UBC Geering Up
Engineering Outreach

Math Monsters

Subject: Math, Art and English Language Arts	**Grade:** 3-5	**Duration:** 1-2 hours
Lesson Overview	Students will be given a 'Math Monster Recipe' and asked to design simple paper puppets of their monsters. Recipes will include a variety of fractions for students to practice their understanding of this subject through an art challenge. As an extension, older students will be asked to write a math themed story with their monster as the main character.	

Curriculum Ties (in addition to satisfying multiple core competencies):

Math Curriculum

Curricular Competencies:

- Reasoning and analyzing
  - E.g. Develop mental math strategies and abilities to make sense of quantities
- Understanding and solving
  - E.g. Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
- Communicating and representing
  - E.g. Represent mathematical ideas in concrete, pictorial, and symbolic forms
- Connecting and reflecting
  - E.g. Reflect on mathematical thinking

Content:

- Fraction concepts
- Ordering and comparing fractions
- Multiplication and division concepts
- Measurement using standard units
- Pattern rules using words and numbers

Art Curriculum

Curricular Competencies:

- Exploring and creating
    - E.g. Intentionally select artistic elements, processes, materials, movements, technologies, tools, techniques, and environments to express meaning in their work
- Reasoning and reflecting
    - E.g. Develop and refine ideas, processes, and technical skills in a variety of art forms to improve the quality of artistic creations
- Communicating and documenting
    - E.g. Adapt learned skills, understandings, and processes for use in new contexts and for different purposes and audiences

Content:

- Elements of design: line, shape, space, texture, colour, form (visual arts)
- Principles of design: pattern, repetition, rhythm (visual arts), contrast, emphasis
- Processes, materials, technologies, tools, and techniques to support arts activities

English Language Arts Curriculum

Curricular Competencies:

- Comprehend and connect (reading, listening, viewing)
    - E.g. Recognize the structure and elements of story
- Create and communicate (writing, speaking, representing)
    - E.g. Create stories and other texts to deepen awareness of self, family, and community

Content:

- Story/text
    - Elements of story
    - Functions and genres of stories and other texts
    - Literary elements and devices

Content Objectives

- To practice interpreting and applying fractions written in multiple ways.
- To connect how critical and creative thinking can be used together to create meaningful and fun art.

Materials & Equipment Needed

Consumables:	Non-Consumables:
• Construction paper – variety of colours • Popsicle sticks • Paper fasteners (to make moveable joints if desired) • Adhesive (Glue/glue sticks/hot glue guns) • Monster Recipes	• Scissors • Rulers • Pens/pencils

Lesson & Activity

Lesson Stages	**Learning Activities**

Introduction	This activity would be best given to students with some understanding of fractions and the different ways of writing them. Once students are comfortable working with fractions, ask them where they might see fractions in real life. A class discussion on this would segue nicely into the activity.
Activity	Introduce the activity to the class, describe how the students will be assessed (e.g. marks for correctly following their monster recipe, marks for a journal reflection, etc.). Put students into pairs (students may also work individually, larger groups are not recommended). Give each student/pair a 'Math Monster Recipe'. Students will then use construction paper and simple craft materials to make paper puppets of their math monster. Students should also give their monster a name! See the end of this document for example monster recipes. <u>Extension:</u> For older students, you may extend this activity by asking them to write a story with their math monster as the main character. Start by providing age-appropriate math story books (see additional resources) as inspiration. It would be a good idea to read one or two to the class. Then ask the students to brainstorm their own ideas. For their stories students may use fractions as their main topic, or you may direct them to focus on different math concepts that they have learned previously.

	Depending on time, students may create extra puppets/backgrounds/props for their math story.
Closure	Students may end the activity by sharing their math monsters and describing the recipe they followed to the class or to another group. If students have also written math stories, these may be presented orally or may be submitted in a form of a story book. Finish the activity with a short verbal or written reflection.
Step Ups & Step Downs	**Step Up** • Provide more steps to build their math monster. • Provide less time. • Ask students to provide a report/diagram that explains how their monster meets the recipe requirements **Step Down** • Give more time and provide more support • Set fewer requirements

Additional Resources

Below is a brief list of story books with math elements. Stories vary in difficulty and topic so please select the most appropriate examples for your students.

- One Grain of Rice by Demi
- Math Curse by Jon Scieszka and Lane Smith
- Sir Cumference and the First Round Table by Cindy Neuschwander and Wayne Geehan

- How Much is a Million? By David Schwartz
- Equal Schmequal by Virginia Kroll and Philomena O'Neill
- One Hundred Hungry Ants by Elinor J. Pinczes and Bonnie MacKain
- The Great Divide: A Mathematical Marathon by Dayle Ann Dodds and Tracy Mitchell

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Monster Recipe 1

Your monster...

- Has a head 3/2 the size of its body.
- Has 4 times as many legs as it has arms.
- Has fangs 1 ½ the length of its eyes.
- Has a tail 3/8 the length of its body.

Monster Recipe 2

Your monster...

- Has a body 2 ½ times the size of its head.
- Has scales on 5/8 of its body.
- Has 5 legs, which have a combined length the same as its body.
- Has 3 times as many horns as eyes.

Monster Recipe 3

Your monster...

- Has arms 1 ½ the length of its head.
- Has wings 4 times as long as its legs.
- Has 2 eyes, one of which is 5/3 the height of the other.
- Has a tail 4/7 the length of its body.

Monster Recipe 4

Your monster...

- Has arms 5/2 the length of its head.
- Has 4 times as many eyes as noses.
- Has 2 fangs, which are 1 ½ the length of its nose(s).
- Has polka dots on 4/7 of its body.

Monster Recipe 5

Your monster...

- Has a head that is 5/3 the length of its body.
- Has 4 times as many tentacles as it has eyes.
- Has tentacles 1 ½ the length of its body.
- Has 3 different colors of skin, which each cover an equal proportion of its body.

Monster Recipe 6

Your monster...

- Has legs 5/2 the length of its head.
- Has vertical stripes on 5/7 of its body.
- Has insect wings 2 ½ the length of its body.
- Has 2 times as many mouths as eyes.

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Monster Recipe 7

Your monster...

- Has arms 1 ½ the length of its head.
- Has wings 4 times as long as its legs.
- Has 2 eyes, one 5/3 the height of the other.
- Has a tail 4/7 the length of its body.

Monster Recipe 8

Your monster...

- Has multiple tails, ½ of which have spikes while the remaining half have none.
- Has pincers 4/3 times as long as its legs.
- Has antennae 1 ½ as long as its head.
- Has a forked tongue which has bumps on 1/3 of its length.

Monster Recipe 9

Your monster...

- Has 4 limbs with webbed feet, one pair of limbs is 1 ½ the length of the other.
- Has 2 times as many fins as limbs.
- Has scales on 5/9 of its body.
- Has a beak on the bottom 1/3 of its face.

Monster Recipe 10

Your monster...

- Has feathers of three different colours that cover its body in equal proportions.
- Has wings 1 ½ the size of its legs.
- Has eyes only on the left half of its body.
- Has a tail 5/3 the length of its body.

Monster Recipe 11

Your monster...

- Has arms 1 ½ the length of its head.
- Has wings 4 times as long as its legs.
- Has 3 eyes, one of which is 5/3 the height of the other two.
- Has a tail 4/7 the length of its body.

Monster Recipe 12

Your monster...

- Has a mustache 5/3 times as wide as its mouth.
- Has fur on ¾ of its body.
- Has a pouch 1/5 the size of its torso (can take inspiration from a Kangaroo pouch).
- Has 2 pairs of legs, one pair being 1 ½ the length of the other.