all of the triangles and then create the whole box themselves. Then I would show them how to put it back onto the box.

10. Superimposed Geometric Figures

The Superimposed Geometric Figures can be used to show many geometric relationships such as tangent, aligned, and inscribed. Here we will see the concentric relationship demonstrated.

These are the Superimposed Geometric Figures. At the shelf, the children have chosen if they wanted the circles, the triangles or the squares. We have the squares. We're going to choose only two colors because we're going to do the concentric superimposed geometric figures. And I'm going to choose red and the child would help me mix up all of the squares. And usually I would do one color and the child does the other color, intermingling the colors. And you start with the red or the blue, whichever you prefer. I'm going to start with the red. We want the largest and then we go on to blue. And since this is concentric, it's going to be placed exactly in the middle and then I'm going for the next red one so I'm alternating the colors and the sizes are gradating down. Again, that visual material. Really having to look not only for the color but the next size. It's even difficult for adults. And there it is, concentric.

11. Binomial Cube

The Binomial Cube introduces a sensorial understanding of algebraic relationships. In the elementary curriculum the Binomial Cube will be used to understand cube roots. The Binomial Cube proves the binomial equation $(a+b)^3$.

When the cube is reassembled the size and color coding provide a control of error for the child. The largest cube is defined as "a" cubed and the smallest cube is "b" cubed. From this assumption many algebraic relationships can be derived in the elementary years. This block represents a squared b. When you combine all the blocks you get the equation: "a" cubed plus 3 a squared b plus 3 b squared a plus "b" cubed.

This is the Binomial Cube. This is a preparation for algebra. This is one of the children's favorite materials. Again, a visual material - taking the piece out, showing the child the whole piece, taking it out in layers. The binomial cube is generally taken out and completely mixed up, not so with the Trinomial Cube. All the pieces are out, we start putting them back in. This is primarily used as a visual material but later on in the elementary curriculum they use it for algebra. The idea, I'm just looking for the piece that will fit, looking with my eyes. That's my favorite one. It has, like a little seat just made for the cube. When you're done, the cube box should be able to close and the lid should be placed upon it.

12. Trinomial Cube* Camera Jolt

The Trinomial Cube represents the trinomial equation $(a+b+c)^3$. Three of the blocks are cubes defined as "a" cubed, "b" cubed and "c" cubed. Similar to the binomial cube, the blocks can be lined up to represent the equation:
 "a" cubed + 3 a squared b + 3 a squared c + b cubed + 3b squared a + 3b squared c + c cubed + 3c squared a + 3c squared b + 6abc.

In the Sensorial curriculum the child absorbs the relationships that later are represented in algebraic equations.

Now this is going to be taken out in layers because of all the many different pieces. And so I'm going to start with the top layer right in front of the child. Again, showing the child the different pieces, looking at the fact that there's a new color introduced and some new pieces. All the pieces, when they're taken out should be at the same level because there are three layers. And there's the top and we move to the middle. And those are the last pieces that should come out as you reveal them in the layers because they are intact and this is usually what makes the child notice. "I know that one!"

And we move to the bottom layer. Some new pieces, same colors. Some new pieces but on the very core there's that old friend, the binomial cube. So when all the pieces are out, I'm going to start the bottom layer and this is what's going to be familiar because we're just beginning the Binomial Cube but I like to emphasize between the two pieces that have red for children that just have, just a little bit more visual difficulties. If they did not notice that the Binomial Cube was the core, basically. I introduced the two different pieces then, again using my eyes to fill in what fits then, actually in every dimension. Bottom layer then we move to the middle layer, again building that Binomial Cube. This is the layer if they did not notice, they usually notice, fitting in the pieces. And then the last layer Trinomial Cube. This layer is completely new but that's always fascinating to me how the Binomial Cube is right there in the very core of it all giving just a little bit of familiarity to the children and then you add those extra little pieces because when they get all the pieces, this can look very challenging. And that favorite one, there's that little seat right there. Again when we're done, making sure that the box closes and that the lid will fit and then it's the child's box to open.

13A. Decanomial

Similar to the Binomial and Trinomial Cube, the Decanomial square prepares the child for understanding mathematics. The Decanomial is the square of Pythagorus. The small red square represents the number one squared. As each new set of squares and rectangles is placed on the rug the child absorbs sensorially what will eventually be the basis for understanding algebraic equations. The colors of the pieces match the unit beads giving the child a color representation for each number that will be used repeatedly as the child moves from the concrete sensorial materials to more abstract math materials. As the pieces form each new square, the equation becomes more complex. The first square is "a" squared. The second is "a" squared + "b" squared + 2ab and so on.

Later on the child will join in and he will help build Decanomial square

Later, in the elementary curriculum, this material can be used to understand square roots and equivalencies.

The child will sense these relationships and later use the same material to develop the more abstract relationships in the mathematics curriculum.

13B. Decanomial* Audio Track

This is the Decanomial. When children are shown to carry the box, they're actually shown to hold it at a slight tilt so that all of the squares and pieces are all exactly staying in the same spot. The beginning of the presentation is with the little red square. Always start in the upper left hand corner so that the body stays out of the way. This material is a preparation for algebra. The child initially is just watching.

Later on the child will join in and he will help build Decanomial.

Now, later on in the multiplication bead bar boxes, a child can recreate this with the bead bars.

I was just spreading out all the different pieces. I want the pieces that go together to stay together so that as I'm building the Decanomial, that all the pieces I need are together and are in order so that I can just place them into the place that they belong. Usually when the child takes over, the child will do the left side of the Decanomial and I would take the right side of the Decanomial so that we're building it together because of the fact that it does take so much time. And in the presentation, you really want to see that result so they get that; 'Wow, I want to get it back out.'

This is color-coded according to the math area. The one chain is a red, just the same, and then the two is a green so it's color-coded to go into the math area like I mentioned with the multiplication bead bars that are later on used. The multiplication bead bars are color-coded the exact same way. One is red, two is green, three is pink, four is yellow and it continues.

14. Sound Cylinders (boxes)

These are the Sound Boxes or Sound Cylinders. With the child, we open one box and I listen and then I give it to the child for her to listen to it and then we start a column. So, I'm just going to go ahead and make a column, listening to each one. Many times, the initial presentation is just three cylinders with the extremes and a cylinder from the middle for children that you've already recognized have an auditory difficulty. Now, for the red set, we would just take them out and set them into a column because they will be the first ones that we listen to. This is the one I'm looking for. Actually, it's the one I'm listening for. And when they are the same, I put them together into the middle and bring back any cylinders that were not the cylinder I was listening for. Again, sometimes listening again.

Putting them together.

The bottom of each cylinder provides the child with a color symbol as a control of error. If the cylinders are correctly matched, the colors will match.

15. The Bells

These are the Bells. Again, this is the use of the auditory sense, being able to hear. This is going to refine it even more because these are the different pitches. This is the C scale.

The notes are not introduced to the child yet. The child is taught about the fact that the white bells are the control, that they stay where they are. The bells that they may move are the brown wooden bells. A child is asked to put on a set of gloves if the child uses the bells. As a directress, I have my set of gloves on. I have color-coded mine to be black so that the child knows that if there is a white pair of gloves, that that one is theirs. The silver part of the bell is never to be touched, even though a child may be wearing gloves- just as a precaution for the bells and caring for them and not causing any damage. The first presentation with the bells is just to choose one bell and the child is just going to use the striker to listen. The bell can be placed back and another bell chosen. Again, the child being shown how to hold the bell, listening to the bell. The child may hum or sing along. And that is the first lesson with the bell

The child is then shown how to do two bells and then the mute is introduced. The child may take any two bells, so the directress is going to take any two bells and mix them up just a little bit. The child is introduced to the mute. The bell can go for a long time or a short time. One bell is played at a time. When it is time to put the bells back, the first white bell that has an empty space is listened to 'cause it is the control. It is not the same. Listening again to the control bell. That one is the same. The bell is brought over, listening to the control bell. And then the bell is placed back. The child is then shown three bells, four bells, five bells, until all eight bells are done. After the child has been introduced with the green boards and the notes and has had lots of repetition, we take that knowledge with the child being able to listen to the bells and knowing the notes and where they are placed on the scale.

We now take it into the composition, the boards that the child will use to read the music and play with the bells. And then another composition board may be used. (The Bells are played according to a composition board with notes on a scale).

The child can also compose his or her own musical composition as well.

16. Touch Tablets

These are the Touch Tablets. We're taking that smooth and rough and refining it. First, we're going to take the tablets that belong together and feel them to make sure that they're the same, and then, one on each side. And I'm going to search for the one that is in the middle, make sure that they are the same. After I touch, I let the child touch. And then, I want the other extreme. They should always be together in the box. Usually this presentation is done without a mask, initially. (The word initially is not there but it should be so translate it).

When I'm done, I'm using my eyes to visually check that they are the same. The child may do this again or we can put a set back, and get a different set out.

17. Fabrics

These are the Fabrics. This is again, a material that they use for tactile or touch. First, we're going to feel them with our fingers and then we're just going to place one on each side, feel the next set. Now again, this presentation is usually done without a blindfold first. I'll go ahead and do the blindfold for the demonstration. A lot of times, the children just use one hand each. If you're not sure, I encourage two hands. When you're done, a visual check and yes, those are all the same, they are matched.

Once the child has become comfortable with material, fabrics with more subtle differences may be used to increase the level of difficulty.

18. Tasting Jars

Okay, this is Tasting. So, the child and I are first going to set up our napkins with our spoons and our cups. I'll go ahead and do the child's first. The idea is to go ahead and have your napkin, then you're going to have your glasses and you're going to have your spoon and let the spoon rest. And I will have mine with my cups and my spoon. We're each going to need water so the child would pour two cups of water.

The water is used to clean the palette and the spoon to ensure that each taste is not influenced by the others.

The child is using the correct set because they will be using this on their own. And then we're going to set up for tasting. Now it usually doesn't matter which side is on which so I don't know if it's on the same in the video. Alright, so we're going to get started. And now I will taste this one to see if it is the same.

Similar to the sound cylinders, the bottom of the jars have a control of error to allow the child to correct him or her self.

19. Smelling Bottles

This is the Smelling Bottles or the smelling jars. We go ahead and take everything off of the tray. This is a homemade one of the jars that were found. The catalogues do sell different looking ones that are made out of plastic. So the idea is to...

No, smell again. And they are put together. And then again, they are checked to see that they are the same, holding the lids so the smell does not escape.

20. Baric Tablets

These are the Baric Tablets. This is the heavy and light set, which is the initial presentation because they are the extremes. First, the child is shown how to hold the baric tablets. We'll even hold the other one to feel the difference. And we want to have

the same amount in each set. We're going to start with four, the child can always have more as long as they are the same amount. And then we mix them up. The blindfold is put on and then the presentation begins. Baric tablets are used to tell the difference in weight. Each wood has a different color. That is why it needs to be isolated with a blindfold. It is visually checked and then the child mixes them up and uses them for himself.

21. Sorting

This is Sorting. The directress uses a blindfold while the child observes. In this case, four types of shells are sorted into four circles. Both fingers are used to feel. Memory and concentration are necessary to sort the shells. If the child forgets where the shells go, he can use his tactile sense to identify the correct circle. When the directress completes the sorting the blindfold is removed and a visual check is done. The objects are placed back into the center and the child puts his blindfold on and does the work while the directress observes.

22. Mystery Bag

In the first Mystery Bag presentation, the child may take a single Mystery Bag, and become familiar with the objects one by one.

The second demonstration takes the work a step further. The child must now find an object that matches one that is presented. In this presentation, the child is invited along with the directress to take two Mystery Bags to a rug. The bags should be made of the same fabric; in this case the green pattern ties them together. The directress reaches into the bag and takes an object out and sets it on the rug. The child reaches into her bag and attempts to find the same object. The demonstration continues until all the objects have been removed. The objects are placed back into the bag and then *the child* chooses the object. The objects can vary as long as they are identical in all aspects.

23 . Thermic Tablets (Touch Boards)

These are the Thermic Tablets. The material develops a sensorial understanding of temperature. For this material a blindfold is used because there is already a visual clue. The tablets are laid out in two sets. The wrist is used to test the difference in thermic sense provided by each tablet. Using the same wrist the bottom tablet on the left is compared to each of the tablets on the right until a match is found.