Seeing Mathematics in Haida Gwaii:

Using Local Visual Images to Create Mathematical Experiences

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Funding for this project has been provided by the Social Sciences and Humanities Research Council of Canada, the Vancouver Foundation and the Canadian Council on Learning.

Creating Mathematical Problems Using Local Images

When introducing the photographs to the students, have them connect to the images by asking questions such as:

Have you seen something like this before?
Have you been to this place?
What does this make you think of?
What are you wondering about?

To help yourself and your students "see" the mathematics in the images, consider the following:

What do you see or notice for patterns:
- colour, shapes, numbers, natural change?
- repeating, increasing or decreasing patterns?

What do you see about groupings/combinations of things:
- colours? objects? patterns?

What do you notice about scale and size:
- what is the relationship of this to that?
- how big is it? how small?
- what is the comparative size?

What do you notice about orientation:
- about direction?
- position?

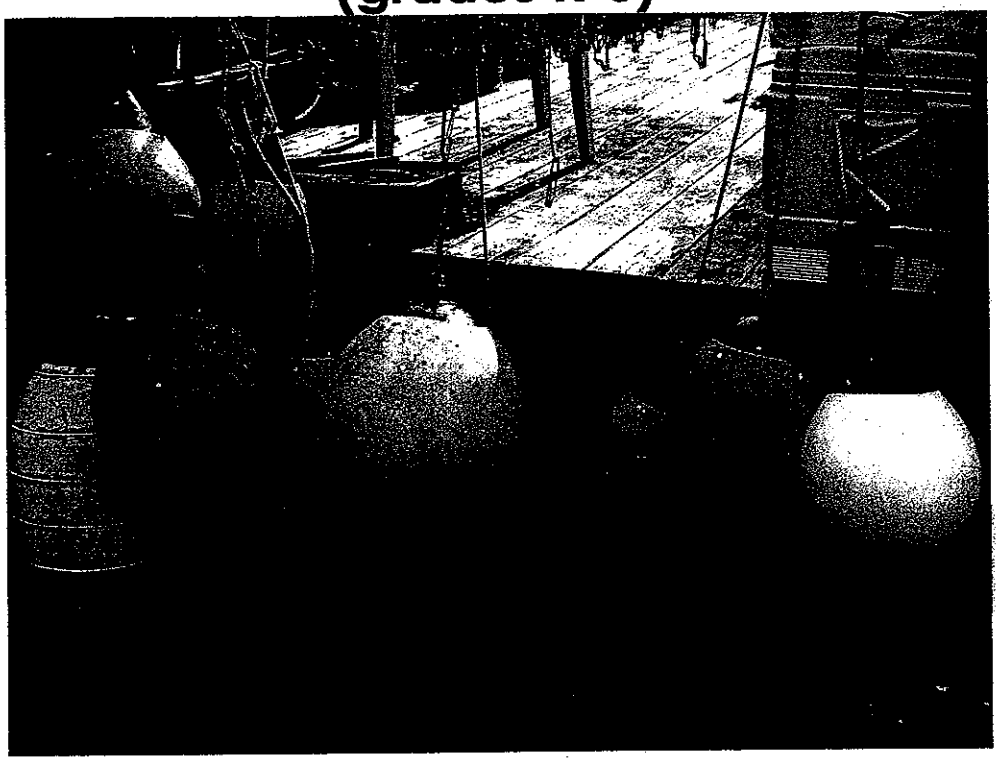
What shapes do you see:
- symmetry? line symmetry, rotational symmetry?
- tiling, tessellations, shape coverings?

What about estimates:
- size, quantity, mass, time, distance, volume, capacity?

How can mathematics help you think about:
- environment, interdependence, relationships?
- influence of culture and community?

Collection of Buoys

(grades k-3)



The Big Mathematical Ideas

- Counting tells us how many things are in a set.
- Numbers can be represented in many different ways.
- Quantities can be decomposed and recomposed in many ways.
- A whole is made up of parts.

Materials/Resources

- Image of collection of buoys (enlarged images or overhead transparencies)
- Buoy to observe and describe
- Mathematics notebooks

The Lesson

- Show students a buoy to observe and describe.
  What shapes do you see? What is this bigger than? Smaller than? What is this? What is it used for?
- Show students the photograph of the buoys.

Have you ever seen a collection of buoys like this before? Where? Why might they all be together?

- Count the buoys in the photograph.
  What's another way we could count them? Another way? (by 2's, by 5's, by colour groups, etc)
- Have students come up with different ways to make 12. There are 12 buoys. In the photograph the buoys are in two groups
  (8 and 4). What are some different ways you could put the buoys in two groups? What about three groups?
  (reduce the number for younger students if necessary)
- Provide students with paper to record their ways to make 12. Encourage students to represent ways to make 12 by building with materials, drawing or using numbers and symbols.
- Bring students together to compare their findings. Record their different combinations and equations on a class chart.

What to watch and listen for...

Are students able to communicate their thinking in more than one way? (words-oral or written, building, pictures, numbers, etc)
Do students approach the task randomly or in a logical, organized manner?
Do students understand the commutative property in relation to combinations? (ie 8 and 4 is the same as 4 and 8)
Do students use a pattern or system to solve the problem?

Questions and problems to extend thinking...

How do you know if you have found all the combinations for 12?
If you had to do the same task for the number 24, where would you start and what would you use from this task to help you?
Choose a larger number and try the same task.

Related Mathematics BC PLOs:

- Demonstrate an understanding of measurement as a process of comparing (kindergarten and grade 1)
- Identify and compare 2-D shapes as part of 3-D objects in the environments (grades 1 and 2)
- Represent and describe numbers, concretely, pictorially and symbolically (kindergarten – grade 3)
- Demonstrate, concretely and pictorially, how a given number can be represented by a variety of equal groups with and without singles (grade 1)

Buoy Combinations

(grades 4-7)

The Big Mathematical Ideas

- Numbers can be represented in many different ways.
- Quantities can be decomposed and recomposed in many ways.
- Models or charts can be created to organize data/information.
- Numerical patterns and relationships can be used to solve problems.

Materials/Resources

- Image of collection of buoys (enlarged images or overhead transparencies)
- Buoy to observe and describe
- Mathematics notebooks

The Lesson

- Show students the photograph of the buoys.
  Have you ever seen a collection of buoys like this before? Where? Why might they all be together?
- Have the students count the buoys in the photograph, visually, without counting one by one.
  How did you see the groups? What size groups did your mind use to help you count? What's another way you could see/count the buoys?

- Pose the following problem:
  If there were just two colours of buoys, what would all the different combinations be? How could we figure this out?
- Have students provide suggestions. If they don't seem to have a starting point, model creating a t-table on a chart or black/whiteboard and label one column orange and the other column white.
  So, if we had one white buoy, how many orange buoys? (if you think they need modelling on how to organize their information)
- Continue filling out chart and have students explain the number patterns they see.
  What's another way you could have figured this out?
- Explain to students that they are now going to solve a related problem and that they can work in partners and they can talk about what they are doing with someone. Pose the following problem:
  If there were three colours of buoys like in the photograph, what would all the different combinations be? How could we figure this out?

  (Reduce the number down from 12 if necessary)
- Provide students with paper to record the different combinations. Encourage students to building with materials, draw or use charts or diagrams to help them solve the problem.
- Bring students together to compare their findings. Record their different processes and the combinations on a class chart.

What to watch and listen for...

Are students able to communicate their thinking in more than one way? (words - oral or written, building, pictures, numbers, etc)
Do students approach the task randomly or in a logical, organized manner?
Do students know when they have found all the combinations and can they prove that they have?

Questions and problems to extend thinking...

How do you know if you have found all the combinations?
What's another way you could organize this information?
When might you need to figure something like this out? (home, work, etc)
What do you notice about the relationship between the number of combinations for two and three colours? How many combinations do you think there will be if there were four colours of buoys?
Choose a different number of buoys or colours and try the same task.