

# SRI GOWTHAMI COLLEGE OF EDUCATION

(Recognised by NCTE, Govt of Andhra Pradesh)

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COLLEGE OF EDUCATION

Affiliated to

ACHARYA NAGARJUNA UNIVERSITY

2015 - 2017

Semester-I

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Subject : MATHEMATICS

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## CERTIFICATE

This is to certify that Mr. Mrs. Kum. DEEPTI PATEL  
Class No..... Regd. No. YIGED 90102 of College of Education  
visited our Institution and conducted the required activities / collected the required  
data regarding to.....

Practicum as a part of B.Ed. Course work stipulated by the Government of Andhra  
Pradesh and approved by Acharya Nagarjuna University.

Signature of the Concerned Teacher

Name :

Signature of the Head of the Institution

Name :

Seal :

This is to certify that Mr. Mrs. Kum. Deepthi Patel  
Class No. Regd. No. V/166 D90 64 has completed the  
required activities regarding to.....

Practicum towards fulfillment of B.Ed. Course work stipulated by the Government  
of Andhra Pradesh and approved by Acharya Nagarjuna University.

This record is assessed.

✓  
valued

N.D.S.A  
Lecturer in-charge

Sri Gowthami College of Education  
DARSN, Prakasam Dt: A.P.

## Activities - I

1. Create 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. Alas in my experience, many math teachers do not understand conceptual understanding. Far too many think that if students know all the definitions and rules, then they possess such understanding.

Students understand connections between counting and addition and subtraction. They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties to solve addition and subtraction problems with in 20. By comparing a variety of solution strategies children build their understanding of the relationship between addition and subtraction.

②

Note that I highlighted, understanding requires focused inferential work, Being helped to generalize from one's specific knowledge is key to genuine understanding.

knowledge or 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 concepts is desirable.

Another common conceptual problem is understanding that an equal sign (=) refers to equality that is mathematical equivalence. By some estimates as few as 25 percent of American sixth graders have a deep understanding of this concept. Students often think it signifies "put the answer here".

1) A number with three digits is always bigger than one with two. Some children will 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 came across whole numbers. ③  
Whereas 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 falls to pieces when one or both of the numbers is less than one. Remember that instead of the word "times" we can always substitute the word "of". So  $\frac{1}{2}$  times  $\frac{1}{4}$  is the same as a half of a quarter. That completely demolishes the expectation that the product is going to be bigger than both original numbers.

3) Which fraction is bigger  $\frac{1}{3}$  or  $\frac{1}{6}$ ?

How many pupils will say  $\frac{1}{6}$  because they know that 6 is bigger than 3? This reveals a gap in knowledge about what the bottom number, the denominator, of a fraction does. It divides the top number, the numerator, of course. Practical work, such as cutting pre-divided circles

Comparing and sorting and comparing the shapes, helps cement understanding of fractions.

4) Common regular shapes aren't recognised for what they are unless they're upright. Teachers can inadvertently feed this misconception if they always draw a square, right angled or isosceles triangle in the 'usual' position. Why not draw them occasionally 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 thing as a diamond. It's either a square or a rhombus.

5) The diagonal of a square is the same length as the side?

Note 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 a 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! 3  
Not always! What about  $23.7 \times 10$ ,  $0.35 \times 10$  or  
 $2\frac{1}{3} \times 10$ ? Try to spot and unpick the just and  
zero, rule wherever it leaves its head.

7) Proportion! Three red sweets and two blue  
Asked what proportion of the sweets is blue  
how many kinds will say  $\frac{2}{3}$  rather than  $\frac{2}{5}$ -  
why? Because they're comparing blue to red,  
not blue to all the sweets. Always stress that  
proportion is "part to whole".

8) Perimeter and area confuse many kinds!  
A common mistake, when measuring the perimeter  
of a rectangle, is to count the squares  
~~surrounding~~ the shape, in the same way as  
counting those inside for area. Now you can  
see why some would give the perimeter of a  
two by three rectangle as 14 units rather  
than 10.

9) Misreading scales still identified as a  
weakness in key stage test papers. The most  
common misunderstanding is that any interval  
on a scale must correspond to one unit.  
Frequent handling of different scales,  
divided up into twos, fives, tens, tenths etc.  
will help to banish this idea.

⑥ A definition of conceptual understanding  
In light of the confusion about conceptual  
understanding and the pressing problem of  
student misunderstanding. I think a slightly  
more robust definition of conceptual  
understanding is wanted. I prefer to  
define it this way.

Conceptual understanding in mathematics  
means that students understand which  
ideas are key and that they grasp the  
heuristic value of those ideas. They are  
thus better able to use them strategically  
to solve problems - especially non-routine  
problems and avoid common misunderstandings  
as well as inflexible knowledge and skill.

In other words, students demonstrate  
understanding of:

- 1) which mathematical ideas are key, and  
why they are important
- 2) which ideas are useful in a particular  
context for problem solving.
- 3) Why and how key ideas aid in  
problem 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.

(1)

5) How to flexibly 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 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> graders who have passed all traditional math courses through algebra and geometry. Middle school students can be given the first 7 questions.

Math teachers, give it to your students tell us the results.

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

1) "you can't divide 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  $0.0156, \frac{1}{60}, 0.0015, 0.001, 0.002$
- 5) multiplication is just repeated addition \* Explain why this statement is false, giving examples.
- 6) A catering company rents out tables for big parties, & people can sit around a table. A school is giving a party for parents, siblings, students and teachers. The guest list totals 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 3 reasons why the means may not be the best

Measure of achievement by explaining  
what the mean hides. a

8) Construct a mathematical equation that describes the mathematical relationship between feed and yards. Hint: All you need as parts of the equation are  $F$ ,  $y$ , =, and  $\geq$ .

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. If 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?

## ACTIVITIES -2

### 2. Indian Mathematicians and their Contributions:-

#### RAMANUJAN →

He was born on 22<sup>nd</sup> December 1887 in a small village of 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 theorems to professor Hardy at Cambridge. As a result he invited Ramanujan to England.

→ He sent a set of 120 theorems to professor Hardy at Cambridge. As a result he invited Ramanujan to England.

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

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

→ When Mr. Littlewood came to see Ramanujan in taxi number 1729, Ramanujan said that 1729 is the smallest number which can be written in the form of sum of cubes of two numbers in two ways i.e.  $1729 = 9^3 + 10^3 = 1^3 + 12^3$ , since

then the number 1729 is called Ramanujan's Number.

→ In the third Ramayan's Number, century B.C. Archimedes noted that the ratio of circumference of a circle to its diameter is constant. The ratio is now called 'P.I' ( $\pi$ ) (The 16<sup>th</sup> letter in the Greek alphabet series) (11)

→ The largest numbers the Greeks and the Romans used were 10<sup>6</sup> whereas Hindus used numbers as big as 10<sup>53</sup> with specific names as early as 5000 B.C. during the vedic period.



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### ARYABHATA

→ Aryabhata was born in 476 A.D. in Kusumapura, India.

→ 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.

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

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

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

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



### BRAHMAGUPTA

→ Brahmagupta was born in 598 A.D. in

Akistan.

→ He gave four methods of multiplication.

→ He gave the following formula used in

G.P. Series.

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

He gave the following formulae, area of cyclic quadrilaterals with sides  $a, b, c, d$ .

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

$$\text{length of its diagonals} = \sqrt{\frac{(bc+ad)}{(ab+cd)}}(ac+bd) \times \sqrt{\frac{(ab+cd)}{(bc+ad)}}(ac+bd)$$



### SHAKUNTALA DEVI

→ She was born in 1939.

→ In 1980 she gave the product of two, thirteen digit numbers within 28 seconds, many countries have invited her to demonstrate her extraordinary talent.

→ In Dallas she completed with a computer to see who gave the cube root of 188138517

baster, she won. At University of USA  
she was asked to give the 23<sup>rd</sup> root of ✓4

9176486769200 3915 809866092 25 853801624 831066  
80144 3086 224071265764 2793 4657040 & 620965

he answered in 50 seconds. The answer is  
546372891 It took a UNIVAC 1108 computer  
full one minute (10 seconds more) to confirm  
that she was right after it was fed with  
13000.

Now she is known to the human computer.



## BHASKARACHARYA :-

He was born in a village or Mysore district. He was the first to give that any number divided by 0 gives infinity( $\infty$ )

→ He has written a lot about zero, surds, Permutation and combination.

→ He wrote, "The hundredth part of the circumference of a circle seems to be straight out Earth is a big sphere and that's why it appears to be flat".

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



### ACTIVITIES - 3

Preparation of T.L.M. for any one topic from classes 6-10 mathematics.

Mathematics Teaching Learning material (T.L.M) on primary and middle school class

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 very useful to make teachers presentation easy, effective and attractive. Teaching learning material makes the mathematical concepts easy and interesting. Let's talk about some geometrical terms and related T.L.M. that can be used and prepared easily in school. There are different innovative ideas for Smart math learning. How to make math learning smart and interesting.

In this article these are my own idea what are your experiences? Please share with this blog. If you want to get my works, please like my Google plus page "Innovative education". To know more

Please visit the page "About this Blog".

Useful teaching learning materials (T.L.M.) for mathematics teaching in middle school classes. What is the role of T.L.M. in mathematics teaching?

$$+ \frac{8}{2} *$$

$$\begin{array}{r} -3 < 5 \\ 4( ) \times 0 \\ +6 = \end{array}$$

Teaching learning material is the great tools to teaching students. It simplifies the subjects and makes teacher's presentation interesting and attractive. Students learn better by examples and T.L.M. In the innovative classroom just like smart class. There are many opportunities for a teacher to arrange teaching learning materials online. To know more about some useful and attractive teaching learning techniques visit other posts on this blog Innovative education.

### READY-MODE TEACHING LEARNING MATERIALS:-

In many schools there are many ready made T.L.M. available for teachers. Many schools have science 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 instruments and equipment are very helpful for teachers 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 or math's instruments and equipment like scale, ruler, compass, 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 teachers have many ideas for teaching learning materials like balls, pencils, seeds etc. They are very cheap and easily available. There should be a separate box to put those learning materials.

## ONLINE LEARNING RESOURCES FOR MATHEMATICS:-

Here are several online tools for teaching mathematics. Teachers can find many awesome websites useful in their classroom. Even they can find any sites teach how to teach numbers. Now students can learn by social networking websites. Many and educational websites are providing a activity to share educational content and ideas worldwide. The use of such websites is very helpful teachers and students. Different learning software helps the teachers to make mathematics learning easy and funny. Teachers can use collaborative learning techniques within the classroom. It is very interesting to introduced project based learning. It is helpful to use audio visual devices just like learning videos to explain the different hard topics an easy way. Teachers can use different types mathematics online learning games as useful T.L.M. (Teaching learning materials).

## THE GEOMETRICAL CONCEPTS IN PRIMARY AND MIDDLE SCHOOL :-

Primary and middle school syllabus in madhya pradesh (India) there are some basic concepts in mathematics like line, rectangle, square, triangle, circle, bield, cone, perimete and such type basic concepts. the textbook are designed in such type to correlate these concepts with the environment. Use of sketch pens and color pencils are easy useful to creat the interest and attraction among the students in mathematics learning.

### EASY T.L.M. THOD MAY BE USED BY TEACHER:-

It is very easy to use teaching learning materials in these classes. Teachers can use different type easily abiable teaching learning materials as matchbox for rectangle, scale for line. There are many teaching learning materials can be prepared by teachers using easily available materials. they can make different learning materials by card sheets, wood, wire, bangles, matchboxes. and so many materials easily available in environment. It is a nice idea to prepare a cloth sheet for numbers 2,3. When teacher uses collaborative techniques to take the teaching learning materials in classroom we can achieve many

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ideas for TLM. Just try to use TLM in your classroom and bring the new experience of mathematics learning with joy.

### HOW TO PREPARE MATHEMATICAL TEACHING LEARNING MATERIALS IN CLASS?

Is an easy and interesting activity to prepare mathematical T.L.M. and models in classroom. Teacher can provide it as a Project for the groups students. Teacher should facilitate the student prepare the projects. Teacher can arrange the essential materials for students. When students learn to prepare the T.L.M. they inspired to do such activities again and again.

### WHITEBOARD AS POWERFUL TEACHING LEARNING MATERIAL: →

Teachers use whiteboard in teaching the classroom. Short cure the smart and innovative ways to use whiteboard as effective teaching learning materials in mathematics teaching? Actually smart and active teaching learning methodologies inspire the teachers to more and more interactive

teaching styles. These teaching methodologies ensure the students participation learning.

Teacher can facilitate the students to use white boards to explained their problems, Ideas and practices. When students use whiteboard they can learn better and they will be able to remember the concepts on longer time.

Teachers can plan how to use whiteboard on longer time. Teacher can plan how to use whiteboard on students. He can use white board as interactive teaching learning material. many educational websites providing learning games and multimedia lessons 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 classrooms where we are planning to internet and multimedia devices to make classroom learning easy, interactive and interesting it is very smart and innovative. What the internet based learning materials?

Internet provides several opportunities to make teaching interesting and interactive. Online learning games are the best example for this. These are many learning games for students make mathematics learning easy and interesting. Smart school class is very suitable for using these games better. Students learn better by games interactive teaching techniques.

## ACTIVITIES - 4

Preparation of power point presentation (PPP) for any one topic from a different branch of mathematics : -

### Some Applications on Trigonometry : -

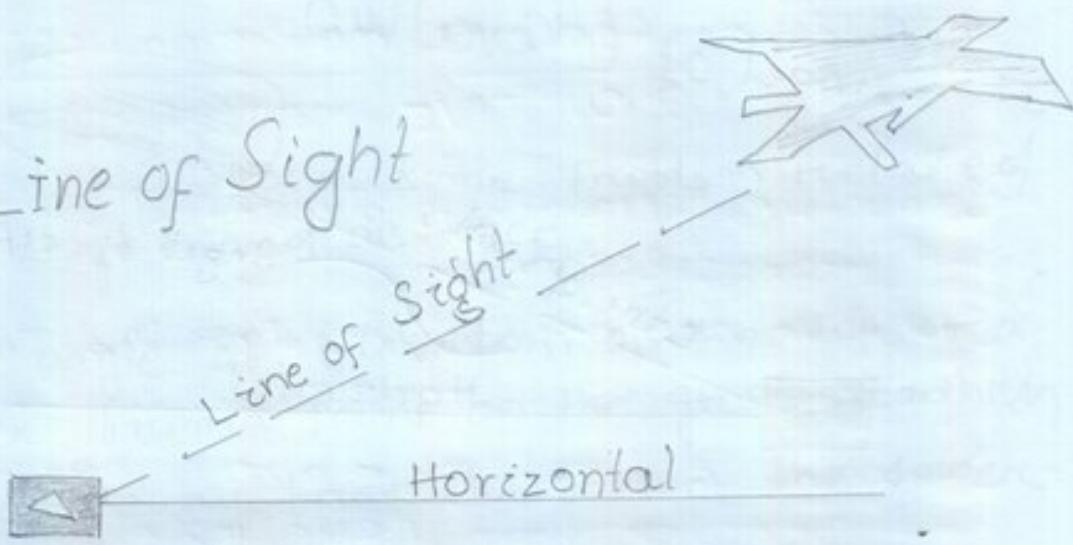
What is Trigonometry ?

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

### LINE OF SIGHT

Observe generally that children usually look to see an aeroplane when it passes overhead. This line joining their eye to the plane, while looking up is called line of sight.

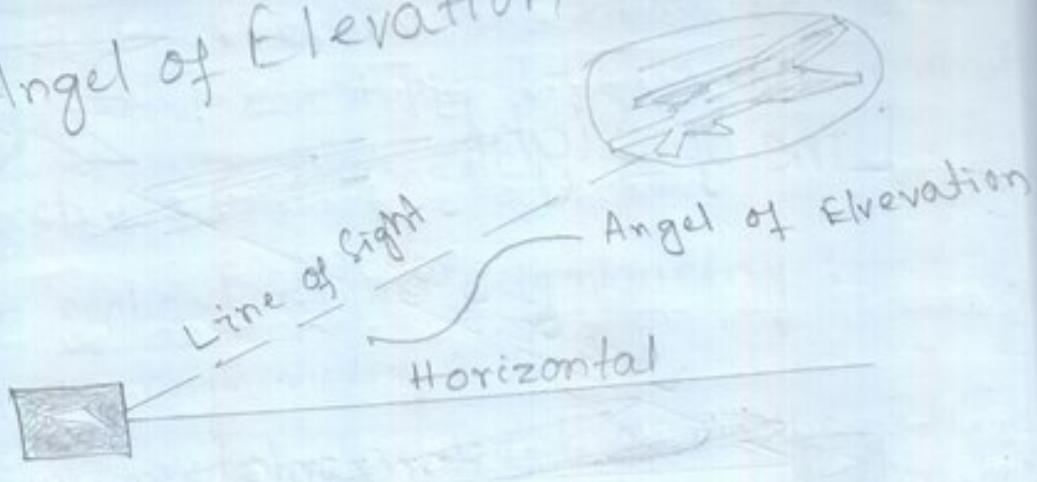
Line of Sight



### ANGLE OF ELEVATION

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

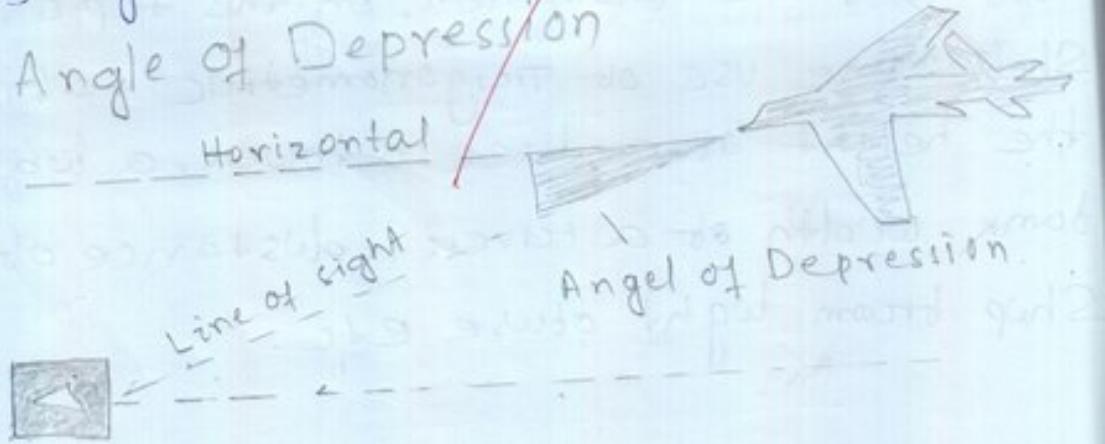
# Angle of Elevation



# ANGLE OF DEPRESSION

If the pilot of the aeroplane looks downwards any object on the ground then the angle between his line of sight and horizontal line drawn away from his eyes is called Angle of Depression.

## Angle of Depression



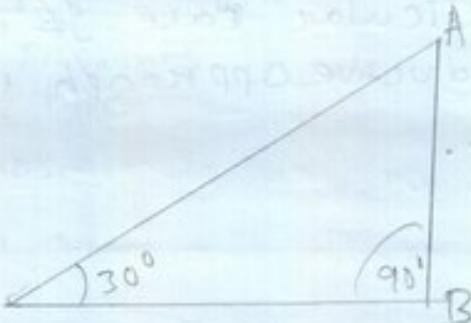
Now let us solve some problem related to Height and distance.

The angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of the tower is  $30^\circ$ . Find height of the tower.

Let AB be the tower and the angle of elevation from point C (on ground) is in  $\triangle ABC$

$$\frac{AB}{BC} = \tan 30^\circ$$

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



$$AB = \frac{30}{\sqrt{3}} = 10\sqrt{3} \text{ m.}$$

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

— x —

## ACTIVITIES - 5

### Methods of teaching mathematics (INDUCTIVE METHOD).

→ Inductive approach is advocated by Pestalozzi and Francis Bacon.

Inductive approach is based on the process induction.

In this we first take a few examples and greater than Pestalozzi.

It is a method of constructing a formula with the help of a sufficient number concrete examples. Induction means to prove a universal truth by showing that it is true for a particular case. If it is true for such cases, Inductive approach is psychological in nature.

Inductive approach is advocated by Pestalozzi and Francis Bacon



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 or formulae.
- 2) Concrete instance to abstract rules.
- 3) Known to unknown.
- 4) Simple to complex.

Following steps are used while teaching by this method:

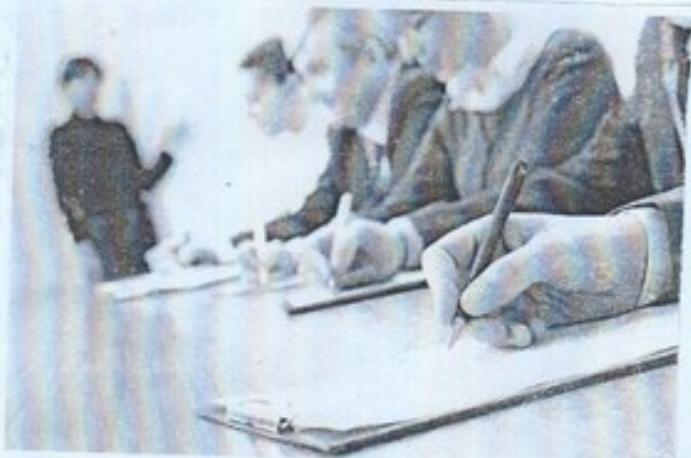
#### (a) PRESENTATION OF EXAMPLES:

In this step teacher presents many examples same type and solutions those

Specific examples are

Obtained with the help

the student.



b) Observation :-

After getting the solution, the students observe these and try to reach to some conclusion.



(c) Generalization → After observation the examples presented, the teacher and children decide some common formulae, principle or law by logical mutual discussion.

(d) Testing and Verification →

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

In this way children logically attain the knowledge or inductive method by following above given steps.

Example (I)

Square of an odd and square of an even number is even.



### Solution

Particular concept:

$$1^2 = 1 \quad 3^2 = 9$$

$$2^2 = 4 \quad 4^2 = 16$$

$$5^2 = 25 \quad \text{Equation 1}$$

$$6^2 = 36 \quad \text{Equation 2}$$

General Concept:

From equation 1 and 2, we get square of an odd number is odd.

Square of an even number is even

### Example 2

Sum of two odd numbers is even

### Solution

Particular concept:

$$1+1=2$$

$$1+3=4$$

$$1+5=6$$

$$3+5=8$$

## General concept: →

- In the above we conclude that sum of two odd numbers is even.
- It does not burden the mind formula becomes easy to remember.
- This method is found to be suitable in the beginning stages. All teaching in mathematics is conducive in the beginning.

## Demerits →

- Certain complex and complicated formula cannot be generated so this method is limited in range and not suitable for all topics.
- It is time consuming and laborious method.
- It is length.
- Its application is limited to very few topics.
- It is not suitable for higher class inductive reasoning is not absolutely conclusive because generalization made with the help of a few specific examples may not hold good in all cases.

## DEMERTS

- Not suitable for all topics
- Time consuming
- Laborious method
- Length
- Limited to very few topics
- Not suitable for higher classes.

## Applicability of inductive method:

Inductive approach is most suitable where,

→ Rules are to be formulated.

→ Definitions are to be formulated.

→ Formulate are to be derived.

→ Generalizations or law are to be arrived at.

## APPLICABILITY OF

### INDUCTION METHOD

→ Inductive approach is most suitable.

→ Rules are to be formulated.

→ Definition to be formulated.

→ Formulate into derivation

→ Generalization from the abstractions.

## Example - 3

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

### Solution →

We have start with  $a^2 \times a^3 = (axa) \times (axaxa)$

$$\text{balance} \rightarrow \boxed{a^2} \times \boxed{a^3} = \boxed{a^5}$$

$$a^3 \times a^4 = (axaxa) \times (axaxaxa) \\ = a^7$$

$$\text{balance} = a^3 \times a^4 = a^7$$

Therefore  $a^m \times a^n = (\text{axaxa} \dots m \text{ times}) \times$

$(\text{axaxa} \dots \times n \text{ times})$

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

## 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 known how a particular formula has been framed.
- Since it is a logical method so it suits teaching of mathematics.
- It is a natural method of making discoveries, majority of discoveries have been made inductively.

## MERITS

- > Self confident
- > Psychological method.
- > meaningful Learning
- > Scientific method.
- > Logical method

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