

M2C3 LESSON OVERVIEW

LESSON TITLE: Making “Bugs”

STANDARDS ALIGNMENT:

GRADE 3	GRADE 4	GRADE 5
<p>3.OA: Represent and solve problems involving multiplication and division. 3.OA 3: Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.</p>	<p>4.OA Use the four operations with whole numbers to solve problems. Gain familiarity with factors and multiples. 4.OA 3. Solve multistep word problems posed with whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted...Assess the reasonableness of answers using mental computation and estimation strategies including rounding.</p>	<p>5.OA Write and interpret numerical expressions. 5.NBT Perform operations with multi-digit whole numbers... 5.NBT 6. Find whole-number quotients of whole numbers with up to four digit dividends and two-digit divisors, using strategies based on place value, the properties of operations and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, arrays and/or area models.</p>
<p>MP: 1 Make sense of problems and persevere in solving them. MP: 3 Construct viable arguments and critique the reasoning of others. MP: 4 Model with Mathematics</p>	<p>MP: 1 Make sense of problems and persevere in solving them. MP: 3 Construct viable arguments and critique the reasoning of others. MP: 4 Model with Mathematics</p>	<p>MP: 1 Make sense of problems and persevere in solving them. MP: 3 Construct viable arguments and critique the reasoning of others. MP: 4 Model with Mathematics</p>

CONNECTIONS (Consider while planning):

- Previous Math Knowledge: *What prior math knowledge and experiences does this lesson consider and/or build on?*
 - Four operations (addition, subtraction, multiplication and division) using numbers between 0-1000. Representing math ideas with pictures, symbols, and words.

- Cultural/Community/Family Connections: *How does the lesson connect to, or build on the knowledge, practices, or experiences of children and families? On community contexts??*
 - Experiences making bugs at festivals, school, or home
 - Experiences of making other crafts at festivals, school, or home
 - Experiences of catching and examining bugs at home or school
 - Experiences calculating number of packages needed for a given number of people

• Language Considerations: *How does this lesson connect and distinguish between everyday language and math language? What specialized vocabulary might be used in this lesson? Are there connections to home language?*

- Chenille
 - We call these *chenille* stems, what should we call these during the lessons?
Fuzzy sticks..... Stems
- Spider, Insect, Bug
- Bug is not an accurate term for referring globally to insects, spiders, and the like. Bugs are a specific sub-category of Insects (as are beetles). We are using bug in the “common use” form, as presented by Merriam Webster:
 - Common Use of Bug: an insect or other creeping or crawling small invertebrate (such as a spider or centipede)
 - Scientific Definition of Bug: any of several insects (such as a bedbug or head louse) commonly considered obnoxious; :any of an order of insects that have sucking mouthparts, forewings thickened at the base, and incomplete metamorphosis

TASK Variations:

Routine 1: Mathematizing World - Open Ended (10 minute) - [Show images of bug crafts]

- What do you notice? What do these pictures make you wonder about? Brief class discussion.
- What questions do you have? What would you need to know to answer those questions?

Routine 2: Mathematizing World - Specific Questions (20 minute) Sensemaking and assumption building [Show images of bug crafts and elicit and/or pose specific questions that can be answered using mathematics; consider using an anchor chart to record “math” questions using questions stems - How much? How many? How much more/less; How big/small?]:

- Look at these images of bugs that children have made ... (use realia or slide)
- What questions do you have that you could use mathematics to answer?
- Possible Question (Warm Up Task): How many chenille stems and how much clay/play dough/egg carton sections would you need to make one bug?

Routine 3: Full Modeling Task (60-90 minute) Students participate in entire modeling cycle

Your class/buddy classes/grade level/school/ is going to make bug crafts. You need Chenille (fuzzy) stems and clay/play dough/egg cartons to make the bugs.

CLASS VERSION:

How many packages of fuzzy stems do you need so that every student in your class can make a bug?

How many packages of clay / play dough / egg cartons do you need so that every student in your class can make a bug?

BUDDY CLASS VERSION: Your class is going to work with another class in your school to make bugs. We will call this other class your buddy class.

How many packages of fuzzy stems do you need so that every student in your class and your buddy class can make a bug?

How many packages of clay / play dough / egg cartons do you need so that every student in your class and your buddy class can make a bug?

GRADE LEVEL VERSION:

How many packages of fuzzy stems do you need so that every 2nd grader at your school can make a bug?

How many packages of clay / play dough / egg cartons do you need so that every 2nd grader in your school can make a bug?

SCHOOL FESTIVAL VERSION:

How many packages of fuzzy stems do you need so that you have enough materials at the school festival for everyone who might want to make a “bug”?

How many packages of clay do you need so that you have enough materials for everyone at the school festival who might want to make a “bug”?

ALL VERSIONS:

Make a plan to figure out how much material you need for your class/buddy classes/grade level/school.

Your plan to make bugs must show:

- How many packages of fuzzy stems you need
- How many packages of clay / play dough / egg cartons you need

You can use pictures, numbers, equations and words to show that your plan will work.

OTHER NOTES ON VARIATIONS:

Students can work on the task first, and then make their bugs. After which they should review their model and revise as needed.

- An optional warm-up task is noted above. The warm up asks students to think about the amount of materials needed for ONE bug.

- If warm-up is included, you can discuss students' designs and come to a class consensus about materials needed for ONE bug (class line plot), OR, students can use different estimates of materials needed, based on designs of their group.

POSSIBLE STUDENT ASSUMPTIONS:

- There are about _____ students in the class/grade level, so we think we will want to make _____ bugs.
- About _____ people will come to the school festival, and we think _____ of those people will want to make bugs.
- We think some people will want to make spiders, and some will want to make insects. We think it will be about half and half; OR
- We think some people will want to make spiders, and some will want to make insects. But we think spiders will be a more popular option, so we want to make sure there are enough materials for most people to make spiders.
- We think we'll need about _____ fuzzy stems for each bug. But we want to make sure we have extra materials, in case some students need to redo their bug, or in case they want a different color, etc..
- We think we'll need about _____ clay sticks/play dough containers for each bug. But we want to have extra just in case people want to use specific colors.
- We think some people will want to make antennae on their bugs, so need to make sure to include enough fuzzy stems so that they can make antennae.
- We assume that the color of the clay stick does not matter
- We assume that you need _____ sticks of clay for each bug, and the color matters.
- In piloting, students estimated the following amounts:
 - 1 stem to 4 stems per bug, some said $1\frac{1}{2}$ stems, $2\frac{1}{2}$ stems.
 - $\frac{1}{2}$ stick of clay to 4 sticks of clay per bug, some groups used fractions.

ANTICIPATED STUDENT STRATEGIES:

Students might:

- Decide on the number of Chenille (fuzzy) stems required for one bug and then (e.g. 4):
 - Calculate by dividing or skip counting the number of bugs that can be made from one package of Chenille (fuzzy) stem (e.g., for pkg of 45, 11 bugs can be made).
 - Calculate by dividing or skip counting the number of pkgs needed (e.g., for grade level task, and estimate of 100 bugs needed; $100 \text{ bugs to make} / 11 \text{ bugs per package} = 9 \text{ packages}$ OR (skip counting) 11, 22, 33, 44, 55, 66, 77, 88, 99 equals 9 packages required).

OR

 - Multiply (or add repeatedly) the number of Chenille stems needed for everyone to make one bug (e.g., for grade level group of 100, $100 \times 4 = 400$).
 - Calculate by dividing or skip counting the number of pkgs needed (e.g., $400 \text{ stems needed} / 45 \text{ stems per package} = 8.88 \text{ packages}$ so 9 packages necessary OR skip

- counting - 45, 90, 135, 180, 225, 270, 315, 360 –8 packages not enough, need 9 packages, which will give 405 stems).
- Reason that people will need a choice of colors of clay so that there cannot be simply a one to one correspondence between pieces of clay and number of bugs made

MATERIALS

- Chenille (fuzzy) stems aka pipe cleaners
- Clay Packages, or Play Dough Packages, or Egg Cartons
- Making Bugs_Student Task
- Making Bugs_Lesson Slides
- If doing school/festival versions: Class/school information about number of students in classes, number of classes per grade and in school.