MOTHER COLLEGE OF EDUCATION (B.Ed & D.Ed)

(Approved by NCTE & Affiliated to SCERT, ANU & Govt. of A.P.)
DARSI - 523 247, Prakasam District, A.P.

Semester-III
Activities EM

Name .....

Subject : PEDAGOGY OF MATHEMATICS

Roll No. .....

Register No. .....

20 - 20

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7) proportion :- Three red sweets and two blue. Asks what proportion of the sweets is blue. how many kinds will say 2/3 rather than 2/5 ? why ! Because there are Comparing blue to red, not blue to all the sweets, Alway Stress that proportion is "part to whole".

8) perimeter and area Confuse many kinds !→

→ A common mistake, when measuring the perimeter of rectangle, is to count the squares surroundings the shape. In the same way as counting those outside for area. Now you can see why some would give the perimeter of a two by three rectangles as 14 units rath than 10.

9) misreadings scales - still identified as a weakness !-

In key stage test papers. The most common misunderstand is that any interval on a scale must correspond to one un frequent handling of different scales divided up into twos fives, 10s, tenths, etc. will help to banish the idea.

A definition of Conceptional understanding on right o the Confusion about Conceptual unclarstanding and the pressing problem of students misunderstandings. I think a slightly more definition of Conceptual understanding is wanted. I prefer to define it this w Conceptual understanding in mathematics means that students understand which ideas are key and that the

—:- ACTIVITY -:- 1

Creat different activities to realize concept attainment by children in any unit from mathematics :—

CONCEPTUAL UNDERSTANDING IN MATHEMATICS :—

The Common Core standards in mathematics stress the importance of Conceptual understanding as a key component of mathematical expertise. Jibao in my experience, many math teachers do not understand Conceptual understanding for two many think that if students know all the definations and rules. Then they posses such understanding.

Student understand Connection between Counting and addition and Substraction. They use properties of addition to add whole numbers and to creat and use increasingly sophisticated strategies based on. These properties to solve addition and Substraction problems with to 20. By Comparing a variety of solution strategies children build their understanding of the relationship between addition and Substraction.

Note that a highlighted understandings requires focused inferential work. Being helped to generalize to genuine understanding.

Knowledge of procedures is no guarantee of Conceptual understanding for example, many children can execute a procedure to divide fractions without understanding why the procedure works most observers agree that knowledge of procedures, and Concept is desirable

another common conceptual problem understanding that an equal sign (=) refers to equality, that is mathematical equivalence by some estimates as few as 25 percent of American Sixth grades have a deep understanding of this concept students often think it signifies "put the answer here'

1) A number with three digit is always bigger than one with two same Children with swear blind that 3.24 is bigger than 4.6 because it's got more digits. why? because for the first few years of learning. they only come across whole number where the digits. rule does work.

2) when you multiply two numbers together. The answer is always bigger than both the original numbers. Another seductive 'rule' that works for whole numbers but fall's to pieces when one or both of the number is less than one remember that. Instead of the word times we can always substitute the word of. 50 1/2 time 1/4 is the same as a half of a quarter. that immediately demolishes the expection that the product is going to the bigger than both original numbers.

3) which fraction is bigger 1/3 or 1/6?

How many pupils will say 1/6 because they know that 6 is bigger than 3! This reavels a gap in knowledge about what the button numbers the denominator. of a fraction does, it divides the top numbers, The numerator of course practical work. such as cutting pre-divided cheese on to bread and Concept is desirable

Another Common Conceptual problem is understanding that an Equal Sign '=' and Fractions and Comparing the Shapes, Helps the Cement understanding of fractions.

4) Common regular Shapes aren't recognised for what they are unless they are upright teachers can inadvertently feed this misConception if they always draw a Square right analyed are isoscales triangle in the 'Usual' position. Whynot draw them occesionally upside down. Facing a different direction, or just tilted over, to force pupils to look at the essential properties and by the way, in maths, there is no such things as a Diamond. It is either a Square or Rhombus.

5) The diagonal of Square is the same length as the side —

Not true, But tempting for many young minds, so, how about challenging the class to investigate this by drawing and measuring once the top table have mastered this, why not ask them to estimate the dimensions of Square whose diagonal is exactly 5cm. Then draw it and see how close their guess was.

6) To multiply by 10, just add and zero Not always what about 23.7×10, 0.35×10 or $2/3 \times 10$? Try to spot and unpick, the just and zero rule whenever it rears its head.

grasp the heuristic value of those Idea. They are thus better able to use them startegically to solve problems especially non-routine problems and avoid common misunder-standings as well as infallible knowledge and skill.

In other words, students demonstrate understandings of-

1) which mathematical Idea are key, and why they are important
2) which Ideas are helpful in a particular Context for Problem Solving.
3) why and how key Ideas aid in Problems Solving by reminding us of the Systematic nature of mathematics
4) How an Idea or procedure is mathematically defensible why we and they are Justified in using it.
5) How to Flexible adapt previous Experience to new transfer problems.

A test for Conceptual understanding

Rather than explain my definition further here, I will Operationalize it in a little test of 13 questions to be given to 10th, 11th, and 12th grader who have passed all traditional maths Courses through algebra and geometry (middle school students can be given the first questions. Maths teacher, give it to your students tell us the results.

I will make a friendly wager, I predict that no students will get all the questions correct, prove me wrong and I shall give the teacher and students a big shout-out

1) "you can't divided by zero" explain why not (even though of course you can multiply by zero)

2) "Solving problems typically requires finding equivalent statements that simplify the problem" explain and in so doing define the meaning of the = sign.

3) you are told to "invert and multiply" to solve division problems with fractions. But why does it work? prove it.

4) place these numbers in order of largest to smallest
0.0157, $\frac{1}{60}$, .0015, .001, .002.

5) multiplication is just repeated addition" explain why this statement is false, giving examples.

6) A Catering Company rents all tables for big parties & people can sit around a table, A School is giving a party for parents, siblings, students and teacher. The guest list total 243. How many tables should the school rent.

7) Most teachers assign final grades by using the mathematical mean, to determine them. Give at least

Reasons why the mean may not be the best measure of achievement by explaining what the mean hides.

8) Construct a mathematical equation that describes the mathematical relationships between feed and yards. Hint fill you need as parts of the equation are f, y = and 3

9) As you know, PEMDAS is shorthand for the order of operation for evaluating complex expressions. The order of operations is a convention. X (A*B) = XA + XB is the distributive property. It is a law. What is the difference between a convention and a law, then? give another example of each.

10) why were imaginary numbers invented?

11) what is the difference between an "accurate" answer and "an appropriately precise" answer?

—o—

ACTIVITY-2

2. INDIAN MATHEMATICIANS AND THEIR CONTRIBUTIONS :-

RAMANUJAN :-

→ He was born on 22 of December 1887 in a small village Tanjore district madras. He failed in english in intermediate, so his formal studies were stopped but his study of mathematics continued.

→ He sent a set of 120 theorms to proffesor hardly of Cambridge. As a result he invited Ramanujan to England

→ Ramanujan showed that any big number can be written as a sum of not more than four prime number

→ He showed that how to divide the number into two or more squares or cubes.

→ when mr. littlewood come to see Ramanujan on taxi number 1729. Ramanujan said that 1729 is the smallest number which can be written on the form of sum of cubes of two numbers on two ways i.e $1729 = 9^3 + 10^3 = 1^3 + 12^3$ since then the number 1729 is called Ramanujan's number.

→ on the third century B.C Archimedes noted that the ratio of circumference of a circle to its drameter is constant. The ratio is now called

'pi' (π) (The 16th letter in the greek alphabet Series)

→ The largest numbers the Greeks and the Romans used were 10⁶ where as Hindus used numbers as big as 10^{53} with specific names as early as 5000 BC during the vedic period.

ARYABHATA :-

→ Aryabhatta was born in 476 A.D in Kusumpur onelia

→ He was the first person to say that earth is spherical and it revolves around the Sun.

→ He gave the formula $(a+b)^2 = a^2+b^2+2ab$

→ He taught the method of solving the following problems.

$1+2+3+4+5 \cdots\cdots + n = \frac{n(n+1)}{2}$

$1^2+2^2+3^2+4^2+5^2+ \cdots\cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$

$1^3+2^3+3^3+4^3+5^3+ \cdots\cdots + n^3 = \left\{\frac{n(n+1)}{2}\right\}^2$

$1^4+2^4+3^4+4^4+5^4+ \cdots\cdots + n^4 = \frac{n(n+1)(2n+1)(3n^2+3n+1)}{30}$

BRAHMAGUPTA :

→ Brahmagupta was born in 598 A.D in pakistan.

→ He gave four methods of multiplication.

→ He gave the following formula used in G.P Series

$a + ar + ar^2 + ar^3 + \ldots ar^{n-1} = (ar^{n-1}) \div (r-1)$

→ He gave the following formula - Area

Area of cyclic quadrilateral with side a, b, c, d

$= \sqrt{(s-a)(s-b)(s-c)(s-d)}$, where $2s = a+b+c+d$

Length of its diagonal $= \sqrt{\frac{bc+ad}{ab+cd}(ac+bd)} \times \sqrt{\frac{ab+cd}{bc+ad} \times (ac+bd)}$

SHAKUNTALA DEVI :

→ She was born in the 1939

→ In 1980 she gave the product of two, thirteen digit numbers with in 28 seconds, many countries have invited her to demonstrate here extra ordinary talent

→ In Dallar She Competed with a computer to See who gave the Cube root of 188138517 faster. She was at university of USA. She was asked to give the 23rd root of 91674867692003915809866092758538048831066801443086224071265164279396570408676...9659.

→ She answered in 50 Seconds. The answer is 54637891. It took a UNIVAC 1108 Computer, full one minute (10 Seconds more) to Conform that She was right after it was fed with 13000

→ Now She is known to be human Computer.

BHASKARACHARYA :—

→ He was born in a village of Mysore district.

→ He was the first to give that any number divided by '0' gives infinity (∞)

→ He was written a lot about zero, Surds, permutation and Combination.

→ He wrote "The hundredth part of the circumference of a circle seems to be straight. our earth is a big sphere and that's why it appears to be Flat.

→ He gave the formulae like $\sin(A \pm B) = \sin A . \cos B \pm \cos A . \sin B$.

ACTIVITY-3

preparation of T.L.M for any one topic from 'Classe 6-10 mathematics !—

Mathematics Teaching learning material (T.L.M) for primary and middle school classes !—

In primary and middle School classes there are many Concepts in mathematics related to our environment. It is very nice to arrange the teaching learning materials for these classes. Using teaching learning material is very useful to make teachers presentation easy effective and attractive. Teacher learning material makes the mathematica Concept easy and interesting. Let's talk about some geometrical terms and related T.L.M that can be use and prepared easily in any School. There may be differe innovative ideas smart math learning. How to make mat learning smart and intersting?.

In this article these are my own idea. what are your experience ! please share with this blog. If yo want to get my [illegible], please like my google plus pa "Innovative education" to know more please visit t page "About this Blog".

useful teaching learning materials (T.L.M) for mathematics teaching in middle School Classes

Teaching learning Material is the great tool to teach the Students. It Simplifies the subjects and makes teachers presentation intersting and attractive Students learn better. by examples and T.L.M. In an innovative Classroom Just like Smart Class. There are many opportinuties for a teacher to arrange many teaching learning materials online. To know more about some useful and attractive teaching learning techniques visit other posts on this blog "Innovative Education".

Ready Made - Teaching Learning Materials :-

In many schools, there are many ready made T.L.M. are available for teachers many schools have Science and mathematics kits. They can purchase several ready made teaching learning materials from market. This ready made T.L.M is very useful. Teachers can purchase many mathematical instruments for Classroom presentation. These instrument and equipment are very helpful for teacher and students.

Mathematics Kit for Class :-

It is good idea to prepare "mathematics kit" in school. A mathematics kit should contain essential equipment used in classroom teaching. It may contain various models of maths instruments and equipments like Scale, ruler, Compas, geometry, boxes, number lines model and

such equipment. It should be easily available for students and teachers should encourage the students to use this kit. In a primary school teacher's share many ideas for teaching learning materials like ball, pencills, seeds, etc. They are very cheaper and easily available. The should be a separate box to put these learning materials.

On line learning Resources for Mathematics

There are several on line tools for teaching mathematics. Teachers can find many awe some websites useful in their classroom. Even they can find many sites teaching how to teach numbers, how students can learn by social networking websites. many social and education websites are providing a facility to share educational content and ideas world wide. The use of such websites is very helpful for teachers and students. different learning software helps the teachers to make mathematics learning easy and funny. Teacher can use Collaborative learning techniques with in the class. It is very interesting to introduced project based learning. It is very helpful to use audio visual just like learning videos, to explain the different hard topics in an easy way. Teacher can use different type mathematics online learning games as powerful T-L-M (Teaching learning material)

The Geometrical concepts in primary and middle school. :-

In primary and middle School syllabus in madhyapradesh (india) there are some basic Concept in mathematics like line rectangle, square, triangle, circle, field, cone, perimeter and such type basic Concepts. The textbooks are designed in such type to correlate these Concepts with the environment. use of sketch pens and colour pencils are very useful to creat the interest and attraction among the students in mathematics learning.

Easy T.L.M. That may be used by teacher:

It is very easy to use teaching learning materials in these classes. Teacher can use different type easily available teaching learning materials as match box for rectangle, scale for line. There are many teaching learning materials can be prepared by teachers using easily available materials. We can make different learning materials by card sheets, wood, wire, bangles, match boxes and so many materials easily available in environment. It is a nice idea to prepare a cloth sheet for numbers 1, 2, 3 when teacher uses collaborative techniques to make the teaching learning materials in classroom he can achive many goals. An innovative teachers has a lot of innovative ideas for T.L.M. Just try to use T.L.M in your classroom and enjoy the new experiences of mathematics learning with joy.

How to prepare mathematical teaching learning mate in class ?

It is an easy and interesting activity to prepare mathema TLM and models in classroom. Teacher can provide it as a project for the groups of students. Teacher should facilitat the students to prepare the projects. Teacher can arrang the essential materials for students when students learn how to prepare the T.L.M they inspired to do such activi again and again.

White board as powerful Teaching learning materi

Teachers use white board in teaching the classroom. what an the smart and innovative ways to use white board as effectiv teaching learning materials in mathematics. teaching ? Ac Smart and active teaching learning methodologies inspire th teachers to use more and more interactive teaching styl These teaching methodologies ensure the student's participate in learning. Teacher can facilitate the students to use w board to explained their problems, ideas, and practices. When students use white board they can learn better an they will be able to remember the concepts. for longe time. Teacher can plan how to use the white board for students. He can use whiteboard as interactive teaching learning material. many educational websi are providing learning games and multimedia le

on mathematics. Teachers can display these multimedia lessons on white boards by the Computers and projectors.

Smart and innovative Teaching learning materials for smart classes :-

In modern classroom where we are planning to use internet and multimedia devices to make Classroom learning easy, interactive and interesting. It is very nice to use internet based teaching learning materials to make mathematics learning Smart and innovative. what is the internet based learning materials? Internet provides several opportunities to make teaching interesting and interactive online learning games are the best example for this. There are many learning games for students to make mathematics learning easy and interstng Smart school Class is very suitable for using these learning games better students learn better by games and interactive teaching techniques.

ACTIVITIES - 4

4. preparation of power point presentation (ppp) for any one topic from a different branch of mathematics

Some applications on Trignometry :-

What is trignometry ?

Trignometry is a branch of mathematics that studies triangles and the relationships between their sides and the angles between these sides.

LINE OF SIGHT

We observe generally that children usually look up to see an aeroplane when it passes overhead this line forming their eye to the plane, while looking up is called line of sight.

Angle of Elevation :-

The angle which the line of sight makes with a horizontal line drawn away from their eyes is called the angle of elevation of aeroplane from them. In this topic we shall make use of trignometric ratios to find the height of tree, a tower, a water tank, width of a river, distance of ship from light house etc.

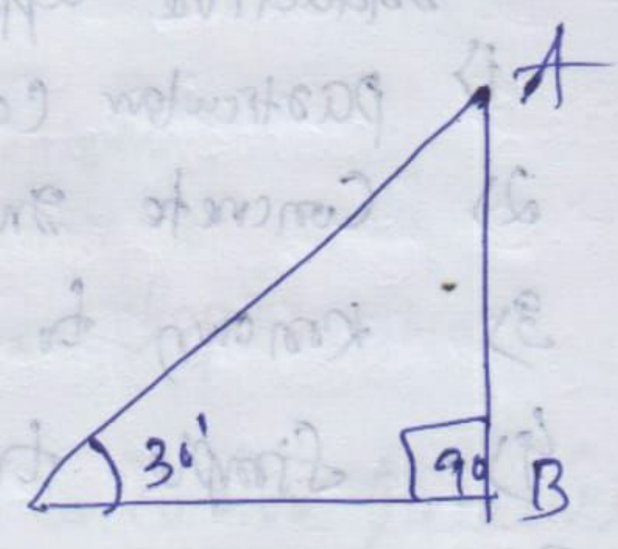
Angle of Depression :-

If the pilot of aeroplane looks downwards at any object on the ground then the angle between his line of sight and horizontal line drawn away from his eye is called angle of depression :

Now let us solve some problem related to height and distance :-

The angle of elevation of the top of a tower from a point on the ground which is 30 m away from the foot of the tower is 30° find the height of the tower.

Ans Let AB be the tower and angle of elevation from point 'C' (on ground) is 30°



In $\triangle ABC$, $\frac{AB}{BC} = \tan 30°$

$\Rightarrow \frac{AB}{30} = \frac{1}{\sqrt{3}}$

$\Rightarrow AB = \frac{30}{\sqrt{3}} = 10\sqrt{3}$ M

∴ the height of the tower is $10\sqrt{3}$ m

ACTIVITIES - 5

METHODS OF TEACHING MATHEMATICS :-

INDUCTIVE METHODS

→ Inductive approach is advocated by pestalozzi and francis Bacon

→ inductive approach is based on the process of induction.

→ in this we first take a few examples and greater then generalize

→ It is method of constructing a formula with the help of a sufficient number of concrete examples. Induction means to provide a universal truth by showing.

that if it is true for a particular case, it is true for all Such cases. Inductive approach is psychological in nature.
→ The Children follow the subject matter with great interest and understanding. This method is more useful in arithmetic teaching and learning

Inductive approach proceeds from.

1) particular cases to general rules of Formulae
2) Concrete instance to abstract rules
3) known to unknown
4) simple to Complex

following steps are used while teaching By this method:

(a) PRESENTATION OF EXAMPLES :-

→ In this Step teacher presents many examples of Sam types and solutions of those Specific examples are obtained with the help of the student.

(b) Observation :

After getting the solution the students observe it and try to reach to some Conclusion.

(C) Generalization :

After observation the examples presented, the te and children decide some Common formulae, principl or laws by logical mutual discussion.

(d) Testing and verification :-

After deriving some common formula, principle or law, children test and verify the law with the help of other examples.

Demerits :-

→ certain complex and complicated formula can't be generated so this method is limited in range and not suitable for all topics

→ It is time consuming and labarious method.

→ It is length.

→ It's application is limited to very few topics

→ It is not suitable for higher clases.

→ Inductive reasoning is not absoultely conclusive because the generalization made with the help of a few specific examples may not hold good in all cases.

Applicability of Inductive method

Inductive approach is most suitable where

→ Rules are to be formulated

→ Defination are be formulated

→ formulate are to be derived

→ Generalizations or law are to be arrived at.

Example law of indices $a^m \times a^n = a^{m+n}$

Sol:- we have starts with $a^2 \times a^3 = (a \times a) \times (a \times a \times a)$

$= a^5 = a^{2+3}$

$a^3 \times a^4 = (a \times a \times a) \times (a \times a \times a \times a) = a^7 = a^{3+4}$

$\therefore a^m \times a^n = (a \times a \times a \cdots \text{m times}) \times (a \times a \times a \cdots \text{n times})$

$\therefore a^m \times a^n = a^{m+n}$.

MERITS :-

→ It enhances self confident
→ It is psychological method
→ It is a meaningful learning
→ It is a scientific method
→ It develops scientific attitude
→ It develops the habit of intelligent hard work.
→ It helps in understanding because the student knows how a particular formulae has been framed.
→ Since it is a logical method, so it suits teaching mathematics.
→ It is a natural method of making discoveries majority of discoveries have been made inductively.