A. NUMBERS AND NUMERATION SYSTEMS

A.1 Cardinal and Ordinal Number Concepts

Boys vs. Girls *(Chidley)*

1. Give each boy in the class two blue beads and each girl two pink beads.
2. Have each member of the class put one of his or her beads on either the boys' string or the girls' string.
3. Hang the two strings side by side.
4. Are there more boys or more girls in our class?
5. How do you know this by looking at the two strings of beads?
6. How many boys are there in our class?
7. How many girls are there in our class?
8. How can you find out from your strings of beads how many people there are in our class?

Birthdays *(Chidley)*

1. Have each child place his second bead on the prong showing the month of his or her birthday. Have the boys put theirs on first and then the girls.
2. In which month are there the most birthdays in our classroom?
3. In which month are there the least birthdays in our classroom?
4. Are there any months in which no birthdays occur?
5. How many people in our classroom have birthdays before we start our summer holiday?
6. Show on a graph the number of birthdays in each month by coloring as many squares under each month as there are beads.

Calendar Activities *(Chidley)*

1. Use a calendar to help you with the following tasks.
2. How many months are there in a year?
3. We only go to school part of a year. How many months of the year do we have school?
4. Can you show me with a picture how long a year is by dividing it up into months? Also show which of these months you spend going to school. Make your picture big.
5. Using your calendar can you find out how many weeks there are in a year.
6. Similarly, can you show how many days there are in a week.

7. Find a way, with a picture, to show what you have found out about months, weeks, and days.
8. Are there more weeks, months or days in a year?
9. Are there more weeks or months in a year?
10. Are there more days or weeks in a year?

Personal Numbers *(Chidley)*

1. The date of your birthday _____.
2. Your age _____.
3. The number of people in your family _____.
4. Your address _____.
5. The number of the bus you take to school _____.
6. Your clothing size _____.
7. Your shoe size _____.
8. Your classroom number _____.
9. Your locker number at school _____.
10. The amount of your allowance _____.
11. Your phone number _____.
12. The address of our school _____.
13. Your favorite T.V. channel _____

Base Ten Charts *(Inkster)*

Give children cards with the following columns on them:

100	10	1

Have partner place various discs under each column up to 9.

e.g.

100	10	1
o o o o	o o	ooooo

The partner must tell what the number is. Then have the partner write down certain numbers such as 14, 65, 928, etc. The other student must place the appropriate discs in the correct column.

Give them columns with the following discs already placed under the numbers:

100	10	1
o o o	ooooo ooo	ooooo ooooo

Have the children draw a picture of another way of showing the same number:

e.g.

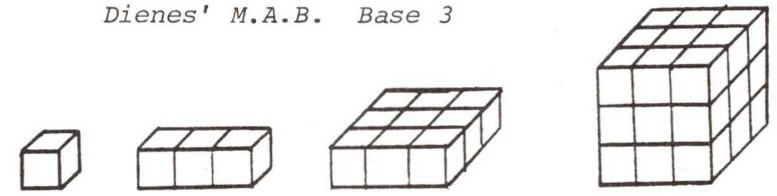
100	10	1
o o o	ooooo ooooo	

Then reverse the question. For example show the bottom picture and have them expand it. This type of exercise will help the children understand the value of the columns and will make understanding easier when adding and subtracting large numbers when borrowing is involved.

Dienes' Multibase Arithmetic Blocks *(Millar)*

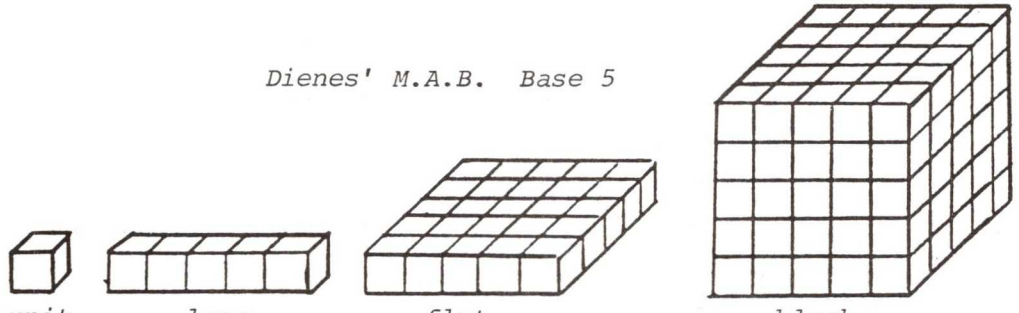
A set of Dienes' Multibase Blocks, or some facsimile, would be needed for the following activities. The basic structure for the units, longs, flats and blocks are illustrated below for base three and base five.

Dienes' M.A.B. Base 3



unit *long* *flat* *block*

Dienes' M.A.B. Base 5



unit *long* *flat* *block*

1. What relationships can you find between the units, longs, flats and blocks? Use three different bases.
2. Make up some questions in addition and check answer by using the blocks. Try another base.

3. Pick up some blocks in each hand. Which hand has more? How many more? Try another base.

4. Take any amount of blocks and double them. Try to multiply these blocks by the number of units in a long. How does this compare to multiplication by 10 in base 10. Try other bases.

5. Give children squared paper 10 X 10. Make a number chart 1 to 100. What patterns can you discover?

6. "1000" Base 3
   Mark dice 0_3, 1_3, 2_3, 10_3, 11_3, 12_3
   Roll 1, 2 or 3 dice. Add the numbers and then subtract it from 1000_3.
   The first to reach 0 wins. Try this with other bases.

7. "Number Bee"
   Two teams - flash a card. First person to get right answer gets a point for the team.

   Card Samples

   Card: 793 / *Answer:* 7 hundreds, 9 tens, 3 ones

   Card: 7 hundreds, 18 tens, 3 ones / *Answer:* 883

All of these activities can, and should be done with at least two bases besides base 10.

Number Patterns *(Bowman, Krueger, Leyshon)*

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1. Circle all the even numbers on the sheet of numbers. What do you notice about the pattern you have formed? Why is this so? What number can you divide evenly into every even number?

2. Circle all the numbers on a sheet that are multiples of 4 (4, 8, 12...). What do you notice about the pattern? How is it like the first one you did? What numbers besides 4 and 1 can you divide evenly into all multiples of 4?

3. Circle all the numbers on a sheet that are multiples of 3 (3, 6, 9...). What do you notice about the pattern? How does it compare to the others you did?

4. Make patterns on other sheets using multiples of 5, 6, 7, 8, and 9. Compare the patterns.

5. Circle all the numbers on the sheet that can only be divided by themselves or by 1.
   Examples: a) 2 is divisible by 1 and 2 only so circle 2
   b) 12 is divisible by 12, 1, 3, 4, 6, and 2, so *do not circle 12.*
   The numbers you have circled are called prime numbers.

6. Devise your own pattern of prime or composite numbers, or a combination of both.

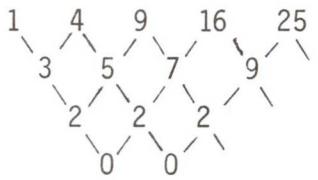
Square Numbers *(Willis)*

1. Cut out several colored one-inch squares. With these, make successively larger squares. Make a chart showing the number of unit squares in each successively bigger square. For example,

   1 x 1 = 1 2 x 2 = 4 3 x 3 = 9

   What would the eleventh square be?

2. Having now acquired some knowledge as to how squares behave, make as many statements as you can about the following pattern.



Number Shapes *(Willis)*

1. On your geoboard, make a series of successively larger pentagons with two sides common. Can you find a pentagonal pattern?

2. The square numbers (which you have seen), the triangular numbers (1, 3, 6, 10, 15, etc.) and the pentagonal numbers (from above) are all related. Make a chart to study their relationship. For example -

△ 1 3 6 10 15

□ 1 4 ...

⌂ 1 5 ...

What relationships do you see?

3. What other number shapes can you grow?

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