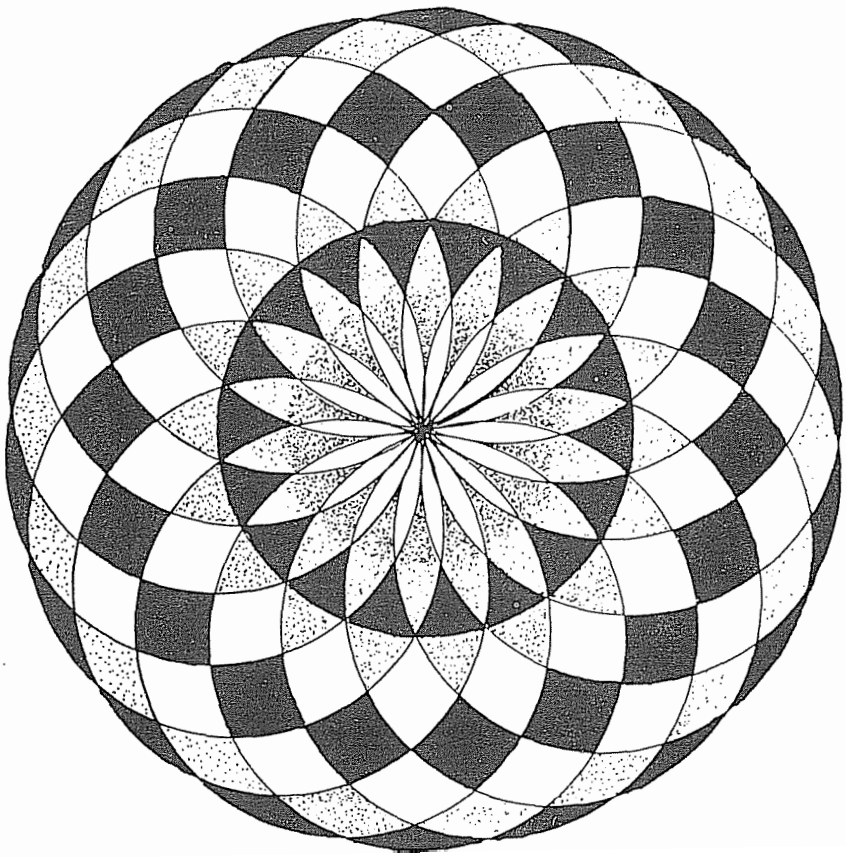
VOLUME II
NUMBER 3

Abacus

A publication of the O.A.M.E.

MARCH 1988

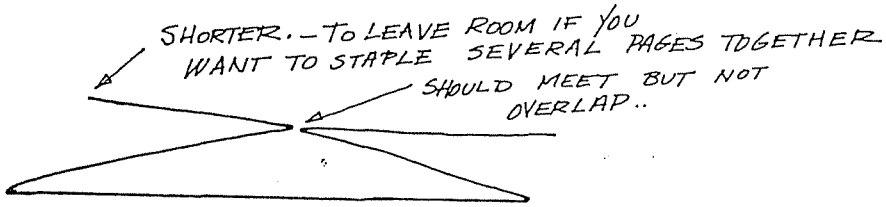


"Before LOGO"

EDITOR: RON RIPLEY
FACULTY OF EDUCATION
QUEEN'S UNIVERSITY

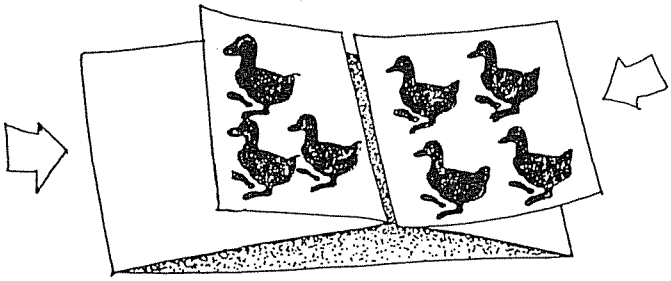
LAYOUT: FRANK CERISANO
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This issue was prepared by the Publication Committee of GVMA.



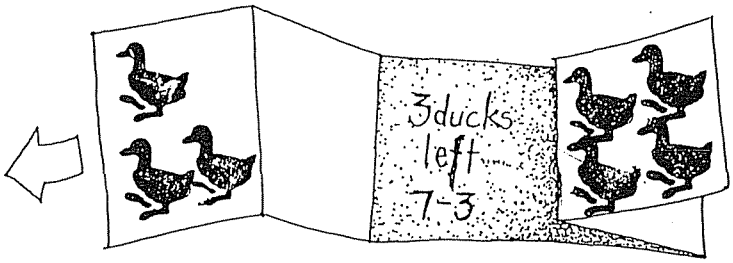
Problem Posing

Steve Lewis and Gary Flewelling
Wellington Board of Education



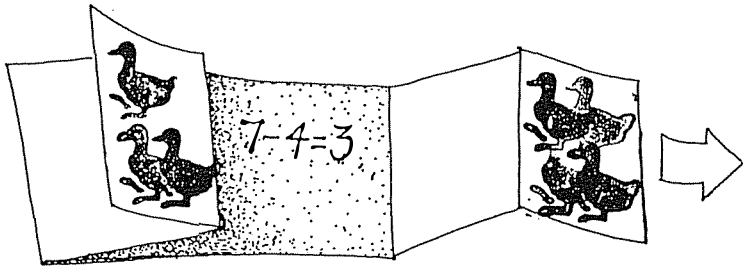
Students should be encouraged to ask and solve questions of their own devising. Here are a few ways in which it can be done.

- two sets of objects can be drawn by hand or by using a rubber stamp

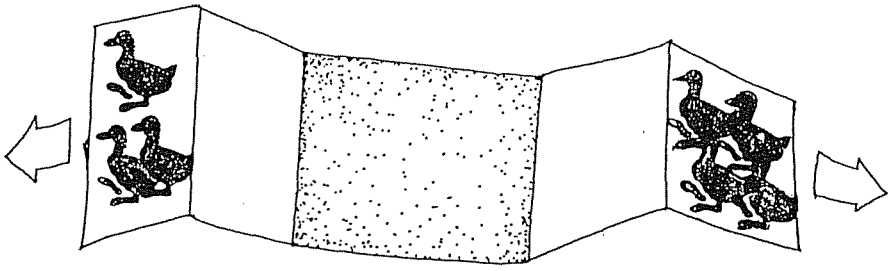


- in the centre section, write a story putting objects with context

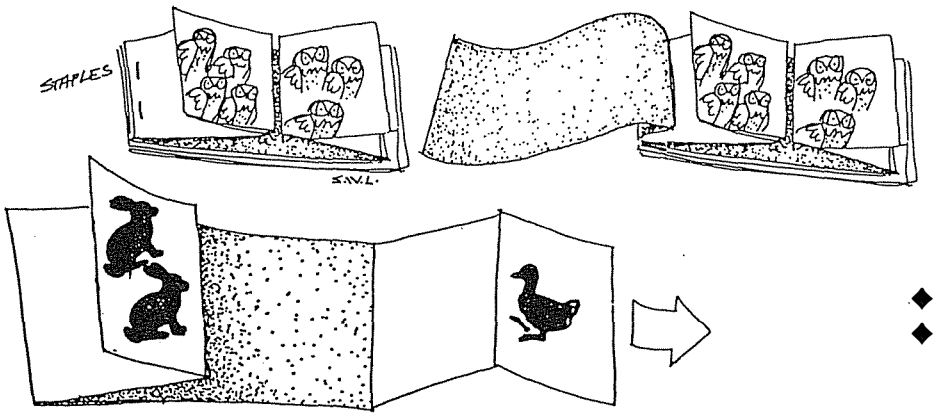
and/or



- students write their own number statements, with or without answers, for each set of pictures



- addition and subtraction action can be demonstrated

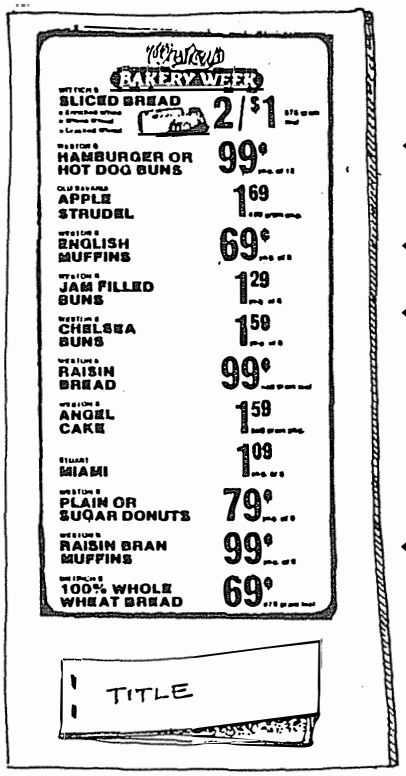


- make a book of a number of such pages
- add a construction paper cover and a title
- use different stamps
- student writes related problem

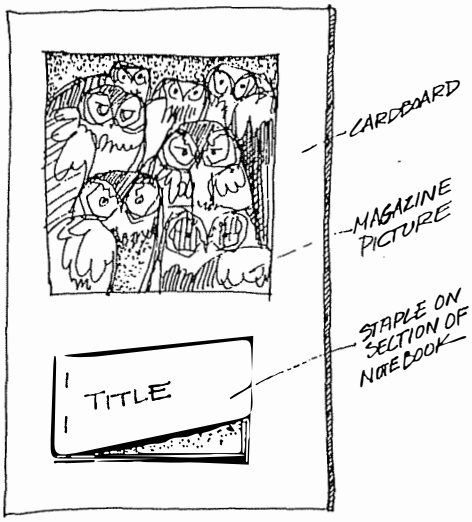


Challenge students to find fractions (or shapes or numbers or ...) as they occur in a picture of their choice (catalogues are excellent!).

- glue pictures on a sheet of paper or in special "fraction" (or shape or number or ...) book
- students write statements or stories about their picture
- language, math in "real world" built on a foundation of increasing visual awareness (for children at many levels of development)



- glue picture to a card
- each page is a new problem
- pictures can be from magazines, newspapers, menus, flyers, catalogues and so on
- answers could be written out and stored separately or written on the back of the card.



Making Room for Decimals

Doug McDougall
Waterloo County Board of Education

Objective:

The student will relate decimals to the concept of area.

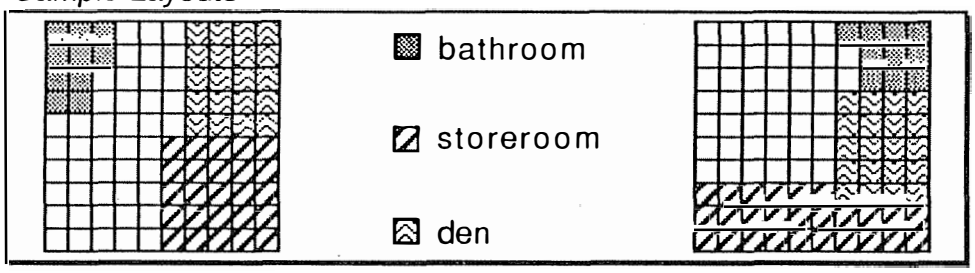
Materials:

10 x 10 grids
Coloured pencils or crayons
Pencils

Activities:

1. a) Using a 10 x 10 grid to represent a basement, show one way of dividing up the space so that:
   - 0.10 is occupied by a bathroom
   - 0.20 is occupied by a den
   - 0.25 is occupied by a storeroom
   - the remaining space is occupied by a recreation room.

Sample Layouts



   b) What decimal of the basement is your recreation room?

2. a) Using a 10 x 10 grid to represent a classroom in your school, design a classroom which contains:
   - a reading area
   - desks
   - bookcases
   - storage areas
   - activity areas

   b) Make a chart listing the areas of the classroom and the amount of space they occupy.

3. Each square on the grid represents one square unit of area. Have the students find the area occupied by each of the rooms in the basement created in Activity 1. The students should notice that the sum of the areas in each case equals 100 square units.

Hockey Playoff Action

Gary Flewelling, Doug McDougall, Stu Telfer
Grand Valley Mathematics Association

A scale drawing of a hockey rink (see next page) can present you with a mathematical opportunity that you can exploit as both a measurement, estimation and problem solving activity. Have the students perform the needed measurements and use the given scale to convert their answers.

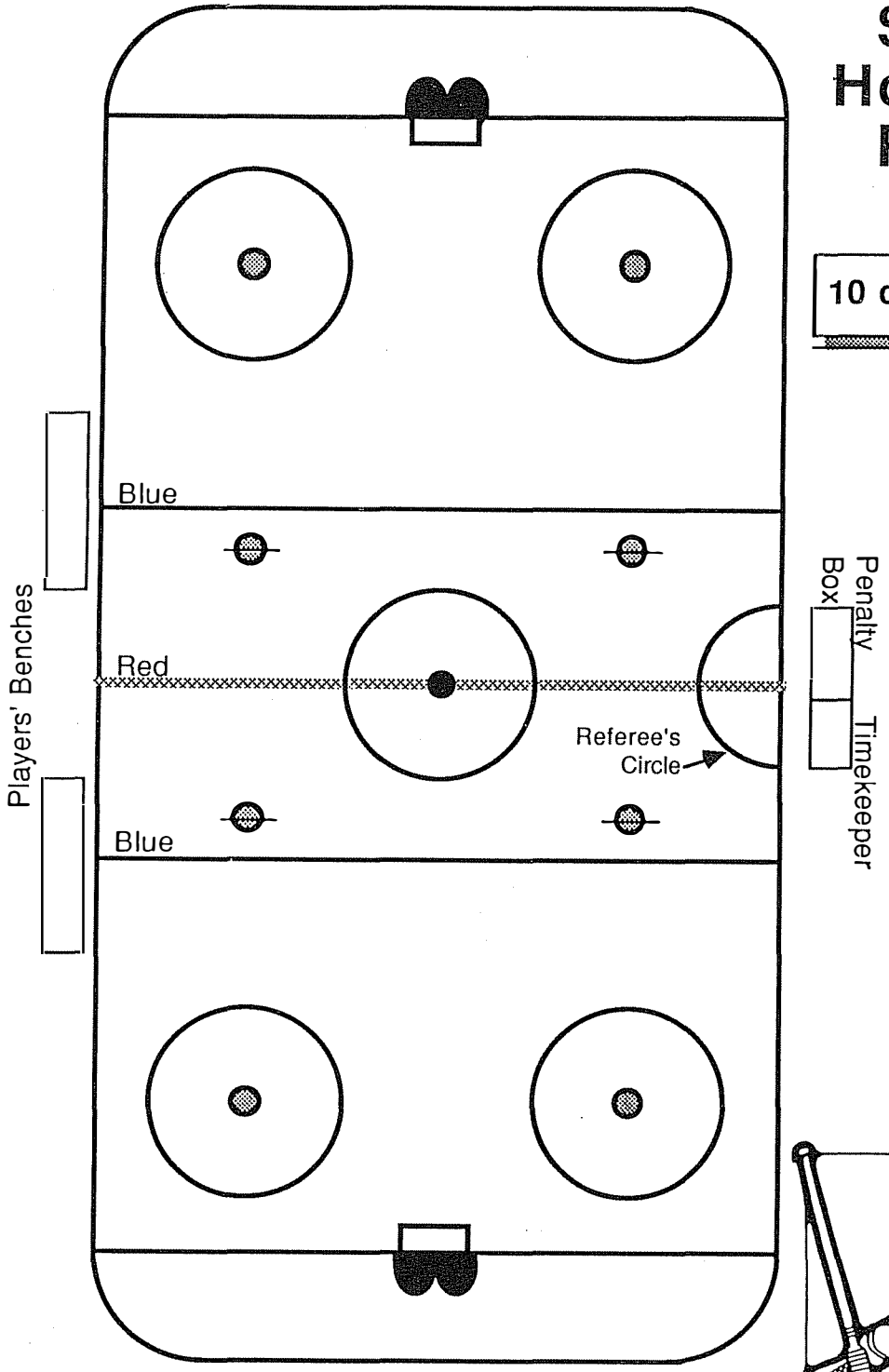
Below is a list of some possible questions that can be asked of students based on the diagram. There are many more that we are sure that you can add to the list. Also, you can extend the activity by having your students create the questions!

Note: some questions may require additional information that the student must find and other questions may have more than one answer

Sample Questions

- ❄ What are the dimensions of the hockey rink?
- ❄ What is the distance between the blue lines?
- ❄ What is the distance between the two nets?
- ❄ How far does a goaltender skate from his net to the player's bench?
- ❄ What is the radius of the centre face-off circle?
- ❄ Advertising space is rented along the boards at a cost of $100/m. How much money could be collected if all available space was sold?
- ❄ Estimate the area of the ice surface.
- ❄ What is the longest pass that can be made without being offside?
- ❄ If the ice surface is flooded to a depth of 3 cm, estimate the amount of water needed to flood the rink.
- ❄ A zamboni clears a track 2 m wide. How many trips around the ice surface are needed to clear the ice at intermission?
- ❄ How long is a shot from the right face-off circle to the net?
- ❄ A slapshot travels at 150 km/h. How long does a goaltender have to react if the shot is taken from: the blue line? centre ice? the back of the face-off circle?
- ❄ How many pucks wide is the goal crease?

International Size Hockey Rink



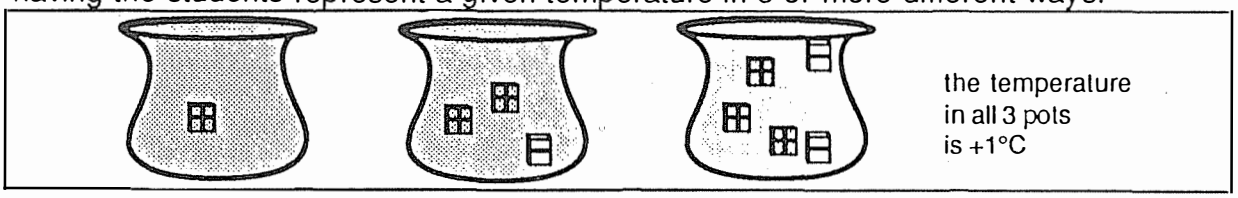


A Consistent Model for Integers

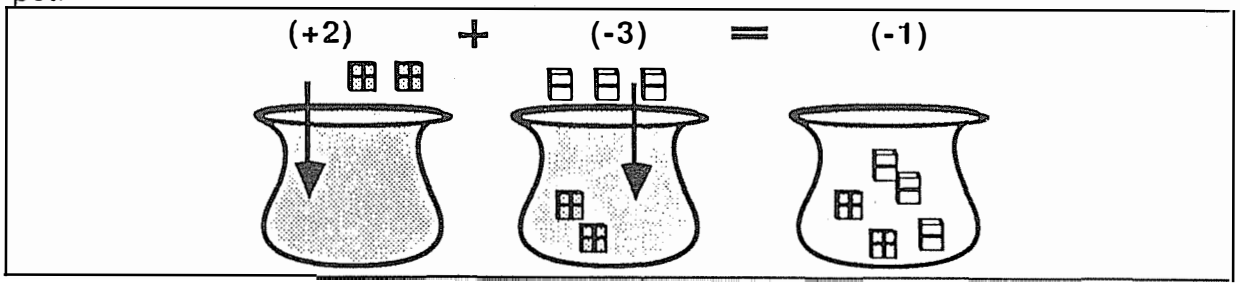
Stu Telfer
Waterloo County Board of Education

A practical model that can be used to illustrate the four basic operations with integers is, what I call, the "cubie model". The model is not new and it has appeared in many different forms, but it does offer a simple, concrete introduction to integers. The worksheets introduce addition and subtraction of integers (core topics in grade 7 and 8) but the idea can be easily extended to include multiplication and division. Apart from having the students draw the individual cubes, you may wish to have them use coloured disks (green for negative, red for positive) to represent the cubes.

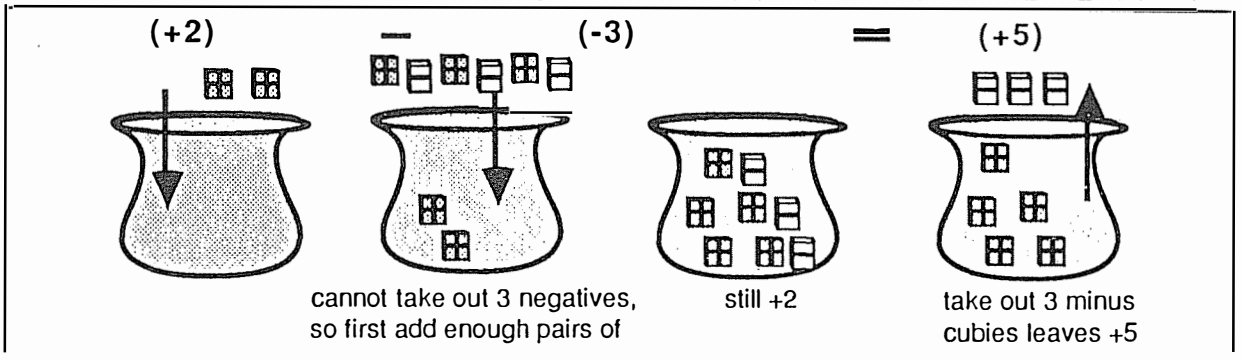
Worksheet #1 : The basic notion of the cubie model is that a pot has an initial internal temperature of 0°C. By adding a "plus cubie" to the pot, the temperature rises 1°C and by adding a "negative cubie" to the pot the temperature drops 1°C. The first worksheet requires that students are able to state the temperature of the pot after several cubies have been introduced. It is important that students realize that any given temperature can be represented in many different ways. Extend the activity by having the students represent a given temperature in 3 or more different ways.



Worksheet #2 : Addition is now a simple matter of the student adding cubies to the pot!

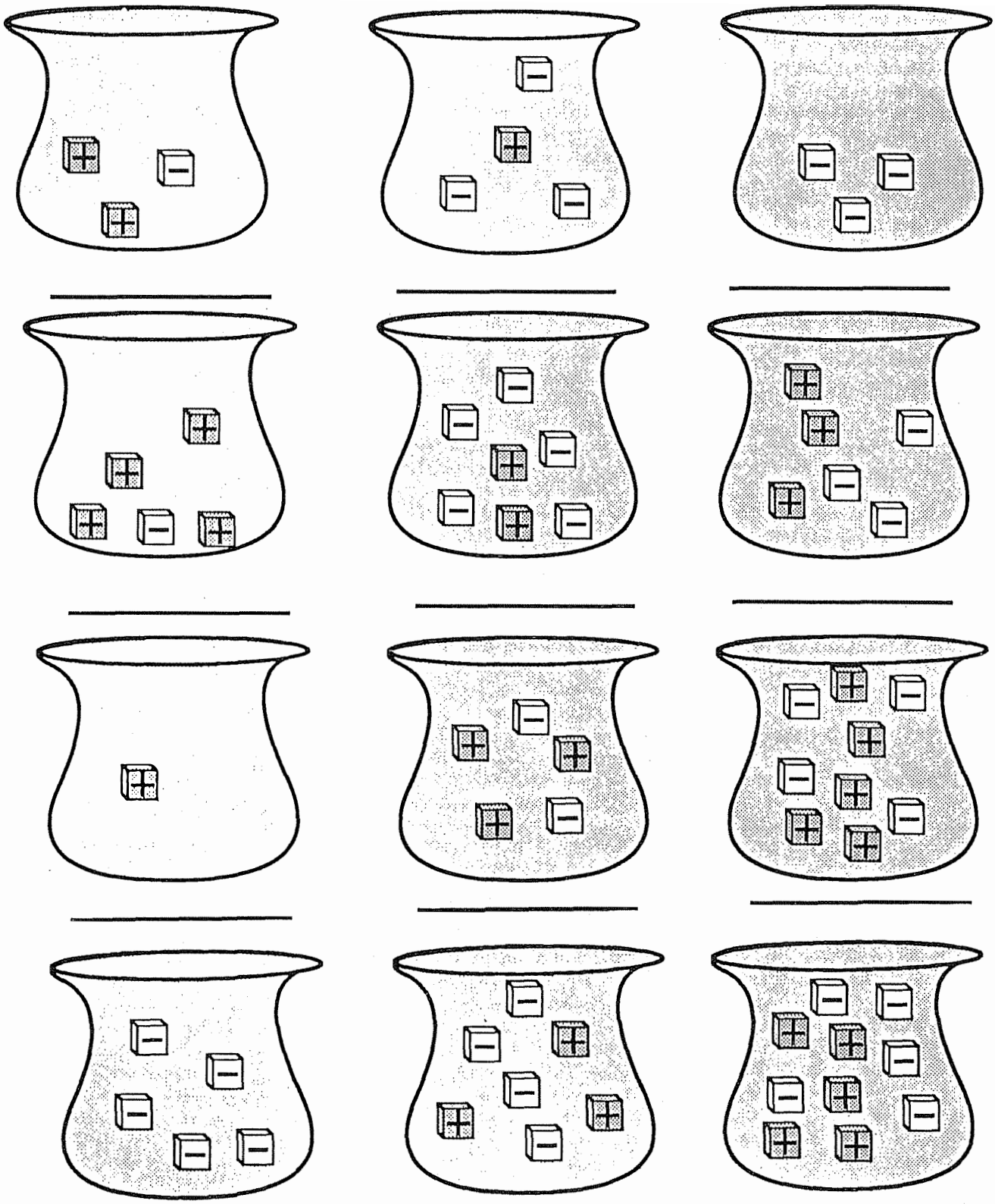


Worksheet #3 : Subtraction builds on the student understanding of 'taking away'. Some questions may require that students alter the number of cubies in the pot to allow for subtraction (see worksheet #1). With a little practice, this model can help students understand how 'taking away a negative' is the same as 'adding a positive'.



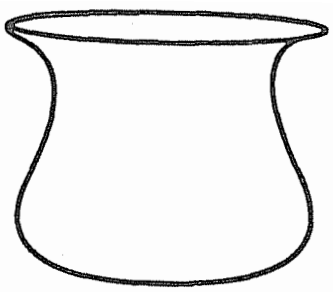
Worksheet #1

State the temperature in each of the following pots:

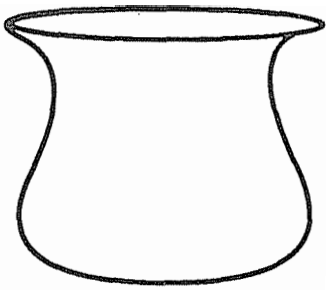


Worksheet #2

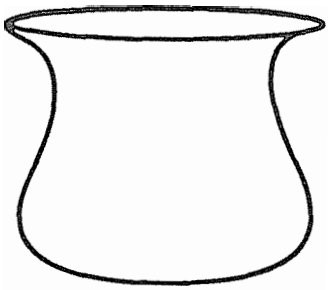
Represent the following additions and state the answer:



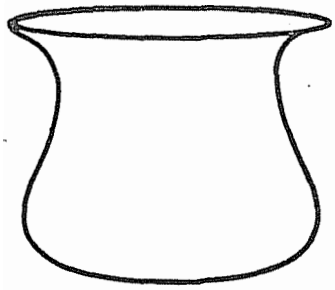
(+3) + (+2) = ____



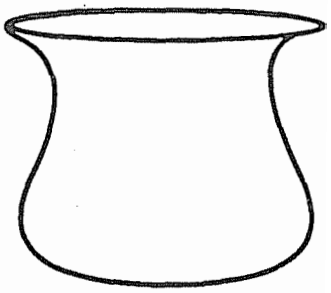
(+5) + (-3) = _____



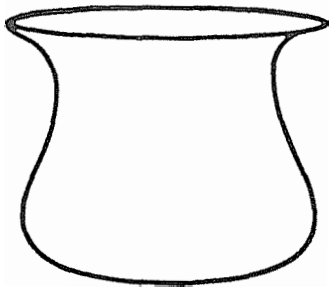
(-4) + (+4) = ____



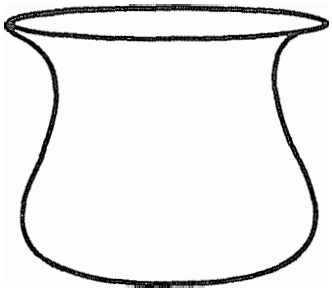
(+3) + (-5) = _____



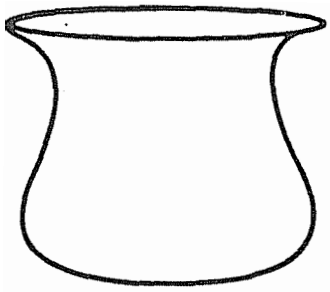
(-2) + (-4) = ____



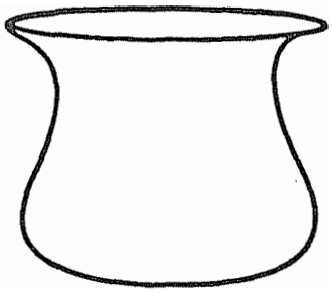
(-1) + (-3) =



(+2) + (-5) = ____



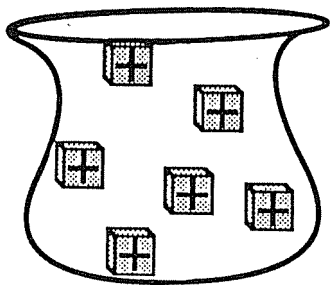
(-3) + (+7) = _____



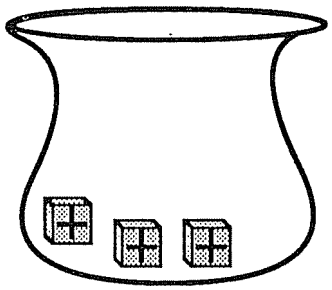
(+2) + (-5) = ____

Worksheet #3

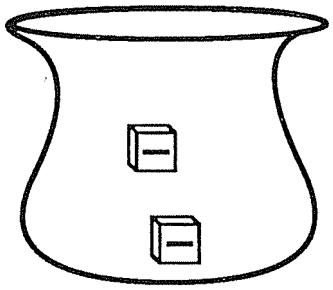
Represent the following subtractions:



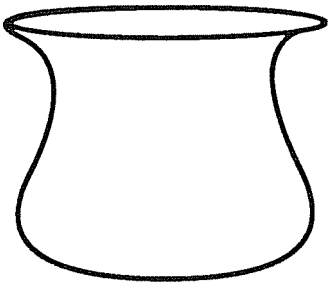
(+6) - (+4) =____



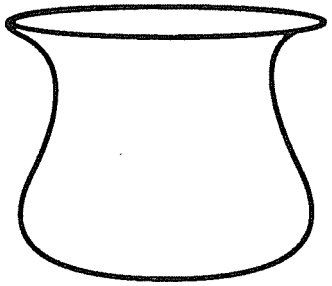
(+3) - (+4) = ____



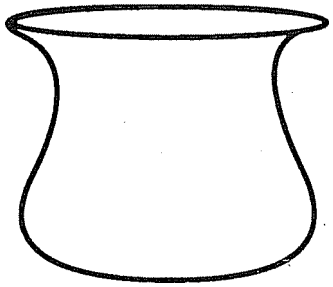
(-2) - (+3) = ____



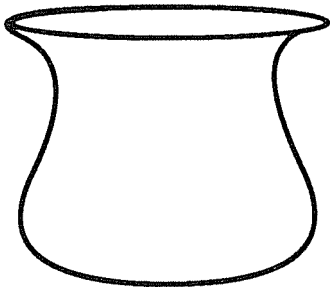
(-3) - (-5) = ____



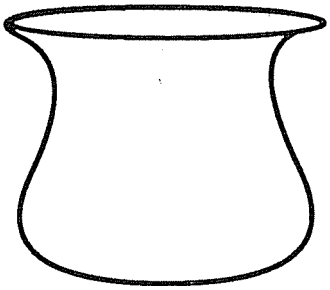
(-2) - (+4) = ____



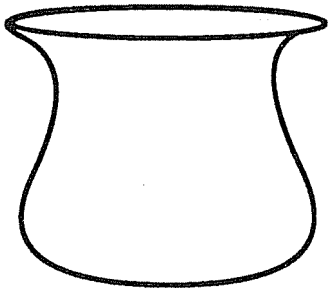
(+1) - (-2) = ____



(+5) - (+6) =



(- 3) - (-5) = ____



0 - (-4) = _____

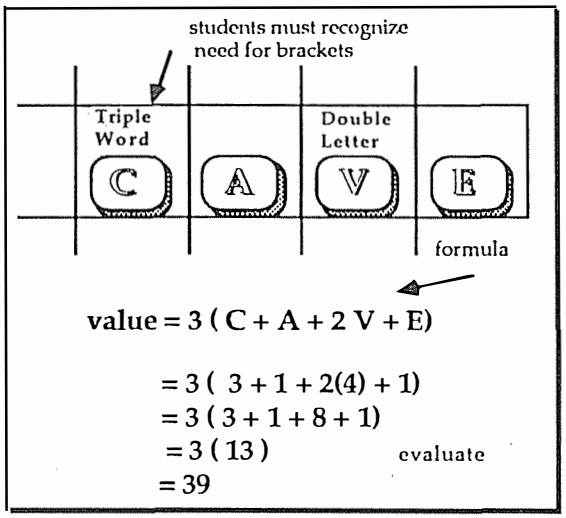
SCRABBLE© - An Introduction to Formulas

Stu Telfer
Waterloo County Board of Education

The use of a Scrabble© board can be a novel way to introduce formulas and substitution.

Often, we ask students questions such as: Evaluate $4a - 2c^2$ when a = 4, c=-3
Such a formula has no meaning or context. Using a Scrabble© board allows the student to not only give meaning to a formula, but also allows him/her to **create the formula**!

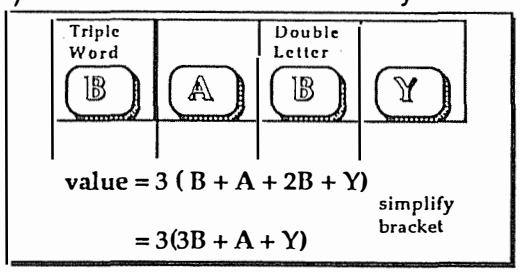
What the activity can do:



- allows the student to generate formulas (from simple to complex)
- reinforces procedures for substitution
- improves the students understanding of the use of brackets (since he/she must use brackets effectively to generate the formulas)
- provides a vehicle for estimation, mental arithmetic and problem solving
- **Worksheet #1** introduces how to create a formula from a word on a SCRABBLE© board. The letter values (same as in real game) are shown in the upper right corner of the worksheet but may be changed easily.
- **Worksheet #2** is an assignment based on a 'revised' SCRABBLE© board. **Note**: the values of the letters are NOT shown. Tell students to refer to worksheet #1 or give other values (try integers, fractions, decimals, etc.. to challenge them).
- **Worksheet #3** is a blank 'revised' SCRABBLE© board

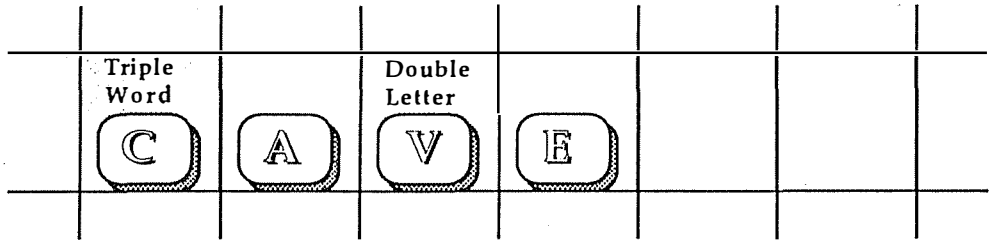
Extensions

- Problem Solving: Use the blank board and ask students to find the best location to place a particular word to maximize their score (i.e. find the best location to place the word MATH, based on specified letter values). This is an excellent activity utilizing reasoning and mental arithmetic.
- Let your students create their own scrabble boards with operations of their choice!
- Use words that will introduce the concept of collecting like terms.



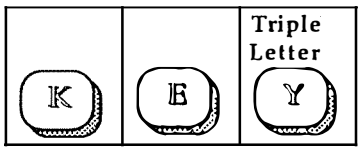
Worksheet #1

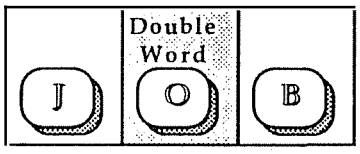
Scrabble© Number Phrases

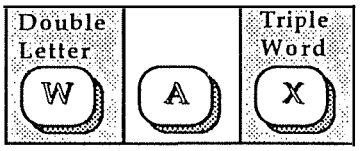


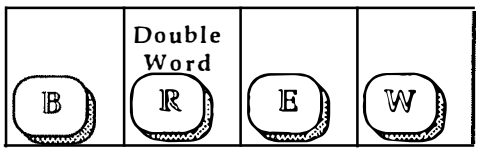
A	1	N	1
B	3	O	1
C	3	P	3
D	2	Q	10
E	1	R	1
F	4	S	1
G	2	T	1
H	4	U	1
I	1	V	4
J	8	W	4
K	5	X	8
L	1	Y	4
M	3	Z	10

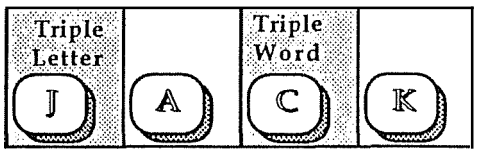
value = 3 (C + A + 2 V + E)
= 3 (3 + 1 + 2(4) + 1)
= 3 (3 + 1 + 8 + 1)
= 3 (13)
= 39

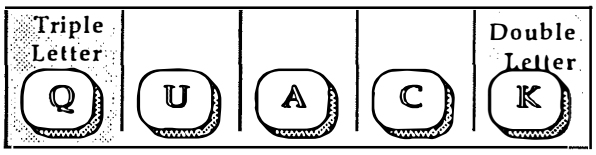


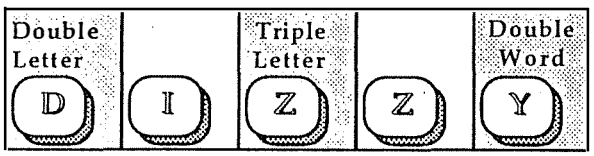








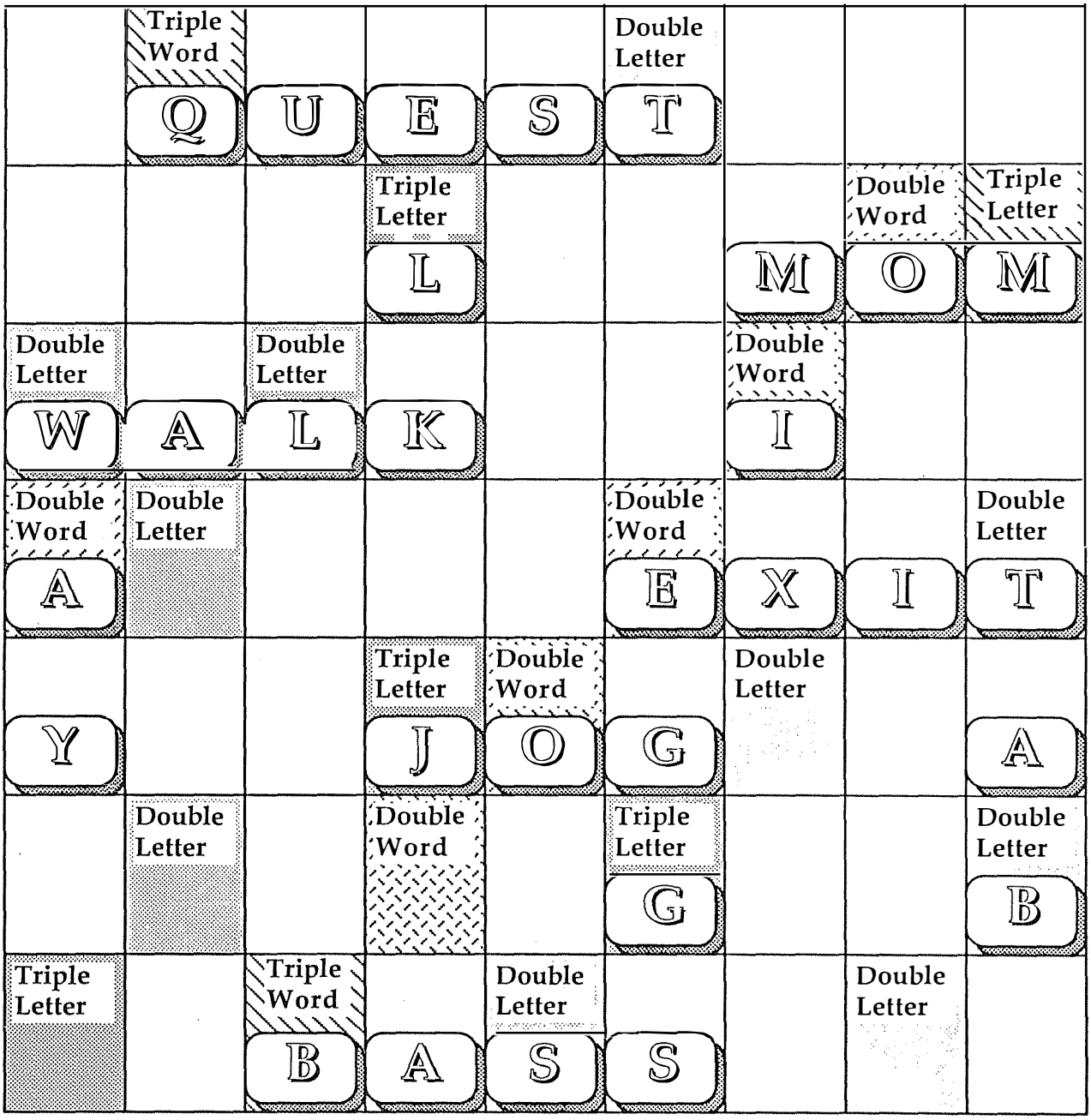




Worksheet #2

For each of the 11 words on the board,

- write an expression
- evaluate by substitution using values that the teacher assigns



Worksheet #3

MATH SCRABBLE © Board

	Triple Word				Double Letter			Triple Word
			Triple Letter				Double Word	
Double Letter		Double Letter				Double Word		
Double Word	Double Letter				Double Word			Double Letter
		Triple Letter		Double Word		Double Letter		
	Double Letter		Double Word		Triple Letter			Double Letter
Triple Letter		Triple Word		Double Letter			Double Letter	

COUNT - UP

Topic: Addition and Place Value

Grade Level: 2 - 3

Time: 10 minutes

Number of players: 2

Materials needed: Gameboard (on next page)
1 Die, 4 Markers

Object: To be the first player to reach 100

Rules:

1. Each player has a two markers
2. The first player rolls the die and places a marker on that number on the gameboard. Players take turns rolling the die.When there's a score over 10, two markers are used:one for the ones digit and one for the tens digit.
3. The game ends when one player reaches 100.

Variations:

1. Use two dice.
2. Start at 100 and subtract the numbers until one player reaches zero.
3. Use one board and let the players co-operate to reach the goal.

Some Criteria for Selecting Games:

1. Does the game teach what you want?
2. Is the game based on chance so that each child has a chance to win?
3. Is it enjoyable for the children?
4. Are the rules few and simple?

100	9
90	8
80	7
70	6
60	5
50	4
40	3
30	2
20	1
10	0
Start	

Player A

Count up ★

10	0
20	1
30	2
40	3
50	4
60	5
70	6
80	7
90	8
100	9
Start	

Player B