Abacus

From the Desk of the Abacus Editor

Thank you to those readers who responded to our Readership Survey, in particular those of you who took the time to add written comments. The response to the *Abacus* was generally favourable — 78% of all survey respondents rated the *Abacus* to be of significant value. However, some concerns were raised in the written remarks:

1) **There aren't any articles discussing issues of interest to Primary teachers.**

Such articles would be printed in the *Gazette,* not in the *Abacus.* The *Abacus,* by definition, consists of activities. The *Gazette* editor **does** try to include articles that would interest elementary teachers in each issue. However, his article selection depends on submissions. If you have an article that discusses elementary school issues, by all means send it to Jack.

2) **The *Gazette* as a whole is geared more for secondary school than for elementary school.**

At this point, OAME membership is predominantly secondary school teachers. As a result, most of the articles submitted are by and for high school teachers. Again, the *Gazette* content depends on the submissions. Perhaps with an increase in elementary membership, more elementary articles would be submitted, and the journal's focus would be more balanced between the levels.

Thank you again for your comments. They did not go unnoticed.

Jennifer

Contents

Spatial Sense and Geometry

- Tangram Puzzle 2
- Grandfather Tang's Story 3
- Making String Games.....3
- Valentine Tangrams.....4
- Make a Puzzle.....6
- Jeopardy – Un Jeu 6

Winter Activities

- Snowmen 7
- Draw a Snowflake 8

Spatial Sense and Geometry

Acknowledgement: The introductory material for this section of the Abacus *and the activities on pages 2 and 3 were submitted by Wendy Ayoub–Wade, Jane Lind and Sharon Young from the Wellington County Board of Education.*

Geometry is the study of shapes in space and spatial relationships. It offers students one of the best opportunities to relate mathematics to the real world. By exploring, investigating, visualizing and problem solving students gain an appreciation of the importance of geometry. Students who develop a strong understanding of spatial relationships and the language of geometry are better prepared to learn number and measurement concepts.

A Publication of the OAME/AOEM • Volume 33 Number 2 • December 1994

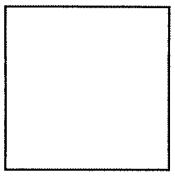
Edited by Jennifer Weiner, c/o Department of Mathematics and Statistics, University of Guelph, Guelph ON N1G 2W1

Business (519) 824-4120, ext. 2157 Fax (519) 837-0221

TANGRAM PUZZLE

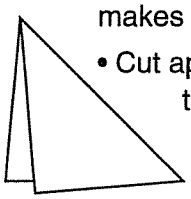
Materials:

- construction paper or origami paper (10.5cm x 10.5cm), scissors

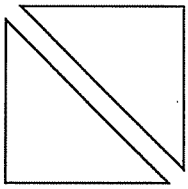


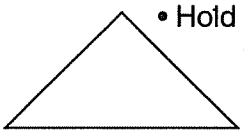
Teaching Strategies and Student Activities:

- Fold the square in half, so that the fold line makes two triangles.

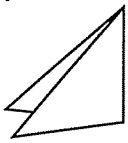


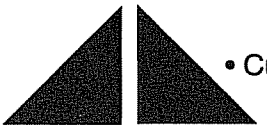
- Cut apart the two triangles along the fold line.





- Hold up one of the two triangles and put the cut edge on the bottom. One point of the triangle should be pointing up.
- Fold the paper so the points on either end of the cut side are together. There are now two triangles.

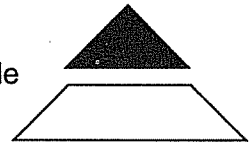




- Cut these triangles apart along the fold line.
- Hold the other large triangle with the cut edge down. Fold the top down until it touches the middle of the bottom.



It makes a small triangle on top of the large triangle.

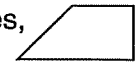


- Cut along the fold line. Hold the long piece by both ends at the bottom and fold the ends until they touch. Each side will look something like a shoe. Cut along the fold line.





- Holding one of the shoe shapes, put the longest side on the bottom.



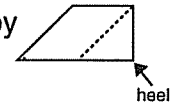
Fold the longest side so that you get a square on one side and a triangle on the other.



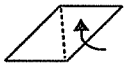
Cut the square and triangle apart.



- Using the other 'shoe', hold it by the heel with the long side at the bottom.



Fold it so that the heel touches where the shoelaces would tie.



You should have a small triangle and a parallelogram.

Cut the two pieces apart.



- Put the pieces back together to make the square.

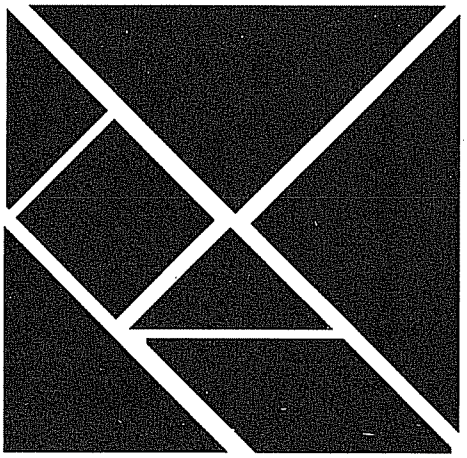
Note: The pieces which should be left over at the end of this activity are coloured black in the diagrams.

Resources:

Supertangrams, Dale Seymour Publications

Sam Loyd's Book of Tangram Puzzles, Van Note

Grandfather Tang's Story, A. Tompert



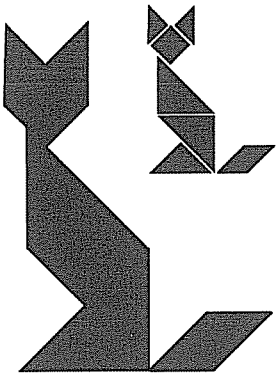
Grandfather Tang's Story

Materials:

- tangrams

Teaching Strategies and Student Activities:

- Introduce tangrams by reading *Grandfather Tang's Story.*
- Have students match animal shapes with animals from the story.
- Have students create their own animal shapes, and write their own books using these shapes.



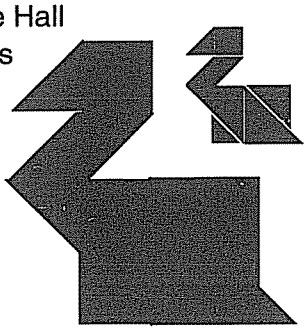
Extensions and Modifications:

- Create puzzle books.
- Copy a design from an example which is not the same size.

Resources:

Grandfather Tang's Story, Ann Tompert

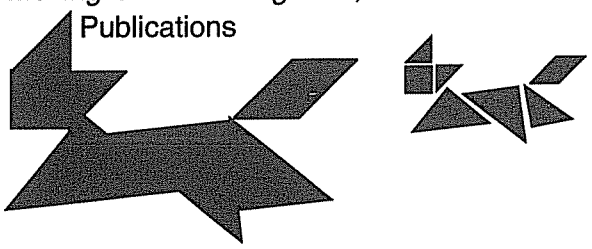
Tangranimals, Prentice Hall Learning Systems Inc.



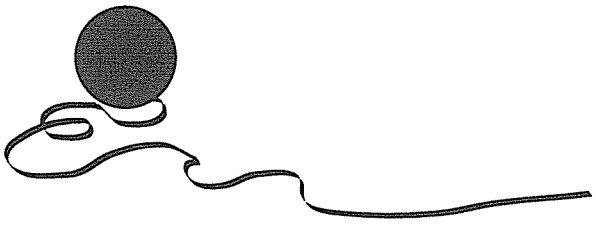
Starting Out with Pattern Blocks, Creative Publications

Hands On Tangrams, Creative Publications

Moving On With Tangrams, Creative Publications



Making String Games



Level:

- Primary/Junior

Materials:

- ball of string or wool or sewing elastic, large space area e.g., gym, playground

Teaching Strategies and Student Activities:

- Groups of students are given a length of string.
- Challenge each group to make a specific shape or a shape with specific features and attributes.

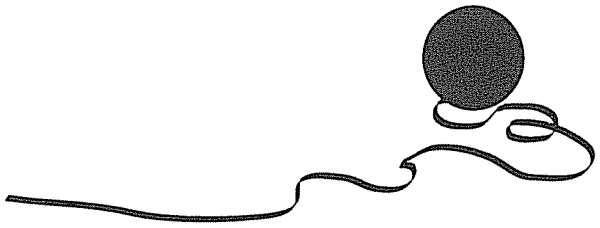
Extensions and Modifications:

- Repeat activity using geoboards.
- Calculate area of shapes using floor tiles.
- Play a game – My shape has 5 corners/sides. What is it?
- Repeat activity using fingers, rulers, etc.

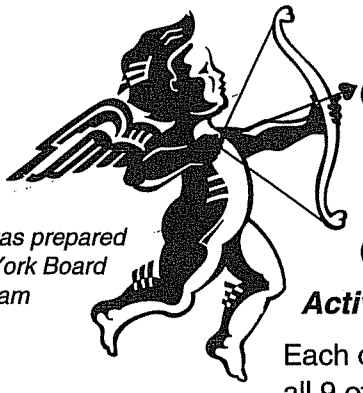
Resources:

String Games, Camilla Grysky

More String Games, Camilla Grysky



VALENTINE TANGRAMS



Acknowledgement: This activity was prepared by Lorna Morrow from the North York Board of Education. The Valentine tangram idea originally came from NCTM.

- Cut out the heart.
- Paste it on a piece of light cardboard for extra stiffness.
- Cut the pieces apart on the solid lines.

Activity 1:

You may want to sketch your solutions to these problems.

(a) Use 5 of the pieces to make a circle. Which of those pieces shows one–quarter of the circle? What fraction of the circle is one of the smaller pieces?

(b) Use 2 of the pieces to make a rectangle. Use the same 2 pieces to make:
- a triangle
- a parallelogram
- a trapezoid.

(c) Use 3 of the pieces to make a rectangle. Add one more piece to this so that you have a longer rectangle.

(d) Use 4 pieces to make a square.

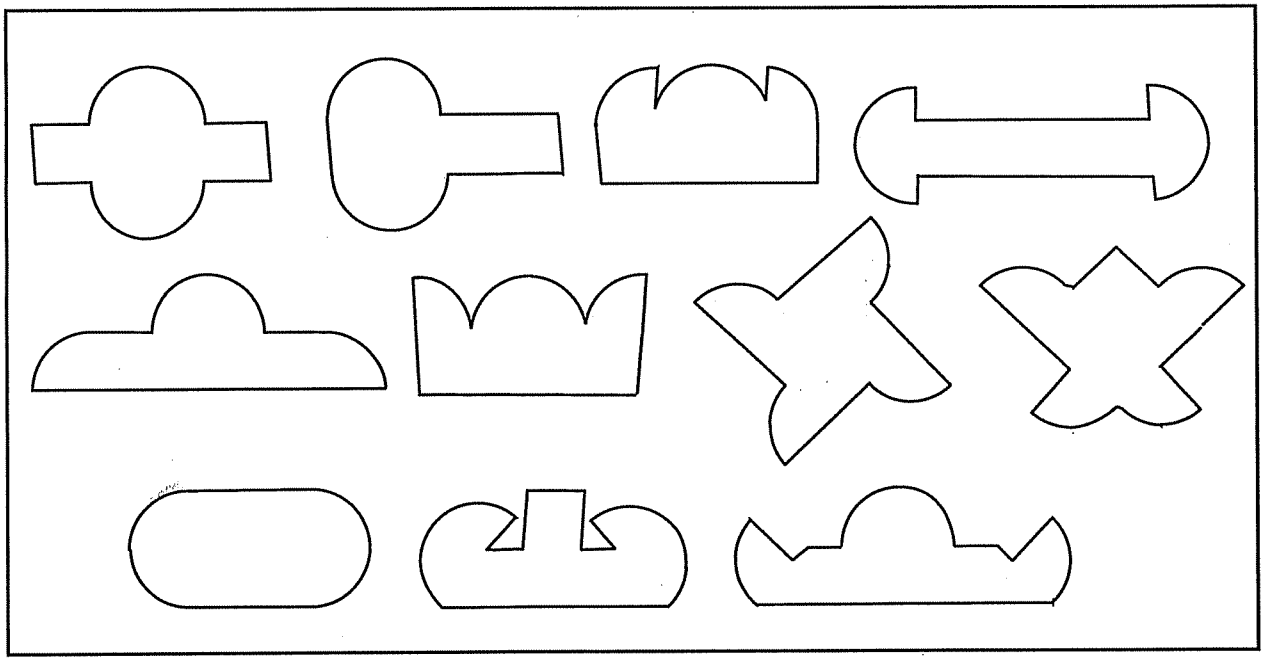
Activity 2:

Each of the figures below can be made using all 9 of the Valentine tangram pieces. Make each figure. Draw lines on the diagrams below to show how you made each one.

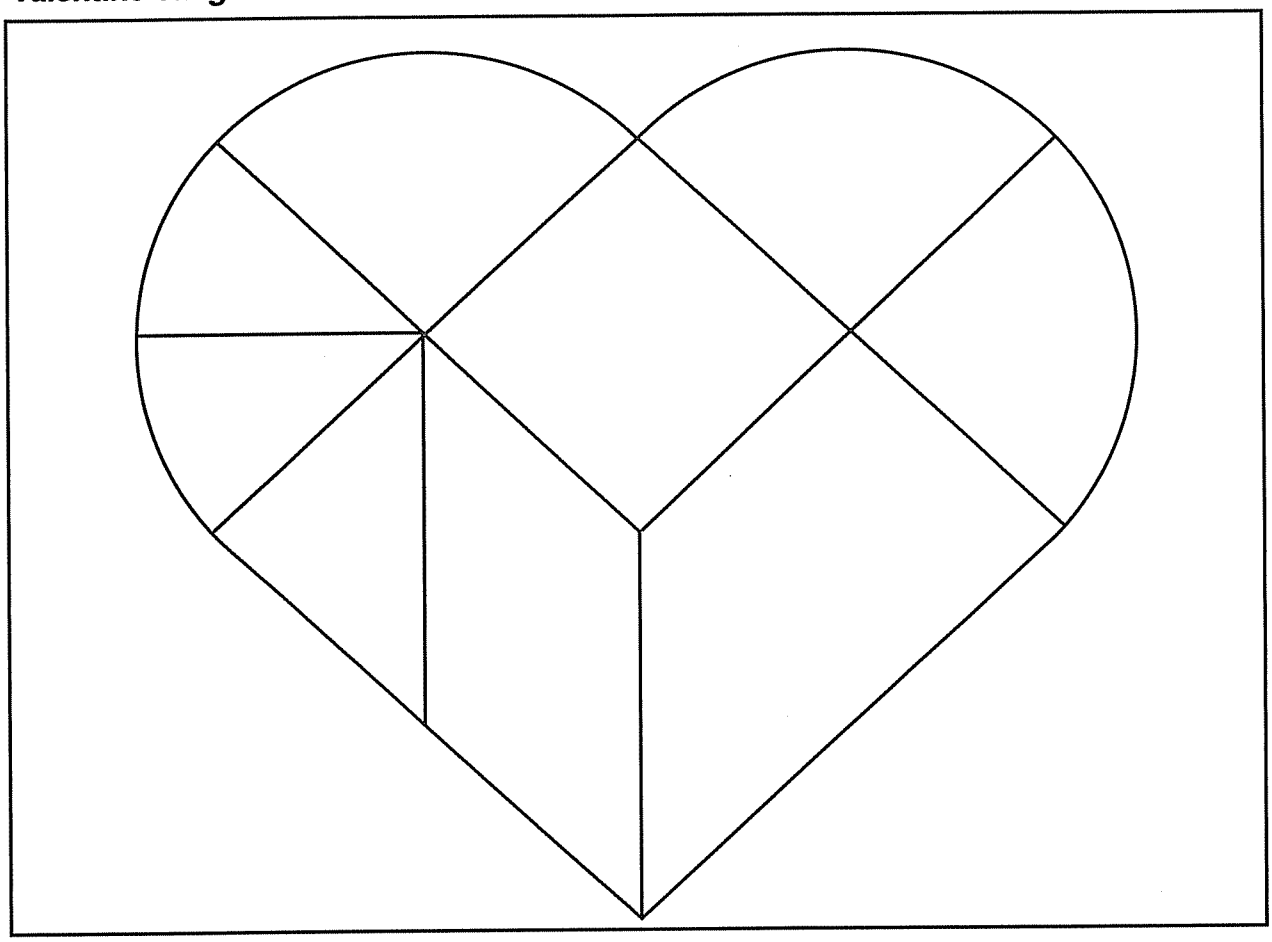
[Hints: Try to 'see' the long rectangle from Activity 1 (c) in figures 1, 2, 3, 4, 5, 6. Can you see where the circle pieces belong in each figure? Try to 'see' the square from Activity 1 (d) in figures 7, 8, 9, 10. One of the figures from Activity 1 (b) is in each of figures 11, 12. Can you 'see' which one?]



Activity 2



Valentine Tangram



Notes to Teachers:

This is a variation on tangrams. Students should construct their own sets of pieces. Older students could be challenged to produce an accurate copy of the original heart using ruler, compasses, or other materials. This will be a simpler task if they are allowed to draw the figure on dot paper or graph paper.

There may be greater success if students work in pairs to solve the problems. Before beginning the problems, you may wish to direct students' attention to the individual pieces. Have them name figures they can (e.g., square, triangle, parallelogram, trapezoid).

The pieces can be used with an overhead projector to illustrate solutions to the problems.

Activity 1:

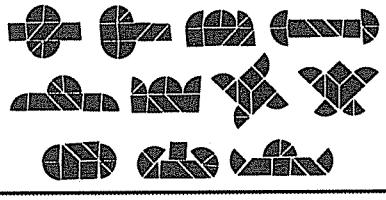
These problems are designed to help students gain some familiarity with the basic pieces and how they fit together. Also note that these figures are embedded in the figures for Activity 2 (see hints). With older students, discuss the fact that all four figures of (b) have the same area because they are made from the same pieces.

Activity 2:

Encourage students to try to 'see' the rectangle, square or trapezoid in each puzzle. They could draw them in lightly where they think these figures occur and use that as a guide in manipulating the pieces.

Solutions to the problems are given below. There may be slight variations in the ways students arrange the pieces.

Answers



Make a Puzzle

Acknowledgement: This activity was prepared by Wendy Ayoub–Wade, Jane Lind and Sharon Young, from the Wellington County Board of Education.

Materials:

- scissors, rectangular pieces of paper

Teaching Strategies and Student Activities:

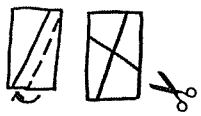
- Students sit in groups of 3–5; Each student has his/her own set of materials. Make a straight cut to divide paper into 2 pieces.



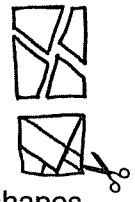
- Pass the 2 pieces to the person on your right.
- Put the two pieces back together to re-create the original shape.



- Overlap the 2 pieces, make one straight cut to get 4 pieces.



- Pass the 4 pieces to the person on your right.
- Create the original shape again. Overlap the 4 pieces; make a straight cut again to end up with 8 pieces.



- To end, students sort the various shapes into groups by their geometric shapes e.g., triangle, square, trapezoid, rectangle.

Extensions and Modifications:

- To make puzzles, glue pictures from magazines on art paper. Cut as above. Put puzzle together.
- Make cuts more complex.

Resources:

- *Make a Bigger Puzzle,* M. Walter

Jeopardy — Un Jeu

Acknowledgement: This game was submitted by Amy Parker, a teacher at Folkstone P.S. in Bramalea, Ontario.

Niveau:

- primaire

But:

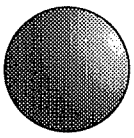
- réviser la géometrie, en particulaire les formes solides

Matériel:

- les formes solides de la géometrie, une roue, de la monnaie

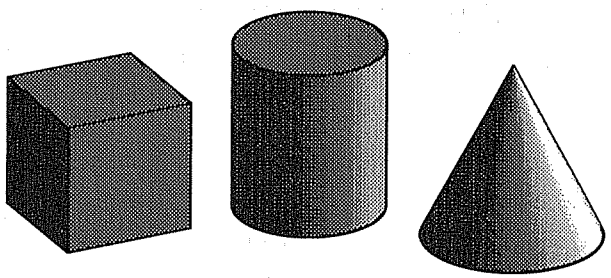
Etapes:

1) Choisis trois joueurs et deux maîtres.
2) Un maître demande une question. Ce qui est le premier à répondre correctement gagne le jeu. Le deuxième maître tourne la roue pour déterminer combien de monnaie a été gagné. Il/elle compte la monnaie pour chaque joueur.
3) Demande une autre question ...
4) Le premier étudiant à gagner 20 sous gagne le jeu complèt.



Questions:

Dis: 1) une forme pour enterrer un pharaoh.
2) une forme qui se ressemble à une boîte.
3) une forme qui se ressemble à une balle.
4) une forme qui va avec de la crème glacée.
5) une forme qui se ressemble à une canette.



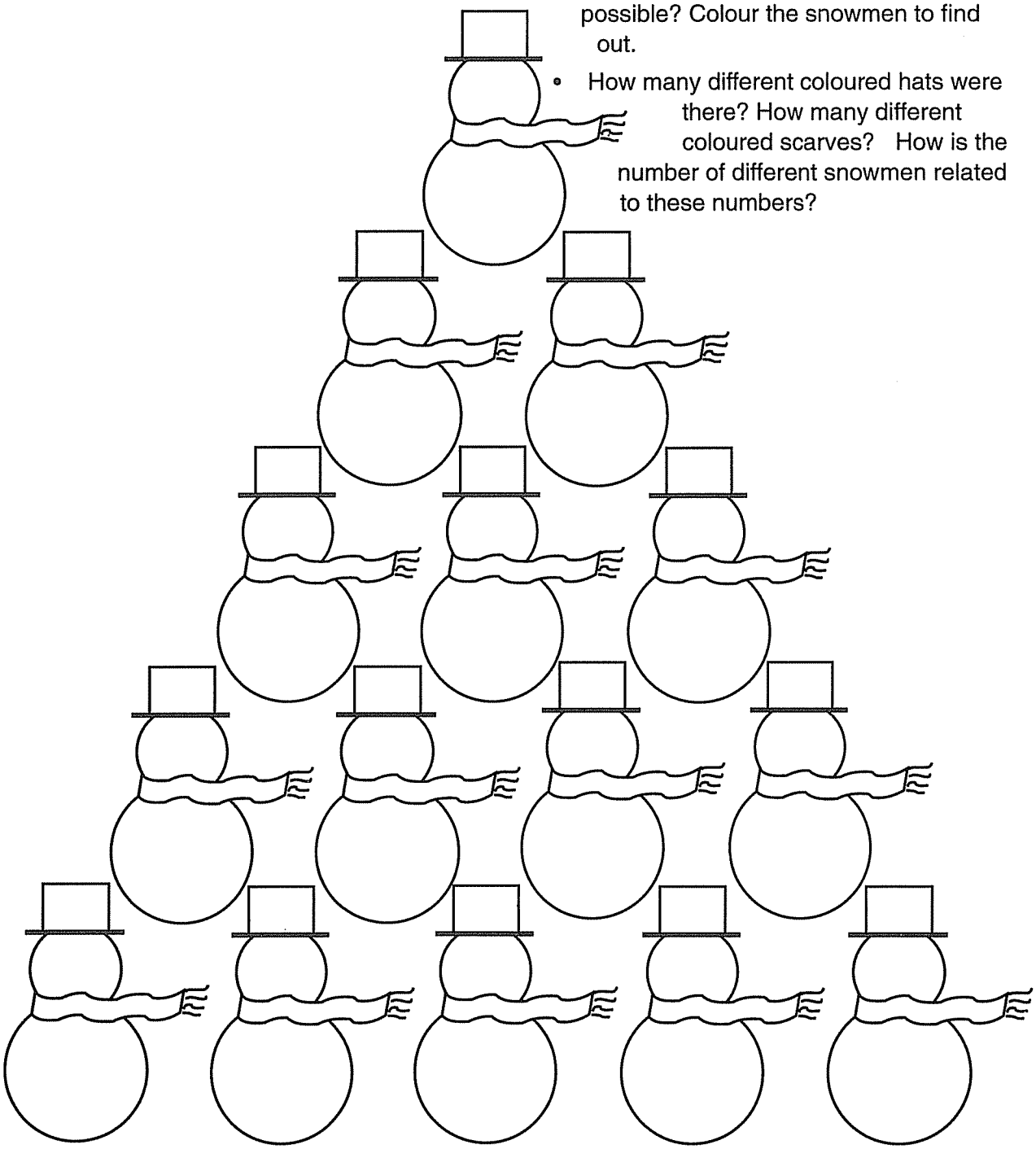
Winter Activities

Acknowledgement: These activities, suitable for primary students, were submitted by Lorna Morrow from the North York Board of Education.

Snowmen

A parade of snowmen is to be part of a winter carnival. Each snowman is to wear a hat and a scarf. Hats are **red** or **green** or **blue**. Scarves are **red** or **green** or **orange** or **blue**.

- How many different snowmen are possible? Colour the snowmen to find out.
- How many different coloured hats were there? How many different coloured scarves? How is the number of different snowmen related to these numbers?

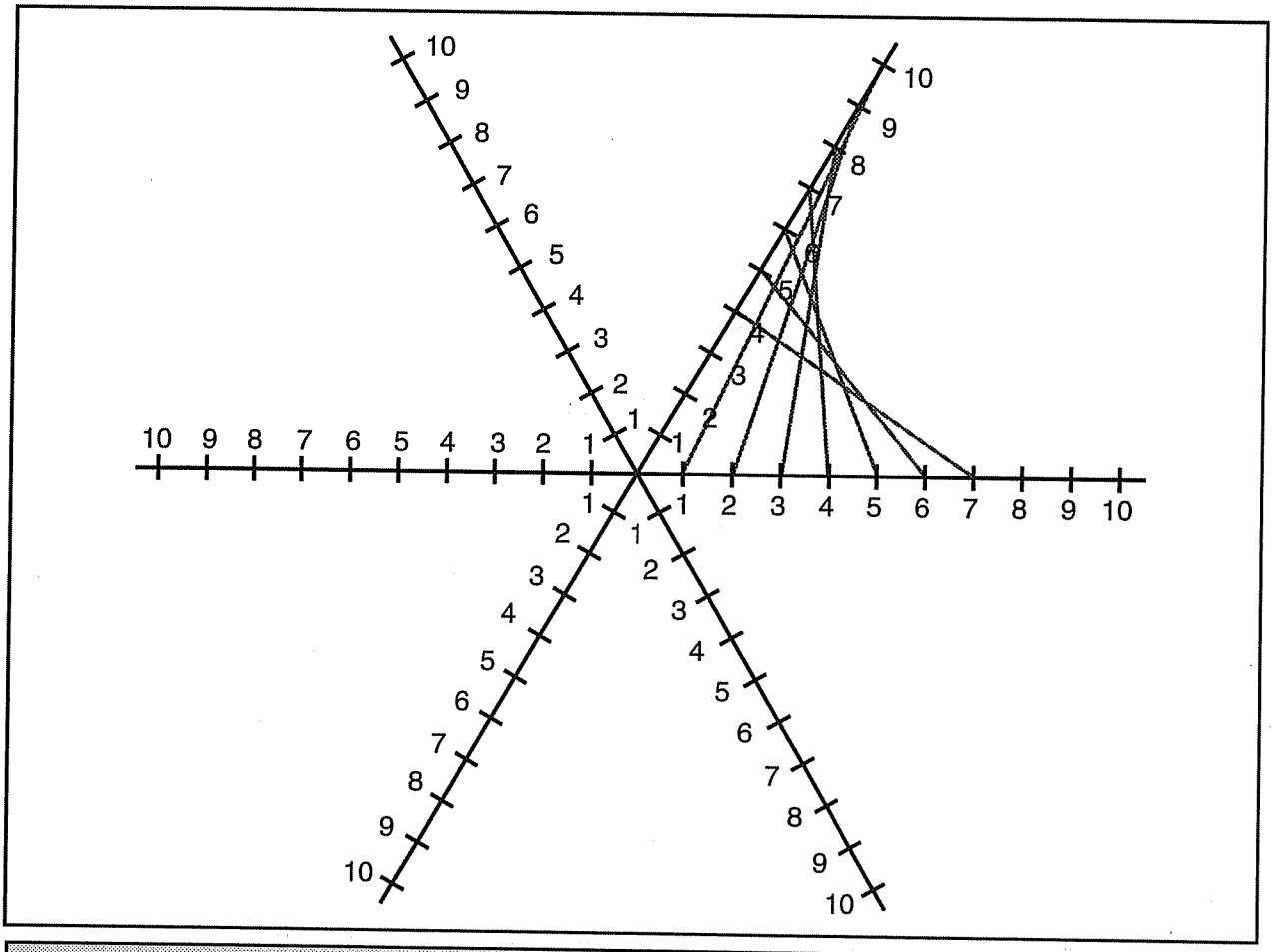


Draw a Snowflake

In the diagram,

- number '10' is joined to the number '1'.
- 9 is joined to 2, 8 is joined to 3, 7 is joined to 4.
- Using a ruler, continue joining pairs of points whose sum is 11.
- Repeat this in each of the other angles to make a snowflake.

Colour some of the sections you have drawn to make a design.



Notes for Teachers:

Snowmen – This activity deals with combinations and organized counting. Observe children to see whether or not they approach the problem in an organized way or if their combinations are decided at random. Discuss various techniques afterwards. For a related activity see the article by Lyn English in the October 1992 issue of *Arithmetic Teacher.*

Draw a Snowflake – Students should use rulers to join points. Younger children may need some help with this skill. The diagram shows 60° angles to give a 6–point snowflake. Try starting with lines intersecting at 90° or 45° . For more on this topic, see "*Line Designs*" from Creative Publications.