

## MATHEMATICS

# Arithmetic Easier Nowadays

Children can learn to add, subtract, multiply and divide before they can write the numbers by a new teaching method that concentrates on arithmetic of concrete objects.

By WATSON DAVIS

► OF THE time-honored three R's—reading, writing and 'rithmetic—arithmetic has long been the worst headache, not only for children, but for teachers.

The trouble is the way it has been taught. That is what the educational experts of Teachers College, Columbia University, believe and they have demonstrated it.

Prof. Howard F. Fehr, head of the mathematics department at this famous educational institution, has demonstrated through several years of experience that arithmetic is easy to learn when the children are taught what the numbers mean.

There is no more starting in with 2 plus 2 equals 4, and 4 plus 4 equals 8. Instead, the teaching trick is to show that two things and two more things are four things. The children learn their arithmetic by using objects. They may be pennies, nickles or dimes. Or they may be dolls, balls, pegs, rings, books, sticks or almost any combination of things that can be arranged and rearranged in different groups.

Even counting on one's fingers is not taboo in this new educational method.

The method is in one sense quite old fashioned and extremely logical. For numbers are used to represent things or groups of things. It is only because we get so used to them and take it for granted that they represent things that we think of numbers as abstract entities in themselves.

## Memorizing Tables Wrong

It is all wrong, say the educators, to attempt to have children memorize those multiplication tables until they do understand and realize that numbers are simply useful symbols.

The development approach to arithmetic, which the new method is called, has already had some five years of experience in the New York City school system, and it is being adopted throughout New York City and other areas as fast as teachers learn how to teach it.

With the fortunate children who acquire their arithmetic by the new method, arithmetic becomes a game. Often the problems are acted out. Learning becomes fun instead of a lesson.

It is not recess and yet a group of boys and girls are actually playing with shiny colored balls. Two balls are taken away from a group of five. This is subtraction. One of the youngsters rolls a ball into the group. That is addition. And now a group of six balls is separated into two groups

of three balls each. This is division. If you have a number of groups of five balls each, for instance, and two or more of them are combined, that is multiplication.

The idea is to present arithmetic as concretely as possible. The new kind of teaching is aimed at having children study and think out situations, not just learn things by rote. Thus, the children begin to understand and develop the mathematical concepts clearly.

Only later do they make written computations and much later they apply what they learned so pleasantly to their own lives, figuring out their little budgets, helping to do the family shopping and keeping scores for their own games.

All the old memorizing and drills and the reciting of tables have not disappeared by any means, but those doing the new mathematical teaching realize that only after children understand numerical facts does memorizing have meaning.

If a child forgets some numerical fact, some item in the multiplication table, such as 3 times 6 equals 18, he can actually sit

down and work it out for himself, allowing logic and reasoning and experience to substitute for memory.

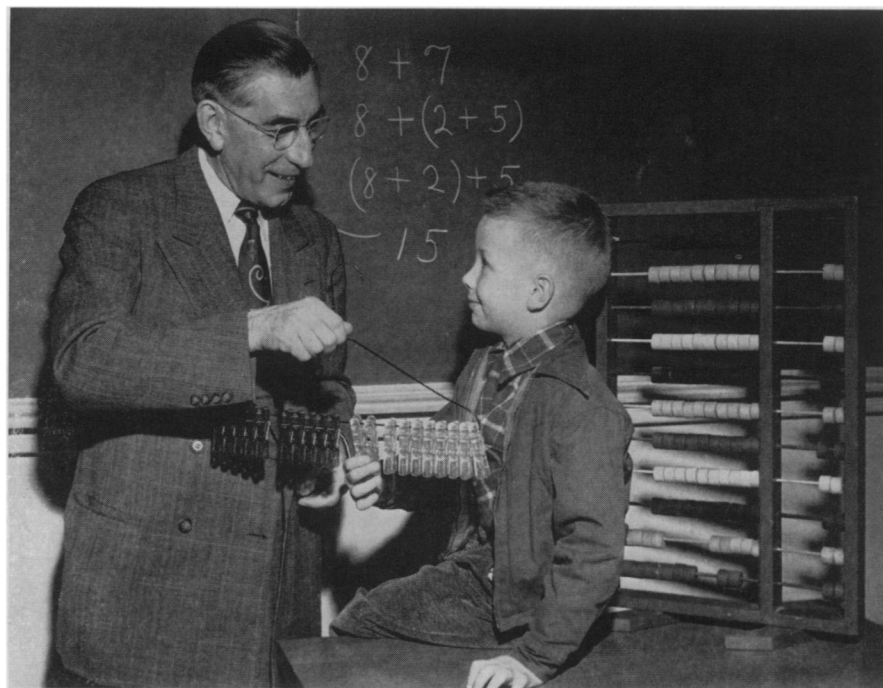
Interest in the new system grew as it was discovered that an increasing number of children were reaching high school unable to understand more advanced mathematics, and many were having difficulty in using ordinary arithmetic in their jobs.

The new system is designed to give students a basic understanding of mathematics as a way of thinking, which will be more permanent and adaptable than memorized skills.

"One of the reasons why arithmetic has been traditionally difficult to teach and learn is that the subject, even at the elementary level, is a science requiring abstract thinking," Prof. Fehr explained.

"Teaching arithmetic so that children can learn abstract ideas from it means that it must be explained logically. The sequence is from many simple and varied experiences with concrete things, to pictures of things, and to more complex mathematical relationships and problems."

Children find numbers, on paper, hard to understand. Every adult is familiar with the number four, but a child must learn to think out the meaning of "fourness" from a variety of experiences. He must learn to recognize four wherever it occurs



**THE NEW ARITHMETIC**—Clothespins help 7-year old Johnny Morris see the answer to a problem in addition. Prof. Howard F. Fehr of Teachers College, Columbia University, finds that if physical objects are used to show what numbers stand for, children will learn basic arithmetic easier than if they merely memorize tables and facts.



**PRAYING MANTIS**—For its size, this insect is one of the most predatory animals in existence. The prayerlike pose of the praying mantis, a near relative of the cockroach, is its normal position for seizing prey.

—four cents, four legs of a chair or four apples. In earlier grades, he may work out these relationships with beads, blocks, sticks or other objects. As he grows, he can use numbers in problems without specifically applying them to the things they represent.

Teaching a child to understand number relationships in this way is made as practical as possible. For example, an important part of arithmetic is the study of measurements in pounds, quarts, minutes and miles. Under the old rote system, these measurements were memorized after the child had become familiar with numbers and before he had had experience with the measurements themselves.

Now, a child's first arithmetic lesson starts in kindergarten, where he learns general ideas of measurement — heaviness or lightness, hot or cold — through class experiences. In the next grades, he learns to measure with more exactness, using the numbers he knows. He pours two pints of water into the class aquarium, or measures a piece of cardboard for a doll house.

In each class, he learns to handle more complex measurements of time, space and objects. He learns to tell the time, to buy and sell in the class "store," to keep score in class games and races, or to check weather temperatures.

From his experience in using measurements, he becomes more skillful in understanding them and in developing the tables of measure. In each class, he uses more advanced methods, starting with whole numbers, then common fractions and, finally, decimal fractions.

This kind of teaching will cause the child to like arithmetic. He will remember the principles involved even after he has forgotten specific skills. Of all types of learning, skills are the most likely to be forgotten unless practiced.

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## VETERINARY MEDICINE

## Destroy Parasitic Grubs

Cattle grubs, which cause up to \$300,000,000 worth of damage to meat, milk and hides annually, are killed in animals injected with organic phosphorus insecticides.

➤ ORGANIC PHOSPHORUS insecticides, fed to or injected into livestock, have killed cattle grubs in tests at the U. S. Agricultural Research Service laboratory, Kerrville, Tex.

If further tests prove the insecticides to be effective and without toxic effect on the meat or milk of the cattle, a method will be at hand to rid the U. S. of a pest that causes up to \$300,000,000 damage to meat, milk and hides annually.

The new insecticides are diazinon, chlorthon and a dialkyl phosphate.

The scientists' problem has been to find a chemical that will kill the grub early in its nine-month life inside the cattle before the grub can do much damage.

External insecticides available today kill the grubs only after they have emerged through the hide on the back of the cattle.

Since the damage to the livestock has already been completed by the time the grub emerges, these insecticides are not usually of value unless applied to a whole area, such as an island, which cannot become reinfested. In such a case, future herds will probably not be bothered by the pests.

Other internal insecticides have been found to cause toxic chemical residues in the meat or milk of the treated animals. Scientists hope the phosphate residues will disappear from cattle very quickly as they do from treated plants.

Only time and many tests will show whether the new insecticides are truly effective and safe. Practical, widespread use of them is not to be expected in the very near future.

The cattle grub has infested cattle in America ever since the first livestock were imported from Europe.

The adults or heel flies, which are about half an inch long, lay eggs on the ankles of the cattle during spring and summer. These flies disturb and frighten livestock, sometimes causing stampedes in which the animals are seriously injured.

The eggs soon hatch and white grubs, or larvae, burrow into the ankles and internally through the body for about nine months. At this time they form cysts on the backs of the livestock after cutting a hole through their valuable skins.

In five to seven weeks the larvae, now fully matured, drop to the ground and form pupal cases from which another generation of heel flies comes forth.

One of the few places in which the insects have been practically eliminated is Clare Island, off the coast of Ireland. Their destruction came in 1920 as the result of a five-year cooperative movement. At that time the cattlemen had to squeeze the larvae

from the cysts on the cattle by hand to destroy them.

Reinfestation of Clare Island has not occurred because heel flies do not operate over large bodies of water.

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## SURGERY

## Nerve Cutting Helps Older Patients, Too

➤ PATIENTS OVER 65 with artery trouble as well as younger ones can be helped by an operation in which certain nerves of the sympathetic system are cut, in the opinion of Dr. Herbert J. Movius II of Long Beach, Calif.

Results were better than expected in 43 patients aged 65 to 83 years, he reports in the *California Medicine* (July).

Of the 43 patients, 19 had an "excellent" result from the operation. Results were fair in 13 and poor in four. One patient died shortly after the operation and six died later.

The results were judged by one or another of three physicians who examined the patients from time to time in the six months to five and a half years since the operations.

The operation was judged worthwhile by 34 patients, with only two saying it was "no good."

The artery trouble the patients suffered is known medically as arteriosclerosis obliterans. In this condition, the artery walls have gotten so thick, inelastic and hard that not enough blood can get through the artery. Gangrene from lack of nourishment to the affected tissues may result. Pain in walking, sometimes inability to walk, and cold feet and legs are other symptoms.

The nerve cutting operation to allow relaxation of the artery walls and thus increase the blood supply has heretofore been limited to younger patients, Dr. Movius points out. However, he says, "a great number past 65" need help but have been denied the operation on the basis of age alone.

In 12 patients, he reports, the operation was done only on one side, that of the more severely affected leg. These patients, six months to four years after, asked for the operation on the other side because they had had relief of symptoms or arrest of the progress of the disease on the affected side.

Of the 43 patients, 24 could walk farther after the operation before pain stopped them and 13 were able to work again.

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