



# Systematic Listing, Counting & Reasoning

## Lesson Plan: Class 01 / LCR /01



<b>Overall goal of the lesson</b>	This class is the foundation of discrete mathematics which can help children think creatively and use thinking skills to solve problems. In this class we cover basic counting, using real-life examples.
<b>Prior knowledge required</b>	Numbers 1-20

**MODULE 1:**      **Module time:** 35 minutes

<b>Goal:</b>	Basic counting and why do we need to count?
<b>Description:</b>	The idea of the basic counting module is to look beyond just numbers to figure out why we need numbers at all, why do we count and how does it help us. This is the building block towards understanding systematic listing, thinking and reasoning skills in higher classes.
<b>Material required:</b>	<p><b>Physical:</b></p> <p><b>For the student</b> - Printed copy of the worksheet 01-LCR- 01_WS for each student, pencil and eraser.</p> <p><b>For the teacher</b> - Blackboard, Laptop, internet connection, paper and pencil / pen, notebook, duster (for fun activity)</p> <p><b>Electronic:</b> Presentation of the corresponding class. Refer to the following links for additional references:</p> <ol style="list-style-type: none"> <li>1. <a href="https://nrich.maths.org/content/id/7011/chapter1.pdf">https://nrich.maths.org/content/id/7011/chapter1.pdf</a></li> <li>2. <a href="http://www.slideshare.net/KassiaOWedekind/math-is-storytelling-slideshare-version?qid=4b405599-090d-4043-8b7c-49bef624d12f&amp;v=&amp;b=&amp;from_search=9">http://www.slideshare.net/KassiaOWedekind/math-is-storytelling-slideshare-version?qid=4b405599-090d-4043-8b7c-49bef624d12f&amp;v=&amp;b=&amp;from_search=9</a></li> </ol>
<b>Procedure Summary:</b>	<ol style="list-style-type: none"> <li>1. Refer to the presentation accompanying this lesson plan Class 01 - P01 - LCR01 - PPT.pptx. During preparation stage, please refer to the notes section of each slide, as it has specific comments and insights in addition to the ones mentioned in this lesson plan. Also, some slides have kid-attention grabbing entities, to help the teachers get their attention. Use those to draw their attention towards the concept presented in each slide. Walkthrough the presentation 01-DA- 01_PPT.df with the students.</li> <li>2. At the end of the class, distribute the worksheet copy 01-LCR- 01_WS.pdf to the students.</li> <li>3. Ask the students to complete the worksheet exercises to determine whether they have understood the lesson.</li> </ol>
<b>Procedure Details:</b>	Slide #2: As we begin the class, let us not get into the table of contents or describe what we will cover today. Simply bring up the slide and after a few seconds immediately close the laptop. Use the blackboard to draw a Duck / Swan using number 2 as base. Now ask children if they can close their eyes and imagine any figures / drawings that can be created using other numbers. Let them speak out one or two digits and corresponding figures that they can imagine. After a couple of minutes, bring up the same Slide #2 and show them that there are more figures that can be made using number 2 - a stork, shark. Rabbit using number 3 and a Koala bear using number 19. At this point, you have their attention. Use it to guide them towards what we will learn in this class - read out aloud the content listed on the slide.

Slide #3: The reason for this slide is to sensitize children to the quantity aspect associated with numbers and help them look beyond just numbers. Simply use the questions on the slide to guide the class discussion towards numbers, let each student focus on one of the numbers by asking them what their favorite number is. Ask children to observe the numbers listed on the slide carefully and see if there is anything interesting about each number - how it looks (size, shape, color).

#### Slide #4-5: Comparing numbers

In these two slides, we turn the discussion towards comparing numbers. See if children can compare numbers based on their value or the quantity they signify, not based on the size. Ask children to pick up the smallest and largest number here. Ask them how do they know that the number is smallest or largest? If they have been taught basic addition / subtraction, ask them what is the difference between the largest and smallest number on this slide. Ask them which number comes first, which one comes last and which one is in between.

#### Slide #6: Numbers and Counting

After favorite number in earlier slide, let's ask the children about their favorite color. They need not select from the ones shown in this slide. Keep this slide visible for some time and let kids observe it closely. We will refer to this same slide and note additional things about numbers in next slide.

#### Slide #7: Listing, Finding patterns

In this slide, we are trying to capture the concept of repetition, counting and color/digit observation in terms of discrete entities.

In the previous slide children were asked about their favorite color. Now, ask them how many colors are there on this slide. How many numbers are there on the slide? Is the number of digits same as the number of colors? This will help them count the number of digits on the slide and also count and compare if any colors are repeated. In a way, children are being encouraged to list numbers on this slide and finding patterns. Ask them why are the number of colors and number of digits on the slide not the same? Answer - some colors are repeated whereas no digit is repeated.

#### Slide #8: Why do we need numbers?

In this slide, we reiterate the concept of why we need numbers and why counting is important. Read the bullets mentioned on the slide and give examples. For e.g., 'how much' - discuss with children the concept of medicine dose when they are sick - doctor asks them to give one spoon or two spoon medicine or one tablet, half tablet etc. Numbers help to identify how much of a quantity is needed. Similarly, relate digits or numerals to quantities. If every student has to be given 1 seat then each one gets one seat only. No student will be given 2 seats to sit as the rule is one seat = 1 student. The third bullet emphasizes the fact that with numbers, discrete quantities are associated and so we can compare numbers and identify what comes before, after, or in between. Ask children if they can give example of where in real life we need this kind of information from numbers? Example: Queue for food in restaurants - first come gets served first. Those in the middle get their chance when others ahead of them get served.

#### Slide #9: Thinking Mathematics

This slide tries to highlight the concept of reasoning, thinking via discrete maths and storytelling. Mathematics is usually taught as a dry subject. In this slide, we try to highlight the fact that Mathematics can help thinking and reasoning skills. If we think, we can reason better and solve problems, not just maths problems, more effectively. Ask children why do we need to think? Std 1 children may not be able to answer the question but it is good to make them wonder what it is to think. The picture shows the story of Panchtantra in which

a tortoise is being rescued by two storks. The storks instruct the tortoise to hold on to the stick until they land and not to speak until they land. As they were flying, people on ground saw tortoise flying by holding a stick and were very amused. They started laughing and pointing to the tortoise. When the tortoise heard people shouting, he became excited and wanted to talk. He did not 'think' what would happen if he talked. He forgot the instructions given to him by storks to not speak until they landed. He did not think that if he opened his mouth to speak, he will not be able to hold the stick that was helping him to fly and he will fall. Mathematics can help us think and sharpen our thinking skills.

Slide #10, 11,12: In this slide and subsequent ones, we focus back on counting and identifying patterns. Usually children of class 1 use informal strategies when it comes to counting, solving problems and reasoning. Through classifying, sorting and pattern detection, discrete mathematics and logical thinking can be introduced to the kids in a simple manner. We don't talk about these complex concepts yet to Std 1 children but these are listed here for the teacher's benefit. In Slide #10, we ask the children to count the black dots on the slide. These dots are arranged in haphazard manner with no order. In the next slide, we will put them in order and ask them if it was easy to count. Ask them to think why it was easy - because they are in a line - or in order.

Slide #13: This slide highlights the concept learnt in previous three slides on the fact that when we list objects in a line or in some order, then it becomes easy to count objects.

Slide #14: Counting shapes and color - in this slide we ask students to observe and count shapes. They learn to identify shapes and count them one by one.

Slide #15: Another aspect of counting is comparing. In this slide we bring students attention to the fact that when we count objects, we can find out if those objects are same, less or greater than some other objects. For example - number of students in the class and the number of seats. Make students count the number of pupils and the number of desks in the class. Ask students if there are any empty desks? Why are they empty? Are those extra or is someone absent? Tell them that teachers can see the empty desk and figure out someone in the class is absent without counting :-)

Slide #16: This slide talks about a class activity. This is performed in several other discrete mathematics kindergarten class around the world. It helps students to understand the importance of 'just once', finding shortest route and other basic counting techniques which form the foundation of discrete mathematics.

Slide #17-20: These slides focus on unique names, identifying those students with similar first names, counting children with first names starting with alphabet A and alphabet S and then comparing the two numbers to see which alphabet is used in more student names.

Slide #21: This slide give examples from daily lives where we need to count, list objects systematically or relate to the quantity associated with a number.

For example: Mathematics, thinking and listing is needed to divide a pizza slice for fair distribution of food. In a classroom, each student must get to sit, therefore the total number of students is counted so that same or more chairs can be provided. Similarly, in a movie hall, seats are shared by audience. Each ticket has a seat number so that no two people contend for the same seat. Equal distribution of resources in everyday life is where counting, listing is useful. Another example could be reading time from a clock or watch or phone. When we read time, we can know whether it is late or early or just in time for some event, say lunch, sleep. Numbers and listing objects can help us know what comes before, after or in between. Example is the queue to pay bills, or get food from the food court counter - those in the middle are after the ones who are ahead in the queue. Middle ones get served only when first, second, third, gets served. Those who are at the end of the queue, move ahead as more people join the queue. Ordered listing of people helps in fair

	<p>chance to all.</p> <p>Slide #22: Recap of this class. Repeat the key learning from this class.</p> <p>At the end of the class, distribute the worksheet to students. Make this an activity for them. Divide the worksheet equally such that all first row students get one bunch. Ask each first row student to take one sheet and pass on the remaining to the ones behind him/her. Ask the last student to come to teacher's desk and return extra copies, if any. Ask them to count and tell the teacher how many extra copies they returned.</p>
<b>Assessment:</b>	Ask one or two children in the class where they use numbers in their day to day life.
<b>Information Broadcast:</b>	Homework: Let children find out where their parents use numbers and counting when they get back home.