Introduction

About the methodology;

This methodology consists of ready to use experiments, accompanied by a detailed write-up which consists of scientific background, pivotal questions, that guide the teacher what to ask before, during, and after the activity. All the teacher has to do is to open the box and perform an exciting experiment which is enclosed in the box. A CD that describes each experiment visually is also provided, so that a first time user teacher can see how to assemble and execute the activities. Colourful posters were developed to assist teaching. Recently a computerized, over the internet quiz and exam system has been added to assist the teacher to follow his students achievements.

Since 1989, tens thousands of teachers have been trained with our ready to use experiments in science at thousands of schools and other educational institutions worldwide.

We believe that teachers are the key element in science education. The aim of our ready to use experiments, called also ***Labless Lab***, is to provide science teachers with an empowering tool to help them increase student's motivation, curiosity interest, thinking and understanding.
Exciting phenomena are demonstrated within minutes, leaving an undiminished impression - thus, the teaching process is most effective and the students get the most out of the experiment.
The *Labless Lab* was designed to enable the performance of experiments without the need for laboratory facilities, electricity or running water. Thanks to the *Labless Lab*, scientific experiments and demonstrations can be performed anywhere - even outdoors.

Science Demo Ltd. has taken a prominent part in educational science projects of major importance, which were supported by educational funds, governmental institutes and NGOs, including *UNESCO*, the United Nations Educational, Scientific and Cultural Organization.
Our training workshops were conducted in many regions throughout the globe. Along with our kits, these workshops have provided teachers from dozens of countries with a turnkey solution for science teaching.
This methodology of teaching science has been developed and constantly modified during the last 20 years and during the period starting January 2009, the subjects have been modified to comply with the new Nigerian curriculum in science.

This methodology was made possible due to the contributions of the staff of science Demo Company and many individuals around the world that used our methodology as well as worked with us over the years.

General guide - lines for performing an experiment

In short

Try to surprise your audience and let them experience the magic before you start teaching

Consider the following four steps

- **Show what you have**
- **Say what you are about to do**
- **Ask the audience what are the observations**
- **Only at that stage you can start teaching**

Part A: Preparation

1) Read the background information, so you are familiar with the subject. If necessary you can supplement your knowledge by reading a text book.
2) Look for the topic "motivation" or "research question".
3) Examine carefully the kit content.
4) Watch the short video movie which describes how to assemble and use the kit.
5) Read carefully the instructions of the kit.
6) You have in the write up guided questions and answers for the teacher, which you can ask, before, during and after the experiment.
7) Based on the kit write up, plan and prepare your presentation. Focus on the objectives of your presentation.

Part B: How to perform the experiment.

1) Open the kit and show the audience the main parts and materials of the kit are.
2) a) Explain the audience what you are about to do.
   b) In some experiments you can ask the audience what do they expect will happen? I this case write all their expectations on the board.
   c) Ask the audience to watch carefully what is happening.
3) Summarize their observations on the board. The audience observations should be written on the board even if they are not fully correct.
4) Involve the class in discussing what the correct observations are.

Remember – The observables in science are most important.

Part C: Why did it happen?

So, only at this stage you can start and discuss with the audience the reasons for the phenomena you all have observed, provide the theoretical background and start the teaching process of that particular subject.

In general terms, not every observation can be fully explained at all levels of education. Some phenomena are suited for higher education. For example, every one can make a correct observation, when one troughs a stone upwards. How does the stone "know" that it should fall down? The standard answer is of course gravitation. But is that a full explanation? Is a stone "aware" of gravitation?

Acknowledgements

I would like to express my deepest thanks and appreciation to my colleagues and friends that work with us during the last year at Science Demo Comp., but first of all I would like to thank, Veronica Ludmer, the CEO of Science Demo., the key person in the success of that project.

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Skill "G" company
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Dr. Gregory Ikechukwu Ibe, Managing director/CEO
Mr. Meir Dagan, general manager of Skill "G"
Mr. Sam Moshe, project manager, (Osun state project)
Mr. Ayo Bada, project coordinator
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Mr. Afam Nnamani, senior primary science instructor

Zvi Ludmer
President & Scientific Director of Science Demo

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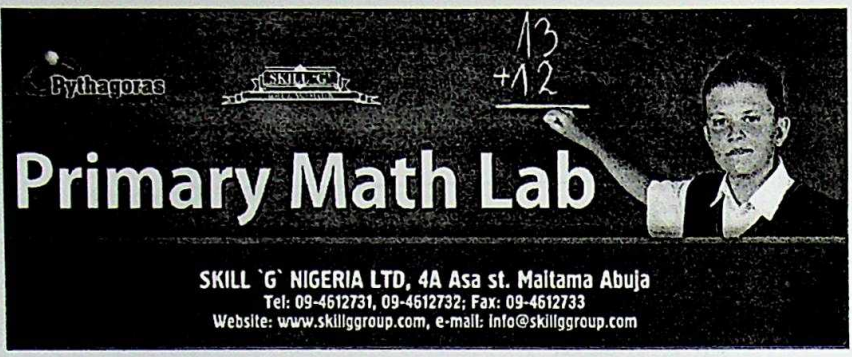


Teacher's Manual

Introduction
README BEFORE USE

In accordance with the
National Mathematics Curriculum
of Nigeria
Edited by: Dr. Philip Slobodsky
Pythagoras Educational Technologies

Introduction

The Primary Math Kit is a multi-functional teaching aid that enables:

- The teachers: a guided and effective teaching. The structured lessons and illustration tools improve the teacher's ability to present the topics included in the curriculum material in a clear and appealing way.
- The pupils: a deeper involvement in the lessons and greater interest in the learned material. The enriched learning environment helps the pupils to concentrate their attention on the new subjects, and absorb abstract mathematical concepts.

The kit provides practice and assessment tools that give the pupils intensive practice and enable teachers to instantly receive the results of pupils' tests.

The **Kit** includes 3 kinds of teaching aids:

- Teacher's Kit
- Pupil's Kit
- Training and Assessment Kit

Teacher's Kit

The Teacher's Kit consists of:

- The *Main Demonstration Board*
- The *Demonstration Posters*
- *Template Work Sheets* & a set of *2-Dimensional Magnetic Demonstration Parts*
- A *set of 3-Dimensional Aids*
- Teacher's manuals

The **Main Demonstration Board** is a *Magnetic White Erasable Board* (50x70cm), which is a useful teaching aid, allowing attractive color writing and drawing. The kit includes markers & eraser for the White Board.

(Note: On its initial use don't forget to remove the transparent sticker covering the board).

The **Main Demonstration Board** also serves as the base for the *Template Work Sheets & the magnetic 2-Dimensional Demonstration Parts,* which the teacher uses for dynamic and interactive demonstrations of the content. The unique *Template Work Sheets* are superimposed on the magnetic board. Each worksheet consists of the contours of the demonstration parts used during the lesson, numbered according to the sequence of their appearance. Such a design provides the teacher an easy location of the required parts.

Some subjects require a demonstration of more complex teaching aids (like an *Abacus* or *Geometrical Space Figures*); in those cases the **3-Dimensional Aids Set** will be of use.

The *set of 3-Dimensional Aids* includes:

- *A 3D Geometrical Set*
- Teacher's Protractor & Compass
- Thermometer
- The *Math Balance*
- Teacher's closed frame abacus
- Teacher's open frame abacus
- Spring scales

The Teacher's Manual consists of a brief plan of every lesson from primary *I* to primary *VI*, provided along with how to use the teaching aids.

Pupil's Kit

The Pupil's Kit consists of **Training Means** to be used during the lesson to practice specific skills, like counting with an abacus or reading a clock. The Pupil's Kit includes:

- Pupils' Abaci
- The pupils' clock
- Sorting chips set
- A measuring tape
- Pupils' drawing set

Training and Assessment Kit

Extensive training is necessary for effective learning. However, pupils don't like preparing much homework because it usually consists of a number of similar boring exercises. To resolve this problem, we have developed a set of tests running on the game-like ***Test-Board***. The tests include a large number of ***Test Cards*** covering the entire curriculum.

The left half of each ***Test Card*** includes a series of exercises. On the right are multiple possible answers. Pointing to the correct answer encourages the pupil by an immediate positive feedback. The grade is displayed on the board and can be recorded by the teacher.

The effectiveness of *Self-Tests* is achieved by:

- The large number of exercises covering the entire curriculum
- The pupils' ability to concentrate on the test due to its attractiveness and game-like form;
- Automatic assessment, which saves the teacher time

The Teacher's Manual specifies for each lesson which ***Test Cards*** are to be used to ensure that the pupils have understood the material and are ready for next year. Only frequent use of the ***Test-Board*** can ensure the desirable level of pupils' knowledge, and the pupils should pass all of these cards. Pupils that fail to do so should be encouraged to revise the learned material and try again.

The teacher may also decide, based on his/her judgment, to test the pupils on additional ***Test Cards*** which are not specified in the **The Teacher's Manual**, for example in order to revise a subject learned in previous years before further extending it.

How to work with the Q&A kit?

The "Q&A" kit consists of a main ***Test-Board***, which serves as the base for the ***Test Cards***.

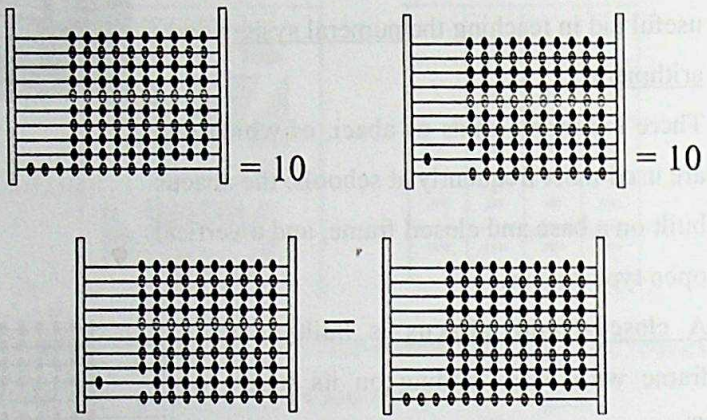
On its initial use the ***Test-Board*** should be inserted 3 AAA batteries, using the small screw (both are supplied in the kit).

The teacher should choose the appropriate ***Test Card*** that contains exercises practicing the current subject recently taught, or one that should be practiced or reviewed at that moment. In order to simplify location of the proper card, the cards have being marked in the following way:

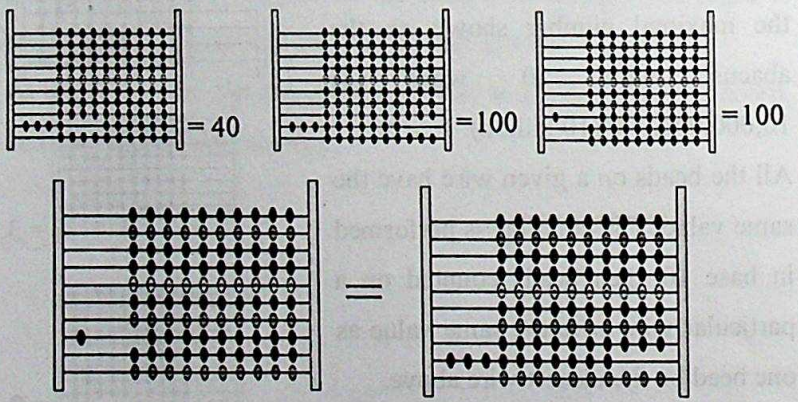
Q&A I-3-1
THEME: BASIC OPERATIONS
Topic 3: Money

The card name shows the class (I in this example, or II, III, IV, V or VI), the theme is as it appears in the Curriculum published by the Ministry of Education (Basic Operations), and the topic (No. 3, Money).

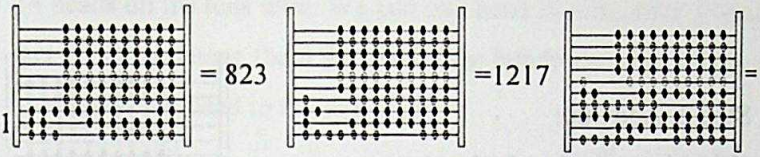
We count up to 9 on any given wire. When we reach 10, we return all the beads on that wire to the right end, and instead move one bead on the wire above to the left side of the abacus:



The value of each bead on the second wire is 10, such that 4 beads represent 40, 10 beads represent 100, and we can replace them with one bead from the wire above (representing the place-value of the hundreds):



Using this method, we can represent any number up to 10 billion on the abacus, and perform the operations of addition and subtraction. The following examples depict the representation of whole numbers on the closed-frame abacus:



Performing addition and subtraction with the closed-frame abacus is as simple as "long addition" or "long subtraction" with renaming and changing when necessary.

Addition using the Closed-Frame Abacus

There are only 2 rules to remember when adding numbers:

1. On any given wire, all the beads have the same value, and they are simply added up to the total of 9.
2. When the sum reaches the value of 10, it is replaced by one bead from the wire above. All the beads from the given wire are returned to the right, and we continue to add the second number.

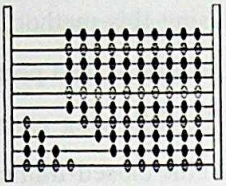
Note:

- In order to add 3 numbers, we must first add the initial two, and then add the third number to the resulting sum.
- It is not necessary to begin adding from the lowest-value digits.

Examples:

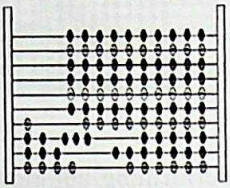
1. 1234 + 325

Step 1. Set the first number:



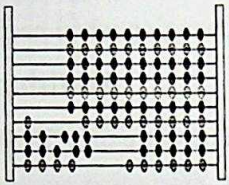
Step 2. Add 300:

(3 beads on the hundreds wire)



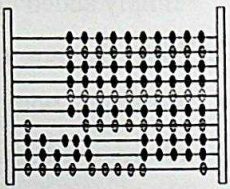
Step 3. Add 20:

(2 beads on the tens wire)

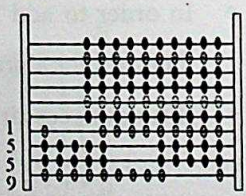


Step 4. Add 5:

(5 beads on the units wire)

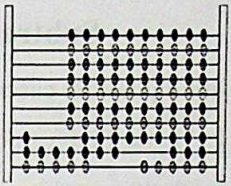


Step 5. Read the result (1559).



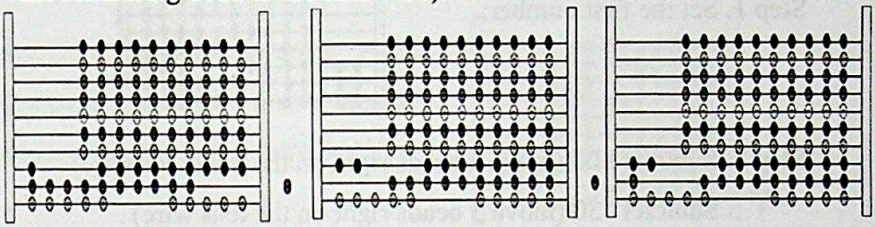
2. 175 + 48

Step 1. Set the first number:



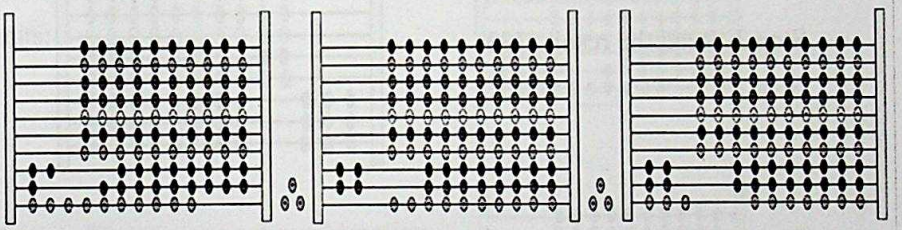
Step 2. Add 40

(4 beads on the tens wire. We add one bead in turn, after 3 beads we get 10, & exchange them for one on the hundreds wire. Finally we add the remaining bead to the tens wire):

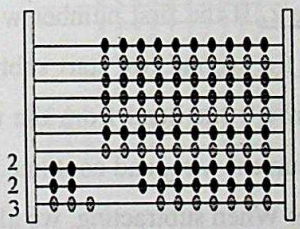


Step 3. Add 8

(8 beads on the units wire. We add one bead in turn, after 5 beads we get 10, & exchange them for one on the hundreds wire. Finally we add the remaining 3 beads to the units' wire):



Step 5. Read the result (223):



Subtraction using the Abacus

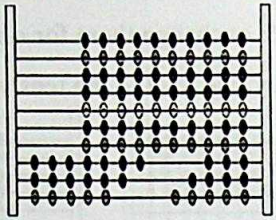
There are 2 possible cases when subtracting two numbers:

Case 1: If the first value on some wire (place-value) is greater than the second, we simply subtract the second value from the first one.

For example:

1. 765 - 432

Step 1. Set the first number:

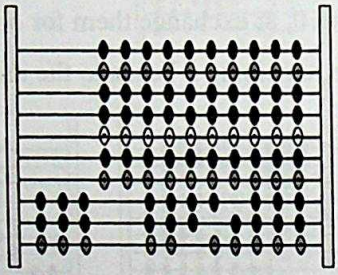


Step 2. Subtract 400 (move 4 beads right on the hundreds wire)

Subtract 30 (move 3 beads right on the tens wire)

Subtract 2 (move 2 beads right on the units wire)

Step 3. Read the result (333).



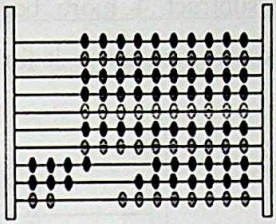
Case 2. If the first number within some wire (place-value) is smaller than the second, we start subtracting until we arrive at zero. Then we "borrow" one bead from the upper wire, exchange it to 10 beads on the current wire, and continue subtracting.

Note: When subtracting, we always start from the lowest-value digit.

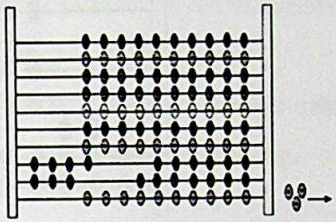
For example:

2. 432 - 65

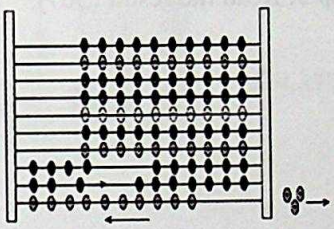
Step 1. Set the first number:



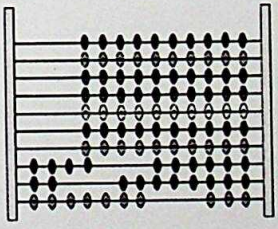
Step 2. Subtract 5 units. After moving 2 beads, we arrive at zero (we have to subtract 3 more beads):



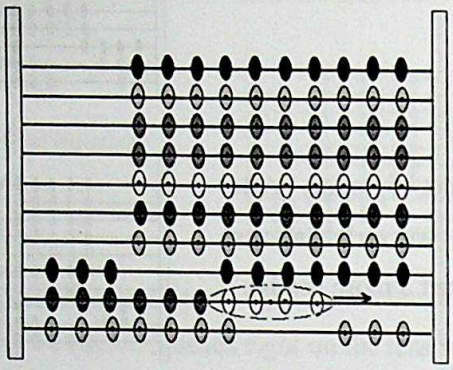
Step 3. We borrow one bead from the tens wire and exchange it for 10 units:



Step 4. We complete the subtraction of units (move 3 beads to right):



Step 5. Subtract 6 tens. After moving 2 beads, we arrive at zero (we have to subtract 4 more beads). We borrow one bead from the hundreds wire, exchange it for 10 tens, and subtract the remaining 4 beads:



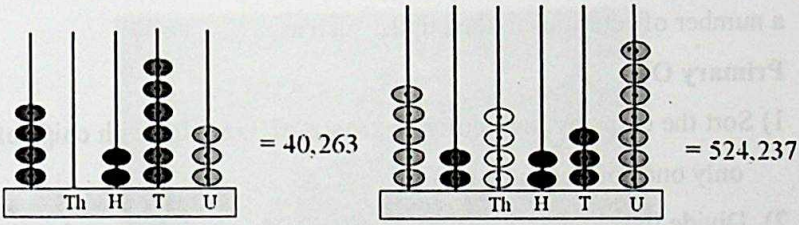
Step 5. Read the result (367).

The Open-Frame Abacus

The open-frame abacus illustrates very well the idea of place-value for a digit, similarly to the written form of a number. Since all its beads can be removed it can also be used to illustrate the concept of **zero**. However, actual calculations cannot be performed with this kind of abacus.

Note that the open frame of the abacus does not allow for all the beads to be stored on the abacus, but rather must be stored elsewhere.

The abacus is provided in a disassembled manner, and the teacher can put it together in accordance with the purpose of the demonstration.



Counting and Sorting Chips

This ancient and very simple, yet powerful tool for teaching and learning arithmetic consists of a large number of colorful plastic chips, making demonstration and practice of very basic arithmetic operations possible such as **counting and sorting.**

Counting in units and in groups is the best way to teach the pupils **to name** numbers, and serves as a necessary introduction to **writing** and **recognizing** the numbers. Since the chips differ in color, they can be used to teach **counting in groups,** which is necessary before teaching the subject of **decimals.**

The simplest way to use chips during the Math lessons is to suggest a number of activities to the pupils, such as:

Primary One

1) Sort the chips by their color in groups of 3, 5, 10, (with chips of only one color in each group).
2) Divide the chips into groups of 4 (with chips of all the colors in each group).

Primary Two

3) Count 10 chips (of all the colors) and divide them into 5 equal groups.
4) Count 20 chips (of all the colors), and divide them into 2, 4, 5, 10 equal groups.

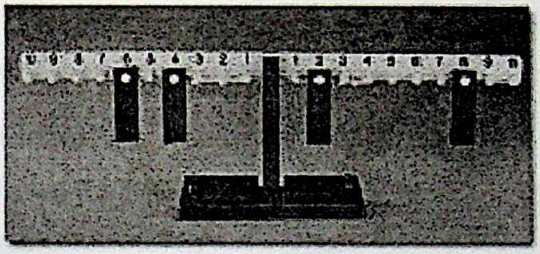
Primary Three and Four

5) Create 2 (or 3,4,5,6,7,8,9) equal groups of a certain number of chips, and count the chips in all the groups together.

Important note:

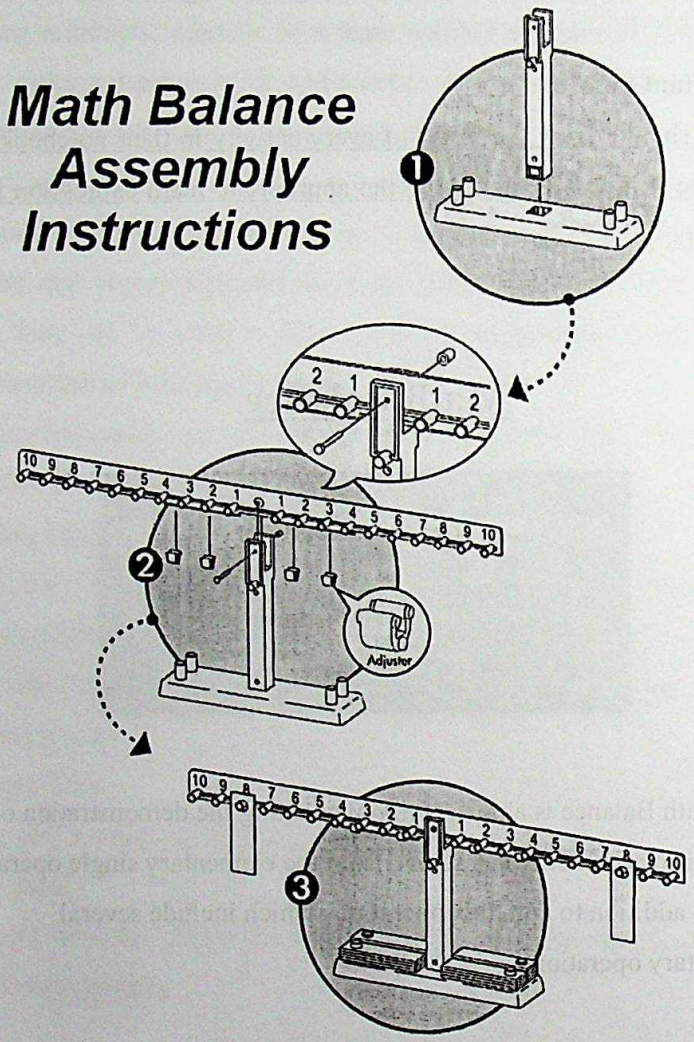
Pupils should **draw** the result of every activity in their notebooks, describe it in words, and write the appropriate math expression in numbers.

Math Balance



The Math Balance is a powerful tool enabling the demonstration of most basic arithmetic operations, from the elementary single operation such as addition to complex operations which include several elementary operations.

On its initial use the Math Balance should be assembled in the following manner:



The Math Balance consists of two *arms* that initially should be in the horizontal position. If the arm is not parallel to the table or floor, it should be adjusted using the small white weights on the bottom edge of the balance arm.

A Math Balance set includes a number of equal *weights* that can be suspended on the *hooks*, placed at equal distances from each other on the arms (10 hooks on each arm).

It is highly recommended that the teacher suggest that the pupils **will discover experimentally** the *balance configuration* for a given set of weights and positions of the hooks on one side of the arm.

In the case of **two weights**, the *balance configuration* can be achieved only if the weights are placed at equal distances on both sides of the arm (on the equivalent numbers).

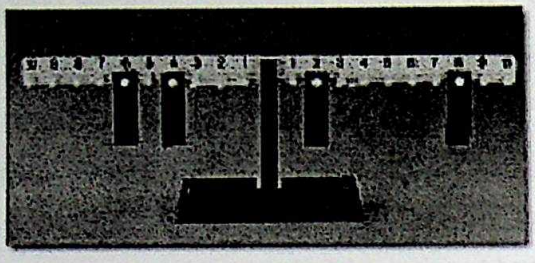
Balancing with three weights allows for more solutions, like: placing two weights on 5 on the left arm, and one on 10 on the right arm (which represents the equality $2 \times 5 = 1 \times 10$); or placing two weights on 3 and 5, on the left arm, and one on 8, on the right arm (which represents the equality $3 + 5 = 8$).

Balancing with more than 3 weights usually allows for several solutions, depending on the given configuration of the weights on the hooks.

***The rules* of the Math Balance** are as follows:

The sum of all the products of the number of weights N by the hook's position D on the left arm must equal the same sum on the right arm:

$$(N_1D_1 + N_2D_2 + \ldots)_{Left} = (N_1D_1 + N_2D_2 + \ldots)_{Right}$$



In the picture: $N_1 = N_2 = 1$ on both left and right arms,

Left arm: $D_1 = 6$, $D_2 = 4$

Right arm: $D_1 = 2$, $D_2 = 8$

The Balance is satisfied because: $6 + 4 = 2 + 8$.

Using this method the teacher can demonstrate the addition of whole numbers (up to 10).

If the balance is lower on one side, we can **remove** or move one or more weights on the corresponding arm, and bring it to the balance position. Removing weights is equivalent to the operation of **subtraction**, so that the Math Balance enables the discovery of the rules of subtraction experimentally.

Also, the results of **multiplication** of two whole numbers (up to 10) can be discovered experimentally using the Math Balance. For example, if we need to calculate 5 x 3, we put 5 weights on hook no. 3 on the left arm, and try to bring the balance to the horizontal position by adding the weights one-by-one on hook no.1 on the right. Finally, we count the number on the weights, which will equal the result (5 x 3 = 15).

A final note: Pupils should **record the results** they and the teacher obtained in the experiments with the Math Balance. This will ensure a better understanding of the subject, and will enable them to repeat the process in the future.

Thermometer

A thermometer is a tool used to measure the temperature of our surroundings as well as of concrete objects. Although a thermometer is not directly related to teaching Math, it can be a useful tool in demonstrating the application of mathematical concepts and processes in daily life, and the importance of accurate measurements and calculations.

To measure the surrounding temperature (inside/outside air), we expose the thermometer to the air, and wait a period of time (approx. 5 minutes). We then observe the level of the colored liquid inside the thermometer against a scale. This reading is the temperature.

A thermometer's scale is **decimal**, divided usually from -20°C (degrees Celsius) up to 60°C. The 1°C graduations are usually divided to 10 tenths of a degree, so that the temperature reading is expressed in decimal form.

The teacher can demonstrate measuring the temperature of the air, a pupil's body, water in a glass, etc., and suggest that pupils make their own measurements. The measurements can be used to demonstrate concepts such as numeration and decimals. The Thermometer may also be useful when teaching topics such as statistics, by allowing the collection of data sets such as the temperature in the class room on each day of the month.

In all the cases, it is highly recommended to draw the setup of the experiment and record the results in the pupil's notebooks!

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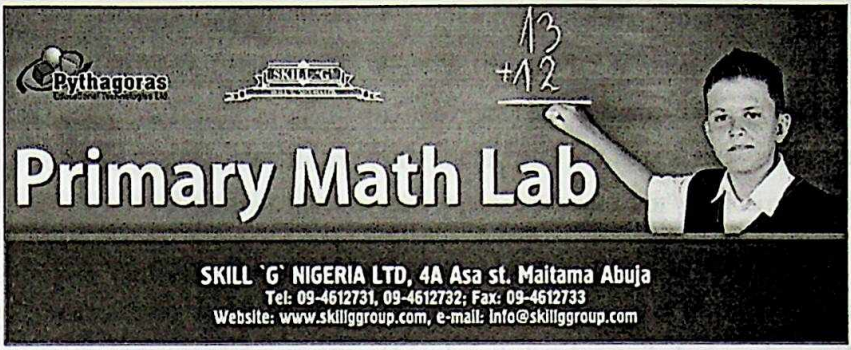

Teacher's Manual

Primary I

In accordance with the
National Mathematics Curriculum
of Nigeria
Edited by: Dr. Philip Slobodsky
Pythagoras Educational Technologies

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The following Manual for the Mathematics teachers therefore consists of a didactical guide to each of the 6 themes that should be taught according to the Curriculum, including a detailed explanation of how to use the Primary Math Kit. The Manual is built around the Curriculum, thus making it available to primary school teachers in a format which renders it easy to implement in the class room.

The Manual refers to the **three main components** of the Math Kit, namely the *Teachers Demonstration Set, the Students Set* and *the Students Training System,* as the basic educational tools around which every lesson can be built.

We hope that the extensive use of the **Primary Math Set** will enrich the learning experience of the Primary School pupils at all the levels and encourage them to improve their achievements, and that the Manual will help the teachers in using it effectively.

Dr. Philip Slobodsky
The Editor
Pythagoras Educational Technologies

PRIMARY ONE

THEME: NUMBERS AND NUMERATION

Topic 1: Whole Numbers 1 - 5

Objectives:

The pupils should be able to:

1. Sort and classify a number of objects in a group or collection;
2. Identify a number of objects in a group or collection;
3. Count up to 5 correctly;
4. Write the numbers 1 - 5 correctly;
5. Arrange the numbers 1–5 in order;
6. Recognize the need for counting and ordering.

Materials:

1. *Posters no. I-3, I-4*
2. *Counting chips*
3. *Improvised materials* like stones, pieces of paper, wood, etc.
4. *Demonstration abacus*

Activities

Teacher

1. Using p*osters no. I-3, I-4,* the teacher demonstrates the meaning **of counting and comparing** whole numbers up to 5. Special emphasis should be placed on the concept of *group*, and to the number of elements in a group **before** and **after** some event.

Activities

Teacher

2. Using *counting and sorting chips,* a teacher demonstrates the equivalence of the results of counting the **real objects** in a group and the **chips** representing the objects.
3. The teacher demonstrates an *abacus*, and shows that using the *beads* on every *wire* is equivalent to using the counting chips.
4. The teacher uses *improvised materials* like stones, pieces of paper, etc. and shows the equivalence of the results. of counting objects in different groups.

Activities

Pupils

1. Draw and paint groups of objects (from 1 to 5) in the notebooks.
2. Make groups of *counting chips* containing 1 to 5 chips, count the number of chips in each group, add one more chip to each group and count the chips again.

Topic 2: The Whole Number 0

Objectives:

The pupils should be able to:

1. Recognize that the symbol 0 stands for nothing or emptiness
2. Read the number 0
4. Write 0

Materials:

1. *Counting chips*
2. *Improvised materials* like stones, pieces of paper, wood, etc.
3. *Open frame demonstration abacus*

Activities

Teacher

1. Using *counting and sorting chips* the teacher creates groups of chips containing different numbers (from 1 to 5), and counts the number of chips in every group aloud. Then he/she removes a chip, one by one, from every group, and counts the remaining chips up to zero.
2. The teacher explains that the result (0) can be considered either as *nothing was – nothing happened*, and as a **result** of some *operation* (removing the chips), that is **the number 0**.
3. The teacher repeats this process using the open frame abacus.

Activities

Pupils

1. Draw and paint groups of objects (from 1 to 5) in their notebooks, and write the number of objects; then draw every group after removing all the objects (for example a tree branch with no leaves), and write the number 0 next to every drawing.

Topic 3: Whole Numbers 6 - 9

Objectives:

The pupils should be able to:

1. Sort and classify the number of objects in a group or collection
2. Identify the number of objects in a group or collection
3. Count and read correctly from 1 to 9
4. Write numbers 1 - 9 correctly
5. Arrange numbers 1–9 in order
6. Recognize the need for counting and ordering

Materials:

1. *Poster* no. I-5
2. *Counting and sorting chips*
3. *Improvised materials* like stones, pieces of paper, wood, etc.
4. *Demonstration closed-frame abacus*

Activities

Teacher

1. Using the *poster*, the teacher demonstrates the meaning **of counting and comparing** whole numbers up to 9. Special emphasis should be placed on comparing the number of elements in a *group* **before** and **after** some event.
2. Using *counting chips*, the teacher demonstrates the equivalence of the results of counting the **real objects** in a group and the **chips** representing the objects.
3. Using the *abacus*, a teacher practices counting the beads on the **lowest wire.**

Activities

Pupils

1. Draw and paint groups of objects (up to 9) in their notebooks and write the number of objects next to every group.
2. **Create** 5 *groups of sticks*, 5 to 9 sticks in every group, and place them in **order** of increasing amount.
3. Using the *pupil's abacus*, move 1 to 9 beads from the right side to the left, draw the operation in their notebook and write the number of beads next to every drawing.

Topic 4: The Whole Number 10

Objectives:

The pupils should be able to:

1. Recognize 10 as a group
2. Use the idea of place value limited to tens and units

Materials:

1. *Counting and sorting chips*
2. *Demonstration closed-frame abacus*
3. *White magnetic board*
4. *Improvised materials* like stones, pieces of paper, wood, etc.

Activities

Teacher

1. Using the *abacus*, the teacher counts the beads on the **lowest wire, each time adding one bead to the left**, until all the beads are used. **This is a group of 10.**
2. Using *counting and sorting chips,* the teacher demonstrates the equivalence of the results of counting the **beads** and the **chips.**
3. Using a *magnetic board* and *counting magnetic parts*, the teacher shows groups of 10 parts, **sorted by size, color** or **shape.**

Activities

Pupils

1. Draw and paint groups of 10 objects in their notebooks, and write the number of objects next to each group.
2. Using the *pupil's abacus*, move 10 beads from the right side to the left, draw the result in their notebook and write the number 10 next to the drawing.

Topic 5: Whole Numbers 1 - 99

Objectives:

The pupils should be able to:

1. Count the numbers 1 - 99 correctly
2. Identify and read the numbers 1 - 99 correctly
3. Write the numbers 1 - 99 correctly
4. Appreciate the need for counting and reading

Materials:

1. *Demonstration abaci*
2. *Counting chips*
3. *Improvised materials* like stones, pieces of paper, wood, etc.

Activities

Teacher

1. Using the *abacus*, the teacher counts the beads on the **lowest wire,** each time **adding one bead to the left**, until all the beads are used. **This is a group of 10**. Then he/she continues counting on the *higher wires*, showing the result increased by 10 on every subsequent wire.
2. Using the *counting chips,* the teacher demonstrates the equivalence of the results of counting the **beads** and the **chips**.
3. The teacher counts aloud the number of pupils in the class, the number of tables, chairs, etc.

Activities

Pupils

1. Draw and paint a number of groups of up to 10 objects in their notebooks, and write the number of objects next to each group.
2. Count the number of all the objects in all the groups together.
3. Use the *pupil's abacus*, and count 9, 19, 29, etc. beads.
4. Complete a self-test using the *Test-Board* (Test Card no. I-1-5).

Topic 6: Fractions

Objective:
The pupils should be able to identify 1/2 and 1/4 using concrete objects and shapes.

Materials:

1. *Poster I-18*
2. *Template Work Sheet* No. I-18 superimposed on the *Magnetic Demonstration Board*, and the corresponding *2-D Magnetic Demonstration Parts* (fraction circles and bars)
3. *Improvised materials* such as stones, pieces of paper, wood, scissors, etc.

Activities

Teacher

1. Using *Work Sheet* No. I-18 (corresponding to Module 18 of the Mathematics Book 1) applied on the *Magnetic White Board*, and the *Magnetic Demonstration Parts*, the teacher demonstrates on the board the **decomposition of the whole to fractions.**

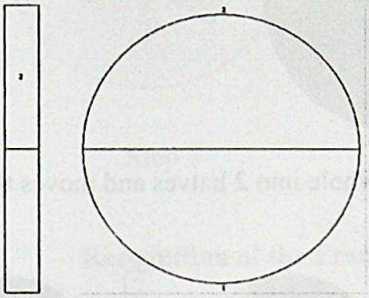
Activities

Pupils

1. Recognize a half (1/2) and a quarter (1/4) of the *Fraction Circles* and *Bars* among the different figures presented on the *Demonstration Board (Template Work Sheet I-18)*.
2. Draw and paint whole objects and their fractions in workbooks.
3. Complete a self-test using the *Test-Board* (Test Card no.8-I).

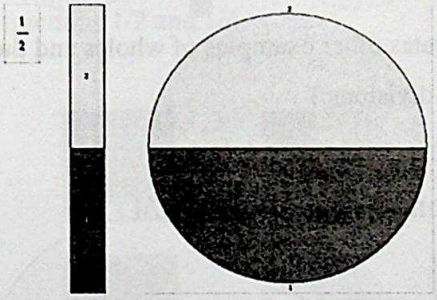
Template Work Sheet No. I-18

Demonstration of the Fraction 1/2



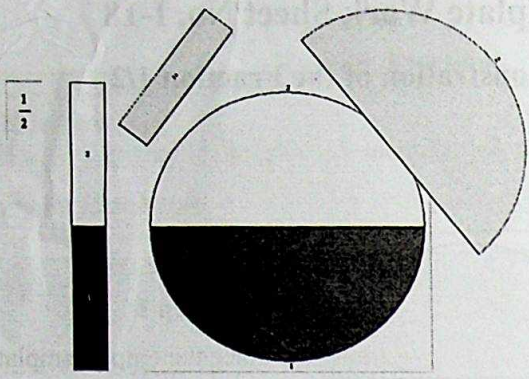
Step 1

Place the empty template – contours of the *demo-parts*.

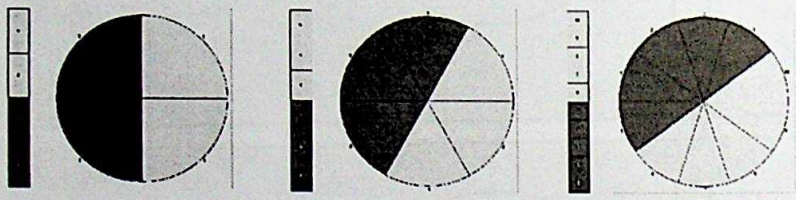


Step 2

The corresponding demo-parts are placed on their locations within the template.

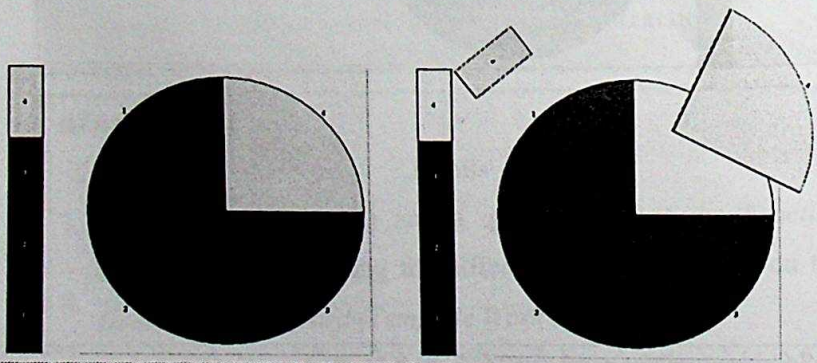


Step 3 The teacher divides the whole into 2 halves and moves them apart.

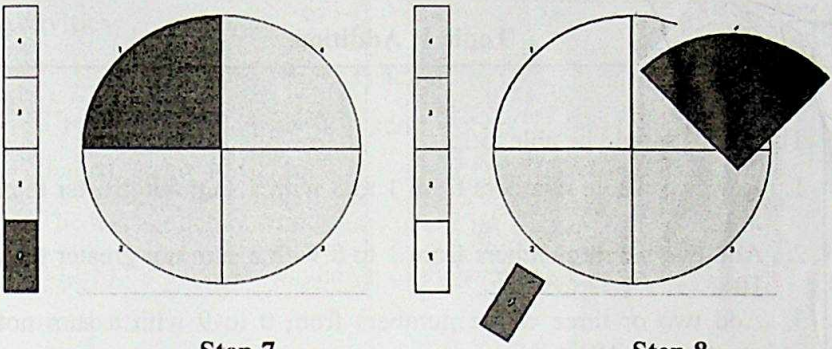


Step 4 The teacher demonstrates other examples of wholes and their divisions.)

Demonstration of the Fraction 1/4



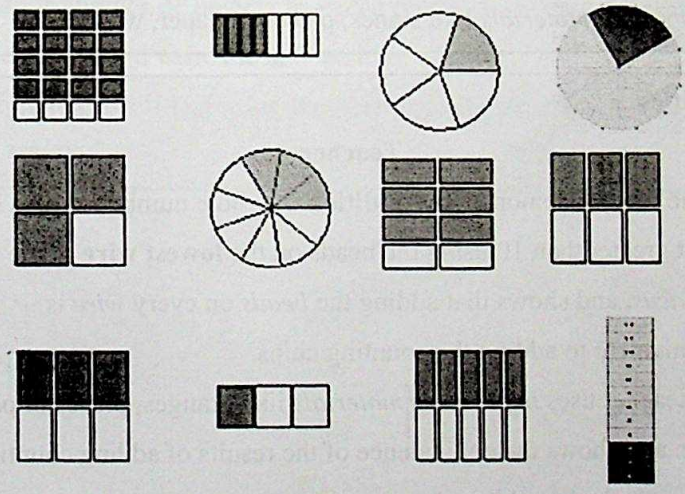
Step 5 **Step 6**



Step 7 **Step 8**

Recognition of the Fractions 1/2 and 1/4

After the demonstration, the teacher suggests that the pupils classify the figures on the *Demonstration Board* according to the number of pieces to which they are divided, and to find those represented by the fractions 1/2 and 1/4.



THEME: BASIC OPERATIONS

Topic 1: Addition

Objectives:

The pupils should be able to:

1. Add two whole numbers from 1 to 3 with a sum not greater than 5
2. Add two whole numbers from 1 to 8 with a sum not greater than 10
3. Add two or three whole numbers from 0 to 9 with a sum not greater than 18
4. Add 2-digit whole numbers with a sum not greater than 40 without exchanging and renaming
5. Appreciate accuracy in addition in everyday life

Materials:

1. *Posters no.I-6, I-8, I-9*
2. *Demonstration abacus*
3. *Counting chips*
4. *Improvised materials* like stones, pieces of paper, wood, etc.

Activities

Teacher

1. The teacher demonstrates **addition** of whole numbers with a sum not greater than 10 using the beads on the **lowest wire** of the *abacus*, and shows that adding the *beads* on every *wire* is equivalent to adding the counting chips.
2. A teacher uses *improvised materials* like oranges, pieces of paper, etc. and shows the equivalence of the results of adding counting chips and other objects.

Activities

Teacher

3. The teacher explains how to add numbers whose sum is greater than 10, using Poster no. I-9.
4. The teacher demonstrates how to use the *Addition Table* (Poster no.I-8) for a quick calculation of the sum of small whole numbers.

Activities

Pupils

1. Using the *abacus, counting chips* and various *improvised materials*, make different groups of up to 10 objects;
2. Draw and paint the groups in the notebooks and write the number of objects next to each group;
3. Add a number of objects to every group; draw the group after the adding and write the new number of objects in it.
4. Complete a self-test using the *Test-Board* (Test Cards no. I-2-1-1 & I-2-2).

Topic 2: Subtraction

Objectives:

The pupils should be able to:

1. Subtract from whole numbers not greater than 9
2. Subtract from whole numbers not greater than 18
3. Appreciate accuracy in subtraction in everyday life

Materials:

1. *Demonstration abacus*
2. *Counting chips*
3. *Improvised materials* like oranges, pieces of paper, wood, etc.

Activities

Teacher

1. Using *Poster* I-7, the teacher demonstrates the meaning of **subtraction** of objects from a group of identical objects.
2. The teacher demonstrates the **subtraction** of whole numbers not greater than 9 using the beads on the **lowest wire** of the *abacus*, and shows that subtracting the *beads* on every *wire* is equivalent to subtraction of the *counting chips* or any other *improvised object*.
3. The teacher organizes groups of identical objects (the number of objects in each group should be greater than 10 and smaller than 18), removes a number of objects from each group, and counts the result aloud.

Activities

Pupils

1. Using the *abacus, counting chips* and various *improvised materials*, make different groups of up to 10 objects in each group.
2. Draw and paint the groups in the notebooks and write the number of objects next to each group.
3. Subtract a number of objects from every group, draw the result and write the number of the subtracted objects and the number of the remaining objects.
4. Complete a self-test using the *Test-Board* (Test Card I-2-2-1).
5. Using the *abacus, counting chips* and various *improvised materials*, make different groups of 10 to 18 objects in each group.
6. Draw and paint the groups in the notebooks and write the number of objects next to each group.
7. Subtract a number of objects from every group; draw the result and write the number of the subtracted objects and the number of the remaining objects.
8. Complete a self-test using the *Test-Board* (Test Card I-2-2-2).

Topic 3: Addition and Subtraction

Objectives:

The pupils should be able to:

1. Find the missing numbers in a problem
2. Appreciate the importance of accuracy in addition and subtraction in everyday life

Materials:

1. ***Poster V-7 (Open Sentences)***

Activities

Teacher

1. The teacher demonstrates different ways of writing the problem – verbally, using words, or symbolically, using *math symbols*.

Activities

Pupils

1. Draw and paint simple situations of adding and subtracting objects from a group.
2. Write the result of the operation (the initial number of objects plus/minus the number of new/removed objects = result) using words and numbers.

THEME: MEASUREMENT

Topic 1: Money

Objectives:

The pupils should be able to:

1. Recognize the different denominations of Nigerian money
2. Add coins to obtain sums that do not exceed 25k
3. Calculate change obtainable from 10k or less
4. Trace coins using brown and white papers

Materials:

1. *Demonstration coins and banknotes*

Activities

Teacher

1. The teacher demonstrates the coins and banknotes, explains the meaning of *denomination value*, and explains the meaning of *sum* and *change*.
2. The teacher organizes a *class game* of imaginary 'buying and selling' of different goods like pencils, notebooks, bags, etc (the pupils can prepare replica's of commodities and use them).

Activities

Pupils

1.Draw and paint Nigerian coins in their notebooks.

2.Write examples of the prices of common commodities and calculate the sum of a 'shopping basket'.

3.Complete a self-test using the *Test-Boards* (Test Cards no. I-3-1 and I-3-2).

Topic 2: Length

Objectives:

The pupils should be able to:

1. Develop the idea of length
2. Compare the lengths of two or three objects
3. Order similar objects according to their lengths
4. Measure length and distance in their natural units
5. Value the need of length and ordering lengths in our environment

Materials:

1. *Poster no. II-7*
2. ***Measuring ruler and meter***

Activities

Teacher

1. The teacher demonstrates different ways of measuring length: using steps, hand span and a measuring meter.

Activities

Teacher

2. Using *Poster II-7*, the teacher explains the similarity and the difference in the meanings of an object's *length* and the *distance* between the points on a ground, and introduces the meaning of the **unit of length.**

Activities

Pupils

1. Measure the width and length of the classroom by steps, and write the results in their notebook (the results obtained by different pupils differ), and by a measuring meter (the results are identical!)
2. Using the ruler, measure the length of a pencil, book, bag, etc, and write the results in their notebooks.

Topic 3: Volume

Objectives:

The pupils should be able to:

1. Develop the idea of volume
2. Compare the volume of different containers
3. Value the need for volume and its use in society

Materials:

1. *Improvised materials like bottles, empty cans, water, grain.*
2. ***Measuring cups***

Activities

Teacher

1. The teacher demonstrates the equivalence of containers of **different shape** but **equal volume** (like 1 liter bottle and 1 liter juice box, etc.), by filling them with the same quantity of water.
2. The teacher demonstrates **measuring volume,** enabling a comparison of different containers' volume.

Activities

Pupils

1. Using a *measuring cup*, evaluate the volume of a milk bottle, juice box, etc., draw the procedure in their notebook, and write the results.

THEME: PRACTICAL AND DESCRIPTIVE GEOMETRY

Topic 1: Three-Dimensional Shapes

Objectives:

The pupils should be able to:

1. Sort out cubes, cuboids, cylinders and spheres
2. Identify and name cubes, cuboids, cylinders and spheres
3. Distinguish between cuboids and cubes
4. Appreciate the presence of solid shapes at homes and in the environment

Materials:

1. *The set of 3D Geo Solids*
2. *Posters no. I-2, II-4, II-5, II-6*
3. *Improvised materials like boxes, balls and bottles*

Activities

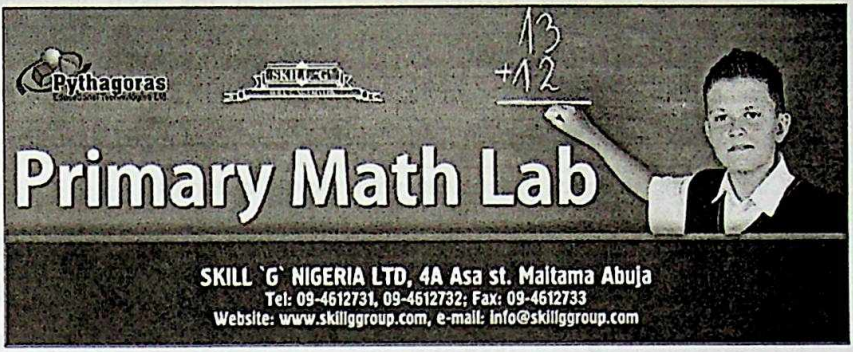
Teacher

1. The teacher demonstrates different solid shapes in the classroom, and points out those belonging to one of the **four basic** shapes: *cube, cuboid, cylinder* and *sphere.*
2. The teacher identifies the shapes using *Posters I-2, II-4, II-5, II-6* and the set of demonstrational *3D Geo Solids.*

Activities

Pupils

1. Draw and paint objects of a basic shape in their notebooks like a football, juice box, bottle, etc., and write the name of the shape.



Teacher's Manual

Primary II

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Edited by: Dr. Philip Slobodsky
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The Editor
Pythagoras Educational Technologies

PRIMARY TWO

THEME: NUMBERS AND NUMERATION

Topic 1: Whole Numbers 1 - 200

Objectives:

The pupils should be able to:
1. Count numbers correctly from 1 - 200;
2. Identify and read numbers from 1 - 200;
3. Identify, order and write numbers up to 200.

Materials:

1. *Demonstration abaci*
2. *Counting chips*
3. *Improvised materials* like seeds, stones, etc.

Activities

Teacher

1. Using the *abaci* (either closed or open frame), the teacher demonstrates the meaning **of counting** whole numbers beyond 10. Special emphasis should be placed on recognizing, naming and writing numbers greater than 100.
2. Using the *counting chips,* the teacher demonstrates the equivalence of the results of counting the **real objects** and the **chips,** which symbolize the objects.

Activities

Pupils

1. Count the beads on the lowest 1 to 10 wires of the *abacus,* and draw the configurations and the numbers of beads in their notebooks.
2. In their notebooks, write a number of 2- and 3-digit numbers up to 200, in words and digits.
3. Complete self-tests using the *Test-Board* (Test Cards no.I-1-5 and II-1-1).

Topic 2: Fractions

Objective:

The pupils should be able to:

1. Divide a collection of concrete objects into two equal parts and four equal parts.
2. Find 3/4 of a concrete object.

Materials:

1. *Poster no. II-9*
2. *Template Work Sheet* No. II-8 superimposed on the *Main Demonstration Board*, and the corresponding *2-D Demonstration Parts*
3. *Demonstration Abacus*
4. Improvised materials like oranges, pieces of paper, wood, etc.

Activities

Teacher

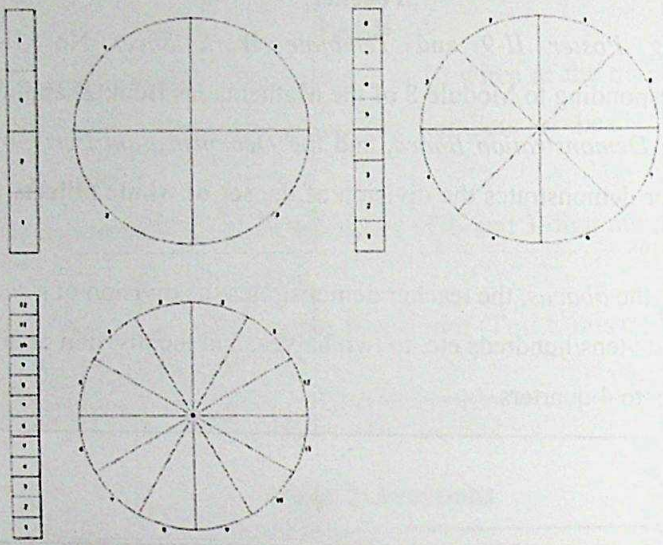
1. Using *Poster II-9* and *Template Work Sheet* No. II-8 (corresponding to Module 8 of the Mathematics Book 2) applied to the *Demonstration Board*, and the *Demonstration Parts*, the teacher demonstrates the division of the **set of whole objects** to fractions.
2. Using the *abacus*, the teacher demonstrates the division of a set of 10 units/tens/hundreds etc. to two halves, and the division of 20, 40 etc. to 4 quarters.

Activities

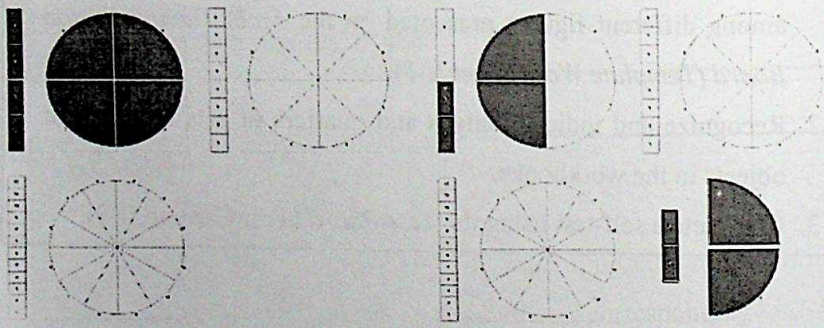
Pupils

1. Recognize a half (1/2) and a quarter (1/4) of the *Fraction Bars* among different figures presented on the *Main Demonstration Board (Template Work Sheet II-8)*.
2. Recognize and indicate halves and quarters of sets of different objects in the workbooks.
3. Complete a self-test using the *Test-Board* (Test Card no.II-8).

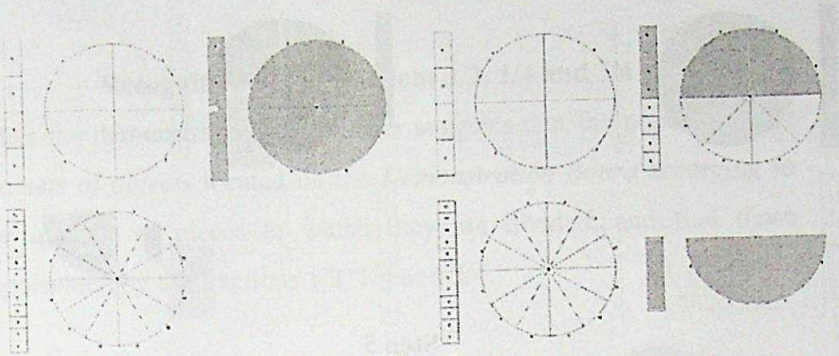
Division of a Set of Objects to 2 and 4 Parts



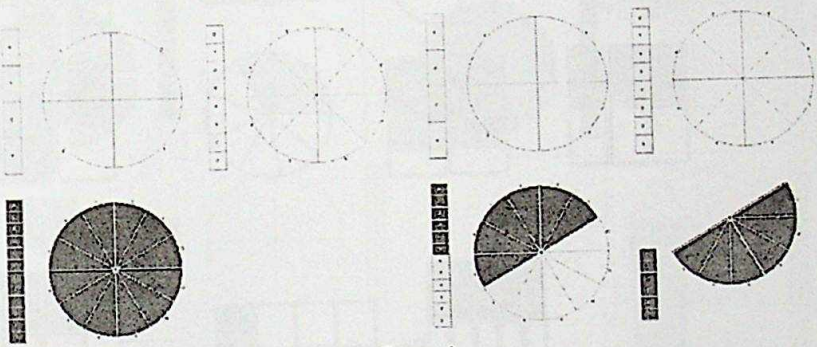
Step 1
(Empty template – Contours of the *Demo-Parts*)



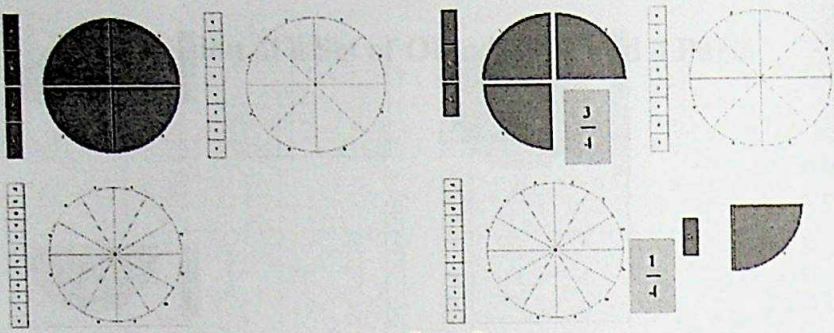
Step 2
(Division of a group of 4 to 2 halves)



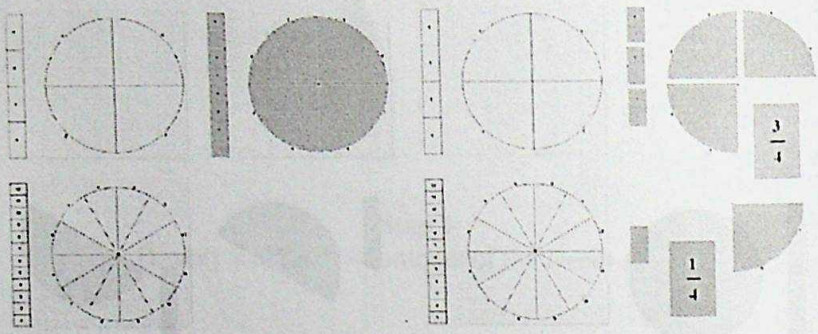
Step 3
(Division of a group of 8 to 2 halves)



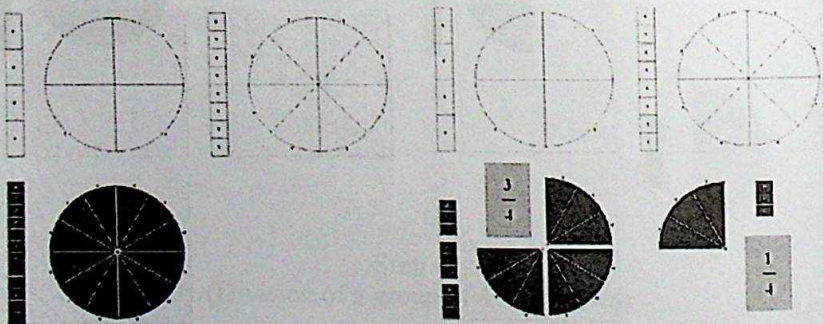
Step 4
(Division of a group of 12 to 2 halves)



Step 5
(Division of a group of 4 to 4 quarters)



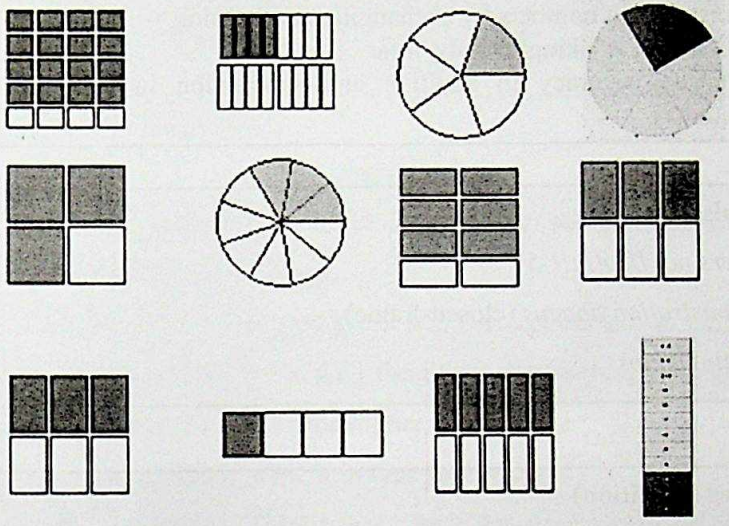
Step 6
(Division of a group of 8 to 4 quarters)



Step 7
(Division of a group of 12 to 4 quarters)

Recognition of the fractions 1/2, 1/4 and 3/4

After the demonstration, the teacher suggests that the pupils classify the *sets of objects* located on the *Demonstration Board* according to the number of pieces to which they are divided, and find those represented by the fractions 1/2, 1/4 and 3/4.



Topic 1: Addition and Subtraction

Objectives:

The pupils should be able to:

1. Add 2-digit numbers without exchanging and renaming
2. Add 3-digit numbers without exchanging and renaming
3. Subtract 2-digit numbers without exchanging and renaming
4. Add 2-digit numbers by exchanging or renaming
5. Subtract 2-digit numbers by exchanging or renaming
6. Add 3 numbers taking two at a time
7. Appreciate accuracy in addition and subtraction in everyday activities

Materials:

1. *Posters no. III-4, III-5*
2. *Demonstration abacus* (closed-frame)
3. *Counting chips*

Activities (Addition)

Teacher

1. Using the *abacus*, the teacher demonstrates the meaning of **place value** (units and tens) as the number of beads on the lowest wire (units) and on the next wire (tens).
2. Using the *counting chips*, the teacher counts a sum of two 2-digit numbers by adding one chip at a time. Then the teacher demonstrates the same result by adding the corresponding **place values** of units and tens of the two numbers.

Activities (Addition)

Teacher

3. Next, the teacher demonstrates addition of the same numbers using the abacus.
4. Finally, the teacher uses *Poster III-4*, and shows how to add the numbers by writing them one underneath the other (long addition).

Activities (Addition)

Pupils

1. Count the sum of two 2-digit numbers (up to 20), adding the counting chips **one-by-one**.
2. Add **the units** of the two given numbers on the lowest wire of the *pupil's abacus* by adding the beads, representing the units, and then add the tens on the higher wire.
3. Read the result and write it in their notebooks.
4. Solve a number of exercises given by the teacher in their notebook.
5. Complete self-tests using the *Test-Board* (Test Card No II-2-1-1).

Activities (Subtraction)

Teacher

1. Using the *counting chips*, the teacher represents a 2-digit number, and removes some chips, one by one (more than 10), counting aloud at each step.
2. The teacher counts the remaining chips, and writes the result of the subtraction operation on the board.
3. Using the *abacus*, the teacher sets the first number, by moving the number of **units** on the lowest wire to the left, and the number of **tens** on the next wire. The teacher then subtracts the second number by moving the number of beads corresponding to the number of units and tens of the second number to the right on the two wires.
4. The teacher reads the remaining number, and shows that it is equal to the number obtained by direct counting.
5. Finally, the teacher uses *Poster III-5*, and shows how to subtract the numbers by writing them one underneath the other (long subtraction).

Activities (Subtraction)

Pupils

1. Solve a number of exercises given by the teacher in their notebooks.
2. Complete self-tests using the *Test-Board* (Test Cards No. I-2-2 and II-2-3).

Topic 2: Multiplication

Objectives:

The pupils should be able to:

1. Multiply numbers using repetitive additions
2. Appreciate the importance of accuracy in multiplication in everyday activities

Materials:

1. *Posters no. III-2, III-7, III-8*
2. *Demonstration abacus*
3. *Counting chips*

Activities

Teacher

1. Using *Posters III-7* and *III-8, the* teacher shows how **repetitive additions** can be written in the short form of **multiplication**.
2. The same results can be obtained using an *abacus*, by successive addition of the given number (the operation should be performed on the lowest wire of the abacus, each time adding 1 to the number of tens when the number of units reaches 10).
3. The teacher demonstrates the conclusive *Multiplication Table (Poster III-2)*, and shows how the product of two one-digit numbers can be instantly found using it.

Activities

Pupils

1. Draw and paint a number of groups (up to 10) of identical objects and identical size (with no more than 9 objects in each group) in their notebook, and count all the objects. Write the result as **repetitive addition** and as **multiplication** of the number of objects in a group by the number of groups.
2. Solve exercises given by the teacher.
3. Complete self-tests using the *Test-Board* (Test Card no. II-2-4).

THEME: PRACTICAL AND DESCRIPTIVE GEOMETRY

Topic: Two-Dimensional Shapes

Objectives:

The pupils should be able to:

1. Identify a square, a rectangle, a circle and a triangle;
2. Indicate which corner of a 2-dimensional shape is a "square corner".

Materials:

1. *Posters no. II-1, II-2, II-3, V-1, V-4*
2. *Magnetic shapes*
3. *Improvised materials* like pieces of paper, scissors, cuttings and drawings of squares, rectangles and triangles

Activities

Teacher

1. Using the *posters* the teacher introduces the classification of two-dimensional (plane) shapes, and shows that complex shape can be decomposed into simple basic shapes.
2. The teacher shows open figures (like a ray, angle) and closed shapes.
3. The teacher shows the **sides** and **corners** of a triangle, square and rectangle, and notes that there are many closed shapes that do not have either sides or corners (like a circle).
4. Using the *posters* the teacher counts the number of sides and
5. Corners in all the basic figures.

Activities

Pupils

1. Draw and paint all the basic shapes in their notebooks, and write their names.
2. Mark all the sides and (in a different color) all the corners of every shape.
3. Identify and mark "square corners" in a square, rectangle and right angle triangle.

Topic: Three-Dimensional Shapes

Objectives:

The pupils should be able to:

1. Identify and count the flat faces of a cube and a cuboid
2. Identify and count the corners of a cube and a cuboid
3. Identify and count the edges of a cube and a cuboid
4. Appreciate objects at home that are cuboids and cubes
5. Identify the curved surface of a cylinder
6. appreciate three-dimensional objects at home that are

Materials:

1. *Posters no. II-4, II-5, II-6*
2. *3D Geo Shapes*
3. *Improvised materials* like balls, boxes, etc.

Activities

Teacher

1. Using *Posters II-4, II-5 and II-6,* the teacher demonstrates the main properties of basic 3-D solids: the number of flat and curved surfaces, edges, corners.
2. The teacher stimulates pupils to identify basic solid shapes in the classroom.
3. The teacher presents the objects from the set of *3D Geo Solids*, and asks pupils to name each one.

Activities

Pupils

1. Draw and paint the basic 3D shapes (sphere, cylinder, cube and cuboid) in their notebook and write their names.
2. Identify and name the basic 3D shapes in the classroom.
3. Count and write the number of surfaces, edges and corners of the basic 3D shapes in their notebooks.

THEME: MEASUREMENT

Topic 1: Volume

Objectives:

The pupils should be able to:

1. Identify and name objects that could be used for measuring volume, such as cups, empty containers, buckets, etc.;
2. Put containers in order based on their volumes.

Materials:

1. *Cups, bottles, empty containers*
2. *Measuring cups*

Activities

Teacher

1. Guide the pupils how to measure the volume of different empty containers using the measuring cups, and compare the volumes of containers without measuring cups (by filling water directly from one container into another).

Activities

Pupils

1. Draw and paint containers of different volumes in their notebooks.
2. Arrange the empty containers according to their volumes, using the measuring cups.

Topic 2: Weight

Objectives:

The pupils should be able to:

1. Put objects in order according to their weights

Materials:

1. *Demonstration Spring scale*
2. *Poster no. VI-6*

Activities

Teacher

1. The teacher demonstrates how to use a *spring scale* to find **the weight** of an object. The teacher shows, using *Poster No. VI-6*, how the weight of different types of objects can be measured using different kinds of ***scales***.

Activities

Pupils

1. Draw and paint the *Demonstration Spring scale* in their notebook.
2. Find the weights of different objects (stones, coins, fruits, etc.)

Topic 3: Time

Objectives:

The pupils should be able to:

1. Recognize the time (in whole hours and half hours);
2. Name and arrange the days of the week.

Materials:

1. *Poster no. II-8*
2. *The "Clock" template*
3. *The Demonstration students' clock*
4. *Watches & clocks available in the pupils' environment*

Activities

Teacher

1. Using the *"Clock" template and Demonstration students' clock,* the teacher explains how the **short** and **long hands** of a clock work, and demonstrates whole hours and half hours using *Poster no. II-8.*

Activities

Pupils

1. Draw and paint a clock in their notebooks. On the clock draw all the positions corresponding to whole hours and half hours, and write the times next to each drawing.
2. Complete self-tests using the *Test-Board* (Test Cards no. II-5-2, and II-5-3).

Topic 4: Money

Objectives:

The pupils should be able to:

1. Describe the uses of money;
2. Recognize all the types of Nigerian coins and banknotes;
3. Convert an amount of up to ₦20 into small units and shop with an amount of money that does not exceed ₦20.

Materials:

1. *Demonstration coins* and *banknotes*

Activities

Teacher

1. Using the various *demonstration coins* and *banknotes*, the teacher guides the pupils how to recognize the different coins and banknotes.
2. The teacher organizes an imaginary "shop game", and guides the pupils how to buy and sell goods with price tags that do not exceed ₦20 (the pupils can prepare replica's of commodities and use them).

Activities

Pupils

1. Draw and paint all the Nigerian coins in their notebook and write their values.
2. Solve exercises given by the teacher on changing money of up to ₦20 into small currency.
3. Complete a self-test using the *Test-Board* (Test Card no. II-5-1).

Topic 5: Length

Objectives:

The pupils should be able to:

1. Compare their natural units with others (e.g. arm's lengths)
2. Appreciate the difference in arm's length and other parts of the body used for measurement
3. Value the need for length measurement using standard units

Materials:

1. *Poster no. II-7*
2. *Measuring meter*

Activities

Teacher

1. Using the *poster*, the teacher explains the difference in measuring length and distance using natural units (like a foot, arm, and hand span) and using a measuring meter.
2. The teacher demonstrates the use of different ways to measure the length of a classroom, the height of a door, the width of a blackboard, etc.

Activities

Pupils

1. Draw and paint the measuring meter in their notebooks.
2. Measure and write the length of various objects in the classroom in their notebook.

Topic 6: Area

Objectives:

The pupils should be able to:

1. Compare the areas of different shapes;
2. Appreciate the use of standard measurement units.

Materials:

1. *Poster no. III-1*
2. *Measuring meter*

Activities

Teacher

1. Using the *poster*, the teacher explains the meaning of an **area** as a number of elementary squares covering a given surface, and demonstrates its calculation using the examples shown on the poster.
2. The teacher demonstrates how to **compare** the areas of two shapes without performing any measurements: if one shape can be covered completely by another, its area is smaller than that of the other.

Activities

Pupils

1. Draw different basic rectangular shapes in their notebooks, and calculate their area by counting the elementary squares.
2. Complete a self-test using the *Test-Board* (Test Card no. II-5-5).

Teacher's Manual – Primary Two

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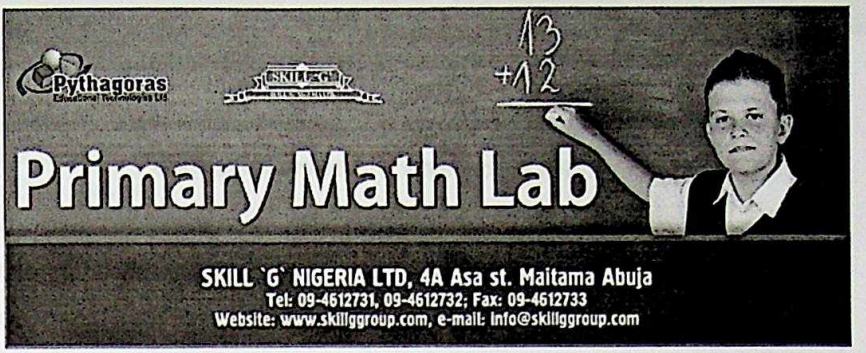


Teacher's Manual

Primary III

In accordance with the
National Mathematics Curriculum
of Nigeria

Edited by: Dr. Philip Slobodsky
Pythagoras Educational Technologies

The revised National Mathematics Curriculum has been developed following the goals and the targets of the 9 - Year Basic Education Program. The teachers are expected and required to expose the pupils to the contents and activities described in the Curriculum. They are also encouraged, as noted in the Curriculum, "to enrich the contents with relevant materials".

The following Manual for the Mathematics teachers therefore consists of a didactical guide to each of the 6 themes that should be taught according to the Curriculum, including a detailed explanation of how to use the Primary Math Kit. The Manual is built around the Curriculum, thus making it available to primary school teachers in a format which renders it easy to implement in the class room.

The Manual refers to the **three main components** of the Math Kit, namely the *Teachers Demonstration Set, the Students Set* and *the Students Training System,* as the basic educational tools around which every lesson can be built.

We hope that the extensive use of the **Primary Math Set** will enrich the learning experience of the Primary School pupils at all the levels and encourage them to improve their achievements, and that the Manual will help the teachers in using it effectively.

Dr. Philip Slobodsky
The Editor
Pythagoras Educational Technologies

PRIMARY THREE

THEME: NUMBERS AND NUMERATION

Topic 1: Whole numbers up to 999

Objectives:

The pupils should be able to:
1. Count numbers up to 999 correctly
2. Write numbers up to 999
3. State the place value of a digit in a 3-digit number
4. Put whole numbers in order and use the symbols > and <
5. Appreciate the need for counting and ordering

Materials

1. *Demonstration closed-frame abacus, open-frame (vertical sticks) abacus*
2. *Counting chips*

Activities

Teacher

1. Using the *abaci*, the teacher demonstrates the **concept of counting** whole numbers greater than 100 up to 999. Special emphasis should be placed on recognizing, naming and writing 3-digit numbers.
2. Using c*ounting chips,* the teacher demonstrates the equivalence of the results of counting the **real objects,** and the **chips** symbolizing the objects.

Activities

Teacher

3. Using the *vertical sticks abacus,* the teacher demonstrates the meaning of **place values of digits** up to thousands.
4. The teacher can play with the pupils the 'place-value-game': the teacher will write 2 or 3 digits on the board, the goal of the game is to create the largest possible number from these digits.

Activities

Pupils

1. Count the beads on the lowest 10 wires of the pupils' *abacus,* and draw the configurations and the numbers of beads in their notebooks.
2. Write a sequence of 3-digit numbers up to 999 in their notebooks, in words and in digits.
3. Complete self-tests using the *Test-Board* (Test Cards no. III-1-1 and III-1-2).

Topic 2: Fractions

Objectives:

The pupils should be able to recognize simple fractions (such as 1/2, 1/3, 1/4, 1/5, 1/6) of a:

1. Group of concrete objects
2. A basic shape (square, circle, rectangle and triangle)

Materials

1. *Template work sheets* no. III-4, III-4-2 and III-4-3. superimposed on the m*ain demonstration board*, and the corresponding *2-D demonstration parts*
2. *Demonstration closed-frame abacus*
3. *Improvised materials* like oranges, pieces of paper, wood, etc.

Activities

Teacher

1. Using *Template Work Sheets* no. III-4 , III-4-2 and III-4-3 (corresponding to Module 4 of Mathematics Book 3), applied on the d*emonstration board* and the d*emonstration magnetic parts*, the teacher demonstrates the division of **whole** and a **set of whole objects** to fractions.
2. Using the *abacus*, the teacher demonstrates the division of several sets (of numbers) to fractions.

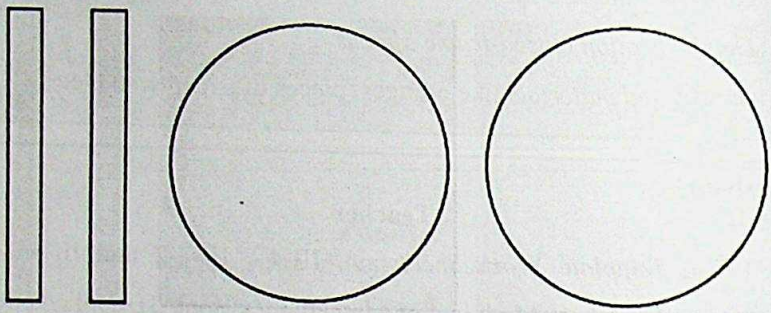
Activities

Pupils

1. Learn to recognize fractions resulting from the division of f*raction bars*, sets of objects and shapes.
2. Complete the exercises assigned by the teacher from their workbooks.
3. Complete self-tests using the *Test-Board* (Test Cards no. III-4-1, III-4-2 and III-4-3).

Template Work Sheet No. III-4

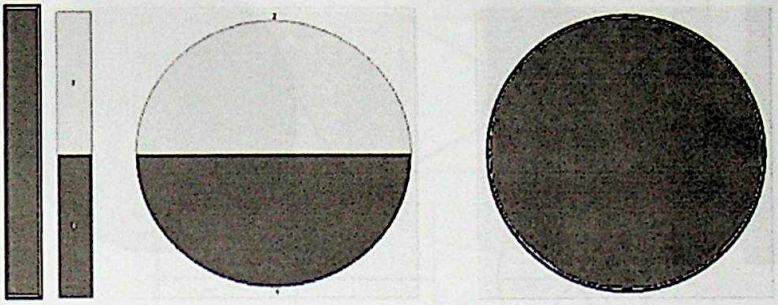
Division of whole to fractions



Expression

Step 1
(Empty template – contours of the *Demo-Parts*)

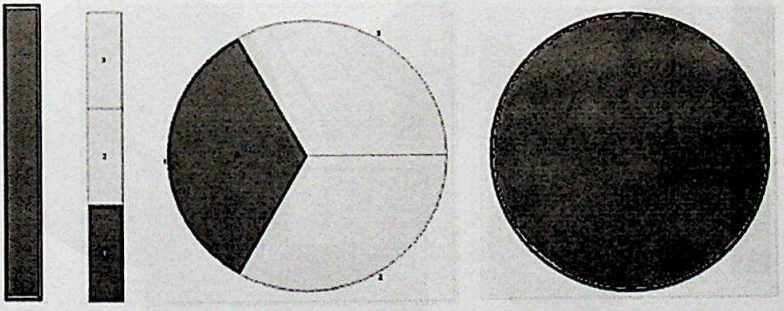
Division of whole to fractions



$$1 = \frac{1}{2} + \frac{1}{2} = 2 \text{ halves}$$

Step 2
(Division of a whole to 2 halves)

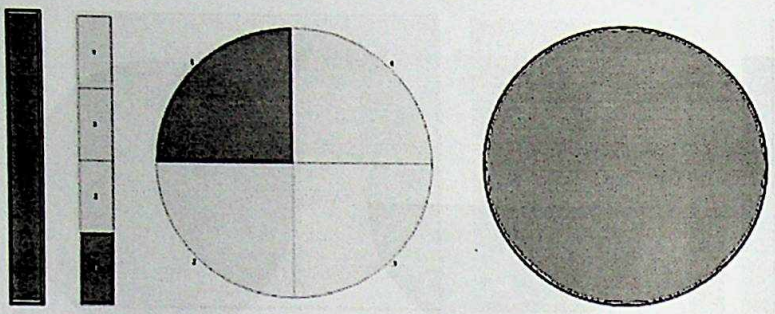
Division of whole to fractions



$$1 = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 3 \text{ thirds}$$

Step 3
(Division of a whole to 3 thirds)

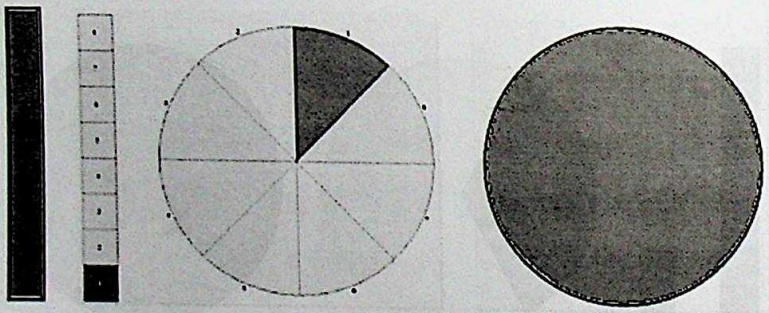
Division of whole to fractions



$$1 = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 4 \text{ quarters}$$

Step 4
(Division of a whole to 4 quarters)

Division of whole to fractions

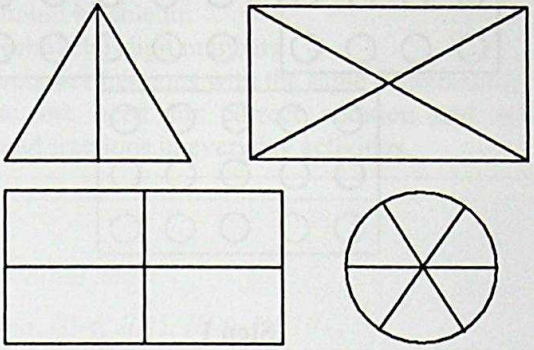


$$1 = \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = 8 \text{ eights}$$

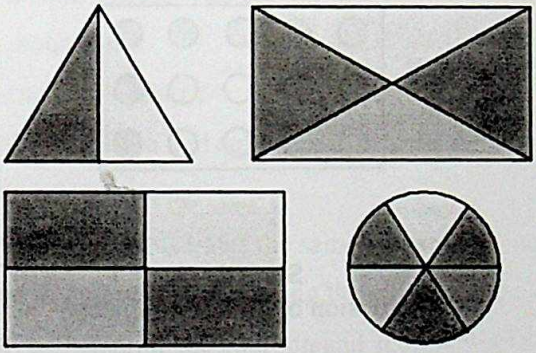
Step 5
(Division of a whole to 8 eighths)

Template Work Sheet No. III-4-2

Division of Shapes and Groups of Objects

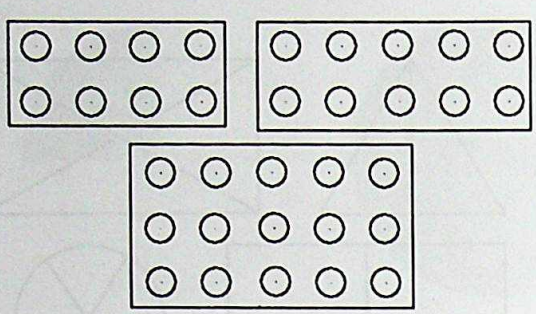


Step 1
(Empty template – contours of the *Demo-Parts*)

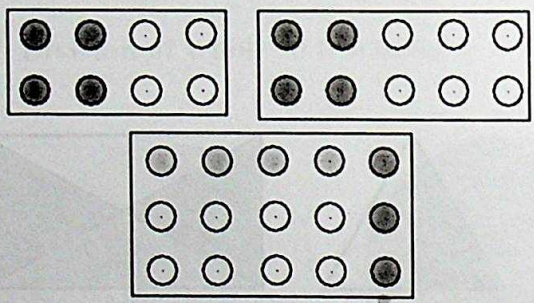


Steps 2 - 5
(Division of shapes to fractions)

Template Work Sheet No. III-4-3



Step 1
(Empty template – contours of the *Demo-Parts*)



Steps 2 - 4
(Division of groups of objects)

THEME: BASIC OPERATIONS

Topic 1: Addition and Subtraction

Objectives:

The pupils should be able to:

1. Add and subtract 3-digit numbers
2. Add and subtract fractions with the same denominator
3. Appreciate the need for correct addition and subtraction of numbers and fractions in everyday activities.

Materials

1. *Demonstration abaci*
2. *Posters no. III-4, III-5, III-9, III-10*

Activities

Teacher

1. Using the *open-frame abacus*, the teacher demonstrates the concept of **place value** (units, tens and thousands) as the number of beads on the lowest wire (units) and on the next two wires (tens and thousands).
2. Using *Posters III-4* and *III-5,* the teacher demonstrates how to perform **long addition** and **subtraction** of two numbers, including exchanging and renaming.
3. Next, the teacher demonstrates the same examples of addition and subtraction of 3-digit numbers using the closed-frame *abacus*.
4. In order to demonstrate the addition and subtraction of fractions with the same denominator, the teacher uses *Posters III-9* and *III-10* and the *magnetic parts*, representing different fractions.

Activities

Pupils

1. Solve exercises that the teacher gives in their notebooks.
2. Add and subtract 3-digit numbers using the *pupil's abacus*, and check the result with the answer written in their notebooks.
3. Draw and paint in their notebooks different examples of addition and subtraction of fractions represented in *a pie form*.
4. 4. Complete self-tests using the T*est-Board* (Test Cards no. III-2-1, III-2-2 and III-2-3).

Topic 2: Multiplication

Objectives:

The pupils should be able to:

1. Multiply from 1x1 to 9x9
2. Multiply a 2-digit number by a 1-digit number
3. Multiply three 1-digit numbers, two at a time
4. Appreciate the need for correct multiplication in everyday activities

Materials

1. *Posters no. III-2, III-7, III-8, IV-4*
2. *Demonstration closed-frame abacus*

Activities

Teacher

1. Using *Posters No. III-7, III-8* and the *Multiplication Table (Poster III-2)*, the teacher repeats the basics of multiplication of 1-digit numbers.
2. Next, the teacher demonstrates the principles of long multiplication of a 2-digit number by a 1-digit number, and writes a number of examples, solving them together with the pupils.
3. The teacher uses *Poster IV-4* to demonstrate this technique for computing the multiplication of a 3-digit number by a 1-digit number.

Activities

Pupils

1. Solve exercises the teacher gives in their notebooks.
2. Draw and paint some illustrations of multiplication.
3. Complete self-tests using the T*est-Board* (Test Cards no. III-2-4, III-2-5, and III-2-6).

Topic 3: Division

Objectives:

The pupils should be able to:

1. Divide whole numbers less than 48 by 2, 3, 4, 5 and 6 without a remainder
2. Express whole numbers less than 48 as a product of factors
3. Find a missing factor of a given number
4. Distinguish between factors and multiples
5. Appreciate the importance of correct division in everyday activities

Materials

1. *Posters No. III-2, III-6*
2. *Demonstration closed-frame abacus*
3. *Counting chips*

Activities

Teacher

1. Using *Poster No. III-6,* the teacher demonstrates how to present a whole number as a product of other numbers (**factors**).
2. The teacher demonstrates using the counting chips the link between the multiplication and division of whole numbers (for example: 3 x 5 = 15, 15 : 5 = 3)
3. The teacher demonstrates how to use the *Multiplication Table (Poster III-2)* in order to quickly find the result of dividing a whole number (from 1 to 100) without a remainder.
4. The teacher demonstrates how to find a **missing factor** in open equations such as: 24 = 2 x 3 x ?

Activities

Pupils

1. Solve exercises that the teacher gives in their notebooks.
2. Write the factors of the numbers 18, 24, 36, 45, 48 in their notebooks.
3. Draw and paint some illustrations of division.
4. Complete self-tests using the *Test-Board* (Test Cards no. III-2-7, III-2-8 and III-2-9) .

THEME: MEASUREMENT

Topic 1: Money

Objectives

The pupils should be able to:

1. Change an amount of money less than ₦20 to smaller units
2. Shop effectively with less than ₦20 using addition and subtraction
3. Do simple multiplication involving money with products less than ₦20
4. Trace coins using brown and white papers

Materials

1. *Demonstration coins*
2. *Demonstration banknotes*

Activities

Teacher

1. The teacher guides the pupils how to recognize the various *demonstration coins* and *banknotes*.
2. The teacher organizes an imaginary shopping game, and guides the pupils in buying and selling goods that cost less than ₦20.
3. The teacher gives the pupils exercises to complete on calculating the prices of several different items (**addition**) and of several identical items (**multiplication**).
4. The teacher gives the pupils exercises to complete on calculating change (**subtraction**), and the price of a single item, when the price of several identical items of the same type is known (**division**).

Topic 3: Area

Objectives

The pupils should be able to:

1. Determine the area of squares and rectangles by counting unit squares
2. Develop an interest in finding the area of square and rectangular shapes in their surroundings

Materials

1. *Poster no. III-1*
2. *Demonstration Ruler*

Activities

Teacher

1. Using *Poster III-1,* the teacher demonstrates the concept of **area** and how to calculate it for squares and rectangles.
2. The teacher notes that it is possible **to measure** the area of a figure only when a net of unit squares can be imposed on the figure.
3. The teacher demonstrates that with **squares, rectangles** and a figure that is **composed** of them, the number of unit squares can be counted exactly. For **triangles,** we can find a way to calculate their area, but it is impossible to count the exact number of unit squares for a circle.

Activities

Pupils

1. Draw and paint a number of squares and rectangles in their notebooks and construct a grid of unit squares covering each drawing.
2. Calculate the area of the shapes by counting the number of unit squares.
3. Draw complex shapes that can be divided into squares and rectangles, and calculate their areas.
4. Complete a self-test using the *Test-Board* (Test Card no. II-5-5).

Topic 4: Volume

Objectives:

The pupils should be able to:

1. Identify a liter as a unit for measuring volume
2. Measure a liquid such as water using a graduated cylinder up to any stated number of liters
3. Appreciate the need for accurately measuring liquids such as kerosene, water, petrol, etc.

Materials

1. *Cups, bottles, empty containers*
2. *Measuring cups*

Activities

Teacher

1. Using empty bottles and containers, water and the *measuring cups*, the teacher demonstrates the concept of **volume** (as the amount of fluid that the container can hold), and its **unit** (liter), as a **measure** of the given amount of fluid.
2. The teacher demonstrates different containers (spoon, cup, juice box, water tank, etc.), and explains the need for **different units** of volume – small and big (e.g. **cubic centimeter** vs. **cubic meter**), according to the volume of the container.
3. The teacher explains that the volume of basic 3D shapes can be **calculated**, but in most real situations it is only compared to other containers and **measured**.

Activities

Pupils

1. Measure the volume of some containers like a bottle, juice box, etc., using the measuring cups and water, and put them in order according to their volume.
2. Write the results in their notebooks.
3. Draw and paint a number of containers in their notebooks, and write their volume in liters near each drawing.

Topic 5: Weight

Objectives

The pupils should be able to:

1. Measure the weights of objects in grams and kilograms
2. Make meaningful comparisons of the weight of objects like rocks and minerals
3. Appreciate the need for grams and kilograms as standard units of measurement for transactions

Materials

1. *Demonstration Spring Scale*
2. *Poster no. VI-6*
3. *Improvised materials* like coins, stones, fruits, etc.

Activities

Teacher

1. Using the table from *Poster No. VI-6*, the teacher explains the difference between the **concept of weight** (how **light** or **heavy** the objects are) and the **units of weight** (a measure of weight).
2. The teacher demonstrates how the weight of different objects can be **compared** (using a *balance*), and how it can be **measured** (using a *scale*).
3. The teacher asks the pupils to measure the weights of different objects like coins, rocks, fruits, etc.

Activities

Pupils

1. Draw and paint the d*emonstration scale* in their notebooks.
2. Measure the weight of different objects (stones, coins, fruits etc.) using the *spring scale*, and write the results in their notebooks.

Topic 6: Time

Objectives:

The pupils should be able to:

1. Tell the time accurately in hours and minutes
2. Give dates in days and months
3. Value the importance of time in daily activities

Materials:

1. *Demonstration students' clock*
2. *Pupil's clocks*
3. *Posters no. II-8, III-3*
4. *The "clock" template*
5. *A calendar*

Activities

Teacher

1. Using the *"clock" template,* the teacher explains the importance of the clock's **long hand,** pointing to the **minutes,** and demonstrates **time in hours and minutes** using *Poster no. III*-3.

Activities

Teacher

2. Reminds pupils about "natural" clocks such as a heart beat every second, day-night changes (24 hours), and summer-winter changes (365 days).
3. Guides the pupils in telling the time of the beginning and end of a lesson.
4. Demonstrates a calendar, and instructs the pupils on how to use it and find the **current day** and the **dates of holidays**.

Activities

Pupils

1. Draw and paint the clock in their notebooks and the positions of its hands corresponding to the times dictated by the teacher.
2. Complete a self-test using the *Test-Board* (Test Card no. III-3-4).

THEME: PRACTICAL AND DESCRIPTIVE GEOMETRY

Topic 1: Symmetry

Objectives:

The pupils should be able to:

1. Identify symmetrical shapes
2. Appreciate lines of symmetry in everyday life
3. State the properties of squares, rectangles and triangles
4. Appreciate the presence of squares, rectangles, triangles and circles in our surroundings, and therefore see mathematics in everyday life
5. Distinguish between curves and straight lines
6. Appreciate the presence of straight lines and curves in real life situations

Materials:

1. *Poster no. IV-1*
2. *Magnetic shapes* of a square, rectangle, circle
3. *Improvised materials* like leaves, paper cuttings, etc.

Activities

Teacher

1. Using *Poster IV-1*, the teacher demonstrates the concept of *line of symmetry* and how to find the line of symmetry in a given plane shape.
2. The teacher should note and demonstrate that some figures can have several lines of symmetry (in a circle, for example – even an infinite number of them!).
3. The teacher asks pupils to discover **all the lines of symmetry** in a rectangular page of paper and in other paper shapes that the pupils prepare using scissors.

Activities

Pupils

1. Draw basic geometrical shapes in their notebooks (one shape per page): square, rectangle, triangle and circle, and cut them out using scissors. Find the lines of symmetry of each shape, and check it by folding the shape along the line.
2. Draw the shapes with the lines of symmetry in their notebooks, and write the name of the figure and the number of lines discovered.
3. Draw different types of triangles, and check how many lines of symmetry there are in each type.

THEME: EVERYDAY STATISTICS

Topic 1: Pictograms

Objectives

The pupils should be able to:

1. Read and show information on pictograms using vertical and horizontal arrangements
2. Appreciate representing information on a pictogram
3. Identify the most common value of a pictogram (the mode)
4. Appreciate the usefulness of the mode

Materials:

1. *Poster no. IV-7*

Activities

Teacher

1. Using *Poster IV-7*, the teacher demonstrates the idea of a pictogram and the concept of mode, and how to determine the mode in every given set of data.
2. The teacher should demonstrate different ways of presenting data, and concentrate on the pictograms.
3. The teacher asks pupils to obtain other sets of data, like all the pupils' foot sizes or heights and to construct a bar graph using this data.

Activities

Pupils

1. Draw a bar graph in their notebooks using the data obtained from measuring the pupils' heights and foot sizes.
2. Find the mode of the data.

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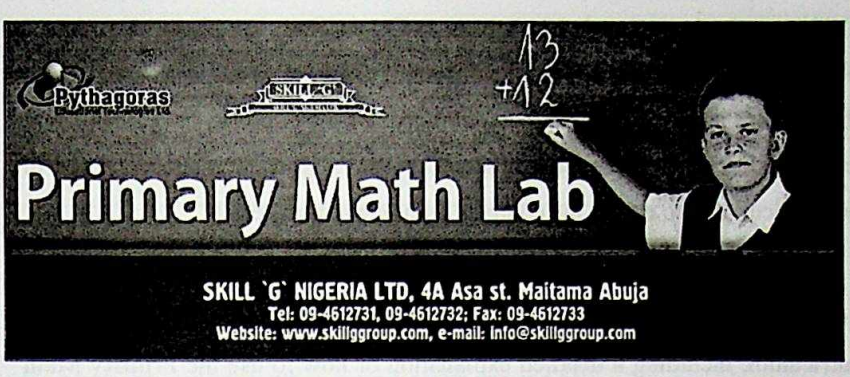


Teacher's Manual

Primary IV

In accordance with the
National Mathematics Curriculum
of Nigeria
Edited by: Dr. Philip Slobodsky
Pythagoras Educational Technologies

The revised National Mathematics Curriculum has been developed following the goals and the targets of the 9 - Year Basic Education Program. The teachers are expected and required to expose the pupils to the contents and activities described in the Curriculum. They are also encouraged, as noted in the Curriculum, "to enrich the contents with relevant materials".

The following Manual for the Mathematics teachers therefore consists of a didactical guide to each of the 6 themes that should be taught according to the Curriculum, including a detailed explanation of how to use the Primary Math Kit. The Manual is built around the Curriculum, thus making it available to primary school teachers in a format which renders it easy to implement in the class room.

The Manual refers to the **three main components** of the Math Kit, namely the *Teachers Demonstration Set, the Students Set* and *the Students Training System,* as the basic educational tools around which every lesson can be built.

We hope that the extensive use of the **Primary Math Set** will enrich the learning experience of the Primary School pupils at all the levels and encourage them to improve their achievements, and that the Manual will help the teachers in using it effectively.

Dr. Philip Slobodsky
The Editor
Pythagoras Educational Technologies

PRIMARY FOUR

THEME: NUMBERS AND NUMERATION

Topic 1: Whole Numbers

Objectives:

1. The pupils should be able to:
2. Count in thousands up to one million
3. Reason quantitatively when counting whole numbers
4. Apply knowledge when counting in groups of:
   - Five
   - Seven (days of the week)
   - 60 (minutes and seconds etc)
5. State the place value of a digit in a 4-digit number
6. Use Roman numerals up to 100 (I to C)
7. Compare whole numbers up to 1000 and arrange them in numerical order using the symbols < and >

Materials:

1. *Demonstration closed frame abacus*
2. *Open-frame vertical sticks abacus*
3. *Counting chips*
4. *Poster no. IV-3*

Activities

Teacher

1. Using the *closed frame abacus*, the teacher demonstrates the **problem in attempting to count and record large whole** numbers (beyond 100 and up to 1 million).

Activities

Teacher

2. Special emphasis should be placed on the **concept of place value,** allowing naming and writing multi-digit numbers in compact **decimal form.**
3. Using the *open-frame vertical sticks abacus,* the teacher demonstrates the concept of **place value of the digits,** up to thousands.
4. Using the *open-frame abacus,* the teacher demonstrates how to represent multi-digit numbers on this type of abacus, and asks pupils to use their *pupil's abacus*, and to set a series of numbers: 1, 10, 100, 1000, 10,000, 100,000, 1,000,000
5. Using *Poster no. IV-3,* the teacher explains the difference in presenting numbers written in **decimal** and **Roman** forms (the values of the letters used in Roman form are independent of their place in the number).

Activities

Pupils

1. Solve the exercises given by the teacher in their notebooks
2. Using the *pupil's abacus*, set the numbers written by the teacher on the *magnetic white board*
3. Write the numbers the teacher shows on the *demonstration abacus* in their notebooks.
4. Complete self-tests using the *Test-Board* (Test Cards no. IV-1-1, IV-1-2, IV-1-6, and IV-1-6-1)

Equivalent Fractions

Objective:

The pupils should be able to:

1. Find fractions which are equivalent to a given fraction

Materials:

1. *Template Work Sheet* no. IV-7 superimposed on the *main demonstration board*, and the corresponding *2-D demonstration parts*.

Activities

Teacher

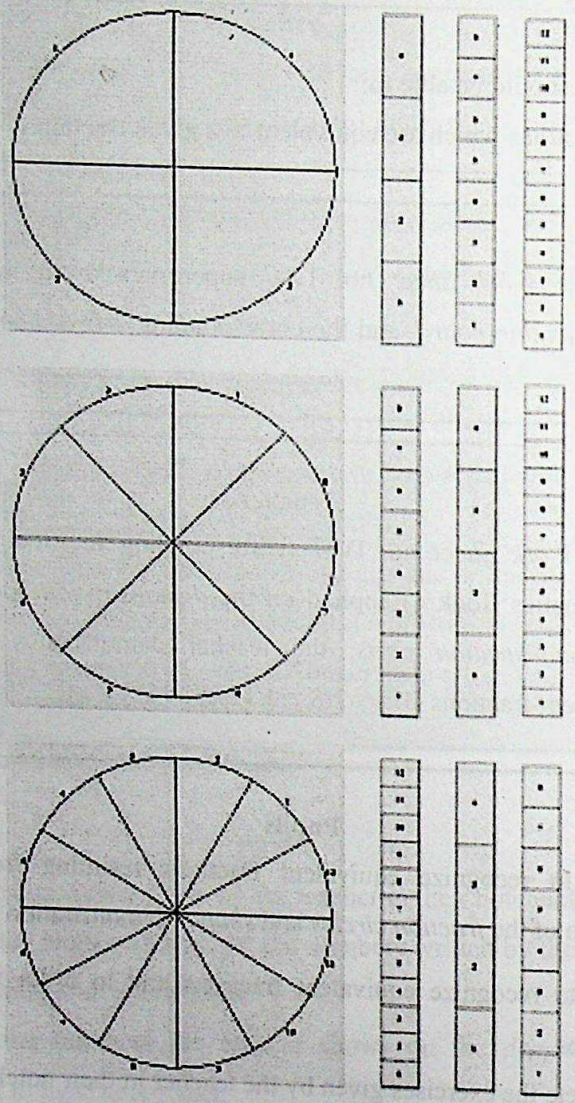
1. Using *Work Sheet* no. IV-7 (corresponding to Module 7 of Mathematics Book 4) applied on the *demonstration board* and the *demonstration parts*, the teacher demonstrates several equivalent fractions (1/4 = 2/8 = 3/12 = 4/16).

Activities

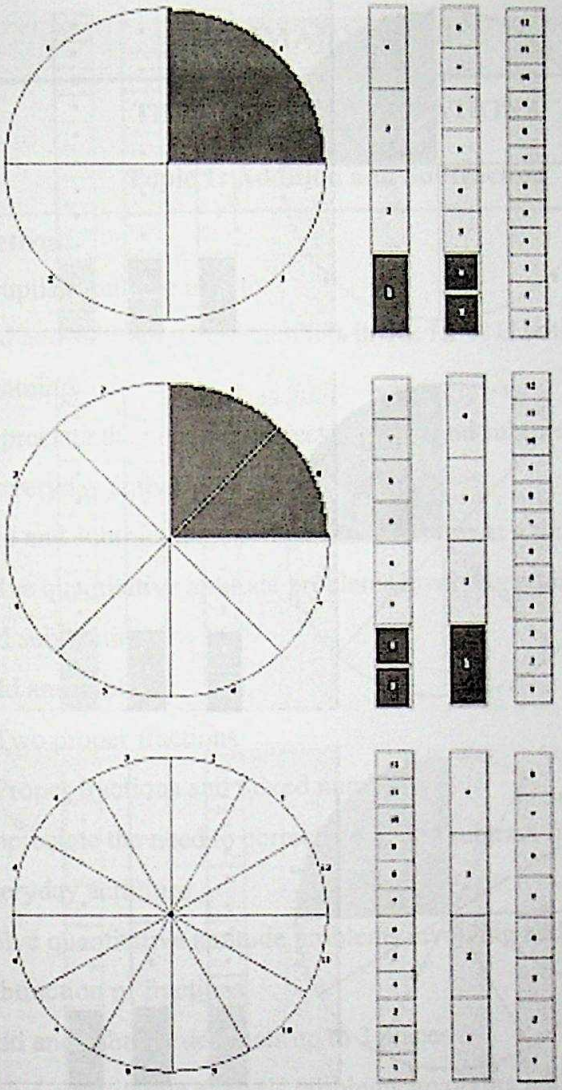
Pupils

1. Learn to recognize equivalent fractions resulting from the division of the *fraction circles* and *shapes* demonstration parts
2. Learn to recognize equivalent fractions and to order unequal fractions
3. Complete the exercises given by the teacher in their notebooks
4. Complete a self-test using the *Test-Board* (Test Card no. IV-7)

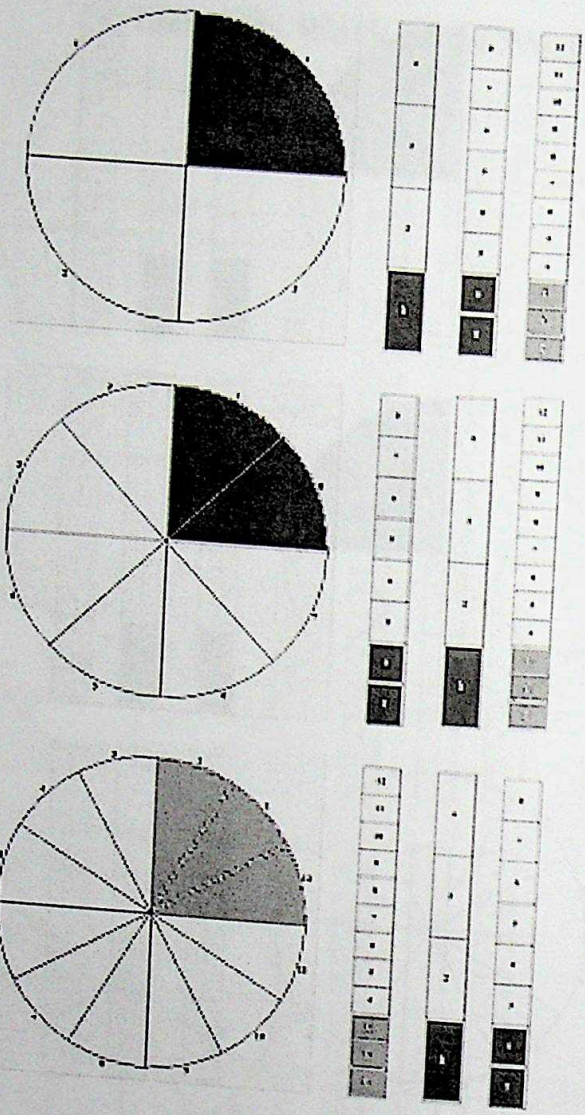
Template Work Sheet No. IV-7



Step 1
(Empty template – contours of the *Demo-Parts*)



Step 2
(Equivalence of 1/4 and 2/8)



Step 3
(Equivalence of 1/4 , 2/8 and 3/12)

PRIMARY FOUR

THEME: BASIC OPERATIONS

Topic 1: Addition and Subtraction

Objectives:

The pupils should be able to:

1. Add and subtract whole numbers in Th. H. T. U with or without renaming
2. Appreciate the need for correct addition and subtraction in everyday activities
3. Add and subtract three 4-digit numbers, two at a time
4. Solve quantitative aptitude problems involving addition and subtraction
5. Add and subtract:
   * Two proper fractions
   * Proper fractions and mixed numbers
6. Appreciate the need to correctly add and subtract fractions in everyday activities
7. Solve quantitative aptitude problems involving addition and subtraction of fractions
8. Add and subtract decimals up to 3 places
9. Solve quantitative analysis problems involving addition and subtraction of decimals

Materials:

1. *Demonstration closed-frame school abacus*
2. *Open-frame vertical sticks abacus*
3. *Magnetic white board*
4. *Posters no. III-4, III-5, III-9, III-10, and IV-3*

Activities

Teacher

1. Using *Posters III-4* and *III-5*, the teacher demonstrates addition and subtraction of 3- and 4-digit numbers.
2. Special emphasis should be placed on the **concepts of place value** and renaming and exchanging digits, when required, in the course of "long addition" or "long subtraction".
3. Using the *open-frame abacus,* the teacher demonstrates the concept of **place values of the digits,** up to thousands.
4. Using the *closed-frame abacus,* the teacher demonstrates how to represent multi-digit numbers on this type of abacus, and asks the pupils to use their *pupil's abacus*, and to set a series of numbers:

   1, 10, 100, 1000, 10,000, 100,000, 1,000,000.
5. Using *Poster no. IV-3,* the teacher explains the difference between the representation of numbers in **decimal** and **Roman** forms (the values of the letters used in the Roman form are independent of their place in the number).

Activities

Pupils

1. Solve the exercises given by the teacher in their notebooks
2. Using the *pupil's abacus*, set the numbers written by the teacher on the *magnetic white board*
3. Write the numbers the teacher shows on the *demonstration abaci* in their notebooks
4. Complete a self-test using the *Test-Board* (Test Cards no. IV-2-1 IV-2-1-1, IV-2-1-5, IV-2-1-6, IV-2-1-7 and IV-2-1-8).

Topic 2: Multiplication

Objectives:

The pupils should be able to:

1. Multiply whole numbers by 2-digit numbers not greater than 50
2. Appreciate the need for ready reckoners in multiplying numbers
3. Solve quantitative aptitude problems involving multiplication of whole numbers by 2-digit numbers
4. Multiply decimals by 2-digit numbers
5. Appreciate the need for ready reckoners in multiplying decimal numbers
6. Solve quantitative aptitude problems involving multiplication of decimals by whole numbers
7. Calculate the squares of 1- and 2-digit numbers
8. Solve quantitative aptitude problems involving calculation of squares

Materials:

1. *Demonstration closed-frame school abacus*
2. *Open-frame vertical sticks abacus*
3. *Magnetic white board*
4. *Posters no. III-4, III-5, III-9, III-10, and IV-3*

Activities

Teacher

1. Using *Posters III-4* and *III-5*, the teacher demonstrates addition and subtraction of 3- and 4-digit numbers.
2. Special emphasis should be placed on the **concepts of place value** and renaming and exchanging digits, when required, in the course of "long addition" or "long subtraction".
3. Using the *open-frame abacus,* the teacher demonstrates the concept of **place values of the digits,** up to thousands.
4. Using the *closed-frame abacus,* the teacher demonstrates how to represent multi-digit numbers on this type of abacus, and asks the pupils to use their *pupil's abacus*, and to set a series of numbers:

   1, 10, 100, 1000, 10,000, 100,000, 1,000,000.
5. Using *Poster no. IV-3,* the teacher explains the difference between the representation of numbers in **decimal** and **Roman** forms (the values of the letters used in the Roman form are independent of their place in the number).

Activities

Pupils

1. Solve the exercises given by the teacher in their notebooks
2. Using the *pupil's abacus*, set the numbers written by the teacher on the *magnetic white board*
3. Write the numbers the teacher shows on the *demonstration abaci* in their notebooks
4. Complete a self-test using the *Test-Board* (Test Cards no. IV-2-1 IV-2-1-1, IV-2-1-5, IV-2-1-6, IV-2-1-7 and IV-2-1-8).

Topic 2: Multiplication

Objectives:

The pupils should be able to:

1. Multiply whole numbers by 2-digit numbers not greater than 50
2. Appreciate the need for ready reckoners in multiplying numbers
3. Solve quantitative aptitude problems involving multiplication of whole numbers by 2-digit numbers
4. Multiply decimals by 2-digit numbers
5. Appreciate the need for ready reckoners in multiplying decimal numbers
6. Solve quantitative aptitude problems involving multiplication of decimals by whole numbers
7. Calculate the squares of 1- and 2-digit numbers
8. Solve quantitative aptitude problems involving calculation of squares

Objectives:

9. Find square roots of perfect squares up to 400
10. Appreciate the relationship between squares and square roots
11. Solve quantitative aptitude problems of square roots of perfect squares not greater than 400

Materials:

1. *Demonstrational closed-frame abacus*
2. *Magnetic white board*
3. *Posters no. IV-4, IV-5, IV-6*

Activities

Teacher

1. Using *poster IV-4* the teacher demonstrates how to multiply multi-digit numbers by one- and two-digit numbers.
2. Special emphasis should be placed on the **concept of renaming** digits, when required, in the course of "long multiplication".
3. Using *poster no. IV-5,* the teacher explains how to calculate a **square** of any 2-digit number up to 20, and asks pupils to write the resulting **Table of Squares** of whole numbers in their notebooks.
4. Using *poster no. IV-6,* the teacher explains the concept of **square root,** demonstrates the **Table of Square Roots** of perfect squares up to 400, and asks pupils to write the table in their notebooks.

Activities

Pupils

1. Solve the exercises given by the teacher and write the solutions in their notebooks
2. Write the **Table of Squares** of whole numbers up to 20 and the **Table of Square Roots** of perfect squares up to 400 in their notebooks
3. Complete self-tests using the *Test-Board* (Test Cards no. IV-2-9, IV-2-10, IV-2-11)

Topic 3: Division

Objectives:

The pupils should be able to:

1. Divide 2- or 3-digit numbers by:
   a) Numbers up to 9 with or without remainder
   b) Multiples of 10 up to 50
2. Solve quantitative aptitude problems involving division

Materials:

1. *Magnetic white board*
2. *Poster no. IV-9*

Activities

Teacher

1. Using *poster IV-9*, the teacher demonstrates "long division" of 2- and 3-digit numbers by a one-digit number.
2. The teacher should differentiate between 2 cases: division with and without a remainder.
3. Alongside the poster, it is highly recommended to write additional examples of long division on the magnetic white board, and ask pupils to copy them to their notebooks.

Activities

Pupils

1. Copy the demonstration examples of long division to their notebooks.
2. Solve the exercises given by the teacher and write the solutions in their notebooks.
3. Complete a self-test using the *Test-Board* (Test Card no. IV-2-12).

Topic 4: LCM (Least Common Multiple)

Objectives:

The pupils should be able to:

1. Find the LCM of numbers up to 9
2. Find the HCF of 2-digit numbers

Materials:

1. *Magnetic white board*
2. *Poster no. III-6*

Activities

Teacher

1. Using *poster III-6*, the teacher demonstrates how to find the LCM for two numbers.
2. The teacher should explain that finding the LCM of two numbers is based on breaking down **each number** to simple multiples; as long as those are found, calculating the LCM is a very simple procedure.
3. The teacher should repeat the subject of representation of a given number by a product of simple multiples, and ask pupils to copy the table from poster *III-6* into their notebooks.

Activities

Pupils

1. Copy the table in poster *III-6* to their notebooks
2. Solve the exercises given by the teacher and write the solutions in their notebooks
3. Complete a self-test using the *Test-Board* (Test Card no. IV-2-13)

Topic 5: Estimation

Objectives:

The pupils should be able to:

1. Give meaningful estimates of sums and products
2. Appreciate the need for estimates in everyday activities

Materials:

1. *Magnetic white board*

Activities

Teacher and Pupils

1. Using the examples and exercises from the textbook, the teacher explains the importance of making estimations in everyday life, like calculating prices and change at the market without using a calculator, time of travel, weight and volume of food, etc.
2. The teacher writes all the examples on the magnetic white board, and asks the pupils to copy them into their notebooks.

PRIMARY FOUR

THEME: MEASUREMENT

Topic 1: Money

Objectives:

The pupils should be able to:

1. Solve problems pertaining to adding money
2. Solve quantitative aptitude problems pertaining to adding money
3. Appreciate the essence of correct addition of money in business transactions
4. Solve problems pertaining to subtracting money
5. Appreciate the importance of correct subtraction of money in business transactions
6. Solve quantitative aptitude problems involving subtraction of money
7. Multiply a sum of money by a whole number
8. Appreciate that multiplication is repeated addition
9. Solve some quantitative reasoning problems pertaining to multiplying money
10. Divide a sum of money by a whole number
11. Appreciate division of things in real life situations
12. Solve quantitative reasoning problems in real life situations
13. Calculate profit
14. Solve quantitative aptitude problems pertaining to profit

15. Develop an interest in ways to make a profit in real life
16. Calculate loss
17. Value the use of money in buying and selling
18. Solve problems on quantitative aptitude

Materials:

1. *Demonstrational closed-frame school abacus*
2. *Magnetic white board*
3. *Demonstration coins* and *banknotes*

Activities

Teacher

1. Using the *demonstration coins* and *banknotes*, the teacher repeats the types of coins and banknotes and their relative values.
2. The teacher introduces the new concept of **profit** as the **difference between selling price and cost price.**
3. The teacher writes a number of examples of calculating profits on the *Magnetic white board* (the examples can be taken from the Mathematics textbook 4), and asks the pupils to solve them.
4. The teacher presents a number of exercises to the pupils using the *abacus*, and asks them to write their solutions in their notebooks.
5. The teacher organizes a shopping game: s/he sets up a shopping corner in the class and engages pupils in making deals and calculating profit, using the *demonstration coins* and *banknotes*.

Activities

Pupils

1. Copy the exercises provided by the teacher to their notebooks.
2. Solve the exercises presented by the teacher in their notebooks.
3. Participate in a shopping game, and write down all the buying and selling transactions in their notebooks.

Topic 2: Length

Objectives:

The pupils should be able to:

1. Estimate a distance in kilometers and a length in meters or centimeters and compare with a measurement
2. Add and subtract lengths

Materials:

1. *Poster no. II-7*
2. *Ruler, measuring meter*

Activities

Teacher

1. Using *poster II-7,* the teacher demonstrates ***measuring meter,*** **units of length** and **distance,** and explains that every length or distance in principle can be expressed in any units, but some units are more suitable for shorter distances (like: mm, cm, m), encountered in diagrams, classrooms, etc., and some for longer distances (like: km, mile, etc.).

Activities

Teacher

2. The teacher guides pupils to **measure the length** of objects in the classroom like: tables, blackboard, door etc., using different tools such as a measuring tape, rope, foot, hand span, and writes the results on the magnetic white board.

Activities

Pupils

1. Measure the length and width of their table using a ruler, and write the results (in m and cm) in their notebooks.
2. Solve the exercises given by the teacher on the white board, and write the solutions in their notebooks.
3. Complete a self-test using the *Test-Board* (Test Card no. V-3-2).

Topic 3: Weight

Objectives:

The pupils should be able to:

1. Add and subtract weights
2. Multiply and divide weights by whole numbers

Materials:

1. *Demonstration spring scale*
2. *Poster no. VI-6*
3. *Improvised materials* like coins, stones, fruits, etc.

Activities

Teacher

1. Using the table from *poster no. VI-6*, the teacher repeats the **units of weight** (kg and gram).
2. Using the *demonstration spring scale*, the teacher demonstrates that the **weight of 2 objects** is equal to the **sum of weights** of each one of them, so that the **weights can be added and subtracted.**
3. The teacher suggests that the pupils measure the weights of different objects like coins, rocks, fruits, etc., and measure the weights of several objects together.

Activities

Pupils

1. Draw and paint the *demonstration spring scale* in their notebooks.
2. Measure the weights of different objects (stones, coins, fruits, etc.) using the *spring scale*, and write the results in their notebooks.
3. Solve exercises that the teacher gives in addition, subtraction, multiplication and division of weights, and write the solutions in their notebooks.

Topic 4: Time

Objectives:

The pupils should be able to:

1. Tell the time on a clock, read a calendar and write dates
2. Appreciate the need for accurate measurement of time and tracking of dates and seasons
3. Solve exercises on quantitative aptitude problems related to time
4. Use the notation **am** and **pm** for denoting the time of the day.

Materials:

1. *Demonstration students' clock*
2. *Pupils' watches*
3. *Posters no. II-8, III-3*
4. The *"Clock" template*

Activities

Teacher

1. Using the *"Clock" template* and *poster no. III-3*, the teacher reminds the pupils of the principles of telling time and the meaning of the **long hand** of a clock, pointing to the **minutes, and the short hand pointing to the hours.**
2. The teacher points to the problem of identical readings of time twice a day, and shows how to overcome this by using the notations **am** and **pm.**

Activities

Teacher

3. The teacher asks the pupils to say the times of waking up, start of lessons, lunchtime, suppertime, etc.
4. The teacher demonstrates the *Calendar*, and guides the pupils on how to use it, and shows the **current day** and the **dates of holydays**.

Activities

Pupils

1. Draw and paint the clock and the position of its hands corresponding to the times given by the teacher, in their notebooks
2. Complete a self-test using the *Test-Board* (Test Card no. IV-3-4)

Topic 5: Area

Objectives:

The pupils should be able to:

1. Find the area of rectangles using the correct formula
2. Calculate the area of farmlands and towns
3. Develop an interest in finding the area of shapes in their environment

Materials:

1. *Poster no. V-2*
2. *Magnetic white board*

Activities

Teacher

1. Using *Poster V-2*, the teacher demonstrates the concept of **area** and how to calculate the area of a rectangle and square.
2. The teacher notes that it is possible to **measure** an area of a figure only when there is a net of unit squares that can be imposed on the figure.
3. The teacher shows that in the case of a **square, rectangle** and a figure that is **composed** of them, the number of unit squares can be counted exactly, but it can also be easily **calculated** using the formula **S = a x b**.

Activities

Pupils

1. Draw and paint a number of squares and rectangles in their notebooks, and construct a net of unit squares covering each drawing.
2. Calculate the area of the shapes by counting the number of unit squares.
3. Calculate the area of the shapes by using the formula **S = a x b**.
4. Complete a self-test using the *Test-Board* (Test Card no.II-5-5).

Topic 6: Volume

Objectives:

The pupils should be able to:

1. Add and subtract in liters
2. Multiply and divide liters by whole numbers
3. Appreciate liter as the unit of volume
4. Solve problems on quantitative aptitude related to addition, subtraction, multiplication and division involving liters

Materials:

1. *Cups, bottles, empty containers*
2. *Measuring cups*

Activities

Teacher

1. Using empty bottles and containers, water and the *measuring cups*, the teacher demonstrates the **additive property of capacity** (as an amount of liquid that a container can keep), that means that we can *add, subtract, multiply and divide* the amounts of liquid.
2. The teacher shows that a container with a capacity of 2-liters contains the same amount of water in two 1-liter bottles, or in four 0.5-liter bottles.
3. The teacher solves a number of exercises on operations with liters, asks pupils to copy them to their notebooks, and presents exercises for individual solution.

Activities

Pupils

1. Draw and paint a number of bottles and containers in their notebooks, write their capacity in liters near each drawing, and write the number of 0.25 litre cups that contain the same amount of water.
2. Copy the solutions to exercises the teacher wrote on the *white board,* to their notebooks.
3. Solve the exercises given by the teacher.

THEME: ALGEBRAIC PROCESSES

Topic 1: Open Sentences

Objectives:

The pupils should be able to:

1. Define an open sentence
2. Find the missing number in an open sentence
3. Appreciate the need for open sentences and give examples from everyday activities
4. Appreciate the relationship between:
   * Addition and subtraction
   * Multiplication and division
5. Solve related quantitative aptitude problems

Materials:

1. *Poster no. V-7*
2. *Magnetic white board*

Activities

Teacher

1. Using *Poster V-7*, the teacher demonstrates the different kinds of open sentences and their importance (a way of writing down the mathematical problem or expression when some data is unknown).

Activities

Teacher

2. The teacher shows how to find missing numbers in the expressions, including the operations of addition and subtraction.
3. The teacher offers a number of exercises from the Mathematics textbook 4, and asks the pupils to solve them in their notebooks.

Activities

Pupils

1. Copy the exercises written by the teacher on the magnetic whiteboard.
2. Solve the exercises the teacher gives.
3. Complete a self-test using the *Test-Board* (Test Card no. IV-2-14).

THEME: PRACTICAL AND DESCRIPTIVE GEOMETRY

Topic 1: Planar Shapes

Objectives:

The pupils should be able to:

1. Identify the plane of symmetry in shapes
2. Locate line(s) of symmetry of objects at school and at home
3. Appreciate the presence of symmetry in different daily situations
4. Identify right angles, acute and obtuse angles in planar shapes
5. Appreciate the use and presence of angles in different daily activities e.g. angles in roots, pictures, etc.
6. Distinguish between horizontal and vertical lines
7. Point to the North, South, East and West
8. Relate the rise and setting of the Sun to the cardinal points

Materials:

1. *Posters no. IV-1, IV-2, V-3*
2. *Magnetic shapes*: squares, rectangle, circle and triangles
3. *Improvised materials* like leaves, paper cuttings, etc.

Activities

Teacher

1. Using *Poster IV-1*, the teacher demonstrates the concept of *line of symmetry* and how to find the line of symmetry in a given planar shape.
2. The teacher should note and demonstrate that some figures may have several lines of symmetry (a circle, for example may even have an infinite number of them!)
3. The teacher asks the pupils to find **all the lines of symmetry** in a rectangular page of paper and in other paper shapes the pupils make using scissors.
4. Using *Poster IV-2*, the *magnetic white board* and *magnetic shapes*, the teacher discusses the types of angles, and asks them to find and name angles in the classroom, and among different *magnetic shapes* that the teacher puts on the board.
5. Using *Poster V-3*, the teacher defines *horizontal and vertical* lines, and explains that these definitions are correct only on the Earth's surface.
6. The teacher asks pupils to find horizontal and vertical lines in the classroom, and draw them in their notebooks.
7. The teacher explains how to navigate using the basic directions North, South, East and West, and how one can find them (using the *compass* or *the position of the Sun*).

Activities

Pupils

1. Draw basic geometrical shapes in their notebooks (one shape per page): a square, rectangle, triangle and circle, and cut them out using scissors. Find the lines of symmetry of each shape, and check by folding the shape along the line.
2. Draw the shapes and the lines of symmetry in their notebooks, and write the name of the figure and the number of lines found.
3. Draw different types of angles, and write their names near each type.
4. Draw horizontal and vertical lines in the classroom, in their notebooks.
5. Draw their way home from the school, the position of the Sun, and the directions North, South, East and West.

Topic 2: Three-Dimensional Shapes

Objectives:

The pupils should be able to:

1. Distinguish between open and closed shapes
2. Appreciate the presence and use of 3-dimensional shapes at homes and in the surroundings.

Materials:

1. *Posters no. II-4, II-5, II-6*
2. *3D Geo Shapes*
3. *Improvised materials* like oranges, balls, bottles, boxes, etc.

Activities

Teacher

1. Using *posters II-4* and *II-5*, the teacher explains the difference between a cube and cuboid, and demonstrates it using the models from the *3D Geo Shapes* set and the improvised materials.
2. Using *poster II-6*, the teacher demonstrates the basic 3D-shapes with curved surfaces (**cylinder** and **cone**), and asks pupils to discover similar shapes in and around the classroom.
3. The teacher shows the difference between **closed shapes**, where there are **no gaps** between neighboring points of the shape (like in any figure from the *3D Geo Solids*), and **open shapes**, which have surfaces that do not come in contact with the neighboring surface (like a table, chair, opened bottle, etc.)
4. The teacher asks pupils to find basic solids in their surroundings draw and name them in their notebooks.

Activities

Pupils

1. Draw basic geometrical shapes in their notebooks.
2. Draw surrounding items with basic shapes in their notebooks .
3. Draw and paint different objects with closed shapes and others with open shapes.

THEME: EVERYDAY STATISTICS

Topic 1: Bar Graph

Objectives:

The pupils should be able to:

1. Prepare bar graphs
2. Appreciate the use of the information in a bar graph
3. Read bar graphs
4. Identify the bar graph mode
5. Appreciate the presence of most common events/data in daily life

Materials:

1. *Poster no. IV-7*

Activities

Teacher

1. Using *Poster IV-7*, the teacher demonstrates different ways of presenting data: as a story, as a pictogram, as a table, as a bar graph.
2. Special attention should be given to a *bar graph*, namely to **constructing** the bar graph based on the given data, and to **reading** the given graph.

Activities

Pupils

1. Draw a bar graph the teacher gives, in their notebooks
2. Find the mode of the data
3. Construct and draw a bar graph in their notebooks using data the teacher writes on the *white board*

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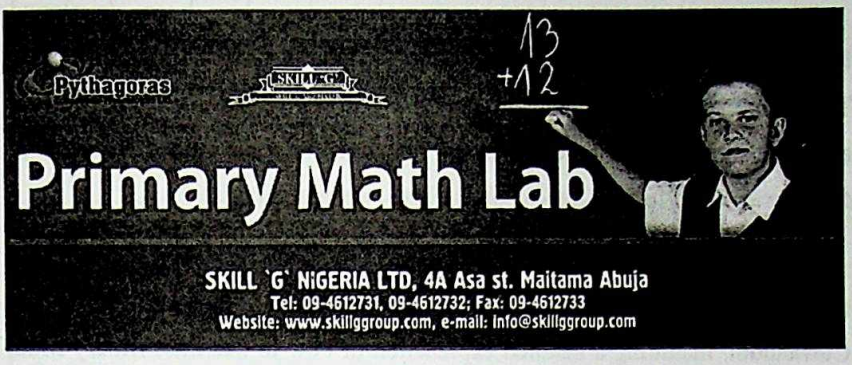

Teacher's Manual

Primary V

In accordance with the
National Mathematics Curriculum
of Nigeria

Edited by: Dr. Philip Slobodsky
Pythagoras Educational Technologies

The revised National Mathematics Curriculum has been developed following the goals and the targets of the 9 - Year Basic Education Program. The teachers are expected and required to expose the pupils to the contents and activities described in the Curriculum. They are also encouraged, as noted in the Curriculum, "to enrich the contents with relevant materials".

The following Manual for the Mathematics teachers therefore consists of a didactical guide to each of the 6 themes that should be taught according to the Curriculum, including a detailed explanation of how to use the Primary Math Kit. The Manual is built around the Curriculum, thus making it available to primary school teachers in a format which renders it easy to implement in the class room.

The Manual refers to the **three main components** of the Math Kit, namely the *Teachers Demonstration Set, the Students Set* and *the Students Training System*, as the basic educational tools around which every lesson can be built.

We hope that the extensive use of the **Primary Math Set** will enrich the learning experience of the Primary School pupils at all the levels and encourage them to improve their achievements, and that the Manual will help the teachers in using it effectively.

Dr. Philip Slobodsky
The Editor
Pythagoras Educational Technologies

PRIMARY FIVE

THEME: NUMBERS AND NUMERATION

Topic 1: Whole Numbers and Fractions

Objectives:

The pupils should be able to:

1. Count in thousands and millions
2. Solve quantitative aptitude problems related to thousands and millions
3. Appreciate counting in large numbers such as in the case of populations of states or countries
4. Give the value of a digit in a whole number or a decimal
5. Solve quantitative aptitude problems related to place value
6. Appreciate the value of a digit in a whole number or decimal
7. Change fractions to decimals, decimals to percentages, and vice-versa
8. Solve quantitative aptitude problems related to percentages
9. Identify prime numbers smaller than 100
10. State the relationship between fraction and ratio
11. Solve quantitative aptitude problems related to ratio

Materials:

1. *Demonstration closed-frame school abacus*
2. *Open-frame vertical sticks abacus*
3. *Poster no. III-6*

Activities

Teacher

1. Using the *open-frame school abacus,* the teacher demonstrates counting in groups of 10, 100, 1000, 10,000, 100,000.
2. Special emphasis should be placed on the **concept of place value** allowing forming, naming and writing multi-digit numbers in a compact **decimal form.**
3. Using the *closed-frame vertical sticks abacus,* the teacher demonstrates another form of presenting the multi-digit numbers up to one million.
4. The teacher demonstrates how to represent **decimal fractions** (tenths, hundredths and thousandths) on the *extended abacus*.
5. The teacher shows how to convert fractions to decimals and vice versa.
6. Using *Poster no. III-6,* the teacher introduces the concept of *prime numbers* as numbers that cannot be divided by any number other than 1 and the number itself. The table in poster III-6 shows that **any number** that is not a prime number **can be separated into a product of prime numbers.**
7. The teacher explains how to determine if a given number is a prime number: we try to divide it by the known prime numbers (2, 3, 5, 7, 11, 13, 17, 19, 23, 29, ...). If we cannot divide it without a remainder then the number is a prime number.

Activities

Pupils

1. Solve the exercises the teacher gives in their notebooks.
2. Using the *pupil's abacus*, display the numbers the teacher writes on the *magnetic white board.*
3. Write the numbers the teacher displays on the *demonstration abac*i in their notebooks.
4. Write the prime numbers up to 100 in their notebooks.
5. Complete self-tests using the *Test-Board* (Test Cards no. IV-1-1, V-1-1, V-1-2 and V-1-3).

THEME: BASIC OPERATIONS

Topic 1: Addition and Subtraction

Objectives:

The pupils should be able to:

1. Add and subtract numbers with 3 or 4 digits
2. Add and subtract fractions and mixed numbers
3. Solve quantitative aptitude problems involving addition and subtraction of fractions
4. Add and subtract decimals
5. Perform mixed operations of addition and subtraction of whole numbers
6. Appreciate the need to carry out operations of addition and subtraction in everyday activities

Materials:

1. *Demonstrational closed-frame school abacus*
2. *Magnetic white board*
3. *Posters no. III-4, III-5, III-9, III-10, IV-8(b) , IV-8(c), IV-8(d),IV -8(e)*

Activities

Teacher

1. Using *posters III-4* and *III-5*, the teacher demonstrates how to add and subtract 3- and 4-digit numbers.

Activities

Teacher

2. Special emphasis should be placed on the concepts of **place value, renaming** and **exchanging** digits, when required, in the course of "long addition" or "long subtraction".
3. Using *poster IV-8(b)*, the teacher reviews how to add fractions with **equal denominators**, and then, using *posters IV-8(c, d, e)*, he/she explains how to add and subtract fractions with **different denominators**.
4. Using the *closed-frame school abacus,* the teacher reviews the principle of forming the decimal fractional numbers, and shows the **addition of decimal numbers** in two ways: by "long addition", and using an abacus.

Activities

Pupils

1. Solve the exercises the teacher gives in their notebooks.
2. Using the *pupil's abacus*, display the decimal numbers, **whole as well as fractional**, that the teacher writes on the *magnetic white board.*
3. Write the numbers the teacher displays on the *demonstration abacus* **and their names** in words in their notebooks.
4. Complete a self-test using the *Test-Board* (Test Cards no IV-2-1, IV-2-1-1, IV-2-1-5, IV-2-1-6, IV-2-1-7, IV-2-1-8, V-2-1, V-2-2).

Topic 2: Multiplication

Objectives:

The pupils should be able to:

1. Multiply a 3-digit number by a 3-digit number
2. Solve quantitative aptitude problems on multiplication
3. Interpret "of" as multiplication when dealing with fractions of whole numbers
4. Multiply numbers by zero and one
5. Multiply decimals by whole numbers
6. Calculate squares of whole numbers up to 50 and square roots of perfect squares up to 400
7. Solve quantitative aptitude problems involving squares of numbers up to 50 and square roots of numbers up to 400

Materials:

1. *Magnetic white board*
2. *Posters no. IV-4, IV-5, IV-6*

Activities

Teacher

1. Using *posters IV-4* and *IV-5*, the teacher demonstrates how to multiply multi-digit numbers by one-digit and two-digit numbers.
2. The teacher should review the concepts of **renaming** digits, when required, in the course of "long multiplication".

Activities

Teacher

3. Using *poster no. IV-5,* the teacher reviews the concept of **square,** and reviews how to calculate a square of 2-digit numbers up to 20.
4. Using *poster no. IV-6,* the teacher reviews the concept of **square root,** demonstrates the **Table of Square Roots** of perfect squares up to 400, and asks pupils to copy the table to their notebooks.

Activities

Pupils

1. Solve the exercises the teacher gives and write the solutions in their notebooks.
2. Copy into their notebooks the **Table of Squares** of whole numbers up to 20 and the **Table of Square Roots** of perfect squares up to 400.
3. Complete self-tests using the *Test-Board* (Test Cards no. IV-2-9, IV-2-10, IV-2-11).

Topic 3: Division

Objectives:

The pupils should be able to:

1. Divide numbers by 10 and multiples of 10 up to 90
2. Solve quantitative aptitude problems involving division of numbers by 10 and multiples of 10 up to 90
3. Divide numbers by 100 and 200
4. Solve quantitative aptitude problems involving division of numbers by 100 and 200
5. Divide decimals by multiples of 10 up to 90
6. Solve quantitative aptitude problems of decimals
7. Divide decimals by 100 and 200
8. Solve quantitative aptitude problems involving division of decimals
9. Divide whole numbers by 2-digit numbers
10. Appreciate division as a means of sharing

Materials:

1. *Magnetic white board*
2. *Poster no. IV-9*

Activities

Teacher

1. Using *Poster IV-9*, the teacher reviews the method of "long division" of multi-digit numbers by one-digit numbers.
2. The teacher should distinguish 2 cases: division with and without a remainder.

Activities

Teacher

3. The teacher demonstrates how to **multiply** and divide **a number by 10** on the *white board*. To do this, we just write 0 to the right of the number:

$$2 \times 10 = 20$$
$$5 \times 10 = 50$$
$$12 \times 10 = 120$$

to **divide a number ending with 0 by 10**, we just **remove the end 0**:

$$20 : 10 = 2$$
$$50 : 10 = 5$$
$$120 : 10 = 12$$

4. To divide a number ending in 0 by a multiple of 10, we first divide it by 10, and then divide the result by the remaining factor:

$$80 : 20 = (80 : 10) : 2 = 8 : 2 = 4$$
$$120 : 30 = (120 : 10) : 3 = 12 : 3 = 4$$

5. To divide a number ending in **00** by 100, we just remove two zeros from the end of the number

$$800 : 100 = 8$$
$$12000 : 100 = 120$$
$$63500 : 100 = 635$$

Activities

Teacher

6. To divide a number ending in 00 by a multiple of 100, we first divide it by 100, and then divide the result by the remaining factor:

$$800 : 200 = (800 : 100) : 2 = 8 : 2 = 4$$

$$1200 : 30 = (1200 : 100) : 3 = 12 : 3 = 4$$

$$63500 : 500 = (63500 : 100) : 5 = 635 : 5 = 127$$

Activities

Pupils

1. Copy the examples of long division to their notebooks.
2. Solve the exercises the teacher gives and write the solutions in their notebooks.
3. Complete a self-test using the *Test-Board* (Test Card IV-2-12).

THEME: MEASUREMENT

Topic 1: Money

Objectives:

The pupils should be able to:

1. Compare Nigerian units of money with Pounds Sterling, American dollars and the currency of other Western African countries
2. Appreciate that currencies differ in value, i.e. ₦100 are not equal in value to $100
3. Solve problems pertaining to profit and loss, simple interest, commission, discount and transactions at the post office, market, etc.
4. Solve quantitative reasoning problems pertaining to money
5. Develop an interest in the correct use and exchange of money in various social transactions.

Materials:

1. *Demonstrational closed-frame school abacus*
2. *Magnetic white board*
3. *Demonstration coins* and *banknotes*

Activities

Teacher

4. Using the *demonstration coins* and *banknotes* the teacher reviews the types of coins and banknotes and their relative values.
2. The teacher reviews the concept of **profit** as the **difference between selling price and cost price,** and introduces the new concept of loss, as the difference **between cost price and selling price** in the case when the selling price is **less** than the cost price.
3. The teacher explains why cost price and selling price are expressed in units of money, but **profit and loss - in percents.**
4. The teacher writes a number of examples of profit calculation on the *magnetic white board* (the examples can be taken from the Mathematics textbook 5), and solve them step-by-step: first calculating the profit in units of money, and then in percent.
5. The teacher introduces the concept of **discount** (reducing the regular selling price, usually calculated in percent), and **commission** (a portion of the selling price given to a salesperson, also expressed in percent).
6. The teacher organizes a shopping game: s/he sets up a shopping corner in the class, provides sample coins and banknotes, and engages pupils in making deals (establishing prices, discounts, and calculating profit and commission).

Activities

Pupils

1. Copy the examples and exercises given by the teacher into their notebooks.
2. Solve the problems the teacher gives in their notebooks.
3. Participate in a shopping game, and write down all the deals in their notebooks.

Topic 2: Length

Objectives:

The pupils should be able to:

1. Calculate the perimeter of regular and irregular shapes such as a square, rectangle, trapezium and polygon
2. Calculate the circumference of a circle when the radius is given
3. Appreciate the relationship between the radius, the circumference and π
4. Calculate the circumference of a circle when the diameter is given
5. Understand the relationship between radius and diameter

Materials:

1. *Poster no. V-1*
2. *Ruler and measuring tape*

Activities

Teacher

1. Using *Poster no. V-1,* the teacher introduces the concepts of perimeter and circumference, and demonstrates the different ways to measure the perimeter and circumference of polygons and circles.
2. Using *poster no. V-1,* the teacher introduces the concept of **Algebraic formula,** allowing the **calculation** of perimeter and circumference when the sides of a polygon or the radius of a circle are known.

Activities

Pupils

1. Copy the drawings from *Poster V-1* and those that the teacher has made to their notebooks, calculate the perimeter of each figure and write the value next to the corresponding picture.
2. Solve the exercises the teacher has given on the *white board*, and write the solutions in their notebooks.
3. Complete a self-test using the *Test-Board* (Test Card no. V-3-2).

Topic 3: Area

Objectives:

The pupils should be able to:

1. Calculate the area of a right angle triangle
2. Appreciate the relationship between right angle triangles and rectangles

Materials:

1. *Poster no. V-2*
2. *Magnetic white board*

Activities

Teacher

1. Using *Poster V-2,* the teacher demonstrates how to calculate the area of a rectangle (by direct counting of the unit squares), and the difficulty that arises when trying to calculate the area of a right-angle triangle in the same manner.
2. The teacher stresses that a rectangle can be divided into two equal right-angle triangles, so that the **area of each triangle** equals **half of the rectangle's area**:

Activities

Pupils

1. Draw and paint a number of squares and rectangles in their notebooks, and construct a net of unit squares covering each drawing.
2. Calculate the area of the shapes by counting the number of unit squares.
3. Calculate the area of the shapes by using the formula **S = a x b.**
4. Complete self-tests using the *Test-Board* (Test Card no. V-3-3).

Topic 4: Volume

Objectives:

The pupils should be able to:

1. Use cubes to find the volume of a cuboid and cube
2. Use a formula to find the volume of a cuboid
3. Appreciate the difference between a cube and a cuboid

Materials:

1. *Poster no.V-8*
2. *Magnetic white board*
3. *3D Geo Shapes*

Activities

Teacher

1. Using *poster no. V-8,* the teacher demonstrates the concept of the **volume of 3D closed shapes,** using an example of two basic shapes: a cube and a box (cuboid).
2. The teacher shows how to calculate volume, either by direct counting of unit cubes, or by using the **formula for volume.**
3. The teacher notes that the formula can be developed only for some special cases of basic 3D solids like those presented in the *3D Geo Solids* set.
4. The teacher notes that the difference between a cube and a cuboid (box) is in the length of their sides: all sides of a *cube* are equal ($a = b = c$), whereas in a *cuboid* they can be different ($a \neq b \neq c$).

Activities

Pupils

1. Draw, paint, and label all the solids demonstrated by the teacher in their notebooks
2. Write the solutions to the exercises the teacher gives on the *white board* using the formulas for volume
3. Solve the exercises the teacher gives

Topic 5: The Structure of the Earth

Objectives:

The pupils should be able to:

1. Describe the shape of the Earth
2. Compare the volume of a sphere and a cuboid

Materials:

1. *Poster no V-6*
2. *Magnetic white board*
3. *A globe*

Activities

Teacher

1. Using *poster no .V-6*, the teacher tells the story of how it was first discovered that the Earth was round and not flat.
2. The teacher explains the concept of a *map*, and draws simplified maps of the classroom, the village or the town and the state on the *magnetic white board.*

Activities

Pupils

1. Draw and paint the maps and the *globe* shown in *poster V-6* in their notebooks.
2. Draw a simplified map of their village.

Topic 6: Capacity

Objectives:

The pupils should be able to:

1. Find the relationship between liters and cubic centimeters
2. Appreciate the use of liter as a unit of capacity and the relationship between liter and cm^3

Materials:

1. *Magnetic white board*
2. *Measuring cups*
3. *Improvised materials*: *spoon, bottles, juice boxes, empty containers*

Activities

Teacher

1. Using empty bottles and containers, water and *the measuring cups*, the teacher demonstrates the **additive property of capacity** (as an amount of liquid that a container can keep), that means that we can *add, subtract, multiply and divide* the amounts of liquid.

Activities

Teacher

1. The teacher shows that a container with a 2-liter capacity contains the same amount of water as in 2 1-liter bottles, or in 4 0.5-liter bottles.
2. The teacher demonstrates that 1 liter is a rather **large unit of capacity**: the capacity of one spoon or a cup **is a small fraction** of a liter, to measure it we use a more appropriate unit of capacity: 1 cm^3 (cubic centimeter).
3. The teacher shows the relationship between the two units: as long as 1 liter is a capacity of a cube of **10cm x 10cm x 10cm,** we can calculate it: 10x10x10 = 1000; **1 liter = 1000 cm^3**
4. The teacher shows how many liters are in 1 cm^3:

1 cm^3 = 1/1000 liter = 0.001 liter

Activities

Pupils

1. Draw and paint 2 cubes with a capacity of 1 liter and 1 cm^3, respectively.
2. Find the capacities of the cubes drawn by a teacher on the *white board.*
3. Evaluate capacities of the empty bottles and containers by comparing with 1 liter of water.

Topic 7: Weight

Objectives:

The pupils should be able to:

1. Solve word problems on weight
2. Develop an interest in the practical application of weight measurement in day to day activities
3. Solve problems on quantitative aptitude involving weight

Materials:

1. *Demonstration spring scale*
2. *Poster no. VI-6*
3. *Improvised materials* like coins, stones, fruits, etc.

Activities

Teacher

1. Using p*oster no. VI-6*, the teacher reviews the **units of weight** (kg and gram).
2. Using the *demonstration spring scale*, the teacher measures the weight of **several** small objects together and separately, and shows that we can **add weights**.
3. The teacher suggests that the pupils weigh different objects like coins, rocks, fruits, etc., and then weigh several objects together.
4. The teacher solves a number of exercises, involving weight, from the Mathematics textbook 5, and gives the pupils some exercises to solve individually.

Activities

Pupils

1. Draw and paint the *demonstration spring scale* and the process of weighing objects in their notebooks.
2. Weigh different objects (stones, coins, fruits, etc.) using the *spring scale*, and write the results in their notebooks.
3. Solve exercises on addition, subtraction, multiplication and division of weights, and write the solutions in their notebooks.

Topic 8: Time

Objectives:

The pupils should be able to:

1. Calculate the average speed of a moving object

Materials:

1. *Poster no. VI-5*
2. *Magnetic white board*

Activities

Teacher

1. Using *poster no. VI-5*, the teacher introduces the concept of speed and presents the formula for calculating average speed.
2. The teacher gives examples of speed calculation for a number of moving objects, like a running man, a bicycle, a car, etc.

Activities

Pupils

1. Draw and paint the moving objects in their notebooks and write the typical speed value for each one
2. Calculate the speed for given values of distance and time, and write the results in their notebooks
3. Calculate their average speed coming to and from school

Topic 9: Temperature

Objectives:

The pupils should be able to:

1. Compare the temperature of various object and areas (locations) in degrees Celsius
2. Appreciate the usefulness of measuring temperature in our daily life

Materials:

1. *Thermometer*
2. *Magnetic white board*

Activities

Teacher

1. The teacher introduces the concept of temperature as a measure of how hot or cold something is, and introduces the *thermometer*.
2. The teacher gives examples of temperatures of different objects, like a human body, water in a bottle, air in a classroom, etc.
3. The teacher explains what can happen to the objects when their temperature rises or falls (water boils when $T = 100°C$ and freezes when $T = 0°C$, metal melts at $T \approx 500°C$, etc.).

Activities

Pupils

1. Draw and paint hot and cold objects in their notebooks and write a typical temperature value for each one
2. Measure their body temperature and write the results in their notebooks

THEME: PRACTICAL AND DESCRIPTIVE GEOMETRY

Topic 1: Planar Shapes

Objectives:

The pupils should be able to:

1. Identify parallel and perpendicular lines
2. Appreciate everyday life applications of parallel and perpendicular lines
3. Solve quantitative aptitude problems pertaining to planar shapes
4. State some properties of triangles
5. Develop an interest in recognizing and identifying various equilateral and isosceles triangles in the environment
6. Solve some quantitative aptitude problems related to triangles
7. State properties of a parallelogram, trapezium and rhombus
8. Develop an interest in recognizing various quadrilateral shapes in homes and schools
9. Solve quantitative aptitude problems related to a parallelogram, trapezium and rhombus

Materials:

1. *Posters no. V-3, V-4, V-5*
2. *Magnetic white board*
3. *Magnetic 2D Geo parts*
4. ***Demonstrational ruler, compass and protractor***

Activities

Teacher

1. Using *Poster V-3* the teacher demonstrates parallel and perpendicular lines, and guides the pupils in identifying them.
2. Using *Poster V-3,* the teacher introduces the concept of **horizontal lines**, and asks pupils to identify horizontal lines in the classroom.
3. Using the *demonstrational ruler,* the teacher draws several **pairs of parallel lines**, and shows that they can go in any direction, and are not necessarily horizontal.
4. Using *Poster V-3,* the teacher introduces the concept of **vertical lines** and guides the pupils in identifying vertical lines in the classroom.
5. Using *poster V-4* and the *Magnetic 2D Geo parts*, the teacher demonstrates different types of triangles and how to determine each type of triangle.
6. The teacher introduces a *ruler*, a *compass* and a *protractor*, and shows how to use them to identify a given triangle.
7. Using *poster V-5* and the *Magnetic 2D Geo parts,* the teacher demonstrates new types of *quadrilaterals* like a *parallelogram, trapezium, rhombus,* and compares them with a *square* and *rectangle,* taught in previous years.

Activities

Pupils

1. Copy all the drawings the teacher demonstrated and drew on the *white board* into the notebooks.
2. Identify the parallel and perpendicular lines in their classroom and draw them in the notebooks.
3. Construct and draw all the types of triangles in their notebooks and write their names.
4. Construct and draw the new types of quadrilaterals in their notebooks and write their names.

Topic 2: Three-Dimensional Shapes

Objectives:

The pupils should be able to:

1. Construct three-dimensional shapes using nets
2. Develop an interest in constructing cube, cuboid and pyramid nets
3. Solve quantitative aptitude problems related to cubes, cuboids and pyramids

Materials:

1. *Posters no. V-11, V-12*
2. *Magnetic white board*

Activities

Teacher

1. Using *poster V-11,* the teacher demonstrates the pattern of netting that can be folded to produce a real 3D cube and box.
2. The teacher explains why there is only one pattern for a cube and 3 different patterns for a box (because all the faces of a cube are identical, and a box/cuboid has 3 different pairs of faces).
3. Using *poster V-12*, the teacher demonstrates the patterns of netting that can be folded to produce a real 3D pyramid (there are two different patterns, and the teacher will explain why).

Activities

Pupils

1. Copy all the drawings the teacher demonstrated and drew on the *white board* into their notebooks.
2. Identify cube and cuboid shapes in their classroom and draw them in the notebooks.
3. Construct and draw the net patterns for the shapes drawn in their notebooks.
4. Identify the pyramid shapes in their classroom, draw them in their notebooks and construct their nets.

Topic 3: Circle

Objectives:

The pupils should be able to:

1. Identify:
   - Radius
   - Diameter
   - Circumference of a circle
2. Appreciate circular shapes at home and school, and their properties
3. Solve quantitative aptitude problems pertaining to circles

Materials:

1. *Posters no. V-1, II-3*
2. *Magnetic white board*
3. *Demonstrational compass* & ***ruler,*** *pupil's compass*
4. *Wire or tape*

Activities

Teacher

1. Using *posters V-1* and *II-3*, the teacher demonstrates a **circle**: its **definition,** the **main properties** and the **formula for circumference.**
2. The teacher identifies circular shapes in the classroom and asks the pupils to estimate their radius and diameter.

Activities

Teacher

3. Using a *demonstrational compass and ruler,* the teacher draws several circles on the *white board*, measures their diameters, estimates the circumference using tape or wire, substitutes the results into the **formula for circumference,** and tries to validate it.

Activities

Pupils

1. Copy the circles the teacher draws on the *white board* into their notebooks using the ***pupil's compass***.
2. Measure the radii (R) and the (D) diameters of the circles drawn, and write the results near the relevant drawings.
3. Substitute the values of R to the **formula for circumference** and calculate it for each circle. Repeat the calculation using the values of D.
4. Complete a self-test using the *Test-Board* (Test Card no. V-3-2).

THEME: ALGEBRAIC PROCESSES

Topic 1: Open Sentences

Objectives:

The pupils should be able to:

1. Find the missing value in open sentences
2. Use letters to represent boxes in open sentences
3. Find the missing value that the letters represent
4. Appreciate that each box in a mathematical statement represents a letter that can be found
5. Use a letter to represent the missing numbers in quantitative aptitude problems and find their values

Materials:

1. *Poster no. V-7*
2. *Magnetic white board*

Activities

Teacher

1. Using *poster V-7,* the teacher reviews the concept of **mathematical expressions** in general, and particularly the form of **open sentence**, where one of the numbers is missing (the **unknown**).
2. The teacher guides the pupils in solving more complicated problems that have been taught in Primary Four, and that can be found in the Mathematics textbook 5.

Activities

Pupils

1. Copy the contents of poster V-7 into their notebooks.
2. Write down and solve the exercises the teacher gives in their notebooks.
3. Complete a self-test using the *Test-Board* (Test Card no. IV-2-14).

PRIMARY FIVE

THEME: EVERYDAY STATISTICS

Topic 1: Data Presentation

Objectives:

The pupils should be able to:

1. Prepare a tally of data
2. Draw bar graphs and pictograms of information collected locally
3. Appreciate the representation of data from events in daily life activities
4. Record the data from experiments in coin tossing and dice throwing
5. Appreciate various chance events in their daily life activities

Materials:

1. *Poster no. IV-7*

Activities

Teacher

1. Using *poster IV-7*, the teacher demonstrates different ways of data presentation: as a story, as a pictogram, as a table, as a bar graph.
2. Special attention should be placed on the *bar graph*, namely to **constructing** a bar graph based on given data, and to **reading** the given graph.

Activities

Pupils

1. Draw a bar graph in their notebooks, according to a story the teacher tells.
2. Construct and draw a bar graph in their notebooks using data the teacher writes on the *white board*.

Topic 2: Measure of Central Tendency

Objectives:

The pupils should be able to:

1. Find the mode of given data
2. Appreciate the concept of mode as applicable in daily life activities
3. Calculate the mean of given data
4. Appreciate the concept of mean of a set of data in daily activities

Materials:

1. *Posters no. IV-7, VI-7*

Activities

Teacher

1. Using *Poster VI-7*, the teacher introduces the concepts of **mode** and **mean** value of a given data.
2. The teacher shows the similarities and differences between the two (the mode is the value that happens most frequently, and the mean is the average of all the values).

Activities

Teacher

3. The teacher asks the pupils to gather other types of data (such as shoe size, height, etc.), complete a table corresponding to the data and construct a bar graph.

Activities

Pupils

1. Take measurements, as instructed by the teacher, and complete the data in the table in their notebooks
2. Construct a bar graph according to the table
3. Find the mode of the data and the mean value
4. Complete a *self-test* (Test Card no. V-6-1)

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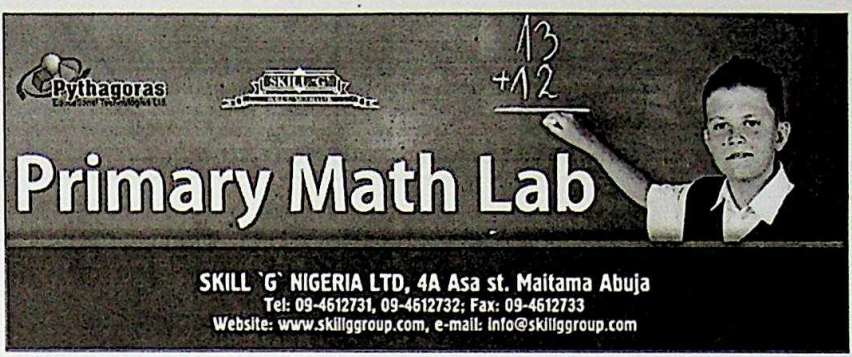

Teacher's Manual

Primary VI

In accordance with the
National Mathematics Curriculum
of Nigeria

Edited by: Dr. Philip Slobodsky
Pythagoras Educational Technologies

PRIMARY SIX

THEME: NUMBERS AND NUMERATION

Topic 1: Whole Numbers and Fractions

Objectives:

The pupils should be able to:

1. Count in millions and billions
2. Write and read up to one million
3. Solve problems involving quantitative reasoning
4. Give the place value and the value of a digit in a given whole number
5. Appreciate the use of place value in counting
6. Solve problems of quantitative reasoning with value and place value
7. Give the value and place value for a digit in a decimal fraction
8. Solve quantitative aptitude problems related to place value
9. Find the LCM of 2-digit whole numbers
10. Appreciate the relevance of LCM to everyday life
11. Find the HCF of 2-digit whole numbers
12. Appreciate the relevance of HCF to everyday life
13. Solve quantitative aptitude problems on LCM and HCF

Materials:

1. *Demonstrational Closed-frame school Abacus*
2. *Open-frame Vertical Sticks Abacus*
3. *Poster no. III-6*

Activities

Teacher

1. Using the *closed-frame school Abacus,* the teacher demonstrates counting in groups of 10, 100, ... up to 1,000,000,000 (one billion). When the number of beads reaches 10, move to the upper wire.

Activities

Teacher

2. The teacher reviews the **concept of place value** allowing forming, naming and writing multi-digit numbers in compact **decimal form.**
3. Using the *open-frame vertical sticks abacus,* the teacher demonstrates another way to present the multi-digit numbers, up to one million.
4. The teacher demonstrates how to represent **decimal fractions** (tenths, hundredths and thousandths) on the *extended abacus.*
5. The teacher uses the table from *Poster III-6* to explain how to find the LCM and HCF of two whole numbers: first it is necessary to decompose each number to primary factors, and then either to find the common factor and multiply them to find the HCF, or to make a product of all the different factors to find the LCM.

Activities

Pupils

1. Write down all the examples the teacher has written on the *white board* in their notebooks.
2. Using the *pupil's abacus*, form the numbers the teacher has written on the *white board.*
3. Write the numbers presented by a teacher on the *demonstration abacus* in their notebooks.
4. Complete self-tests using the *Test-Board* (Test Cards no. V-1-1, V-1-2, VI-1-1, and VI-1-2-1).

Topic 2: Fractions

Objectives:

The pupils should be able to:

1. Order fractions
2. Appreciate sharing in everyday life
3. Solve problems on quantitative reasoning
4. Express decimals as fractions and vice versa

Materials:

1. *Magnetic White Board*
2. *Magnetic 2D parts*

Activities

Teacher

1. The teacher uses the *magnetic 2D parts* in order to demonstrate the relative values of simple fractions, and shows the relationship between simple and decimal fractions.
2. The teacher solves and writes the exercises from the Mathematics textbook 6 on the *magnetic white board*, and asks pupils to write the solutions in their notebooks.

Activities

Pupils

1. Write down all the exercises the teacher has written on the *white board* in their notebooks.
2. Draw and paint the graphical representations of the basic fractions shown by the teacher in their notebooks.

Activities

Pupils

3. Write the numbers the teacher presents on the *demonstration abacus* in their notebooks.
4. Complete self-tests using the *Test-Board* (Test Cards no. VI-2-2, VI-2-3-1, and VI-2-3)

Topic 3: Demography

Objectives:

The pupils should be able to:

1. Read, write and compare populations of big cities
2. Read and compare population of HIV positives in different countries
3. Appreciate the use of counting in thousands and millions of population in demography, epidemiology, etc.

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher guides the pupils to define what population is, and discusses with them why it is useful to measure population and the population change over time.
2. The teacher writes the typical populations of villages, towns, cities and countries on the *white board*, emphasizing the difference in scales.
3. The teacher asks the pupils to give the population of their house and class, and then to try and estimate the population of their village/town. The teacher writes down the population of Nigeria, and of its main cities.

Activities

Teacher

4. The teacher guides the pupils to compare the population data of HIV positives from different countries of the world. The teacher guides the pupils to appreciate the importance of studying and measuring population and population change in the context of epidemiology.

Activities

Pupils

1. Write down all the data the teacher has written on the *white board* in their notebooks.
2. Write the populations of the major Nigerian cities in their notebooks.
3. Complete the exercises the teacher gives.

Topic 4: Ratio and Proportion

Objectives:

The pupils should be able to:

1. Solve problems on ratio
2. Appreciate the application of ratio in everyday life
3. Solve quantitative reasoning problems involving ratio
4. Solve problems on direct proportion
5. Appreciate applications of direct proportions in daily life
6. Solve problems on quantitative reasoning involving direct proportion
7. Solve problems on inverse proportion
8. Appreciate that some daily activities are inversely related
9. Solve problems on quantitative reasoning in inverse proportions

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher revises previous knowledge of ratio, and uses of ratio, such as in a map.
2. The teacher guides the pupils in solving quantitative aptitude problems involving ratio, and ratio in populations.
3. The teacher explains how to find the simplest form of a ratio, and how this is equivalent to reducing fractions.
4. Using examples the teacher introduces the concept of **direct proportion**, explaining that when two values vary yet their ratio remains the same they are proportional. The teacher asks the pupils to give examples of direct proportion from daily life.
5. The teacher writes a number of examples of problems involving direct proportion on the *magnetic white board*, and solves them.
6. Using examples the teacher introduces the concept of inverse proportion, explaining that when one value increases the other one decreases proportionally. The teacher asks the pupils to give examples of inverse proportion from daily life.
7. The teacher writes a number of examples of problems involving direct proportion on the *magnetic white board*, and solves them.

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.
3. Complete self-tests using the *Test-Board* (Test Cards no. III-5-2 and V-5-1).

Topic 5: Ratio of Family Size and Resources

Objectives:

The pupils should be able to:

1. Find the ratio of family size and resources
2. Appreciate the need to correctly use ratio in relating proportion of resource to family size

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher guides the pupils in solving ratio problems pertaining to family resources. The pupils will appreciate the connection between family size and the resources allocated to each family member, i.e. that as the family gets bigger each member gets less.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Objectives:

The pupils should be able to:

1. Express two populations in given ratio.

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher guides the pupils in expressing the ratio of two populations, giving real-world examples such as the ratio between the populations of two countries or two cities.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Topic 7: Ratio of Prevalence of HIV/AIDS Between Both Sexes, Two States

Objectives:

The pupils should be able to:

1. Express the ratio **of the prevalence of HIV/AIDS between the two sexes in a town or country.**
2. Appreciate the correct expression of ratios in monitoring the trend of infection of **HIV/AIDS in the different sexes and among states**
3. Solve quantitative aptitude problems on ratio of **HIV/AIDS** infection

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher guides the pupils in solving ratio problems pertaining to the prevalence of HIV/AIDS in different populations, mainly comparing females and males.
2. Discuss with the pupils how correct computation of this ratio can help clearing the epidemic trend.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Topic 8: Percentage

Objectives:

The pupils should be able to:

1. Express one number as a percentage of another
2. Calculate numbers expressed as a percentage of another
3. Express one population as a percentage of another population
4. Appreciate percentage in representing proportion of related things such as population and prevalence of HIV/AIDS
5. Solve problems on increased percent
6. Appreciate the need to correctly determine percentage increase such as in population growth
7. Solve problems on percentage decrease
8. Solve problems of quantitative aptitude on percentage decrease

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher guides the pupils in expressing numbers as a percentage of another number.
2. The teacher discusses with the pupils applications of percentage computation in real life and its usefulness when representing proportion of related things, focusing on the topic of HIV/AIDS prevalence in the population.
3. The teacher introduces the concept of percentage increase, and guides the pupils in solving percentage increase problems using the formula: Percentage Increase = $\frac{\text{Increase}}{\text{Initial Value}} \times 100$
4. The teacher repeats the concept of population growth as an example for the application of percentage increase in real life, and asks the pupils to give more examples.
5. The teacher introduces the concept of percentage decrease, and guides the pupils in solving percentage decrease problems using the formula: Percentage Decrease = $\frac{\text{Decrease}}{\text{Initial Value}} \times 100$
6. The teacher discusses with the pupils real life applications of percentage decrease, such as in the accurate calculation of discounts.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.
3. Complete a self-test using the *Test-Board* (Test Card no. V-4-5).

THEME: BASIC OPERATIONS

Topic 1: Addition and Subtraction

Objectives:

The pupils should be able to:

1. Add any set of numbers, fractions and decimals
2. Solve problems on subtraction of whole numbers
3. Solve word problems involving addition and subtraction of whole numbers
4. Develop an interest in addition and subtraction in daily life

Materials:

1. *Posters no. III-4,III-5, III-9, IV -8(b), IV-8(c), and IV -8(d)*
2. *Magnetic White Board*
3. *Magnetic 2D parts.*

Activities

Teacher

1. Using *Posters no. III-4 and III-5,* the teacher reviews the methods of long addition and subtraction of 3-digit numbers, and demonstrates the methods for any multi-digit numbers.
2. Using *Posters no. III-9, IV -8(b), IV-8(c), and IV -8(d),* the teacher reviews addition of fractions.
3. The teacher guides the pupils in solving word problems involving addition of whole numbers.

Pupils

1. Write all the examples the teacher writes on the *white board* in their notebooks.
2. Complete self-tests using the *Test-Board* (Test Cards no. IV-2-1, IV-2-1-1, V-2-1 and V-2-2)

Topic 2: Multiplication

Objectives:

The pupils should be able to:

1. Multiply a 3-digit number by a 3-digit number
2. Appreciate the importance of multiplication and its applications in daily life
3. Solve problems of quantitative aptitude on multiplication
4. Multiply decimal by decimal (to one decimal place)
5. Multiply fractions by fraction
6. Calculate the square of numbers up to 500
7. Calculate the square roots of perfect squares

Materials:

1. *Posters no. IV-4, VI-10, IV-5*
2. *Magnetic White Board*

Activities

Teacher

1. Using *Poster no. VI-10* the teacher guides the pupils on multiplying a fraction by a fraction.
2. Using *Poster no. IV-5* the teacher revises the calculation of squares of numbers: the teacher repeats to the pupils that in order to calculate the square the number is multiplied by itself.

3. Using *Poster IV-6* the teacher repeats to the pupils that a square root of a number is a number that multiplied by itself yields the first number.
4. The teacher guides the pupils, using examples written on the white board, how to compute square roots of perfect squares using the factorization method, for example:
   To find the root of 225 we first break it into its prime factors-

   5 225

   5 45

   3 9

   3 1
5. If the factors can be divided into two even groups (3*5)(3*5) then the multiplication of the factors in each group gives us the square root (3*5 = **15**).

Activities

Pupils

1. Write all the examples the teacher writes on the *white board* in their notebooks.
2. Solve the exercises the teacher gives in their notebooks.
3. Complete self-test using the *Test-Board* (Test Cards no. IV-2-9, IV-2-10, IV-2-11, VI-2-3, and VI-2-3-1).

Topic 3: Division

Objectives:

The pupils should be able to:

1. Divide whole numbers and decimals by 2-digit and 3 digit numbers
2. Appreciate the importance of division in daily life

2. *Magnetic White Board*

Activities

Teacher

1. Using poster no. IV-9 the teacher revises division of a 3-digit number by a 1-digit number. Then the teacher guides the pupils, writing examples on the white board, how to extend this process and perform the division of a 3-digit number by a 2 and 3 digit numbers.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Topic 4: Indices (Power)

Objectives:

The pupils should be able to:

1. Write in numbers index form (where the power does not exceed 5)
2. Solve problems involving powers
3. Appreciate the need to write numbers in index form
4. Complete exercises on quantitative reasoning involving indices

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher gives examples of multiplication problems in which a number is multiplied by itself and introduces the index notation form of powers.

Activities

Teacher

2. The teacher guides the pupils using examples written on the white board in factoring numbers and writing them in index form (36=2*2*3*3 = 2^2*3^2, 48=2*2*2*2*3=2^4*3).
3. The teacher guides the pupils in solving problems involving index notation.

Activities

Pupils

1. Write all the examples the teacher writes on the *white board* in their notebooks.
2. Complete a self-test using the *Test-Board* (Test Card no VI-2-4).

Topic 5: Ratio and Percentage

Objectives:

The pupils should be able to:

1. Solve problems on ratio
2. Express a number as a percentage of another number
3. Solve problems on profit and loss percent
4. Appreciate the implication of profit and loss in business
5. Complete exercises on quantitative aptitude on ratio, percentage, profit, and loss

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher guides the pupils in solving problems involving ratio.

Activities

Teacher

2. The teacher explains how to express a number as a percentage of another number (e.g. what percentage of 4 is 2? 2/4 *100 = 50%).
3. The teacher reviews the concept of **profit** and **loss** as the **difference between selling price and cost price.**
4. The teacher writes a number of examples of profit and loss calculation on the *magnetic white board*, and solves them step-by-step: first calculating the profit in units of money, and then as a ratio and percent.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.
3. Complete self-tests using the Test-Board (Test cards no. V-4-3 and V-4-4).

Topic 6: Ratio and Population Issues

Objectives:

The pupils should be able to:

1. Find the amount of money allocated for the health care of an individual citizen in a year
2. Express the number of children per family in ratio format
3. Express the measure of fertility, morbidity and mortality of two sets of population as a ratio of one to another
4. Appreciate the application of ratio in population issues
5. Solve quantitative reasoning problems on population issues

1. *Magnetic White Board*

Activities

Teacher

1. The teacher guides the pupils in applying their knowledge of ratio in expressing population issues such as the annual allocation per citizen of health care budget, the number of children per family, and measures of fertility, morbidity and mortality
2. The teacher guides the pupils solving quantitative reasoning problems pertaining to population ratio issues, giving examples from daily life.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Topic 7: Order of Operations

Objectives:

The pupils should be able to:

1. Work with the basic operations in the right order
2. Appreciate the order of operations in solving life problems
3. Solve quantitative aptitude problems involving BODMAS

Materials:

1. *Magnetic White Board*

PRIMARY SIX

THEME: MEASUREMENT

Topic 1: Money

(a) Population and Economic Consequences

Objectives:

The pupils should be able to:

1. Solve problems on taxes and rates
2. Solve problems involving buying and selling of shares and dividends
3. Calculate interest for shares and dividends
4. Solve problems on quantitative aptitude based on taxes and rates as well selling shares and dividends

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher introduces basic economical concepts, for example:

   Tax: A fee charged by the government, for example, on an income or activity.

   Rate: The proportion of interest on a sum of money

   Shares: A certificate representing one unit of ownership in a corporation, mutual fund, or limited partnership.

   Dividend: A payment given to a company's shareholders

2. The teacher discuses with the pupils the reasons for having taxes which are an important source of public revenue.

Activities

Teacher

3. The teacher discuses with the pupils on the buying and selling of shares, and the role they play in economy.
4. The teacher solves problems on quantitative aptitude based on taxes, rates, shares and dividends.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

(b) Conversion of Currencies

Objectives:

The pupils should be able to:

1. Use a ready reckoner
2. Use a calculator to convert from one currency to another
3. Appreciate the use of a ready reckoner and calculator for the conversion of currencies
4. Solve problems on quantitative aptitude based on converting from one currency to another

Materials:

1. *Magnetic White Board*
2. A ready reckoner for currency conversion

Activities

Teacher

1. The teacher discusses with the pupils real life situations in which we need to convert currency, emphasizing the importance of knowing the exchange rate, and of the accuracy of the calculation.

Activities

Teacher

2. The teacher explains how to use a ready reckoner for the conversion of currencies.
3. The teacher guides the pupils in solving problems of currency conversion, using the ready reckoner and a calculator. In order to value the role of the calculator in these computations, the teacher asks the pupils to try and solve the conversion problems without the use of a calculator.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Topic 2: Length

Objectives:

The pupils should be able to:

1. Use the Pythagorean rule to find the unknown length of a right angled triangle
2. Solve quantitative aptitude problems involving the Pythagorean rule

Materials:

1. *Poster No. VI-1*
2. *Magnetic White Board*

Activities

Teacher

1. Using poster VI-1, the teacher guides the pupils in identifying the hypotenuse, opposite and adjacent sides of a right-angle triangle. The teacher asks the pupils to find the number of the unit squares in the squares constructed on the triangle sides, and compare that of the hypotenuse to the sum of the other two.
2. Using the poster the teacher presents the Pythagoras rule ($a^2+b^2=c^2$, where c is the hypotenuse).
3. The teacher guides the pupils in solving problems using the Pythagoras rule.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.
3. Complete a self-test using the Test-Board (Test card no. VI-3-2).

Topic 3: Perimeter

Objectives:

The pupils should be able to:

1. Discover that different rectangles with the same area have different perimeters

Materials:

1. *Poster no. VI-2*
2. *Magnetic White Board*
3. *Magnetic 2D parts*

1. Using *Poster no. VI-2* the teacher demonstrates how rectangles with the same area may have different perimeters, while rectangles with the same perimeter may have a different area.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.
3. Complete a self-test using the Test-Board (Test card no. V-3-2).

Topic 4: Area

Objectives:

The pupils should be able to:

1. Calculate the areas of a figure that can be divided into rectangles and/or triangles
2. Calculate land areas in hectares

Materials:

1. *Poster No. VI-3*
2. *Magnetic White Board*

Activities

Teacher

1. Using poster no. VI-3, the teacher guides the pupils in calculating the area of a figure that can be divided into rectangles and triangles.
2. The teacher explains that land areas can be measured in hectares (1 hectare = 10,000m^2), and guides the pupils in solving problems pertaining to land areas.

board in their notebooks.

2. Complete the exercises the teacher gives on the calculation of the area of figures that can be divided into rectangles and squares.
3. Complete the exercises the teacher gives on finding land areas, and converting areas in square meters to hectares.
4. Complete a self-test using the Test-Board (Test card nc. VI-3-1).

Topic 5: Volume

Objectives:

The pupils should be able to:
1. Calculate the volume of prisms, cylinders and spheres
2. Solve quantitative aptitude problems on the volume of prisms, cylinders and spheres

Materials:

1. *Poster no. VI-4*
2. *Magnetic White Board*

Activities

Teacher

1. Using *Poster no. VI-4*, the teacher presents the formulae of the volumes of a prism, cylinder and sphere.
2. The teacher guides the pupils in solving quantitative aptitude problems involving volumes of prisms, cylinders and spheres.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Topic 8: Time

Objectives:

The pupils should be able to:

1. Tell time in seconds and minutes
2. Solve quantitative aptitude problems on time
3. Read timetables of journeys, especially for trains and airplanes
4. Appreciate the need for accurate measurement of time in real life

Materials:

1. *Poster no. III-3, Pupils' clock*
2. *Magnetic White Board*
3. Instruments for time measurement such as a hand-watch and a stop-watch.
4. A train or airplane time-table.

Activities

Teacher

1. Using *Poster no. III-3 and the pupils' clock*, the teacher repeats the principles of telling time. The teacher discusses also the hand that points to the seconds, demonstrating it using a hand watch or a stop watch.
2. The teacher asks the students to time themselves while performing various activities such as encircling the classroom and school, or solving a set of math problems. The teacher summarizes the pupils' measurements on the white-board.

Activities

Teacher

3. The teacher guides the pupils in solving quantitative aptitude problems involving time.
4. The teacher presents a train or an airplane time-table, explains how it is used, and asks the pupils to estimate the time it takes to get to a certain destination.

Activities

Pupils

1. Write down their time measurements in their notebooks.
2. Complete the exercises the teacher gives.

Topic 9: Time Athletics

Objectives:

The pupils should be able to:

1. Estimate time to complete races
2. Appreciate the use of mathematics in everyday life

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher presents the class with the records of the 100 meters run, for men and women, over the years. The teacher asks the students to try and estimate, using these data, the records for 200m, 400m, and 800m. The teacher then presents the actual data – were their estimates accurate?

Teacher

2. The teacher presents the results table of a typical 100m run: what is the difference between the first and the second place? And the first and the last place?
3. The teacher asks the pupils to estimate the time it will take a typical boy and girl from their class to run 100 meters, and then to measure their time.

Activities

Pupils

1. Write down the data the teacher has written on the *white board* in their notebooks.
2. Write down their time estimation versus their actual measurements in their notebooks.

Topic 10: Speed

Objectives:

The pupils should be able to:

1. Solve problems on speed
2. Solve quantitative aptitude problems on time and speed

Materials:

1. *Poster no. VI-5*
2. *Magnetic White Board*

Activities

Teacher

1. The teacher introduces the concepts of speed, steady speed and average speed, and discusses with the pupils how can speed be calculated.

Activities

Teacher

2. Using poster no. VI-5 the teacher defines speed as the ratio between the distance covered and time, explains the units in which it is expressed. The teacher gives examples for the speed of objects from daily life, and asks the pupils to give examples of situations in which it is important to be able to perform speed computations.
3. The teacher asks the pupils to use the time measurements from the previous time lessons to compute the speed of the train, airplane, of the running speed of the professional athletes and class pupils.
4. The teacher guides the pupils in solving quantitative aptitude problems involving speed.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Topic 1: Open Sentences

Objectives:

The pupils should be able to:

1. Solve problems expressed as open sentences
2. Interpret word problems as open sentences and solve them
3. Solve related problems on quantitative aptitude

Materials:

1. *Poster no. V-7*
2. *Magnetic White Board*

Activities

Teacher

1. Using poster no. V-7 the teacher revises the topic of open sentences, guiding the pupils in solving more complicated problems, which include three or more arithmetic operations.
2. Guides the pupils in expressing word problems as open sentences, for example: there are 80 oranges divided equally between 4 baskets. How many oranges does each basket contain?

   X+X+X+X=80

   4X=80

   X=80/4=20

Activities

Pupils

1. Write all the examples the teacher writes on the *white board* in their notebooks.
2. Complete a self-test using the *Test-Board*

   (Test Card no. VI-4-1).

THEME: GEOMETRY AND MEASUREMENT

Topic 1: Angles

Objectives:

The pupils should be able to:
1. Measure angles in degrees
2. Measure angles in a plane

Materials:

1. *Posters no. IV-2, V-3*
2. *Demonstrational Ruler, Protractor*
3. *Magnetic White Board*
4. Improvised materials: interesting images of daily-life objects

Activities

Teacher

1. The teacher explains that angles are measured in degrees (a circle divided into 360). The teacher demonstrates, using the demonstrational protractor, how it is used to measure angles.
2. Using poster no. IV-2 the teacher reviews the different types of angles.
3. Using poster no. V-3 the teacher reviews the definition of parallel and perpendicular lines, and asks the pupils how they relate to angles (i.e. the angle between perpendicular lines is 90°, the angles between a line crossing two parallel lines are equal).

Activities

Teacher

4. The teacher asks the pupils to indicate edges, vertices and surfaces of 3-D shapes. The teacher and asks the pupils to measure the angles of the shapes and find parallel and perpendicular lines in them.
5. The teacher presents pictures of daily-life objects and encourages the pupils to find parallel lines, perpendicular lines, and the different types of angles in them.

Activities

Pupils

1. Draw the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Topic 2: Height and Distances

Objectives:

The pupils should be able to:
1. Measure heights of human beings, building, trees and distance
2. Appreciate the heights and distances of things in the environment

Materials:

1. *Poster no. II-7*
2. *Demonstrational Ruler*, meter rule
3. *Magnetic White Board*
4. Measurement instruments from their environment: tapes, a click-wheel

Activities

Teacher

1. Using poster no. *II-7* the teacher reviews the units we use to measure length and distance.
2. The teacher asks the pupils to measure heights and distances in their environment, using a meter rule, a tape, or a click-wheel: their height, the dimensions of their classroom, the size of the school yard, etc. The teacher will summarize the measurements on the *White Board.*

Activities

Pupils

1. Wri*te down the* examples the teacher has written on the *white board* in their notebooks.
2. Write down the measurements they make in their notebooks, with an explanation on how they were taken.
3. Complete the exercises the teacher gives.

Topic 3: Polygon

Objectives:

The pupils should be able to:

1. Solve more difficult problems on two-dimensional and three-dimensional shapes
2. Appreciate two- and three-dimensional figures in the environment

Materials:

1. *Posters no. V-1, V-4, V-5, V-8*
2. *Demonstrational Ruler, 2D Magnetic shapes, 3D Geo shapes*
3. *Magnetic White Board*

Activities

Teacher

1. Using the posters, the 2D magnetic shapes and the 3D Geo shapes, the teacher reviews the features of different 2D and 3D shapes (such as a square, rectangle, rhombus etc).
2. The teacher encourages the pupils to identify shapes in their surrounding environment.
3. The teacher guides the pupils in solving more difficult problems involving shapes.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.

Topic 4: Scale Drawing

Objectives:

The pupils should be able to:

1. Draw plans according to a given scale
2. Develop an interest in converting length and distances of objects to any scale

Materials:

1. *Magnetic White Board*
2. Demonstrational ruler

Activities

Teacher

1. The teacher guides the pupils in converting the measurements they have taken during the height and distance lessons and convert them accurately using a certain scale.

Activities

Teacher

2. The teacher takes the pupils out to make measurements of their surrounding (their school and nearby streets and farms). The teacher asks the pupils to use their measurements to prepare an accurately scaled map of their school and school area.

Activities

Pupils

1. Make the computations the teacher has required in their notebooks.
2. Complete an accurately scaled map of their school and home area.

Topic 5: Planar Figures

Objectives:

The pupils should be able to:

1. Identify the basic properties of a rectangle and a square
2. Discover and appreciate various square and rectangular objects in their environments

Objectives:

The pupils should be able to:

1. Review the basic properties of:
   i. Isosceles
   ii. Equilateral
   iii. Right-angle
   iv. Scalene triangles
2. Review basic properties of a circle.

Materials:

1. *Posters no. V-1, I-1, II-1, II-2, V-2, V-4, II-3*
2. *Demonstrational Ruler, Protractor*
3. *Magnetic White Board*

Activities

Teacher

1. Using posters no. *V-1, V-2, I-1, II-1, and II-2,* the teacher reviews the features of rectangles and squares.
2. Using poster no. V-4 the teacher reviews the features of a triangle, and different types of triangles – Isosceles, Equilateral and Right-angle. The teacher introduces the Scalene triangle – in which all 3 sides are unequal.
3. Using poster no. II-3 the teacher reviews the properties of a circle.
4. Guide the pupils in solving quantitative reasoning problems involving planar shapes.

Activities

Pupils

1. Write down the examples the teacher has written on the *white board* in their notebooks.
2. Complete the exercises the teacher gives.
3. Complete self-tests using the Test-Board (Test cards no. V-3-3 and VI-5-1).

PRIMARY SIX

THEME: EVERYDAY STATISTICS

Topic 1: Population

Objectives:

1. The pupils should be able to:
2. Interpret pictograms and bar graphs
3. State the meaning of population
4. Appreciate the use of pictograms and bar graphs in representing population of people or data

Materials:

1. *Poster No. VI-8*
2. *Magnetic White Board*
3. *Magnetic 2D parts*

Activities

Teacher

1. The teacher discusses with the pupils the meaning of the term population, as a collection of human-beings or organisms, and how it is used in different scientific disciplines such as sociology, biology and statistics.
2. The teacher uses poster no. VI-8 to demonstrate the features of a bar-graph.
3. The teacher guides the pupils, step-by-step, in creating a bar graph based on data the teacher gives based on daily life issues.

Activities

Pupils

1. Copy the bar graph depicted in the poster VI-8.
2. Create a bar graph based on the data given by the teacher.

Topic 2: Measure of Central Tendency

Objectives:

The pupils should be able to:

1. Find the mode of data
2. Appreciate the use of the mode in analyzing population of people or data in daily life
3. Calculate the mean of given data
4. Appreciate the use of the mean in analyzing population of people or data in everyday life

Materials:

1. *Poster no. VI-7*
2. *Magnetic White Board*

Activities

Teacher

1. Using *Poster no. VI-7* the teacher introduces the concepts of mean and mode of the data.
2. The teacher asks the pupils to find the mean and mode of certain data sets.
3. The teacher discusses with the pupils the importance of these concepts when analyzing data.

Activities

Pupils

1. Copy the example given in poster VI-7.
2. Write down the examples the teacher has written on the *white board* in their notebooks.
3. Complete the tasks the teacher gives.
4. Complete a self-test using the Test-Board (Test card no.VI-6-1).

Topic 3: Data Collection and Representation

Objectives:

The pupils should be able to:

1. Prepare bar graphs of data from experiments
2. Appreciate and enjoy collecting information by carrying out an experiment, collecting data and making accurate measurements.

Materials:

1. *Magnetic White Board*

Activities

Teacher

1. The teacher guides the pupils in collecting data from various sources and analyzing it:
   - The pupils will conduct several experiments such as tossing a coin and tossing a dice.
   - They will collect sets of data from their environment, such as the number of rainy days in a certain month, the number of farm animals of different types in their region, the height of pupils in their class, as well as lower and higher classes in their school, and other relevant population features in their environment.
   - The pupils will then summarize their data in bar graphs, find the mean and the mode, and try to draw conclusions from it.
   - Note: this activity should be done in groups, such that each group is assigned a different topic of investigation.

Activities

Pupils

1. Document their results and observations in their notebooks.
2. Complete a group report with their data, graphs, analysis and conclusions.
3. Each group should present its findings to the class in a structured and clear manner.

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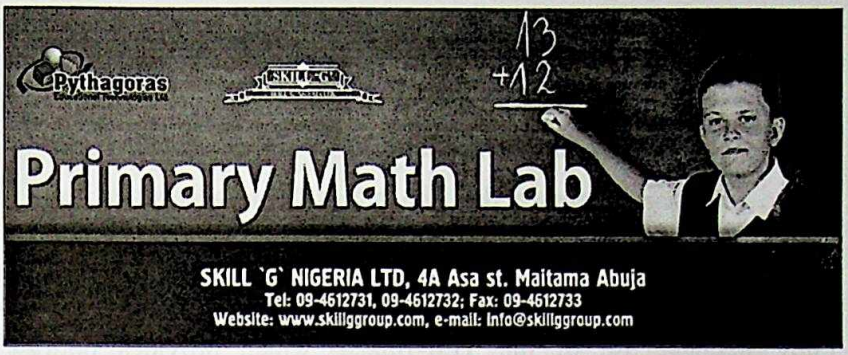


Teacher's Manual

Test Board Cards Index

In accordance with the
National Mathematics Curriculum
of Nigeria

Edited by: Dr. Philip Slobodsky
Pythagoras Educational Technologies

Training and Assessment Kit

Math Test Board

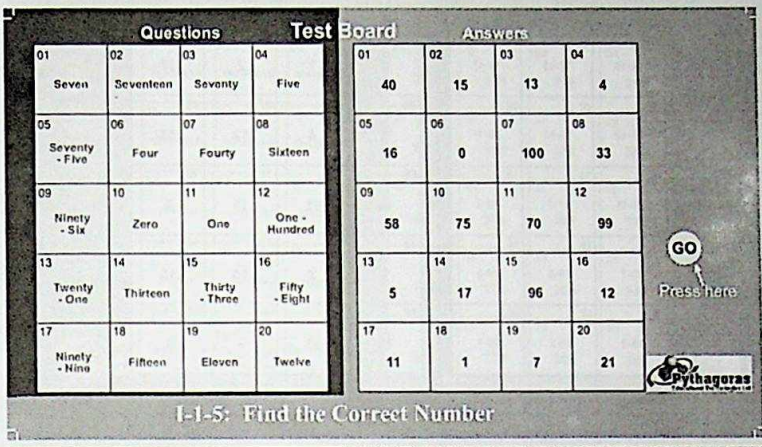
The Teacher's Manual specifies for each lesson which ***Test Cards*** are to be used to ensure that the pupils have understood the material and are ready for next year.

Only frequent use of the **Test-Board**, which provides both extensive practice and positive feedback, can ensure the desirable level of pupils' knowledge. The pupils should pass all these ***Test-Cards***, and pupils that fail to do so, should be encouraged to revise the learned material and try again.

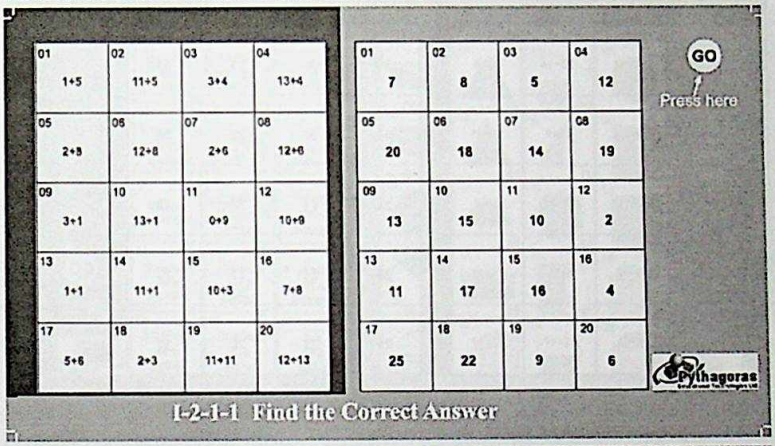
To allow the teacher easy location of the required card, the following manual specifies all ***Test-Cards*** for the years 1 to 6 of the Primary Curriculum included in the Math-Pack:

Before Initial Use :

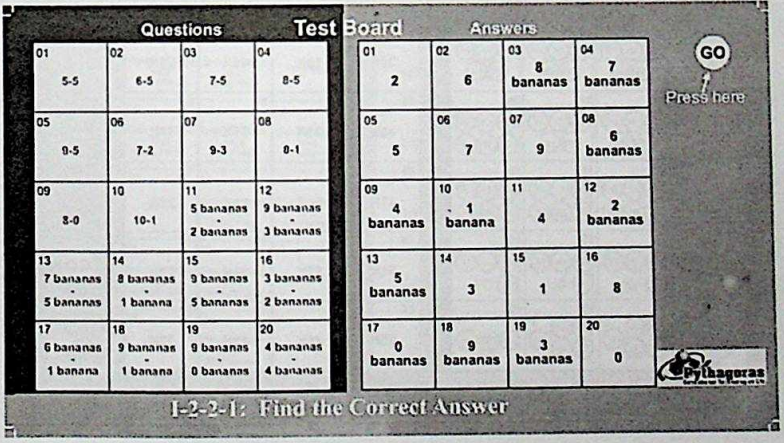
Please Read The Instructions In The User Manual



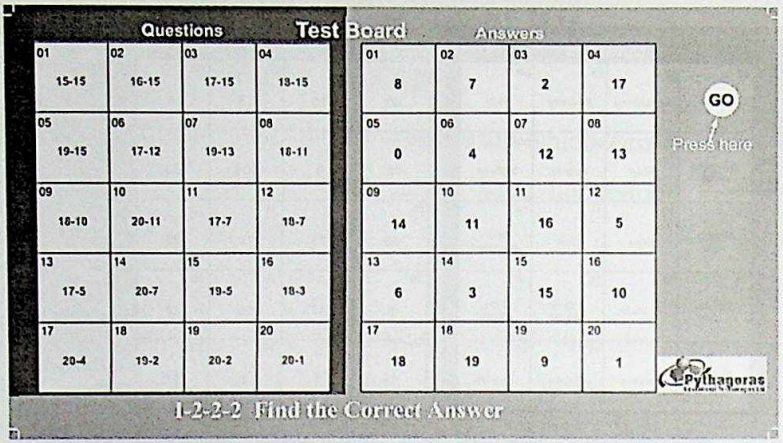
I-1-5: Find the Correct Number

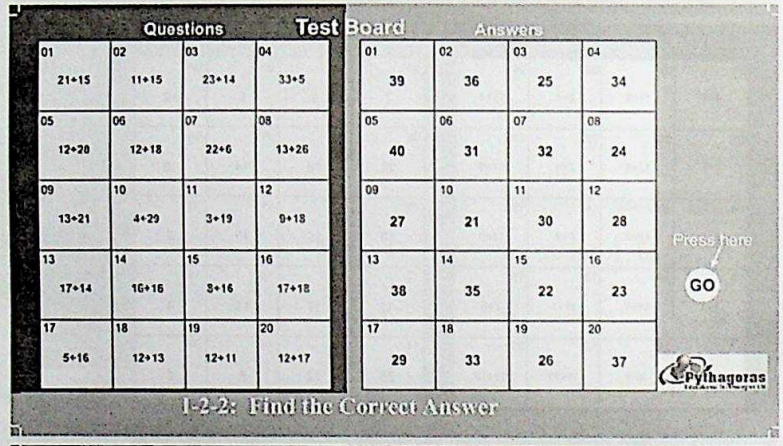


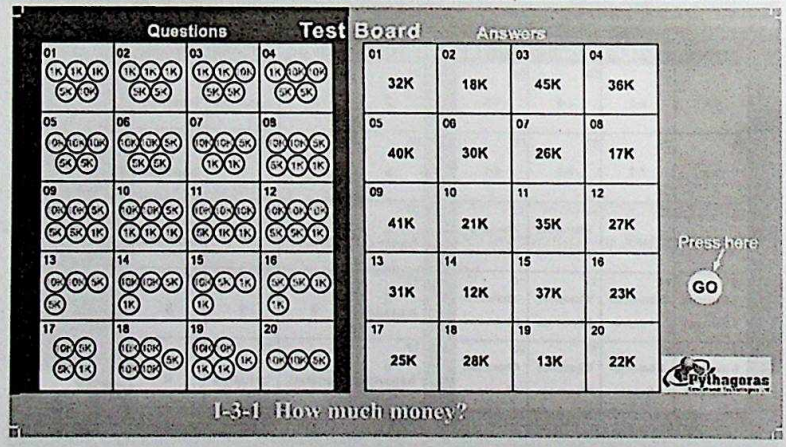
I-2-1-1 Find the Correct Answer



I-2-2-1: Find the Correct Answer


Questions
Test Board
Answers
01 15-15
02 16-15
03 17-15
04 18-15
05 19-15
06 17-12
07 19-13
08 18-11
09 18-10
10 20-11
11 17-7
12 18-7
13 17-5
14 20-7
15 19-5
16 18-3
17 20-4
18 19-2
19 20-2
20 20-1
01 8
02 7
03 2
04 17
05 0
06 4
07 12
08 13
09 14
10 11
11 16
12 5
13 6
14 3
15 15
16 10
17 18
18 19
19 9
20 1
GO
Press here
Pythagoras
1-2-2-2 Find the Correct Answer


Questions
Test Board
Answers
01 21+15
02 11+15
03 23+14
04 33+5
05 12+28
06 12+18
07 22+6
08 13+26
09 13+21
10 4+29
11 3+19
12 9+18
13 17+14
14 16+16
15 8+16
16 17+18
17 5+16
18 12+13
19 12+11
20 12+17
01 39
02 36
03 25
04 34
05 40
06 31
07 32
08 24
09 27
10 21
11 30
12 28
13 38
14 35
15 22
16 23
17 29
18 33
19 26
20 37
Press here
GO
Pythagoras
1-2-2: Find the Correct Answer


Questions
Test Board
Answers
01 32K
02 18K
03 45K
04 36K
05 40K
06 30K
07 26K
08 17K
09 41K
10 21K
11 35K
12 27K
13 31K
14 12K
15 37K
16 23K
17 25K
18 28K
19 13K
20 22K
Press here
GO
Pythagoras
1-3-1 How much money?

Test Board

Questions

01 9k+12k+5k	02 2k+10k+5k	03 5k+10k+5k	04 1k+10k+2k
05 5k+22k+3k	06 4k+25k+5k	07 3k+24k+9k	08 2k+18k+5k
09 5k+24k	10 5k+11k	11 10k+2k	12 5k+32k
13 15k+9k	14 8k+13k	15 7k+32k	16 14k+28k
17 3k+2k+13k	18 5k+24k+3k	19 7k+26k+5k	20 9k+19k+29k

Answers

01 36k	02 32k	03 21k	04 34k
05 25k	06 16k	07 37k	08 39k
09 42k	10 30k	11 20k	12 18k
13 13k	14 17k	15 29k	16 57k
17 38k	18 12k	19 26k	20 24k

GO Press here

Pythagoras

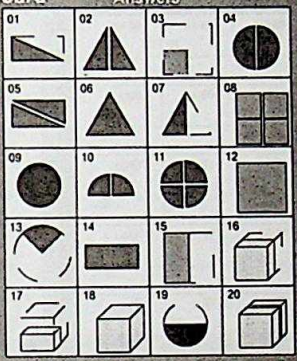
I-3-2 What is the price?

Test Board

Questions

01 Whole circle	02 One half of a circle	03 Two halves of a circle	04 1/4 of a circle
05 2 quarters (2/4) of a circle	06 4 quarters (4/4) of a circle	07 Whole rectangle	08 2 halves (2/2) of a rectangle
09 Half (1/2) of a rectangle	10 Whole triangle	11 2 halves (2/2) of a triangle	12 Half (1/2) of a triangle
13 Whole square	14 One half of a square	15 Quarter of a square	16 4 quarters of a square
17 Whole cube	18 2 halves of a cube	19 One half of a cube	20 1/4 of a cube

Answers



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Pythagoras

I-6-1: Fractions of Shapes

Test Board

Questions

01 Seventy two	02 One hundred and seventeen	03 One hundred and sixty nine	04 Fifty five
05 One hundred and nine	06 One hundred and sixty three	07 One hundred and forty two	08 One hundred and ten
09 One hundred and fifteen	10 Eleven	11 One hundred and forty nine	12 One hundred and nineteen
13 One hundred and ninety nine	14 One hundred and twenty one	15 One hundred and seventy four	16 Eighty six
17 One hundred and eighteen	18 Twelve	19 One hundred and fifty seven	20 Twenty

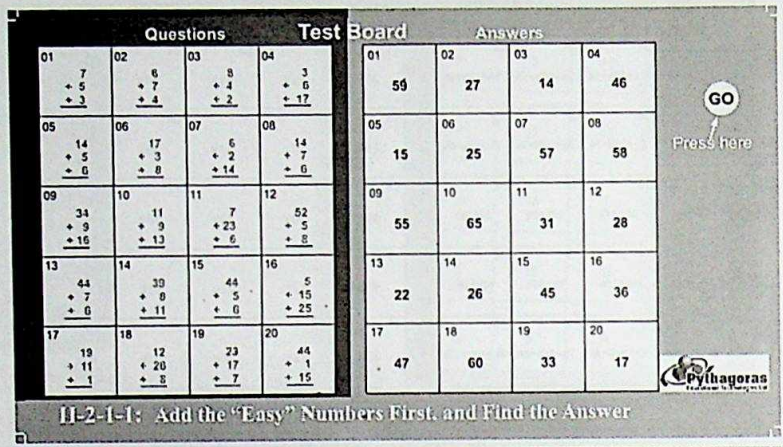
Answers

01 142	02 12	03 121	04 163
05 110	06 11	07 119	08 174
09 86	10 109	11 169	12 118
13 55	14 117	15 115	16 20
17 157	18 149	19 72	20 199

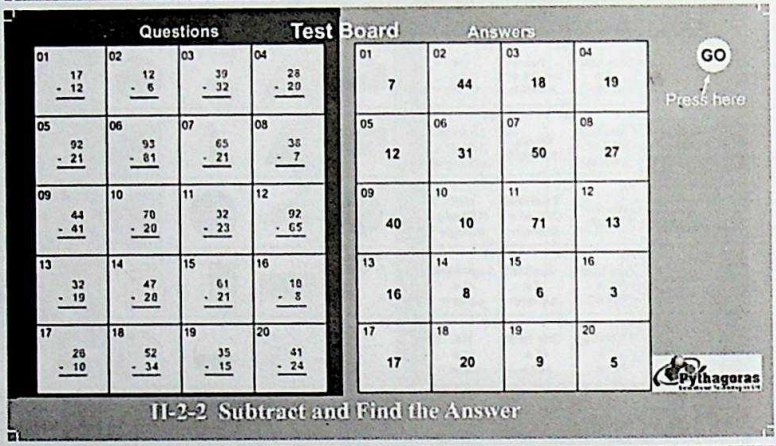
GO Press here

Pythagoras

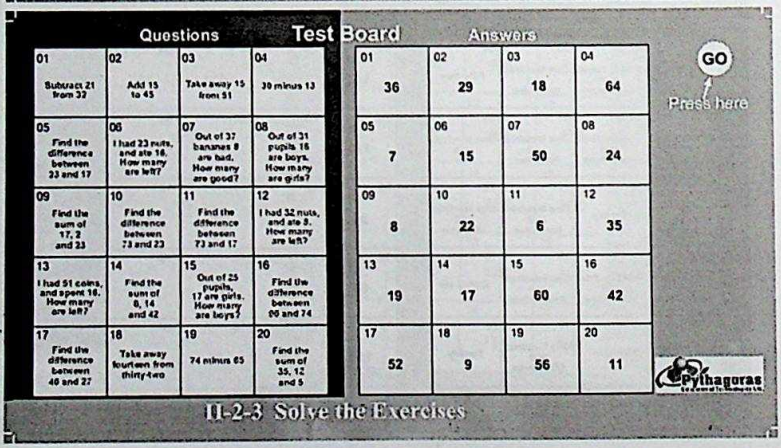
II-1-1 Find the Correct Number



II-2-1-1: Add the "Easy" Numbers First, and Find the Answer



II-2-2 Subtract and Find the Answer



II-2-3 Solve the Exercises

Test Board

Questions	
1.	4 + 4 + 4
2.	3 + 3 + 3 + 3 + 3 + 3
3.	5 + 5
4.	2 + 2 + 2 + 2 + 2 + 2
5.	7 + 7 + 7
6.	10 + 10 + 10 + 10
7.	6 + 6 + 6 + 6 + 6
8.	8 + 8 + 8
9.	3 + 3 + 3 + 3 + 3
10.	7 x 10
11.	7 x 9
12.	4 x 7
13.	5 x 0
14.	9 x 1
15.	8 x 4
16.	6 x 5
17.	10 x 10
18.	7 x 5
19.	How many legs do 4 cows have?
20.	How many fingers do 3 pupils have?

Answers

01 8 x 3 = 24	02 4 x 3 = 12	03 35	04 3 x 5 = 15
05 7 x 3 = 21	06 0	07 9	08 32
09 28	10 100	11 10 x 4 = 40	12 6 x 5 = 30
13 2 x 6 = 12	14 30	15 63	16 16
17 160	18 70	19 3 x 6 = 18	20 5 x 2 = 10

Press here GO

Pythagoras

II-2-4 Solve the Exercises

Test Board

Questions	
1.	How many 10k are in N3?
2.	How many 25k are in N4?
3.	How many 50k are in N10?
4.	Write in numbers: Forteen kobo
5.	Write in numbers: Seventy-five Naira
6.	Write in numbers: Twenty-three kobo
7.	18k + 22k = ?
8.	28k + 33k = ?
9.	71k + 14k = ?
10.	35k + 23k = ?
11.	23k + 18k = ?
12.	27k + 19k = ?
13.	51k + 31k = ?
14.	42k + 17k = ?
15.	25k + 10k + 1k = ?
16.	50k + 20k + 5k = ?
17.	5k + 30k + 15k = ?
18.	N3 + N10 + N1 = ?
19.	N7 + N6 + N13 = ?
20.	N24 + N7 + N16 = ?

Answers

01 41K	02 N14	03 25K	04 23K
05 61K	06 60K	07 8K	08 36K
09 75K	10 N75	11 20	12 50K
13 14K	14 16	15 85K	16 N47
17 N26	18 5K	19 30	20 20K

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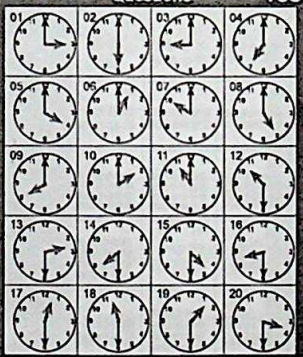
Pythagoras

II-5-1 Money: Solve the Exercises

Test Board

Questions



Answers

01 3 O'clock	02 9 O'clock	03 10 O'clock	04 Half past 11
05 Half past 7	06 1 O'clock	07 5 O'clock	08 Half past 3
09 Half past 10	10 Half past 4	11 Half past 8	12 4 O'clock
13 Half past 2	14 Half past 12	15 7 O'clock	16 6 O'clock
17 8 O'clock	18 2 O'clock	19 Half past 1	20 11 O'clock

GO Press here

Pythagoras

II-5-2 What is the time?

II-5-3 Time (Days of the week): Answer the questions

Questions	
1.	What is the first day of the week?
2.	What is the second day of the week?
3.	What is the third day of the week?
4.	What is the fourth day of the week?
5.	What is the fifth day of the week?
6.	What is the sixth day of the week?
7.	What is the seventh day of the week?
8.	How many days a week do we go to school?
9.	How many days are there in a week?
10.	How many weeks are in a month?
11.	How many days are in a month?
12.	How many days are there in a year?
13.	How many seconds are there in a minute?
14.	What day of the week is Sunday?
15.	What day of the week is Monday?
16.	What day of the week is Tuesday?
17.	What day of the week is Wednesday?
18.	What day of the week is Thursday?
19.	What day of the week is Friday?
20.	What day of the week is Saturday?

Test Board

Answers

01 Tuesday	02 Saturday	03 Fifth	04 First
05 Friday	06 5 days	07 4 weeks	08 365
09 Second	10 Third	11 Thursday	12 60
13 Fourth	14 Wednesday	15 Monday	16 7 days
17 Seventh	18 Sixth	19 28/30/31	20 Sunday

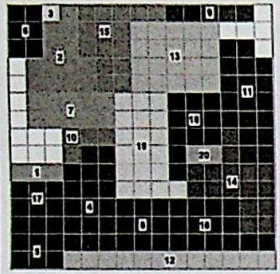
GO

Press here

Pythagoras

II-5-5 What is the area of the figures in square centimeters?

Questions



Test Board

Answers

01 5	02 9	03 1	04 11
05 3	06 8	07 20	08 16
09 15	10 12	11 7	12 6
13 10	14 17	15 14	16 18
17 19	18 2	19 4	20 13

GO

Press here

Pythagoras

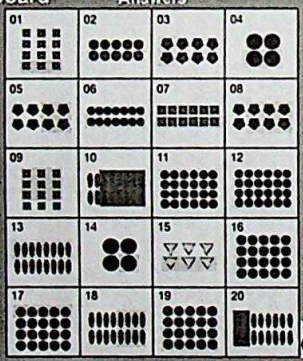
II-8: Find the Correct Part of a Group

Questions

Test Board

Answers

01 Find 1/2 of 10	02 Find 1/2 of 14	03 Find 1/2 of 4	04 Find 1/2 of 6
05 Find 1/2 of 12	06 Find 1/2 of 16	07 Find 1/4 of 4	08 Find 1/4 of 8
09 Find 1/4 of 12	10 Find 1/4 of 16	11 Find 1/4 of 20	12 Find 1/4 of 24
13 Find 3/4 of 8	14 Find 3/4 of 12	15 Find 3/4 of 16	16 Find 3/4 of 20
17 Find 3/4 of 24	18 Find 2/4 of 8	19 Find 2/4 of 16	20 Find 2/4 of 20



Press here

GO

Pythagoras

Test Board

Questions	
	Write in numerals:
1.	Two hundred and seventy one
2.	Five hundred and seventeen
3.	Eight hundred and sixty nine
4.	Two hundred
5.	Nine hundred and nine
6.	One thousand
	What is the number?
7.	1 hundred 3 tens and 8 units
8.	3 hundreds 5 tens and 1 unit
9.	6 hundreds 8 tens and 9 units
10.	4 hundreds 0 tens and 0 units
11.	1 hundred 4 tens and 9 units
12.	7 hundreds 5 tens and 0 units
	What number is missing?
13.	721 722 723 ___ 725
14.	830 840 850 ___ 870
15.	325 425 525 ___ 725
16.	890 885 880 ___ 870
17.	450 400 350 ___ 250
18.	835 735 635 ___ 435
19.	214 216 218 ___ 222
20.	305 310 315 ___ 325

Answers

01 271	02 869	03 138	04 535
05 860	06 1000	07 351	08 320
09 750	10 625	11 875	12 909
13 724	14 300	15 200	16 517
17 689	18 400	19 220	20 149

GO

Press here

Pythagoras

III-1-1: Counting from 1 - 1000

Test Board

Questions			
01 8 - 1 <> = 9 - 1	02 8 - 1 <> = 7 - 1	03 8 - 3 <> = 4 + 2	04 8 + 3 <> = 4 - 2
05 18 + 3 <> = 25 - 2	06 58 - 9 <> = 25 + 23	07 58 - 19 <> = 15 + 24	08 58 - 9 <> = 17 + 35
09 58 - 9 <> = 18 + 31	10 28 + 9 <> = 6 x 6	11 18 + 19 <> = 7 x 3	12 5 x 6 <> = 7 x 4
13 4 x 3 <> = 2 x 7	14 4 x 4 <> = 2 x 7	15 14 + 3 <> = 2 x 8	16 14 - 2 <> = 2 x 6
17 100 - 20 <> = 10 x 7	18 40 + 20 <> = 20 x 3	19 34 + 26 <> = 5 x 10	20 4 x 5 <> = 18 + 2

Answers

01 49 < 52	02 7 < 8	03 60 = 60	04 49 = 49
05 21 < 23	06 12 < 14	07 16 > 14	08 17 > 16
09 30 > 28	10 80 > 70	11 49 > 48	12 39 = 39
13 11 > 2	14 12 = 12	15 37 > 21	16 60 > 50
17 20 = 20	18 37 > 36	19 7 > 6	20 5 < 6

Press here

GO

Pythagoras

III-1-2: Put the correct sign >, < or =

Test Board

Questions			
01 HTU 231 +342	02 HTU 357 +241	03 HTU 205 +450	04 HTU 600 +309
05 HTU 890 +109	06 HTU 368 +231	07 HTU 725 +242	08 HTU 25 +242
09 HTU 725 + 42	10 HTU 360 + 9	11 HTU 8 +051	12 HTU 33 +306
13 213 +426	14 13 + 84	15 909 + 20	16 735 +204
17 780 +110	18 780 +110	19 615 + 24	20 3 +900

Answers

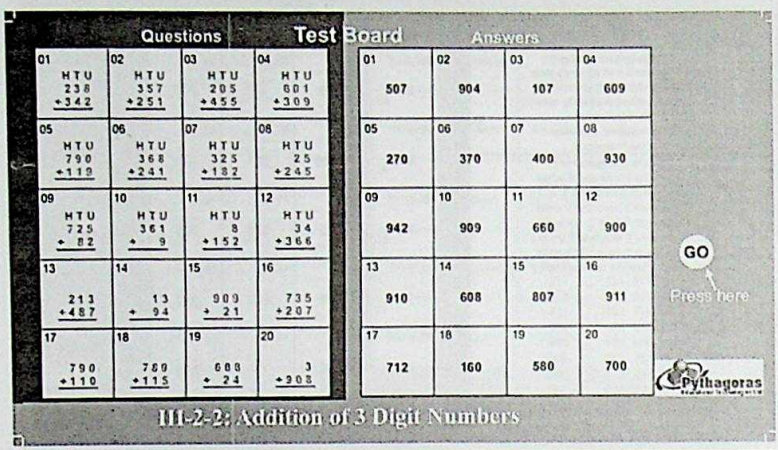
01 573	02 655	03 967	04 899
05 97	06 599	07 267	08 903
09 339	10 929	11 939	12 999
13 638	14 890	15 909	16 598
17 767	18 369	19 639	20 659

GO

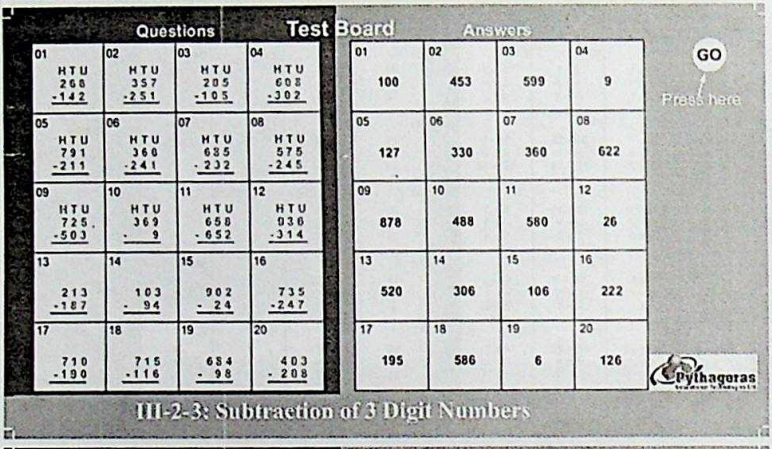
Press here

Pythagoras

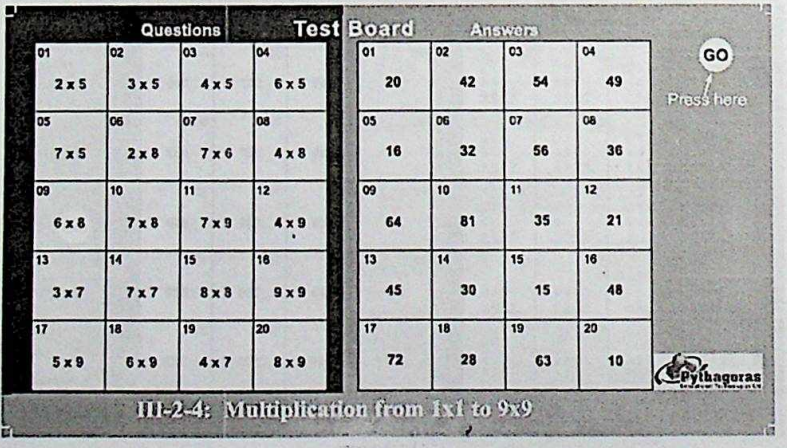
III-2-1: Addition of 3 Digit Numbers



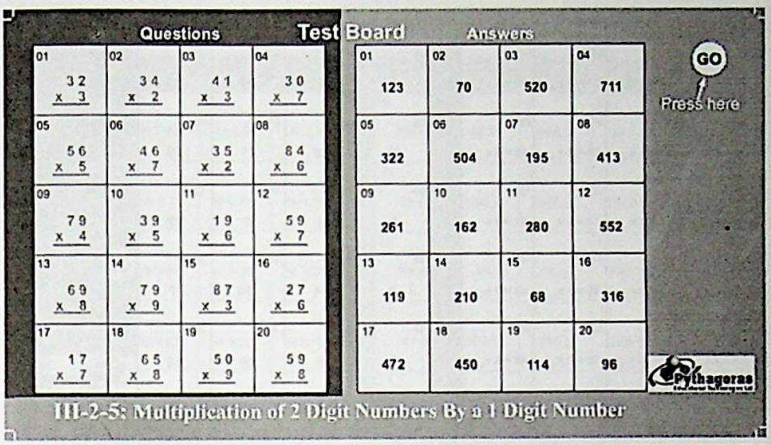
III-2-2: Addition of 3 Digit Numbers



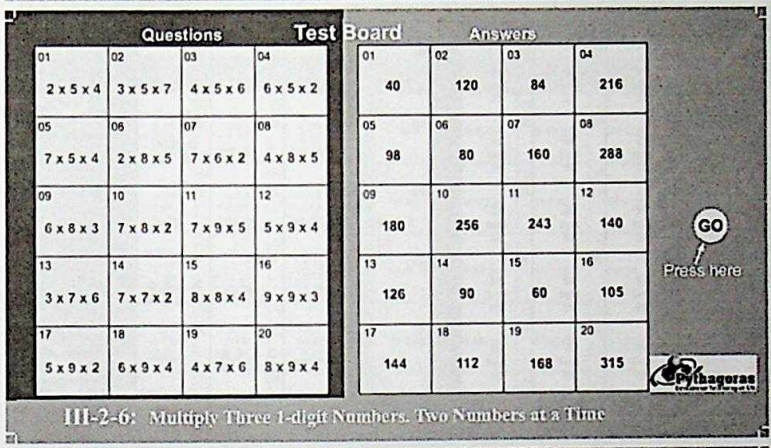
III-2-3: Subtraction of 3 Digit Numbers



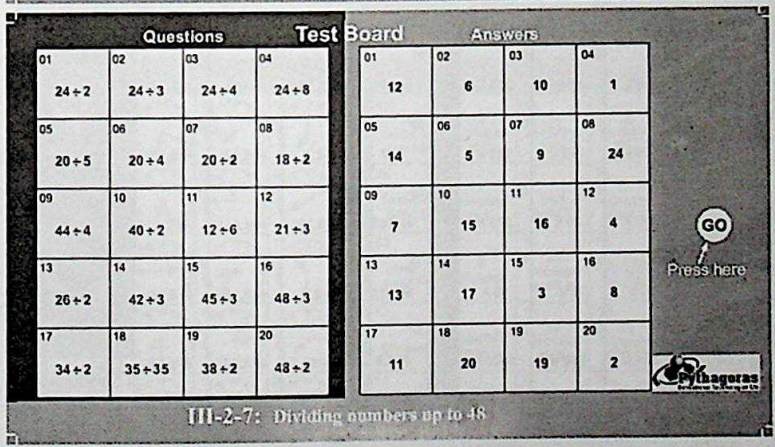
III-2-4: Multiplication from 1x1 to 9x9



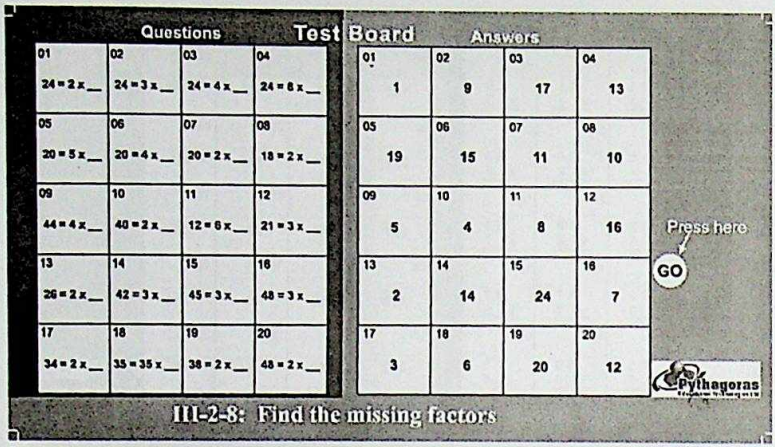
III-2-5: Multiplication of 2 Digit Numbers By a 1 Digit Number



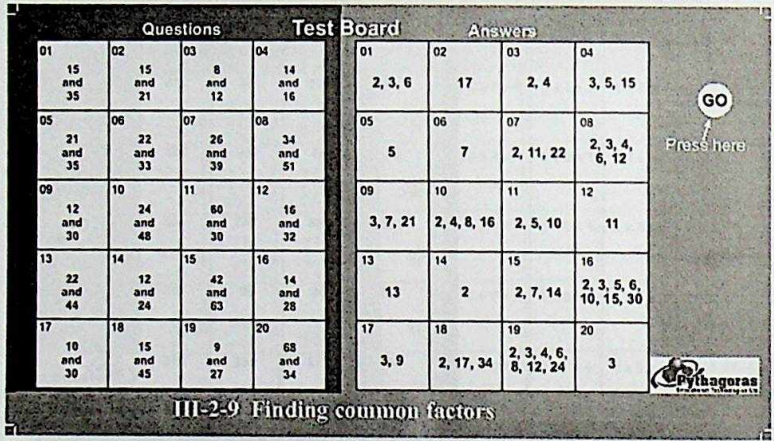
III-2-6: Multiply Three 1-digit Numbers. Two Numbers at a Time



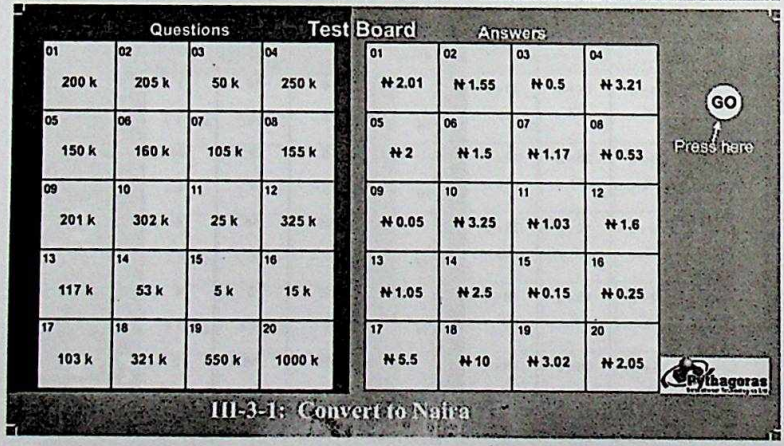
III-2-7: Dividing numbers up to 48



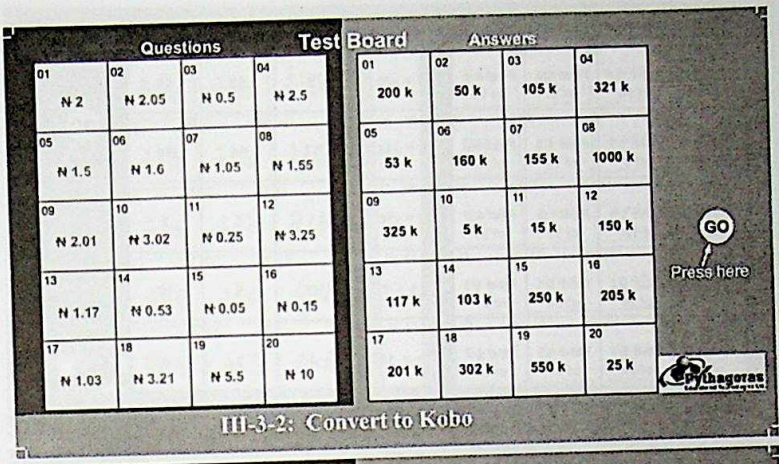
III-2-8: Find the missing factors

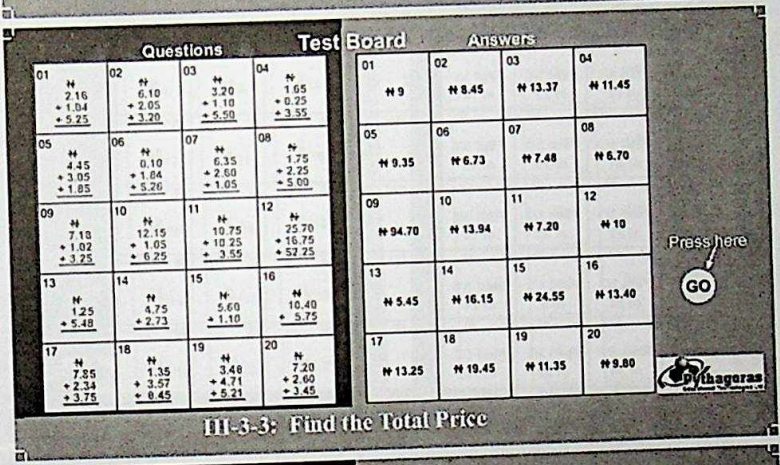


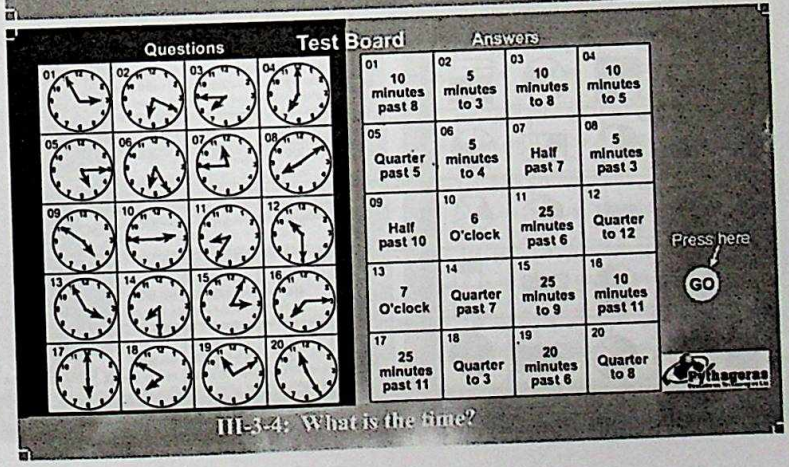
III-2-9 Finding common factors

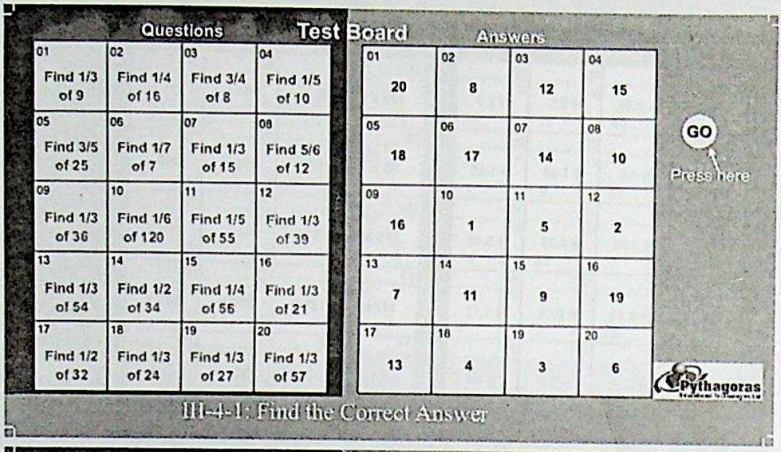


III-3-1: Convert to Naira

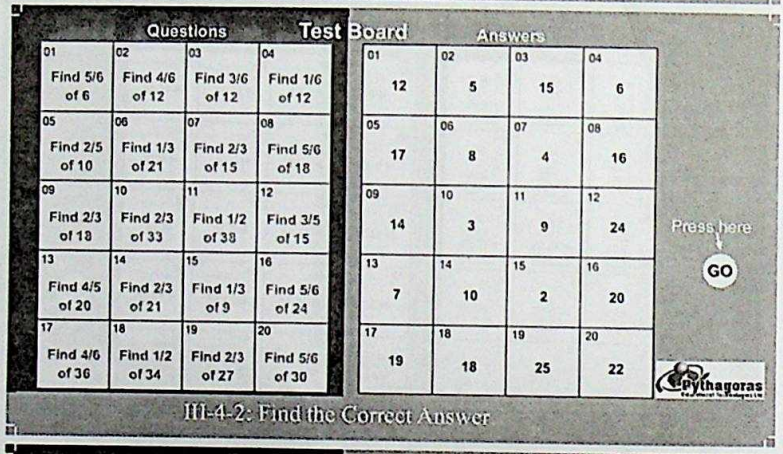

Questions
Test Board
Answers
01 ₦ 2
02 ₦ 2.05
03 ₦ 0.5
04 ₦ 2.5
05 ₦ 1.5
06 ₦ 1.6
07 ₦ 1.05
08 ₦ 1.55
09 ₦ 2.01
10 ₦ 3.02
11 ₦ 0.25
12 ₦ 3.25
13 ₦ 1.17
14 ₦ 0.53
15 ₦ 0.05
16 ₦ 0.15
17 ₦ 1.03
18 ₦ 3.21
19 ₦ 5.5
20 ₦ 10
01 200 k
02 50 k
03 105 k
04 321 k
05 53 k
06 160 k
07 155 k
08 1000 k
09 325 k
10 5 k
11 15 k
12 150 k
13 117 k
14 103 k
15 250 k
16 205 k
17 201 k
18 302 k
19 550 k
20 25 k
GO
Press here
Pythagoras
III-3-2: Convert to Kobo


Questions
Test Board
Answers
01 ₦ 2.16 + 1.84 + 5.25
02 ₦ 6.10 + 2.05 + 3.20
03 ₦ 3.20 + 1.10 + 5.50
04 ₦ 1.65 + 0.25 + 3.55
05 ₦ 4.45 + 3.05 + 1.85
06 ₦ 0.10 + 1.84 + 5.26
07 ₦ 6.35 + 2.60 + 1.05
08 ₦ 1.75 + 2.25 + 5.00
09 ₦ 7.18 + 1.02 + 3.25
10 ₦ 12.15 + 1.05 + 6.25
11 ₦ 10.75 + 10.25 + 3.55
12 ₦ 25.70 + 16.75 + 52.25
13 ₦ 1.25 + 5.48
14 ₦ 4.75 + 2.73
15 ₦ 5.60 + 1.10
16 ₦ 10.40 + 5.75
17 ₦ 7.35 + 2.34 + 3.75
18 ₦ 1.35 + 3.57 + 0.45
19 ₦ 3.48 + 4.71 + 5.21
20 ₦ 7.20 + 2.60 + 3.45
01 ₦ 9
02 ₦ 8.45
03 ₦ 13.37
04 ₦ 11.45
05 ₦ 9.35
06 ₦ 6.73
07 ₦ 7.48
08 ₦ 6.70
09 ₦ 94.70
10 ₦ 13.94
11 ₦ 7.20
12 ₦ 10
13 ₦ 5.45
14 ₦ 16.15
15 ₦ 24.55
16 ₦ 13.40
17 ₦ 13.25
18 ₦ 19.45
19 ₦ 11.35
20 ₦ 9.80
Press here
GO
Pythagoras
III-3-3: Find the Total Price

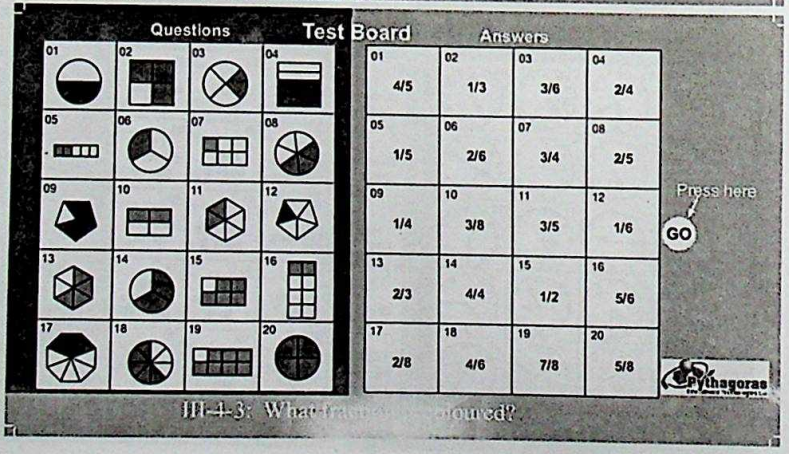

Questions
Test Board
Answers
01 10 minutes past 8
02 5 minutes to 3
03 10 minutes to 8
04 10 minutes to 5
05 Quarter past 5
06 5 minutes to 4
07 Half past 7
08 5 minutes past 3
09 Half past 10
10 6 O'clock
11 25 minutes past 6
12 Quarter to 12
13 7 O'clock
14 Quarter past 7
15 25 minutes to 9
16 10 minutes past 11
17 25 minutes past 11
18 Quarter to 3
19 20 minutes past 6
20 Quarter to 8
Press here
GO
Pythagoras
III-3-4: What is the time?



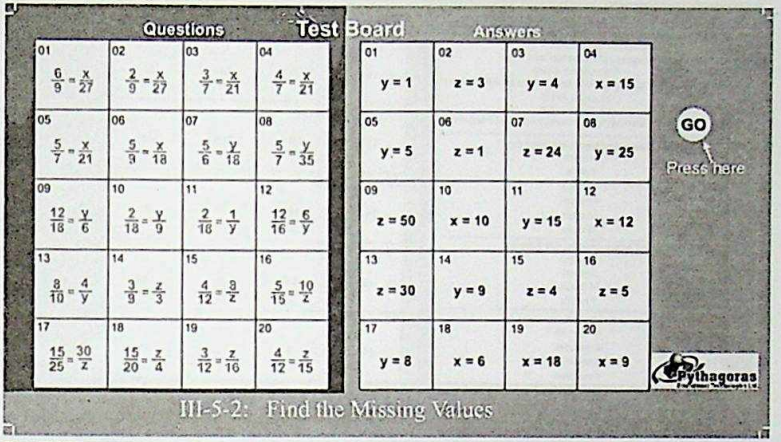
III-4-1: Find the Correct Answer



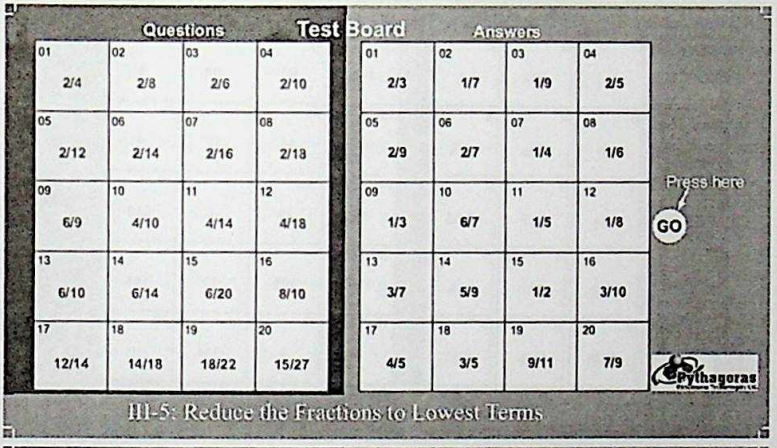
III-4-2: Find the Correct Answer



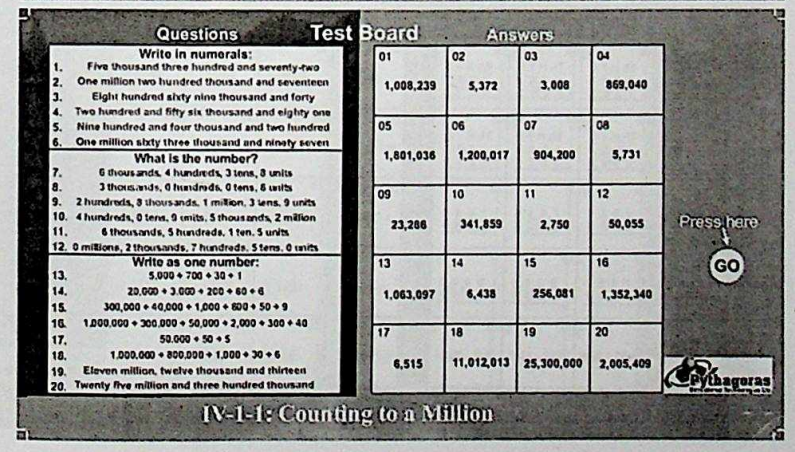
III-4-3: What fraction is coloured?



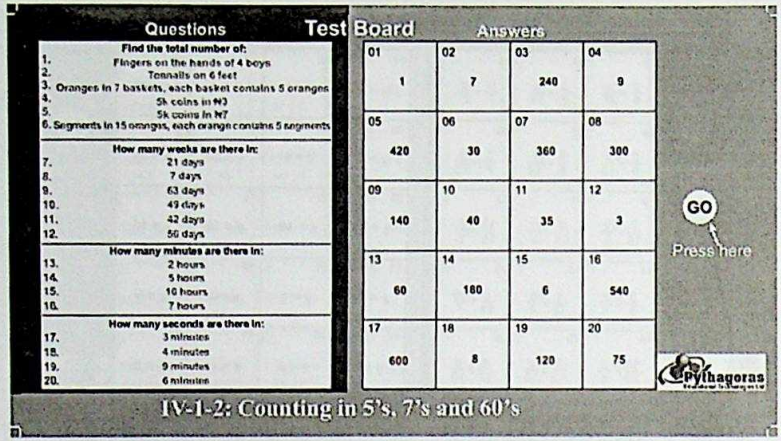
III-5-2: Find the Missing Values

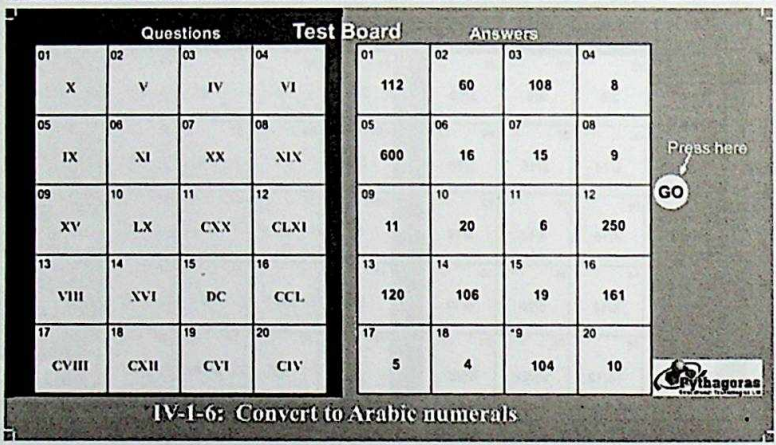


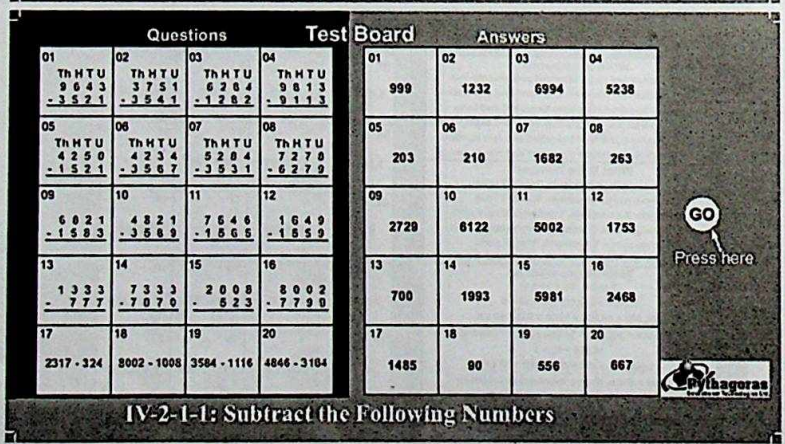
III-5: Reduce the Fractions to Lowest Terms

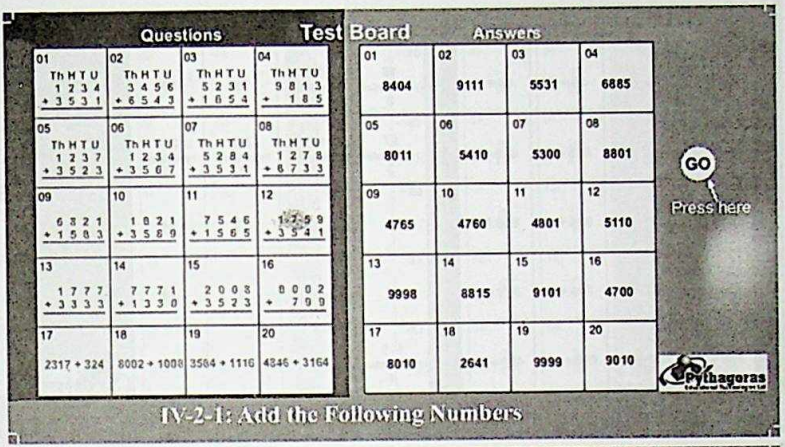


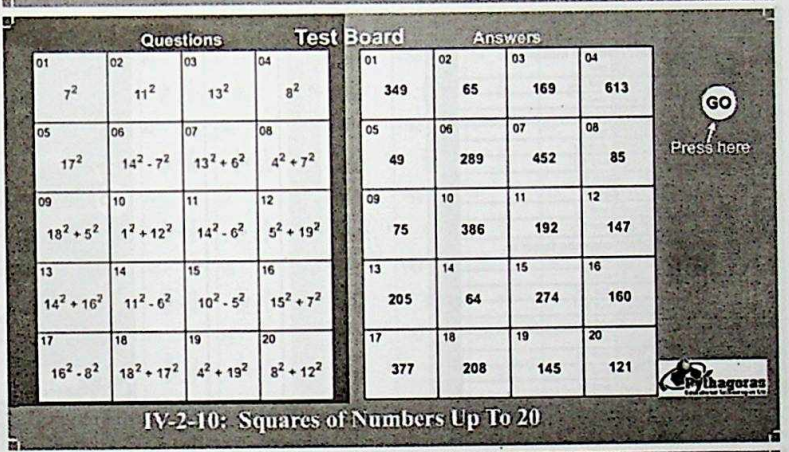
IV-1-1: Counting to a Million

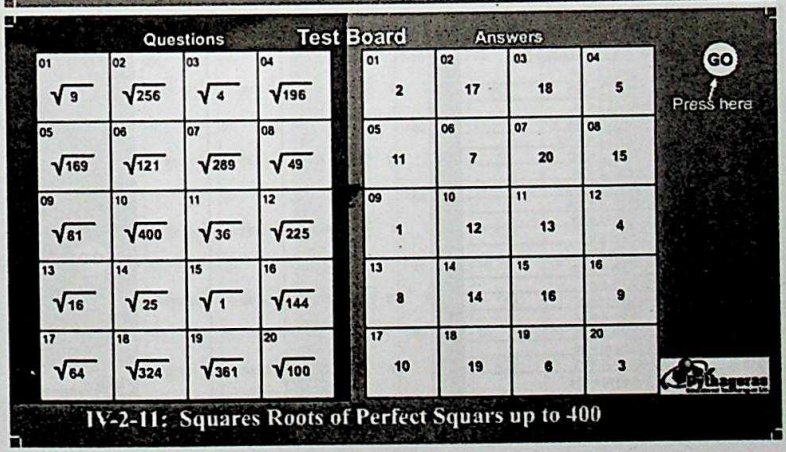

Questions
Test Board
Answers
Find the total number of:
1. Fingers on the hands of 4 boys
2. Toenails on 6 feet
3. Oranges in 7 baskets, each basket contains 5 oranges
4. 5k coins in ₦3
5. 5k coins in ₦7
6. Segments in 15 oranges, each orange contains 5 segments
How many weeks are there in:
7. 21 days
8. 7 days
9. 63 days
10. 49 days
11. 42 days
12. 56 days
How many minutes are there in:
13. 2 hours
14. 5 hours
15. 10 hours
16. 7 hours
How many seconds are there in:
17. 3 minutes
18. 4 minutes
19. 9 minutes
20. 6 minutes
01 1
02 7
03 240
04 9
05 420
06 30
07 360
08 300
09 140
10 40
11 35
12 3
13 60
14 180
15 6
16 540
17 600
18 8
19 120
20 75
GO
Press here
Pythagoras
IV-1-2: Counting in 5's, 7's and 60's

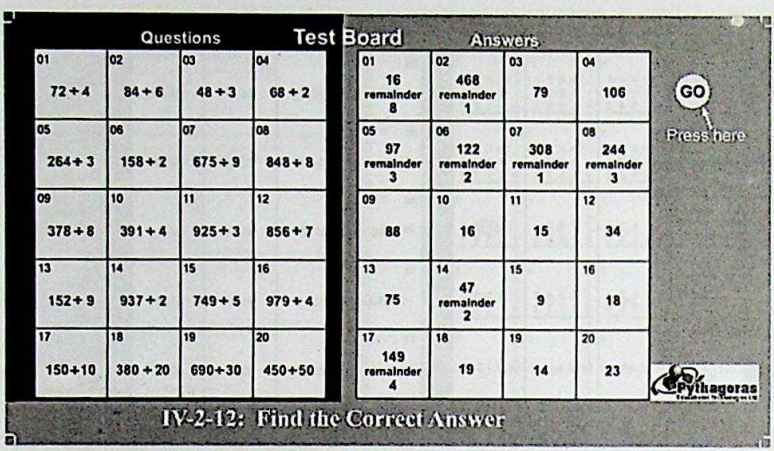

Questions
Test Board
Answers
01 X
02 V
03 IV
04 VI
05 IX
06 XI
07 XX
08 XIX
09 XV
10 LX
11 CXX
12 CLXI
13 VIII
14 XVI
15 DC
16 CCL
17 CVIII
18 CXII
19 CVI
20 CIV
01 112
02 60
03 108
04 8
05 600
06 16
07 15
08 9
09 11
10 20
11 6
12 250
13 120
14 106
15 19
16 161
17 5
18 4
19 104
20 10
Press here
GO
Pythagoras
IV-1-6: Convert to Arabic numerals


Questions
Test Board
Answers
01 ThHTU 9643 - 3521
02 ThHTU 3751 - 3541
03 ThHTU 6264 - 1262
04 ThHTU 9813 - 9113
05 ThHTU 4250 - 1521
06 ThHTU 4234 - 3567
07 ThHTU 5284 - 3531
08 ThHTU 7278 - 6279
09 6021 - 1583
10 4821 - 3569
11 7546 - 1565
12 1649 - 1559
13 1333 - 777
14 7333 - 7070
15 2008 - 523
16 8002 - 7790
17 2317 - 324
18 8002 - 1008
19 3584 - 1116
20 4846 - 3104
01 999
02 1232
03 6994
04 5238
05 203
06 210
07 1682
08 263
09 2729
10 6122
11 5002
12 1753
13 700
14 1993
15 5981
16 2468
17 1485
18 90
19 556
20 667
GO
Press here
Pythagoras
IV-2-1-1: Subtract the Following Numbers

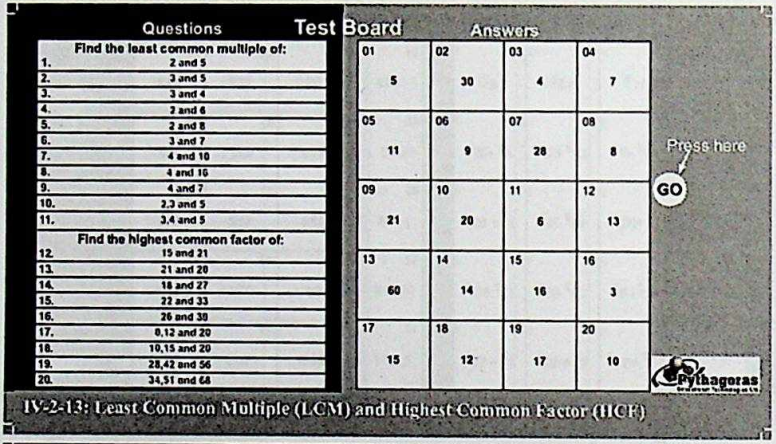

Questions
Test Board
Answers
01 Th H T U 1 2 3 4 + 3 5 3 1
02 Th H T U 3 4 5 6 + 6 5 4 3
03 Th H T U 5 2 3 1 + 1 6 5 4
04 Th H T U 9 8 1 3 + 1 8 5
05 Th H T U 1 2 3 7 + 3 5 2 3
06 Th H T U 1 2 3 4 + 3 5 6 7
07 Th H T U 5 2 8 4 + 3 5 3 1
08 Th H T U 1 2 7 8 + 6 7 3 3
09 6 8 2 1 + 1 5 8 3
10 1 8 2 1 + 3 5 6 9
11 7 5 4 6 + 1 5 6 5
12 1 7 5 9 + 3 5 4 1
13 1 7 7 7 + 3 3 3 3
14 7 7 7 1 + 1 3 3 0
15 2 0 0 8 + 3 5 2 3
16 8 0 0 2 + 7 0 9
17 2317 + 324
18 8002 + 1008
19 3584 + 1116
20 4846 + 3164
01 8404
02 9111
03 5531
04 6885
05 8011
06 5410
07 5300
08 8801
09 4765
10 4760
11 4801
12 5110
13 9998
14 8815
15 9101
16 4700
17 8010
18 2641
19 9999
20 9010
GO
Press here
Pythagoras
IV-2-1: Add the Following Numbers


Questions
Test Board
Answers
01 7^2
02 11^2
03 13^2
04 8^2
05 17^2
06 $14^2 - 7^2$
07 $13^2 + 6^2$
08 $4^2 + 7^2$
09 $18^2 + 5^2$
10 $1^2 + 12^2$
11 $14^2 - 6^2$
12 $5^2 + 19^2$
13 $14^2 + 16^2$
14 $11^2 - 6^2$
15 $10^2 - 5^2$
16 $15^2 + 7^2$
17 $16^2 - 8^2$
18 $18^2 + 17^2$
19 $4^2 + 19^2$
20 $8^2 + 12^2$
01 349
02 65
03 169
04 613
05 49
06 289
07 452
08 85
09 75
10 386
11 192
12 147
13 205
14 64
15 274
16 160
17 377
18 208
19 145
20 121
GO
Press here
Pythagoras
IV-2-10: Squares of Numbers Up To 20

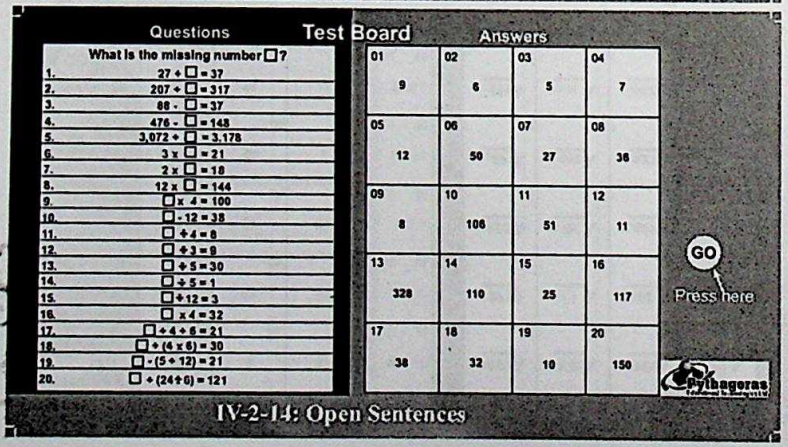

Questions
Test Board
Answers
01 $\sqrt{9}$
02 $\sqrt{256}$
03 $\sqrt{4}$
04 $\sqrt{196}$
05 $\sqrt{169}$
06 $\sqrt{121}$
07 $\sqrt{289}$
08 $\sqrt{49}$
09 $\sqrt{81}$
10 $\sqrt{400}$
11 $\sqrt{36}$
12 $\sqrt{225}$
13 $\sqrt{16}$
14 $\sqrt{25}$
15 $\sqrt{1}$
16 $\sqrt{144}$
17 $\sqrt{64}$
18 $\sqrt{324}$
19 $\sqrt{361}$
20 $\sqrt{100}$
01 2
02 17
03 18
04 5
05 11
06 7
07 20
08 15
09 1
10 12
11 13
12 4
13 8
14 14
15 16
16 9
17 10
18 19
19 6
20 3
GO
Press here
Pythagoras
IV-2-11: Squares Roots of Perfect Squars up to 400



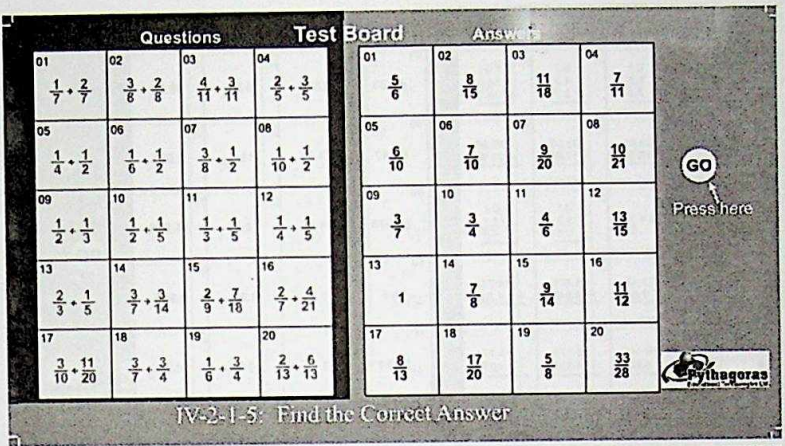
IV-2-12: Find the Correct Answer



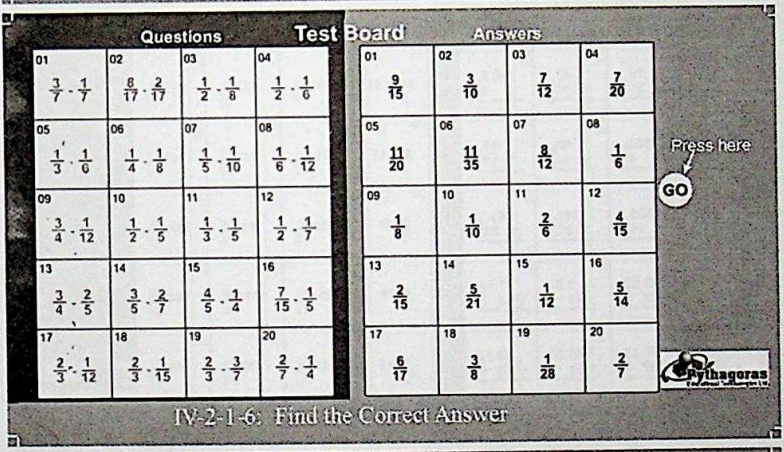
IV-2-13: Least Common Multiple (LCM) and Highest Common Factor (HCF)



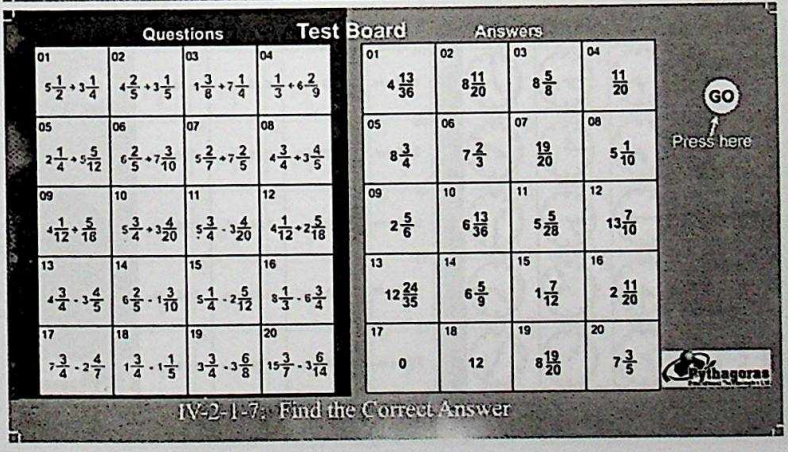
IV-2-14: Open Sentences



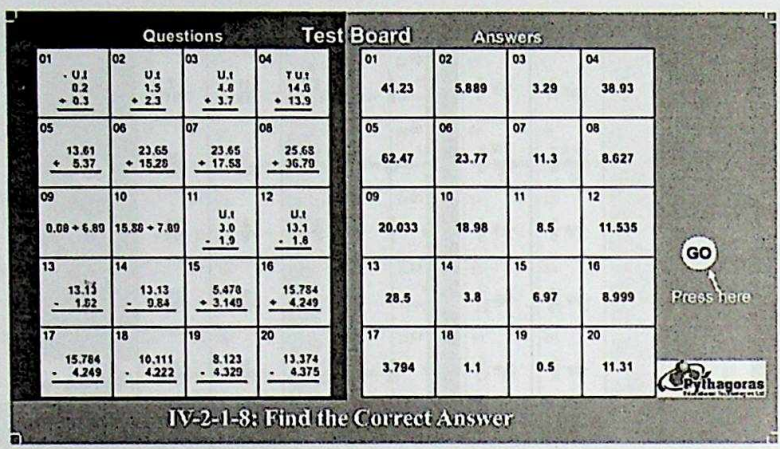
IV-2-1-5: Find the Correct Answer

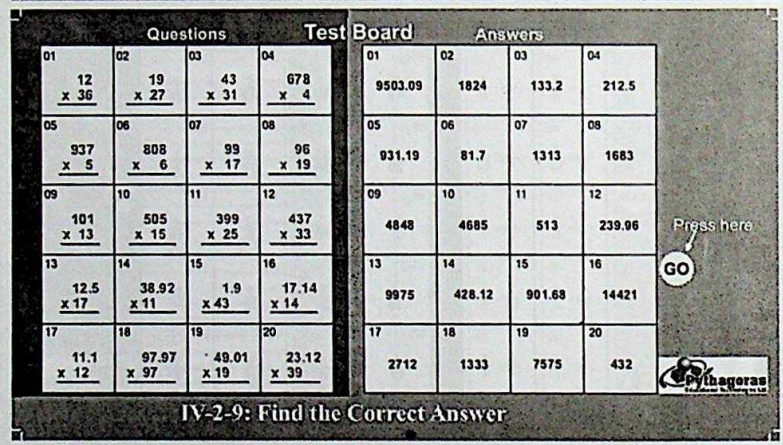


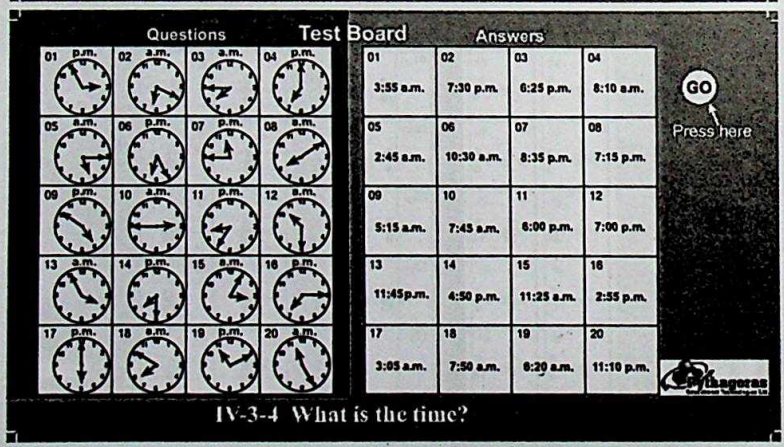
IV-2-1-6: Find the Correct Answer

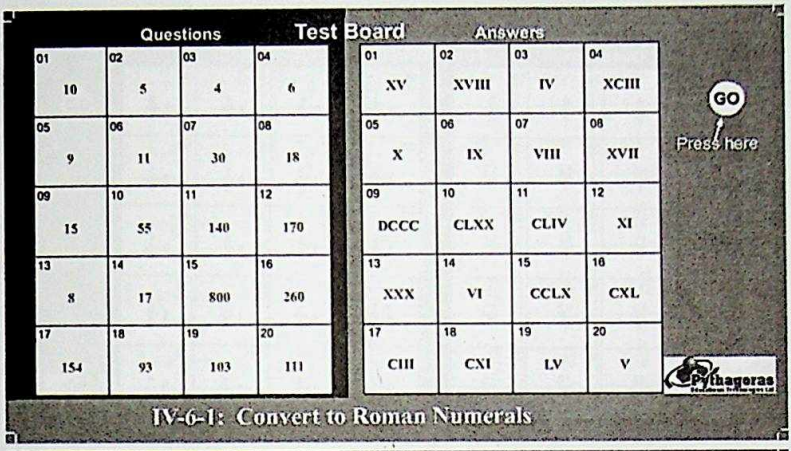


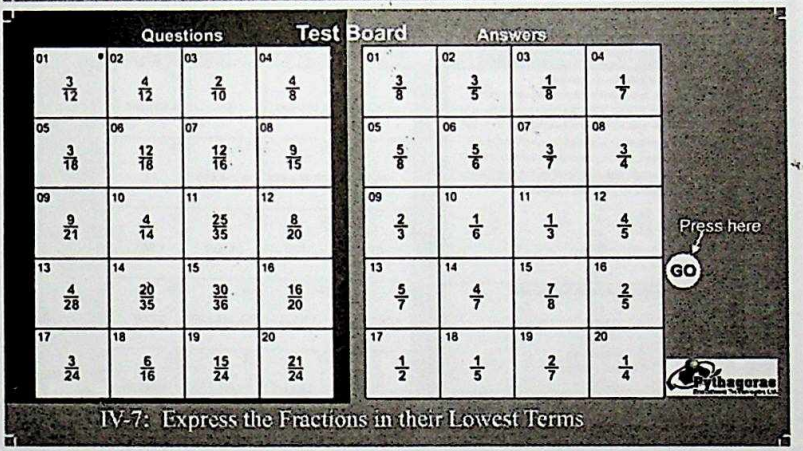
IV-2-1-7: Find the Correct Answer

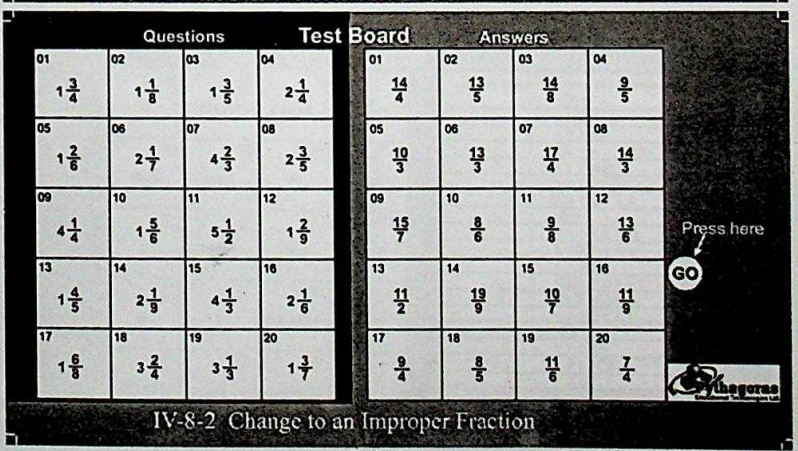

Questions
Test Board
Answers
01 0.2 ÷ 0.3
02 1.5 ÷ 2.3
03 4.8 ÷ 3.7
04 14.6 ÷ 13.9
05 13.61 + 5.37
06 23.65 + 15.28
07 23.65 + 17.55
08 25.68 + 36.70
09 0.09 + 6.89
10 15.88 + 7.89
11 3.0 - 1.9
12 13.1 - 1.8
13 13.13 - 1.82
14 13.13 - 9.84
15 5.478 + 3.140
16 15.784 + 4.249
17 15.784 - 4.249
18 10.111 - 4.222
19 8.123 - 4.329
20 13.374 - 4.375
01 41.23
02 5.889
03 3.29
04 38.93
05 62.47
06 23.77
07 11.3
08 8.627
09 20.033
10 18.98
11 8.5
12 11.535
13 28.5
14 3.8
15 6.97
16 8.999
17 3.794
18 1.1
19 0.5
20 11.31
GO
Press here
Pythagoras
IV-2-1-8: Find the Correct Answer

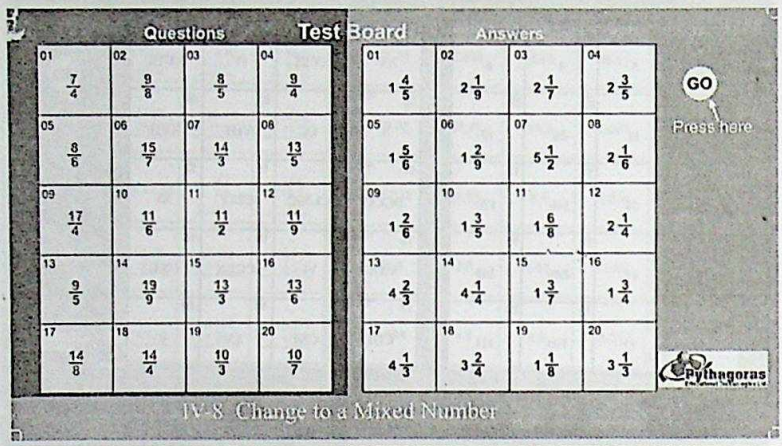

Questions
Test Board
Answers
01 12 x 36
02 19 x 27
03 43 x 31
04 678 x 4
05 937 x 5
06 808 x 6
07 99 x 17
08 96 x 19
09 101 x 13
10 505 x 15
11 399 x 25
12 437 x 33
13 12.5 x 17
14 38.92 x 11
15 1.9 x 43
16 17.14 x 14
17 11.1 x 12
18 97.97 x 97
19 49.01 x 19
20 23.12 x 39
01 9503.09
02 1824
03 133.2
04 212.5
05 931.19
06 81.7
07 1313
08 1683
09 4848
10 4685
11 513
12 239.96
13 9975
14 428.12
15 901.68
16 14421
17 2712
18 1333
19 7575
20 432
Press here
GO
Pythagoras
IV-2-9: Find the Correct Answer

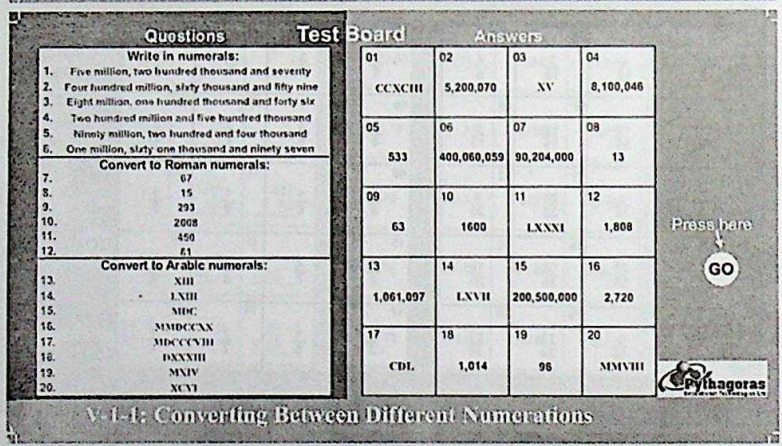

Questions
Test Board
Answers
01 p.m.
02 a.m.
03 a.m.
04 p.m.
05 a.m.
06 p.m.
07 p.m.
08 a.m.
09 p.m.
10 a.m.
11 p.m.
12 a.m.
13 a.m.
14 p.m.
15 a.m.
16 p.m.
17 p.m.
18 a.m.
19 p.m.
20 a.m.
01 3:55 a.m.
02 7:30 p.m.
03 6:25 p.m.
04 8:10 a.m.
05 2:45 a.m.
06 10:30 a.m.
07 8:35 p.m.
08 7:15 p.m.
09 5:15 a.m.
10 7:45 a.m.
11 6:00 p.m.
12 7:00 p.m.
13 11:45p.m.
14 4:50 p.m.
15 11:25 a.m.
16 2:55 p.m.
17 3:05 a.m.
18 7:50 a.m.
19 6:20 a.m.
20 11:10 p.m.
GO
Press here
Pythagoras
IV-3-4 What is the time?

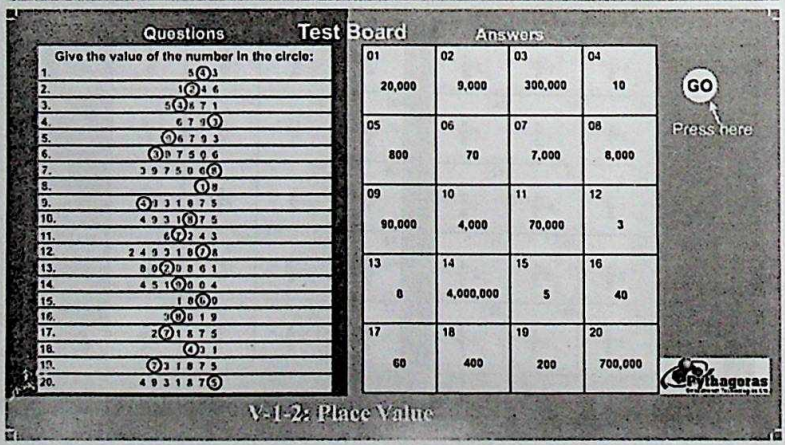

Questions
Test Board
Answers
01 10
02 5
03 4
04 6
05 9
06 11
07 30
08 18
09 15
10 55
11 140
12 170
13 8
14 17
15 800
16 260
17 154
18 93
19 103
20 111
01 XV
02 XVIII
03 IV
04 XCIII
05 X
06 IX
07 VIII
08 XVII
09 DCCC
10 CLXX
11 CLIV
12 XI
13 XXX
14 VI
15 CCLX
16 CXL
17 CIII
18 CXI
19 LV
20 V
GO
Press here
Pythagoras
IV-6-1: Convert to Roman Numerals


Questions
Test Board
Answers
01 3/12
02 4/12
03 2/10
04 4/8
05 3/18
06 12/18
07 12/16
08 9/15
09 9/21
10 4/14
11 25/35
12 8/20
13 4/28
14 20/35
15 30/36
16 16/20
17 3/24
18 6/16
19 15/24
20 21/24
01 3/8
02 3/5
03 1/8
04 1/7
05 5/8
06 5/6
07 3/7
08 3/4
09 2/3
10 1/6
11 1/3
12 4/5
13 5/7
14 4/7
15 7/8
16 2/5
17 1/2
18 1/5
19 2/7
20 1/4
Press here
GO
Pythagoras
IV-7: Express the Fractions in their Lowest Terms


Questions
Test Board
Answers
01 1 3/4
02 1 1/8
03 1 3/5
04 2 1/4
05 1 2/6
06 2 1/7
07 4 2/3
08 2 3/5
09 4 1/4
10 1 5/6
11 5 1/2
12 1 2/9
13 1 4/5
14 2 1/9
15 4 1/3
16 2 1/6
17 1 6/8
18 3 2/4
19 3 1/3
20 1 3/7
01 14/4
02 13/5
03 14/8
04 9/5
05 10/3
06 13/3
07 17/4
08 14/3
09 15/7
10 8/6
11 9/8
12 13/6
13 11/2
14 19/9
15 10/7
16 11/9
17 9/4
18 8/5
19 11/6
20 7/4
Press here
GO
Pythagoras
IV-8-2 Change to an Improper Fraction


Questions
Test Board
Answers
01 7/4
02 9/8
03 8/5
04 9/4
05 8/6
06 15/7
07 14/3
08 13/5
09 17/4
10 11/6
11 11/2
12 11/9
13 9/5
14 19/9
15 13/3
16 13/6
17 14/8
18 14/4
19 10/3
20 10/7
01 1 4/5
02 2 1/9
03 2 1/7
04 2 3/5
05 1 5/6
06 1 2/9
07 5 1/2
08 2 1/6
09 1 2/6
10 1 3/5
11 1 6/8
12 2 1/4
13 4 2/3
14 4 1/4
15 1 3/7
16 1 3/4
17 4 1/3
18 3 2/4
19 1 1/8
20 3 1/3
GO
Press here
Pythagoras
IV-8 Change to a Mixed Number


Questions
Test Board
Answers
Write in numerals:
1. Five million, two hundred thousand and seventy
2. Four hundred million, sixty thousand and fifty nine
3. Eight million, one hundred thousand and forty six
4. Two hundred million and five hundred thousand
5. Ninety million, two hundred and four thousand
6. One million, sixty one thousand and ninety seven
Convert to Roman numerals:
7. 67
8. 15
9. 293
10. 2008
11. 450
12. £1
Convert to Arabic numerals:
13. XIII
14. LXIII
15. MDC
16. MMDCCXX
17. MDCCCVIII
18. DXXXIII
19. MXIV
20. XCVI
01 CCXCIII
02 5,200,070
03 XV
04 8,100,046
05 533
06 400,060,059
07 90,204,000
08 13
09 63
10 1600
11 LXXXI
12 1,808
13 1,061,097
14 LXVII
15 200,500,000
16 2,720
17 CDL
18 1,014
19 96
20 MMVIII
Press here
GO
Pythagoras
V-1-1: Converting Between Different Numerations


Questions
Test Board
Answers
Give the value of the number in the circle:
1. 5(4)3
2. 1(2)4 6
3. 5(4)6 7 1
4. 6 7 9(3)
5. (2)6 7 9 3
6. (3)9 7 5 0 6
7. 3 9 7 5 0 6(6)
8. (1)9
9. (4)3 3 1 8 7 5
10. 4 9 3 1(8)7 5
11. 6(7)2 4 3
12. 2 4 9 3 1 8(7)8
13. 8 0(7)0 8 6 1
14. 4 5 1(0)8 0 4
15. 1 8(6)9
16. 2(0)8 1 9
17. 2(7)1 8 7 5
18. (4)3 1
19. (7)3 1 8 7 5
20. 4 9 3 1 8 7(5)
01 20,000
02 9,000
03 300,000
04 10
05 800
06 70
07 7,000
08 8,000
09 90,000
10 4,000
11 70,000
12 3
13 8
14 4,000,000
15 5
16 40
17 60
18 400
19 200
20 700,000
GO
Press here
Pythagoras
V-1-2: Place Value

Test Board

Questions			
01 $\frac{1}{3}+\frac{2}{9}$	02 $\frac{1}{3}+\frac{3}{7}$	03 $\frac{3}{4}+\frac{5}{6}$	04 $\frac{5}{6}+\frac{7}{8}$
05 $\frac{1}{2}+\frac{3}{4}+\frac{5}{8}$	06 $\frac{1}{3}+\frac{5}{6}+\frac{4}{9}$	07 $\frac{1}{4}+\frac{2}{3}+\frac{3}{7}$	08 $\frac{3}{5}+\frac{1}{10}+\frac{7}{15}$
09 $1\frac{2}{3}+4\frac{5}{6}$	10 $3\frac{1}{3}+4\frac{1}{4}$	11 $6\frac{1}{7}+7\frac{1}{6}$	12 $8\frac{7}{8}+9\frac{8}{9}$
13 $1\frac{2}{3}+\frac{4}{5}+7\frac{3}{4}$	14 $\frac{3}{8}+1\frac{7}{12}+\frac{5}{24}$	15 $1\frac{1}{3}+2\frac{1}{6}+7\frac{1}{2}$	16 $11\frac{1}{3}+\frac{1}{6}+\frac{1}{2}$
17 $\frac{11}{20}+\frac{9}{10}+\frac{7}{30}$	18 $19\frac{9}{11}+36\frac{7}{15}$	19 $17\frac{7}{9}+12\frac{5}{36}$	20 $97\frac{7}{9}+2\frac{2}{9}$

Answers			
01 $1\frac{1}{6}$	02 $7\frac{7}{12}$	03 $56\frac{47}{165}$	04 $6\frac{1}{2}$
05 12	06 $\frac{16}{21}$	07 100	08 $2\frac{1}{6}$
09 $1\frac{7}{8}$	10 $\frac{5}{9}$	11 $1\frac{7}{12}$	12 $1\frac{29}{84}$
13 $1\frac{17}{24}$	14 $1\frac{41}{60}$	15 $13\frac{13}{42}$	16 $29\frac{11}{12}$
17 11	18 $18\frac{55}{72}$	19 $10\frac{13}{60}$	20 $1\frac{11}{18}$

GO
Press here
Pythagoras

V-2-1: Find the Correct Answer

Test Board

Questions			
01 $\frac{5}{6}-\frac{1}{3}$	02 $\frac{2}{3}-\frac{1}{4}$	03 $\frac{4}{15}-\frac{1}{5}$	04 $\frac{7}{12}-\frac{1}{3}$
05 $\frac{5}{7}-\frac{1}{3}$	06 $\frac{3}{8}-\frac{1}{5}$	07 $\frac{3}{7}-\frac{2}{5}$	08 $\frac{3}{4}-\frac{1}{5}$
09 $2\frac{3}{4}-1\frac{1}{4}$	10 $3\frac{5}{7}-\frac{1}{4}$	11 $2\frac{5}{7}-1\frac{3}{28}$	12 $6\frac{2}{3}-4\frac{8}{9}$
13 $6\frac{1}{3}-4\frac{3}{5}$	14 $2\frac{1}{7}-\frac{1}{2}$	15 $6\frac{5}{12}-5\frac{5}{6}$	16 $3\frac{1}{2}-1\frac{3}{9}$
17 $3\frac{1}{2}-\frac{13}{8}$	18 $\frac{7}{2}-\frac{15}{8}$	19 $1\frac{3}{8}-\frac{11}{6}$	20 $1\frac{3}{9}-\frac{1}{11}$

Answers			
01 $\frac{1}{15}$	02 $\frac{1}{35}$	03 $1\frac{5}{8}$	04 $1\frac{9}{14}$
05 $\frac{7}{40}$	06 $\frac{11}{20}$	07 $3\frac{13}{28}$	08 $1\frac{7}{9}$
09 $\frac{19}{24}$	10 $2\frac{1}{8}$	11 $\frac{8}{21}$	12 $1\frac{11}{15}$
13 $1\frac{7}{8}$	14 $\frac{1}{4}$	15 $\frac{5}{12}$	16 $1\frac{1}{2}$
17 $1\frac{25}{88}$	18 0	19 $1\frac{17}{28}$	20 $\frac{1}{2}$

GO
Press here
Pythagoras

V-2-2: Find the Correct Answer

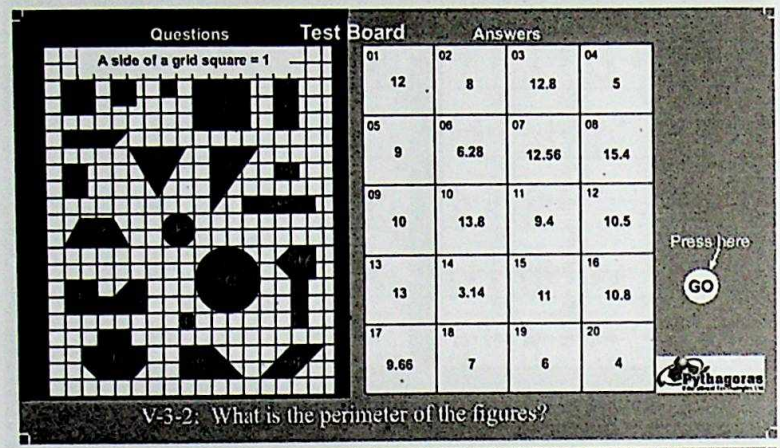
Test Board

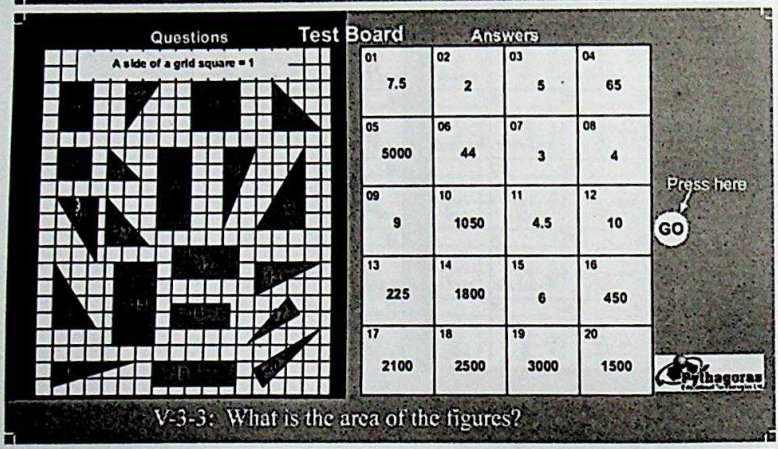
Questions			
01 $4\times\frac{1}{7}$	02 $5\times\frac{3}{15}$	03 $3\times\frac{2}{3}$	04 $7\times\frac{1}{2}$
05 $8\times\frac{1}{2}$	06 $9\times\frac{1}{4}$	07 $9\times\frac{2}{3}$	08 $\frac{1}{3}\times 15$
09 $\frac{4}{5}\times 10$	10 $\frac{3}{4}\times 24$	11 $1\frac{3}{4}\times 60$	12 $3\frac{1}{4}\times 32$
13 $\frac{7}{8}\times 64$	14 $\frac{1}{6}\times 240$	15 $\frac{4}{5}\times 25$	16 $18\times 3\frac{1}{6}$
17 $2\times 3\frac{1}{6}\times 4$	18 $3\frac{1}{6}$ of 100	19 $\frac{3}{4}$ of 12	20 $\frac{4}{5}$ of 250

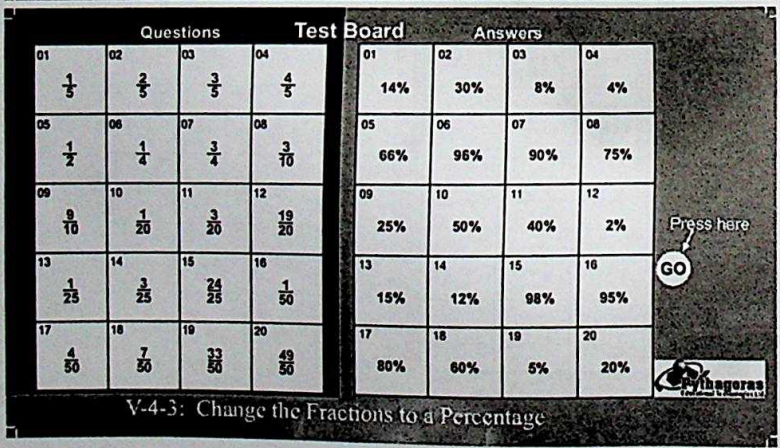
Answers			
01 $\frac{4}{7}$	02 2	03 6	04 $316\frac{2}{3}$
05 40	06 $2\frac{1}{4}$	07 5	08 200
09 104	10 20	11 57	12 4
13 56	14 $25\frac{1}{3}$	15 $3\frac{1}{2}$	16 1
17 8	18 18	19 3	20 105

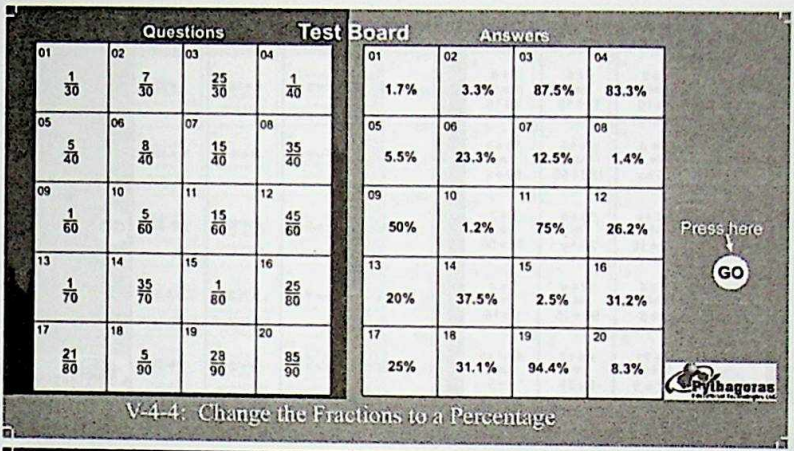
GO
Press here
Pythagoras

V-2-3: Find the Correct Answer

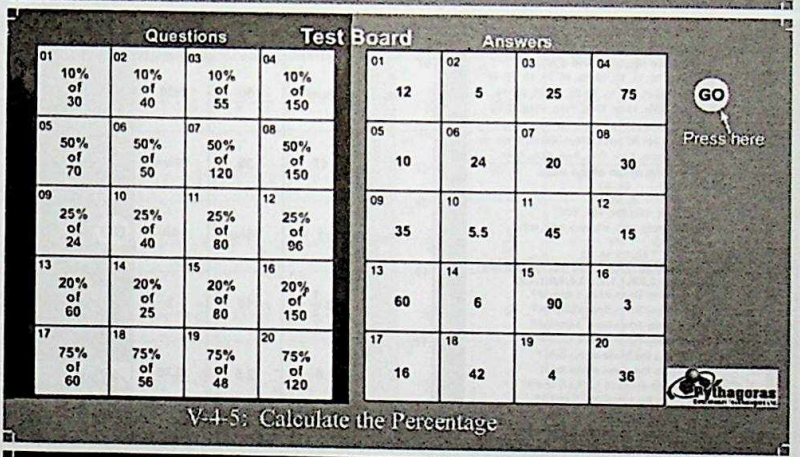

Questions
Test Board
Answers
A side of a grid square = 1
01 12
02 8
03 12.8
04 5
05 9
06 6.28
07 12.56
08 15.4
09 10
10 13.8
11 9.4
12 10.5
13 13
14 3.14
15 11
16 10.8
17 9.66
18 7
19 6
20 4
Press here
GO
Pythagoras
V-3-2: What is the perimeter of the figures?


Questions
Test Board
Answers
A side of a grid square = 1
01 7.5
02 2
03 5
04 65
05 5000
06 44
07 3
08 4
09 9
10 1050
11 4.5
12 10
13 225
14 1800
15 6
16 450
17 2100
18 2500
19 3000
20 1500
Press here
GO
Pythagoras
V-3-3: What is the area of the figures?

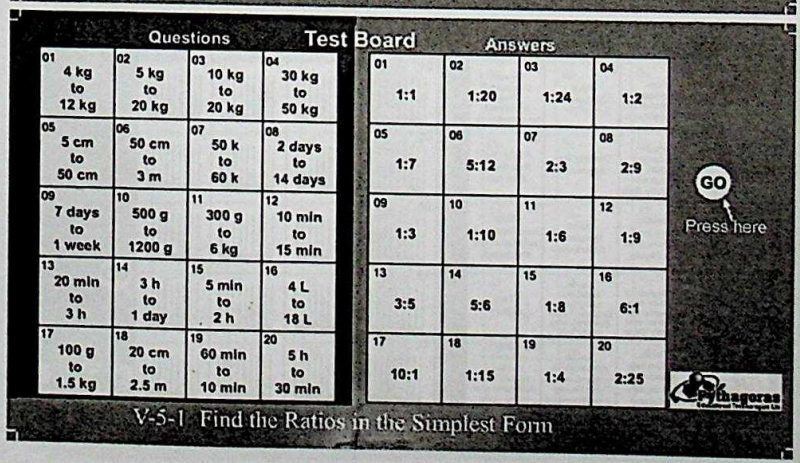

Questions
Test Board
Answers
01 1/5
02 2/5
03 3/5
04 4/5
05 1/2
06 1/4
07 3/4
08 3/10
09 9/10
10 1/20
11 3/20
12 19/20
13 1/25
14 3/25
15 24/25
16 1/50
17 4/50
18 7/50
19 33/50
20 49/50
01 14%
02 30%
03 8%
04 4%
05 66%
06 96%
07 90%
08 75%
09 25%
10 50%
11 40%
12 2%
13 15%
14 12%
15 98%
16 95%
17 80%
18 60%
19 5%
20 20%
Press here
GO
Pythagoras
V-4-3: Change the Fractions to a Percentage



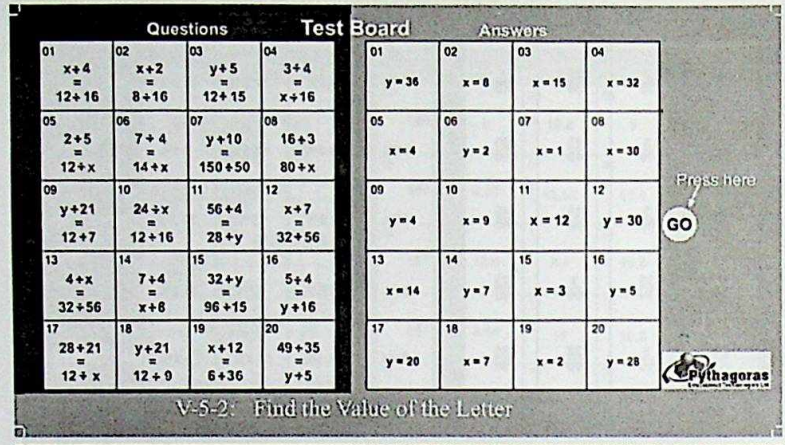
V-4-4: Change the Fractions to a Percentage

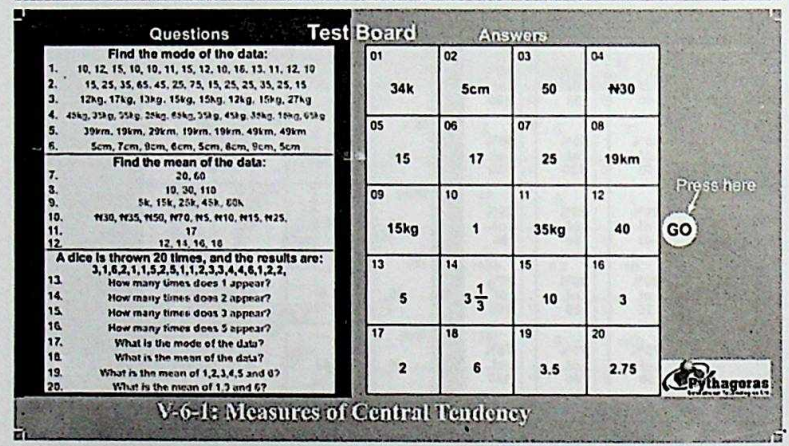


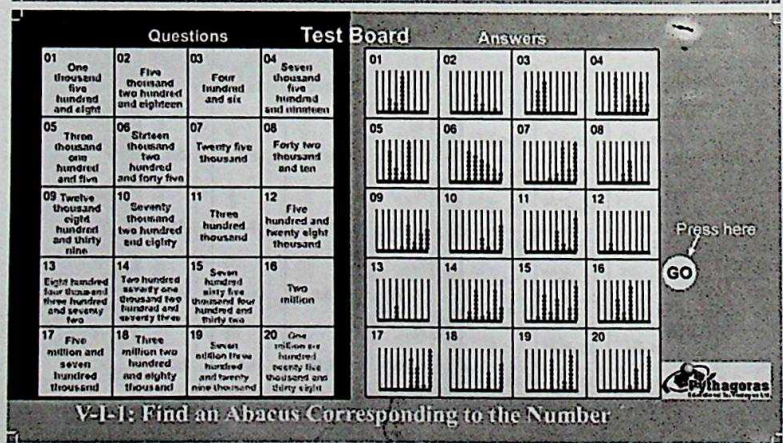
V-4-5: Calculate the Percentage

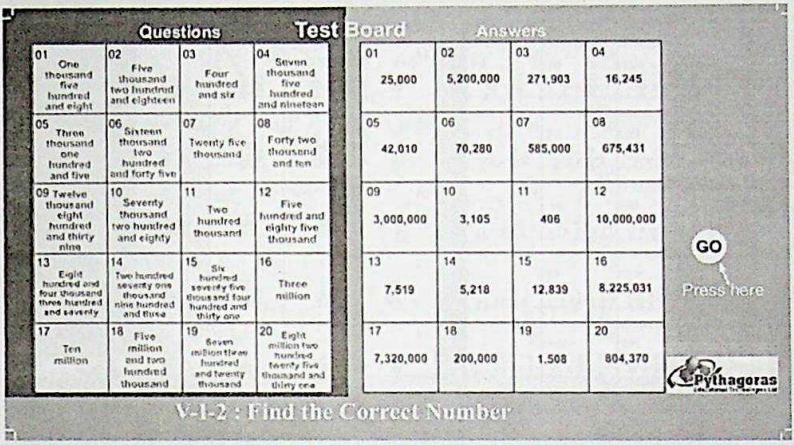


V-5-1: Find the Ratios in the Simplest Form

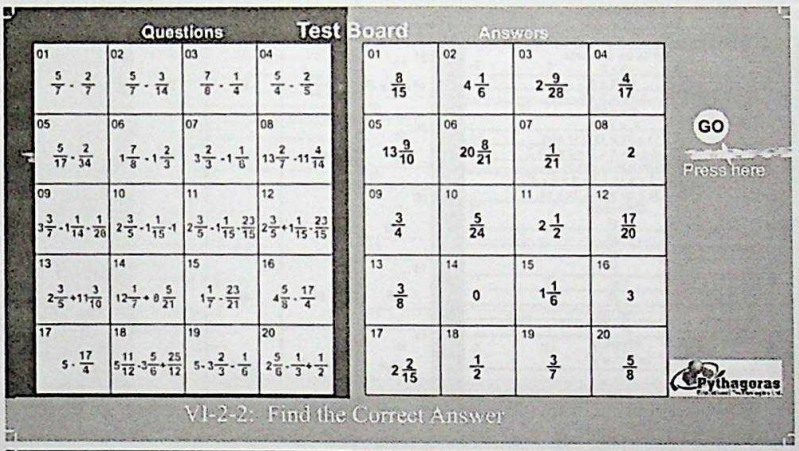

Questions
Test Board
Answers
01 x+4 = 12+16
02 x+2 = 8+16
03 y+5 = 12+15
04 3+4 = x+16
05 2+5 = 12+x
06 7+4 = 14+x
07 y+10 = 150+50
08 16+3 = 80+x
09 y+21 = 12+7
10 24+x = 12+16
11 56+4 = 28+y
12 x+7 = 32+56
13 4+x = 32+56
14 7+4 = x+8
15 32+y = 96+15
16 5+4 = y+16
17 28+21 = 12+x
18 y+21 = 12+9
19 x+12 = 6+36
20 49+35 = y+5
01 y = 36
02 x = 8
03 x = 15
04 x = 32
05 x = 4
06 y = 2
07 x = 1
08 x = 30
09 y = 4
10 x = 9
11 x = 12
12 y = 30
13 x = 14
14 y = 7
15 x = 3
16 y = 5
17 y = 20
18 x = 7
19 x = 2
20 y = 28
Press here
GO
Pythagoras
V-5-2: Find the Value of the Letter


Questions
Test Board
Answers
Find the mode of the data:
1. 10, 12, 15, 10, 10, 11, 15, 12, 10, 16, 13, 11, 12, 10
2. 15, 25, 35, 65, 45, 25, 75, 15, 25, 25, 35, 25, 15
3. 12kg, 17kg, 13kg, 15kg, 15kg, 12kg, 15kg, 27kg
4. 45kg, 35kg, 55kg, 25kg, 65kg, 35kg, 45kg, 35kg, 15kg, 65kg
5. 39km, 19km, 29km, 19km, 19km, 49km, 49km
6. 5cm, 7cm, 9cm, 6cm, 5cm, 8cm, 9cm, 5cm
Find the mean of the data:
7. 20, 60
8. 10, 30, 110
9. 5k, 15k, 25k, 45k, 60k
10. ₦30, ₦35, ₦50, ₦70, ₦5, ₦10, ₦15, ₦25,
11. 17
12. 12, 14, 16, 18
A dice is thrown 20 times, and the results are: 3,1,6,2,1,1,5,2,5,1,1,2,3,3,4,4,6,1,2,2,
13. How many times does 1 appear?
14. How many times does 2 appear?
15. How many times does 3 appear?
16. How many times does 5 appear?
17. What is the mode of the data?
18. What is the mean of the data?
19. What is the mean of 1,2,3,4,5 and 6?
20. What is the mean of 1,3 and 5?
01 34k
02 5cm
03 50
04 ₦30
05 15
06 17
07 25
08 19km
09 15kg
10 1
11 35kg
12 40
13 5
14 $3\frac{1}{3}$
15 10
16 3
17 2
18 6
19 3.5
20 2.75
Press here
GO
Pythagoras
V-6-1: Measures of Central Tendency

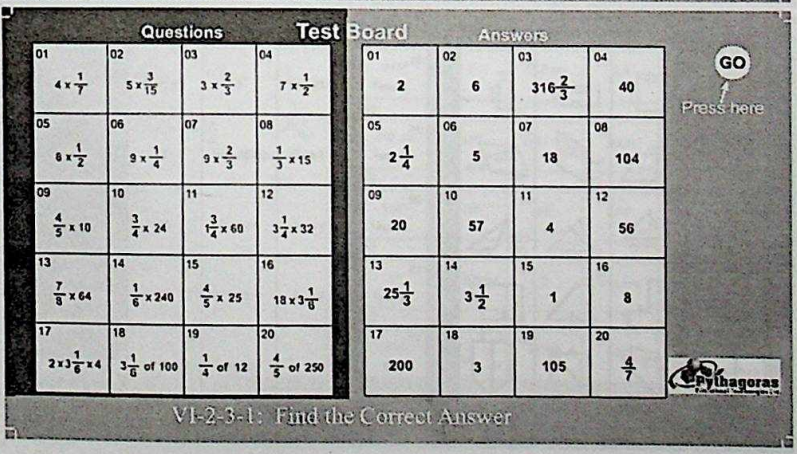

Questions
Test Board
Answers
01 One thousand five hundred and eight
02 Five thousand two hundred and eighteen
03 Four hundred and six
04 Seven thousand five hundred and nineteen
05 Three thousand one hundred and five
06 Sixteen thousand two hundred and forty five
07 Twenty five thousand
08 Forty two thousand and ten
09 Twelve thousand eight hundred and thirty nine
10 Seventy thousand two hundred and eighty
11 Three hundred thousand
12 Five hundred and twenty eight thousand
13 Eight hundred four thousand three hundred and seventy two
14 Two hundred seventy one thousand two hundred and seventy three
15 Seven hundred sixty five thousand four hundred and thirty two
16 Two million
17 Five million and seven hundred thousand
18 Three million two hundred and eighty thousand
19 Seven million three hundred and twenty nine thousand
20 One million six hundred twenty five thousand and thirty eight
Press here
GO
Pythagoras
V-1-1: Find an Abacus Corresponding to the Number



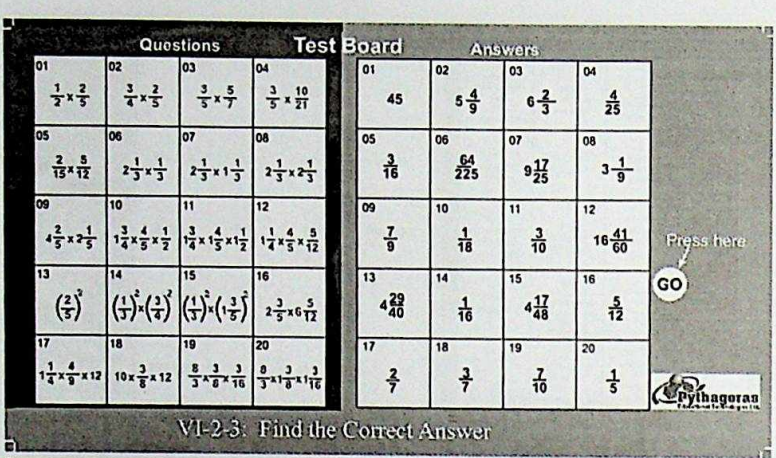
V-I-2 : Find the Correct Number

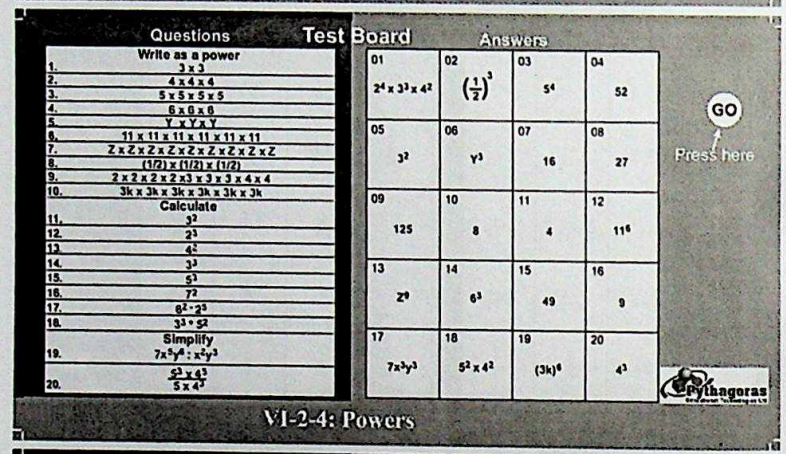


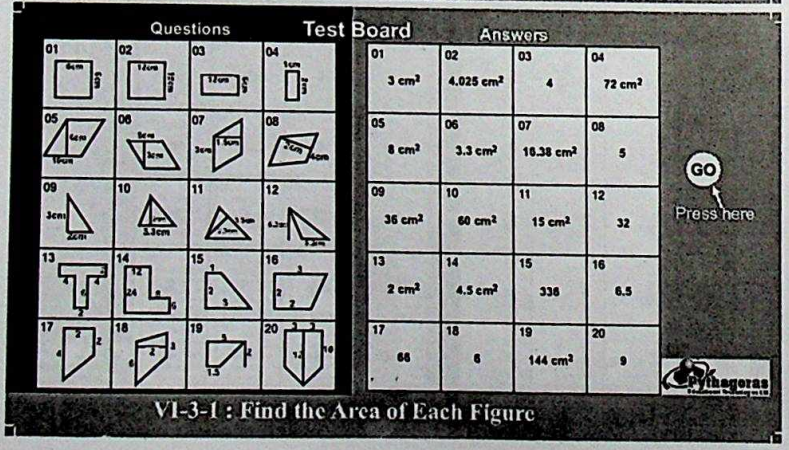
VI-2-2: Find the Correct Answer



VI-2-3-1: Find the Correct Answer

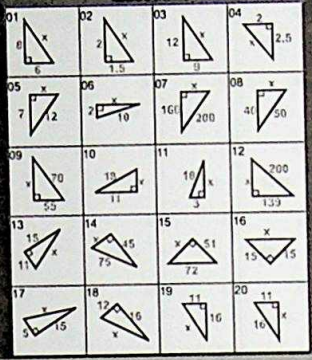

Questions
Test Board
Answers
01 $\frac{1}{2}\times\frac{2}{5}$
02 $\frac{3}{4}\times\frac{2}{5}$
03 $\frac{3}{5}\times\frac{5}{7}$
04 $\frac{3}{5}\times\frac{10}{21}$
05 $\frac{2}{15}\times\frac{5}{12}$
06 $2\frac{1}{3}\times\frac{1}{3}$
07 $2\frac{1}{3}\times1\frac{1}{3}$
08 $2\frac{1}{3}\times2\frac{1}{3}$
09 $4\frac{2}{5}\times2\frac{1}{5}$
10 $1\frac{3}{4}\times\frac{4}{5}\times\frac{1}{2}$
11 $1\frac{3}{4}\times1\frac{4}{5}\times1\frac{1}{2}$
12 $1\frac{1}{4}\times\frac{4}{5}\times\frac{5}{12}$
13 $\left(\frac{2}{5}\right)^2$
14 $\left(\frac{1}{3}\right)^2\times\left(\frac{3}{4}\right)^2$
15 $\left(\frac{1}{3}\right)^2\times\left(1\frac{3}{5}\right)^2$
16 $2\frac{3}{5}\times6\frac{5}{12}$
17 $1\frac{1}{4}\times\frac{4}{9}\times12$
18 $10\times\frac{3}{8}\times12$
19 $\frac{8}{3}\wedge\frac{3}{8}\times\frac{3}{16}$
20 $\frac{8}{3}\times1\frac{3}{8}\times1\frac{3}{16}$
01 45
02 $5\frac{4}{9}$
03 $6\frac{2}{3}$
04 $\frac{4}{25}$
05 $\frac{3}{16}$
06 $\frac{64}{225}$
07 $9\frac{17}{25}$
08 $3\frac{1}{9}$
09 $\frac{7}{9}$
10 $\frac{1}{18}$
11 $\frac{3}{10}$
12 $16\frac{41}{60}$
13 $4\frac{29}{40}$
14 $\frac{1}{16}$
15 $4\frac{17}{48}$
16 $\frac{5}{12}$
17 $\frac{2}{7}$
18 $\frac{3}{7}$
19 $\frac{7}{10}$
20 $\frac{1}{5}$
Press here
GO
Pythagoras
VI-2-3: Find the Correct Answer


Questions
Test Board
Answers
Write as a power
1. 3 x 3
2. 4 x 4 x 4
3. 5 x 5 x 5 x 5
4. 6 x 6 x 6
5. Y x Y x Y
6. 11 x 11 x 11 x 11 x 11 x 11
7. Z x Z x Z x Z x Z x Z x Z x Z x Z
8. (1/2) x (1/2) x (1/2)
9. 2 x 2 x 2 x 2 x 3 x 3 x 3 x 4 x 4
10. 3k x 3k x 3k x 3k x 3k x 3k
Calculate
11. 3^2
12. 2^3
13. 4^2
14. 3^3
15. 5^3
16. 7^2
17. $8^2 \cdot 2^3$
18. $3^3 \cdot 5^2$
Simplify
19. $7x^5y^4 : x^2y^3$
20. $\frac{5^3 \times 4^3}{5 \times 4^3}$
01 $2^4 \times 3^3 \times 4^2$
02 $\left(\frac{1}{2}\right)^3$
03 5^4
04 52
05 3^2
06 Y^3
07 16
08 27
09 125
10 8
11 4
12 11^6
13 2^9
14 6^3
15 49
16 9
17 $7x^5y^3$
18 $5^2 \times 4^2$
19 $(3k)^6$
20 4^3
GO
Press here
Pythagoras
VI-2-4: Powers


Questions
Test Board
Answers
01 3 cm²
02 4.025 cm²
03 4
04 72 cm²
05 8 cm²
06 3.3 cm²
07 16.38 cm²
08 5
09 36 cm²
10 60 cm²
11 15 cm²
12 32
13 2 cm²
14 4.5 cm²
15 336
16 6.5
17 66
18 6
19 144 cm²
20 9
GO
Press here
Pythagoras
VI-3-1 : Find the Area of Each Figure

VI-3-2: Find the Unknown Side Using the Pythagoras Rule

Questions



Test Board

01	02	03	04
43.3	9.8	30	14.25
05	06	07	08
143.8	17.75	2.5	9.75
09	10	11	12
15	15.81	3.2	120
13	14	15	16
60	11.62	10	50.8
17	18	19	20
21.21	18.6	19.42	20

Answers

Press here

GO

Pythagoras

VI-4-1: Open Sentences

Questions

Find the value of the letter in the following sentences:

1. $x + 7 = 12$
2. $y - 7 = 3$
3. $Z + 10 = 30$
4. $m + 2 = 4$
5. $n \times 3 = 12$
6. $x + x = 18$
7. $2y - 4 = 20$
8. $3z + 18 = 36$
9. $4x + 12 = 56$
10. $\frac{x}{5} + 8 = 18$
11. $\frac{y}{2} - 3 = 13$
12. $\frac{m}{3} - 2 = 11$
13. $\frac{m}{3} + \frac{2m}{3} = 15$
14. $\frac{x}{3} + \frac{x}{2} = 35$
15. $\frac{2x}{5} + \frac{x}{15} = 21$
16. $\frac{h}{15} + \frac{1}{4} = \frac{3}{4}$
17. $\frac{x}{21} = \frac{1}{3}$
18. $4x + 3 = x + 9$
19. $7c + 8 = 5c + 14$
20. $z + 2z + 3z - 9 = 5z + 4$

Test Board

01	02	03	04
15	42	9	6
05	06	07	08
50	39	32	$7\frac{1}{2}$
09	10	11	12
4	20	7	8
13	14	15	16
12	11	13	5
17	18	19	20
45	2	10	3

Answers

GO

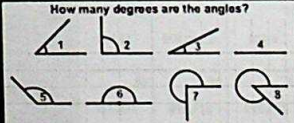
Press here

Pythagoras

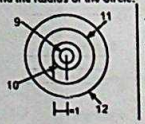
VI-5-1: Circles and Angles

Questions

How many degrees are the angles?



Find the Radius of the Circle:



Find the Diameter if:

13. R = 5 cm
14. R = 7.5 cm
15. R = 12 cm
16. R = 155 cm

Find the Circumference of the Circles:

17. R = 10 cm
18. R = 13 cm
19. D = 100 cm
20. D = 40 cm

Test Board

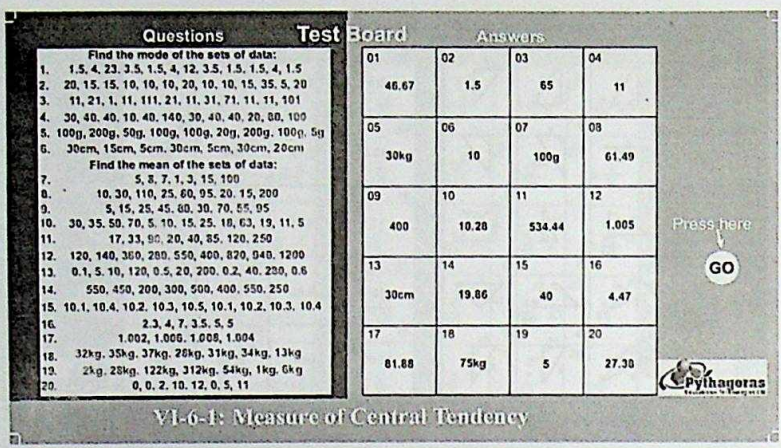
01	02	03	04
315°	1	81.7 cm	0.5
05	06	07	08
310 cm	90°	125.7 cm	15cm
09	10	11	12
135°	45°	30°	270°
13	14	15	16
0°	62.8 cm	2	314 cm
17	18	19	20
24 cm	3	10 cm	180°

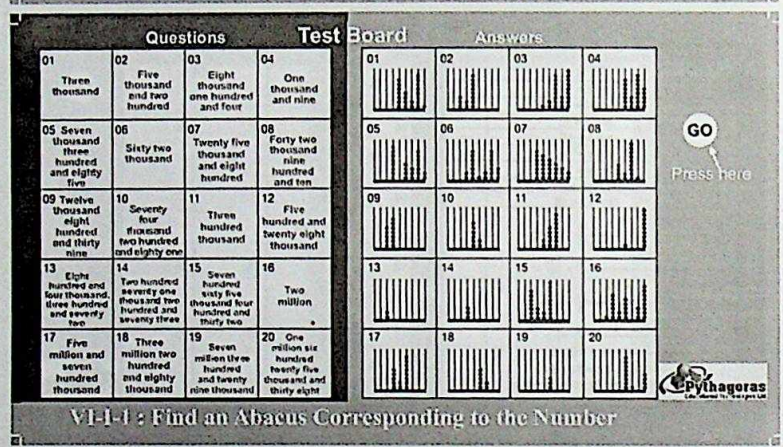
Answers

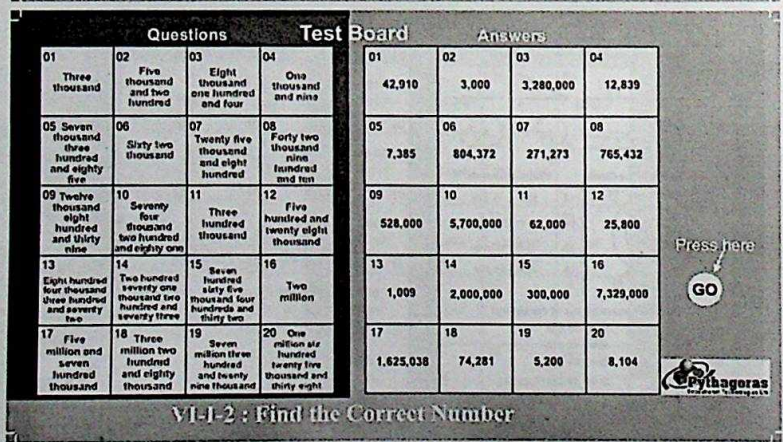
GO

Press here

Pythagoras


Questions
Test Board
Answers
Find the mode of the sets of data:
1. 1.5, 4, 23, 3.5, 1.5, 4, 12, 3.5, 1.5, 1.5, 4, 1.5
2. 20, 15, 15, 10, 10, 10, 20, 10, 10, 15, 35, 5, 20
3. 11, 21, 1, 11, 111, 21, 11, 31, 71, 11, 11, 101
4. 30, 40, 40, 10, 40, 140, 30, 40, 40, 20, 80, 100
5. 100g, 200g, 50g, 100g, 100g, 20g, 200g, 100g, 5g
6. 30cm, 15cm, 5cm, 30cm, 5cm, 30cm, 20cm
Find the mean of the sets of data:
7. 5, 8, 7, 1, 3, 15, 100
8. 10, 30, 110, 25, 60, 95, 20, 15, 200
9. 5, 15, 25, 45, 80, 30, 70, 55, 95
10. 30, 35, 50, 70, 5, 10, 15, 25, 18, 63, 19, 11, 5
11. 17, 33, 90, 20, 40, 85, 120, 250
12. 120, 140, 360, 280, 550, 400, 820, 940, 1200
13. 0.1, 5, 10, 120, 0.5, 20, 200, 0.2, 40, 280, 0.6
14. 550, 450, 200, 300, 500, 400, 600, 250
15. 10.1, 10.4, 10.2, 10.3, 10.5, 10.1, 10.2, 10.3, 10.4
16. 2, 3, 4, 7, 3, 5, 5, 5
17. 1.002, 1.006, 1.008, 1.004
18. 32kg, 35kg, 37kg, 26kg, 31kg, 34kg, 13kg
19. 2kg, 28kg, 122kg, 312kg, 54kg, 1kg, 6kg
20. 0, 0, 2, 10, 12, 0, 5, 11
01 46.67
02 1.5
03 65
04 11
05 30kg
06 10
07 100g
08 61.49
09 400
10 10.28
11 534.44
12 1.005
13 30cm
14 19.86
15 40
16 4.47
17 81.88
18 75kg
19 5
20 27.38
Press here
GO
Pythagoras
VI-6-1: Measure of Central Tendency


Questions
Test Board
Answers
01 Three thousand
02 Five thousand and two hundred
03 Eight thousand one hundred and four
04 One thousand and nine
05 Seven thousand three hundred and eighty five
06 Sixty two thousand
07 Twenty five thousand and eight hundred
08 Forty two thousand nine hundred and ten
09 Twelve thousand eight hundred and thirty nine
10 Seventy four thousand two hundred and eighty one
11 Three hundred thousand
12 Five hundred and twenty eight thousand
13 Eight hundred and four thousand, three hundred and seventy two
14 Two hundred seventy one thousand two hundred and seventy three
15 Seven hundred sixty five thousand four hundred and thirty two
16 Two million
17 Five million and seven hundred thousand
18 Three million two hundred and eighty thousand
19 Seven million three hundred and twenty nine thousand
20 One million six hundred twenty five thousand and thirty eight
GO
Press here
Pythagoras
VI-1-1 : Find an Abacus Corresponding to the Number


Questions
Test Board
Answers
01 Three thousand
02 Five thousand and two hundred
03 Eight thousand one hundred and four
04 One thousand and nine
05 Seven thousand three hundred and eighty five
06 Sixty two thousand
07 Twenty five thousand and eight hundred
08 Forty two thousand nine hundred and ten
09 Twelve thousand eight hundred and thirty nine
10 Seventy four thousand two hundred and eighty one
11 Three hundred thousand
12 Five hundred and twenty eight thousand
13 Eight hundred four thousand three hundred and seventy two
14 Two hundred seventy one thousand two hundred and seventy three
15 Seven hundred sixty five thousand four hundreds and thirty two
16 Two million
17 Five million and seven hundred thousand
18 Three million two hundred and eighty thousand
19 Seven million three hundred and twenty nine thousand
20 One million six hundred twenty five thousand and thirty eight
01 42,910
02 3,000
03 3,280,000
04 12,839
05 7,385
06 804,372
07 271,273
08 765,432
09 528,000
10 5,700,000
11 62,000
12 25,800
13 1,009
14 2,000,000
15 300,000
16 7,329,000
17 1,625,038
18 74,281
19 5,200
20 8,104
Press here
GO
Pythagoras
VI-1-2 : Find the Correct Number

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