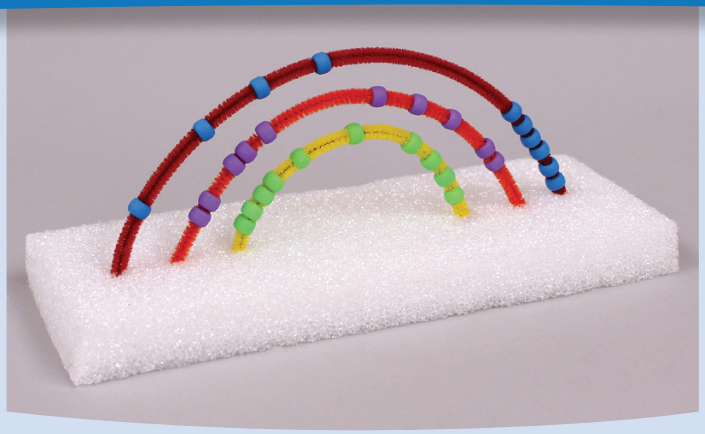
Rainbow Abacus



MATH
GRADE LEVEL
KINDERGARTEN – FIRST

COMPLETION TIME
• 30 minutes

MATERIALS

FOR STUDENT:
(one per student unless otherwise noted)

- FloraCraft® Make It: Fun® Foam Block, cut from large Foam Block (see "FOR TEACHER") to 4" x 10" x 1" thick
- Chenille stems, one of each: Yellow, orange and red
- Pony beads, ten of each: Green, purple and blue
- Three small plastic cups
- Pencil

FOR TEACHER:

- FloraCraft® Make It: Fun® Foam Block, 15/16" x 11 15/16" x 17 15/16" (approx. 12" x 18" x 1" thick) (can get five 4" x 10" pieces per foam block)
- FloraCraft® Design It:® Wire Cutter
- Glue gun (for teacher only) or thick white tacky glue
- Serrated knife
- Masking tape
- Pencil
- Ruler

OBJECTIVES

Students learn:

- Counting from 1- 10 and potentially up to 30
- Grouping to count and begin adding and subtracting
- Listening and following step by step instructions
- Use of fine motor skills

STANDARDS

- Counting and cardinality – compare numbers
- Identify greater than, less than, or equal to the number of objects in another group by using math and counting strategies
- Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from
- Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions or equations

TEACHER PREPARATION

Note: Read through all the instructions first and check out the TIPS! Have a glue gun plugged in and ready to use (ideally set on low temperature) but out of student reach. This can give you immediate adhesion when in a hurry to help students. Be sure glue has cooled before returning projects to students (takes a minute or so.) It is also recommended that you make one project first, before preparing the materials for any others, since knowing how the parts fit, might affect how you prepare.

[1] Use a ruler and pencil to measure and make small marks as ruler guides for the 4" x 10" pieces on the foam block. With a vertically-positioned block, three vertical pieces fit across the top and two horizontal pieces fit across the bottom, with only a couple of inches not used. (The pencil will show on the foam if you go over the mark a couple of times. However it's not necessary to draw the entire line – just measure and mark in a couple of places as a guide for placing the ruler.)

Then, on a cutting mat or stack of newspapers, turn the foam block horizontally and use a serrated knife against the edge of a ruler to vertically cut the foam block apart along that line, using several passes of the knife for each cut. Repeat to separate the five pieces.

[2] Next, use a ruler and pencil to measure and mark the placement of the chenille stem ends on one of the foam bases. Horizontally place the foam base on table. With the ruler aligned with the left edge, mark 1", 2", 3", 7", 8", 9" positions, running along the middle of the base. Press down just the point of the pencil into each mark to make starter holes. Repeat for all students.

Tear a 3" length of masking tape and put it on the bottom side of each foam base (for students to print their names).

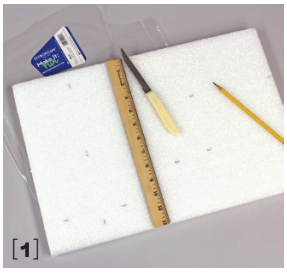
[3] Use the ruler and a wire cutter to measure and cut the yellow chenille stem to a 7" length and the orange chenille stem to a 10" length. (Leave the red chenille stem at a 12" length.) Repeat for all students.

[4] Count out 10 beads of each color and place them in a separate plastic cup for each color. Repeat for all students.

Prepare the work area by setting the foam base, three chenille stems and three cups of beads at each student's place.

LESSON INTRODUCTION

- Explain that an abacus was a counting tool made from wood, many years ago before calculators were invented. Show how it works by moving beads from one side of the rainbow to the other and count.
- Share that the students have been practicing with numbers and now they can group them to add and subtract. For example, the rainbow's top row has 10 beads plus the middle row of 10 beads = 20. Then, if they add the bottom row of 10 beads, there are a total of 30 beads. Show how the beads can move to the right or left, so that addition and subtraction can be done on each row.


[1]


[2]


[3]


[4]

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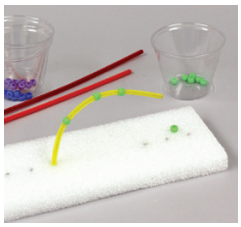
INSTRUCTIONS

[1] Have students turn over their foam bases and print their names on the masking tape strips. Mention that the chenille stems need to remain straight for now, so they should not curve them, yet. Also, explain that they should leave the beads in the cups until it's time to put them on their abacus.

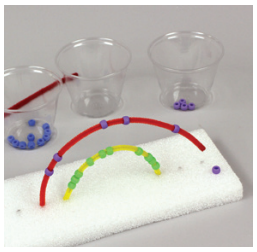
[2] Have students turn over their foam bases, showing the pencil dots/starter holes. Explain that you're going to be working from the inside out. Ask them to point to the two inside dots. Be sure they know which ones to use.

Have them separate their bead cups, setting the green ones closer to them. Demonstrate and have students pinch about an inch away from one end of the yellow chenille stem, and push it down into one inside hole (going in about 1/2"). Then instruct them to take one bead at a time, out of the cup and string it onto the yellow chenille stem.

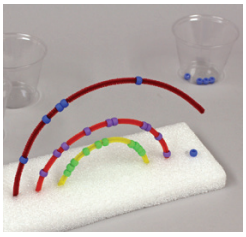


When all ten beads are on the yellow chenille stem, show them how to bring the other end down and insert it into the other inside hole. (You and/or an assistant may want to walk around to check that there are ten beads and that the chenille stem ends are in the right holes and pressed in about 1/2".)

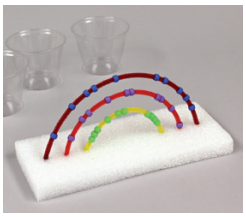
[3] Explain that they will do the same thing with the orange chenille stem, inserting one end down into a hole closest to the yellow chenille stem. Have them string their ten purple beads and insert the other end into the other hole closest to the yellow chenille stem.



[4] Explain that students will do the same thing, again, with the red chenille stem, but that this time, they can only push the red chenille stem end into the foam, just a little way. Then they can string ten blue beads and insert the other end into the foam, just a short distance.



[5] If necessary, you can unplug the glue gun and go to each student to glue those short red ends into the foam holes (because the 12" length stem doesn't leave much for inserting into the foam). As you glue, try to even out the distance between each curved stem by pulling the ends up or pushing them down as needed.



Fortunately the beads don't easily slip off the chenille stems, but to assure that they don't come off as students use the abacus, you can use the glue gun on all of the chenille stem ends, removing them from the holes enough to apply glue and reinsert.

[6] If time, have students add and subtract using their abacus.

MODIFICATIONS

To simplify project:

- Use only one or two chenille stems.
- Have one end of each chenille stem already glued into their holes so that students just thread the beads and insert the other ends into the holes.

To expand project:

- Create 5 rainbow bands by starting with two shorter chenille stems, making all of the bands a little closer together.
- Create an invention look by using plastic–coated wire to hold multicolored beads, inserted into a large foam base. Add more and more wire lines of beads to create a "Counting Contraption!"

For multiple ages:

- Younger and older students can work side-by-side with the older students designing different shapes such as a star, heart, moon, octagon, pentagon, etc., while the younger students work on the rainbow shape.
- Suggest to older students to tightly twist together the ends of chenille stems to make longer stems that can coil (around a pencil), zig-zag (by bending) or flow into shapes that still allow beads to move along the lengths.

ADDITIONAL IDEAS

- Research the use of the abacus to determine more about its use, such as how multiple rows were used to make advanced calculations.
- Make a giant abacus by using a larger foam base and jumbo (larger diameter and longer) chenille stems (found in specialty toy stores) with larger colored beads.
- Create different shapes with chenille stems and beads; then mount them like sculptures on the foam.
- For a more durable abacus, students can use wood skewers or thin dowels threaded with beads, capped on the ends by foam.

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TIPS

- Pony beads are available in clear plastic cases with divided compartments, eliminating the need for sorting. (The colors are very fun for kids!)
- Pony beads are also available in a glitter-look and could be used to place a greater value on certain beads, if that works into your lesson.
- Notice in planning how to cut the foam, that by putting three pieces in one direction and two in the other direction, there is less waste and the yield is five. If using a different size 1" thick foam block, draw a sketch for yourself of the dimensions and determine the maximum number of 4" x 10" pieces possible.
- If any cut edges of the foam are irregular, just rub another edge of foam against it, over a plastic-lined wastebasket, to sand them down and smooth them.
- When making starter holes in the foam base with the point of a pencil, be sure you don't press the pencil all the way in. The diameter of a pencil is larger than the diameter of a chenille stem end, so this would make the chenille stems loose.
- As the students finish using their abacuses, suggest that they divide their beads in half, with five pushed all the way to each side on each row. (Because the beads flatten the nap on the chenille stems, keeping the nap raised in the middle area makes it possible for it to hold beads in a position.)

REFERENCES

29 Ways To Make Math Fun by Patricia Martinez
The Grapes of Math by Greg Tang
One Is A Snail, Ten Is A Crab by A. and J. Sayre
City By Numbers by Steven Johnson