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COUNTRY OF RIDDLES

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FOREWORD

This article is composed of materials accumulated during lessons, which are given in classes of elementary school №30 of Petrozavodsk. The official name of the course is «Development of creative thinking using elements of theory of inventive problems solving (TRIZ)».

Today psychologists, teachers and parents are seriously working on the problem of development of creative thinking in children. Several ways of solving this problem are seen.

Some specialists study structure and quality of creative thinking and imagination in detail. Basically, they train children's capabilities by giving them such exercises as «Think of as many uses for this object as you can» or «Create a sentence using the following words», etc. Such exercises, of course, help children's development, but hardly can be seen as creative activity. Even as kids understand it, creative activity should give bright, attractive and new

results. Developing creative ability without making kids familiar with creativity is the same as teaching a kid to swim only on the sand. Will such a student want to use his abilities in real creative activities? Will he be able to do that?

Other teachers create along with their students - they sculpt, draw, playact, write short stories without stopping to think which exactly abilities they are developing. They give their students a taste for creating, but no conscious tools to use. Such people practically can't share their unique experience of creating, because only the experience put into clear rules and techniques is usable.

Here TRIZ gives its users unique possibilities, allows them to improve old and create new; that means, to create with help of definite rules, terms and techniques. Based on objective laws of the world, TRIZ allows anyone who understands its rules to solve creative problems.

Older children who study TRIZ are able to write stories and to invent new real technologies. It is more difficult for small kids, because they don't know physics and chemistry that are so important for an inventor. Some of them can't even write.

The necessity to find objects of creativity for our smallest students led us to riddles. Not many children will be left unmoved by a good riddle. When riddles are used, many problems can be solved, such as systematization of an object's characteristics and functions, to building models and developing associative thinking. Besides, composing riddles is an art that can be mastered even by 4- or 5-year-old children.

The following material has been used for a year and a half in groups of 6-years-old children. When used to organize individual work with 8- and 9-year-olds it produced, we think, satisfactory results.

Our experience of using these materials allows us to give some advice, especially to those who are not too familiar with TRIZ.

1. **Country of riddles** is not a collection of lesson plans but just a general skeleton of training. For example, in the author's version the topic «Colour» takes, depending on age or level of development of children, one or two full sessions. However, teachers, due to their own goals, may either add to the groundwork of the lesson, or use parts of it in other sessions. An example of creative (even though, in our opinion, not completely correct) usage of the material from **Country of riddles** is S. Gin's article «World of riddles».

2. The following material is just a cross-section of lessons that mainly touch riddles. Teachers should have in mind that the lessons must contain, as necessary elements, inventive problems. Synthesis of such problems and their solutions is discussed in another article.

3. Finally, to those teachers who never studied TRIZ and who are seriously interested in this theory, we advise training on one of our seminars.

A couple of words about the structure of this material: in the first 8 chapters the general skeleton of lessons is given, didactic goals are outlined. Also these chapters briefly describe the general plot of the lessons, specific exercises and examples of riddles are given.

In the chapter 9 we try to show how these materials can be used in some school subjects.

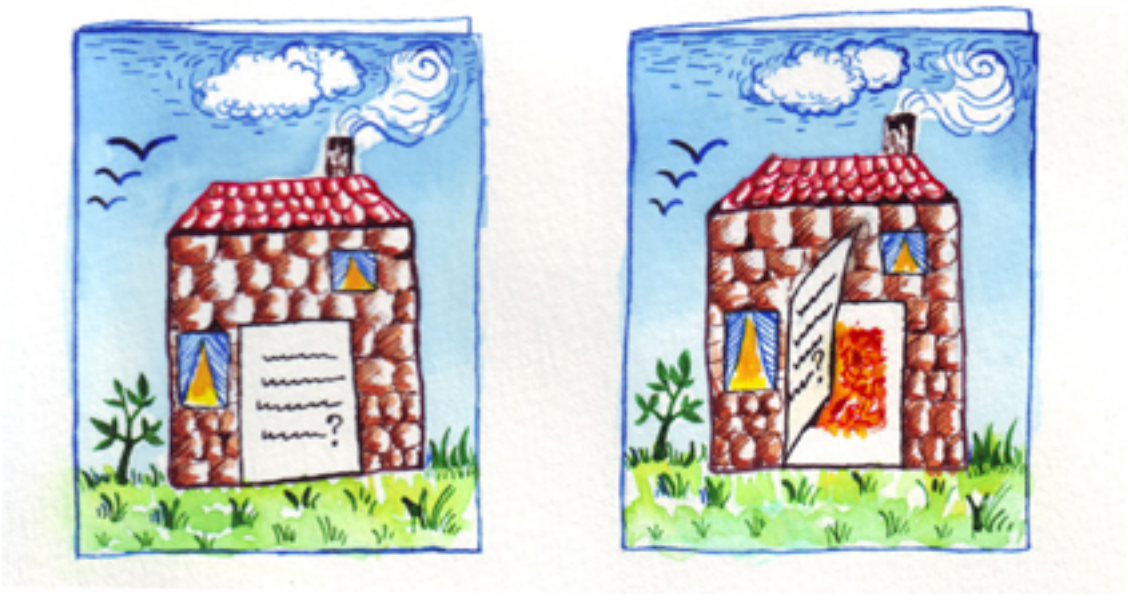
In the chapter 10 we propose some general schemes of synthesis of different kinds of riddles. When comfortable with that material, a teacher, in the author's opinion, will be able to compose his or her own skeletons of riddles according to his or her own didactic goals.

In the chapter 11 the author shares ideas about effect riddles have on kids' education.

CHAPTER 1: Country of Riddles – what is it?

What do we know about the Country of Riddles? First of all, this is a country, and this means that like every country it has mountains, rivers, seas, cities and roads. No, wait - mountains-riddles, rivers-riddles, seas-riddles... But what is a river-riddle? Could it be a river that exists but at the same time doesn't exist? You can solve this problem with your students, while we turn onto road (also riddle) which leads to the City of Riddles. That city is inhabited by strange objects (which are riddles also). Its inhabitants will appear only if we find an answer to them, and during other time they sit in their little houses and tell us different strange things about themselves.

Children invented a way of bringing riddles to class – they draw a house in their notebook, and the question is on the door. If the door is opened (it's cut in the paper), the answer written on the next page can be seen.



How do we play riddles?

1) One of the students leaves the classroom temporarily. The teacher shows an object to the class and discusses with the students a riddle they are going to compose. Then the object is hidden, and the student is called to solve the riddle. We should say it is not easy to solve a riddle – one should be able to create a mental image of an object by joining several characteristics. If you don't believe it – try for yourself.

2) The next step is composing riddles mentally. This time the one who is going to be solving it doesn't have to leave the room – he or she simply turns to the blackboard. The teacher shows an object to the class, and the students mentally compose a riddle. Then the process of solving is repeated.

CHAPTER 2: The City of the Simplest Riddles

Our first goal is to learn how to separate objects according to their characteristics. Our journey starts in the City of the Simplest Riddles. Its four streets are called "Shape", "Colour", "Size" and "Substance". Let's write the names on the board, and in the centre we will have the Central Square.

To make an object into a riddle in this city you have to describe its shape, colour, size (compared to some other object) and substance it's made of.

Example: "Rectangular, black, smaller than the wall but bigger than the window, wooden" - blackboard.

But, before we compose real riddles, let's walk the streets of the city.

Street "Shape"

Ex. 2.1

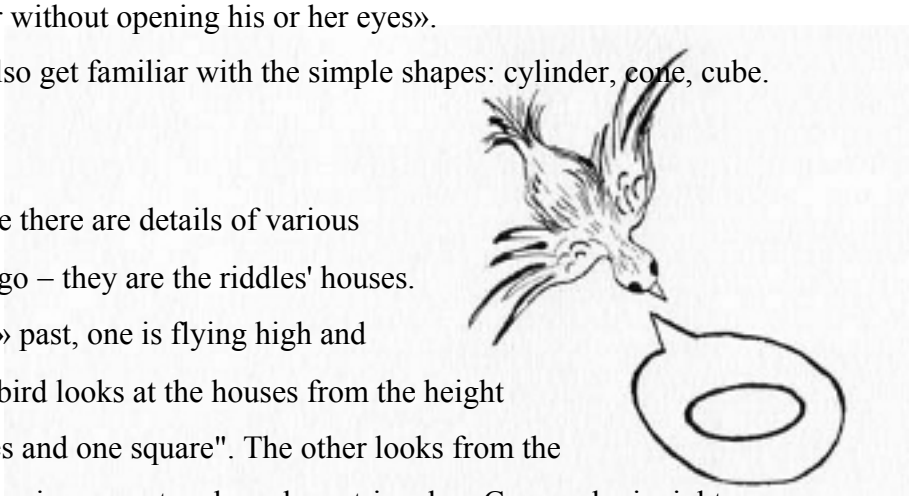
«In this house round and flat objects live. Guess who inhabits the house? Which group (team of students) will put more tenants into the house?»

The points can be counted with chips.

Ex. 2.2

«We knock on the next door, and they answer, «The objects that live here can be found in your classroom, and they have a rectangle in their shape. Remember us with your eyes closed». Attention - everybody closes their eyes and thinks while I slowly count to ten. After that a person whom I touch will answer without opening his or her eyes».

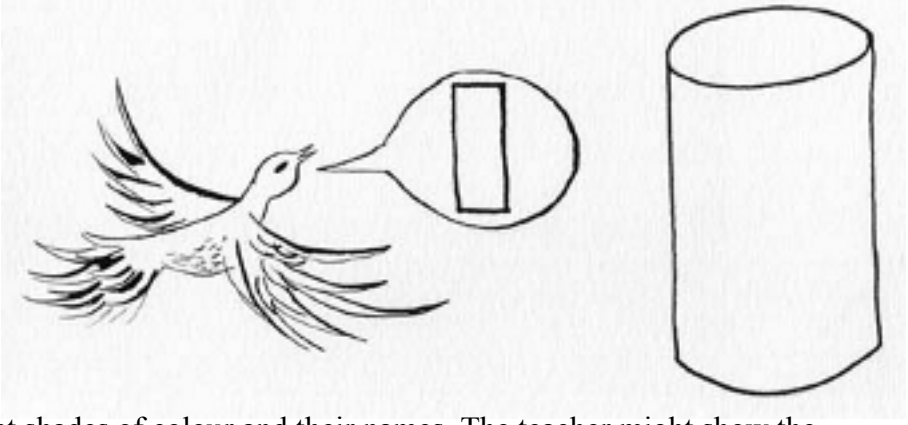
On the street we also get familiar with the simple shapes: cylinder, cone, cube.



Ex. 2.3

«Look, on the table there are details of various shapes from children's Lego – they are the riddles' houses. Two toy birds are «flying» past, one is flying high and the other – low. The first bird looks at the houses from the height and says, "I see two circles and one square". The other looks from the front and argues, «No, there is one rectangle and one triangle». Guess who is right».

This might be the first time children understand that objects can be seen differently from different directions.



Street «Colour»

Talk about different shades of colour and their names. The teacher might show the students a spinning top that mixes the rainbow into one white colour.

Street «Size»

Kids get familiar with such terms as "height", "width", "length" and learn to describe objects in comparison (for example, "wider than a pencil-box but more narrow than a chair"). It might be good to start with objects that have opposite characteristics (such as wide-narrow, tall-short, etc.)

Ex. 2.4

«Solve a riddle: what can be first big and then small? (A muffin, a candy, sugar in tea...)».

«And what can be first small and then big? (A person, a soap bubble, dough – everything that grows)».

Here we make our first steps in imagination development.

Ex. 2.5

«We have a guest – a little gnome who dreams of becoming a giant. On the street «Size» it is possible, only the kids' help is required. To make the gnome grow we must tell everybody that he can do something only big people can do. Let's make him start growing gradually. We start: «The gnome is so big he can sit at the teacher's desk». Who's next? «The gnome is able to reach the ceiling»; «The gnome is able to take a bird out of its nest», «...tumble a nine-stored building», «...drink a lake», «...step from a planet onto a planet», «the gnome sees our Earth as a small globe...», etc.».

Finally, the gnome is scared of his giant size and asks us to make him tiny. I start: "The gnome is now so small he can fit into a key-hole". Kids continue: "The gnome is so small he sees every puddle as an ocean", "...when a bread-crumb fell on his head, he started to cry because he thought it was a brick", "...you can't even see him in a microscope". Finally; "The gnome is so small he can't do anything".

A riddle for you, readers – try to describe an even smaller gnome.

Comment 1

In this exercise it is important to point at the graduality of growth, or there is a possibility that some student will enlarge the gnome to the size of Universe, and the other children won't have anything to do.

Comment 2

It also matters that the size of the gnome is shown through his acts. Describing his size through comparison (big as a skyscraper) is much easier than finding appropriate things to do for a giant.

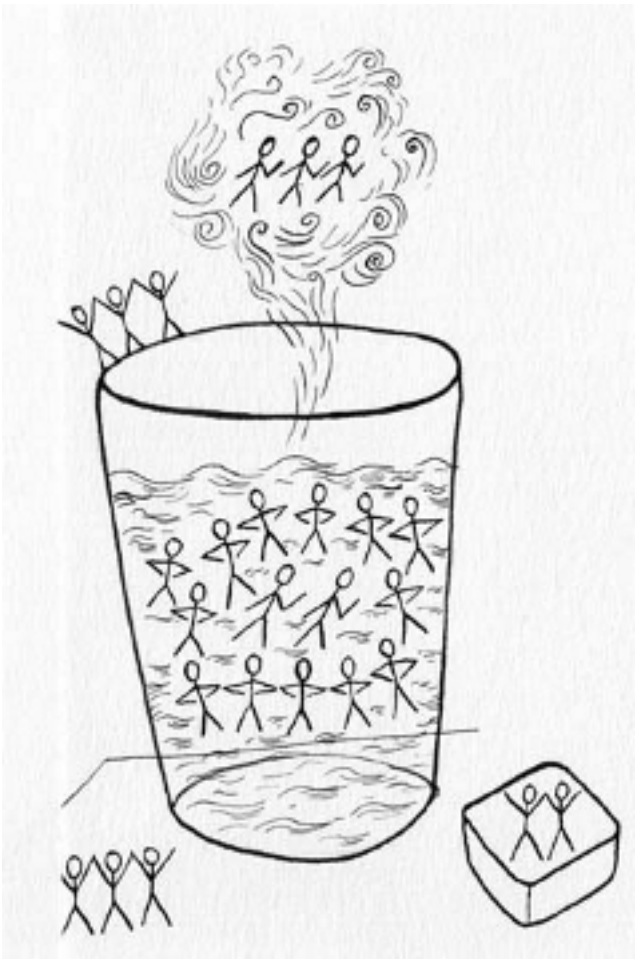
Ex. 2.6

Our gnome is disappointed – he doesn't want to become a giant or a microbe anymore. He

asks the students to draw the world's biggest tree for him so he can climb it and look around. Besides, near that tree he can, when he wants to, feel very small.

«Draw a very, very large tree on a standard sheet of paper».

Street «Substance»



Here we teach kids about the structure of matter, using the popular TRIZ model - Method of Little People.

«Imagine that every object, every substance, everything living and non-living around us consists of very little people. They behave very differently. The Little People of solids (stone, wood) hold hands tightly - so tightly you can't weaken their grip. That's why solids don't change form. The Little People of liquids don't hold hands - they just stand very close to each other, shifting from one foot to another. That's why liquids don't hold their shape. But if you fill a glass with liquid, you can't add anymore in there - the Little People stand so closely to each other there is no free space between them. Also there are gaseous People. They are silly - they are far away from each other, always running back and forth and bumping into each other. Into the glass full of gaseous People you can add more - remember, there are lot of space between them. If we breathe more air into the glass, the Little People will move closer, that's all».

Several students come out in front of class and show how the Little People behave in solids, liquids and gases. It is possible to introduce «soft». People, who are holding hands but are bent easily (cloth, paper).

Further in the city there are riddles with Little People.

Ex. 2.7

«Guess what's drawn in here: solid People on the outside, inside solid and liquid People, and solid again in the very centre. (That could be a cherry, a plum, a peach; or maybe a lake - in the centre there is a large island and small islands closer to the shore)».

Kids can find many versions of solutions for such riddles.

Ex. 2.8

«Compose your own riddle with the Little People and draw it. (Another version: a group of students composes a riddle and acts it out, with them posing as the Little People)».

After exploring every street of the city we are on the Central Square where all the streets meet. Here riddles live that require a description that includes the shape, colour, size and substance at once. We can now start composing more complicated riddles.

Comment 3

On this stage the teacher should have various simple objects: a piece of chalk, a mirror, a pencil-box, a jar, etc. (Not every object can be described according to the "shape-colour-size-substance" scheme.)

Ex. 2.9

«I have an object, which lives in this house and doesn't want to tell anything about itself. Try to ask questions - perhaps, it will answer them».

Students understand quickly that the easiest thing is to walk the familiar streets and find out the shape, size, colour and substance of the object. Some find other good questions - what is that object for? Where is it? And so on.

There is another way to warn off senseless going through different versions. Before the game starts I talk to one of the students, and we act out a small scene:

Student:	**Teacher:**
	- I have an object.
- Is it a cup?	- No.
- An eraser?	- No.
- A book?	- No.
- A ball?	- No.
	- I can't find the answer!

The teacher asks the class: «Why can't she solve the riddle? What should she ask me first? »

Then we start the game «Dialogue with IBM» or «Yes-No».

Ex. 2.10

«In our city we have a large computer centre. Who knows what a computer is? So, IBM can play riddles, too, and they can answer your questions. But, unlike humans, this machine can only say two words – «yes» and «no». If you ask it a question that cannot be answered with

these two words, the machine will make a sound like that: «T-t-t...» (I click my tongue). Now try to solve the riddle the computer has. Ask questions».

«What shape is it?» (T-t-t...)

«What colour is it?» (T-t-t...)

Finally somebody understands: «Is it round?» – «Yes!»

Comment 4

In the beginning students don't follow the answers of the others, so it would be good if the computer stopped from time to time and buzzed quietly indicating that the students have to repeat what they have found out about the object.

When that game is well understood, the method of description of the object should be changed.

Ex. 2.11

«The computer has a new riddle for you; the object in the riddle is one of the characters of a fairy tale or a cartoon. On the blackboard there are questions that will show you the way to the solution. Remember that the computer can only answer «yes» or «no»».

Questions on the blackboard are: what does it look like? Where does it live? How does it move? What does it do?

«Where does it live?» (T-t-t…)

«Does it live in a house?» – No!

Comment 5

Younger students will do better in «Yes-No» if you give them the key questions that they are going to need to find the solution. For the children who can't read you can replace questions with symbols. Of course, first you have to teach children to understand the symbols.

Comment 6

In the exercises that have been described here, the key questions, of course, do not include all the branches of systematic solving. But, in our opinion, it's not needed. The basics should not be too complex; the students can add their own branches depending on the context of a riddle.

Comment 7

For those teachers, who are familiar with the basics of inventing, let's mention another effect of the game «Yes-No». Asking questions, the students actually conduct morphological analysis of an object along the axis given by the teacher (the key questions on the board are the axis of a morphological box). Therefore, work with «Yes-No» logically leads us to building morphological tables.

CHAPTER 3: The City of Five Senses

Our next goal is to teach children to use their five senses as a resource for solving various problems.

To get into that city we have to go through the Gate of Blindfolds. We choose a guide and blindfold him, and I take a bell, a bottle of perfume, open cans of sugar and salt out of my bag. The guide should guess what these objects are by listening to the sound, smelling, touching and tasting them. The students explain which sense helped them to define the object.

Let's draw a conclusion. A person has:

5 senses 5 receptors 5 ways to discover something.

Senses	receptors	ways to discover something
Sight	 Eyes	Looking
Hearing	 Ears	Listening
Touch	 Skin	Touching
Smell	 Nose	Smelling
Taste	 Tongue	Tasting

Five senses – five streets in the city.

Street «Sight»

Ex. 3.1

«Let's look at an object and describe the way we see it (not only size, shape, colour and substance but also other characteristics)».

Then we'll organize a contest – which group of students, looking at an object, will compose the longest riddle? The number of characteristics we mark with chips, and the longest riddle is put to live into the largest house.

Street «Hearing»

«Objects that live here can be guessed by the way they sound. But right now the street is silent, all the sounds are hiding from us. What are we going to do? We can't guess an object without it sounding».

«We decide to be very-very quiet and wait. Perhaps, the objects will think we're gone and sound again»?

Ex. 3.2

«Let's close our eyes, sit quietly and listen which sound will come from what direction».

We hear: whistle on the left, rustling on the right, and tapping in the middle of the class.

«That means that in one group of houses there objects that can whistle. Guess what they are».

Similar exercise is given to the other groups.

Ex. 3.3

«I have a small bucket in my hands».

«It can thunder because it's been living in the same house with tanks, cannons and machine guns; but now the bucket asks us to find another apartment for it to live in. What can we do with it to teach it to make more peaceful sounds? »

We decide to pour water into the bucket. Now it can bubble and will be able to live with a stream or a kitchen tap.

Here we also study the nature of sound. We observe the way our throat vibrates when we make sounds; then we simulate with the help of the Little People vibrations in solids, liquids and gases. Conclusions can be made about the way sound is spread in different materials. To finish the topic we play with a match telephone.

Street «Touch»

How can an object feel? It can be sharp, blunt, smooth, hard, soft, warm, cold, slippery, rough...

Ex. 3.4

On the table there is a cardboard house with its roof off. I ask students to touch the inhabitants of the house. The first student's task is to find a smooth object, name it, take it out and show it to everybody. If you found a smooth object you get a point. The next task is to find a soft object, and so on.

For older students the task is harder - they have to find an object that has two characteristics (for example, soft and rough), then - three characteristics, and so on.

Street "Smell"

We fill the house with objects that have nice smells. We try to distinguish between different sorts of perfume by their smell and simulate with the help of the Little People the way perfume produces its smell.

Street «Taste»

We create sour, sweet, bitter and tasteless houses and try to distinguish between different berries judging by their taste.

A variety of exercises are possible; the important thing is to use all the five senses, to show their necessity to the students.

Then we start up on the riddles, which besides characteristics we've known before (shape, colour...) have some new ones. Possible questions are: How does it sound? How does it feel? How does it smell? How does it taste? The rules of the game are the same as before. However, now less time is given to the descriptive riddles than to "Yes-No" game.

Comment

The teachers that are familiar with the way of solving inventive problems are advised on this stage to start using problems connected to discovering. For example, a problem about discovering that a filling has fallen out of a tooth. (The answer: under the tooth a substance with strong taste is put beforehand).

In such problems students are given the basis – **five ways to discover something:**

- to hear,
- to see,
- to smell,
- to taste,
- to touch.

CHAPTER 4: The City of Similarities and Differences

The goal here is to develop in children associative, imaginative thinking and teach them to compare objects and situations.

In this city some very beautiful riddles live. Any object can be brought in here – there is enough place for everybody.

However, to get into the city you'll need a pass.

Ex. 4.1

I have a fur hat in my hands; what does it look like?

Possible answers are: a kitten, a crocodile, a pile of snow. It's not enough to just give an answer; you have to prove it. «From what direction do you have to look to see the crocodile? Where's its tail? Underwater? What is it doing right now?»

When every group of students has a pass, we can come in to the city. Here every riddle lives amongst friends it is similar with. Similar objects don't hide, they feel free to walk out of their houses and tell everybody what similarities and differences they have with the object in the riddle.

Ex. 4.2

Let's compose a riddle from the table on the blackboard.

What does it look like?	How is it different?
A ballerina	Non-living
An umbrella	Doesn't hide you from rain
A mushroom	Can't eat it.

Example: this is a riddle about a small spinning top: «Like a ballerina but non-living; like an umbrella but doesn't hide you from rain; like a mushroom but you can't eat it. What is it?»

Comment 1

When composing a riddle, you should tell students that the differences have to be important and meaningful, not just any.

In another house objects act differently - they tell us how the riddle is similar to them.

Ex. 4.3

The new basis showed on blackboard:

What does it do?	What is it similar to?
Gives light	A lamp
Melts	Snow
Drips	Rain

Example: A riddle about a candle. It can be presented as: «Gives light, but not a lamp; melts but not snow; drips but not rain».

Comment 2

What forms of work can be proposed? As before, the riddles are composed for one student (or for a group) by the whole class. Mental composition is not used here, since such riddles require longer work with words. It might be more efficient to divide students into groups and organize a contest. Also, composing riddles could be given as homework, but then the students should be given tables with the basics. On one side of the sheet a student can write his or her riddle, and on the other side— the answer.

Comment 3

The exercises, described in this chapter, require ability to read and write. These requirements can be evaded if the basis is given orally (it is usually easy to remember) and the parents are involved in the homework.