

Not Just Math

- **More Ideas** Gordon Scott, September, 1998.

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(counting, number charts and lines, days of the week, months, practise tests and drills on basic facts, odd and even)

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(syllables, vowels, spelling and story writing, activities for rhyming words and words with same beginnings, questioning)

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(light and color, gravity and friction, balance, maps and story writing)

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Who might find this booklet useful?

Beginning and Experienced Teachers, Teachers of Teachers, Parents.

In this booklet I will try to describe more of what I used in my classroom that may be useful to you in teaching young children.

You may not wish to use the ideas as they are, but they could spark new ideas of your own that are better suited to you, and your teaching situation.

I'm including a set of speed tests for basic facts as I know they are tedious to make up, but I feel they are very useful to young children.

Some of what is here has been mentioned in my Games, Simple Math, and Not So Simple Math booklets.

The ideas in this booklet are not all mine. I'm sure many may have been picked up somewhere at sometime, and some I know I have modified from others.

Please contact me by mail or e-mail if you have any questions, comments, or advice for improvements.

As with my other booklets, my wife, Margaret, has also searched carefully for errors and poorly worded explanations. I'm sure we haven't found them all.

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If you have any questions, suggestions, or comments, address an email to **@telus.net** but first put **m.games** before it. (This address is split to attempt to foil programs which gather addresses for sale to junk mailers.)

Part 1. Math Related:

Number Sense:

I can't stress enough the importance of experiences with all kinds of counting, especially when it is related to a number line or chart. We want children to be able to count in a very simple sense, keeping track of what was already counted, not skipping numbers, and keeping them in order. But more than that we want children to appreciate the value of the number they count, and to relate it to all the other numbers they are familiar with.

I don't intend to even try to tell all one might say about counting and the development of a sense of the value of numbers in relation to others. I'd just like to offer a few more ways of working with them that might give you a start.

When you look at two sets of randomly placed objects that are close in number, and over a certain size, say 35 and 37, you may not get a visual picture of which is larger, and by how much. Simple counting will tell you which is larger, but it won't show you.

Spotting the two numbers on a number chart from 0 to 100, or a number line from 0 to 200+ will give a visual picture of the difference, and will reinforce an understanding of the ordered growth of numbers.

So will arranging the two groups in an ordered way so they can easily be compared.

Lining up the two sets so that one can see that 37 has two more than 35 is a worthwhile experience.

Placing the objects in groups of ten, with some left over is also valuable.

I've described in my other booklets how I made much use of common egg cartons, laid out in two rows of 6. I cut off two egg places so the carton would hold 10 small objects in two rows of 5. With these it is easy to compare two sets of objects visually, and it relates directly to the very important concept of place value. Children can easily compare the sets of ten for most numbers they might work with, and if the amount of tens is the same in each number they need only look into the partially filled cartons, the ones, to compare the relative size of the numbers.

Number lines and charts:

In my Simple Math booklet I've described the number line that I made from 0 to 203 on cash register roll paper. It ran all across the front of the classroom and half way down one side. From a stiff paper product I cut out some markers with windows in them that would slide along the line to show how many days we had been at school. It was simply a matter of leaving a flap that would fit behind the line, top and bottom. The line was stapled to the wall in the center so the the marker could slide all along it, even around the corner (much to the delight of the children).

I had to have two markers, one which served for the one and two place numbers, and another to change to for the three place numbers.

With this permanent set of numbers visible to all, and laid out in a line, we had a very useful tool for a lot of different work. Together we did skip counting, adding onto and taking away from large numbers, multiplication, comparisons of value, place value work, and the concept of before, after and between. By thinking of the line extending around the room several times we could even get a sense of how really big a thousand would be.

Some teachers prefer to form the same kind of line as the days go by. They start the rolled up line at 0 and print on a new number each day, extending the roll as they go. The youngest children then have the advantage of seeing the numbers printed out, but the older children lose the advantage of having the full line to refer to during the year.

I haven't done this, or seen it used, but I believe that teachers who aren't able to have a number line stuck up around the room could make a large number chart to serve the same purpose. It would have to go from 0 to beyond the normal school year, and be spaced out to allow up to three figures. Some simple marker could be used to move along the chart if the numbers were already printed.

My classroom also had a 0 to 99 chart we used to see the regular repeated patterns the numbers form. It was especially useful to reinforce what always came before and after a number of tens. Some children have difficulty learning what comes before numbers like 40.

We also used it for place value work. The numbers in each of the ten's and one's places were printed with different colors. One's place numbers were black and ten's place numbers were red. 0 to 9 in the first row were written as 00, 01, 02, ... This made it easy to see place value at work, and completed some interesting patterns.

Each morning we started the day by moving the marker along the number line. We also added a 1in. snap together cube to a pile we kept on a high ledge. Ones were loose. Sets of ten snapped together in lines. Ten lines became a square of 100.

On a steel chalkboard close to these blocks I first printed a column of 0 to 9, with 9 at the top, and had a magnetic marker to place beside the number of days at school. I printed a second 0 to 9 column to the left to go beyond 9, and used a different marker to show the number of tens. Eventually a third column had to be added.

This activity clearly demonstrated the repeated movement through the one's place numbers before a new ten's place number could be used.

Along with this we learned the use of tally marks, four vertical lines, one for each day, and a diagonal line across them for the fifth day. When we had two sets of 5 we circled them and noted that we had a set of 10. Comparisons were made with hands and fingers.

We didn't always use tally marks; just often enough to keep the children familiar with them since they are sometimes useful.

Days of the week and Months of the Year:

Sitting on the chalk ledge of the classroom we had a board, about the size of a large calendar page, covered in colorful plastic, into which 5 rows of 7 screw hooks had been placed. I had a set of round tags with holes in them so they could be hung from the hooks. The tags were used to show 1 to 31. Above each column of hooks was a label for each of the days of the week.

This way we could keep track of the days of the month by adding the appropriate tag under the day of the week. (I made some special tags for certain holidays.)

A retiring teacher whose husband had made it for her gave me this calendar, and I passed it on when I retired.

Another way of doing this might be to make up and duplicate a calendar page, without the numbers or the month written on it. This way the children could see the numbers being formed and progressing through the weeks and the month.

For the youngest children I had a large chart with the days of the weeks printed on it. For all the children, I used a set of three stiff paper pockets set along the chalk ledge. 'Yesterday', 'Today', and 'Tomorrow' were printed on the pockets. I also had a set of 7 large strips on which were printed the days of the week.

Each day we moved these days of the week to the appropriate pocket. The day of the week strips moved from 'Tomorrow' to 'Today' to 'Yesterday'. This allowed us to develop a sense of future, present, and past. We were also able to talk about terms such as the day after tomorrow, and the day before yesterday.

These pockets were simply formed by folding the bottom of a larger sheet in accordion (or pleated skirt) fashion and stapling the ends to make a durable pocket.

We also had a large chart to show the months of the year in two columns of 6 each, with the number of the month printed beside each. At the bottom of this chart was a space to show 'Last Month', 'This Month', and 'Next Month'. I simply cut out two slits after each so one of a set of 12 strips, each with a month printed on it, could be tucked into the slits to hold it in place for the month.

Of course this allowed us to discuss past, present, and future again, as well as the month before last month, and the month after next month.

Tests and drills on basic facts:

The word "test" seems to bring out negative emotions in some people.

The tests I refer to here are not those primarily used for reporting purposes.

I do believe that the frequent use of tests on basic facts can have positive results for children. Arithmetic or math soon requires students to be both quick and accurate.

Some children are not inclined to be one, or the other, or both.

Tests do give them a reason to be quick and accurate. They can become a reality in their lives. Children can come to see in other children the results of trying hard, and learn to be proud of their best efforts.

If you've ever taken part in a Kindergarten sports day you may have seen children who already are willing to put out a great deal of energy to do their best. But many children will only go through the motions of doing a task with the least effort. Ask them to try to jump far and they will just jump, where a few will surprise you.

The tests used for basic facts were all of the same format, and they were of different degrees of difficulty. All the children became familiar with the task, and it was possible to give different tests that suited their ability, or grade level, at the same time.

There was a column of 20 questions, such as $4 + 3 = \underline{\quad}$, on a narrow sheet of paper, all in horizontal form, and all with the missing number in the same place. They would be handed out, upside down, and all children would wait with their pencils ready for the signal to start. When I gave the signal to start I would note the time.

The children would print their name at the top and start to print the answers. Whether they checked their work or not was up to them.

(Early on I might leave charts or chalkboard notes up that would allow them to look up at the answers. They soon found this was not the best thing to do since it took more time than searching one's memory.)

I stayed at the front, watched for inappropriate behavior, and waited for children to bring their finished papers to me. There was a space at the bottom of the test where I could print the number of minutes they had finished in. After 5 minutes I called in any remaining papers and marked them as 5+ minutes.

The papers were easily marked over my lunch hour as I had an answer key to set the tests on top of, and I didn't bother to mark correct answers. I just drew a line through incorrect answers. Numbers that were unclear were also marked wrong.

After lunch, and before the tests were returned, I wrote the names of the children with perfect scores on the chalkboard under the headings: 2 minutes, 3 minutes, 4 minutes, 5 minutes, indicating the amount of time it took them to finish.

The tests were then handed back so they could be finished or corrected, and help was available from me or later, selected more able students.

Some may feel this is very harsh treatment, but it gave us an opportunity to discuss the speed at which we all are able to do things. Foot races were a common topic. Children out on the playground soon learn who they can catch, and who they can't.

I also used it as a time to talk about the purpose of speed and accuracy in math facts, and how I knew from experience that we would be able to watch the whole class improve.

Probably on the second day of this some children would hand in a perfect paper and take three minute less to do it. Then if their name were up, say under the heading "4 minutes", I could erase their name and print it under "3 minutes". There it would stay, unless they could show that they could improve to under 2 minutes.

Names never came off the list, and never moved back to a slower time, unless someone was caught copying answers from others too often.

Children who used their fingers, or looked about the room for other aids, soon found that memory was fastest.

I'll always remember one very bright little lady who suddenly did poorly when I covered up some charts she had been using.

"Well, I guess I'll have to learn those," she said.

And I'll always remember Betty, in Grade Two, who could get 20 correct answers in under a minute, faster that her teacher could ever hope to go.

I hope you can see these were not troublesome tests. They only took a few minutes to mark. The majority were perfect. Few corrections were required, and if time were short, then children with perfect scores were delighted to help others and mark corrections. Those doing well were eager to help others improve.

N.B: Sample drill tests on loose sheets will be given at the end of this booklet.

Drills are also important. Drills are activities children might do as a class activity, but probably more often as a individual or group activity. They might be oral, or written.

The purpose of a drill activity is for children to attempt to get the correct answer, and if their answer is incorrect, to see or hear the correct answer as soon as possible.

In a drill, having the answer given to you is, in a sense, more valuable than getting the correct answer. Being given the correct answer tells children two things, what is correct and what is not correct.

Long ago my school district made up sturdy cards with about 50 questions on each, all in vertical format. Under each was a hole where the answer should be. A child placed the card on a blank sheet of the same size, printed the answer in the space created by the hole, and, when finished, turned the card over, keeping it the same way up.

On the back of the card, above each hole, was written the question as well as the answer. This meant the children could mark and correct their own answers which appeared in the holes. Even children more inclined to do things the easiest way were forced to look at the question and its correct answer.

I have seen a number of similar drill cards, each card being graded as to difficulty and number operation.

Another type of drill I used required papers similar to that used for speed and accuracy tests. This time there were two spaces after each incomplete number sentence. The first was for the child's answer. The second was for the child to write the answer I gave if the child had not written his/hers yet, or had written an incorrect answer.

eg. $6 + 3 =$ _____ (child's) _____ (teacher's)

This drill had the advantage of a very quick reinforcement for the correct answer, and correction for wrong answers.

It also forced a certain speed as the teacher read out the question, paused a short time, then reread the question and filled in the answer.

There was then a pause while some wrote in the teacher's space before going on. At the end the children could count up the number of answers they got on their own.

Even those who wrote the teacher's answer in their own space had the benefit of seeing, hearing, and writing the correct answer to the question.

There are many commercially available drill cards and they come in many forms. Some drill cards are very easy to make or have made by parents or older children.

If you've read my Simple Math booklet you know my approach to basic math facts was based on a very simple format. "Part + Part = Whole" and "Whole - Part = Part". It covered all the basic addition and subtraction situations. "Factor x Factor = Whole" and "Whole \div Factor = Factor" covered all the basic multiplication and division situations. (\div is the closest I can come to a division symbol.)

For this reason I made up drill cards that had a triangular form, with the "Whole" at the top and the "Part" or "Factor" on each side at the bottom. I didn't, but I could have, made the drill cards out of triangular pieces.

A drill card would contain 2 of the 3 related numbers on one side, with the third as a blank or question mark. On the other side the full three were given so children could be challenged by others to come up with the third number in the set, or could work on their own.

I know now that I should have made similar cards, but with all three numbers on one side. On the other would have been the four (or two) number sentences the three related numbers on the other side could make. A child would be challenged to come up with those four (or two) sentences.

Odd and Even Numbers (those made with sets of two):

Paying attention to this distinction between numbers early on can be very useful later. (Even numbers are also easily related to multiplication.)

Children can learn to make an easy check of answers to simple or complex questions.

At a glance one can tell this answer is incorrect: $4187 + 2948 = 7134$. You don't even have to know $7 + 8 = 15$. You just have to see that it is an 'odd + even = odd' situation, and the 4 in the one's place of the answer isn't odd.

Children can soon work out the statements about even and odd numbers that always will be true for the whole numbers they work with.

I believe it is good for children to know that math has such simple ideas that always are true.

Using 'o' for odd and 'e' for even, you can soon discover that:

$o + o = e$, $o + e = o$, $e + o = o$, $e + e = e$, and $o - o = e$, $o - e = o$, $e - o = o$, $e - e = e$.

$o \times o = o$, $o \times e = e$, $e \times o = e$, $e \times e = e$, and $o \div o = o$, $e \div o = e$.

It can help to think of odd numbers as being an even number, plus one more.

Part 2. Language Related Ideas:

It may seem odd to have these among so much math stuff, but I've already put a few language related games in my Games booklet. Most of these grew out of what I was doing in the number games, but the class Arithmetic Game actually came about because of the success I had with the class Spelling Game.

Please have a look at the end of the Games booklet to see those that promote practice of letter recognition, alphabetical order, word discrimination, spelling, and more.

Syllables:

I found the practice of syllable recognition to be very useful as it related directly to vowels, spelling, and reading.

One little activity song I learned somewhere was used often early in each year, and fairly frequently thereafter.

It was popular, flexible, and allowed a great deal of learning about syllables.

EVERYONE: (Pretend to hold a bee in your two hands and sway it to the left and right with the rhythm.) "Hickety - Tickety Bumble Bee,
Can you say (sing, clap, tap, step,...) your name for me?"

ONE CHILD, eg: "Har - ry" (two claps, and give help when it's needed)

EVERYONE: "Har - ry, Har - ry" (two claps, two claps)

Then start again with a new person.

I soon began to print the children's names on the chalkboard in groups according to their number of syllables, although we referred only to the number of claps at first. Most of the time there were a few one syllable names, a lot of two syllable names, and very few three syllable names. Rarely was there a four syllable name.

The names allowed us to note that vowel sounds occurred in all the syllables. Four syllable names would have at least four vowels, with at least one vowel per syllable. One syllable names had one vowel sound, made by one or two vowels.

We also discussed shortened names and nicknames, such as Jo for Joanne. This caused a lot of interest as we wondered why it was done, and heard of many shortened pet names used at home.

When the names were familiar we substituted “this word” or “a word” for “name” in the song. I would then say a word for a child to clap, tap, or sing in syllables.

Frequently we used the names of familiar objects, such as vegetables, animals, and flowers. Children could also be challenged to have their own word ready when their turn came.

I changed the song activity once in awhile to “Hippety - Hoppity little frog, Can you tap this on a log?”

Now I am not a singer, but I managed to come up with a tune the children were content to follow. They didn’t know any better!
Don’t be afraid to make up your own.

Vowels:

The English language is riddled with exceptions to rules, but children can still learn a few basic ones about vowels that usually work. Along with a knowledge of syllables this can aid their ability to read and spell new, simple new words.

Studying syllables allows one to demonstrate that the five vowels, and ‘y’ appear far more often than other letters. In fact they may be the only letter in a syllable. All the other letters we call consonants. Consonants mainly have one sound, with a few exceptions. Vowels have two main ones, their long and short sounds. I demonstrated why these might be called ‘long’ and ‘short’ by running my fingers along a ruler as I said one of each type in a normal fashion. The children could do this too. Saying a long vowel always carried the fingers farther, and of course the long sound was easiest to remember since it was the letter’s name.

Together we slowly made up a chalkboard chart that demonstrated the combinations of **consonants (c) and vowels (v)** that seemed most often to result in the two main sounds vowels had; their long and short sounds.

Long Vowels

L1: vce (ate)
L2: cvce (late)
L3: cvvc (leap)
L4: vvc (oat)
L5: cv (so)

Short Vowels

S1: vc (at)
S2: cvc (hat)

Except for L5, long vowel sounds tend to happen when two vowels occur in one syllable and the second is silent. This old rhyme is a memory aid:
“When two vowels go walking,
The first one does the talking,
And it says its own name.”

Another set I found useful after dealing with the above were the vowels with ‘r’ after them (vr). They came in three basic sounds: 1. ar 2. er, ir, ur 3. or.

These became more complicated when a final ‘e’ was added (vre). Some changed, but some did not.

The same was true when we had ‘w’ after the vowel (vw) and again with a final ‘e’ (vwe).

Along with this we did study consonant sounds, and consonant combination sounds, such as ‘ph’, but vowels were most important.

Phonics:

I’m not trying to push phonics to any great extent, and that’s what we’ve been talking about here.

I believe a knowledge of phonics is important, but it can also be overdone, especially in the early grades.

I believe that readers (readers being text books designed just for reading instruction) with a phonetically controlled vocabulary are the best for most beginners.

During most of my last 14 years of teaching I had Grade 1, or 2, or both in my class. Sometimes I taught Grade 3 as well.

I had many children come into my class unable to read, or read well, after a year or two of instruction. I received a lot of praise from anxious parents when these children began to read within a few months.

The praise was misdirected.

I had kept a set of beginning readers that were carefully constructed phonetically.

At the same time they were about familiar animals, a very appealing subject for young children.

These were what really allowed the children to learn to read. Along with them went a set of workbooks to allow further reading, practice with words and sounds learned, and an extension of these. Of the two, the readers were the most important tool.

These readers, Sun Up, A Happy Morning, A Magic Afternoon, and more, were out of favor. They were linked to phonics, and phonics was out of favor with the decision makers. However, even though many classes had them at one time, and now had the ‘up to date’ “readers”, it was difficult to get these books.

Specialist teachers who dealt with reading problems ‘borrowed’ them for their own use. “Old-fashioned” teachers hoarded them.

If they were so useful, why not get more of them? Well, they were out of print. They weren’t made anymore. Why? Because those in charge of buying new books were not in favor of the phonetically based readers. Why? Maybe it wasn’t in style?

I had also held onto a set of beginning readers that were a bit more difficult and less phonetically controlled, and these we used as well. I found a lot of practice at first with books that at least appeared easy was very important in developing confidence.

Confidence in reading is just as important as it is in math, and that is very important!

Self doubt leads to backtracking and a loss of focus on the whole thought being worked with.

If you spend too much time looking at the trees you can get lost in the forest.

Spelling and Story Writing:

I've always felt the most important part of writing stories in the younger grades was the expression of connected thoughts, the story itself and not the appearance of the final product. For this reason I never made a big fuss about spelling, even with Grade 3's. Neatness too was not a prime concern. I seldom asked for a second copy, unless there was a good reason, such as to have stories for display.

Most stories were just read aloud by the writer to the whole class or to a small group. I felt there was a time for learning to print neatly, a time for learning to spell correctly, and a separate time to practise the expression of one's thoughts through writing.

Many young children are slow to express their thoughts, not because they can't think of words, but simply because they don't know how to form them on paper. They have a problem with spelling and they don't like to put down something they are sure is spelled wrongly. Telling them spelling doesn't count is of little help. They have their own standards.

I know many teachers make a habit of providing the spelling of words that are holding up a child's story telling, just as I did. Where I would differ would be in the practise of requiring a child to look up, or enter the word, in alphabetical order, in some kind of spelling dictionary. These children were to consult this dictionary before asking the teacher. After trying this method for a few years I decided this was too slow a process and it interfered with the child's train of thought for too long.

I preferred to have a large set of small blank papers available. When a child came to me I simply wrote their word on a sheet and they carried it away. Many times there were several words needed and they were all printed on the same sheet. If a child came back a second time they would bring their little sheet with them. When they had no more use for the sheets they threw them away.

I know this seems wasteful in more than one way, but it has it's advantages.

For instance, it can counter some children's natural tendency to avoid extra work.

Such children may reconsider the idea of asking for the correct spelling of a word if they are sure they are going to have to do a lot more with that word than just copy it into their story.

However if it just means getting up to walk over to a friendly person for a little individual help, well, that's not work.

Besides, some of the children had to ask me to spell entire sentences.

At times I would have to ask the others to do their best while I dealt with some children who, at first, could not form a sentence, let alone a story. They were given priority. They might be able to come up with only one word, or two disconnected words, but we would work together to form a thought they seemed to want to express. I would print out a sentence, or more, and they would happily go back to copy their ideas onto their paper.

Gradually all such children came to me with more of their thoughts formed in their minds, and with spelling as the more major concern.

A final word on this subject is that children need to read these stories to someone very soon after the writing of them, especially the children having the most difficulty.

Their thinking vocabulary outstrips their reading vocabulary.

Even reading to one another in small groups can satisfy their need to know that someone else has listened to what they were trying to say.

Rhyming Words, and more:

Children really like rhyming words. I found they were a great device for getting children to practice phonics, spelling, and reading skills.

I made up little booklets where one rhyming word was placed on the last page, on stiff paper, and the other pages were shorter and made of ordinary paper. The last page was made so the portion of the word that would rhyme stuck out beyond the other sheets.

For instance, if I chose 'lake' as the word on the last page I would leave the 'ake' sticking out. On the top sheet I could print the letter 'm' and what was visible on the two sheets would form 'make'. On the other sheets I could print 'l', 'j', 'sh', ...

I had a large number of these booklets and they all worked the same way.

By reading one word the children could easily figure out a lot more.

I made up larger sheets, using stiff paper, that did a similar job. 'ake' would have been printed in the center and circled. Around the outside of it were printed all the beginning letters for rhyming words ending with 'ake'. Because of the type of paper I was able to make another set on the other side of the sheet.

We also had similar booklets and sheets to the above where the beginning of the word was always the same and the ending changed. In the above booklets the pages were stapled together on the left. These booklets were stapled on the right.

I chose a word such as 'chose' and printed it on the stiff paper used as a last page. Then I stapled smaller sheets to the right side of the last page so they would cover all but the 'ch' in 'chose'. On these sheets I printed word endings that would work with 'ch'.

For instance, I could have printed 'ase', 'ip', and 'alk' to form 'chase', chip, and 'chalk'.

Most of the time these were used as extra activities when other work was finished, sometimes individually and sometimes in pairs.

Questions:

Despite their reputation for being full of questions, I've found that children do need instruction and practise in asking others for information.

Early each year we would have frequent short sessions to practise forming specific questions of different types.

Show and Tell provided opportunities to form and ask questions, to practise paying attention to questions others had asked, and to practise remembering answers already given.

Part 3. General:

I'm going to mention three sets of activities that relate to both math and language skills, those that developed a better familiarity with the concept of left and right.

At times when a little break was needed I would have all the children stand and face me. I would then direct them to make specific jump turns.

At first it was just, "From where you are, jump to your left."

I would then face the way they had originally faced, hold out my left hand, and jump in the direction that hand pointed to. Later I would only say something like, "All of you should be facing the window side of the room".

When they were more sure of themselves I started to ask them to take a certain number of jumps in a certain direction, such as, "Take two jumps to the left. ... You should have passed the window wall and have your backs to me."

The kind of jumps they were taking were actually one quarter of a circle at a time. Later we started talking about the jump turns in fraction terms. I would say, "Take 3 quarter jumps to the left. ... Now take 1 quarter jump to the right. ... Do you have your back to me? Did you pass the window wall?"

We also used this to practise the cardinal directions, north, south, east, and west. I could remind them they were facing south and then ask them to, "Jump to the left until you are facing west. ... How many quarter jumps did you take?"

With the older children we got into more complicated one-eighth jumps, and terms such as 'northwest'.

It was also possible to get into the topic of degrees and learn that a quarter jump turn covered 90 degrees of the 360 degrees in a complete turn. This led to the notion of a right angle.

I certainly can't put down here everything you might do, but I hope I've said enough to give you some ideas.

A less active but still enjoyable practice was to have everyone follow directions such as:

“Put the thumb of your left hand on your right shoulder”.

“Put your right hand pointer finger under your right eye, and your left hand thumb to the top of your right ear.”

The more complicated ones were always good for a lot of giggles.

Another activity was to have one child stand and follow directions such as, “Take 5 steps forward, turn to your left, and take 3 steps backwards”. Soon the children could become the director and learn to steer someone acting as a robot from one part of the room to another.

This was not an activity all could participate in at once, but it was one they could use during their play times outdoors. Of course we had to be certain the ‘robots’ understood they had the capacity to ignore any directions that could harm them.

Part 4. Science and More:

Light and Color:

I’m including this section because, although I’ve seen many very good books on primary science ideas, I don’t remember seeing ones like those given here.

That’s not to say I didn’t sometime, somewhere. After teaching for a long time the source of ideas can become a little fuzzy.

I and the children enjoyed working with light, mirrors, prisms and lenses. Much has been written about these.

We also were able to move into topics of symmetry and mirror images. I can always remember the ease at which some Grade 3 children could do cursive writing backwards, just so they could look at their writing in a mirror and see it as it should be. Obviously their minds and muscles were not locked so firmly into a pattern as mine.

But this isn’t about prisms, mirrors and lenses. It is about light and color. It isn’t a complex science activity, although it would be a very complex study if you were to really go into it. I say this simply because the subject deserves some attention, even at an early age. You don’t need to know a lot about color, nor have perfect color vision; something I lack, just like about 1 out of 10 other males.

I don’t intend, as I’ve said in my other booklets, to go into great detail about how a lesson is made up. I just want to give you a start towards developing your own.

All that is required is some different colored paper. 8.5 x 11 sheets are just fine, and the more colors the better.

I had a big bag of colored circular stickers given to me, ten different colors in all. I also had a lot of different colors of art construction paper.

I put 10 different colored stickers on one side of each of the different colored sheets I had, and I did include one black and one white sheet.

Note: I did this when the children weren't around. You'll see why later. The stickers were arranged in the same way and order on each page. Scraps of colored paper could have been glued on in their place.

These sheets were then placed on a chalk ledge, with the light shining on them as equally as possible.

The children were asked to decide how many different sticker colors they saw altogether, on all the sheets. The sheets were left up for awhile so they could study them and discuss them together.

Some time later I asked the same question. I had about 9 different colored sheets so the answers varied between 10 and 90, with most being towards 90.

Then I asked how many different colors of stickers must I have had altogether. Again most answers were close to 90, but some clever people would sense a trick and begin to change their answers to 10, or close to it.

We had a great discussion about how answers could be completely correct in one sense, and completely wrong in another. The children who saw 90 different colors on the stickers were quite right. The children who were sure there were only 10 different colors of stickers were quite right.

How could that be?

This way we approached the subject of background and how one color can affect our perception of another.

To make this clearer we stuck a red sticker in the middle of several different sheets and watched what we saw change. We did the same with a green sticker.

To make the point that what our minds think they see is influenced by how our eyes work, we did the following, but not all at once.

I put up one sheet with one red sticker, gathered the children together close in front of it, and asked them to stare at the sticker for 60 seconds or less. Some children had difficulty, but holding their hands up on either side of their faces helped.

They were to report on what they saw, and it wasn't long until some began to see something they knew wasn't there.

After about 60 seconds they were asked to look at another part of the paper where there was no sticker. Again they saw something that wasn't there.

We repeated this for a green sticker, and again on different backgrounds.

For the older children this led into discussions about what was inside our eyes, and what was happening to these parts. We could even discuss how flip books give a sensation of motion, and how motion pictures turn a set of still pictures into the movies.

Next we went back to the sheets with 10 stickers. We turned off all the interior lights and saw what changes this brought about. We closed the window blinds and did the same.

I had access to a small slide or filmstrip projector. I'd already made up some stiff paper holders with windows in which I had inserted different colors of plastic or cellophane for use in other work with mirrors, lenses and prisms. With these I was able, with the classroom windows covered and lights off, to shine different colors on the sheets. This made a terrific difference to some colors we were looking at.

We could discuss what color was. It obviously had something to do with light.

Another activity the children liked was to view their own clothing in different colored lights using the projector and the colored filters. Sometimes they were delighted with the improvement this made, and sometimes not.

We tried the same with colored pictures they had created.

Later we repeated some of this with the light from a prism held in front of the projector beam.

Gravity and Friction:

There are times in science lessons when the object may be to promote the growth of questioning minds, rather than a knowledge about, for example, spiders. I've included a few ideas here that need very little material or preparation, although you should try them out on your own first.

The following brought about a lot of discussion amongst children of various ages, speculation as to what was at work here, and questions to be answered. As always I'm not going to describe lesson plans. These have to suit your situation.

I had a large number of glass baby food jars, the kind that roll beautifully if you lay them on their side. I found a thin piece of smooth surfaced plywood about 1 ft. (30 cm) wide and 3 feet (1 m) long. We had old books of uniform size which we stacked on the floor, and then we put one end of the wooden strip on the stack to form a ramp.

I had filled the jars to different levels with sand or water and left one empty.

We then placed a jar on its side at the top of the ramp and let it roll down the ramp and along the classroom floor. We described the jar's contents on a piece of tape which we left on the floor where the jar stopped rolling.

I started with the full jar of water, but which you start with is up to you. I just wanted a base point. Before rolling the next jar we could get predictions as to whether it would roll farther or not as far.

Then, after the second jar had stopped, it was time to ask for possible reasons for the difference in distance rolled.

I saved the empty jar until last.

Note that these jars can break and care must be taken that they don't run into metal chair or desk legs. The board I had was not too thick so there wasn't much of a drop to the floor when the jar rolled off the end. Also, the floor was not hard.

If you only had a thick board, or a cement floor, I think it would be wise to taper the end of the board or tape a wedge to the end to make sure the jar was not hitting the floor too hard.

It was also possible to vary the roll distance by increasing or decreasing the size of the stack of books. We always used books of exactly the same thickness so we could accurately picture the difference between stacks.

What was important here, in my mind, was the predictions before and the discussion after, about the result of each roll. I found the children very interested in looking for reasons why the jars might roll different distances, and in coming up with changes to the jars that might further their theories.

For instance, if a jar partly filled with water rolled farther than one partly filled with sand, what would happen if the jar were partly filled with water and sand?

Gravity and Balance:

Hammers, or Rocks and Sticks:

One day, long ago, I was shown how to hang a hammer from one end of a foot long (30 cm) wooden ruler. Only a small portion of the other end of the ruler sat on a table.

It really caught my interest.

The trick is to have a loose loop of cord around both ruler and hammer handle, but about 4 in. (10 cm) from their ends. The end of the hammer handle must be able to touch against the ruler, and the hammer must hang free under the other end of the ruler.

You can experiment with the size and placement of the loop.

Place the free end of the ruler on the edge of a desk or table so that the heavy end of the hammer hangs underneath it. Done properly, the heavy hammer should appear suspended under the table without any direct connection to it.

At first it amazed me how this struck people of different ages. Adults and older children who hadn't seen it before were very interested and puzzled at first by what they saw, because it seemed to go against their experience with heavy objects. The younger children seemed to just accept it as something normal.

With the older children it was an interesting way to begin a discussion of gravity, center of gravity, and balance. With some experimentation we were able to make the ruler start to stand on its end, and we were able to add small weights to the end that was off the table.

For children who wished to show their parents, and who lacked a hammer at home, we got two short sticks, taped a rock to one end of one stick, and put a loose loop of cord around the end of the other stick and the free end of the stick with the rock.

Books:

Just about every classroom I've been in had a set of old hard covered texts, all the same size and weight, and perfect for experimenting with stacks, and discussing gravity, center of gravity, and balance.

Put one book on top of a table, but with one side right to the edge. Place the next book on it but a little past the edge of the desk. Continue to place books on the stack with each a little farther out. (If you're worried about them falling, start the stack on the floor.)If the texts are small it might be better to place the books with one end towards the edge of the desk.

Children like to speculate on how many books can be added to this slanting pile, and why. How far past the edge of the desk can the top book be? You might like to reverse the slant at some point and start bringing the top book back toward the desk. Could you get the top book right over the bottom, with an empty vertical space between them? Another trial could be to have two piles form an arch with one book at the top.

Map Making, Map Reading, and Story Writing:

A little or a lot can be done with this simple project, and you don't have to know a great deal about maps yourself to make it work. It can be varied according to the age of the children, and it can be changed to suit your location.

I drew and duplicated a simple black and white map of an island.

The map contained contour lines to show four different heights of land and three different depths of water.

Each of the seven different sections was identified by the letters 'a' to 'g'. There was a simple map legend containing a description of that land, without measurements, and how it should be colored.

NB: an example of this map follows the sheets of drill tests.

Now you could add more to this, or take away from it. If you live on an island the children may be more interested in the map of a mountain valley, or a mountain range with a wide plain on the other side, or a mountain range with something of their own design on the other side.

On my map I'll make 'a' the highest land, land that may contain mountains. I would ask that it be colored red. 'b' will be high land that may contain hills. Color it brown.

'c' will be for flatter and lower lands. Color it yellow.
'd' will be for low lands, as at the beach. Color it green.
'e' will be for shallow water you might swim in. Color it very light blue.
'f' will be for water deep enough for all sailboats. Color it light blue.
'g' will be for water deep enough for the biggest boats. Color it medium blue.

This information is contained in a **'map legend'** on the page.

My island has a large, sheltered bay on the south side with water of depth 'e, f, g', and surrounded mainly by land that is 'c' and 'd' in height. The mouth of the bay is formed by land that is 'b' in height.

There is another narrow bay on the southwest side, water of 'f' depth, and surrounded by land that is 'b' in height.

The land around the large bay moves north as 'c' and 'd' in height until it reaches the north coast.

The west side of the island is high with sections of 'a' land and some mountains.

The east side is lower with sections of 'b' land and some hills.

After coloring their maps, and some thought and discussion, more details such as rivers, lakes, streams, and waterfalls could be added.

What they are involved with now is map reading. They are interpreting the lines and colors on the page.

Where would rivers and streams start? What direction would they flow? What would happen if a stream were to flow into the small narrow bay surrounded by high land?

Where would you find a lake?

Where might people build a dock, a road, a little town, school, farms, an airport?

Where would the roads go?

For the older children you could get into more complex cardinal directions. You could decide this island was on the other side of the equator, and discuss the changes this would make. Latitude could be brought in to decide how far from the equator the island is, and what effect this might have. You might bring in the topic of prevailing winds and how the island's mountains might affect rainfall amounts and patterns. Would this island be mainly dry, or would it be good for growing crops?

Children can make up symbols for various items of interest if they wish.

There's a lot to discuss, and a lot of decisions to make. There is also room for a lot of individuality.

Story Writing:

They can write stories based on this map. These can be factual explanations as to where things are located, and why. Or they can simply be stories about life on the island. The stories might also be related to story books they have read. There may be buried treasure, or strange animals.

I've always found this kind of topic, a new unknown land, to be a favorite of children, and a productive one.

I can remember long ago an actual news story about a man who got on his horse to travel into the mountains and was never heard from again. Thinking about where he'd ended up and what he might be doing really appealed to the children.

Starting on p.12 I've told how I handled story writing in the classroom, and why. Now I'll give further reasons for my beliefs.

I started teaching in 1960 with a Grade 5 class. At that time, Spelling was a very important subject, as was Handwriting. Even at university many of the education staff seemed very concerned with how correctly you formed your letters and words. This didn't trouble me because by this time I was able to do quite well in these areas.

When I moved to the primary grades after about six years I gradually found that this emphasis on the appearance of stories created by children was not realistic, and in fact it took away from their stories.

Most young children like to please the teacher, and if the teacher wants something neat and correctly spelled, that is what they will strive to produce. But this can be very difficult for many. It can become the main focus of their efforts.

What I believe we want is for them to learn how to communicate their thoughts to us through print almost as freely as they talk.

Print lets them speak to us, but at a distance, or a later time.

I have had children who were very slow in learning to spell and print, yet who were able to express very interesting ideas with ease when speaking. When these children found I didn't mind interpreting their printed efforts, and would help with words they got stuck on, they opened up and delivered some really good stories.

During story writing times I was kept very busy helping children with the lesser task of spelling whenever they came upon a word they knew they couldn't attempt. As quickly as I could I supplied the correct spelling and a model of good printing on a small piece of paper.

They concentrated on the story writing.

Part 5. Math Drill Tests:

Following this page are 6 sheets of drill tests of varying levels of difficulty. Their use has been described on p. 4 to 6. They are loose so they can be duplicated easily. I've tried not to repeat questions on the first two pages of each set, addition and subtraction, and multiplication and division.

These may be too difficult for some and too easy for others. My intention was to provide you with an example, if these do not fit your situation.

They are not the same groups of questions I used in my classroom.

I do know that when I first made up my drill tests I had great difficulty making sure I didn't repeat questions on the same test, and I didn't leave out too many.

This time I used my computer, made up a complete list of facts, and used the cut and paste function to create as many drill tests as possible.

Then I made a copy of those and used 'cut and paste' again to take from them and create the last tests.

You could use copies of these sheets in a similar way to create your own.

These samples could also be used to make up drill sheets of the type described on p.6 and p.7 . The questions are read aloud by the teacher, there is a short pause to allow the children to print their answer, and then the teacher rereads the question, with the answer. Any child who has the wrong answer, or no answer, then writes the answer in what can be called the teacher's space. This can simply be a second line space to the right.

This has the advantage of having children see and hear the question, followed by the complete number sentence. Errors are corrected immediately.

The teacher has control over the amount of time taken for the task.

The samples could also be used to make up other types of drill cards.

This is the last of my booklets describing ideas I found useful over the years in my classroom. I hope you've found something in them to adapt to your teaching situation, or they have made you think of some better ideas, or further ideas, yourself.

Just one idea can stimulate the growth of another.

The card games in my first booklet grew out the experience of watching my son play a simple card game at a friend's house. Once I had the made the number cards then more games began to come to mind, and not all of them worked. It's been the same with most of my ideas.

I know it is very difficult to be creative when you are under stress and overworked, and that is the lot of many teachers, especially the beginning ones.

But now we've got the internet, and a lot of successful ideas can be saved for others to consider, to use, and to build on.

That's real progress! Happy teaching!