

## TRINOMIAL CUBE

### Materials:

A wooden cube with a removable lid. The lid has a pattern painted on it. The cube has two hinged doors which open out. Inside the box there are various blocks, prisms, and cubes which are colored black, red, blue, and yellow. All of the pieces add up to the algebraic equation  $(a+b+c)^3$ : where: 'a' is represented in red and 'b' is represented in blue and 'c' is represented in yellow.

A felt mat with three sections, "t", "m", and "b".

The equation is:  $(a+b+c)^3 = a^3 + 3a^2b + 3a^2c + 3b^2a + 6abc + 3b^2c + b^3 + 3c^2a + 3c^2b + c^3$

### Presentation:

1. Invite the child to do the lesson.
2. Show the child the shelf and name the activity.
3. Carry the box to a rug by placing the fingers around the box and the thumbs on top of the lid.
4. Place the box to the top right of the rug and seat the child on your sub-dominant side.
5. Retrieve the felt mat from the shelf and place it to the right of the box.
6. Remove the lid from the box and place it between the hinges directly below the box. Be sure that the red painted square is on the top left.
7. Un-roll the felt mat and place it to the right of the box.
8. Remove the pieces starting with the yellow cube in the lower right corner of the cube. Place the yellow cube on the top of the "t" column on the felt mat.
9. Next remove the piece directly to the left of the yellow cube and place it on the felt mat under the "t" column.
10. Continue with the middle then bottom layers in the same manner, removing all of the pieces from right to left and placing them in the appropriate column on the felt mat. Middle pieces in the "m" column and bottom pieces in the "b" column.
11. Trace each column upon completion to show that all pieces in each column are the same height.
12. Begin returning the blocks to the box by placing them on the lid. Start with the solid red cube in the "b" column; place it on the lid on the red painted square. Continue in a like manner, placing the bottom pieces from left to right and top to bottom.
13. Repeat step 12 for the middle and top layers of the cube.
14. Close the sides on the box.
15. Replace the lid on the box.
16. Roll up the felt mat.
17. Return the material to the shelf in the acceptable manner.
18. Return the felt mat to the shelf.
19. Invite the child to do the lesson.

Variations:

1. Build the cube off of the lid.
2. Matching the prisms color to color.
3. Take all of the prisms out and place them randomly on the rug. Build the cube directly onto the box, bottom layer first.

Extensions:

1. Use a blindfold.

Points of Interest:

1. Seeing the pattern on the lid, top, and sides of the cube.
2. Noticing the color, size, and shape of the various prisms.
3. Touching and matching the colors on each side of the prisms.

Aim:

Direct:

1. To teach and clarify dimensional changes.
2. Development of hand-eye coordination.
3. Development of sense of order, concentration, coordination, and independence.

Indirect:

1. Preparation for algebra.

Control of Error:

1. In the material, if built incorrectly the box will not close properly and the lid will not fit.
2. The pattern on the lid.

Language:

Cube, prism, trinomial cube, layers, blue, black, yellow and red.

Age:

4 ½ years and up.

Comments:

S.M.T.T.I.  
Language

## SANDPAPER LETTERS

### MATERIALS

1. Sandpaper letters - lower case (t,m,b,f,a)
2. Rug or table

### PREPARATION

1. Invite the child to do the lesson
2. Take the child to the sink, wash your hands, and invite the child to wash her hands.
3. Indicate where the lesson is located in the environment
4. Name the material
5. Model how to carry the lesson to a rug or table.
6. Seat the child on your subdominant side.

### PRESENTATION

1. Remove the sandpaper letters and place them beneath the container.
2. Select a letter and position it in front of you.
3. Hold the sandpaper letter firmly with the subdominant hand. Trace the letter using a downward stroke of the index and middle finger and then give it's sound.
4. Trace the letter again and invite the child to say the sound with you. Have the child trace the letter independently and say the sound.
5. Place the letter face down on the rug in the upper left hand corner
6. Repeat the same process with the other letters.
7. Use the Three Period Lesson with the letters

### CONTROL OF ERROR

1. In the directress or another child.

S.M.T.T.I.  
Language

POINTS OF INTEREST

1. The feel of the sandpaper
2. Making the sounds of the letters

DIRECT AIM

1. Learning the sounds of the letters
2. Auditory discrimination of sounds

INDIRECT AIM

1. Preparation for writing
2. Preparation for reading and spelling

AGE

3 years and up

COMMENTS

1. Children may work in pairs to trace the letter and give the corresponding sounds.
2. The teacher may make the sound of the letter and ask the child to trace that letter.
3. The teacher may choose a letter and have the child make the appropriate sound.
4. Don't trace the letter and make the sound at the same time.
5. Stress the sound of the letter and **NOT** the name at this time.
6. Try to make the sound as clean as possible. Avoid adding a vowel sound with consonant sound, ie., "t " not "tu"
7. Suggested order for presentation of the sandpaper letters:  
Set one - t m b f a  
Set two - h g r c i

S.M.T.T.I  
Language

Set three - l s d k u

Set four - w p j n o

Set five - q v x y z e

8. Other options for organizing the letters are as follows:

t m b c

h g r f

l s d k

w p j n

q v x y z

a e i o u

S.M.T.T.I.  
Language

t m b f a

h g r c i

l s d k u

w p j n o

q v x y z e

S.M.T.T.I.  
Language

## GREEN SERIES - MODEL LESSON - CVC PICTURES AND MOVEABLE ALPHABET

### MATERIALS

1. Moveable alphabet
2. Tray
3. Picture cards of long vowel pictures with controls on the back
4. Rug
5. Control mat with boxes for the pictures and lines for the letters (optional)

### PREPARATION

1. Invite the child to do the lesson
2. Indicate where it is located in the environment
3. Name the material
4. Model how to carry the lesson to a rug or a table
5. Seat the child or children on your subdominant side
6. The child or children should have experience with short vowels and consonant blend and digraphs.

### PRESENTATION

1. Place the moveable alphabet and the tray of pictures on the top right hand corner of the rug.
2. Remove a picture from the tray and place it at the top left hand corner of the rug. Say the name of the picture slowly - "pail"
3. Tell the child that there are several ways to write the long "a" sound and that "a" with silent "e" is only one of them.
4. Turn the card over to show the child the "ai" which is written on the back. This tells us how to spell the long sound of "a" in this word.

S.M.T.T.I.  
Language

5. Say the word "pail" again slowly pronouncing each sound. lay out the letters to spell the word stating again that we spell the long "a" sound in this word with "ai".
6. Slide your fingers under the letters and say the sounds reading the word.
7. Remove another picture from the tray and place it under the first picture and say the name - "tray". Turn the card over and show the child that we spell the long "a" sound in this word with "ay". Ask the child to find the letters that they hear in the rest of the word.
8. Slide your finger under the letters and ask the child to read the word.
9. Read each word slowly sliding your index finger under the word from left to right as you read.
10. Ask the child to read each word.
11. Ask the child to return the pictures to the tray.
12. Ask the child to read each word and return the letters to the moveable alphabet box.
13. Return the materials to the shelf

CONTROL OF ERROR

1. In the directress or another student

POINTS OF INTEREST

1. The moveable alphabet
2. The pictures themselves

DIRECT AIM

1. Practice in forming words
2. Practice in reading long vowel words

INDIRECT AIM

1. Preparation for spelling, reading, and writing



S.M.T.T.I.  
Language

AGE

5 and ½ and up

COMMENTS

1. Children who have the skills to write may write the words they have formed.
2. Ask the children to think of other words which have that long vowel. Have them write the words with the moveable alphabet.
3. This same exercise is done with each of the long vowels and phonograms.

Long a    ai   ay   a\_e

Long i    ie   i\_e   igh   -y   -i-

Long o    oa   oe   o\_e   -o   ol

Long e    ee   ea   ey   -y

Long u    ue   u\_e   ew   oo

ir   er   ur

oi   oy

al   all   aw   au

ou   ow

Silent letters    k   w   b

Soft c and g    ( c and g when followed by i e or y )

S.M.T.T.I.  
Language



*“There is only one basis for observation: the children must be able to express themselves and thus reveal those needs and attitudes which would otherwise remain hidden or repressed in an environment that did not permit them to act spontaneously. An observer obviously needs something to observe, and if he must be trained to be able to see and recognize objective truth, he must have at his disposal children placed in such an environment, that they can manifest their natural traits.”*

*Maria Montessori, The Discovery of the Child, The Clio Montessori Series, reprinted 1944*

MATH-Linear Counting

G. TEN BOARDS

MATERIALS: A wooden box containing 2 sets of notched strip boards demonstrating the numbers 10-90 on 9 segments, wooden numeral cards from 1 to 9, a container that holds a bead stair from 1 to 9 and 45 ten bead bars. You may use a counter for this lesson.

PREPARATION: Invite a ready child who knows his numbers from one to ten and is extremely familiar with the bead stair sequence and skip counting by tens. Obtain a large rug and unroll it. Prepare to work vertically. Show the child where the lesson is housed and name it.

PRESENTATION #1 (Tens only):

1. Retrieve the large wooden box and place it in the bottom right corner of the rug.
2. Retrieve the tray containing the 45 golden bead bars. Place it in the upper left corner of the rug.
3. Seat the child on your s.d. side.
4. Remove the lid from the box and place it underneath.
5. Remove the strip boards and place them vertically in the middle of the rug. (There should be an empty slot at the bottom when placed correctly.)
6. Point to the number 10 on the board. Say "This SAYS ten." Obtain one golden bead bar and place it to the left of the board. "This IS ten."
7. Point to the number twenty on the board. Say "This SAYS twenty." Obtain two golden bead bars and place it to the left of the board. "Ten, twenty. This IS twenty."
8. Continue making the association of the tens numbers up to 90.
9. If the child asks why the last slot is empty, see if he knows what number would go there. If available, add one more ten bead bar to the ninety and then place a hundred square over it to show the equivalency. Place the hundred square in the empty slot. Remove the extra ten bead bar next to ninety.

PRESENTATION #2 (Tens numerals):

1. Follow the above presentation, but add the bead stair and wooden numerals from 1-9.
2. Point to the number 10 on the board. Say, "This SAYS 10." Obtain one golden bead bar and place it to the left of the board. "This IS ten."
3. Obtain the one bead bar and place it next to the ten bead bar. "This is eleven. Ten and one- (obtain the numeral card that says 1 and slide it over the zero) - make eleven. This SAYS 11."
4. Remove the one bead bar and the numeral one. Replace them with the two bead bar and the numeral two. "This IS twelve and this SAYS 12." Continue in this manner through nineteen.

## TENBOARDS cont' 2

5. After nineteen, place the unit bead below the nine bead bar that made nineteen and say "Nineteen and one more make twenty." Place a ten bead bar next to it to show the correlation. Replace the colored bead bars. Move the two golden bead bars down so that they are now next to the numeral 20.
6. Continue making the association of quantity and symbol for the numerals 21 through 29.
7. Continue same process all the way through 99.
8. At this point, one more bead can be added to the nine bead bar, demonstrating that this would make 100. Exchange all 9 ten bead bars and the ten unit beads for a hundred square and place it in the empty slot at the bottom.
9. Replace all pieces of equipment in the appropriate manner. Invite the child to make numerals from 10-99 on his own.

### CONTROL OF ERROR:

1. In the directress.
2. When the child recognizes the numerals.
3. The child recognizes the pattern in the continuation of the numerals from 10 to 99.
4. Sliding the wooden number cards into position over the zero.
5. When all bead bars are used appropriately to make new ten numbers.

### POINTS OF INTEREST:

1. Placing the strip boards into a vertical column.
2. Sliding the wooden number cards into position.
3. Seeing the new number appear.
4. Recognizing the numerals and counting out loud.

### DIRECT AIM:

1. To associate the ten numerals with the quantity of the bead bars.
2. To reinforce the teen numbers.
3. To associate all numerals from 10 to 99.

### INDIRECT AIM:

1. To develop memory training.
2. To reinforce mathematical concepts.
3. To prepare the child for sequencing number tiles on the Hundred Board.
4. To further develop a sense of O.C.C.I.

## TENBOARDS cont' 3

### VARIATIONS:

- 1.. Select the numerals at random and build the Ten Numeral accordingly.
2. Make a number with the beads and ask the child to represent it on the ten boards.
3. Make a number on the ten boards and ask the child to represent it with the beads.

### EXTENSIONS:

1. A child can stamp the ten numbers using the bead stair stamps. Then write the numeral next to it.
2. A child can color a paper that reinforces the quantity of beads and then write the numeral.
3. A child can learn the written word for the ten numbers. "ten, twenty, thirty, etc."

LANGUAGE: ten boards, slots, numeral cards, one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve, thirteen, fourteen, fifteen, sixteen, seventeen, eighteen, nineteen, through ninety-nine etc.

AGE: 4 ½ and up

### NOTES/COMMENTS:

1. **QUANTITY LESSON:** A separate quantity presentation may be given prior to this lesson. The teacher would use only the bead stair from 1-9 and 9 ten bead bars. She would then isolate a ten bead bar and say "This IS ten." Add the one bead next to it and say "Ten and one make eleven. This IS eleven." Continue through nineteen. Add one more unit bead to bead below the nine bead bar that made nineteen and say "Nineteen and one more make twenty." Place a ten bead bar next to it to show the correlation. Replace the colored bead bars. Explain, "Now we're going to make numbers in the twenties. Continue making the association of quantity and symbol for the numerals 21 through 29. Proceed through 99.

2. **SYMBOL LESSON:** A separate symbol presentation may be given prior to this lesson, and after the "Quantity Lesson". The teacher would use only the strip boards and the wooden numerals. She would set the boards up vertically in the middle of the rug. Then, place the wooden numeral cards in a pile from 1 to 9. Point to the number 10 on the first board and say, "This SAYS ten." Obtain the numeral 1 card and slide it over the zero explaining that "Ten and one make eleven." Remove the numeral one and replace it with the numeral 2. "This SAYS 12." Continue through nineteen. After nineteen, point to the number 20 on the board. Say "This SAYS 20." Add the numeral one card and say "This SAYS 21", etc. Continue through 99.