Abacus

From the desk of the Abacus editor

This issue of the *Abacus* will be a departure from the norm. You will find a collection of quite wonderful activities gathered from other journals across the continent. I hope you enjoy them and put them to good use in your classrooms.

I also hope they inspire you to submit your original activities to the *Abacus.*

Jennifer

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Math and Literature: Make a Connection!

Acknowledgement: This article, written by Kerri Wood, first appeared in the Spring, 1995 issue of the Wisconsin Teachers of Mathematics *journal. Kerri is a first grade teacher at Knapp Elementary School in Knapp, Wisconsin.*

Many ways exist to integrate curriculum, although, mathematics has frequently been left out of the integration picture. It has often been looked upon as an abstract and confusing language that isn't related to life outside of school or to other subjects in school. The NCTM (1989) *Standards* encourage the use of mathematics in other subject areas, as well as to use other subject areas in mathematics. Children need to see how mathematical ideas are related. They must also see how mathematical ideas are connected to everyday life, so they become aware of the usefulness of mathematics. Integration through math and literature is one way to make this happen.

Wonderful changes are in the wind. Children's literature has something great to offer to the study of mathematics – meaningful context. Through books, children come to see mathematics as a natural part of everyday life. Mathematics can no longer be relegated to completing workbook pages but rather, must become a purposeful tool for solving problems and making decisions (Whitin & Gary, 1994). No longer should mathematics be isolated from reality; number concepts, measurement, and problem solving are often times a natural part of a story. Children's books can give students the opportunity to connect their experience to various mathematical concepts and sometimes to the "not–so–real" fun of fantasy. Weaving the beauty of mathematics with the enjoyment and context of good literature makes an interesting and meaningful learning connection for kids.

My venture into the world of literature began about ten years ago. I began using real books first to supplement the basal reader program and eventually they replaced it. Then I fell upon the wonderful connection between my science and social studies themes and literature. Soon my reading program was linked thematically to science and social studies through the use of fiction and non–fiction books, poetry, plays and original writing. I was suddenly more enthused about my teaching and planning and my students seemed to be making connections and enjoying learning. Mathematics was the last area that I began to tie together with literature. I began to find that mathematics was a natural part of most of the stories I was already reading with the children. It became a matter of recognizing the natural use of

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mathematics in the stories and drawing upon these connections in planning learning experiences.

If you love books, you're really going to like what's happening in the world of books and mathematics. I have tried to illustrate the use of a few of my favourite children's books in several topic areas with activities I have used in the classroom. The enthusiasm for these books is contagious. Enjoy and get hooked!

Button, Button: Who's Got My Button?

I have used these books and poems with my students to interest them in exploring buttons. *The Button Box* by Margarette S. Reid is about a young boy exploring and sorting his grandmother's button box.

"The Lost Button" chapter in *Frog and Toad Are Friends* by Arnold Lobel tells how Toad loses one of his buttons on a walk and how he and Frog try to find it.

Corduroy by Don Freeman is a story about a bear named Corduroy who has lost the button on his overalls and searches all over the department store to find one. Lisa buys Corduroy and sews on a new button.

"Buttons" is a poem about exploring buttons on a rainy day. It is from *Soldiers* by Avelyn Davidson.

The following are tasks that I have used with my students as we investigated buttons.

1. Go on a button hunt. Have children collect buttons from home, neighbours, grandmothers, aunts, uncles and teachers. Watch the collection grow and notice certain characteristics or attributes that make them alike and different. These buttons can then be used for the following activities.
2. Give the children many opportunities to sort the buttons according to the attributes they select. Have them describe why they grouped a certain way or have other students guess their groupings.
3. When Toad lost his button, he had to be able to describe it very well in order to find it again. As students are sorting buttons, they usually will come across one that really strikes their fancy. Have students find their favourite button. On a large index card have each student describe their favourite button in as much detail as they can. Then all of the buttons get lost together in a pile. The children trade cards and see if they can find the button described on the card in the "Lost Button" pile.
4. Small groups of children can play "Button, Button, Who's Got My Button?" Children can take turns choosing one button or selecting one attribute and recording on the secret slate. Other group members must ask questions that can be answered with a "yes" or "no". If the answer is "yes", the button/s stay in the ring. If the answer is "no", the button/s go out of the ring. The children try to guess the button rule in as few guesses as possible.
5. Predict how many buttons are in the classroom. How many buttons are in the school? Interview classmates and teachers. Design a way to organize the data collected. (Beware! Kids may count belly buttons.)
6. Play the "Grabs" game. Partner start with a pile of buttons. Each child takes one handful of buttons. Have students estimate how many buttons are in a handful, then count and check their estimate. Then the game begins by sorting the buttons in groups of two. If the buttons fit into even groups of two without any leftover, the person gets a point. Then they group by threes, fours and fives. Again, if the groups are even with no leftovers, the child gets a point. After several rounds, the children discuss which numbers are the best to have and why. Were the handfuls close in number?
7. Have students ponder this question: Why were buttons invented?

Dive Into Tessellations

I have introduced my students to tessellating patterns with *Swimmy* by Leo Lionni. *Swimmy* and the other small fish learn to swim closely together and in the shape of a larger fish so they will not be seen and eaten.

By taking a 3x3" square of tagboard, I showed the students how to cut a half moon out of one side and tape it to the flat opposite side to make a fish shape. Then I showed the students how to trace the piece and slide the fish shape to continue the pattern with no gaps. It became our working definition of tessellation. Josh immediately asked if his fish had to look just like mine. I asked him how he might like to change it. He wanted a fin and teeth on his fish. I told him that was a great idea. He ran into the wonderful problem of adding on a fin and realizing that now his shape wouldn't tessellate. I asked him to think about what he might do. After consulting with his friend Brent, Josh figured out that he would have to cut the fin out of one side and tape it on the opposite. Then they would fit together. Once the students had created and traced their patterns, they added details and colour.

Round and Round the Money Goes

The Go–Around Dollar by Barbara Johnston Adams follows a dollar bill as it travels from person to person. Students enjoy the story and learn fascinating facts about money. This book should be read more than once to catch the story and the trivia.

First, I had the children examine a real dollar bill with a magnifying glass to explore the fascinating detail in making paper money. Then the children started talking about ways that they could earn or get a dollar and then how they might spend it by passing a real dollar bill from child to child in our circle. We then put all of the class ideas into a class add–on book of how the "go–around dollar" got all around our community. Isaac ended the book by not spending his dollar, but putting it into a savings account. We had quite a discussion about what that dollar does while in the savings account. Now we will have to go to the bank to find out!

Come and pig out on food, money, and math concepts with Mr. and Mrs. Pig and the piglets in *Pigs Will Be Pigs* by Amy Axelrod. Calculating the amount of money that the pigs find all over their house is a wonderful problem to solve as the story is read. The author provides several other problems to solve within the story as well. My students had a wonderful time creating number stories to solve from the menu of the Enchanted Enchilada. This led to reviewing the menus of some favourite local restaurants, comparing costs, and finally creating their own menus.

If you want to learn about how money came to be and how we use it, *Round and Round the Money Goes* by Melvin and Gilda Berger is the book for you. The book examines old money, foreign money, mint sets, and so on. My class enjoyed reading and discussing the information presented.

In *Dollars and Cents for Harriet* by Betsy and Giulio Maestro, Harriet needs five dollars. She finds ways to earn it and learns how pennies, nickels, dimes and quarters add up. Ask the children to think about what they could buy for $5.00. Ask them to choose one item that they would like to buy, and to think about how they might go about saving enough money to purchase it. Their task is to write a savings plan to earn the $5.00. Children can share their savings plans with their parents and ask for their approval and help in actually using the savings plans.

Caps and Hats

A Three Hat Day by Laura Geringer is about R. R. Pottle the Third and how he loves hats. In a happily ever after ending, R. R. finds the perfect wife wearing the perfect hat. On sad days R. R. chose two hats and wore them one on top of the other. Have students look at the pictures of R. R.'s hats on page nine in the book and investigate how many different combinations of two hats R. R. could wear on a sad day. The students need to find a way to organize and record their data.

The peddler in *Caps For Sale* by Esphyr Slobodkina is tired from selling and takes a nap under a tree only to find that some naughty monkeys have taken his caps. "Caps, caps for sale. Fifty cents a cap" led us to an interesting conversation about the cost of hats. Do caps really cost fifty cents? We talked about how much it might cost for the materials to make different hats and the cost of hats today. We decided to have a hat factory to make hats to sell at our school art sale. The children decided which materials would be available and the cost, such as newspaper, streamers, sequins and feathers. Every child had $0.40 to buy supplies make their hat. They developed a plan for their hat and estimated the expected cost. Then they began their construction. Upon completion of their hats, the students decided what price to put on the hat. It was interesting to see how some children valued their time, which was reflected in the selling price. Parents bought beautiful hats from $0.45 to $5.00.

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Editor's Note: Due to space limitations, the remainder of this article will appear in the December issue of the *Abacus.*

Who's Thinking in Your Classroom?

Acknowledgement: This article first appeared in the Wisconsin Teacher of Mathematics, *Fall 1994 edition. It was written by Kerri Wood, a first grade teacher at Knapp Elementary School in Knapp, Wisconsin.*

For a long time, primary mathematics was seen largely in terms of CONTENT. Often such content would concentrate excessively upon "rote learning" and "performing basic operations". At least it was in my classroom. Math class wasn't much fun for me and certainly not for my students. I showed the students how to solve the problems, the student filled in all the blanks and then I checked all the blanks.

Not a very thoughtful or motivating scenario, is it?

The NCTM *Standards* have led the way in reinforcing that mathematics is more than a body of knowledge (CONTENT); it is a mode of inquiry (PROCESS) which involves searching for patterns and relationships, analysis, communication and solving problems. The implication for primary mathematics is that students will have to be presented with activities that will enable them to learn how to USE their mathematical knowledge and skills and APPLY them to a wide range of mathematical problems.

The type of questions or tasks we pose for students to become involved in will determine how much "real thinking" is done. It is my point of view that the learning tasks and activities in the classroom can be done in a more open, exploratory or investigational manner with only slight modifications. The advantages to more open questions and tasks are:

Students do more critical thinking.

They are motivated because they are making choices.

Students of differing abilities can approach the same problem or task and work at their own level and share strategies.

Students are encouraged to persevere with a task that may not be solved immediately and may have many "right" answers.

Remember, "the journey, not the destination, is the goal."

Explore the possibilities and try some open–ended questions and investigations with your students.

Centi–Metric

Acknowledgement: This activity originally appeared in the March 1995 issue of delta–K, the Journal of the Mathematics Council of the Alberta Teacher's Association. *Activities in this journal were compiled by Betty Morris.*

Concept: Measurement – metric

Grade Level: 3–6

Number of Players: 2–4

Materials:

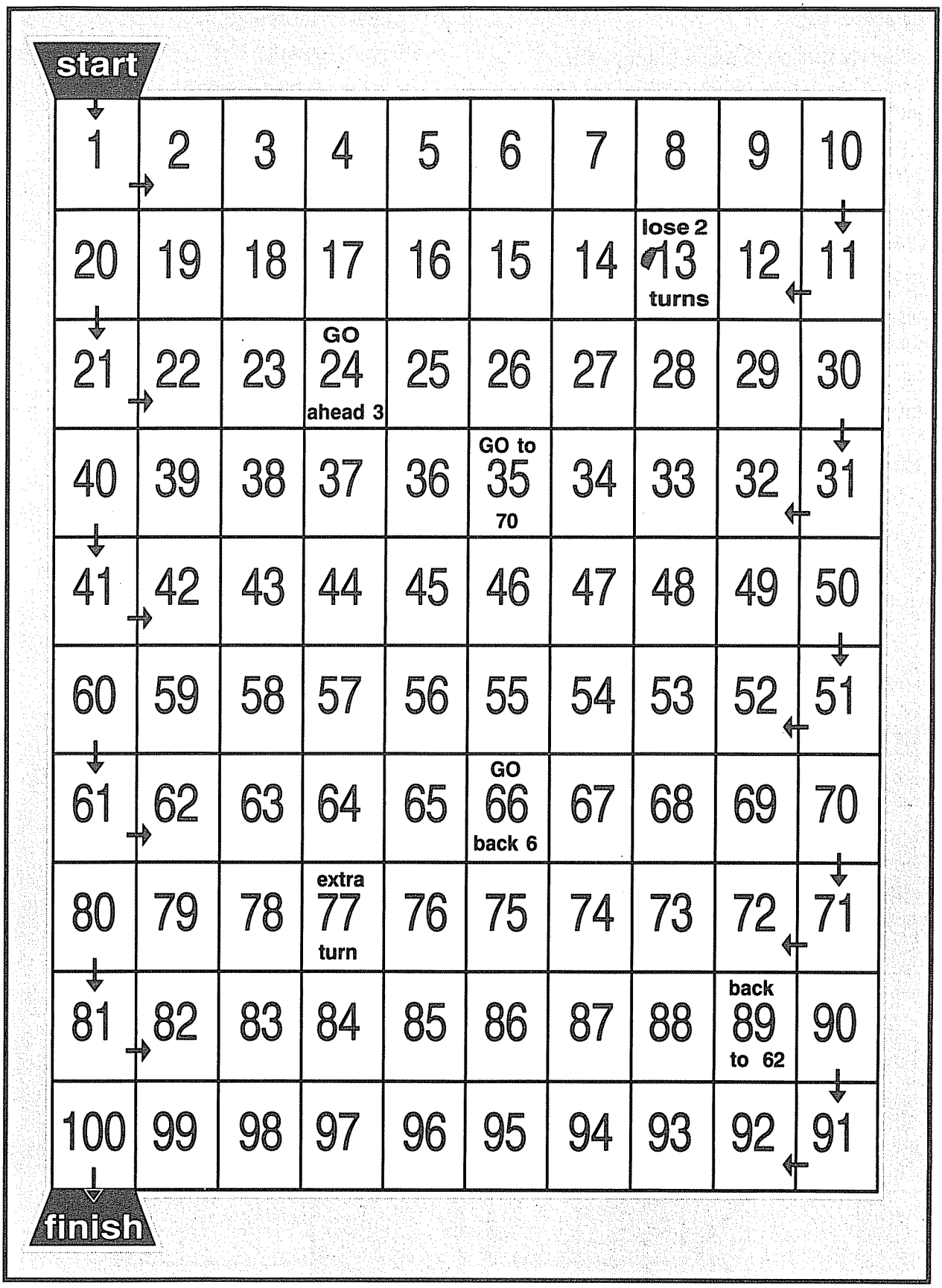
- gameboard
- ruler
- deck of 64 cards (see list below)
- 1 marker per player

Object:

To measure centimetres and reach finish

Rules:

1. Place shuffled cards face down.
2. In turn, players draw a card and follow the directions. Measure lines to the nearest whole centimetre.
3. The winner is the first to reach finish.


start
1
2
3
4
5
6
7
8
9
10
20
19
18
17
16
15
14
lose 2
13
turns
12
11
21
22
23
GO
24
ahead 3
25
26
27
28
29
30
40
39
38
37
36
GO to
35
70
34
33
32
31
41
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54
53
52
51
61
62
63
64
65
GO
66
back 6
67
68
69
70
80
79
78
extra
77
turn
76
75
74
73
72
71
81
82
83
84
85
86
87
88
back
89
to 62
90
100
99
98
97
96
95
94
93
92
91
finish

Directions:

Follow illustration to make gameboard. Around the border of the board draw segments of the following lengths:

A. 5 cm **B.** 12 cm **C.** 8 cm **D.** 2 cm **E.** 19 cm
F. 24 cm **G.** 10 cm **H.** 15 cm **I.** 6 cm **J.** 7 cm

Make the indicated number of cards with the following directions:

For each letter from A–J, make four cards:

3 should read: Measure [insert letter] and move forward that amount

1 should read: Measure [insert letter] and move backward that amount

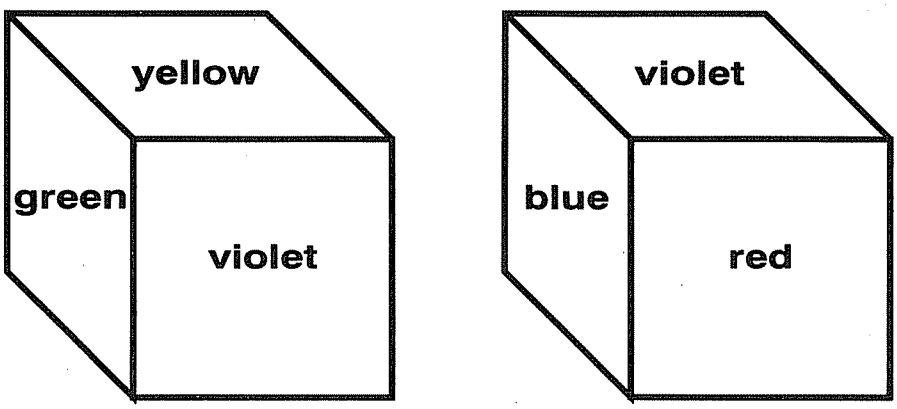
Other cards

- 5 Take an extra turn
- 5 Lose one turn
- 1 Move to square 37
- 1 Move to square 60
- 1 Move to square 85
- 1 Return to start
- 1 Exchange places with the leader
- 1 Move to leader's square
- 1 Move to square of person in last place
- 1 Measure C and move forward twice that amount
- 1 Measure D and move backward three times that amount
- 1 Pick someone (not you) to get an extra turn
- 1 Pick someone (not you) to lose one turn
- 1 Move forward the difference between A and G
- 1 Move forward the difference between F and E
- 1 Move forward the difference between J and I

Colourful Cube

Acknowledgement: This activity submitted by Janeane Golliher originally appeared in the Winter 1994 issue of the Colorado Mathematics Teacher.

Ryan has a colourful cube. It has sides coloured red, orange, yellow, green, blue and violet. Two views of the cube are shown below. Make a cube that is coloured like Ryan's cube. Be sure it matches both cubes shown. Can you change the cube and still have it match both views? Explain your answer.

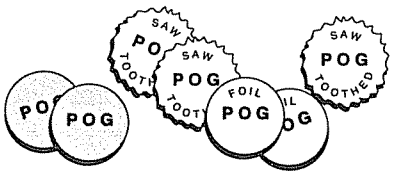


Decisions, Decisions, Decisions!!!

Acknowledgement: *This activity page has been adapted from the April 1995 issue of* The Illinois Mathematics Teacher.

Sharing Pogs:

You have 3 saw–toothed edged pogs, 2 foil covered pogs and 2 plain pogs to loan to your friends. You want to divide them among 3 friends so you can play a game. How can you divide them, if you need to give each friend at least one pog and you want to use all 7 pogs. Can you think of other ways? How many ways do you think you can do this? (Hint: Use coins or counters to help you.)

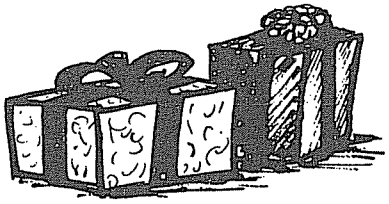


Fall Fair:

You are selling hot chocolate at a fall fair. You have quarters, dimes, nickels and pennies in your change drawer. Each cup of hot chocolate costs 40 cents. Your teacher buys 3 cups and gives you two dollars. In how many ways can you give your teacher the correct change?



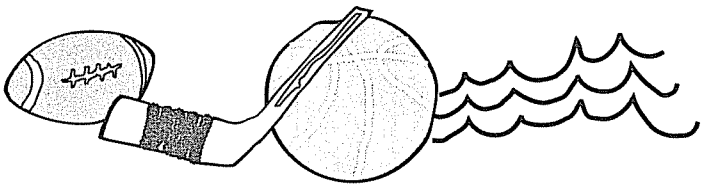
Birthday Mystery:



Your birthday is coming up. A relative wants to buy you jeans and two tops. When she took you to the store to pick out which ones you wanted, you couldn't decide between two pairs of jeans and three tops. How many different combinations of jeans and tops might you get?

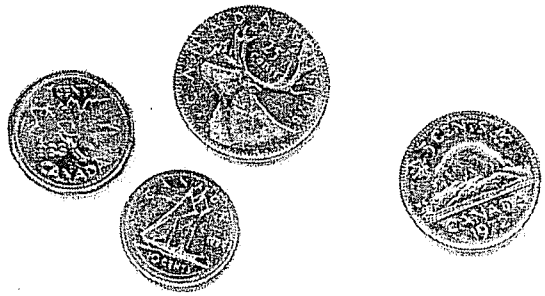
Sports Activities:

It's time for you to pick which sports you will play this fall. You are given the following choices: football, basketball, hockey, swimming, and cross–country running. However, there are some restrictions: (1) you can't play two "ball" sports and (2) you can't play two indoor sports (hockey and swimming). How many different choices do you have?



No Change

A shop has a notice which says:
No change given here.



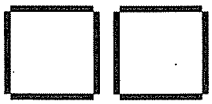
What amounts can be paid with these four coins?

Sticks

Take 12 sticks.



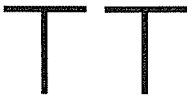
Make squares



Make triangles



and T's

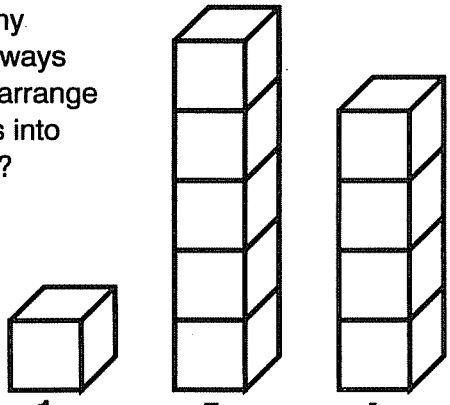


or a mixture.

What different combinations can you make?
Use all the sticks.

Towers

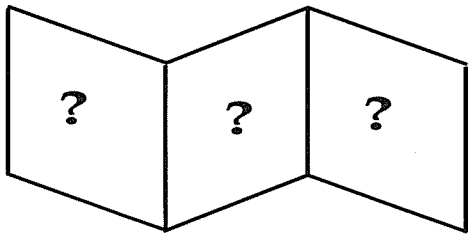
How many different ways can you arrange 10 cubes into 3 towers?



Which of the tower trios have two towers the same height?

Flapstrips

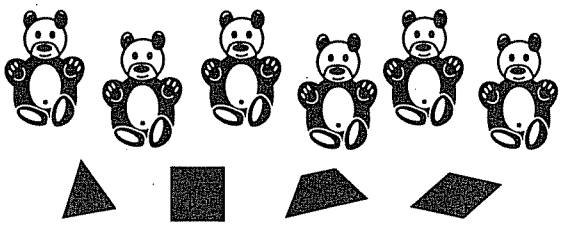
Write the numbers 1, 2, 3, 4, 5, 6 on both sides of a strip of paper.



How many different 2–digit numbers can you make by folding the strip in different ways?

Tables for Bears

Use teddy bear counters and pattern blocks.



How can you seat 6 bears at some tables?
Don't leave any spaces.

Trios



Which three of these digits can fill the boxes?

1 2 3 4 5 6 7 8 9

How many different ways can you find?