

# Written output suggestions for gifted children and visual spatial learners

Lesley Ansell-Shepherd



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**Introduction** I have two sons who are visual spatial learners [http://www.gifteddevelopment.com/VSL\\_List.htm](http://www.gifteddevelopment.com/VSL_List.htm) They are highly to exceptionally gifted children, but they have both had difficulties with written output. As this has also occurred with other males in the family I have put together information on our family's experience in the hope it will help other parents of gifted visual spatial children, or gifted children with written output disorders or dysgraphia (Id online website [http://www.ldonline.org/ld\\_indepth/writing/dysgraphia.html](http://www.ldonline.org/ld_indepth/writing/dysgraphia.html) ) as written output disorders may be labelled.

**Visual Spatial Learners** Linda Silverman has pioneered the concept of the "visual-spatial" learner, a child who does extraordinarily well on tasks with spatial components; solving puzzles, visual transformations, mazes etc., but who has difficulty with sequential computational problems, spelling, planning steps, and mastering the sequential skill of handwriting among others. These students can have extreme difficulty in elementary grades, where handwriting and neatness are the main route to interesting projects and good grades. As an individual who's natural tendency is to work in a visual -spatial form (as a landscape designer) but who mastered sequential school tasks easily, I have searched for means to help my children with written output issues.

**Resources** In my search for answers and aids, I have found certain people and resources extremely helpful. **Dr. Janice Booth**, wrote a pamphlet on Written Output Disorders for the Children's Hospital of Vancouver, and credits much of her work to the work of Dr. Mel Levine.

**Tony Buzan** has a number of books to teach memory and sequencing skills, including mindmapping ©

**Ron D Davis**, who suffers from Dyslexia, wrote a book about his dyslexia , *The Gift of Dyslexia* , Berkeley Publishing Group, 1997 which had much interesting information and several exercises I used to try to explore my son's large motor skills development.

**Jeffrey Freed**, whose work as a tutor for ADHD and ADD children led him into contact with Dr. Silverman, wrote an exceptionally useful book, *Right Brained Children in a Left Brained World* <sup>1</sup>, Jeffrey Freed and Laurie Parsons, Simon and Schuster 1997. Although Freed subtitled his book *Unlocking the potential of your ADD child*, he has extensive experience working with Dr. Linda Silverman and gifted children as well. His techniques can be applied to gifted children with written output and visual spatial learning styles. Many of his techniques for working with visual spatial learners in writing, spelling and math follow in this article. Please refer to his book for detailed information.

**Sheila Herman** has written a resource guide for teachers in the Vancouver School District *Recognizing and Dealing with GLD Elementary Students* which has helped clarify issues for teachers.

**Dr Linda Silverman** of the Gifted Development Centre in Denver, Colorado, focuses on issues related to this learning style, information is available from her website <http://www.gifteddevelopment.com>

**A Personal History** In my family there are those who write neatly and those whose writing is illegible. Those with the worst handwriting have some unusual skills as well, we can move items in space, in our heads. This has always been a source of frustration when trying to explain to the family members who do not have this ability, why a planned window or doorway must go exactly there! Interestingly, those of us who have this spatial ability are also essentially ambidextrous, although some choose to use their right hands and some their left. When I realized my children shared my spatial abilities, I was relieved that they would understand me.

Coming from a family with right, left and ambidextrous members I was not concerned when my children demonstrated no special preference. My children read before they entered school, read fast and well. Our family also has a history of deep readers so that was not an unusual pattern for us. Both children were good learners.

In their pre schools, (starting age 3) both our sons were extremely reluctant to use pencils, although they happily used certain textures of paint and large ball shaped or block shaped crayons. The main issue with the pencils related to how they sounded and felt used on paper. Children's felt pens were similarly despised for the sound they produced, but artist's brush felt pens, a far more difficult medium to use, were used well by both boys. Pens were "hard to hold" and writing or printing was "too slow for my ideas". We left them to what we assumed was normal development. Their fine motor skills were exceptional for their age, both able to use tiny screws and screwdrivers with clocks, and Meccanno® sets while less than 5 years old. Problems began for both of them in grade 1 of public school, when their mental abilities and comprehension of math, English, reading, far exceeded their ability or interest in written output. With help they are both functioning well beyond their grade levels, but useful or appropriate help was very difficult to find.

**Written output disorders** involve a number of factors. For many children there may be difficulty with integration of verbal memory, motor skills, visual and auditory sequencing, spatial organization and perception among a host of other issues. Although we found the diagnosis and assistance of an occupational therapist very helpful in assessing possible difficulties for our sons, we found many of the issues related to their giftedness, coloured the process and the "treatment" considerably. Occupational therapists talk about modification, adaptation and remediation in their approach to written output difficulties. Below are some of the ways we employed these strategies to work with our children.

**Output frustration** was at the root of our sons unwillingness to write. As gifted children they had exceptionally clear memories and very high standards for what they wanted their work to represent. Their ideas were often very complex and involved concepts outside of their teachers or classmates knowledge or experience, concepts which adult draftsmen could not display to their satisfaction. Additionally they both have Dabrowski's sensorial overexcitability (<http://www.ocsc.com/hoagies/overex.htm>) to a high degree, and this limited the tools they were willing to use to express themselves.

**Spatial and sequential issues** and motor memory, as well as information processing speed seem to be related to many forms of written output disorders in gifted children. Letters and their shapes may not have a particular place on the page. Letters (or numbers) may be reversed or out of order. If children can form the letter correctly, they may ignore space between words or sentences. A child may be able to copy instructions in the same plane of his writing, but may be unable to copy those instructions accurately from the board. I'm not able to write fast enough to keep up with my thoughts! is a common complaint among gifted children, whose vocabularies may be 5 or more years above their spelling or writing ability, and who may be interested only in gathering and discussing important facts, not in whether the pig and the spider lived happily ever after.

**Clear communication** needs to be fostered between the child, the teacher and the parent in an effort to help lessen the problem of reluctant writers. Despite clearly reported knowledge of the child's written output issues, many teachers still seem to feel an intelligent child, especially a verbal child, can spell or write properly if they put their minds to it. My eldest son quietly protested about required daily journal entries, his journal for four months reads: Today I must write in my journal. Yesterday I had to write in my journal. Tomorrow I will write in my journal, repeated in a three day cycle. His teacher never questioned his unwillingness to participate.

Talk frankly to your child and their teacher about the need to separate out a mark for knowledge from a mark for product. A child who repeatedly fails written spelling tests may not benefit from rote repetition of words he can spell orally. A child who can read adult textbooks, may despise writing assignments based on talking animals.

My children would know the material but the speed their brains work at would cause them to lose track of what they were writing and huge parts of sentences would be missed. Other times they would misspell a word because they were concentrating on forming the letters, not spelling the word. They could spell words correctly but repeatedly failed spelling tests where words had to be written in a sentence. They could not write fast enough. Math tests had to be enlarged 400 or more percent to allow them enough space to form numbers and put them down in order. My sons were doing rapid math correctly in their heads and were happy just writing the answer, unfortunately their teachers, who lacked understanding of their abilities, were not happy with answers alone. When forced to show your work the children often got the wrong answer due to the writing process. They would choose impossibly difficult (but of interest to them) subjects for assignments, then suffer enormous frustration in producing an acceptable product for a mark. (The hydrogen bomb and its differences from other atomic bombs, was one grade 5 French immersion choice.) All of these issues contributed to poor self esteem and frustration that overwhelmed demonstration of their abilities.

Ask teachers to award marks based on various components of the assignment \_\_\_/10 for content \_\_\_/10 for presentation \_\_\_/10 for research \_\_\_/10 for original thought or creativity \_\_\_/10 for organization

Then discuss with your child why a perfect mark in presentation is unlikely but that better organization would give them an improved mark next time. Praise your children for clear expression of their concepts and ideas. Avoid praise for how a paper looks, but help them use tools that will aid their success (white erasers (especially pencil shaped in a holder), erasing shields (drafting stores), drawings pasted in instead of done directly on the page, transfer techniques for drawings, graph or grid paper for math, computer software for reports, spell checkers.)

## What I would do if I had a third child to get through this process

- I would adapt drawing and colouring materials for a sensorially overexcitable ( <http://www.ocsc.com/hoagies/overex.htm> ) toddler. Whiteboards and dry erase pens on the wall for large motor movement, artists quality brush markers, tube watercolours, calligraphy and gel pens for artistic expression and fine motor control without the complaints about texture and sound. (many young gifted children have hearing and touch abilities well beyond the expected range)
- I would play much more with cornmeal on a plate starting very early (2 or 3) to teach cursive letter formation. Or use fine sand in a frame (a miniature Japanese sand garden) both of which can be shaken gently to cause the letters to disappear.
- I would start formal drawing instruction at age 3 or 4, from Mona Brookes' book Drawing with Children , (Jeremy Tarcher, inc. Los Angeles) so my children would have tools to express their advanced ideas.
- I would try to spend more time on slower methods of expression; poetry and songs and attempt to encourage less time on fact collection (may be futile with gifted children).
- I would be aware that primary teachers rarely use reading material of interest to gifted boys and would make sure Roald Dahl's chapter books, (<http://www.roalddahl.com>) especially his book for dyslexics, The Vicar of Nibbleswick, and fact and reality based books with high reading levels were available in primary classrooms.
- I would demand far more understanding and adaptation from my children's teachers and would remove children from poor situations as soon as possible.
- I would insist on adaptive processes and marking as soon as possible to allow my children to separate their expression of knowledge and understanding, from the process of writing.

## Issues that came up and how we worked through them with our children

**Writing posture and pencil grip** Our sons have to move when they think, which creates problems for handwriting. We found that at home, we could alleviate this problem using large exercise balls, (also sold in a seat form through Jocus toys in Canada) as a form of seating which allowed them to softly bounce in place, but which prevented poor posture as too much movement or lack of a centred position would cause them to slide off. At school we settled on seat cushions which supported proper posture, especially when desks were the wrong size.

We used the largest soft bulb pencil holders we could find to help improve our children's grip, when even this was problematic (they hated the sound and feel of pencils) we shifted to using gel pens with soft built in grips and taught our children to neatly cross through spelling or letter formation mistakes. (at least using this method, teachers had a sense of how much effort was going into the writing process, when they erased they were simply labelled messy.)

We tried a number of arm postures and discovered that at school, other objects on the desk often interfered with holding the page at the correct angle for writing. At home we created a portable sloped writing surface. (When I went to school we still had dip pens and sloped desks. This probably stopped me from cluttering up the surface and forced me to learn to anchor pages properly to prevent paper from slipping.) Embarrassment about the "look" of their writing also caused strange arm postures when the children tried to hide their work.

**Writing Tools** Many gifted children complain of the sound or "texture" of pencil lead on paper. Try a variety of writing implements, from carpenter's pencils, regular pencils with soft shaped finger grips, artists pencils (higher numbers), felt pens, calligraphy (chisel tipped) felt pens, brush felt pens, large bulbous ball point pens, large format gel pens with soft writing grips. For many gifted children gel pens are preferred because they flow smoother and with less sound than other writing implements. Don't worry about needing to use pencil to allow the erasing of mistakes. Pencils involve other issues such as pressure, angles and sharpness which complicate the writing process more than pens. Establish a rhythmic writing style and worry about correcting spelling mistakes once written letter formation is more automatic.

## What comes first? Printing or Cursive Writing?

Multidimensional visual orientation also makes him more prone to errors in copying letters and numbers, he may reverse them or write entire words backward...It's very difficult for a right brained child to do more than one thing at a time. As he struggles to translate pictures into words and to form letters, spell and punctuate, his mental picture becomes distorted. (Jeffrey Freed<sup>1</sup>) ... Left brained people think in symbols and words, so they experience very little difficulty in translating their thoughts onto paper. ... Several studies have shown that while the skills that govern drawing and even cursive and calligraphy originate primarily from the right hemisphere, printing is a left-brained task. (Jeffrey Freed)

Cursive writing is much easier than printing for children who have difficulty with starting directions for letters. These children find linking letters is easier than trying to space each part of a printed letter separately. Memory of letter formation for cursive writing seems to be easier if you use a cursive teaching method which groups the types of letter formation, although some children find it easier to link the letters if they write in time to music with a steady beat.

The main issues with teaching children in kindergarten or grade one to write rather than print, revolve around what they commonly see in the classroom. Books and the items on the board will be printed. If children are being taught cursive writing from the beginning to help with letter formation, they need clear examples of small and capital letters, taped to the top corner of their desk for reference. Teaching gifted children cursive writing rather than printing does not seem to affect their ability to decode print for reading, however classmates will not be able to read or mark their cursive written work.

Asking children to "draw" their letters may help them focus on shapes rather than meaning or sound and may make the writing process easier. For my sons, use of calligraphy pens and exercises to explore the effects using different edges of these pens also helped them learn the right "touch" to use with a pen as holding the pen the wrong way had an observable effect.

For some children printing may be easier than cursive writing. If a child can set letters on a line, printing works well. If letters are in every direction, with many of them backwards, linking letters with cursive writing can help solve directional issues.

**Capitals and copying from the board** Formation of capital letters needs a lot of work. Cursive capitals are less used and children may forget the pattern to form them. Also many written capitals are very different from small letters and the print version. Capitals are unfortunately very important to primary school markers who work primarily in print. Make sure your child has examples in front of them for reference. Help them understand how their score for writing differs from their score for knowledge. (a sentence marked incorrect due to lack of a capital offers no comment on creativity, language or other skills)

Copying from the board may be almost impossible at first because transferring visual images through dimensions may be more difficult for these children. Copying from a page occupying the same plane as you are trying to write on may be relatively simple. In the early stages, make sure a set of letters, capital and small, are taped to the top surface of the child's desk. A copy above the blackboard or on the wall may be of no use.

If your child has difficulty transferring information from the board to the page, make sure the teacher checks the accuracy of the child's transcription. Spelling errors on tests may be due to the child studying an incorrect example, badly copied from the board. If possible ask the teacher to provide a paper copy of homework or examples written on the board for study purposes, to ensure transcription is not causing errors.

**Tests** For tests, especially timed tests (spelling and math drills are usually the culprit) talk frankly with your child about writing information or ideas down in a way that helps the marker understand what they know, and make sure you separate your child's knowledge of how to spell or write creatively from their score for correctly written answers. Insist on the child receiving separate marks for knowledge versus output. If large strings of information must be remembered during the writing process, (series of numbers taken down for math, sentences for spelling) make sure the pace is appropriate for your child or insist on modified tests.

## Particular issues and things to try

### Writing Stress process not product

These children will write starting letters in any direction or order. Their neural circuitry may lag behind their peers in the link between brain and hand. As they tend to be perfectionists, they will do anything to avoid exposing their weakness and will avoid practicing. Make handwriting a game. Have the child critique your writing, then compare yours and theirs. The goal is to get your child to focus on making perfect letters while picking apart your handwriting to see some different ways of making letters or number. Once you have individual letters down, move on to words, phrases and sentences.

Try coloured paper, paper with coloured centre lines (see the paper pdf on this website) or paper with a grid to help these children organize their letters (and numbers) on the page.

To ensure children in early grades are learning the process of sentence and paragraph formation, have them dictate their stories to tape, then scribe for them (onto a computer if possible) so that they can learn how to rearrange their sentence order, add description in the correct places etc. Gifted children work several years above the vocabulary of their age peers. Formation of elaborate sentences, coupled with written output issues, can overwhelm them. When their peers are expected to write. Sam and Fred walked the dog. Your child may insist on: Sam and Fred romped happily off to the park with their Labrador puppy, Nuisance. The combination of advanced language, spelling and written output issues can be overwhelming, especially if your child naturally uses longer words and sentences (needs even more time to write than their average classmates.)

**Keyboarding**, although it helps with drafts, re writing, spell checking, re-organizing etc., keyboarding is a difficult task for right brained children as it still involves brain to hands messaging with almost the same neural circuitry as handwriting. For children with small hands, regular keyboards are difficult to span. Innovative children's keyboarding programs may help get the typing speed up to a reasonable 30 words a minute, but this is unlikely to occur before the age of 10. While these skills are developing act as a child's scribe, entering text into the computer for them for longer reports so that the child can rearrange and edit drafts without re writing. This way they will have the opportunity to learn the skills of creative writing freed from output issues.

**Voice recognition** software is not anywhere near a level of development that gifted children will tolerate. Predictive software (which tries to guess the word you want via the first few letters) can be exceptionally frustrating for children with large vocabularies.

Although it may be tempting to try to have the child do most course work on the computer, check with your child. Many gifted children find computer course material in areas like math and social studies too slow due to the way the computer screen restricts their reading speed. They may prefer well written workbooks which have fill in sections to create overview notes, over slow paced or repetitive computer instruction.

**Software** We found Broderbund's The Amazing Writing Machine particularly useful for our reluctant writers. It has a Spin feature which creates a story or letter in many styles and allows a child to fill in the blanks. Thank you letters to grandma became much more creative. In primary years the funny voices that would read the work aloud were an incentive (more typing occurred just to hear the robot read forbidden words) but the actual word processing software is useful up into high school grades.

**Dictation** To get a very young child to overcome a fear of writing, have them talk slowly as you write their words. The next step is to gradually get them to write while you talk. Start with two or three simple words, and, to, for. Let minor mistakes slide or correct them gently. Alternate dictating and writing, keeping a sample so the child can observe their progress.

With an older child, have a written instead of a spoken conversation. Do this without criticism of spelling or punctuation. Follow this with a competition where you choose two words out of a book at random and see who can write the shortest complete sentence using those words. This game rewards the student for writing less instead of more.

**Scribing** For larger reports act as the child's scribe, helping them to organize a paper, typing out their ideas for them exactly as they dictate them, then having them correct the sentence structure when they read it back. Try to get them to write some of the paper themselves, but not get overwhelmed with the process as opposed to the ideas. Mindmapping techniques from Tony Buzan (see resources) or mind mapping software may help get ideas organized for larger projects.

While working as your child's scribe help them to recognize what they are doing and gradually wean them from their dependence on you for typing or writing. (this may take several months) Help them brainstorm ideas, break up writing into manageable sized pieces, define needed structure:

- Three to five sentences are enough for a paragraph.
- A paragraph talks about a single idea.
- Writing is better if you rearrange some sentences.
- What descriptive words would explain your idea better

Define reports by the number of pages, ideas or paragraphs. If gifted children with writing difficulties must write 500 words they will stop precisely at 500, focussing on the number of words rather than the writing.

Gifted children need creative writing skills much earlier than non gifted peers, but schools do not address them until after the primary grades. Gifted children need writing and analysis tools at their equivalent reading level , in addition to the skills of mechanical writing, in order to express their ideas.

Write with them gradually weaning them off to write more on their own. Help by offering support, key phrases, ideas, until your child becomes accustomed to the process of writing and can do it on their own.

**Spelling** Spelling problems can be related to written output issues. If you have a child who is a visual-spatial or right brain learner a child who tends to learn visually in whole pictures rather than parts, there are some techniques that can help. Many of these children have outstanding abilities to visualize in three dimensions. This can create problems for them in a system where everything is written in order from left to right. Children who remember words visually and have good memories may have difficulty if free form spelling is allowed for too long in their school careers. Although initially the free form spelling removes the pressure of being correct, children with exceptional memory skills often quickly memorize the wrong spelling and have difficulty learning the correct one. Try to correct these memorized spelling problems with gentle encouragement.

**Spelling techniques to try . Use Colour.** Notice how changing the colour of the word changes the way you visualize it. This same technique can help poor spellers learn. Jeffrey Freed<sup>1</sup> suggests:

- choose a word that is slightly more difficult than your child can presently spell. (cartographer, existentialism) Break the word into different coloured syllables using a different colour for each syllable **cartographer**. write the word in large letters, filling the page.
- hold the paper at least a foot away from your child, instructing him/her to look at it until he can see it in his mind. He may just see the word or he may see the word and a picture. Have the child take as much time as they need to remember what the word looks like (Freed insists on at least twenty seconds)
- turn the paper face down, instruct your child to spell the word out loud (initially helps recall visual image)
- If the child can spell the word, have them spell it backwards. Spelling backward doesn't have to be used as a way to learn the spelling once the child can visualize and spell words. Backwards spelling is a way of boosting a child's confidence by an unusual skill.
- Another suggestion from Ron Davis, suggests drawing a box around the word to create a word shape, outlining the letters that stick down or up from the line **space**

Once you have a word visualized, try to get the child to answer questions about it. In the word cartographer how many a's are there? What is the 8<sup>th</sup> letter? Encourage your child to have fun with this step. This is an unusual skill they are able to display. Work with your child on three or four words each day for one week. Then switch to easier words, adding more of them. As an example for a third grader you might switch to gentle, lion, return, tender. It is important to tell your child not to attempt to spell the word until he can see it. The next step is to have the child select words from a favourite book or text. Instruct your child to underline the words, study the and spell them forward and backward. After six or so sessions of visual spelling from a text, the child is ready to take the word from their visual memory and commit it to paper.

- Pick a favourite book and underline several words, each about eight or nine letters long. Have the child look at the words one at a time then all at once. Ask, Can you see all the letters? If so, spell them. Make sure the child checks their picture of the word before writing each letter.

## Spelling games

A number of spelling games work well as well. Guessing the letters, a variety of the Jeopardy, game show helps children learn and visualize the letters in their spelling word list. One person selects a word from the list, he tells the other player how many letters there are in the word. The other asks questions. Is there an E? An N? etc. until they guess the correct word.

Play varieties of the classic hangman game

For younger children try having your child trace the word with his finger on a blackboard, a table top, or in a plate of corn meal or sand. Have them say the words out loud as they trace them

Have the child type out the words on a keyboard or typewriter and print them.

**Math** "Truly brilliant mathematicians, so-called late bloomers, will generally struggle with computation and showing their steps, but if the fire remains inside of them long enough that they survive into higher math, they'll find it's in sync with their learning style. In working with right-brained children, try to install in them a love of math and a glimpse of the big picture; that math is so much more than being able to memorize times tables or solve an equation in three or four steps. I often wonder how much loss of potential occurs because children who are potentially brilliant at abstract, conceptual math get the message early on that they are poor at this wonderful subject. (Jeffrey Freed! )

Touch methods, abacus, golden bead Montessori materials etc. work better for teaching young visual spatial learners math. These children have a great ability to hold and retain images. Mental math is far easier than written math. Also, these children require longer processing time, especially if written output is factored in as well as issues with organizing numbers and questions on the page. Rush a visual learner and he is out of his game says Jeffrey Freed. Timed tests and endless repetitions create problems for these learners

For many of these children the area of strength is mathematical intuition. Exploring complex mathematical concepts before they have to learn basic math facts, helps these children. Jeffrey Freed says once they have a solid understanding of math and are intrigued by the concepts, they'll be more willing to master basic math concepts like simple division. (this certainly applied to my gifted children)

Visual learners need to know why they are doing something, a step by step process may frustrate them

With these types of children, act as their scribe and have them do mental math. Ask them to take a number, divide it by \_\_\_\_, tell you what it is, square it, tell you what it is, add \_\_\_\_ to it, tell you what it is. etc. while you write down the number.

Have the child start with addition, regardless of which grade they are in. Have them visualize the numbers and do the vertical string of addition in their head. Discourage them from using their fingers, have them do it in their head (usually exactly what teachers will **not** let them do.) Once the child is successful at single digit numbers, move on to double digits. In their heads.

Move on to subtraction. Make sure the child understands subtraction is the opposite of addition, have them think of the problem as what number plus 13 equals 17. This is the same as seventeen minus 13 equals ?

Work on five to ten different problems. You can use the tally method //// beside the numbers to help the child visualize the process.

Teach negative numbers using a thermometer and winter temperatures. Teach this as early as first grade to visual learners.

Visual learners usually do better at multiplication by using a series of visual steps instead of memorizing tables. Have them double numbers, then double again for the 4 times table. If they know that, have them add another number to get to the number times 5 or go up ten, and subtract the difference.

Use a grid multiplication table. (numbers one to 9 across the top and down the side, answers to multiplication of the quadrant on each square of the grid Cover the answers with pennies and remove the penny for a correct answer. Teach the grid pattern, not the single number table.

Use gridded paper for math problems (see paper pdf) This helps written output sufferers by aiding them to line up numbers and set up a clear visual picture.

As they progress have them apply their memory to more difficult problems. I.e.  $83 \times 34$  have them break it down into pieces, first  $83 \times 3$  (249) and add a 0 as the number is  $83 \times 30$

Have them visualize the number until it is in their "view" next have them multiply  $83 \times 4$  (332) Tell them to retrieve the first number and add the simplest part of the  $83 \times 4$  the 300 to get a mental total of 2790, then add 30 (2820) then 2 (2822)

**Division** explain that division is simply the other side of multiplication. Start with a two digit number i.e. 57 divided by 8. Have the child choose the number which is closest to the number they are dividing i.e.  $6 \times 8 = 56$  and put the 56 under the 57. Subtract. The answer would be six, remainder 1 Next work on three digit numbers divided by a single digit one. 256 divided by 4 What multiplied by 4 would get you closest to 256 (60) Is this larger or smaller when you multiply it out.  $4 \times 60 = 240$ , how can you get closer? Use trial and error to move higher and lower until you get the right answer.

You can write down the numbers but don't have the child write. Have your child spend their time visualizing the numbers in their head. Work from three digits divided by one to four divided by one, then three digits divided by 2 (174 divided by 12)

Stay away from step by step division until the multiplication relationship is clear, and stay away from writing it down until your child can hold the numbers in their head.

**Algebra** Freed suggests demonstrating this to visual spatial learners at a young age, 6 or 7, using blanks in an equation instead of variables  $x, y$  etc.  $\_\_\_\_\_ + \_\_\_\_\_ + 5 = 25$ . Give the child some choices and tell them they must plug the same number into each blank (choices 3, 5, 10, 8) Once your child has a grasp of the basic algebra, make the equation slightly more difficult  $\_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ + 3 = 42$  (schools would present this as  $3x + 3 = 42$ ) give the child possible numbers as answers (10, 11, 13, 15, 17)

### Useful books for visual spatial math learners.

Don Cohen's Worksheets Calculus by and For Young People for keen primary mathematicians to adults (This is the best demystification of calculus ever) <http://www.shout.net/~mathman/>

MathMagic for Your Kids Scott Flansburg William Morrow Pub. 1997 for primary grades

Math Smart Marcia Lerner, Princeton Review /Random House 1997 for intermediate to high school math