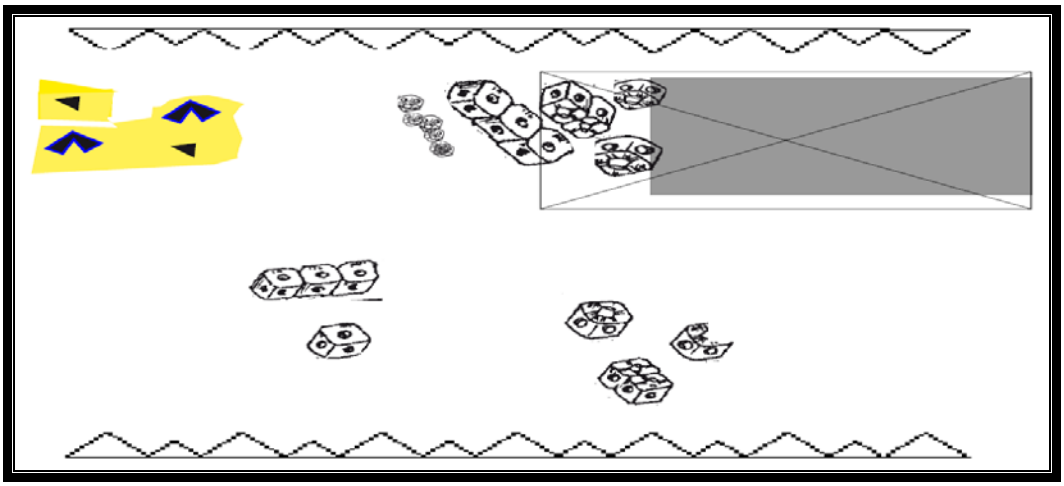
Ideas for Using Hex-a-flex Blocks to Teach Mathematics

Facilitator's Guide

Presentation Plan

Master Set of Resources



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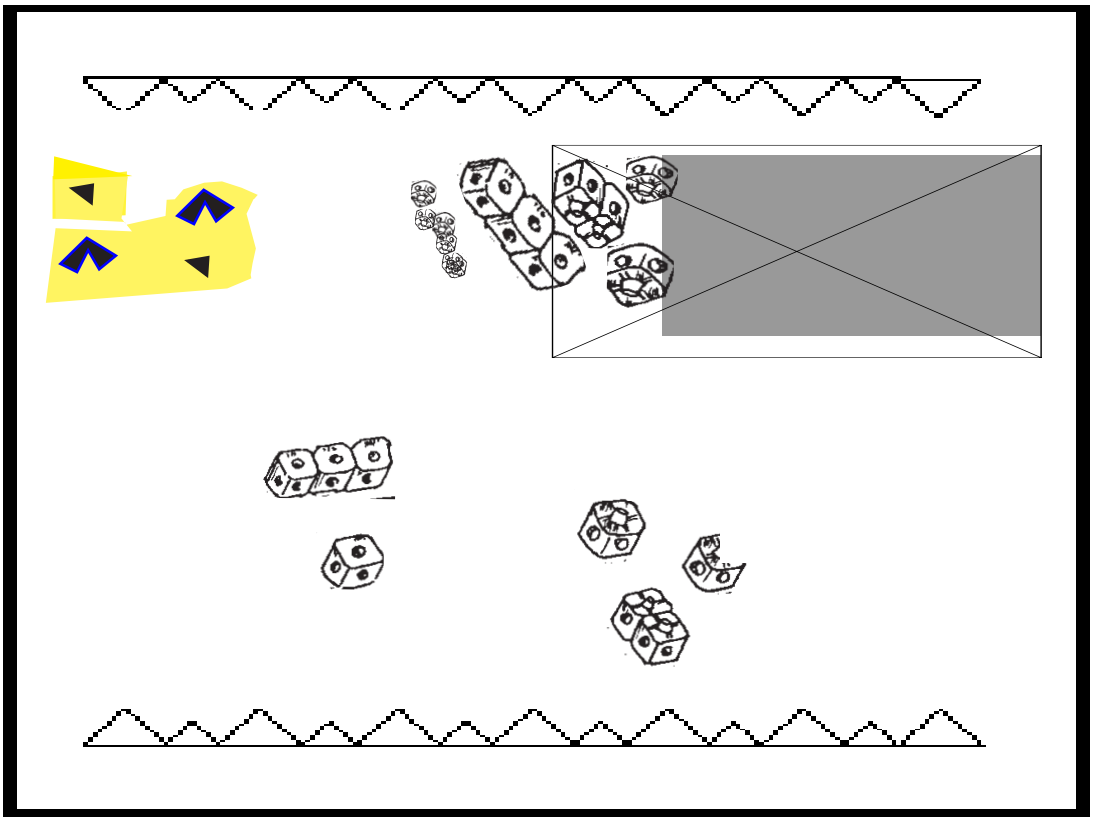
INSET PACKAGE

Ideas for Using Hex-a-flex Blocks to Teach Mathematics

3. Master Set of Resources



Using Hex-a-flex Blocks to Explore Geometric and Fraction Concepts

1 FACILITATOR'S GUIDE

Description

In this workshop participants will be shown different ways of using Hex-a-flex blocks to explore fractions and geometric concepts. Participants will be involved in experiencing a range of hands-on activities. Time will be provided for participants to collaboratively create a hex-a-flex activity to be trialled in their classrooms.

Note: This workshop is to be presented after participants have completed the INSET "Learning Math by Doing."

Rationale

Many pupils experience difficulty in developing an understanding of fractions. It is well documented that the use of concrete materials can assist pupils to grasp an understanding of basic fraction concepts and the relationship among them. To enable teachers to provide students with more concrete learning experiences sets of hex-a-flex blocks have been given to all the PROBE elementary schools. This workshop will provide participants with sample activities that can be used to explore fractions and geometric concepts.

Target Audience

Grades V – VI Math teachers

Duration

2 hours

Objectives

Participants will:

- use hex-a-flex blocks to solve math activities
- create and document a math activity that involves the use of the hex-a- flex blocks
- evaluate a range of activities
- identify benefits of using hex-a-flex blocks to develop fraction and geometrical concepts.

Preparation

- Prior to the workshop the facilitator will need to prepare at least five fraction models (see Activity Card 1: Exploring Fractions) for Exploring Fraction Activity 1.
- Participants should be asked to bring the math text books and a copy of the math competencies for grades 5 and 6.

Evaluation

The success of the workshop will be measured by appraising the participants' ability to:

- complete the activities
- participate in discussions about the activities
- ability to identify and discuss the benefits of using hex-a-flex blocks to develop fraction and spatial concepts
- create a math activity either individually or in a small group
- list the benefits of using hex-a-flex blocks to develop fraction and spatial concepts.

Resource List

Activity Cards

Exploring Geometric Shapes Activity Card 1:	Build the Shape
Exploring Geometric Shapes Activity Card 2:	Shape Puzzle
Exploring Geometric Shapes Activity Card 3:	Block Challenge
Exploring Fractions Activity Card 1:	Fraction Models
Exploring Fractions Activity Card 2:	Read, Make and Solve
Exploring Fractions Activity Card 3:	Fraction Puzzles

Handouts

Handout 1:	Solutions to Rotational Activities
Handout 2:	Design a Math Activity

Equipment

1 set of Hex-a-flex blocks for each group of 6 participants

2 PRESENTATION PLAN FOR FACILITATOR

Session	Time	Activity	Comment
1	10 min	Introductory Activity: Memory Game • Organize participants into groups of 2 - 4 members. • Each participant selects 2 of each of the blue, yellow, orange and green hex-a-flex blocks. • Tell participants they will be: (i) shown a 3 dimensional (3-D) shape that has been built using the same color and number of cubes that they have (ii) given 30 seconds to study the shape, before it will be covered (iii) asked to build the shape they were shown from memory. • Allow approximately 3 minutes for participants to complete the activity. • Invite one participant to display his/her group's construction. Ask: "How is this construction different to/the same as the original?" • Facilitator displays the original shape. Participants compare the 2 shapes. Invite participants to use mathematical language to describe how their shape is different from the original	• Prior to starting the workshop the facilitator needs to construct a 3 dimensional shape using 2 each of the blue, yellow, orange and green hex-a-flex blocks. Make certain that the participants prior to doing the introductory activity cannot see this shape. • Encourage participants to note the color and the position of each block. • Encourage participants to work independently. • Encourage participants to note differences other than the color of the blocks used. • Possible responses to: (b) Mathematical language such as faces, edge etc. • Point out that this is one way of introducing the blocks to pupils and getting them used to manipulating them.

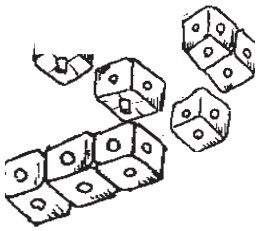
Session	Time	Activity	Comment
		• Ask participants: (a) How did you feel about this activity? Why? (b) What mathematics did you use when doing this activity?	
2	5 min	Workshop Overview • Facilitator explains that the workshop focuses on using the Hex-a-flex blocks to explore fractions and geometric concepts. Participants will: 1. use hex-a-flex blocks to solve math activities 2. identify benefits of using hex-a-flex blocks to develop fraction and geometric concepts 3. design a math activity that involves the use of the Hex-a-flex blocks.	• Remind participants that all elementary PROBE schools have been given sets of the hex-a-flex blocks. • Mention that other math concepts can be developed with the hex-a-flex blocks, however this workshop will only focus on fraction and geometric concepts.
3	70 min	Rotational Activities • Organize participants into groups with 2-4 members. • Explain the procedures 1.Assign each group to an activity station. Six different activities will be presented. Exploring Geometric Shapes Activity Card 1: Build the shape Activity Card 2: Shape Puzzle Activity Card 3: Block Challenge	• Multiple copies of each activity will need to be available and set up as a learning station prior to commencing the rotational activities. • Refer to Handout 1 solutions for Fraction Models, to make models for Exploring Fractions activity card 1. Use 2 different colours to represent each model.

Session	Time	Activity	Comment
		Exploring Fractions Activity Card 1: Fraction Models Activity Card 2: Read, Make and Solve Activity Card 3: Fraction Puzzles 2.Ten minutes will be allowed for each activity. 3.Upon signal, groups rotate in a clockwise direction to next activity. • Participants do the activities. • Group discussion. Refer to each activity and ask participants to share solutions and the methods used. Ask participants if they would use these kinds of activities in the class-	• Move around the groups, checking progress. • Refer to Handout 1 for Solutions. • Point out that the activities are similar to those in the textbook "Mathematics in Everday Life" for grade 5 pupils.
4	30 min	Designing an Activity • Arrange participants into groups of 2 to 3. Task is to design a new activity or modify one of the Hex-a-flex activities used in the session to introduce, develop or extend geometric or fraction concepts. • Provide each group with a copy of Handout 2 for recording the activity. • Discuss what needs to be recorded under each heading. • Allow 15 minutes for designing the activity.	• Move around the groups, checking progress.

Session	Time	Activity	Comment
		• Each group exchanges their activity with another group. • Allow 10 minutes for participants try the activity written by another group. Description of Activity • Each group shares the activity and comments on: (a) The main benefit of the activity. (b) The main weakness of the activity. • Facilitator collects all the completed sheets.	
	5 min	Reflection • Invite participants to respond orally to the following: (i) What did you gain from this workshop? (ii) Identify the benefits of using Hex-a-flex blocks to teach fraction and geometrical concepts. • Give each participant a copy of the activity cards and Handout 1.	• Encourage participants to trial the activity designed in their classroom, make any necessary changes and return it to the facilitator. Facilitator to compile a booklet containing the activities created.

Activity Card 1: Exploring Geometric Shapes

Build the Shape



Instructions

- Use the Hex-a-flex blocks to build the shape described.
- Check and record your answer.

Clues

1. It is a closed spatial figure.
2. It has six faces.
3. All its edges are congruent.
4. All of its faces are congruent.

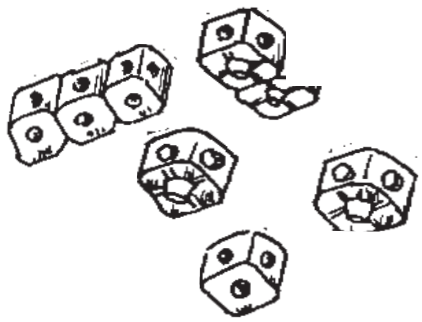
Extension Activity

Writing Clues

1. Use the Hex-a-flex blocks to construct a 3 dimensional shape.
2. Write a set of clues for someone else to follow to build the shape you constructed.
3. Check that the clues are accurate and can be easily followed.

Activity Card 2: Exploring Geometric Shapes

Shape Puzzle



Instructions

- Use the Hex-a-flex blocks to build the three-dimensional shape described by the clues.
- Check and record your answer.

Clues

1. It is a closed spatial figure.

2. It has six faces.

3. Opposite faces are congruent.

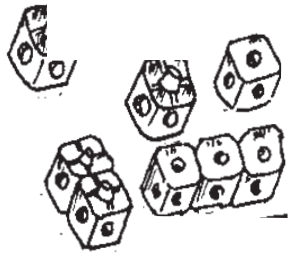
4. Four of the six faces are rectangular.

Extension Activity

Write 2 to 4 sentences describing the mathematical properties of the three-dimensional shape you constructed.

Activity Card 3: Exploring Geometric Shapes

Block Challenge



Instructions

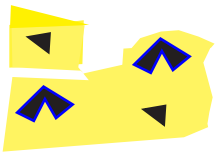
- Use the Hex-a-flex blocks to build the shape described by the clues.
- Check and record your answer.

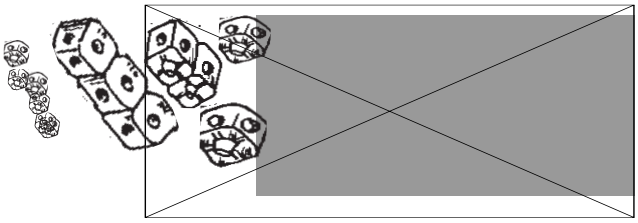
Clues

1. There are six blocks in all.
2. One of the blocks is white.
3. The purple block shares one face with each of the other five blocks.
4. The two green blocks do not touch each other.
5. The two orange blocks do not touch each other.
6. Each green block shares an edge with the white block.
7. Each orange block shares one edge with each of the green blocks.

Activity Card 1: Exploring Fractions

Fraction Models



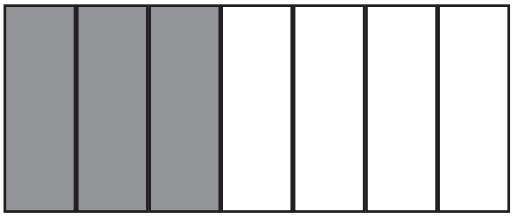


Instructions

Study the fraction models displayed and name each fraction. If the model shows an improper fraction, give its mixed number form.

For example:

Given:

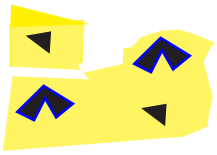


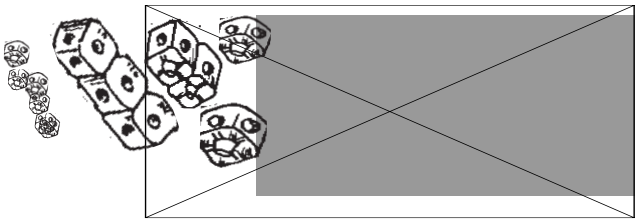
The illustration shows 10/7 which is an improper fraction. Participants will then express 10/7 in mixed number form. So the answer is 1 3/7.

2. On a sheet of paper write the letter identifying each model, then beside the letter record your answer.

Activity 2: Exploring Fractions

Read, Make and Solve





Instructions

- Use the Hex-a-flex blocks to make a fraction model to find the answer to the following problems.
- Beside the number of the problem draw the model you made and write your answer.

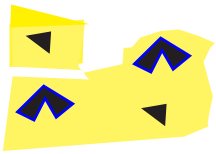
Problems

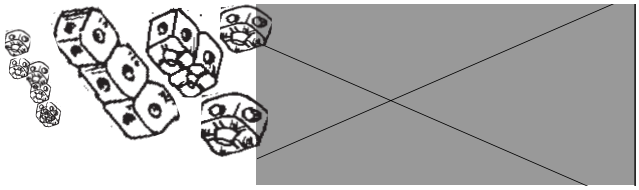
1. In a family of 6 children, one is a boy. What part of the group is the boy?
2. Mrs Banzon baked a bar cake for her children. She divided it into 12 equal parts. Her children ate 5/12. How much was left?
3. A group of 3 girls made leche flan in their cooking class. It was divided into equal parts. After tasting 1/7 they shared the remaining leche flan equally. What fraction of the whole flan did each girl get?

Extension Activity: Create your own word problem.

Activity 3: Exploring Fractions

Puzzling Fractions





Instructions

- Use the hex-a-flex blocks to solve each fraction puzzle.
- Check and record your answer.

Fraction Puzzle 1

1. There are 12 cubes.
2. 1/3 of the total number of blocks are yellow.
3. 1/3 of the total number of blocks are black.
4. Half of the number of yellow blocks are brown.
5. 1/6 of the total number of blocks are red.

Fraction Puzzle 2

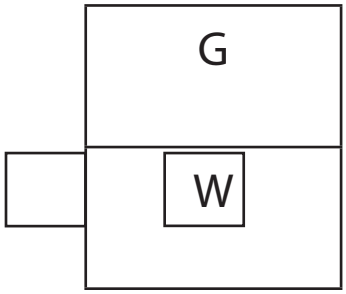
1. There are 8 cubes.
2. 2 of the cubes are yellow.
3. 1/4 of the total number of cubes are green.
4. There are two more red than white blocks.

Handout 1: Solutions to Rotational Activities

Exploring Geometric Shapes Activity Card 1: Build the Shape
Solution: A CUBE

Exploring Geometric Shapes Activity Card 2: Shape Puzzle
Solution: A RECTANGULAR PRISM
Extension Activity: A range of answers is possible. Check that the properties listed are appropriate for a rectangular prism.

Exploring Geometric Shapes Activity Card 3: Block Challenge
Solution:



Exploring Fractions Activity Card 1: Fraction Models
Solution:
Model a – 3 and 2 sixths
Model b - 2 and 2 fifths
Model c – 1 and 1quarter
Model d – 1 and 5 sevenths
Model e - 4 and 2 thirds

Exploring Fractions Activity Card 2: Read, Make and Solve
Solutions:
Problem 1: 1/6
Problem 2: 7/12
Problem 3: 2/7

Exploring Fractions Activity Card 3: Fraction Puzzles
Solutions:
Fraction Puzzle 1- 4 yellow, 2 brown, 2 red, 4 black.
Fraction Puzzle 2 – 2 yellow, 2 green, 3 red, 1 white.

Handout 2: Design a Math Activity

Design a Math Activity

Name of activity:

Objectives:

The pupils will be able to:

Learning Competency/Rating Period:

Time required:

Materials required:

Instructions:

Extension Activity:

Handout 3: Labels for Exploring Fractions

Model A

Model B

Model C

Model D

Model E