

Snap Math: Calculating with Circuits!

Materials Needed:

- Snap Circuits Jr. Kit (or similar)
- Paper
- Pencil

Lesson Activities:

Introduction (5 mins):

Did you know that building circuits is like doing math? Every time you add a piece, like a wire or a switch, you're adding to your circuit! Today, we'll use your Snap Circuits to practice arithmetic "adding, subtracting, and maybe even a little multiplying!"

Activity 1: Circuit Component Count (15 mins)

1. Gather a small selection of different Snap Circuit parts (e.g., 5 blue snap wires, 3 black snap wires, 1 switch, 1 battery holder, 1 lamp).
2. Count how many of each type of component you have. Write these numbers down.
3. Add them all together: How many total components do you have? (e.g., $5 + 3 + 1 + 1 + 1 = ?$)
4. Now, build a very simple circuit using some of the parts (like connecting the battery, switch, and lamp).
5. Count the components you used. Write that number down.
6. Subtract the number of components used from your starting total. How many components are left over? (Starting Total - Used Components = ?)
7. Try building another circuit and repeat the addition and subtraction practice.

Activity 2: Power Path Addition (15 mins)

1. Let's pretend each blue snap wire represents the number '2' and each black wire represents the number '3'.
2. Build a path connecting two points using only snap wires. For example, use 3 blue wires and 2 black wires.
3. Calculate the 'value' of your path by adding the values together. (e.g., Blue + Blue + Blue + Black + Black = $2 + 2 + 2 + 3 + 3 = ?$)
4. Challenge: Can you build a path with a total value of exactly 10? How about 15? Write down the combinations you use (e.g., 2 Blue + 2 Black = $2 + 2 + 3 + 3 = 10$).
5. Try adding a switch (value '1') into your path. How does that change the total value?

Activity 3: Component Groups (Multiplication Introduction) (10 mins)

1. Find a component you have several of, like the blue snap wires. Let's say you have 5 of them.
2. If we decided each blue wire had a 'cost' of 4 imaginary 'Circuit Credits', how many credits would all 5 wires cost together? (5 wires x 4 credits/wire = ?)
3. You can think of this as adding 4, five times: $4 + 4 + 4 + 4 + 4$. Multiplication makes this faster!
4. Try this with another component type. If you have 3 resistors and decide each is worth '5 points', what's the total point value? (3 resistors x 5 points/resistor = ?)

Wrap-up & Assessment (5 mins):

Great job being a Circuit Mathematician today! Show me one circuit you built. Tell me:

- How many total parts did you use? (Addition)
- If you took away the switch and one wire, how many parts would be left? (Subtraction)
- If you needed 3 circuits exactly like this one, how many lamps would you need in total? (Multiplication)

We saw how adding components is like addition, taking them away is like subtraction, and counting groups of the same component is like multiplication!

Differentiation:

- **Support:** Focus only on Activity 1, using smaller numbers of components for simpler addition/subtraction. Use fingers or draw pictures alongside the components.
- **Challenge:** Introduce 'negative' values for taking components away, or assign different values to more components (resistors, LEDs) and calculate more complex path values. Create multi-step word problems involving circuit parts.