

Course 504
Learning Mathematics at Elementary Level
Assignment 1

Q.1. “Children understand mathematical knowledge from their environment”. In the reference of the statement, as a primary teacher, discuss the strategies used by children to acquire mathematical knowledge.

Answer:

Young children are learning mathematics all the time through a wide variety of play experiences. From the time they are born, babies are surrounded by sense impressions. Shapes in particular are of immediate importance: babies react instinctively to the arrangement of shapes which make up the human face.

In the home, in parent and toddler groups, and pre-school settings, children have many opportunities to enjoy and learn Math’s through Play.

“Play is an effective vehicle for fostering Mathematical concepts and developing positive attitudes to mathematics... Adults in the pre-school setting should seek to extend informally the mathematical experiences the children have already had in their home environment.”

Mathematics in the Home

Mathematics is everywhere in the home. With the support of parents, children can grasp many mathematical concepts through their play.

Children will begin to:

- know and understand early mathematics language of measurement, shapes, spaces, positions, early numbers, order and patterns*
- know the sequence of numbers*
- begin to understand positional words, e.g. in, on, outside*
- show an awareness of time*

- *be aware of shapes in their environment*
- *be aware of 1-to-1 correspondence*
- *acquire new vocabulary*
- *learn number rhymes and songs, e.g. one, two, buckle my shoe etc.*
- *be aware of conservation*

When we say a child “knows her numbers” what we often mean is that she can recite the names of numbers in ascending order. This is quite useful to be able to do, but it means very little in itself. Children need to come to know what the number system really means. They can be helped to do this through play.

Young children have many mathematical experiences in their home environment. For example:

- *They learn about money as they go shopping with parents*
- *become aware of numbers as they count the stairs to bed*
- *start to understand the concept of time as they become familiar with the routine of their day – wash, dress, breakfast etc.*

A child’s daily life offers many practical opportunities to learn about number, shape, space, sorting and matching. For instance:

- *setting places at the table – a cup for me, a cup for you*
- *playing with water*
- *steering the pram*
- *helping to sort the washing, matching socks, big shirt / small shirt*
- *tidying up – putting similar items together*
- *matching lids to saucepans*

Here are a few ways in which you can use play to learn mathematical concepts.

Sand and Water

- *Using sand can develop mathematical concepts and language, e.g. heavy, light, empty, full, big, and little*
- *Conservation – how much will it hold*
- *Make shapes and patterns*
- *Provide boxes and materials of different shapes and sizes to compare weight and quantity*
- *Look at the differences between wet and dry as a means of looking at weights*

Language

- *You can help to promote mathematical language such as – heavy, light, empty, full, long, short, big, small in relevant contexts*
- *Look at your home environment to develop language, especially positional words – small object in front of big object, behind, in, on*

Dough

The use of dough can help to develop a mathematical understanding for pre-school children.

- *Develops mathematical language – short, long, fat, thin*
- *Make shapes of different dimensions – flat shapes, 3-d shapes*
- *Create opportunities to compare things that float with things that do not*

Imaginative Play

- *Simple activities like letting your child set the table for dinner can help develop counting skills, e.g. getting out three pieces of cutlery.*
- *Involve your child with household activities. After washing, allow your child to sort clothes into different colors, or different types of clothes, e.g. t-shirts and socks. This will help to develop a child's knowledge of shapes and colors.*

Books and Rhymes

Enjoy stories and rhymes with your child that has a mathematical element, e.g. “One-two, Buckle my Shoe”,

This can also help to develop literacy skills by showing your child that the print reads from left to right.

Let your child count out items in the books – how many animals are on the page, how many items are blue. Using rhymes can also help develop your Childs awareness of sequencing

Physical Play

- Develop fine motor skills through physical activity, e.g. sorting out a jigsaw, threading beads*
- Block play or playing with toy cars can help to develop sequencing by encouraging your child to sequence according to size, color, use (e.g. bike, car, and lorry)*
- Playing with different sized blocks can help to develop an understanding of weight and dimensions.*
- Tidying toys away allows children to sort into different sizes and colors.*
- It can also develop mathematical language – first, second, third, how many are blue, which is largest / smallest.*

Q.2. Give three characteristics of constructivist teaching. Illustrate these in the context of introducing shapes to children in class II.

Answer:

Children do not just receive content; in a very real sense they re-create and reinvent meaning for every system they encounter including language and mathematics. Teachers need to provide activities and interactions that structure or scaffold learning so students can create meaning in incremental segments.

Constructivist teaching and learning requires that students make meaning

by:

1. *Using higher order thinking skills*
2. *Showing depth of knowledge (not covering the curriculum)*
3. *Understanding and making connections to the world beyond the classroom*
4. *Engaging in substantive conversation and discussion*

Constructivism also requires a network of social support for student learning and Achievement that includes more than the teacher's response and feedback.

Constructivism places emphasis on big ideas and concepts and requires students to engage in a meaning-making process with these ideas and concepts. In classroom practice constructivist teachers begin with WHOLE concepts and work toward the parts, unlike textbook curriculums that usually begin from parts and work toward the whole.

The constructivist practices are a direct challenge to traditional forms of assessments. In the constructivist classroom assessment of student learning is interwoven with teaching and occurs through teacher observation and student exhibitions and portfolios as well as other collections of student work.

Learning Objectives

Students will be able to identify circles, squares, triangles, and rectangles.

Lesson

Introduction (5 minutes)

Gather the students where they can watch the music videos.

Watch Shapes Song and Preschool Shapes song on the interactive whiteboard.

After watching the videos, ask the students which shapes they noticed.

Tell students that today they will be learning about shapes with a fun game and some coloring.

Explicit Instruction/Teacher modeling (10 minutes)

Tell your students to sit in a circle.

Place a blue square, yellow circle, orange rectangle, and red triangle in the circle.

Tell your students that you will describe a shape and they are to guess

which one it is.

Proceed with the following prompts: something yellow with no sides, something red with three sides, something blue with four corners, and something orange with four sides. Add more choices to the circle if your class needs more of a challenge.

Ask your students to think about how a circle is different from a square, and how a square is different from a triangle.

Ask your students to describe what a side is, to which they should answer one straight line that makes part of a shape. Ask your students to describe a corner, where two sides of a shape touch.

Guided Practice/Interactive modeling (20 minutes)

Tell your students that they will be playing Color Shape Bingo.

Hand out the bingo cards and counters.

Put the call out sheet in plain view.

Tell the students to listen and look as you call out the shapes.

First you will describe the shape card in terms of color, number of sides, and number of corners, then you will show the card for visual matching.

When students have a matching shape they will put a counter on it. Tell the students that they will say “bingo!” when all four of their shapes are covered. Tell the students that there may be more than one winner at a time. When someone wins, that person will be the next caller. If more than one child wins at a time, they will sit together and share the job of being the caller.

As the shapes are called, help the children keep track by placing a counter on the call out sheet. Have your students’ trade bingo boards between rounds.

Independent Working Time (10 minutes)

Have the students remain in a circle.

Hand out the Shapes Jumble worksheet.

Read the instructions and model how to color one or two of the shapes.

Ask your students to raise their hands if they understand what they will be doing.

Dismiss them to work independently.

Extend Differentiation Enrichment:

Advanced students may create a picture using shapes.

Support: Struggling students may use a shape chart as they play the game and complete their work. Some students may benefit from playing the game again in a small group.

Review

Assessment (5 minutes)

During guided practice, the students should increase in speed and confidence as the bingo game progresses. Look for students who need support. Sit closer to them and give clues and encouragement.

During independent practice, the students should follow directions and color accurately.

Review and Closing (5 minutes)

Play one of the songs again on the interactive whiteboard.

Ask the students to think about the different shapes.

Invite the students to describe the shapes by their lines and corners. Invite the students to think of other things they could do with shapes.

Ask your students to volunteer what they will tell their parents about the lesson.

Compliment students on their hard work!

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Assignment 2

Q.1. what is addition? Describe an activity that you would like to select in teaching of concept of addition at the primary classes.

Answer:

Addition is the action or process of adding something to something else. Or the process of calculating the total of two or more numbers or amounts.

Objectives

1. *At the end of this lesson the students should be able to add different objects together to find out how many objects there are total*
2. *The students should be able to explain up to 3 different reasons that being able to add is important*

Materials

1. *5 colorful building blocks*
2. *5 pieces of paper with the numbers 1 through 10 on them*

Introduction

The teacher should start out by explaining that addition is simply the combination of 2 or more different groups of numbers. For example if you have a pile with 2 objects in it and another pile with one object in it you get three. The teacher should count the separate piles, then put the piles together and count them again. Next the teacher should get five students to come up to the front of the room. The students should be split up into 2 groups one with 3 individuals and the other with 2. The students in the first group should each get pieces of paper with the numbers 1, 2 and 3 written on them. The students in the second group should get the numbers 4 and 5. The class should then count the students in the first group. The teacher should then say that we are now going to add 2 and 3 together. As the group of two moves to the group of three the teacher should say that we

have just added 2 to 3. The students should then count the this new group and come up with the number five. The teacher should not move on if the students do not readily recount the new group and do not seem to understand that the groups have now been combined.

Main lesson

The teacher should now talk to the students about the different ways we can use addition in our everyday lives. The teacher should give the example of figuring out how many fish are in the fish tank. The fish could be separated in several ways depending on what fish are in the tank. If there is 1 black fish and 2 gold fish this is an easy number for the children to add. The teacher should then have the students take turns going around the room and looking for things they could add together. The teacher should be accepting of most anything the students want to add. If one student want to add three block and one desk that is ok.

The teacher should then ask the students about things in their homes that they can add and ask everybody to think of something at home tonight that it could be beneficial to add.

Conclusion

As a conclusion to this lesson the teacher should have several different objects that she has gathered for the students to add. Each student should get a chance to do this. If any students make a mistake the teacher should correct them and help the students by having them count each pile and then count the piles together.

Evaluation

The students should be informally evaluated based on how the teacher has observed them answering questions. A short quiz could be used as well, but should not take more then five minutes to finish.

Q.2. Explain the common mistakes committed by children in doing measurement related problems. Suggest learning activities to rectify such mistakes.

Answer:

Learning how to use a ruler is one of the basic things that a child learns when beginning her mathematical education. One of the most common math errors which take place here is the tendency to measure from 1 instead of the 0 mark on a ruler. This leads to calculation errors and inconsistencies.

Careless errors occur simply because they are not paying attention, or are working too fast.

This seems obvious, but students are often in a rush to finish so that they can move on to something else. Rushing is the easiest way to ensure careless mistakes. Encourage kids to take it slow and pay attention to what they're doing.

There is always more than one way to solve a math problem. By teaching or exploring a concept in multiple ways and from multiple angles, you provide students a richer math environment and allow for deeper understanding.

Plus, some students may find one method easier, while other students prefer a different method.

As a classroom teacher, I always required students to show all their steps because if they used the correct procedure and showed me that they understood the concept.

For example: When measuring a line segment, a child might begin from the 1 marking on the ruler, thereby getting a completely wrong reading.

Set up two stations for students to practice measuring length, width, height, and weight.

Station 1 - Place several classroom objects and the ruler, tape measure, and yardstick at the station. Have students take turns using the measuring tools to find the length, width, and height of each object. They should record their measurements in Chart 1 Measuring the Length, Width, and Height of Objects. Then they can compare and discuss measurements using terms like greater than, less than, longer, and shorter.

Station 2 - Place several classroom objects and the scale at the station.

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Have students take turns weighing each object. They should record their measurements in Chart 2 Measuring the Weight of Objects. Then they can compare and discuss measurements using terms like greater than, less than, heavier, and lighter.

PRACTICE WITH MEASURING CUPS

Set out bowls, measuring cups, and spoons for your child to explore. Practice measuring with a variety of substances. Cheerios, rocks, dominoes, flour, water, dirt, sand – whatever you feel comfortable allowing your child to use. Substances that can be level (like water, flour, sand, and dirt) are great for teaching the skill of line reading and making measuring cups level to accurately measure something.

Letting your child help in the kitchen is the perfect time to hone measuring skills. Measuring ingredients for recipes and adding them in will give your child real life experiences to draw on later.

HOW TO USE A RULER

Teach child how to correctly use a ruler. Place the end of the object to be measured at the zero line on the ruler. For many rulers, the zero line is the end of the ruler; for other rulers, the zero line is the first mark on the ruler.

For Aiden's age, we just work on pointing to the number the object is the closest. For older children, you can show them how to use the marks in between the large numbers ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ and even the $\frac{1}{8}$ ths or $\frac{1}{16}$ ths if you are so inclined). It is also a great idea to teach children how to measure in both inches and centimeters. Each of the marks on the centimeter side of a ruler is 1 millimeter ($\frac{1}{10}$ of a centimeter). This division is actually a little easier than the sixteenths on the inches side of the ruler.

NON-STANDARD MEASURING

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Non-standard measuring is another way to teach children how to measure. Instead of measuring with a ruler with numbers, you use any object you wish to measure. For example, we used sticky notes to measure Aiden's cars. We lined up the sticky notes one after the other. Aiden's cars were 6 sticky notes long.

We can use your child's hands, feet, or body to measure things. How many "feet" long is your bed? How many Aiden's long is your room? Non-standard measuring introduces the concept of measurement and allows children to begin to practice the skill.

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Assignment 3

Q.1. why there is a need of continuous and comprehensive evaluation in mathematics teaching learning? As a mathematics teacher, how continuous and comprehensive evaluation helps you in teaching learning of mathematics?

Answer:

Mathematics plays an important role in our life. It not only helps in day-to-day situations but also develops logical reasoning, abstract thinking and imagination. It enriches life and provides new dimensions to thinking. The struggle to learn abstract principles develops the power to formulate and understand arguments and the capacity to see interrelations within concepts. This enriched understanding helps us deal with abstract ideas in other subjects as well. It also helps us understand and make better patterns, maps, appreciate size, dimensions and observe similarities in solids and shapes.

Children often are not able to work in terms of ideas alone. They need the comfort of context and/or models linked to their experience to find meaning. This stage presents before us the challenge of engaging the children while using the contexts but gradually moving them away from such dependence. So while children should be able to identify the principles to be used in a contextual situation, they should not be dependent or be limited to contexts. As we progress further in the middle school there would be greater requirement from the child to be able to do this.

Learning Mathematics is not only about using algorithms, getting correct answers or methods, not only about how to solve problems, but to look for patterns and logical relations between them. Mathematics classrooms at the Primary stage must focus on the following:

- Help the learner realize that mathematics as a discipline relates to our experiences and is used in daily life, but has an abstract basis.*
- Know that emphasis should not be on teaching how to use known appropriate algorithms, but on helping the child develop an understanding of mathematics and appreciate the need for and develop different*

strategies for solving and posing problems.

- Know that language should be given due importance since it helps in developing mathematical understanding.*
- Provide sample opportunity for the child to help her/him evolve her/his own understanding through engagement with the concepts.*
- Understand that classroom processes should de-emphasize algorithms and remembering of facts, and should emphasize the ability to follow logical steps, develop and understand arguments.*

The traditional evaluation system is concerned almost entirely with summative evaluation, which was done through unit tests, monthly tests and term end tests. These tests focus on the progress made by the pupil during a period of instruction which covered a given section of the syllabus. It is called summative since it comes after instruction has been completed and so is not linked to on-going teaching-learning.

Quite a lot of concepts in mathematics are abstract. How to make them meaningful to children is a continuous challenge for teachers. In an elementary stage, where children are not yet fully able to make the kind of abstractions required for understanding, it makes sense to teach mathematical concepts in different ways. Emphasis needs to be placed on representing mathematical ideas with concrete materials.

There is also a need to move on or shift to multi-dimensional approach, which includes spoken language, concrete materials, pictures, real life contexts and symbols in written form also. All such strategies will help in development of mathematical thinking also.

The process will continue throughout the year for all the units done in three terms. The final assessment record at the end of the year will include the progress of all the three terms and will give the students and the parents a clear idea of the student's achievement.

Since continuous assessment is for informing and improving learning as it continues, it is not necessary to produce copious and frequent recorded evidence of all learning to show to people other than the teacher.

As shown in our examples, the assessment is often to help see the next step to be taken. However some records can be built for the student's own memory (for example, written work in note-books, graphs, drawings, performance in written tests etc.). There may be some evidence of learning the teacher may want to retain as her personal record, to inform her on a

student's progress over time

One way to truly respect a learner, as an intelligent and thinking human being, is to allow him/her to assess his/her own learning. We do great injustice to children by never allowing them to take charge of their own learning. But genuine assessment of one's own progress can be done only when an individual is

Completely free from fear and pressure.