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TEACHING OF PRIMARY SCHOOL MATHEMATICS

By:
Pankaj

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TEACHING OF PRIMARY SCHOOL MATHEMATICS

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Sample Preview of the Solved Sample Question Papers

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QUESTION PAPER

(June – 2017)

(Solved)

TEACHING OF PRIMARY SCHOOL MATHEMATICS

Time: 3 hours] *[Maximum Marks: 100*

(*Weightage 70%*)

Note: *Question no. 1 is* ***compulsory****. Answer any eight questions from Q. No. 2 to 10.*

Q. 1. ***(a)*** **State two different mathematical concepts you use while cycling. Justify your answer.**

Ans. Speed and Distance Calculations: The distance travelled by a body or vehicle in a unit time is known as its speed.

If the two objects move in opposite direction at different speeds

If the speed of 1st object = x km/hr and

Speed of 2nd object = y km/hr

Therefore, their relative speed = (x + y) km/hr

We know, speed of one object with respect to another is called relative speed.

If distance between them = *d* km, then

Time after which the two objects meet = d km/ (*x* + *y*) km/hr

If time after which they meet is given i.e., time = *t* hours

Then distance covered in 't' hours = time × relative speed = t hours × (*x* + *y*) km/hr

Now we will learn to calculate when two object move in opposite direction at different speeds.

(b) **List four reasons why children should learn mathematics.**

Ans. Career: Math is needed for almost every single profession in the world. If you want to be a CEO, a real estate agent, a biologist, or even a rocket scientist, it is without a doubt that numbers will be utilized. Basically, you will never be able to escape math and you might as well accept it and have fun learning it while your career does not depend on it.

Money: Another aspect of growing up into a young adult is opening and managing a bank account. It is important to be accurate in math to care for your precious savings, making sure there are no mistakes.

Countdowns: For many, this will be the most important reason on this list to know math: so you can countdown the days until school is over and summer starts!

Test Scores: It is towards the end of May, and for all high school students, the school year is coming to an end very soon. That also means final report cards will be coming out. In order to finish with an A in that tough class, you need to know what to get on the next test to keep your average up. You need math to calculate that test score (and maybe even to ace the test) to know what your final grade can be.

(c) **Explain why 'classification' is considered a pre-number concept. Also give an outdoor activity to help assess a child's ability to classify.**

Ans. The Essential Pre-number Concepts

- Matching
- Sorting
- Comparing
- Ordering
- Subitizing
- Matching

Matching leads to understanding the concept of one-to-one correspondence. When a child passes out cookies, each child in the room gets one cookie. Maybe there are just the right amount of cookies or maybe there are extra cookies. Matching forms the basis for our number system. When a child can create "the same", it then becomes possible to match two sets. This becomes a pre-requisite skill for the o more difficult tasks of conservation

Sorting: Children need to look at the characteristics of different items and find characteristics that are the same. Young children usually begin sorting by colour before sorting by other attributes.

Comparing: Children look at items and compare by understanding difference. Big/little, hot/cold, smooth/rough, tall/short, heavy/light At the preschool level children should make comparisons of more, less and same by making visual comparisons.

Ordering: Ordering is foundational to our number system. Children have to be able to put items in an order so they are counted once and only once. Putting items in order is a prerequisite to ordering numbers. Seriation is ordering objects by size, length, or height. When giving a child directions use ordinal words (first, next, last).

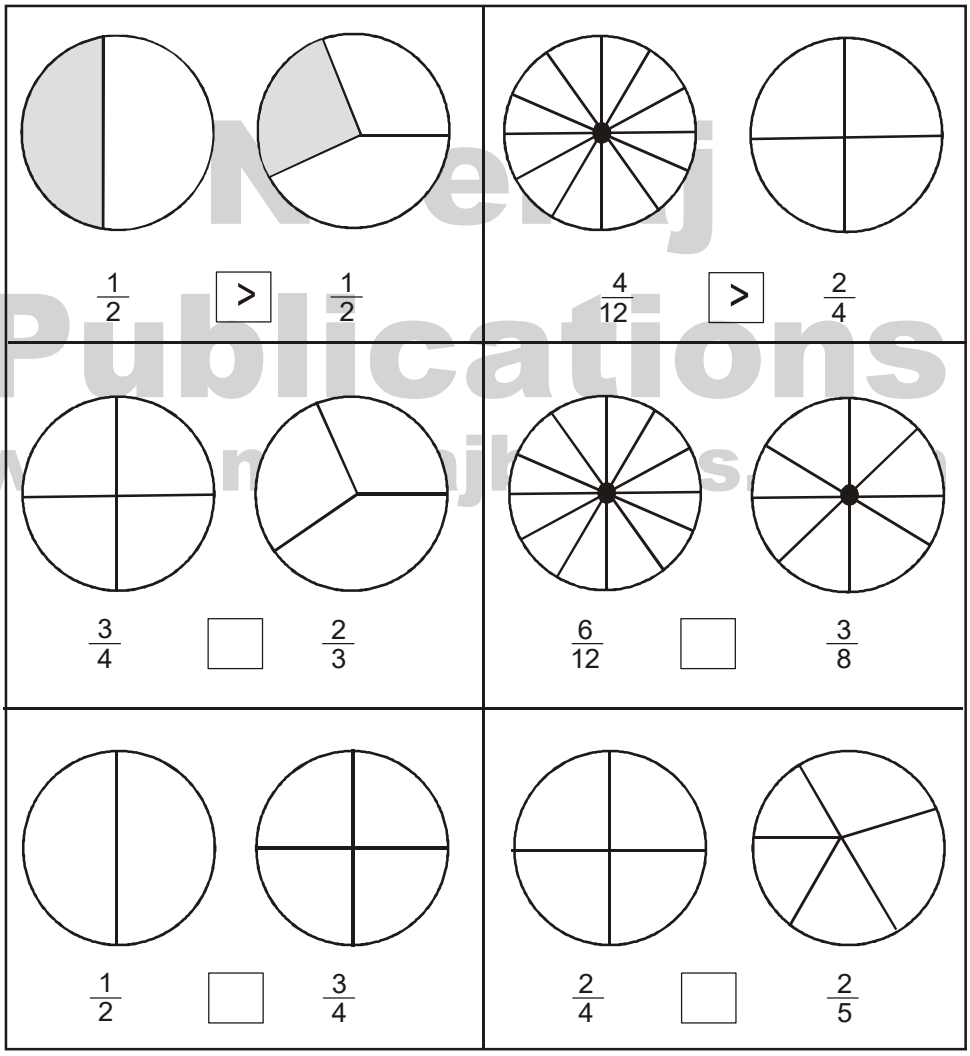
Subitizing: Instant recognition of a number pattern without counting is the definition of subitizing. The pattern can be reconstructed without knowing the amount. Subitizing helps the children see small collections as one unit. This provides an early perceptual basis for number, but it is not yet "number knowledge".

(d) **Give an activity to help a class of 30 children learn to compare fractions. Further, give an algorithm for comparing two fractions.**

Ans.

Comparing Fractions

Shade and use >, < or to compare the fractions.



Sample Preview of The Chapter

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TEACHING OF PRIMARY SCHOOL MATHEMATICS

ASPECTS OF TEACHING MATHEMATICS

Why Learn Mathematics?

1

INTRODUCTION

Every subject contains information necessary to become a knowledgeable and functional member of our society. As we become more technologically dependent, technical reasoning is needed for survival. Mathematics is no longer just a subject taken by the elite. Now it has become a staple in our educational system even though it is not appreciate by many people until it is needed. It is about relationship, or put more "Mathematically", it is about structure. In this chapter, first we learn to count, then to learn add and multiply. It can be fun just as we play games, do crosswords puzzles and read mysterious riddles for fun. Many of the people like Accountants, Agriculturists, Architects, Programmers, Chemists, Lawyers, Nurses, Medical Doctors, Technicians, everyone using mathematics in their daily life.

CHAPTER AT A GLANCE

MATHMATICS IN OUR LIVES

Mathematics has been around since the beginning of time and it most probably begin with the counting.

Mathematics Is All Around Us

It is an integral part of any sport, like a Baseball player have to figure out there batting average. Mathematics is used in calculating the ball speed, total runs scored by team or a player, measuring the bat and ball and also counting number of players, it is just used in counting like: How many candidates are taking part in the quiz competition or just how big is one million? Mathematics is used in our everyday lives; from figuring out the amount needed to buy your lunch, in calculating the bank's interest or one can say everywhere.

Do All Our Activities Involve Mathematics?

Yes, all of our activities are involved in mathematics. e.g. In planting a garden of any size, we require maths. To calculate the size and width of your garden as well as spacing of your plants requires Maths. Because it will give accurate measurement and allow you to have straight row in your garden.

In cooking it is imporant to understand numbers because most of the recipe measured by teaspoon, table spoon, etc.

In shopping, to plan a budget, everywhere we are just using mathematics.

Maths for Fun

All puzzles and games require mathematical logic and deduction and using games can make mathematics classes more enjoyable, exciting and interesting.

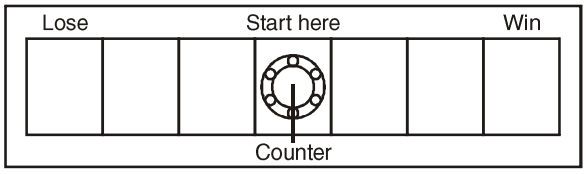
Here, is a Game for you named Left and Right it's a game for 2 players only.

You will need

(1) A counter e.g a stone, a bottle cap

(2) Two dice

(3) A board with 7 squares



Place the counter on the middle square. Throw 2 dice. Work out the difference. If the difference is 0, 1 and 2 then move the one counter towards left. If the difference is 3, 4, 5 move one space to right. Take it in turns to throw the dice, calculate the difference and move the counter. Keep a tally of how many times you win and how many you lose. Collect the result of all the game in the class. It's a quite interesting game.

HOW MATHEMATICAL IDEAS GROW?

They grow from three methods:

(i) Concrete to Abstract
(ii) Particular to General
(iii) Hierarchical Structures

Concrete to Abstract

Concrete object can be seen and touched. Abstract things are imaginary and can be felt only. So the teacher should forward from concrete to abstract.

Suppose, we are talking about the things like an orange, a laddoo, a ball. All of them have the same type of roundness. So, whenever we will talk about the concept for roundness then automatically an image will be formed in the listener's mind. Now, after this they can separate the objects that are round from those that are not. Now they realise that the property of roundness is common to all. But other attributes like their size, their colour, their measurements will separate them from each other. Now we gradually separate the idea of roundness from the many concrete things it is abstracted from. Now, on the basis of these essential properties of roundness we develop the concept of sphere. If once we have formed the concept, then we don't need to think of a particular round object when we're talking about the sphere. So, this will successfully abstracted from the concept from concrete experience. Suppose if we have to find out the volume of a sphere then it depend on its radius and after that we will come to know how big or small the sphere is so, this will examine the relationship between them.

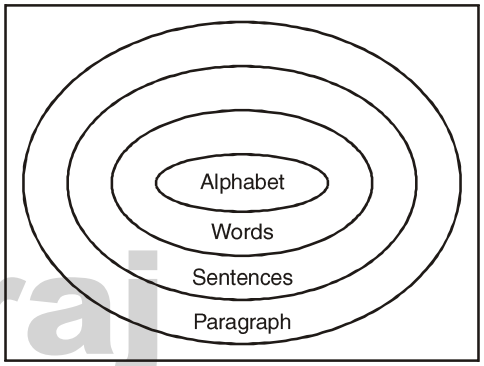
In this way we can generate more related abstract ideas and study relationship between them in an abstract manner.

Particular to General

General means common and everyone have it and particular is that which is special and make it different from others. e.g. the beak of a particular bird has many features. But that is not part of the concept of 'beak'. For instance, My bird has a long beak. I would describe the colour of that, shape of that and so on. But would this description fits the beak of any bird? Wouldn't some of these features need to be changed from bird to bird. So, if we want to apply this concept to all birds. I need to form an image of a beak which is not bound by the particular properties of my bird's beak.

Hierarchical Struture

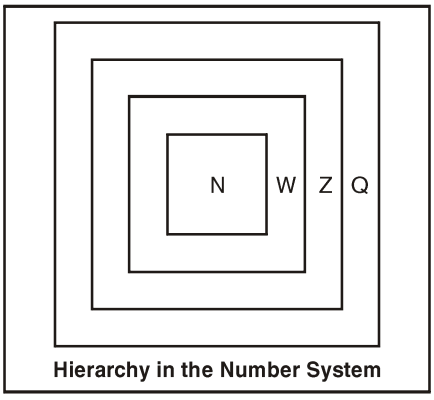
This is a structure of data having several levels arranged in a tree like structure. Here, we are taking an example of Alphabets how these are converted to the paragraph.



(1) Alphabet: A, B, C .....Z *a, b, c,* .....*z*
(2) Words: Apple, Mango, etc.
(3) Sentence: This is an apple.
(4) Paragraph: This is an apple. It is red in colour.

Alphabet
↓
Words
↓
Sentence
↓
Paragraph

Now, we are going to describe it by another method.



Hierarchy in the Number System

Firstly, there was only some natural numbers starts from 1, 2, 3,... Then zero include in this and known as the whole numbers from 0, 1, 2. Then, the negative numbers included in this and they became integers from –2, –1, 0, 1, 2, ----------then after adding positive and negative function they became rational numbers which is in the form of P/q.

THE NATURE OF MATHEMATICS

There are mainly three reasons which make the Mathematics powerful.

Mathematical Statements are Unambiguous

Every statement of mathematics is clear and precise. e.g. if we talk about the square then the definition of square is clear i.e. it has four sides and all sides are equal. So, there is no place for doubt.

Truth Criteria

Consider these statements:

(i) Water freezes at 0ºC.

(ii) 10 divides 20 without any remainder.

By actual experiment we can check both of these statements.

In the first statement, by cooling, freezing the water under some pressure, it can be shown to freeze at a temperature i.e. 0ºC.

And in second statement, we have to take 20 objects and divide them into 2 equal parts i.e. 10 in each part. So, nothing remain left.

So, we can say that 10 divides 20 without any remainder and every statement of maths is actual and only just need to apply some rules and logic.

Deductive Method

In this, the teacher first tells the rules to the pupils and the student apply those rules in different situation of language learning. It saves time and makes the process easy.

Inductive Method

In this method, the teacher should present certain examples before the students, and then frame the rules with the help of examples, the students are able to induce rules. It stimulates the power of thinking and reasoning.

Use of Symbols

In mathematics, we use symbols more as compared to statement because it makes them brief and clear.

For example, multiply seven thousand to two hundred.

Here it's complex than the following statement:

$$700 \times 200$$

It's a symbolic representation of the above given example and it makes it more understandable.

THINKING MATHEMATICALLY

We came to know about the relationship between the Arithmetic Mean (AM) and the Geometric Mean (GM). Suppose, there are 2 numbers i.e. 5, 4 then you can find the Arithmetic mean by just adding both numbers 4 then divide it by 2 same as here: $\frac{5+4}{2} = \frac{9}{2}$ and to find out the GM you have to multiply them and after underooting them as $\sqrt{5\times 4} = \sqrt{20} = 2\sqrt{5}$. There are some examples of it.

Number Pair	AM	GM
(1, 4)	$\frac{1+4}{2} = \frac{5}{2}$	$\sqrt{1\times 4} = \sqrt{4}$
(2, 6)	$\frac{2+6}{2} = \frac{8}{2} = 4$	$\sqrt{2\times 6} = \sqrt{12} = 2\sqrt{3}$
(3, 9)	$\frac{3+9}{2} = \frac{12}{2} = 6$	$\sqrt{3\times 9} = \sqrt{27} = 3\sqrt{3}$

Now, need to find out the general rule of it. Is AM ≥ GM? Now, there is need to check the generalization power and need to prove conjecture. So, there are several ways of proving it like:

$\frac{x+y}{2} \geq \sqrt{xy}$ this will be true if

$(x + y) \geq 2\sqrt{xy}$, this will be true if

$(x + y)^2 \geq 4xy$ which is true if

$x^2 + y^2 + 2xy \geq , 4xy$ which is true if

$x^2 + y^2 + –2xy >, 0$ which is true if

$(x – y)^2$ 0 and this is always true since the square of a number is always non-negative. So, now we can say that AM of any two positive number is greater than or equal to their GM.

EXERCISE

Q. 1. Think of an indoor game and an outdoor sport that you or your children play. Write down what mathematics is used while playing them.

Ans. If we talk about an Indoor Game Ludo, then we always think that how many moves we have to take more while playing it. And when we play an outdoor game like Cricket we always have to count the score. So we can say that without Maths these both games can't be played.

Q. 2. "I do a lot of maths while working in the kitchen", says a friend of mine. List four ways in which mathematics is used in the kitchen.

Ans. We use a lot of maths in the kitchen e.g.

(i) When we cook any vegetable we use ingredient by measuring the quantity of vegetables.

(ii) When we prepare tea we pour the milk by measurement.

(iii) When we kneed the dough we add the water by estimation.

(iv) When we make the rice, we put the rice and water by proportion.

Q. 3. In a conversation with a friend I said, "Maths is in virtually everything around us. Even activities like making 'rangoli' patterns, making designs and prints for clothes, dancing, feeding one's children and catching a train involve mathematics." He disagreed violently and said," Some of the things you mention can perhaps have some elements of mathematics. But all of them don't involve mathematics." Would you agree with my friend or with me? Why?

Ans. Yes, this is reality that maths is in virtually everthing. In shops we use maths for the calculation or to keep the account of the customer. Vegetable seller uses mathematics to count the money. At home, a lady manage the budget by using mathematics. So, it's necessary in every field of life. Even a child takes his firts step by making virtual image, how much steps he has to move on. Without maths a life can't be possible.

Q. 4. List specific examples of:

***(i)* Estimates of quantity, and/or**

***(ii)* Seeing relationships, and/or**

***(iii)* Grasping patterns in the following situations.**

***(a)* Hari lives in Jaipur, and has to reach Delhi on 23rd March by 10:00 A.M.**

***(b)* Suresh wants to knit a sweater.**

Ans. *(a)* Hari has to make the estimate of the distance how much time he takes to reach Delhi?

(i) He needs to measure the speed of vehicle by which speed he is going.

(ii) He has to know about the expenditure.

(iii) He use to take the shortest and comfortable way.

(iv) He needs to take the help of the map and follow it.

(b) Firstly, he should choose his choice of wool.

(i) Colour of the wool.

(ii) Quantity like how much wool he needed.

(iii) Quality of the wool (means the best type of wool for his sweater).

(iv) Needs to think about the pattern and design which he wants to use in his sweater.

Q. 5. Think of at least one real-life experience each of children that would relate to the following mathematical concepts: Addition, Volume, Symmetry and Probability.

Ans. Reeta has 2 pencils and Reena has 3 pencils when she count both of them together then there are total 5 pencils.

So, here we are using the concept of Addition. Then the total space they occupy is known as the volume.

Reeta has one pencil of Natraj and one is of Apsara. While Reena has two pencils of Natraj and one is of Apsara.

So total pencils of Natraj are 3 and these are symmetric in nature.

While on the other sides there are total 2 pencils of Apsara and these too are symmetric in nature.

If we have to choose one pencil randomly then there is probability of getting Natraj $\frac{3}{5}$.

So, here we are using the concept of probability.

Q. 6. Create four problems/riddles/puzzles for children to help them feel that 'maths is fun'. Try them out on the children around you. Find out which ones they enjoyed, and why, which letter complete the third circle.

(i)

Ans.