



The development of fine motor and handwriting skills

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Introduction

- The most important mechanical tools that students bring to the classroom are their hands.
- Hand skills are critical for early childhood learning.
- Refined hand skills are needed to master handwriting; a major occupation of school aged children. They also provide the basis for all manipulative activities and hand tool use.
- Hands manipulate the environment to learn.

(Fine Motor Skills in the Classroom, Jayne Berry, OTR/L, Therapro Inc. 1999, pg 3)

Objectives for Teachers

- To increase your knowledge of hand skill development
- To broaden your knowledge and sharpen your observation skills in recognizing problems in hand skills development
- Increase your understanding of your students' hand functioning
- Learn how to modify the classroom environment and develop remediation activities to improve hand skills.
- Increase awareness of occupational therapy as a resource service.

Objectives for Therapists

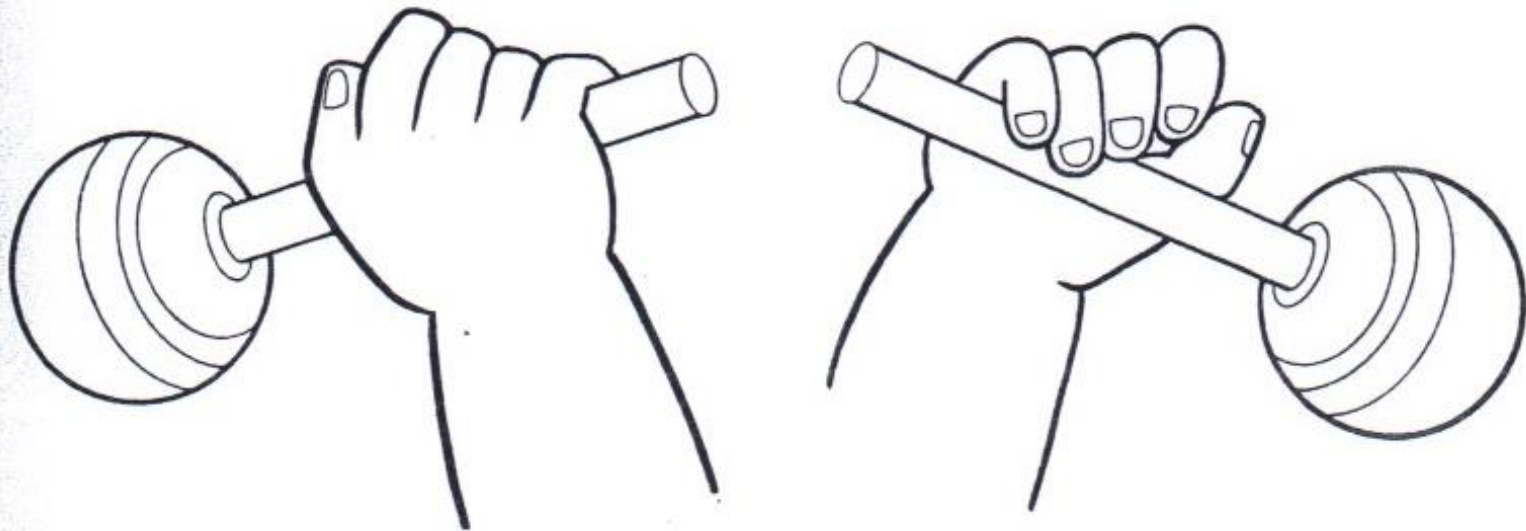
- To share knowledge and observation skills of hand skills development with school staff
- Respond to teachers' requests for informal, non-referral consultation on overall hand functioning and on the specific needs of individual students
- Provide classroom remediation for students
- Develop effective services within the least restrictive classroom environment and enhance that environment for all students.

(Fine Motor Skills in the Classroom, Jayne Berry, OTR/L, Therapro Inc. 1999, pg 5)

The development of hand skills from birth to 3 years

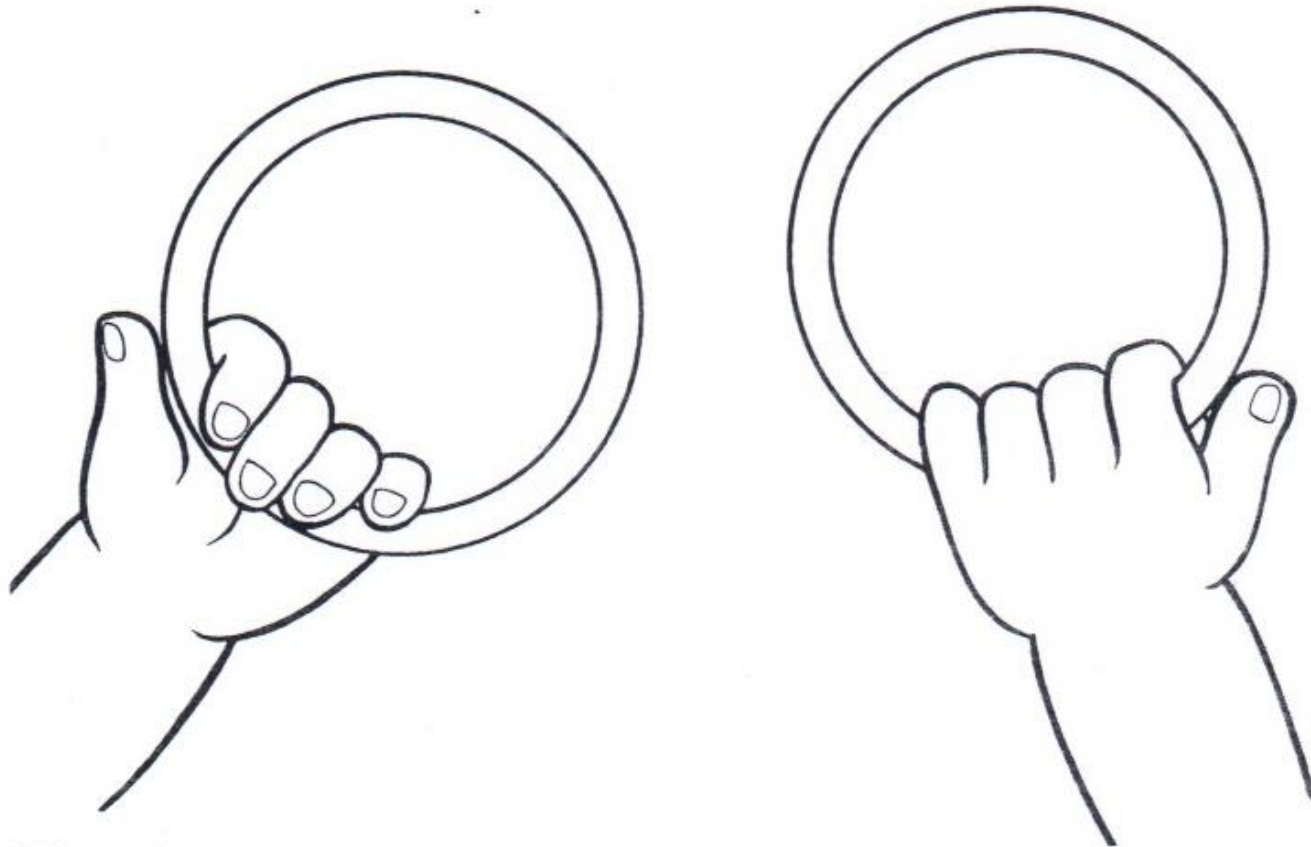


4.22 USES ULNAR PALMAR GRASP (3½-4½ mo.)



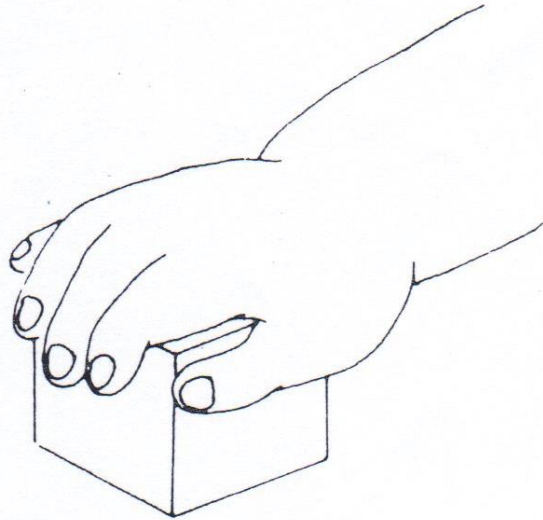
The child grasps an object which is placed in his hand. He uses an ulnar palmar grasp, that is, he grasps the object with the ring finger and little finger against his palm.

4.28 USES PALMAR GRASP (4-5 mo.)



The child grasps an object against the palm without use of the thumb.

4.30 USES RADIAL PALMAR GRASP (4½-6 mo.)



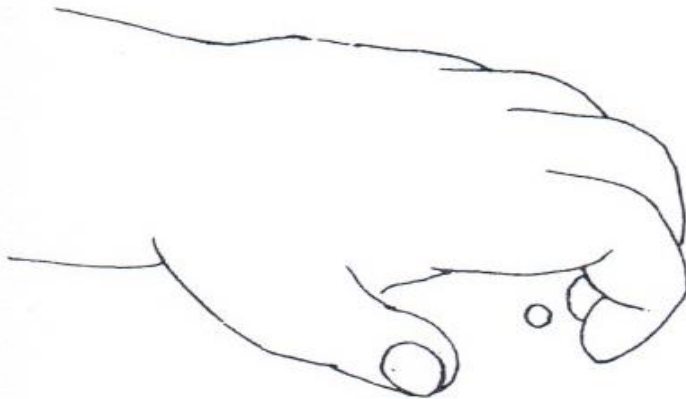
The child uses a radial palmar grasp, that is, he grasps an object with his thumb, index and middle fingers against his palm.

4.43 USES RADIAL DIGITAL GRASP (7-9 mo.)



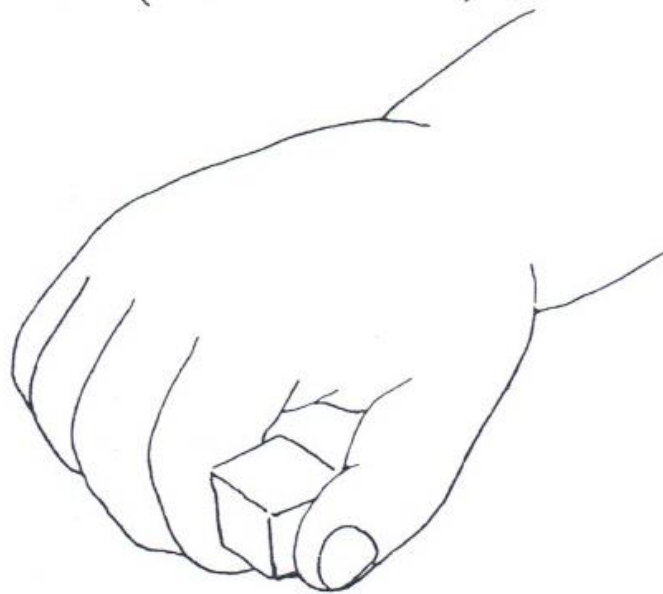
The child grasps an object with the thumb, index and middle fingers without the use of the palm.

4.44 RAKES TINY OBJECT (7-8 mo.)



The child grasps at a pellet sized object such as a raisin by using a raking motion. The child flexes the fingers toward the palm without using the thumb.

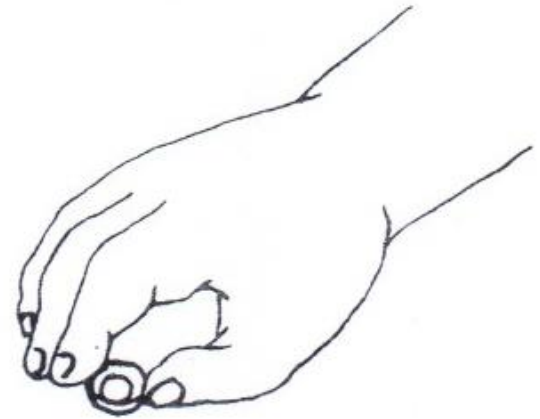
4.45 USES INFERIOR PINCER GRASP (7½-10 mo.)



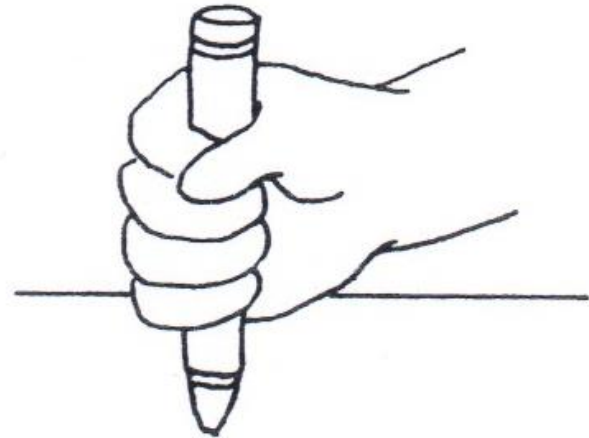
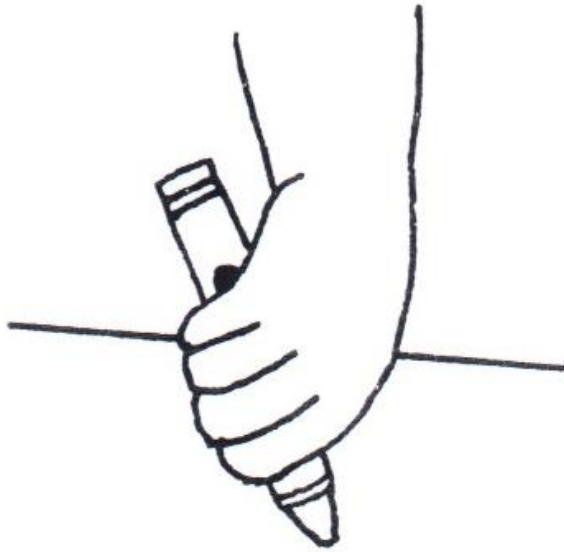
The child grasps a small object with his index finger and thumb. The thumb is positioned at the lateral or lower part of the index finger.

4.52 USES NEAT PINCER GRASP (10-12 mo.)

The child grasps a tiny object the size of a raisin with precise thumb and index finger opposition.



4.55 GRASPS CRAYON ADAPTIVELY (11-12 mo.)

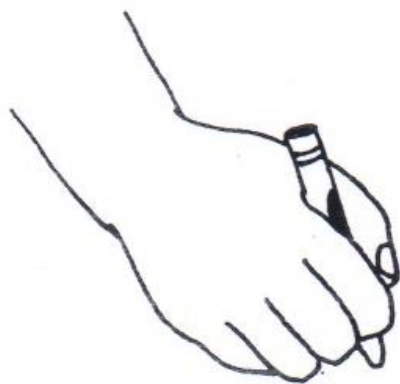


The child grasps the crayon and positions one end of the crayon toward the paper.

4.78 HOLDS CRAYON WITH THUMB AND FINGERS (23-25 mo.)



The child holds a crayon with her thumb and fingers, rather than in a fisted hand.



4.83 MAKES FIRST DESIGNS OR SPONTANEOUS FORMS (24-35 mo.)



The child begins to make definite and controlled strokes which appear to be spontaneous designs or forms. He is beginning to manipulate the crayon with his thumb and fingers and therefore make smaller, more controlled forms or marks.

**4.89 HOLDS PENCIL WITH THUMB AND FINGERS—ADULT-LIKE GRASP
(29-31 mo.)**



The child holds a pencil with his thumb and fingers in an adult-like grasp.

Handwriting Readiness



- Some controversy exists as to when children are ready for formal handwriting instruction. Differing rates of maturity, environmental experiences, and interest levels all are factors that can influence children's early attempts and successes in copying letters. Some children may be ready for writing at age 4, and others may not be ready until age 6.

(Case-Smith, J. Et al; Occupational Therapy for children, Therapro 1996)

Typical Development of handwriting skills

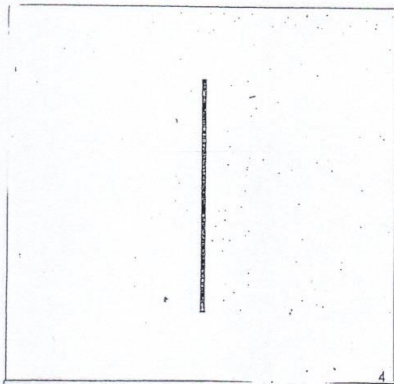
- Typically developing children, by the age of 6 or 7 years old, are fairly competent at writing legibly when instructed with a traditional handwriting curriculum.
- Note: However, more and more we are seeing typically developing children with delayed fine motor skills and decreased hand strength because they are not using their hands in ways that would strengthen their muscles. As a result we are seeing a variety of inefficient grasp patterns which affect handwriting and fine motor skills.

Geometric forms

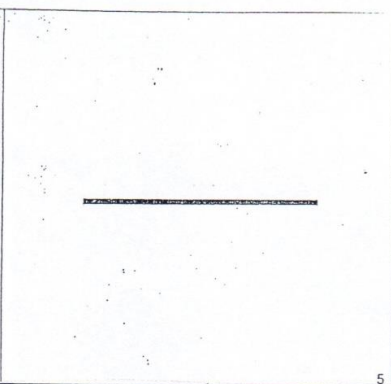
Some authors believe that Handwriting instructions should begin after the child is able to master the first nine figures in the Developmental Test of Visual-Motor Integration by Berry-Buktenica. (VMI)

Visual-motor integration or VMI can be evaluated as a factor in [child](#) development by providing the child with geometric designs ranging from simple line [drawings](#) to more complex figures and asking that the designs be copied. The construction skills used in the test have been shown to indicate visual motor [impairment](#), such as problems with fine motors skills of the hand and hand-eye coordination. The developers of the test, Keith E. Beery and Norman A. Buktenica, have established adequate norms for visual motor performance by children in various age groups. The test is considered especially useful to help evaluate children with other disabilities or disabling conditions. It can also be used for the evaluation of motor skills such as [handwriting](#).

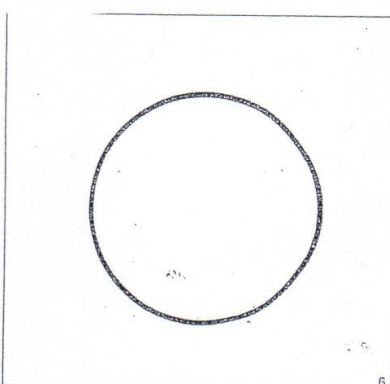
(Gale Encyclopedia of children's health. Answers.com)



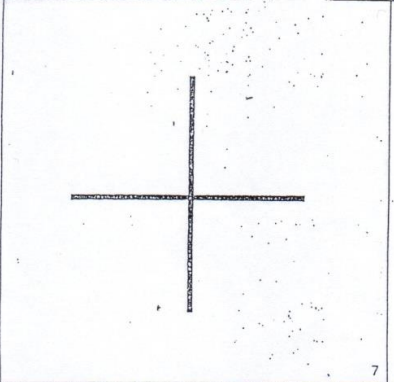
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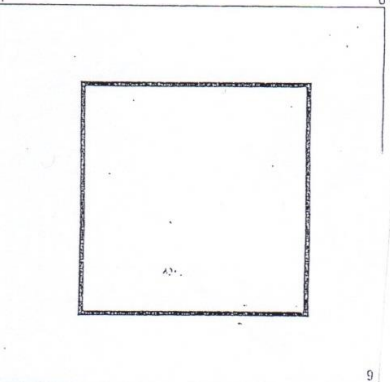
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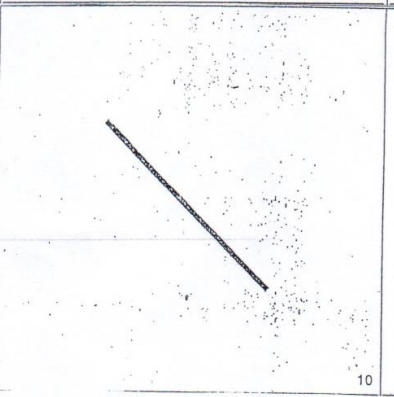
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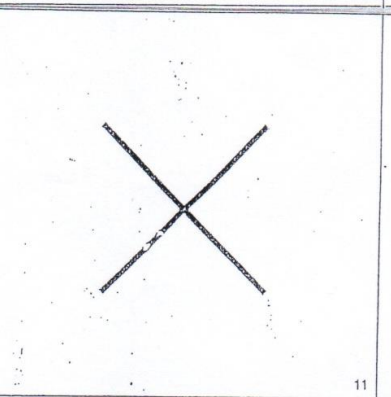
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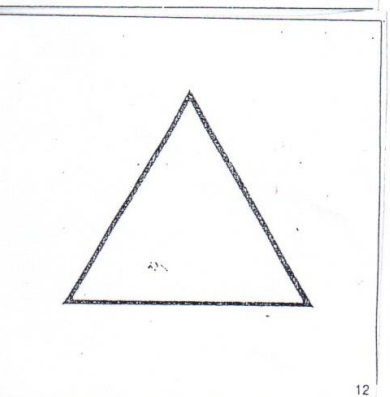
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10



11



12

PRE-STROKE, LETTER, AND NUMBER STYLE

Strokes — Pre-Strokes, Shapes, Letters, and Numbers

In preschool, children start to make deliberate single strokes with control. Some strokes are developmentally easier to write than others. * Children gradually develop their ability to copy forms in a very predictable order. The *Get Set for School* workbook teaches strokes to children based on the following order:



2-3 year olds

3-4 year olds

4-6 year olds

* Gessell, Arnold, and others. *The First Years of Life*. New York: Harper and Row. 1940.

Prerequisites to handwriting

Before handwriting instructions can begin, children must have the following

- Small muscle development
- Eye-hand coordination
- The ability to hold utensils or writing tools
- The capacity to smoothly form basic strokes such as circles and lines
- Letter perception, including the ability to recognize forms, notice likenesses and differences
- Orientation to printed language; which involves the visual analysis of letters and words and right-left discrimination

Maladaptive Grasp Patterns Seen in the Classroom



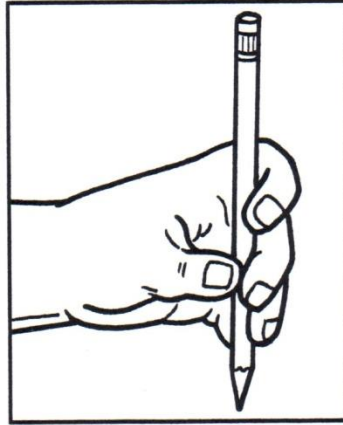
MALADAPTIVE GRASPS

A maladaptive grasp does not follow a developmental progression and should be corrected to achieve legible quality handwriting.

DESCRIPTION OF GRASP

7 POOR GRASP DUE TO LOW MUSCLE TONE

- Web space collapses
- Thumb appears unstable; joints in the hands are loose and maybe hyperextended
- Hand may appear stiff because of the attempt to hold the position

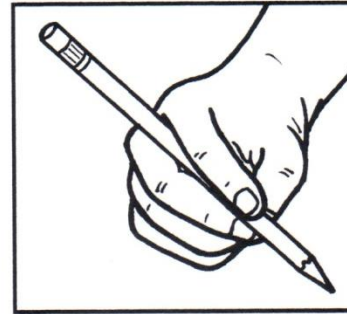


INTERVENTION

Work on a vertical surface to stimulate stability in the shoulder, arm, wrist and hand.

Work on all the above activities. Also, the student should be seen by an O.T. for specific intervention activities.

NOTE: An adaptation for the low tone grasp is positioning the pencil between the index and the middle finger. It is a more stable position and the intrinsic muscles are in a position to work.



DESCRIPTION OF GRASP

8 LATERAL PINCH GRASP

- Reduced to no web space; no thumb opposition
- Can have tripod or quadripod grasp



INTERVENTION

Develop web space.

Develop finger opposition.

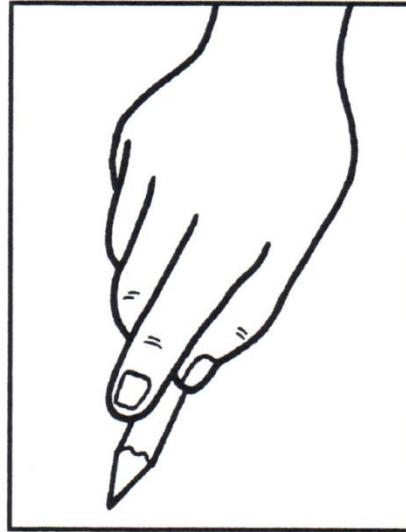
Develop thumb stability.

The student may benefit from a pencil grip (STETRO or TRIANGLE) to position the fingers.

DESCRIPTION OF GRASP

5 IMMATURE PRONATED GRASP (2 TO 3 YEARS)

- Wrist pronated (thumb down)
- Tool held with fingers
- No web space
- Arm moves as a unit



INTERVENTION

Develop wrist stability.

Develop web space.

Develop separation of the sides of the hand.

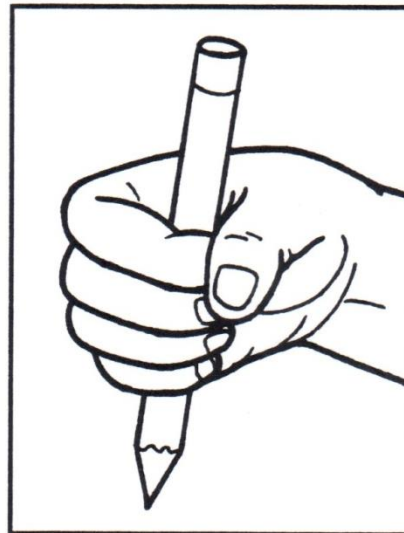
Develop a delicate touch.

Use of a vertical surface is helpful for encouraging correct wrist position

DESCRIPTION OF GRASP

6 POWER GRASP (1 TO 1 1/2 YEARS)

- Fisted neutral hand
- Wrist flexed
- Arm moves as a unit



INTERVENTION

Develop small muscles of the hand.

Develop wrist stability.

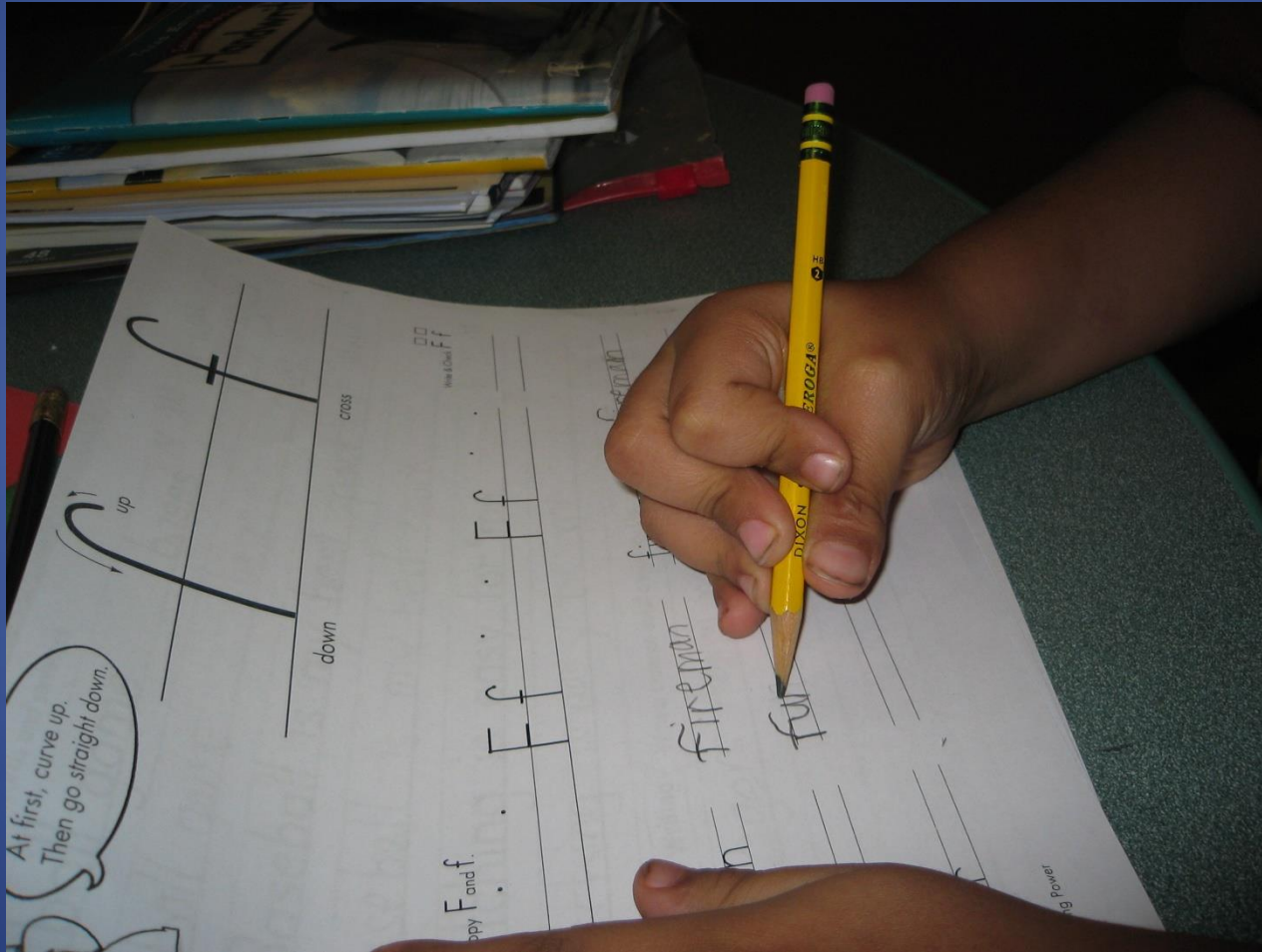
Develop arches of the hand.

Develop separation of the sides of the hand.

Poor pencil grasp



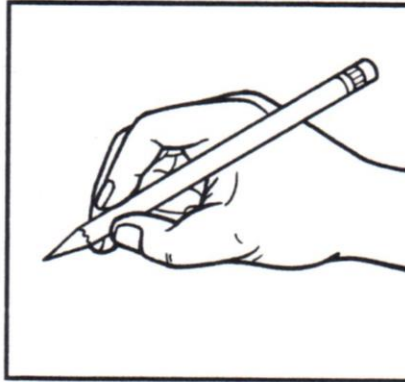
Poor Pencil Grasp



DESCRIPTION OF GRASP

1 MATURE DYNAMIC TRIPOD (4 1/2 TO 6 YEARS)

- Wrist extended up
- Grasp distal with opposition of thumb, index and middle fingers in a triad
- Open web space with thumb stable
- Fingers move during tool use



INTERVENTION

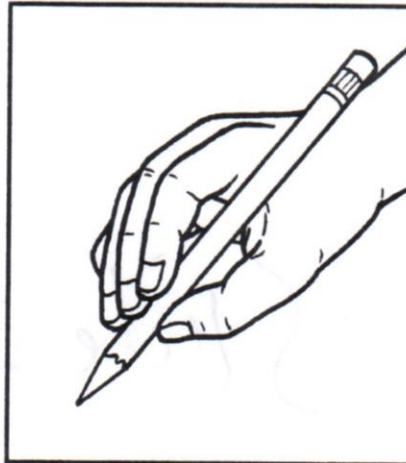
No intervention.
This grasp is optimal for precision and speed, combining biochemical advantage with sensory awareness due to contact with appropriate sensory receptors in the hand.

DESCRIPTION OF GRASP

2 DYNAMIC QUADRIPOD

A common alternate grasp using four fingers around the tool shaft. This provides more stability in the grasp.

- Grasp distal with opposition of thumb, index, middle and ring finger
- Open web space with stable thumb
- Fingers move during tool use



INTERVENTION

Helpful to introduce tripod position.

Develop separation of sides of the hand.

Equipment cues to form tripod grasp are helpful; STETRO GRIP or TRIANGLE PENCIL GRIP.

1. C A I N G O O N T S

2. cold

boat

boat

coll

or coffee

more

goes

or

goes

or

goes

or

hold

kind

hold

high kind

hold

high kind

road

high kind

road

show

more

show show

LET GO DOWN SIDE.

ONES

I WILL HAVE A ROCK.

THE CAR DRIVING DOWN.

MY FAULT SHOWS SKIN.

MY GREAT GOES FAT.

I AM BY THE TREE.

The role of the Occupational Therapist in the educational environment

Evaluation and remediation:

- Determine what is interfering with the child's functional performance to produce written text.
- Apply clinical reasoning skills to identify the performance components interfering with written communication, and determine why the child is struggling to write or has unreadable handwriting.

Performance components related to handwriting

There are 3 components that may be interfering with the child's functional performance to produce writing:

Sensori-Motor Component

- Sensory
- Neuromuscular
- Motor

Cognitive Component

- Attention
- Memory

Psychosocial Component

- Coping skills
- Self-Esteem
- Motivation

Sensori-motor components

Sensory

Tactile and Proprioceptive - grasp on writing tools.

Visual - scanning the printed line, focusing on formation of letters.

Kinesthesia - allows appropriate pencil pressure and directing writing tools.

Form constancy - discriminate between numbers, letters, similar forms b/d, saw/was.

Position in space - placing letters, words on the line, spacing between letters.

Visual closure - which letters have been formed completely

Sensorimotor components

Neuromuscular

Muscle tone – sustaining upright position, upper extremity stability and mobility.

Strength – ability to grasp and maintain consistency on writing tools.

Postural control – ability to make postural adjustments while writing in various positions.

Sensorimotor components

Motor

Crossing the midline – writing in a horizontal plane across the midline of the body

Bilateral integration – holding writing tools and stabilizing paper

Laterality – consistent use of one hand for writing

Praxis – capacity to plan, sequence and execute letter forms, arrange letters to build words

Fine motor coordination, particularly in-hand manipulation – moving the pencil between fingers

Visual motor integration – color within the lines, trace, reproduce letters and numbers.

Cognitive component

Cognitive skills required for handwriting include:

- Attending to a writing task over time
- Recalling letter formations and handwriting strategies over periods through visual, verbal, and auditory memories
- Generalizing of handwriting from practice in an intervention program to real-life situations, such as performing classroom assignments, copying a recipe and signing checks

Psychosocial component

- Psychosocial aspects to consider include the child's values and interests, self-regulation, self-concept, and coping skills. For the child who sees his or her handwriting as a continual visual reminder of inadequacy at school, will exhibit a loss of interest and motivation in producing written text
- Some students with poor handwriting tend to feel inadequate and their self-esteem suffers.

Handwriting intervention

The Occupational Therapist uses frames of references to determine therapeutic strategies for remediating handwriting problems.

Neuro-developmental frame of reference

Postural control, muscle tone, joint stability, proximal stability

In this frame of reference the emphasis is on preparing the child's body for handwriting for about 5 to 10 minutes before the instructional program.

Weight bearing on hands wheelbarrow walking



Weight bearing on one hand and working with the other



Propelling scooter board with hands



Pushing against resistance



Crab walking



Strengthening shoulder abduction and adduction



Tug-O-War for Grip Strength



Heavy work

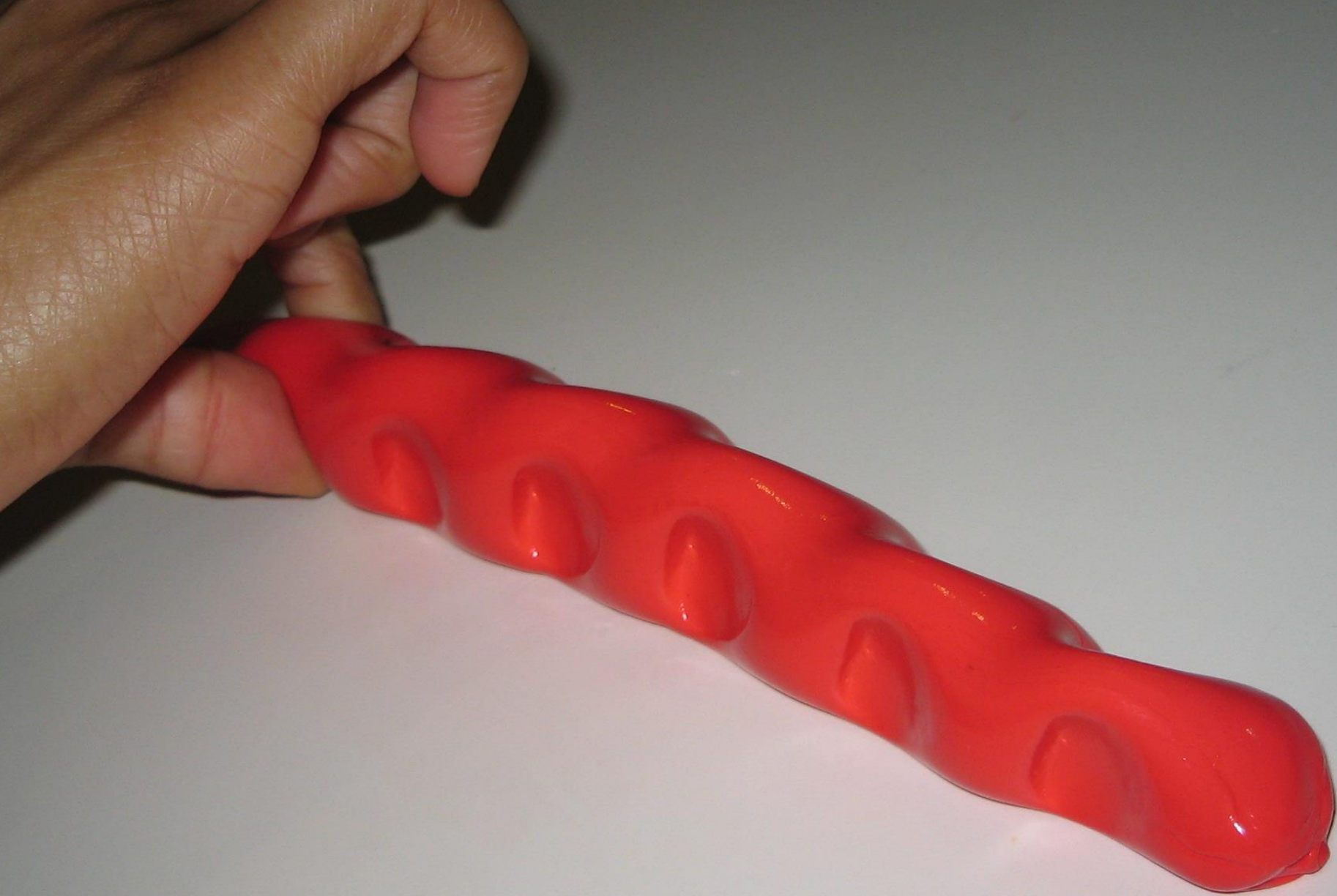


Hand and Finger Strengthening Exercises



Pulling resistance toys

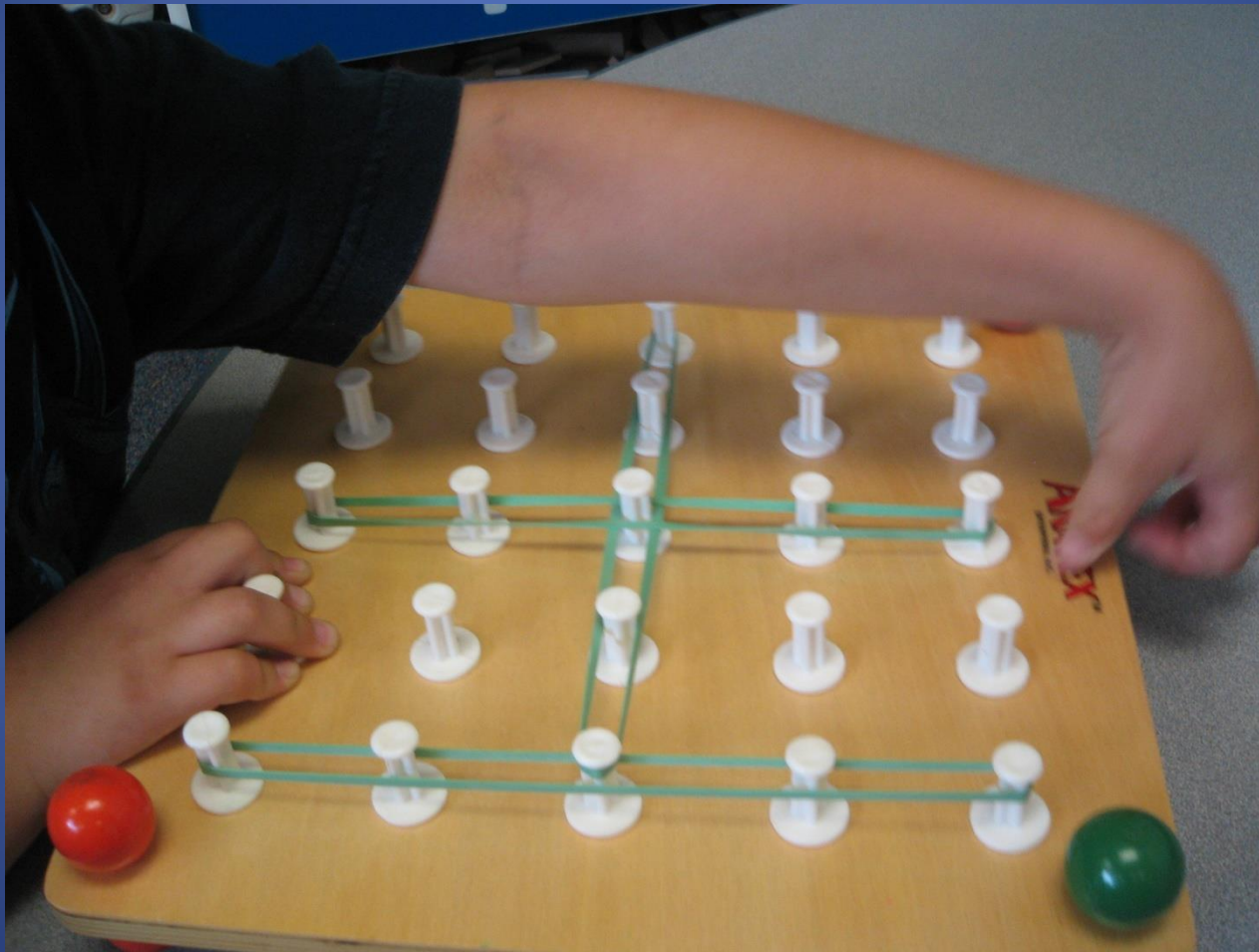


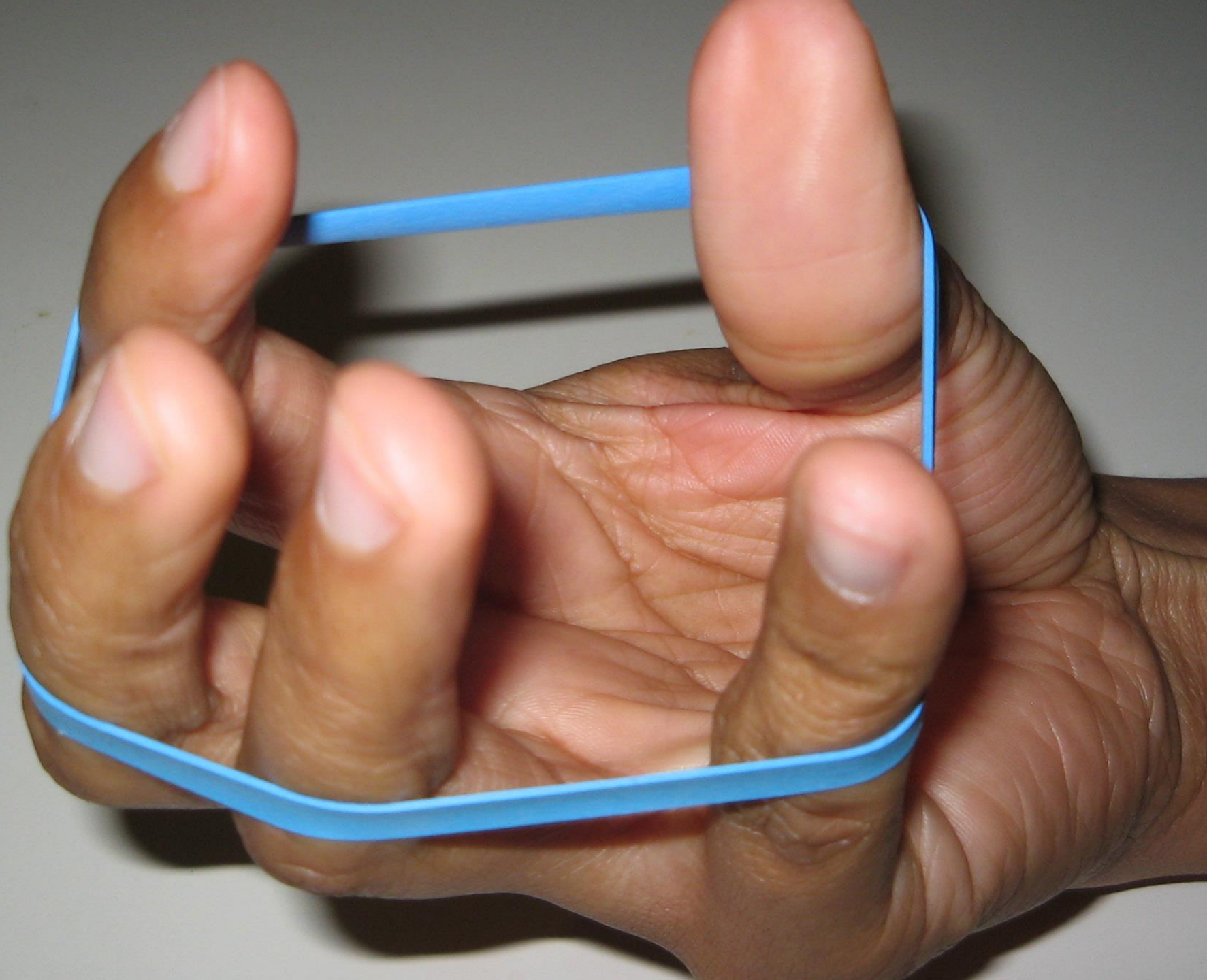


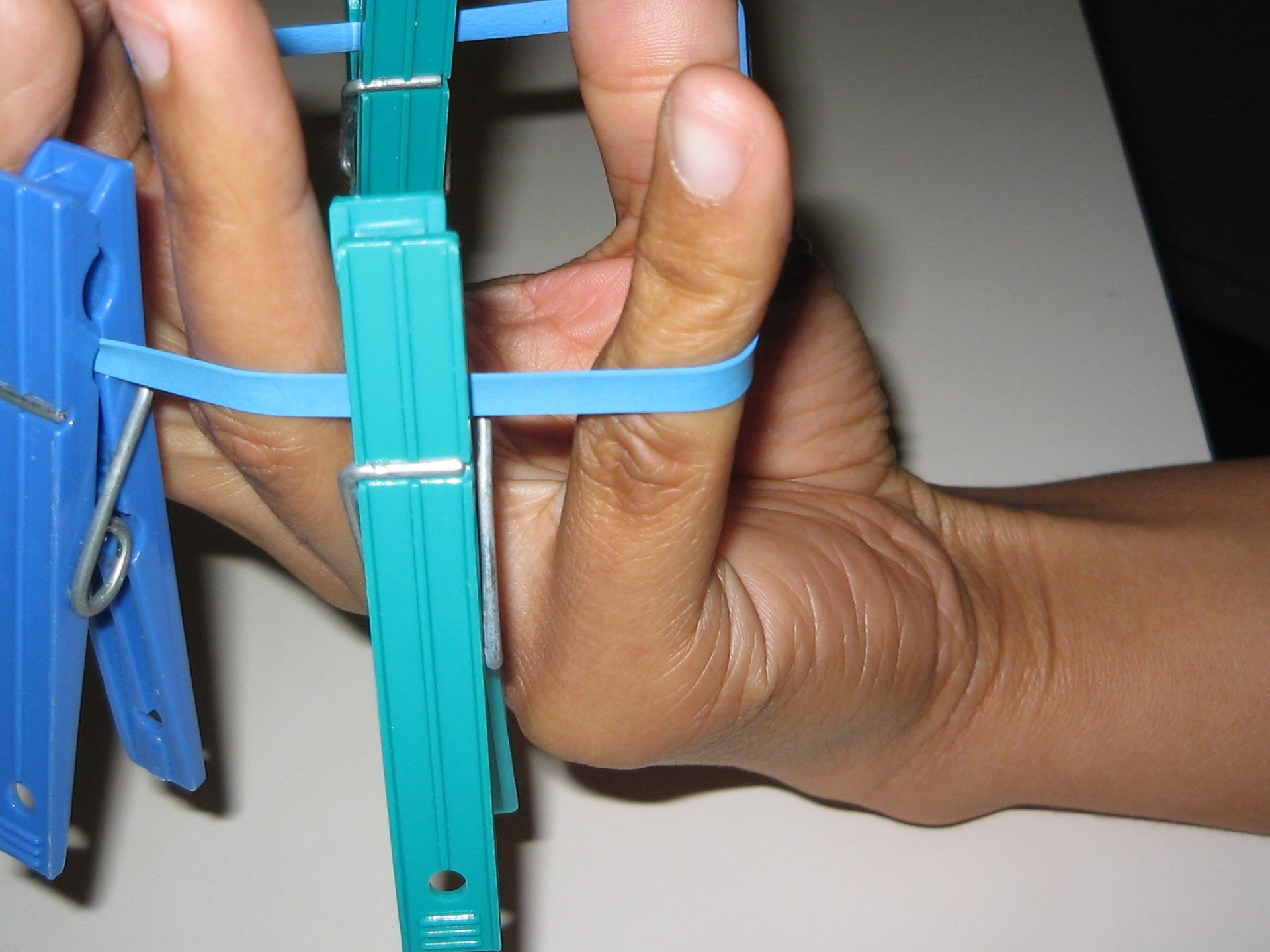




Finger strengthening with rubber-band board.



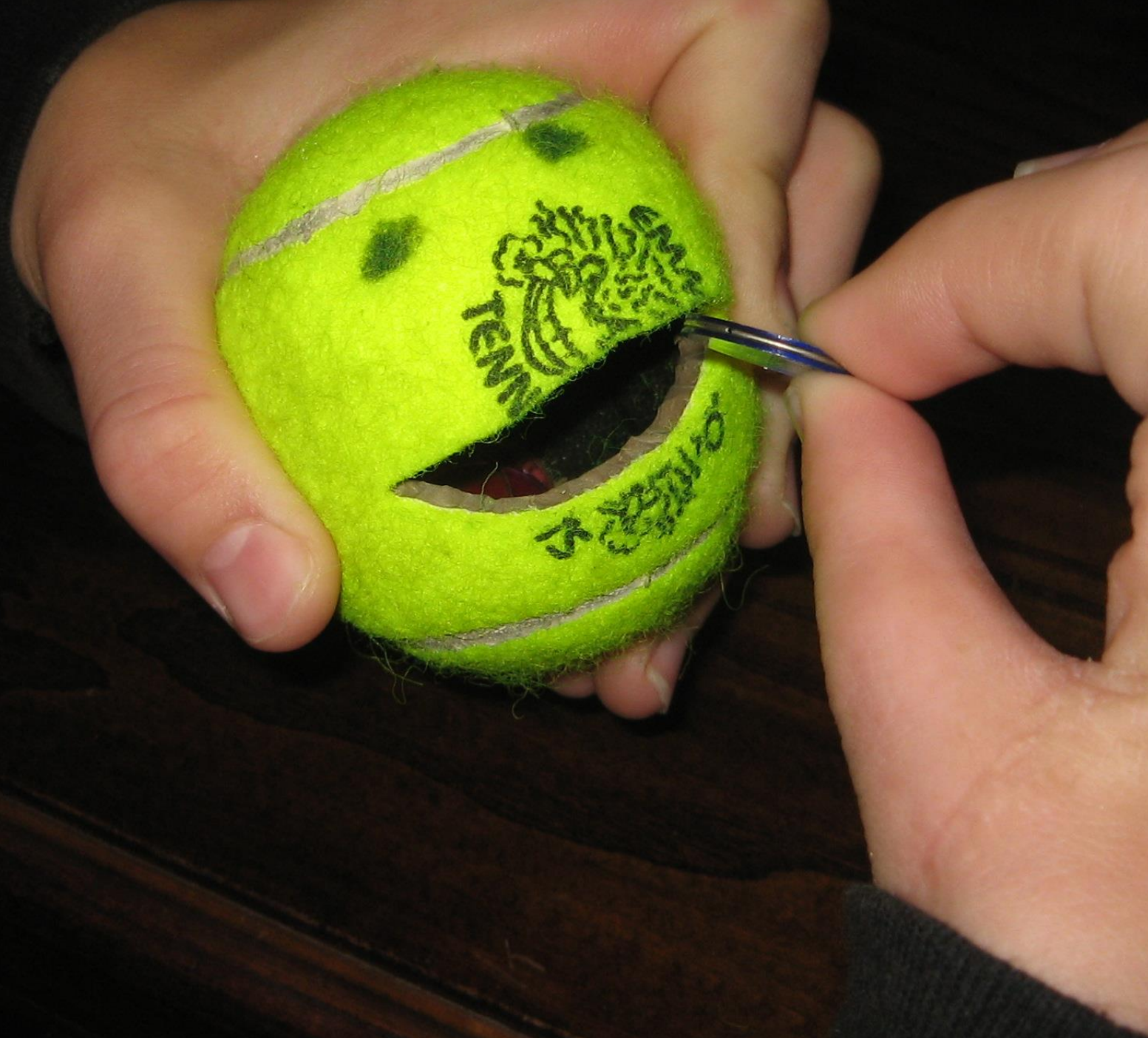




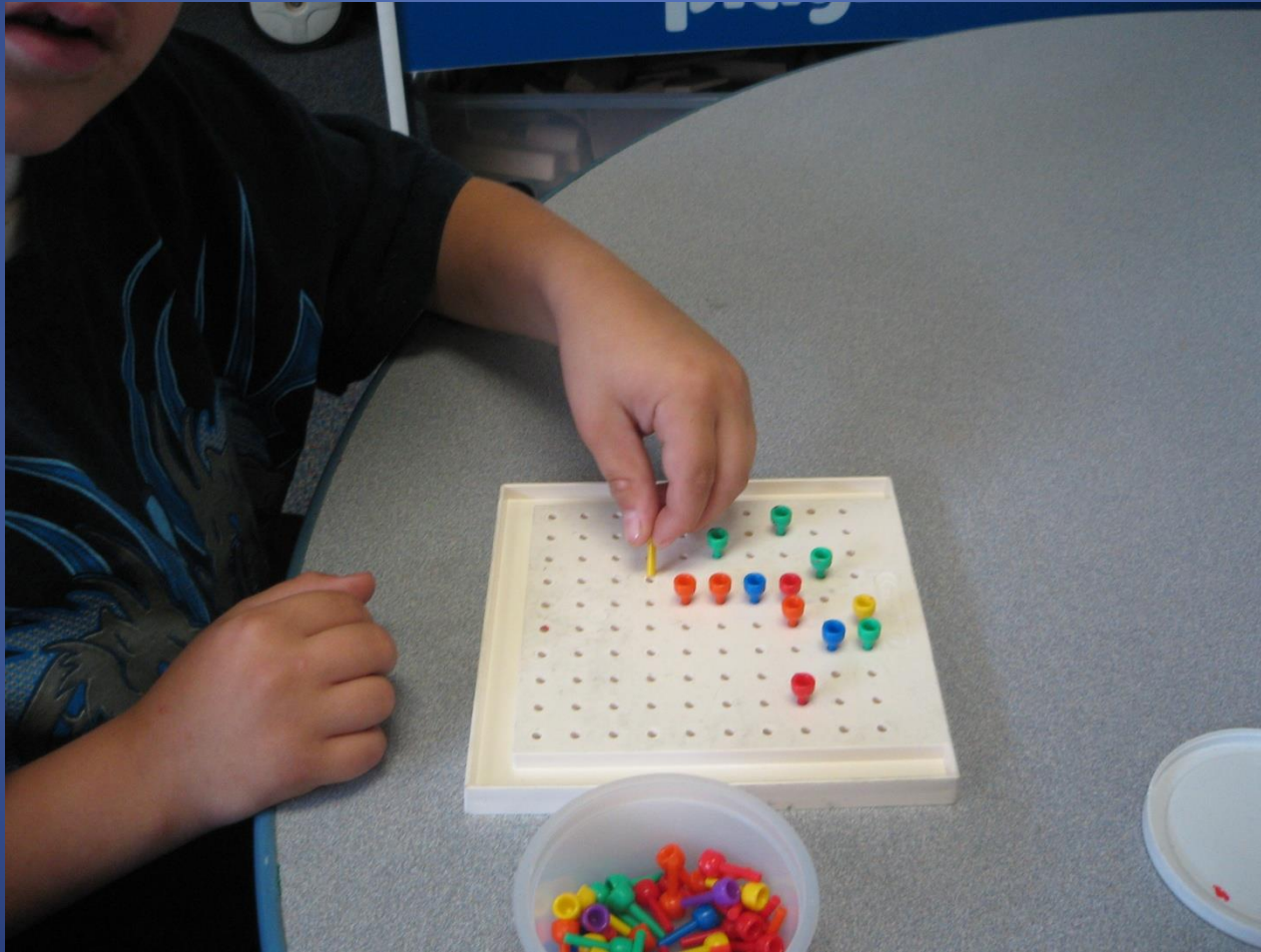








Strengthening the pincer grasp





Sitting Posture for Writing

If you write with your  right hand . . .

Sit up tall.
Keep both feet on the floor.



Keep your paper straight.
Put both arms on the desk.
Pull your pencil toward the
middle of your body.
Use your left hand to move
the paper.



Hold the pencil like this.
Do not squeeze the pencil
when you write.

Writing Positions

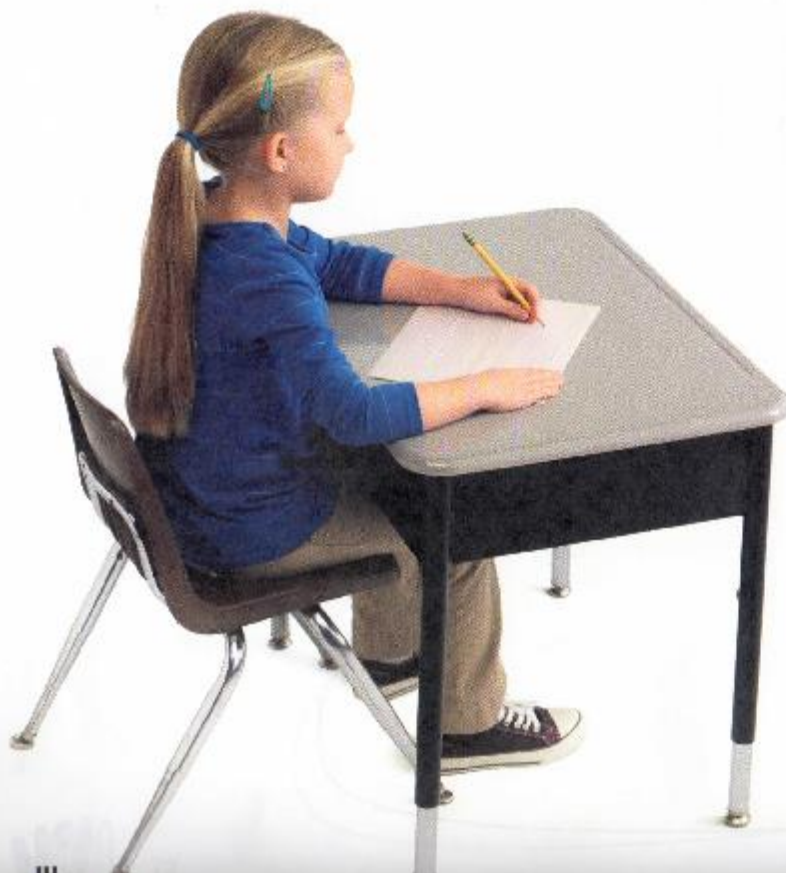
If you write with your



left hand . . .

Sit up tall.

Keep your feet on the floor.



Slant your paper.

Put both arms on the desk.

Pull your pencil toward your left elbow.

Use your right hand to move the paper.



Hold the pencil like this.

Do not squeeze the pencil when you write.

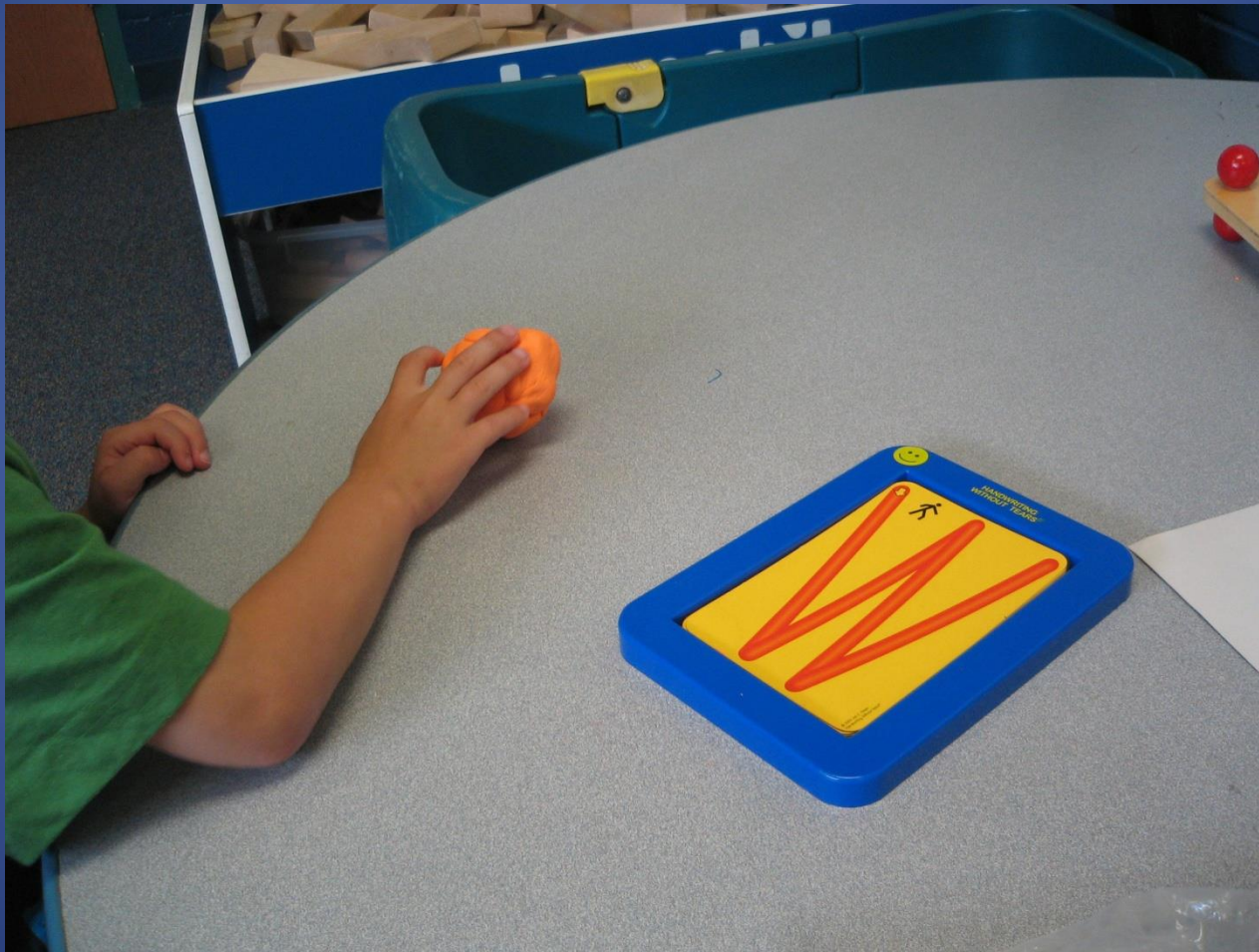
Weak abdominal muscles “I’m Stuck”



Weak abdominal muscles: W-sitting



Example of weak hands: difficulty rolling play-doh into thin strips.



GOOD POSTURE CAN BE FUN

Arms and Hands

Here are some warm-ups that children enjoy.



Push palms



Pull hands



Hug yourself tightly

Total Posture – Stomp!

Stomping is fun and really works! Students' feet will be on the floor and parallel in front of them. The arm movements make their trunks straight. The noise and chaos let them release energy, but it's under your control. When you have them stop stomping, they'll have good posture and be ready to pay attention. Use stomping a few times a day.

Directions

1. Sit down and show the children how to stomp their feet and wave their arms in the air.
2. Have them shout, "Na, na, naaah, na, na, naaah," with you as they wave and stomp.



The Stomping Game

Use *Stomp Your Feet*, Track 10, from the *Rock, Rap, Tap & Learn* CD.

Directions

1. Children push their chairs away from their desks to get ready.
2. Sing and follow along with the music and movement.



Head and Shoulders

Do this activity any time you find your children sagging.



Raise shoulders up



Pull shoulders back



Let them down

Handwriting intervention

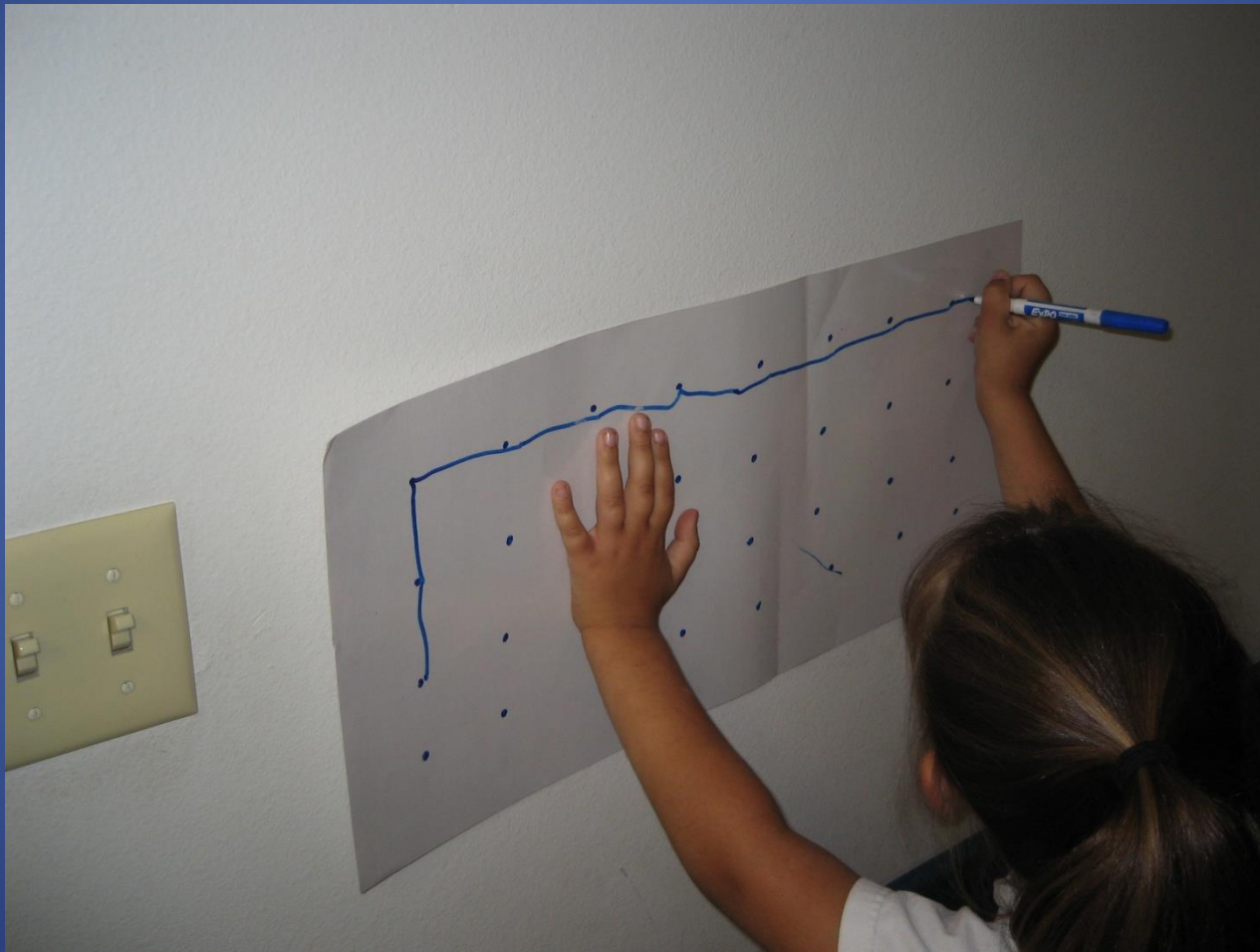
Sensory frame of reference

Changing the writing tools: for example, using vibrating pens, weighted pens, or chalk

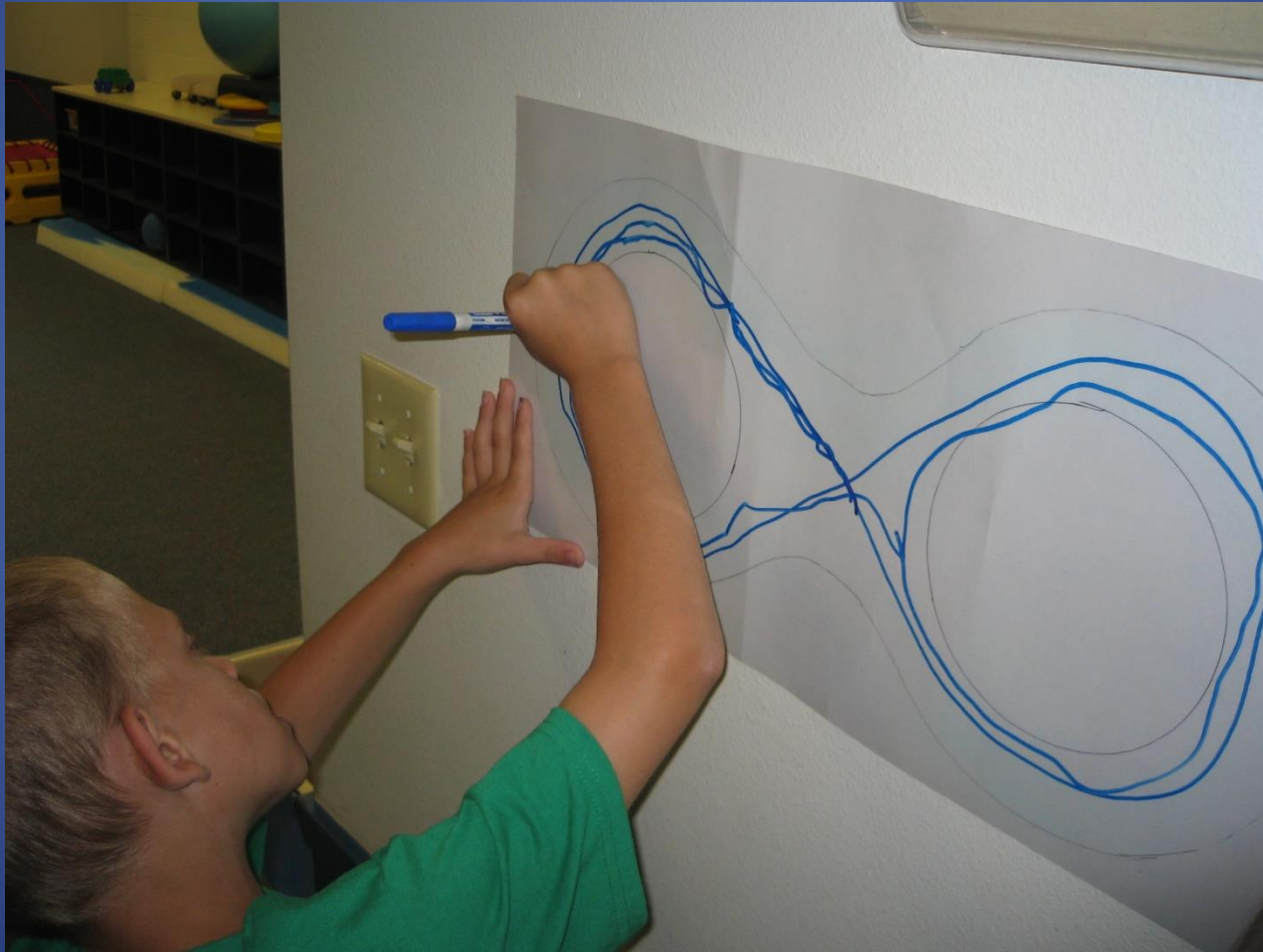
Changing the body position: for example, the child lays on his/her stomach on the floor to write
Standing to write increases level of arousal, full extension of the trunk

Changing the surface of writing: for example using chalk mats, trays of sand, textured wall paper, laminated poster board.

Writing on an elevated surface (printing/visual tracking left to right)



Crossing midline with crazy 8







Handwriting intervention

Acquisitional frame of reference

Handwriting is a motor skill that can be improved through practice, repetition, feedback, and reinforcement.

Use handwriting programs:

The learning progression is modeling, tracing, copying, then writing letters and words from memory. Handwriting programs address spacing, size, alignment, letter forms.

Zaner-Bloser

Handwriting



TEXAS EDITION



Zaner-Bloser

Handwriting



AMPLE COPY
Classroom Use
able

K

Name: 2

Handwriting Without Tears®

Handwriting Without Tears®

Name: K



Handwriting Without Tears®

GET SET FOR SCHOOL



NAME _____



Coloring, Drawing, Singing, Counting, and
School Readiness

When to teach upper & lower case letters

Upper case letters should be taught in Pre-K

Students see upper case letters in their world on signs everywhere, so it is easier for them to recognize these letters.

Upper case letters are easier to write because they always start at the Top.

Start with straight line letters first.

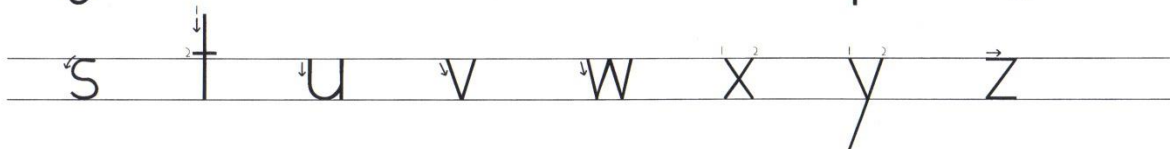
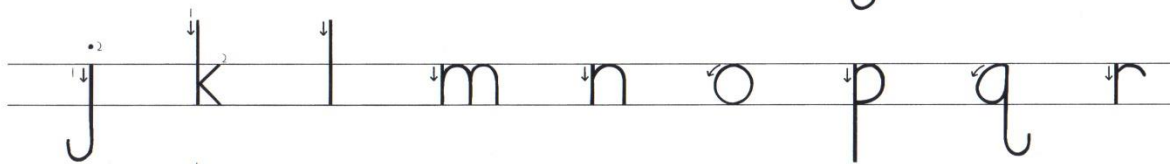
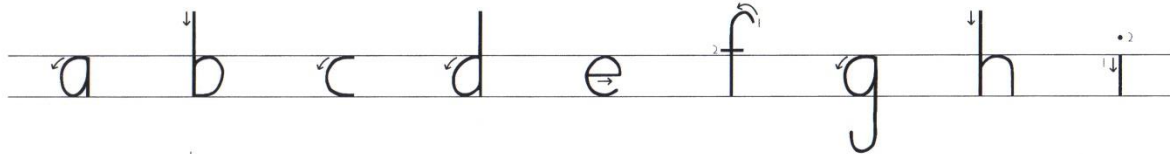
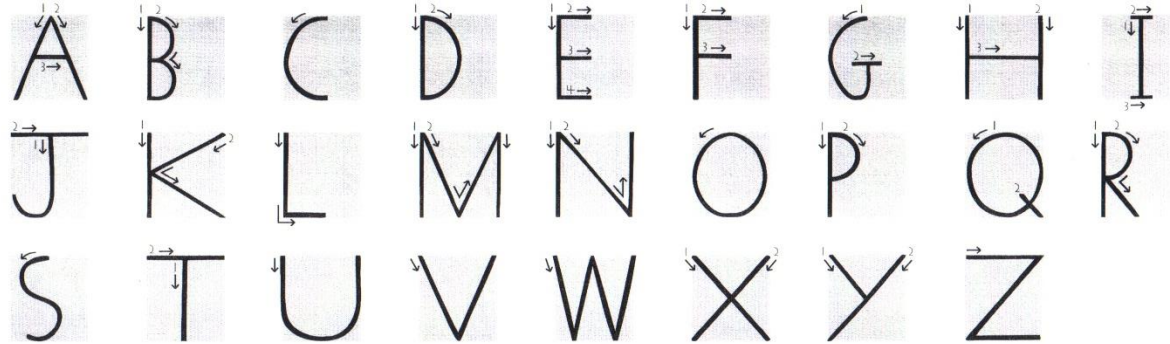
Lower case letters should be taught in Kindergarten

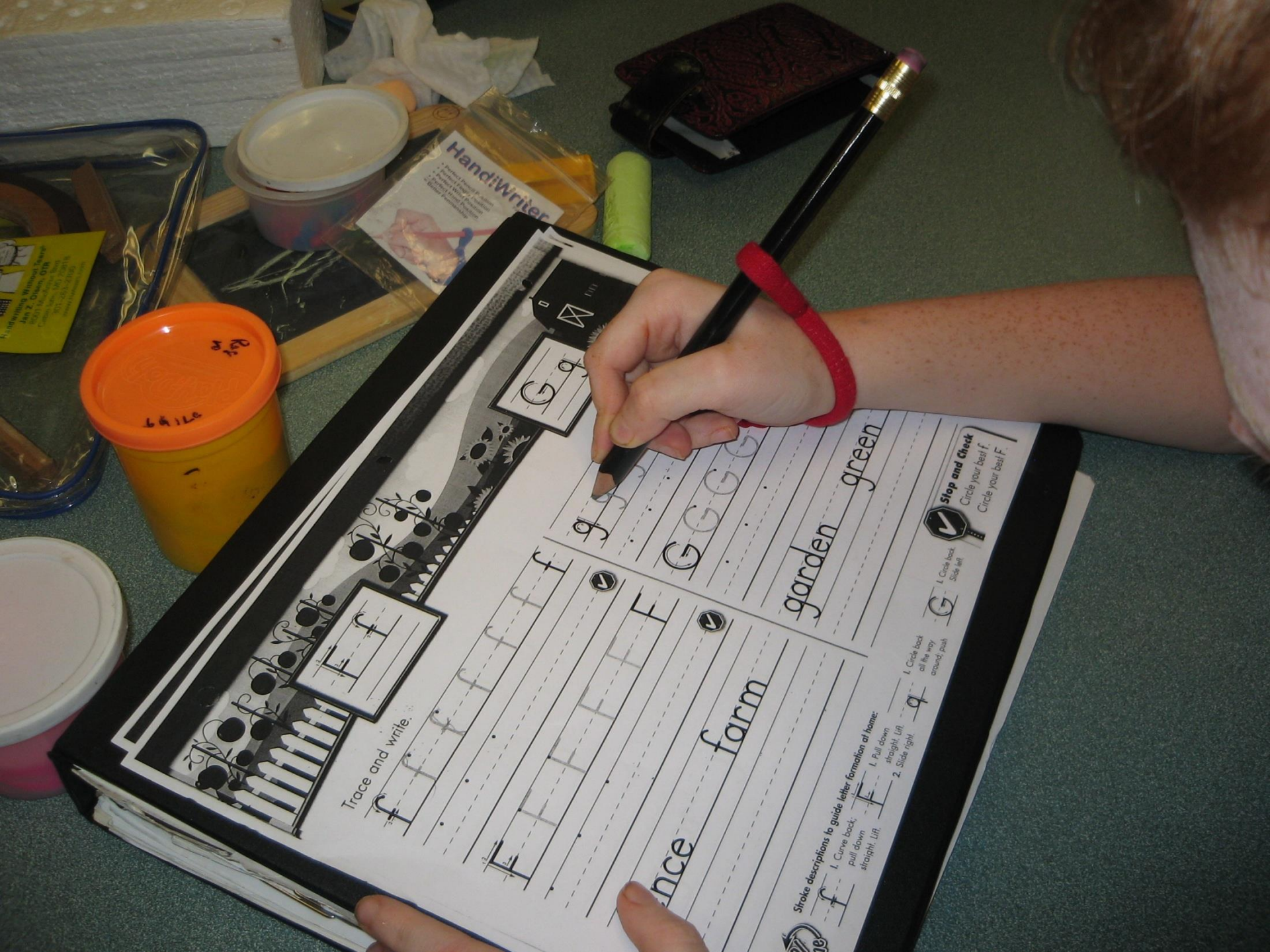
- Students are ready for the changes in the letter forms,
 - * tall letters
 - * short letters
 - * descending letters

Handwriting without tears

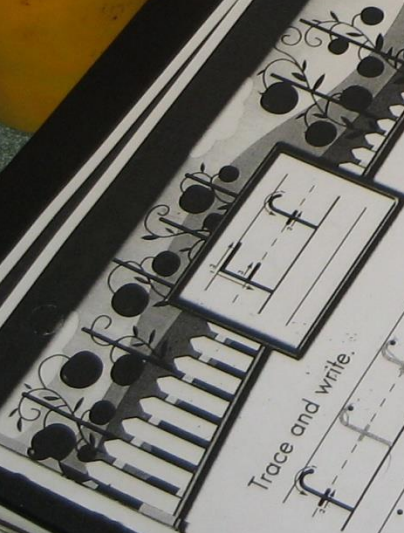
Capitals, Lowercase Letters

Capitals, Lowercase Letters, and Numbers





Trace and write



f f f f f f f f
F F F F F F F F

ance farm



g g g g g g g g

garden green

Stroke descriptions to guide letter formation at home:
f 1. Curve back; pull down straight. UR.
F 1. Pull down straight. UR.
2. Slide right.

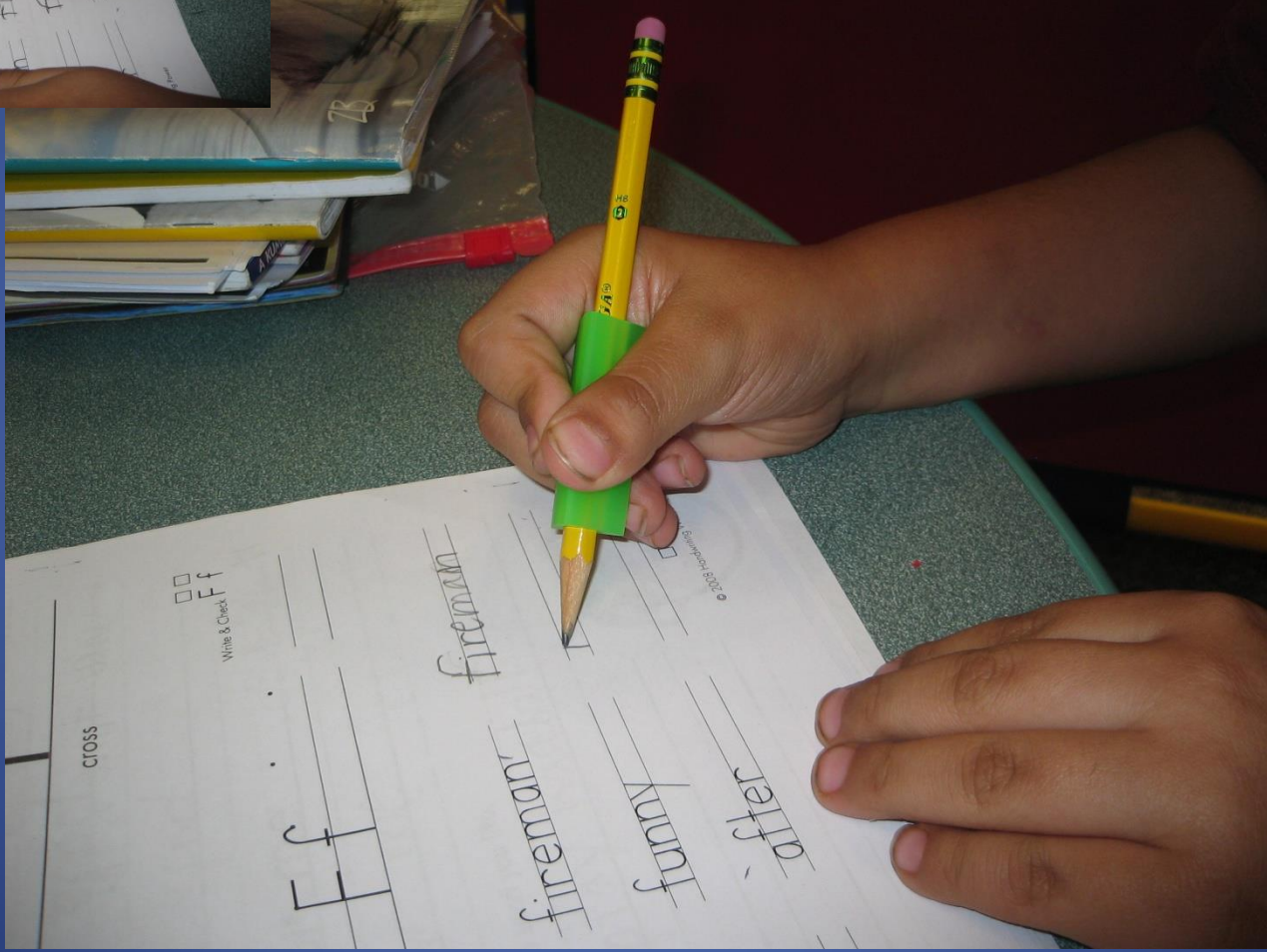
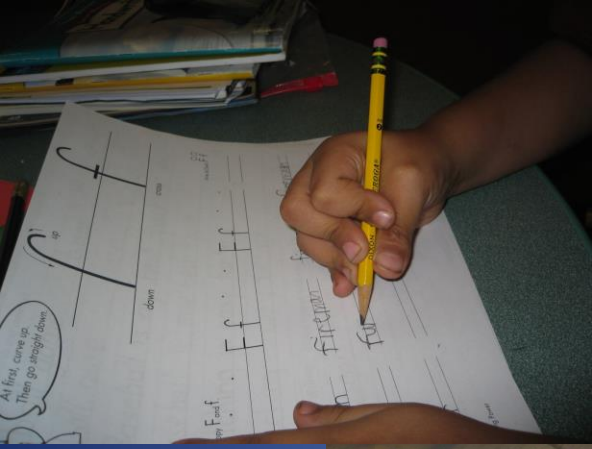
1. Circle back all the way around push

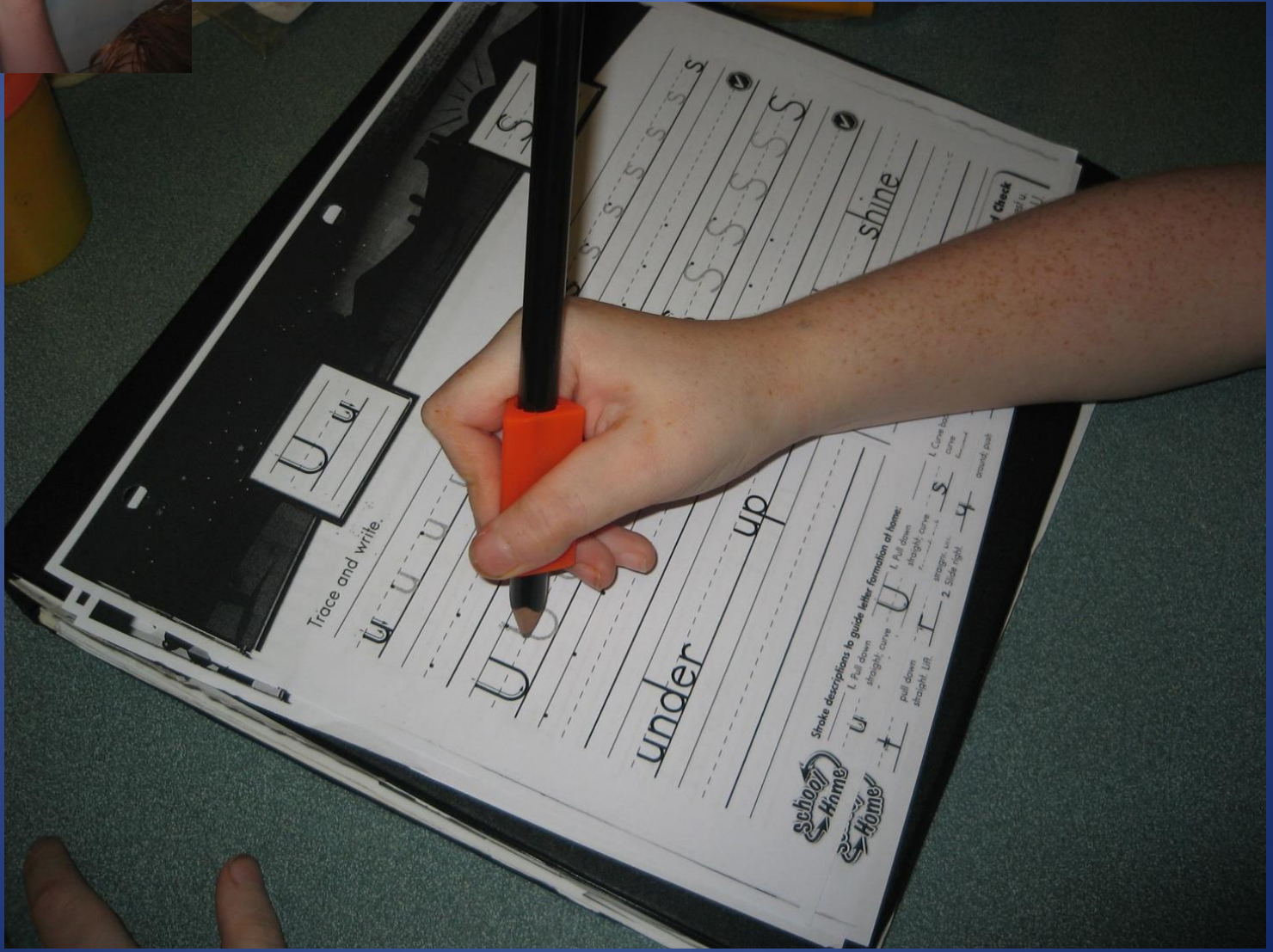


1. Circle back Slide left



Stop and Check
Circle your best f.
Circle your best G.





The Handwriting Process

The Handwriting Process

THE INTENT TO PREVENT

Good handwriting skills result from your thoughtful attention and instruction. Students require deliberate instruction to develop good habits and overcome bad ones.

With this guide and HWT materials, you will be prepared to help students make writing a natural and automatic skill. You'll find that their handwriting abilities and habits vary. Regardless of where they start, you can help them develop and improve their skills:

Teach

How to hold the pencil correctly



Letters/numbers that face the right way

3 cats

Letters/numbers that start at the top

top

Letters/numbers that are formed correctly and consistently

10 right

Fix

Awkward pencil grips



Reversals

E cats

Starting at the bottom

bottom

Incorrect letter/number

9 wrong

Follow Up

- Classroom Screening for Fine Motor difficulties in Kindergarten and 1st grade
- Provide strategies for remediation
- Classroom Screening for handwriting difficulties in Kindergarten and 1st grade
- Provide strategies for remediation

Thanks for your time and attention

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