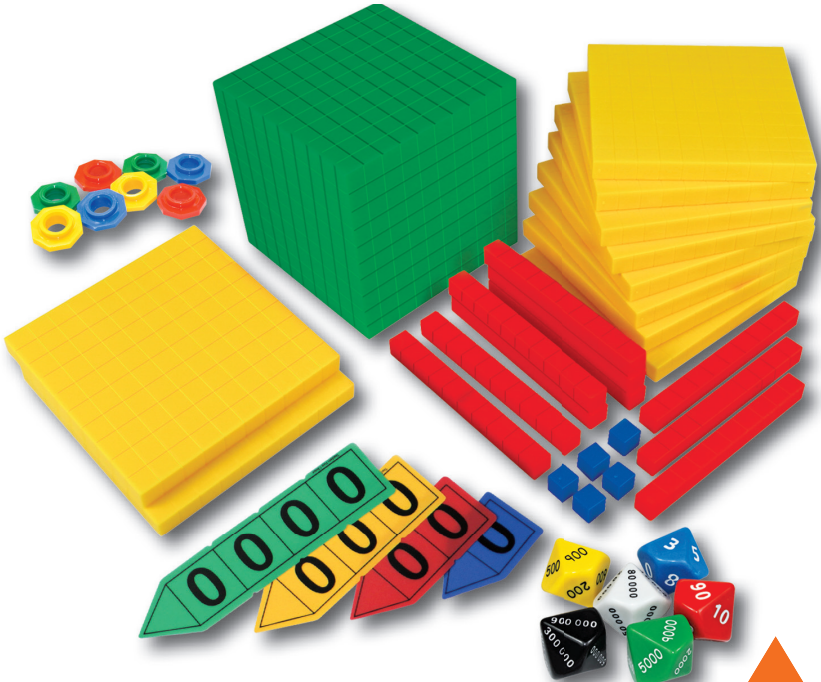KnowHow

An introductory guide on using the Base 10 Range.

Includes Activities.

Introducing the

BASE 10
RANGE

ALL
GRADES

BASE 10

EXPLORE THE RANGE OF BASE 10 SUPPORT MATERIALS

Base 10 materials are designed for specific use with our Number System which is called the decimal system because it uses ten digits in its notation. These are 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0.

By placing digits in appropriate places any imaginable number may be represented. The Place Value system has been described as one of humankind's greatest inventions. Each position (or place) in a number represents a value ten times greater than a number in the adjacent right-hand position (place). For example, in the number 10, the 1 may be explained as "10 lots (or groups) of 1". In 352 the 2 represents 2 units, the 5 indicates "5 lots of 10 lots of 1" and the 3 represents "3 lots of 10 lots of 10 lots of 1".

At first sight this may seem complicated, but if students gain a sound understanding of Place Value Concepts, their future number experience will flow easily.

The Know How® Base 10 Materials introductory booklet presents some simple starting activities using just a small selection of the materials available. Remember, some of these materials assume prior knowledge of certain aspects of the number system. If the children appear to be "lost" do not persist with the materials, rather look for a developmentally sound procedure that, in time, will make the material meaningful to the learner.

THE **KNOW HOW** SERIES OF BOOKS WILL INTRODUCE YOU TO A WIDE RANGE OF MATHEMATICAL TEACHING IDEAS AND EXPERIENCES.

TEACHABLES teachables IS PROUD TO PRESENT A LARGE COLLECTION OF SUPPORT MATERIALS TO ASSIST CLASSROOM TEACHERS PRESENT SUCCESSFUL MATHEMATICAL EXPERIENCES TO STUDENTS.

BASE 10 MATERIALS

Place Value Student Dice

4 ten face dice, each depicting 0 - 9, 00 - 99, 000 - 900 and 0000 - 9000.

Place Value Jumbo Dice

3 each dice depicting 0 - 9, 00 - 90, 000 - 900 and 0000 - 9000.

Place Value Student Decimal Dice

4 ten face dice, each depicting 0 - 9, 0.0 - 0.9, 0.00 - 0.09 and 0.000 - 0.009.

CHALLENGE

- Toss 2 or more dice and total the throw. After five throws, the player with the highest total wins. Another option is to take turns to throw. The first player to reach a certain total wins.

Place Value Arrows

These consist of Place Value Arrows, Decimal Place Value Arrows, Teachers Place Value Arrows and Magnetic Place Value Arrows.
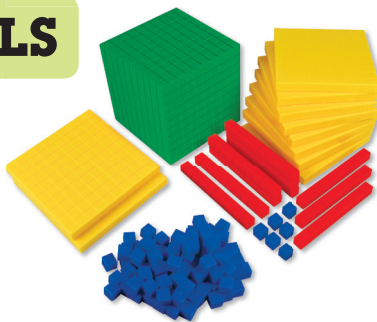
These arrows help reinforce place value alignments. They may be used in conjunction with any of the dice sets.
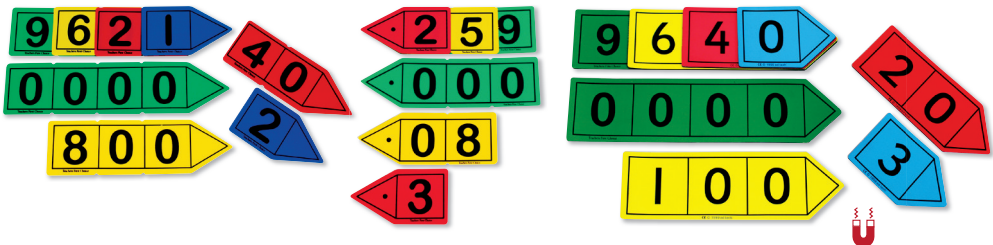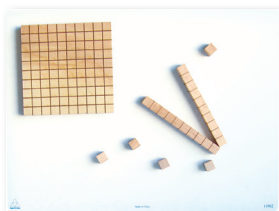
BASE 10 MATERIALS
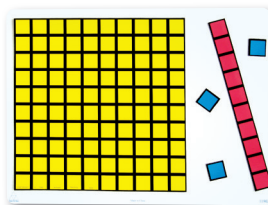

MAB Blocks (Base 10) Wooden

MAB Blocks (Base 10) Plastic

MagneMAB 3D

Wooden - ideal for small group work on the Magnetic Show and Tell board.

MagneMAB 2D Teacher & Student Packs

Flat coloured pieces. Suitable for demonstration purposes and small group work. Students enjoy manipulating the various pieces.
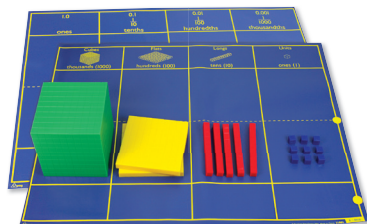
OTHER BASE 10 SUPPORT MATERIALS

teachables

Base 10 products are colour coded

Units   -Blue,

Longs   -Red,

Flats   -Yellow,

Cubes   -Green.
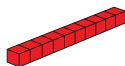

Place Value Student Set

Base 10 Combo Mat

Place Value Show and Tell Boards
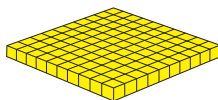
BASE 10 TERMINOLOGY
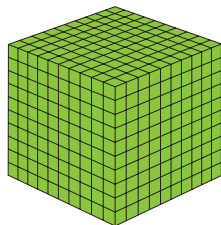
1 Unit = 1   1 Long = 10   1 Flat = 100   1 Cube = 1000

BEGINNING EXERCISES

Make a Flat

You will need: **MagneMAB 2D Student Packs**
Magnetic Show and Tell Board
0 - 9, 10 sided dice.

Take turns to throw the dice. Each player collects the number of units (blue) matching the number on the dice.

Rule: As soon as 10 units are collected trade them for a long (red).

Winner: First to collect a certain number of longs or enough longs to make one flat (yellow).

Pay Back

You will need: **MagneMAB 2D Student Packs**
Magnetic Show and Tell Board
0 - 9, 10 sided dice.

Take turns to throw the dice. Each player collects the number of units or carries out any necessary Pay-back trade.

On every third throw, the player has to pay back the appropriate number matching the number on the dice.

Rule: As soon as 10 units are collected, trade them for a long.

Winner: First to collect a certain number of longs, or enough longs to make one flat.

Play these games with regular Base 10 blocks. Children may be encouraged to record the various transactions, but do not insist on formal setting out.

VARIOUS CONCEPTS ARE BEING DEVELOPED AND REINFORCED WHILE PLAYING THESE GAMES INCLUDING: PLACE VALUE, ADDITION AND SUBTRACTION.

BEGINNING EXERCISES

BEGINNING EXERCISES

Strengthening Trading Games

You will need: **A Base 10 Combo Mat or A4 sheets of paper drawn into three columns - one for hundreds, one for tens and one for units.**
MAB Blocks (Base 10)
(Initially) 6 sided dice.

Place all the blocks in the middle of two players: this may be called "the Bank". Take turns to throw the dice and count out the number of units from the Bank matching the throw. Place the units in the appropriate column.

Rule: When a player has 10 or more of any one block, the player must trade the 10 blocks for 1 block of the next magnitude. The first player to trade for a flat wins this round.

To complete the game: Keep progressive total scores over a week. The player with the greatest total after five days of play is the winner. Alternatively, create competing teams and play a round-robin series.

Explore ways of arranging the blocks so they are easier to count.

Encourage the students to keep written records of the games, but note that there is no need to force written records. Children need to verbalise procedures and results.

First throw plus

Second throw

After many throws

96

Throw a

=101

Trade for

=101

BEGINNING EXERCISES

Introducing Subtraction in Trading Games

You will need: **A Base 10 Combo Mat or A4 sheets of paper drawn into three columns - one for hundreds, one for tens and one for units.**
MAB Blocks (Base 10)
(Initially) 6 sided dice.

Place all the blocks in the middle of two players: this may be called "the Bank". Take turns to throw the dice and count out the number of units from the Bank matching the throw. Place the units in the appropriate column and trade where necessary. On every third throw, the player is required to **pay back to the Bank** the number of units indicated on the dice throw. Once the action is completed, players may earn units on the next 2 rounds. Then, in the third throw it is "pay back time".

There may be a situation where there are no units available for pay back. Challenge the players as to what action they can take. Here you may introduce the concept of decomposition ("breaking-down") where a long is traded "back" to units in order to provide the required number.

At this stage avoid symbolic representations. Rather, allow the notion of subtraction to evolve. In time, students will be able to record the process but they will not need to use carrying figures in order to find the solution.


After 2 throws → **Throw a** 🎲 → **Decomposition** → **4 to Bank** → **Pay-back complete**
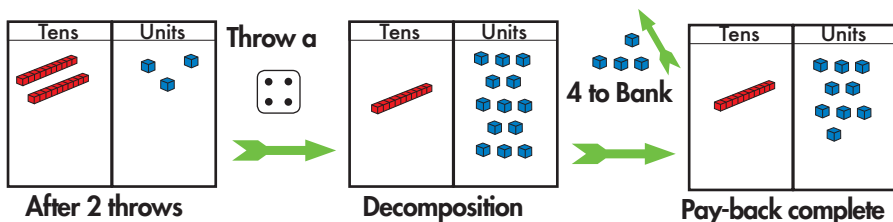
Player: "I had 23 but I had to pay back 4. I did not have four units, so I traded 1 long for 10 units so I could pay 4 units to the Bank."

With a good knowledge of the decomposition process, students will master this challenge easily.

55 - 32.

Firstly what does this statement say?
Now use the Base 10 blocks to explain.

55 → **Take away 32** / **-32** → **=23**

BEGINNING EXERCISES
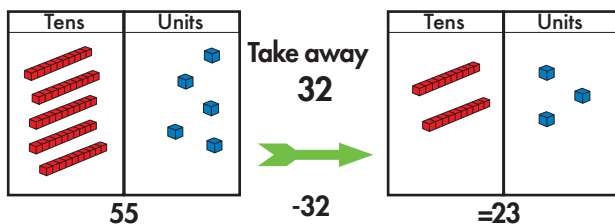
BEGINNING EXERCISES

Some searching questions you may ask as the children are playing Trading Games

What is your collection worth in units?

What is your collection worth in longs?

What is your collection worth in flats?

Whose collection is the most valuable? Why?

In order to get another long (or flat), how many units must you earn? Explain.

What is the difference in value between the highest and the lowest total?

Variations to the trading games.

Throw 2 dice instead of 1 and add the numbers together.

Use dice that have larger numbers i.e. with 10, 12 or 20 faces.

Start with 200 and play until 300.

Begin with 5 longs. Each throw of the dice indicates the number of units to be paid back. First to trade to zero longs/units is the winner.
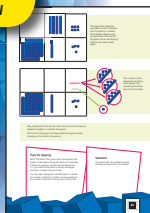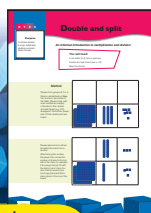
Begin with 3 flats. First to reach 6 flats wins.

Each throw of the dice is increased by 10 times.

FOR A CLEAR DESCRIPTION OF TRADING GAMES REFER TO
DEVELOPING MATHEMATICS WITH BASE TEN.
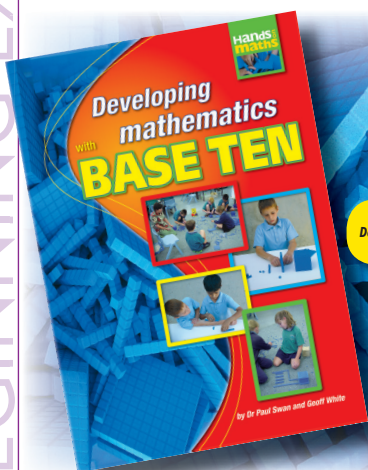
Sample pages
Developing mathematics
with BASE TEN

Full colour reference resource, including reproducible student worksheets. This book provides a range of developmental activities that encourage the use of manipulatives in the classroom. Includes clear, precise illustrations and step-by-step instructions.
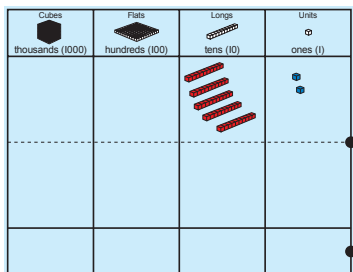
Available from
Modern Teaching Aids
PO Box 1126
Dee Why NSW 2099
Australia
Phone: 1800 251 497
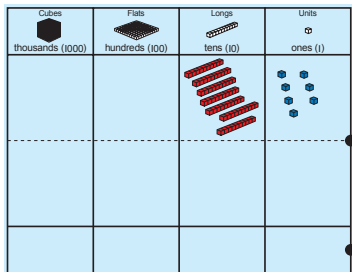**sales@teaching.com.au**

Expanding Numbers

You will need: **Base 10 Combo Mat**
MAB Blocks (Base 10)

Draw this chart and model the number on the Combo Mat. Fill in the spaces.

52   **77**

Number	Place Value	Expanded Form
52	5 tens 2 ones	50 + 2
77	7 tens 7 ones	70 + 7
?	17 tens 5 ones	?
?	?	100 + 60 + 9

Build and Trade Puzzles

You will need: **Base 10 Combo Mat**
Base 10 Blocks

Write a set of numbers to build on the Combo Mat.

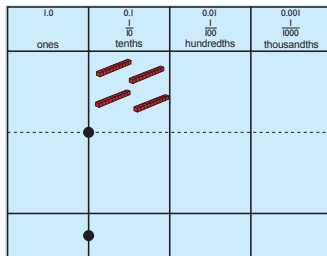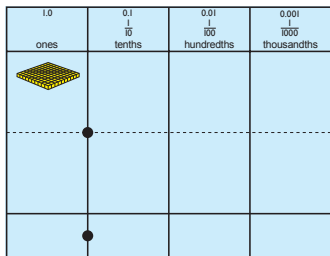| Build		Trade		Name
Tens	**Ones**	**Tens**	**Ones**	**Number**
4	13	5	3	53
8	14	9	4	94
1	28			

Challenge the students to build the numbers on the Mat, do the trades and record the results.

Using the Base 10 Decimal Mat

You will need: **Base 10 Combo Mat**
MAB Blocks (Base 10)

Tell the students the Flat has the value of 1. Create a set of problems to solve.

For example: If [image] has a value of 1, What is the value of the long? How many tenths do you see? Write as a decimal. What percentage of 1 is that?
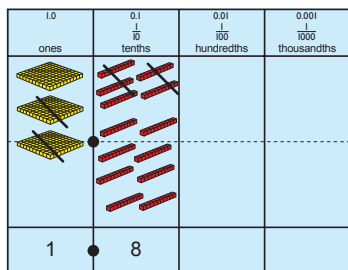
Put more than 10 red strips in the tenths column. Encourage the students to trade. Discuss results.

Use the Combo Mat to add, subtract, multiply and divide decimals using trading where necessary. Here is an example.
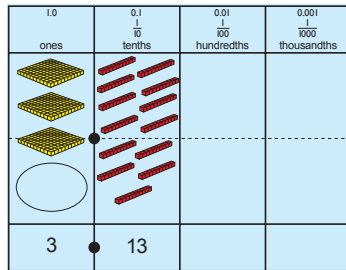
The teacher had 4.3 metres of ribbon but used 2.5 metres for prizes. How many metres did she have left? (The flat has a value of 1 metre.)
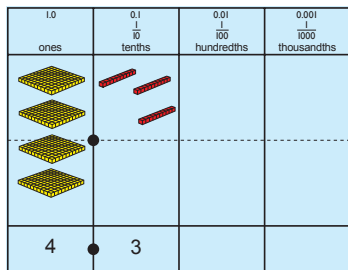
Build

**Trade**

Trade

Subtract

"1.8 metres of ribbon is left."

Using the Magnetic MAB, discover Decimal Fractions

You will need: **Magnetic Show and Tell Board**
MagneMAB 2D Teacher Pack

On the yellow square place a red strip.

What is the relationship between the yellow square and the red strip? (I hope you would see a relationship of 1 to 10, that is one red strip out of 10 red strips (yellow square).
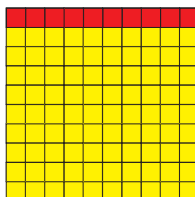
We can say that the red strip is 1/10 of the square. If we called the yellow square 10, what is the value of the red strip? (1).
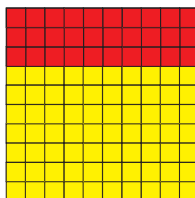
Now lets call the yellow square 1, what is the value of the red strip? (1/10 or 0.1).

So let's call the yellow square 1/10. What is the value of the red strip? (1/100 or 0.01).

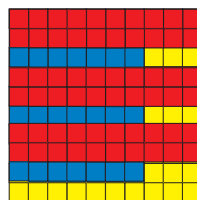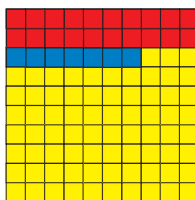Create a chart to show all the different values.

Place three red strips on the yellow square.
Fill in the values on the chart.

Place 2 red strips and 7 blue squares on the yellow square.

If the yellow base has a value of 1, you have placed 0.27 on the square. Now what is the value of 3 lots of 0.27. Explain.

Value of the yellow base	Value of red strip	Value of three red strips	Decimal fraction
100	10	30	
10	1	3	
1	1/10	3/10	0.3
1/10	1/100	3/100	0.03

Helping bring ideas together

Place Value Student Set

Supporting the stage of development from concrete to abstract, the Place Value Set provides a sound bridge from the informal to the formal.

Numbers are shown by hexagonal beads on a Three Prong Abacus. Each prong will hold only nine beads, forcing a trade to take place. The 10th bead is placed on the next prong while the other nine beads are discarded.

The Number Builders Cards (Montessori Cards) are designed to align exactly with the prongs; hence, the concrete representation is directly linked with the number symbol. The inclusion of the dice enables all the materials to be used in a trading game mode.

teachables