# Place Value Activity Package



Activities humbly borrowed from various sources. Where possible, sources are acknowledged with the activity.

> Package assembled by Manuel Silva Numeracy Project Support Teacher Winnipeg School Division 2005

## Place Value

- Whole number vertical computational algorithms have negative effects on the development of number sense and numerical reasoning. (*Kammi, 1994, Vince Wright 2000*)
- The standard computational algorithms for whole numbers are "harmful" for two reasons. First, the algorithms encourage students to abandon their own operational thinking. Second, the algorithms "unteach" place value, which has a subsequent negative impact on the student's number sense (*Kammi & Dominick, 1998*)
- Place Value is extremely significant in mathematical learning. Yet students tend to neither acquire an adequate understanding of place value nor apply their knowledge when working with computational (procedural) algorithms. (Fuson, 1990; Jones and Thornton, 1989)
- Students associate the place-value meanings of "hundreds, tens, ones" more in terms of order in placement than in base-ten groupings (Bendarnz and Janvier 1982)
- A major reason for place value lapses is the linguistic complexity of our place value system in English. For example, we do not name "tens" as done in some languages (e.g. "sixty" vs. "six-tens") (Fuson, 1990; English and Halford, 1995)
- Students with a weak understanding of place value have a difficult time understanding decimals...students will often assume that "more digits" implies that a number is larger. (Heibert and Wearne, 1986)
- Many students never master the standard long-division algorithms. Even less gain a reasonable understanding of either the algorithm or the answers it produces. A major reason a underlying this difficulty is the fact that thee standard algorithm (as usually taught) asks students to ignore place value understandings (*Silver et al., 1993*)

As teachers of early years mathematicians we cannot ignore these glaring facts from the research, as well, as our own classroom observations. The time is here to change the way we are teaching students to "do" math in our classrooms. We need to stop teaching vertical procedural algorithms in our early grades (1-2) and introduce them later on once students have shown clear understanding of place value, part-part-whole thinking as well as flexible strategies with whole number computation.

This package is bursting with great ideas that have been created for use by teachers in our Division, to assist teachers in targeting place value instruction in an engaging and meaningful way.

I would like to thank Manuel Silva for taking the time to compile all the great resources that we as teachers have been creating and using...now you have them all in one place!

Enjoy using these materials...kids may not remember all the math you teach them but they will never forget your attitude!

Meagan Mutchmor K-8 Mathematics Consultant

#### Some Thoughts on Place Value

Place value understanding plays a key role in the primary grades. It is essential to have a strong foundation in place value in order to achieve success in making sense of our number system (based on the digits 0-9), counting, adding multiple-digit numbers, money and many other math skills. For this reason, it is important that place value not be taught in isolation for a few weeks but that it be integrated all year long into the math program. In fact, the National Council of Teachers of Mathematics (NCTM) recommends that all mathematics strands be taught in an integrated fashion throughout the year and not in isolation.

When teaching place value to students, it is important to be aware of how students' developmental levels affect their understanding in place value. For example, a student may be able to count to 100 but may not be able to see that 23 is the same as two groups of ten and three ones or 1 group of ten and 13 ones. They may be able to count individual items but have difficulty counting groups of objects.

John Van de Walle states in his book, *Elementary and Middle School Mathematics: Teaching Developmentally*, that counting plays a key role in constructing base-ten ideas about quantity and connecting these concepts to symbols and oral names for numbers. In order to develop place value concepts, activities should involve concrete models, practice using place value language orally, illustrations and symbols. The activities should focus on one or more of the following three main components of place value: grouping activities, giving oral names for numbers and written symbols for the concepts. It is also necessary to help children connect place value concepts to real-world situations. Working with numbers around them at school, home and community makes learning meaningful for the students.

Jim Martland, et. al, in their book *Teaching Framework in Number*, outline a three level model for the development of base-ten arithmetical strategies.

**Level 1: Initial Concept of Ten**. The student does not see ten as a unit of any kind. The student focuses on the individual items that make up the ten. Student counts forward or backward by ones in addition or subtraction tasks involving tens. At this level, the student can identify numbers in the range of 1 to 10.

Level 2: Intermediate Concept of Ten. Ten is seen as a unit composed of ten ones. The student is dependent on representations of ten such as open hands of ten fingers. The student can perform addition and subtraction tasks involving tens when they are presented with materials but not when presented as written number sentences.

Level 3: Facile Concept of Ten. The student can solve addition and subtraction tasks involving tens and ones without using materials or representations of materials. They can solve written number sentences involving tens and ones by adding or subtracting units of tens and one.

#### Number Sense and Place Value Development

Based on research in Young Mathematicians at Work: Constructing Number Sense, Addition and Subtraction (Fosnot and Dolk, 2001).



#### **Place Value**

Student recordings of their work

- Sporadic drawings with no attempt to represent the quantity
- One-to-one correspondence in the pictures to the real object
- Iconic (symbols) representations to represent the quantity of the objects
- Symbolic representation of the quantity using one symbol (a number)

Once students have developed the concepts of cardinality, one-to-one correspondence, part/whole relationships and compensation, they will begin to see the need for an organized way to keep track of their counting, especially of larger groups of objects. They will begin to organize their counting into groups of five or ten. After working with this concept many times, they will begin to understand that ten objects can be represented as one ten. Students need to develop the concept that one group of ten equals ten units within that group. This is called *unitizing* (using a number to count not only objects but also groups). This must be in place before students can understand place value. They can then start to work with the concepts of making 10s (8 and 2 make 10, 7 and 3 make 10) and breaking numbers apart (26 is 20 and 6 and eventually, 26 + 32 = [20 + 30] + [6 + 2]).

#### Subitizing

The ability to subitize is a precursor to place value understanding.

Subitizing is the ability to recognize dot arrangements in different patterns.

Since children begin to learn these patterns by repetitive counting they are closely connected to their understanding of the particular number concept. Quantities up to 10 can be known and named without the routine of counting. This can help children in counting on (from a known patterned set) or learning combinations of numbers (seeing a pattern of two known smaller patterns).

Young children should begin by learning the patterns of dots up to 6. Students should also associate the dot patterns to numbers,

numerals, finger patterns, bead strings, etc. You can then extend this to patterns up to 10 when they are ready.

Subitizing is a fundamental skill in the development of number sense, supporting the development of conservation, compensation, unitizing, counting on, composing and decomposing of numbers.

For example:

We want children to learn that

- there are 5 dots in this pattern or arrangement;
- five is more than four;
- a set of 5 objects can be separated into a set of two objects and a set of three objects, etc.;
- five counters, no matter how arranged, still retains the same numerical quantity;
- the associated oral name for a set of five things is "five";
- the numeral corresponding to a set of five objects is "5".

#### More subitizing online at: www.wsd1.org/pc\_math



#### Subitize, Subitize

Subitize, Subitize, Seeing sets of different size. Sets of 3, sets of 5, It's lots of fun to subitize!

Sets of 4 and sets of 2, Let me subitize with you. Sets of 6 and sets of 4, Let us subitize some more.

Subitize, subitize, Seeing sets of different size.

By Linda Boughton



Created by Meagan Mutchmor

#### Some Activities to Further Develop Place Value

#### **Counting Forward and Backward**

Counting forward and backward helps to develop rote number patterns. Children should have the opportunity to count forward and backward in multiples of 1, 2, 5, 10, 3, 4 as well as from random starting points. They can count numbers in the decades, centuries or millenniums.

#### **Number Patterns**

Being able to identify number patterns on the hundred chart and addition/ multiplication charts expands a child's knowledge of number sense. Many opportunities to explore number patterns helps students to solidify this knowledge. Counting by multiples is a counting pattern that is essential for the understanding of multiplication concepts.

#### Money

Money is a great way to learn about place value and trading appropriate coins. Concepts such as fractions and decimals can also be taught through the use of money.

#### 2- and 3- Digit Addition/Subtraction

Good place value concepts and number sense will foster good understanding of addition and subtraction concepts.

# Number Of The Day

Show with base 10 blocks [younger groups can use 10 frames]

The number just before is ....

10 more than this number is ....

Write in expanded notation....

This number is odd/even....

10 less than this number is ....

The number just after is ....

Write out in words ....

3 other ways to make this number are:

This number is a multiple of ....

25 more than this number is ....

Start at today's number and count by 5's ten times.

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### More Number of the Day

Roll dice to determine three digits (for example 562:)

- ⇒ The greatest number you can make by rearranging them is 652.
- $\Rightarrow$  The smallest number you can make is 256.
- $\Rightarrow$  Add the digits together.

(5+6+2=13).

- ⇒ Multiply them (5x6x2 = 60).
- $\Rightarrow$  Count up in tens
- (562, 572, 582, 592, 602 and so on).
- $\Rightarrow$  Count down in tens

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(562, 552, 542 and so on).
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 $\Rightarrow$  Count up in hundreds

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(562, 662, 762, 862, 962, 1062 etc.).
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- $\Rightarrow$  Count down in hundreds
- (562, 462, 362, 262, 162, 62).
- ⇒ Subtract the numbers (5-6-2 = -3).
- $\Rightarrow$  Divide it by tens
- (562, 56.2, 5.62, 0.562, 0.0562 and so on).
- $\Rightarrow$  Multiply by ten
- (562, 5,620, 56,200, 562,000 and so on).

Created by Meagan Mutchmor

#### Number of the Day Chart



Note : this is just a starter of ideas to use. You can change any of the boxes to suit your students and grade level.

#### Flip and Fold

- ⇒ Use Flip and Fold cards to help your students learn their number relationships as well as learn to "Bridge to Ten"
- $\Rightarrow$  Create cards on construction paper and then mac-tac or laminate to protect them.
- ⇒ Different Flip and Fold cards can be made to go with your thematic units, use stickers or copied pictures to make more variety.
- ⇒ These cards can be a great take home game that students create on their own. Use potato prints as a art activity or bingo dabbers. Parents could also make them at a parent function and then use them with their children.

Source: Meagan Mutchmor, Math Consultant, WSD



Materials: 3-4 players 1 deck of cards, minus the face cards Ace = 1



- 2. Each pair of cards that makes 10 is placed face up in front of the player who makes it.
- 3. The winner is the player with the most pairs when no more 10s can be formed.

#### Leftovers

Materials: 2 players 1 deck of cards, no face cards 25 bingo chips

- 1. One player deals half the cards to each player.
- 2. Both players turn over their top two cards.

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- 3. Each player determines how close the total of their cards is to ten.
- 4. The player whose total is closest to ten gets a chip. Ties are both rewarded a chip.
- 5. The game is over when the chips are gone. The winner is the person with the most chips.





#### **Making Tens**

Materials: 2 players 5 or more regular dice 10 bingo chips, or any other counter



- 1. One player rolls all the dice and makes groups of ten with the numbers rolled. The total points left over after making tens is remembered by the player.
- 2. The second player takes a turn.
- 3. The player with the least leftover points wins the round and takes one bingo chip.
- 4. The game is over when the chips are gone. The winner is the person with the most chips.

#### **Knock Knock**

Materials: 2-4 players 1 deck of cards 10 counters



- 1. Aces are worth 1; face cards are worth 10.
- 2. Each player is dealt 4 cards, and the remaining cards become the draw pile.
- 3. The players take turns taking the top card from the draw pile, and discarding one of the cards in their hand.
- 4. They are trying to make the greatest possible total value.
- 5. When one player thinks he/she has the largest total, he/she says *Knock, Knock*. Everyone else has one more turn.
- 6. Players then add their totals. The winner takes one counter.
- 7. The game is over when counters are used up.

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Materials: 3 students 12, 20 or 30-sided die for each student 30 bingo chips

- 1. Each student rolls a die without the other students seeing the number rolled.
- 2. Each student, in turn, tries to predict whether they have the lowest, highest or in between number.
- 3. After hearing all the predictions, they may change their prediction.
- 4. Students show their number.
- 5. Each student who was correct receives a bingo chip.
- 6. The winner is the first child to get 10 chips.

#### Race to 10/100/1 000

Materials: 2-4 players

1 000, 100 or 10 place value mats
6, 20, or 30-sided dice
Base ten materials – units (1), longs (10), flats (100) and blocks (1 000)

- 1. Students roll die and the highest number goes first.
- 2. Students play in turn by rolling the die and taking the appropriate amount of units, longs, flats, etc.

e.g. a roll of  $19 = 1 \log (10)$  and 9 units (1s)

- 3. Students continue and make appropriate exchanges as needed.
- 4. The winner is the first to reach the targeted number: 10, 100 or 1 000.
- Variations: Start with 10, 100 or 1 000 and subtract the roll. Grades 4+ may race to 10 000+ or use decimal numbers.

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#### **Guess My Number**

Materials: Hundred Chart pocket chart or an overhead of a Hundred Chart

- 1. Pick a secret number from the hundred chart and don't tell the students what it is.
- 2. Have students ask you questions to try and guess what the number is? Sample questions include: is it more than/less than, odd/even, a multiple of \_\_\_, end in \_\_\_, have \_\_ tens/units, etc.
- 3. Cross off numbers on the overhead chart or flip them on the pocket chart as they are eliminated by student questions.
- 4. Use a tally to keep track of how many guesses it takes the class before they identify the secret number. Next time you play, try to beat that number of guesses.

Extensions:

- $\Rightarrow$  Students may play the game in partners or small groups.
- $\Rightarrow$  Use hundred charts in the various centuries.

#### What's Your Number?

#### Materials: 3 dice

Recording sheet

1. Roll the 3 dice.

e.g.

2. Arrange all three in order to make **6** different numbers.

<u>3 2 6</u>	326,	263,	632,	
	362,	236,	623.	

- 3. Record your numbers as in the example above.
- 4. Order your numbers from least to greatest.
- 5. Show your numbers using
  - pictures
  - standard notation
  - expanded form

Name \_\_\_\_\_

Date\_\_\_\_\_

#### What's Your Number?

\_\_\_\_\_ \_

\_\_\_\_\_ \_\_\_\_

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_ \_\_\_

Record your 3 numbers from the dice.

Make 6 different numerals using them.

Order the 6 numerals from least to greatest.

Draw a picture to show **1** of these numerals.

Write the numeral using standard notation.

Write the numeral in expanded form.

#### Hidden Number Game

- Materials: Whole class/small group/individual Overhead projector Base ten blocks Magic cloth
  - 1. Show the students part of an equation while part of the equation is hidden.

$$\square + \square = {}^{\text{or}}$$

2. Students determine the answer.

Variation: Show students part of an equation.

e.g. 11 + ? =

My number is 45. What is my hidden number?

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#### **Five Tower Game**

Materials: 2 players

Unifix cubes

2 dice

1 copy of the Recording Sheet per student

- 1. Roll the dice and take that many cubes.
- 2. Snap them into a tower.
- 3. Take turns doing this with your partner until you each have 5 towers.
- 4. Each player snaps his/her own 5 towers together into a train.
- 5. Compare your tower with your partner's. Whose is longest? How much longer?
- 6. Each partner now breaks his/her own train into **tens** and **ones**.
- 7. Record your results on the recording page.



Source: A Collection of Math Lessons by Marilyn Burns

Name	

Date \_\_\_\_\_

#### **Five Tower Game**

My train is cubes long.						
My partner's train is cubes long.						
Whose train is longer?						
How much longer is it?						
I have tens and ones in my train. Total cubes						
My train is cubes long.						
My train is cubes long.						
My train is cubes long. My partner's train is cubes long.						
My train is cubes long. My partner's train is cubes long. Whose train is longer?						
My train is cubes long. My partner's train is cubes long. Whose train is longer? How much longer is it?						

#### **Number Pattern Detectives**

\*Use of a vertical number line provides a powerful visual representation of place value number patterns which facilitates numerical understanding.

Materials: Chart paper-sized graph paper cut into strip (vertical number line), 2 or 3 columns across or adding machine tape Overhead projector Base 10 blocks—tens and ones Permanent black marker

- 1. Show students the vertical number line that you have prepared.
- 2. Divide students into pairs and number each student as 1 or 2.
- 3. Have a pair of students come up to the overhead and have partner 1 add 1 cube to the overhead. Partner 2 records the number on the vertical number line, either starting at the top or bottom of the line.
- 4. Continue bringing up pairs and having partner 1 add 1 cube and partner 2 record the new number. Partner 1 makes any trades as necessary.
- 5. When all pairs have come up, have the partners change roles and continue the activity.
- 6. When all pairs have come up a second time, stop the activity and have the students look for patterns on the vertical number line. If students identify repeating patterns, loop the repeating sequence, one colour for the ones place and one colour for the tens place.
- 7. Complete the number line another day, beginning where it stopped.

Extensions:

- $\Rightarrow$  You may wish to continue to 100 or beyond.
- $\Rightarrow$  Students may wish to make their own vertical number line and loop the patterns they see.
- $\Rightarrow Have students record the counting sequence on an empty 10 x 10 grid and see if there will be patterns to loop and then compare the two tools.$

0	0
0	1
0	2
0	3
0	4
0	5
0	6

Created by Manuel Silva

#### The Closest One

#### Materials: 2-4 players

1 deck of cards without face cards, 10 = 0Paper and pencil



- 2. Each player will turn over two cards from their pile.
- 3. Before doing this, each player predicts what they think the 2 digit number they can create might be.
- 4. Players then turn their top two cards and create a 2 digit number (i.e. 2, 7 can be 27 or 72).
- 5. Players calculate how close they are to their prediction.
- 6. The player who is the closest to their prediction receives 1 point.
- 7. The winner is the first player to reach 5 points.

Source: Les éditions de la Chenelière Inc.

#### **Pick the Place!**

Materials: 2 players Paper clip, pencil, spinner Paper

- 1. Players divide the paper in half and each one signs his/her name on the top of their half.
- 2. Each player then draws four blank spaces on their side of the paper on which they will write the digits they spin. You can adapt the game by having students draw two or three blank spaces.
- 3. One player spins the spinner and writes that digit in a chosen blank. If the spinner lands between two numbers, he chooses either number.
- 4. The players alternate turns until each player forms a four-digit number.
- 5. Each player states his number. If they are identical, the round is a draw. Otherwise, the player with the larger number draws the appropriate inequality symbol <> between the numbers and earns one point.
- 6. Play continues until one player earns five points and is the winner.

Source: The Mailbox Magazine, Primary Aug./Sept. 2003





Materials: 2 to 4 players

Hundred Chart (any century) One set of cut out numbers to match hundred chart

- 1. Each player picks up 7 numbers and places them in front of them so that they are not visible to the other players.
- 2. Each player in turn places a number anywhere on the chart,
- 3. In the next, and all other rounds, the number must be placed beside, above or below (diagonal to the number is accepted as well) one of the numbers already on the board.
- 4. If the player cannot place a number, then another must be drawn from the pile and play passes to the next player.
- 5. The first player to put all of his or her numbers on the board is the winner.

Source: Manitoba Education and Training Website http://www.edu.gov.mb.ca/ks4/cur/math/activity\_games.html

#### **Hundred Chart Picture**

Materials: 10 x 10 Grid Crayons

- 1 Colour a picture using different colours on the hundred chart you wish to work with.
- 2. Each student gets a hundred chart in a predetermined range.
- 3. Ask students to colour certain number boxes in specific colours, one number at a time and not in sequential order.
- 4. When finished, the student should have an identical picture to the teacher's.

Extension:

- $\Rightarrow$  This activity can also be done by providing students with written instructions as to which numbers to colour in each colour.
- $\Rightarrow$  Use any 10 x 10 grid with varying number ranges such as 501 to 600 or 351 to 450.

#### Hundreds Chart Tic-Tac-Toe

Level:	Grade 2 and up
Skills:	Identification of place value 1—100
Players:	2
Equipment:	1 hundreds board, cards (Ace=1) - 9, paper, pencil, markers
	(2 different colours)
Getting Starte	d:
	Players select a colour of marker. The goal of the game is for a
	player to get three or more of their markers in a row either
	vertically, horizontally or diagonally. Player number one begins by
	drawing two cards and making this number to their partner: i.e.
	draw 6, 3 and says "six tens and three ones equals sixty-three".
	Player number one then covers this number with their marker.
	Then this player verbally gives the other number that they can
	make with their two cards (i.e. thirty-six) and covers that number.
	Player number two then takes a turn, drawing two cards and
	covering both numbers, remembering to verbalize the tens and
	ones place value to the other player. Play continues until one
	player gets three or more of their markers in a row. When this
	happens, this player scores two points for each marker in a row
	(i.e. six points for three in a row, eight points for four in a row, and so on).
	Distant can also staal on opponent's space. When a player makes a

Players can also steal an opponent's space. When a player makes a number already occupied by their opponent, they can replace it with their own marker. For each number stolen, they receive five points.

If a player draws two cards that they have already drawn, two new cards may be taken.

Players can play until a set time limit is reached or they reach a certain number of points.

Source: Math Games for Kids Using Special Dice by Joanne Currah and Jane Felling

Hundred Chart

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

**101-200 Hundred Chart** 

101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200

201-300 Hundred Chart

201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300

**301-400 Hundred Chart** 

301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330
331	332	333	334	335	336	337	338	339	340
341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370
371	372	373	374	375	376	377	378	379	380
381	382	383	384	385	386	387	388	389	390
391	392	393	394	395	396	397	398	399	400

401-500 Hundred Chart

401	402	403	404	405	406	407	408	409	410
411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430
431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470
471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490
491	492	493	494	495	496	497	498	499	500

501-600 Hundred Chart

501	502	503	504	505	506	507	508	509	510
511	512	513	514	515	516	517	518	519	520
521	522	523	524	525	526	527	528	529	530
531	532	533	534	535	536	537	538	539	540
541	542	543	544	545	546	547	548	549	550
551	552	553	554	555	556	557	558	559	560
561	562	563	564	565	566	567	568	569	570
571	572	573	574	575	576	577	578	579	580
581	582	583	584	585	586	587	588	589	590
591	592	593	594	595	596	597	598	599	600

601-700 Hundred Chart

601	602	603	604	605	606	607	608	609	610
611	612	613	614	615	616	617	618	619	620
621	622	623	624	625	626	627	628	629	630
631	632	633	634	635	636	637	638	639	640
641	642	643	644	645	646	647	648	649	650
651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670
671	672	673	674	675	676	677	678	679	680
681	682	683	684	685	686	687	688	689	690
691	692	693	694	695	696	697	698	699	700

701-800 Hundred Chart

701	702	703	704	705	706	707	708	709	710
711	712	713	714	715	716	717	718	719	720
721	722	723	724	725	726	727	728	729	730
731	732	733	734	735	736	737	738	739	740
741	742	743	744	745	746	747	748	749	750
751	752	753	754	755	756	757	758	759	760
761	762	763	764	765	766	767	768	769	770
771	772	773	774	775	776	777	778	779	780
781	782	783	784	785	786	787	788	789	790
791	792	793	794	795	796	797	798	799	800

801-900 Hundred Chart

801	802	803	804	805	806	807	808	809	810
811	812	813	814	815	816	817	818	819	820
821	822	823	824	825	826	827	828	829	830
831	832	833	834	835	836	837	838	839	840
841	842	843	844	845	846	847	848	849	850
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861	862	863	864	865	866	867	868	869	870
871	872	873	874	875	876	877	878	879	880
881	882	883	884	885	886	887	888	889	890
891	892	893	894	895	896	897	898	899	900

901-1 000 Hundred Chart

901	902	903	904	905	906	907	908	909	910
911	912	913	914	915	916	917	918	919	920
921	922	923	924	925	926	927	928	929	930
931	932	933	934	935	936	937	938	939	940
941	942	943	944	945	946	947	948	949	950
951	952	953	954	955	956	957	958	959	960
961	962	963	964	965	966	967	968	969	970
971	972	973	974	975	976	977	978	979	980
981	982	983	984	985	986	987	988	989	990
991	992	993	994	995	996	997	998	999	1000

#### **Blank Hundred Chart**


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# 1 to 100 Base Ten Hundred Chart

37

(Base ten blocks are abstract and should only be introduced in grade 3 or 4.

Base ten blocks are abstract and should only be introduced in grade 3 or 4 once students demonstrate an understanding of place value concepts.

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Created by Manuel Silva

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<sup>\*</sup>Use these alternate place value spinners for various activities or instead of dice.



<sup>\*</sup>Use these alternate place value spinners for various activities or instead of dice.





<sup>\*</sup>Use these alternate place value spinners for various activities or instead of dice.

 $\Rightarrow$  Cut a hundred chart into Jigsaw puzzle pieces and have the students reassemble the hundred chart again.

 $\Rightarrow$  Provide students with hundred chart jigsaw pieces that only have one or a few numbers written on it and the students have to fill in the missing numbers from that section of the chart. Use various shapes to the puzzle pieces.

 $\Rightarrow$  Use the 1 to 100 Base Ten Hundred Chart with pictures of base-ten materials on it, to do the same jigsaw activities mentioned above. Extend to charts in higher ranges, such as 401 to 500.

# Number Before/After/Between

Setting up activities that emphasize children working with numbers that come before/after/between other numbers helps to expand a child's understanding of number. Some activities include:

- $\Rightarrow$  Oral activities with students, which can including using number wands.
- $\Rightarrow$  In pairs, one student covers 10 numbers on a hundred chart with counters. The partner records the number on a piece of paper and indicates which number comes before and/or after.
- $\Rightarrow$  Children create a tic tac toe grid. The first child fills in a number in the middle square. The partner fills in another square with an appropriate number, using a different colour. The children alternate turns until a row of 3 consecutive numbers has been formed by a player's numbers in their colour.
- $\Rightarrow Have children cut out sets of 3 or more squares from squared paper (2 cm grid paper works well). The child places the square on the hundred chart and fills in the missing numbers.$

(Source: Explorations 2 by Addison-Wesley)

- ⇒ Students need lots of opportunity to create their own base-ten materials and to explore various ways of creating the same number. Creating their own place value kits of tens and ones can be done by using things such as glitter glue and popsicle sticks. This tends to work better than the traditional beans glued to popsicle sticks as the tend to unglue easily.
- ⇒ Digi-blocks are also a good commercial material to use since students have to "pack" and "unpack" the tens and hundreds rather than exchange for a pre-fabricated ten long or hundred flat that can not be taken apart. (For more on digi-blocks, visit the website www.digi-block.com.)



Source: Dale Seymour Publications



Source: Dale Seymour Publications



Source: Dale Seymour Publications



Source: Dale Seymour Publications

#### **Toss It!**



# **Toss It!**



Created by Manuel Silva

# Toss It!

Tens	Ones	Tens Ones
tens and	_ones =	tens andones =
Tens	Ones	Tens Ones
tens and	_ ones =	tens and ones =
Tens	Ones	Tens Ones
tens and and	_ ones =	tens and ones =

Created by Meagan Mutchmor

Place Value Activities

Winnipeg School Division

51

### **Make It Four Ways**

\*In order to expand place value and number sense understanding, students need the opportunity to explore and demonstrate various representations of the same number. This will lead to a better understanding of questions such as, how many tens are in the number 123? Students should respond 12.

Materials: Blank paper Pencil Base ten blocks or other materials

- 1. Assign each student a number up to 99 or have students pick a number from a container.
- 2. Provide each student with a blank paper and have them fold it into 4 squares.
- 3. Students reproduce the number that they were given or chose in 4 different ways using the blocks.
- 4. Students then record their 4 different representations of the number on their paper using words and numbers.

For example, 85 could be 8 tens and 5 ones, or 7 tens and 15 ones, etc.

Variations:

- $\Rightarrow$  Use other materials instead of the base ten blocks to do this activity.
- $\Rightarrow$  Work with numbers in the hundreds.
- ⇒ Make playing cards with 3 or 4 different ways of naming the same quantity. Include 10 to 12 different quantities. Students can play Concentration or Snap. They can also create their own sets of cards.
- $\Rightarrow$  Make or have student make puzzles that show different representations of the same number. Mix them up and let students put them together in a centre.

# **Digit Place**

Materials: 2 players Paper

- 1. One player picks a 2-digit number. (The digits should be different.)
- 2. The other person tries to guess the number.
- 3. For each guess, the first person tells how many digits in the guess are correct **and** how many of the correct digits are in the correct place.
- 4. A chart may help to keep track of guesses. Do not tell which digit is correct just how many.

Guess	Digit	Place
27	0	0
13	1	1

Play again with the other player guessing this time. Can also use 3-digit numbers.

Source: A Collection of Math Lessons by Marilyn Burns

#### **Stars**

Materials: 2 players A way to time 1 minute Paper or notebook and pencil

- 1. Players predict how many stars they think they can draw in 1 minute. They record their prediction on paper.
- 2. Player 1 makes stars while the partner times 1 minute.
- 3. When 1 minute is up, the player circles groups of 10 stars.
- 4. The player records how many 10s and how many 1s they have.
- 5. Repeat the activity and then have players switch roles.

Source: A Collection of Math Lessons by Marilyn Burns

Materials: Kidney beans Paper and pencil

- 1. Students predict how many times they can pinch (grab) exactly 10 beans.
- 2. Students predict how many times they think they can pinch 10 beans in 10 tries.
- 3. Students create a table to keep a tally of their results.

Less Than 10	10	More Than 10

4. Have students repeat the activity to see if they can improve their results. Students may use popcorn or other objects instead. They may even add up the total amount of beans that they pinched after ten tries.

Source: A Collection of Math Lessons by Marilyn Burns

#### Handfuls

Materials: Place Value board Beans, cubes, counters Small cups, paper and pencil

- 1. Students predict how many beans they can hold in a handful.
- 2. Students take a handful of beans and use the cups to group the beans into groups of 10.
- 3. They place the cups on the place value board along with extra beans. They record the results. Repeat with cubes and counters.

Handfuls of	 	 _
Count:		10a
		108
15		

Source: A Collection of Math Lessons by Marilyn Burns

## Make a Shape

Materials: 2 players Crayon Colour tiles White paper

- 1. On white paper, the student draws a shape that they think can be covered by 32 tiles.
- 2. Students cover the shape using 10 tiles of one colour, then 10 of another colour, and so on until the shape is covered.
- 3. Students record the number of tiles they used.
- 4. Students now draw another shape that they both think can be covered by 32 tiles and repeat the activity.

Source: A Collection of Math Lessons by Marilyn Burns

#### Fill the Cube

Materials: 1 unifix cube Popcorn kernels Lentils Paper and pencil

- 1. Students predict how many kernels of popcorn they'll need to fill the unifix cube.
- 2. Students record their predictions on their paper.
- 3. Students fill the cube.
- 4. Students group the kernels into groups of 10. They count how many 10s and 1s and record it.
- 5. Students then repeat the activity with the lentils.

Prediction: Popcorn Lentils	
Count:	
Popcorn	Lentils
10s 1s	10s 1s

Source: A Collection of Math Lessons by Marilyn Burns

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# Fill the Boxes

Materials: Unifix cubes 3 boxes Paper and pencil

- 1. Students pick one box and predict how many cubes it will take to fill the box and close it with the lid.
- 2. Students record their predictions and then fill the box.
- 3. Once the box is filled, the student removes the cubes and snaps them into trains of 10.
- 4. They count 10s and 1s and record the answer on the paper.
- 5. Students repeat the activity with the other two boxes.



Source: A Collection of Math Lessons by Marilyn Burns

# I Have....Who Has...?

Materials: One game card per student

- 1. Each student receives a card.
- 2. The teacher selects a student to start. The student reads his/her card, i.e. I have..., who has...?
- 3. The student who has the number that matches the criteria indicated will read his/her card next.
- 4. The game continues until it comes full circle back to the student who began.

Adapted from the game Who Has? at http://www.edu.gov.mb.ca/ks4/cur/math/activity\_games.html

I Have...Who Has...?

I have	I have	I have
15	18	13
Who has 3 more?	Who has 5 less?	Who has 4 less?
I have	I have	I have
9	19	20
Who has 10 more?	Who has 1 more?	Who has 10 less?
I have	I have	I have
10	5	1
Who has half of me?	Who has 4 less?	Who has 10 more?

I Have...Who Has...?

I have	I have	I have	
11	6	3	
Who has 5 less?	Who has half of me?Who has more?		
I have	I have	I have	
7	17	16	
Who has 10 more?	Who has 1 less?	Who has 2 less?	
I have	I have	I have	
14	4	2	
Who has 10 less?	Who has half of me?	f Who has 2 tens more?	

Adapted by Manuel Silva

I Have...Who Has...?

I have	I have	I have	
22	25	21	
Who has 3 more?	Who has 4 Who has less? more?		
I have	I have	I have	
27	24	12	
Who has 3	Who has half	Who has 4	
less?	of me?	less?	
I have	I have	I have	
8	26	23	
Who has my double plus 10?	Who has 3 less?	Who has 8 less?	

Adapted by Manuel Silva

# Pick a Path

#### Materials: 2 dice Game board

#### **Directions**:

- $\Rightarrow$  The object of this thinking game is to work together to fill in the game board with numbers in the range of 11 to 66, going from the smallest to largest number.
- $\Rightarrow$  Discuss with students that they will be using the dots on the dice to represent digits and they'll use these to create two-digit numbers. For example, if they roll a 2 and a three, they can make the number 23 or 32.
- $\Rightarrow$  Students begin by recording the number 11 in the first circle and the number 66 in the last circle.
- $\Rightarrow$  Students roll the dice and write the two possible two-digit numbers on a piece of paper. They then decide which number to add to the board and where to place it.
- $\Rightarrow Play continues until all circles are filled. However, if students roll two digits that do not create a number that can be placed on the board, then the game ends and they have to start over again.$

#### **Extensions**:

- $\Rightarrow$  Three dice may be used to create three-digit numbers.
- $\Rightarrow$  A 12-sided or 30-sided die may be used with younger children in order to help them learn how to play the game within a number range with which they are more comfortable.

# **Vocabulary**: before, after, between, smaller, less than, more than, bigger/larger

Source: Adapted by Kara Kolson & Suzanne Mole from an activity by Marilyn Burns



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# The Largest Number

Materials: 2 players

Deck of cards without face cards and without 10s (Ace=1)

- 1. Shuffle and deal the deck.
- 2. Players turn over three cards from their pile.
- 3. Players create the largest number possible with the three digits they have turned over.
- 4. The person with the largest number wins the 6 cards.
- 5. Continue play until one person wins all the cards or play for a specific amount of time.

Extension: Play the same game by forming 2-digit or 4-digit numbers.

Source: Les éditions de la Chenelière Inc.

## **Building Numbers**

Materials: Spinner with numbers 0-9 Paper and pencil

- 1. Students spin a spinner three times and record each spin.
- 2. Students record a three-digit number, then rearrange the digits to see how many three-digit numbers they can make.
- 3. Students record which of these numbers is greatest and which is least.
- 4. Students use place value models to represent the greatest and least numbers, then record a sentence telling about these numbers.

Extension: Students make a picture using the place value models. They tell how many are in their picture.

Source: Addison-Wesley

Materials: Any number of players

Pack of cards numbered 0 to 9 (4 of each numeral)

- 1. Deal 3 cards to each player. Turn them face up in the order in which they are dealt (left to right).
- 2. Place the remainder of the deck in the middle and turn one card face up, beside the deck.
- 3. Beginning with the dealer, each player has 3 choices:
  - keep the cards he has showing,
  - exchange any of his cards for the card facing up in the centre (top one only), or

- choose the top card of the deck (facing down) and use it to replace any 1 of his 3 cards.

His old card goes face up on top of the discard pile.

4. The winner is the player who can make the largest numeral after 3 rounds.

Source: Learning Concepts Limited 1972

#### More Than/Less Than

Materials: More than/less than spinner (10 +/-, 100 +/-), paper clip, pencil About 24 cards with numbers written on 1 side in the centuries (i.e. 234), and answers to corresponding spinner tasks on back Paper and pencil, 2 to 4 players

- 1. Shuffle the cards and place face up.
- 2. Player 1 picks a card and writes the number on his/her paper.
- 3. The player spins the spinner and changes the number on the card according to what the spinner tells him/her to do. Record on paper.
- 4. The player then verifies if the answer is correct by looking on the back of the card. If it is he gets 1 point.
- 5. The card goes to the bottom of the pile.
- 6. The other players repeat the same in turn.
- 7. Play continues until a player gets a predetermined number of points, such as 10.

234	
Front of card.	-







Spinner created by M. Silva

# Hungry Bug Makes Ten

Materials: Counters Empty Ten Frames List of 9+, 8+, 7+ equations

\*The purpose of this activity is to develop strategies for the sums between ten and twenty. It helps to develop the concept of 9+, 8+ and 7+.

*To solve* 9 + 4, *take nine counters and place them on a ten frame:* 



Nine is a "Hungry Bug" that wants to be ten; how many more does he need? (One) If he gobbles up one of the four, what is left? (3) The sum is 10 + 3.

Give the students more of the 9+ questions and have them follow the same strategy as described above.

Repeat the activity with 8 as the hungry bug and 7 as the hungry bug on different days.



8 +



7 +

Extension:

 $\Rightarrow$  Transfer the same activity to the empty bead number line.

Source: Adapted by Manuel Silva from *Base Ten Mathematics: Interludes for Every Math Text* by Mary Laycock, 1977

## One, Two, Three, Shh!

Materials: 1 grouping mat per student

- 3 small cups for each child (such as lids, Dixie cups, muffin cups, etc.)
- A container with small objects (such as beans, pebbles, bingo chips, bread tags, etc.)
- 1. Have students prepare their mats by folding up the bottom 2 sections so they have only 3 sections in front of them.
- 2. Say to students, **Point to the white side.** This is where we start placing our objects. Put your finger on the shaded side. When we have this many objects (3) we have made a cup, so the objects are collected and placed on this side.
- 3. When identifying numbers and amounts on the mat, students should read the mat from left to right, such as 0 cups and 0
- 4. Have students add 1 object at a time to the mat and read what is on it, such as 0 cups and 1, etc. When there is 0 cups and 4, there is no place on the mat for the object so students need to make a cup and place it on the shaded area.
- 5. Continue to add to the mat until you have 3 cups and 0. Now have the students reverse the project by removing 1 object at a time from the mat.
- 6. Students can play this in pairs on another day.

Variations:

- ⇒ Give pairs of students a flipping object (coin, 2-sided counter or bottle cap). Each child selects a side of the flipping object (heads/ tails, up/down, print/blank) which will designate their turn to add 1 more (or remove one). Their goal is to fill and empty their mat.
- $\Rightarrow$  Play the game using a die and rolling how many objects to put on the mat.
- $\Rightarrow$  Use the same activity to explore the bases of 4 and 5.
- $\Rightarrow$  Attach 2 mats together to work with numbers up to 10.

Source: *Explorations 2*, Addison-Wesley, 1987

Source: *Explorations 2* by Addison-Wesley

# How Many?

Materials: 8 containers (such as jars, bags, etc.)

8 collections of small objects (such as beans, pasta, beads, counters or cubes)Recording Sheet for each student

\*This activity works best as a centre.

- 1. Have 8 containers filled with 8 collections of small objects. Each container should have a different amount of objects in it.
- 2. Have students either look in one container at a time or spill out the container and estimate how many of objects are in the container. You may wish to provide students with small containers in which they can place their groups of 10.
- 3. They record their responses on the recording sheet.
- 4. Once the student has estimated, have them group the objects in groups of ten in order to verify how many there are. They then record their responses on the recording sheet.

Extension:

- $\Rightarrow$  Students can place the containers in order from least to most or most to least.
- $\Rightarrow$  Students can compare their estimates with the verified amount to see if they were close to the answer. They might also figure out the difference between the two numbers.
- ⇒ Students could do a similar activity and when they've identified how many objects are in the container, they can indicate on their sheet how much there would be if there were 10 more/less, 25 more/less, etc.
- $\Rightarrow$  Use money instead of objects and place various amounts of coins in 8 envelopes. Students count the amount of money.

You can also use this alternative page to record students' work:

Tens	Ones	

Activity by M. Silva

# How Many?

Container	Estimate	Verify	
Α	I estimate that there are tens and ones.	I verify that there are tens and ones	
В	I estimate that there are tens and ones.	I verify that there are tens and ones.	
C I estimate that there are tens and on		I verify that there are tens and ones.	
D	I estimate that there are tens and ones.	I verify that there are tens and ones.	
Ε	I estimate that there are tens and ones.	I verify that there are tens and ones.	
<b>F</b> I estimate that there are tens and ones		I verify that there are tens and ones.	
G	I estimate that there are tens and ones.	I verify that there are tens and ones.	

Created by M. Silva

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Created by Lisa Siemens

Materials: Base 10 blocks Paper and pencil Base 10 cut-outs (optional)

- 1. Students create a picture on their paper using the base 10 blocks.
- 2. Next, they trace the blocks or glue paper cut-outs of the blocks onto their paper.
- 3. Students can record the value of their picture or have a partner in the class find the value.
- 4. They may be challenged or they can challenge a friend to create a picture that has the same value as their picture.

### Hit the Target

Materials: 6 bingo chips Target board Paper and pencil

- 1. The target board should have three circles drawn as a dart board (3 circles within each other). The inner circle should have 100 written in the center, the middle circle 10 and the outer circle 1.
- 2. The student flicks the 6 chips onto the board.
- 3. The student then records how many chips landed in each circle and the number they add up to.



Source: *Explorations 2* by Addison-Wesley

N	ame
1N	ame

# Hit the Target

Hundreds	Tens	Ones	Total
**Place Value Cut-outs** 



Source: Explorations 2 by Addison-Wesley

# **Roll a Flat**

Materials: 4 players

Base ten blocks 1 regular die 3 computer mats per group, as below

- 1. One child is the banker
- 2. Each child rolls the die to determine who goes first.
- 3. Play continues clockwise.
- 4. On each roll, the child asks the banker for the number of units indicated ad places them on the units space of the computer.
- 5. When there are ten, the child groups and asks the banker for a long.
- 6. Whoever trades ten longs for a flat first wins.

Variations:

- $\Rightarrow$  Play using 2 dice or substitute dice for spinners.
- $\Rightarrow$  Keep playing until you exchange 10 flats for a block.
- $\Rightarrow$  Fill the computer mat and then subtract the amount rolled on the die or dice.

 $\Rightarrow$  Use the variation created by Barry Hammond by playing the game in the same way but using bingo chips in yellow, red, green and blue. The students exchange coloured chips rather than base-ten materials. Instead of working with base ten, work with other bases such as 3, 4, 5.

	му Со	mputer	
Blocks	Flats	Longs	Units
( <i>blue</i> )	( <i>green</i> )	( <i>red</i> )	( <i>yellow</i> )

Source: Base Ten Mathematics: Interludes for Every Math Text by Mary Laycock, 1977

# Money Exchange Game/Roll to ...

Materials: 2-4 players 1 die Play coins



- 1. Students roll die to determine who begins. Highest number begins the game.
- 2. Player rolls and takes appropriate coins. e.g. 4 = 4 pennies
- 3. Students exchange coins as needed. e.g. 5 pennies =1 nickel

5 nickels = 1 quarter

4. The winner is the first student to reach \$1.00.

Extensions: 10 pennies = 1 dime 10 dimes = 1 dollar 5 pennies = 1 nickel 2 nickels = 1 dime 10 dimes = 1 dollar etc.

## **Making Change**

Materials: Flyers and scissors 6 small 10 x 10 grids Crayon Play coins

- 1. Tell students that the grid represents 100 pennies which make up a dollar. You may wish to do some whole class samples first.
- 2. Students cut out 6 items from the flyers that cost less than \$1.00.
- 3. They glue the item with it's price and one of the grids side by side on the blank paper.
- 4. Using the play money, they reproduce the cost of the item. Next, using the crayon they colour in the equivalent number of boxes to match the price of the item.
- 5. Students then look at what's left and record that amount as their change due beside the grid on the paper.

Source: The Power of Ten by Trevor Caulkin



	A OTHER DE	
ollar: \$1.00	CCHANGE CHANGE	
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	A NULL OF A	
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# 10 x 10 Grid for Making Change

#### **Money Poem**

Penny, penny, easily spent, Copper brown and worth one cent.

Nickel, nickel, thick and fat, You're worth five cents. I know that.

Dime, dime, little and thin, I remember, you're worth ten.

Quarter, quarter, big and bold, You're worth twenty-five I am told!

Source: Unknown

#### SMART

My dad gave me one dollar bill 'Cause I'm his smartest son, And I swapped it for two shiny quarters 'Cause two is more than one!

And then I took the quarters And traded them to Lou For three dimes—I guess he don't know That three is more than two!

Just then, along came old blind Bates And just 'cause he can't see He gave me four nickels for my three dimes, And four is more than three!

And I took the nickels to Hiram Coombs Down at the seed-feed store, And the fool gave me five pennies for them, And five is more than four!

And then I went and showed my dad, And he got red in the cheeks And closed his eyes and shook his head -Too proud of me to speak!

Shel Silverstein

The Money-Value Song (Tune: Farmer in the Dell)

> A penny is one cent! A nickel is five! A dime is ten pennies, And a quarter is twenty-five!

A dollar is one-hundred Pennies in a row, Now with this little song, Money-value I know!

Source: Unknown

<u>The Dollar Song</u> (Tune: Ten Little Dinosaurs)

10 little, 20 little, 30 little pennies.40 little, 50 little, 60 little pennies.70 little, 80 little, 90 little pennies.100 pennies make a dollar!

2 small, 4 small, 6 small nickels. 8 small, 10 small, 12 small nickels. 14 small, 16 small, 18 small nickels. 20 nickels make a dollar!

1 tiny, 2 tiny, 3 tiny dimes.4 tiny, 5 tiny, 6 tiny dimes.7 tiny, 8 tiny, 9 tiny dimes.10 dimes make a dollar!

1 big, 2 big, 3 big quarters.4 big, 4 big, 4 big quarters.1 big, 2 big, 3 big quarters.4 quarters make a dollar!

Source: Unknown

### Money Trading Song

(Tune: Miss Lucy Had a Steamboat)

5 pennies trade a nickel 2 nickels trade a dime 2 dimes and a nickel trade a quarter every time 4 quarters trade a dollar And that is quite a lot And a dollar in my pocket is exactly what I've got!

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# **Place Value-Money Game Boards**

\*The following two game boards can be used to play place value or money concept games as outlined below.

Materials: 2 to 4 players

Game board, library card pocket or envelope Set of 20 cards, either place value concepts or money concepts Playing piece per player

- 1. Create a deck of about 20 cards which have different amounts of base-ten cut-outs glued on one side and the number representation on the other side. Use money cut-outs if doing a money concept game. Rubber stamps can also be used to create the deck of cards. Some of the cards could ask students to count backwards from random starting points or tell what number comes before/after a given number.
- 2. Draw 1, 2 or 3 dots in the bottom right hand corner of each card's answer side. This will indicate how many spaces students will advance on the game board if they get the correct answer.
- 3. Players place their tokens in the start spot.
- 4. The cards are shuffled and placed face up in a library card pocket or envelope so that they can't be seen.
- 5. Players determine who begins and the player takes the top card and tells the group what the value of the card is. The player or another player in the group checks the answer on the back of the card.
- 6. If correct, the player advances the number of squares corresponding to the number of dots on the answer side of the card. If incorrect, the player does not advance. The card is placed at the bottom of the pack.
- 7. Play now moves clockwise across the circle. The winner is the first player to reach the end of the board.





Source : Découvertes mathématiques



The following activities use the place value tents or the arrow cards.

- $\Rightarrow$  Call out a number and have students reproduce the number using the tents.
- $\Rightarrow$  Have students compose and decompose numbers with the tents. They may record their work in their journals or notebooks.
- $\Rightarrow$  Have students add numbers together using the tents. This is a great activity for developing mental math strategies using hundreds, tens and ones. Have large tents made as well so that students can act out using them in front of the class.
- $\Rightarrow$  Subtraction can also be done by decomposing the numbers using the tents.
- $\Rightarrow$  Multiplication and division could also be demonstrated using multiple copies of the tents.
- $\Rightarrow$  Use the tents with base ten blocks or digi-blocks to indicate the number that the students have reproduced with the concrete objects.
- $\Rightarrow$  Play the exchange game using dice or spinners and have students indicate the number with the tents.

Source: Australia Numeracy

6
Ĺ
9
S
4
3
7

Place Value Tents-Ones

	20	30
40	20	90

70	80	90

100	200	300
400	<b>200</b>	600

006
800
700

**Place Value Tents—Hundreds** 





Numeracy Project

# **Place Value Arrow Cards**







# TOP TEN TIPS FOR NUMERAL WANDS

Here are some suggestions for using the numeral wands.



- **MAKE THE NUMBER.** This could be 1/2/3 digits, depending on the grade group being targeted.
- **NUMBER AFTER.** Show the number that comes after the spoken number; problems may arise with 'teen' and 'ty' numbers.
- **NUMBER BEFORE.** Sounds easy, but some children are counting from one to find this number.
- **SHOW ME THE ANSWER.** This could cover any one of the four operations or even a combination of two.
- MULTIPLES. Can the children give a number that is a multiple of 2, 5, 10, etc.
- **BIGGEST NUMBER.** Select target digits and ask the children to show the "biggest three digit number", "the biggest three digit number you can make with your partner", "the biggest two digit number that does not use a 9".
- **PROBLEM SOLVING.** Problems that involve the use of the decimal point; calculations with measures and money.
- **BIG NUMBERS.** Focusing on thousands, ten thousands, etc. encourage children to make and say a big number.
- **ZERO.** Think about numbers that contain zeros, say these numbers and encourage the children to make them (talk about the place value that a zero holds in the middle or end of numbers).
- **ORDER PLEASE.** Children make a range of two digit numbers and another child has to order the children showing their numbers, look at the gaps between the numbers, what numbers are missing?

Teachers may wish to make two sets of numbers per wand in order that students may be able to create double digit numerals (ex. 44).

- ⇒ Important points to note when working with numeral wands are that the children are given some thinking time; therefore pose the question, ask children to solve it and to hold the answer to their chest. On the count of three all children show their answers together. This means those less-confident are given some time to gather their thoughts.
- ⇒ Secondly, encourage children to look at their own answers to check that the number 'reads' what it is expected to before showing it to the teacher. This is a habit that is best imposed early on!



### **Place Value Kits/Tools**

Each student could have their own place value kit to be used throughout the year. The kit could include a deck of cards, 2 dice, place value tents, place value pockets and set of numbers, etc.

Here are some other materials that can be created for use with developing place value concepts:

### **Counting odometer**

- $\Rightarrow$  Use a cylindrical container, such as a small juice can, for the odometer.
- $\Rightarrow$  Print the numerals 0 to 9 on each of 3 narrow strips of adding machine tape.
- $\Rightarrow$  Tape the 3 strips around the can.
- $\Rightarrow$  Tape a strip of construction paper with 3 windows over the 3 strips so that the numbered strips can still be moved. You should be able to see a numeral through each window.

This can be adapted to indicate multiples of hundreds, tens and ones so that a number can be created in expanded notation.



### Abacus

- ⇒ Each student will need a sturdy base, (i.e. a Styrofoam or cardboard tray, plastic lid, etc.), 3 straws, Plasticine, 3 cards labelled hundreds, tens, ones and 27 small light items that fit onto the straws (i.e. Cheerios, bread tags, washers, bolts, pasta, etc.)
- $\Rightarrow$  Students use the Plasticine to attach the straws to the base.
- $\Rightarrow$  The labels are placed in front of each straw.
- $\Rightarrow$  Students create numbers on their abacus by placing the small objects onto the appropriate straw.

Source: Explorations 2 by Addison-Wesley

# **Place Value Folding Pockets**

Hundreds	Tens	Ones

Source: Manitoba Education, Citizenship and Youth website http://www.edu.gov.mb.ca/ks4/index.html

0	1	2	3	4
5	6	7	8	9

Materials: 2-4 players

100 digi-blocks per group

- 1 recording sheet per group
- 1 die per group (+1, -1, +10, -10, -1, +10 on the faces) or the spinner
- 1. Players write their names on the recording sheet.
- 2. Give each group 100 digi-blocks (10 groups of ten).
- 3. Students place 60 digi-blocks (6 groups of ten) on the playing surface.
- 4. One student will be the recorder and the other students will roll the die. If playing with 4 players, they may pair up and play one team against the other. Each team would require a separate recording sheet but they could share 1 die.
- 5. Before play, students determine and write the criterion for the winning score, i. e. estimate what number they might finish at, more than/less than 60, etc. If playing 2 players against 2 players, then they might state that the winner is the team with the smallest/largest final number, the number closest to 60, the number with the largest digit in the tens place, etc. Write the criterion on the winning score line at the top of the page before the game begins.
- 6. The roller rolls the die and adds or removes the amount indicated on the die from the 60 digi-blocks. The recorder records the new amount on the page.
- 7. Play continues until they get to the bottom of the page. The winner is the team that meets the criterion.
- 8. Play again but have a new recorder.

Adapted from Give and Take from 200 from http://www.digi-block.com/

103

Team:

The winning score:

Team:

&

The winning score:

&

Team: & The winning score:

Tens	Ones
6	0

Tens	Ones
6	0

Tens	Ones
6	0



### **Digi-block Place Value Activities**

The following activities are some other great place value activities that can be found on the digi-block website at *www.digi-block.com*. Click on the Weekly Pack-it link and then the archived activities to find all of the available activities. The activities include directions and masters that can be copied off the site. Masters are saved as .pdf files. Grade levels are based on an American math curriculum. It is recommended that the teacher check out activities across the grade levels and find the ones more appropriate to his/her particular students. Many can be adapted for different abilities within the classroom.

### Kindergarten

Ten Scoop Ways to Make 10 Ten and Some More

#### Grade 1

First to 50 Lucky Number Countdown from 100 How Many in a Cup? Ten and Some Extra Complements to 100

### Grade 2

Race to 200 Count by Tens Give and Take Before and After

### Grade 3

Pack, Pack, Pack Give and Take from 200 Race to Zero Making Castles Match It Numbers Incognito It's Puzzling

### Grade 4

How Much, How Many...is 1000? How Big is it? Race to 500 Closer to Digit Shuffle Go and Stop What's in the Number? 105

# **Empty Number Line**

The empty number line is a tool that helps students develop number sense, arithmetical understanding and place value understanding. It is a powerful tool in the development of mental math strategies.

At the early stages of numerical development, children need to be able to rote count numerals and have one-to-one correspondence in order to be ready for using an empty number line. Being able to count-on is essential for the empty number line to be most effective. Pre-requisite skills to using the empty number line should include the 20-bead measure and then the 100-bead measure. These will help children to develop number sense and operational sense before using the empty number line.

Children need to start off by learning to anchor their numerical thinking to 5 and 10 and then build relationships with the numbers to 20. The 20-bead measure is a powerful tool at this point.

Next, children need to start counting out collections into groups of 10 plus groups of 10 with leftovers (ex. 12 is 10 and 2 leftovers) and make these connections using the 100-bead measure.

Once this is established, children need to begin concretely adding on 10, 20, 30, etc. to a nonmultiple still on the 100-bead measure. We want children to start progressing to thinking about addition and subtraction and recording their thinking on an empty number line. It is important to remember that we want to encourage children to begin with the largest addend when counting on. A simple beginning would involve adding a 1-digit number to another 1-digit number and then progressing to adding a 1-digit number to a 2-digit number.

Children will then begin to display an understanding of part-whole thinking. They need the ability to *make a 10* and to *jump by 10s and 1s*. By the end of grade 2, children need to know at least the three following skills in order to start to become flexible in their additive/subtractive reasoning abilities: *doubles, combinations for 10* and 10 + any single digit.

In order to progress in their part-whole thinking, children need to be able to jump by bigger groupings beyond 10. They may also incorporate a subtraction strategy into the addition equation. They will eventually begin to use alternate numbers rather than the ones in the equation in order to attain a response.

The same development will occur when working with multiplicative reasoning.

### More empty number line online at: www.wsd1.org/pc\_math

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Source: Manitoba Provincial Numerical Knowledge and Reasoning Assessment, 2004 \*This activity helps to demonstrate a student's place value understanding. Cover the tens and ones on the bottom of the page with a long strip of cardstock. Uncover a column at a time up to the asterisk. Once at 32, cover up 32 and continue to reveal more columns, adding on to the original 32. You will need to enlarge this page and copy it onto and overhead transparency. A similar activity called Incrementing Strips can be found in *Teaching Number: Advancing children's skills and strategies* by Wright, Martland, Stafford & Stanger, 2002, pp. 48, 183-184.

Numerical Knowledge and Reasoning Assessment

# **Operational Reasoning - Additive (Incrementing & Decrementing)**

1. -introduce <u>one</u> unifix cube, and <u>ten</u> unifix cubes linked in a 'long'; relate the concrete models to these pictured examples:



<u>I will uncover pictures of unifix cubes.</u> Tell how many cubes there are altogether.



Winnipeg School Division



Created by Manuel Silva

108

123

112


Created by Manuel Silva

109

128

97





## **Assessment - Digit-Correspondence Task**

This activity is based on a task found in the Comprehensive Assessment Program and can be done with the whole class. Two student samples are provided on the next two pages. Overheads can be made for use with the assessment. Teachers may further create their own similar tasks and use them periodically during the school year in order to assess students' growth in their place value understanding. This same activity can be done in an interview format using unifix cubes instead of the circle overheads.

This task is adapted from a research study by Sharon Ross (1989). Ross's study found that by presenting a digit-correspondence task to students, teachers were able to assess gaps in student understanding of place value. "In digit-correspondence tasks, students are asked to construct meaning fort eh individual digits in a multidigit numeral by matching the digits to quantities in a collection of objects. As measured by such tasks, even in the fourth and fifth grades no more than half the students demonstrate an understanding that the **5** in **25** represents five objects and the **2** the remaining **20** objects. (Kamii, 1982; Ross, 1986; Ross, 1990)"

Teacher script for the task: (script uses the 18 circles task)

Place overhead on projector.

Ask students: How many objects are in this picture?

Write the number on the transparency.

Say: Eighteen stands for 18 circles.

Circle the digit "8" in one colour and ask the students to do the same.

Ask: What does this part of 18 (pointing to the digit that you circled) have to do with how many circles are in the picture?

Ask the students to write down what they think and colour the picture to explain what they mean. Allow response time.

Circle the digit "1" in a different colour and ask the students to do the same.

Ask: *How about this part*? (pointing to the digit that you circled) *What does this part have to do with how many circles are in the picture*?

Allow students time to explain their thinking both in writing as well as by colouring on their paper.

Adapted by M. Silva





Adapted by M. Silva

## **Digit-Correspondence Task - Scoring Rubric** Five Distinct Levels of Understanding (Ross, 1989)

The following scoring rubric uses the 24 circles task as an example for scoring.

- 1. **Single Numeral**: The child writes 24 (or 18) but views it as a single numeral. The individual digits 2 and 4 have no meaning by themselves.
- 2. **Position Names**: The child identifies correctly the tens and ones positions but still makes no connections between the individual digits and the circles.
- 3. Face Value: The child matches 4 circles with the 4 and 2 circles with 2.
- 4. **Transition to Place Value**: The 4 is matched with 4 circles and the 2 with the remaining 20 circles but not as groups of ten.
- 5. **Full Understanding**: The 2 is correlated with 2 groups of ten circles and the 4 with 4 individual circles.