

Mathematics: The Language of STEM

Ring-a-Round the Circus!

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CONTENT AND TASK DECISIONS

Grade Level(s): 3rd, possibly used for multiplication/division readiness at the end of 2nd

Description of the Task: Students will design a circus using three or more performance stages (rings) and partition given animals into equal acts within those “rings”.

Indiana Mathematics Content Standards:

3.C.3: Represent the concept of division of whole numbers with the following models: partitioning, sharing, and an inverse of multiplication. Understand the properties of 0 and 1 in division.

3.C.4: Interpret whole-number quotients of whole numbers (e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 object each).

3.C.5: Multiply and divide within 100 using strategies, such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$), or properties of operations.

Indiana Mathematics Process Standards:

PS.1: Make sense of problems and persevere in solving them.

PS.2: Reason abstractly and quantitatively.

PS.3: Construct viable arguments and critique the reasoning of others.

PS.4: Model with mathematics.

PS.5: Use appropriate tools strategically.

Mathematics Content Goals: Students will understand that division occurs when the total number of items are shared or partitioned equally into sets/groups.

Language Objectives: Students will orally explain how they partitioned their animals into sets while using mathematical vocabulary. (E.g. partitioning, equality, and sets)

Materials: 10-20 plastic animals or laminated pictures of animals per partner group, at least 3 laminated circus “rings”/ embroidery hoops per partner group, paper/ journals/posterboard, pencils or markers

THE LESSON

Before:

- Student Actions

1. Turn and talk to your fellow trouper. Inquire about if they have ever been to the circus. If they answer yes, find out if they have a favorite circus act. If they have never see the circus, then find out what they might like to see at the circus.

- Teacher Actions

1. Elicit student responses to the question: Who shared with their fellow trouper that their

favorite part of the circus involved some animal performance? What type of animals could you watch at a circus? What kind of tricks may they perform?

2. Explain to students that “The Greatest Grade on Earth” circus (can be your name, grade, or other student-created title) needs their help. It will be up to them to build a circus using three or more rings. They will need to decide on what animal acts and how many animals to use in each of the rings.
3. Instruct students to record their mathematical thinking on their poster by using pictures, words, and/or symbols in order to present the total number of animals used in their circus. Spend 3-5 minutes discussing helpful representations on our poster. Ask: Would it be useful to draw in detail each animal that you placed in your circus ring? Draw a picture of a detailed lion on the board. Ask: Was this a wise use of my mathematical time? What if I needed to draw six lions in my ring? Would a detailed drawing help me arrive at my answer in a timely way? What might be a better way to show or represent my lions? What symbol or picture might I use?

During:

- Student Actions
 1. The show must go on! Students collect materials from the Tool Table and join their fellow troupers. To ensure a more random amount of animals and rings, have student teams “divide and conquer” to gather supplies. Partner 1 would gather rings at one Tool Table, while Partner 2 would collect a handful of animals at another Tool Table.
 2. Students begin to partition their animals into circus rings based upon their vision.
 3. Students will represent, using words, pictures, and/or symbols, on their poster how they created their circus rings for the big show.
- Teacher Actions
 1. Wait for 3-5 minutes! Do not move around the room, yet. Allow students to think for themselves without teacher hints or help.
 2. After the initial “free think”, travel among your groups asking open-ended questions about their rings and their contents. For example, “What can you tell me about your circus acts? How did you decide to group your animals? What pattern do your rings make? How could you find the total number of animals used without counting each individually?”

After:

- Student Actions
 1. Student will present their circus layout to the whole class by showing their posters and explaining their reasoning.
 2. Fellow students will be encouraged to ask questions or give positive feedback to the teams presenting.

- Teacher Actions
 1. Encourage students to present their posters to the class. Look for examples of remainder animals.
 2. Ask questions like, “What should you do with your extra animal?” or “How did you decide to group your animals?” “Did your method help you determine the total number of animals used?” “What would you do differently?”

ASSESSMENT

Observe: Teacher will walk around the room and take notes on each student’s thinking.

Ask: I will ask students to prove their understanding of partitioning through answering an exit slip problem. For example, “Cyrus the Circus Clown will put an equal number of circus peanuts in bags. He has 15 peanuts in 3 bags. How many peanuts will be in each bag?” This problem could also be in picture form.

EXTENTION—Day Two

During

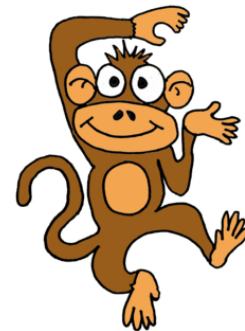
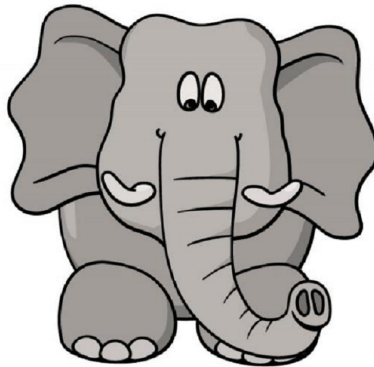
- Teacher Actions
 1. Make an announcement from the Ringmaster that circus code requires every ring to have equal numbers of animals in them.
- Student Actions
 1. Students will now partition their animals equally among their rings. Have students flip their posters over and now draw their new and improved circus using the equality code.

After

- Student Actions
 1. Student will present their new circus layout to the whole class by showing their posters and explaining their reasoning.
 2. Fellow students will be encouraged to ask questions or give positive feedback to the teams presenting.
- Teacher Actions
 1. As students present their new and improved circus layout, discuss possible real-life problems with having different kinds of animals in the same ring.
 2. Ask “How did you decide to group your animals after the circus code was mentioned?” “How did the new code help or make more difficult the dilemma of “leftover” animals from the day before?” (idea of remainder)

Resources

- Plastic animals can be purchased online at Birthday Direct, Oriental Trading, Windy City Novelties, or on other sites.
- Embroidery hoops can be purchased at various craft stores or online. A more cost effective solution would be to buy colored paper plates and then cut out the center circle to form a “ring”.
- If you would rather use animal pictures, simply print the attached pictures, cut them out, and then laminate them for durability.



Lion courtesy of <http://www.clipartkid.com/cartoon-lion-cliparts/>

Elephant courtesy of <http://colourdrawingfreewallpaper.blogspot.com/2013/12/elephant-coloring-cartoon-drawing-free.html>

Tiger courtesy of <https://clipartfest.com/categories/view/2d812ac51a700193e4d9d8768aa2e0baa5fb276d/cartoon-tiger-clipart-cute.html>

Seal courtesy of <http://www.clipartpanda.com/categories/seal-clip-art-cartoon>

Bear courtesy of <http://www.clipartbest.com/free-cartoon-bear>

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