

Meet CSU Extension
Front Range STEM
Specialist



Claire Dixon

Claire Dixon is employed as the Front Range STEM Specialist/ 4-H Youth Development for Colorado State University Extension since 2011. She holds a B.S. Biological Science and M.B.A. from the University of Denver.

She works with educators, extension agents, teachers and out-of-school time staff. Claire is a presenter at local, regional, state and national conferences, supporting professional development and development in STEM (Science, Technology, Engineering and Mathematics).

She has taken the lead in supporting Colorado 4-H Robotics programs and has a personal interest in working with underserved audiences.

She was a leader of a unique coalition with campus partners and USGS as a co-author of the National 4-H Youth Science Day for 2013 - 4-H Maps and Apps.

Claire supports STEM and K-12 work in Larimer, Weld, Boulder, Broomfield, Denver, Adams, Arapahoe, Jefferson, Gilpin, Clear Creek, Douglas and El Paso Counties.

Fascinating Map Fact:

The earliest known maps are of the heavens, not Earth. Dots dating to 16,500 BC found on the walls of the Lascaux caves map out part of the night sky.

STEM Connections

Colorado
State
University

Extension



Connecting Science, Technology, Engineering, and Math concepts to our everyday lives.

ProblemsLayers

Let's Talk Trash

Activity taken directly from NYSD Maps and Apps

The activity this month is the original proposal the Colorado team (lead by Claire Dixon and Christy Fitzpatrick) sent to National 4-H. It became the 2nd activity in the 2013 National Youth Science Day Maps and Apps activity. If you would like to do the both activities, please ask your county 4-H agent to borrow the Maps and Apps kit.

In our last STEM Connection mapping activity, Where in the World is Gregory Felsen, we learned about scale and coordinates on maps. This month, we use layers as well as employing coordinates. Next month's STEM Connection will conclude this activity by analyzing geographical data to solve problems, in this case, trash in Sterling, Colorado!

From the activity:

The mayor in the City of Sterling, Colorado has asked for your expertise to help resolve a messy situation. In this city, the middle school, high school, recreation center, and fairgrounds are all located close together. Whether it's the county fair, a Friday night football game, or a special community event, this area sees a lot of traffic—and a lot of trash. The city has already picked up the trash and recorded where everything was using a grid. To help reduce the amount of trash this area sees in the future, the mayor would like to install recycling and trash receptacles throughout the area and wants your help in determine the best location for them.

EXPLORE IT - DESIGN IT - DO IT

Modern maps are built in layers to store **spatial data**. This is called **geographic information systems (GIS)**. This becomes a very powerful tool in analyzing issues or solving problems. For Part I of ProblemsLayers, you will plot the data (the trash location for each type: plastic bottles, aluminum cans, paper goods and non-recyclable trash). Next month, you will analyze these data to determine the best locations for installing the recycling and trash receptacles.

- You have folded your transparent page protector in half. Each of the halves (two on the front and two on the back) will become one of the four layers, one layer for each type of trash found.
- Insert the **base map** into one section of the page protector. Use the **red** sharpie pen and label this section "**Layer 1: Plastic Bottles.**" Mark where the 4 corners of the base map on the page protector. Locate the **coordinates** on the map using the trash data charts for Layer 1: Plastic Bottles.
- Insert the **base map** in a different section of the page protector. Use the **blue** sharpie pen, and label "**Layer 2: Aluminum Cans.**" Mark the 4 corners of the base map on your page protector. Locate the **coordinates** on the map using trash data charts for Layer 2: Aluminum Cans.
- Insert the **base map** in a different section of the page protector. Use the **green** sharpie pen, and label "**Layer 3: Paper Goods.**" Mark the 4 corners of the base map on your page protector. Locate the **coordinates** on the map using trash data charts for Layer 3: Paper Goods.
- Insert the **base map** in a different section of the page protector. Use the **black** sharpie pen, and label "**Layer 4: Non-Recyclable Trash.**" Mark the 4 corners of the base map on your page protector. Locate the **coordinates** on the map using trash data charts for Layer 4: Non-Recyclable Trash.
- Cut your page protector apart into the 4 sections, order each layer on top of the base map, and clip them together with the binder clip.
- Save this map for next month's STEM Connection. We will analyze these data to determine the most efficient spots to place the recycling and trash receptacles to eliminate the Sterling trash problem!

Happy New Year 2014!

Age Appropriate:

4th—HS grades

Time Required:

About 45 minutes

Materials:

- Transparent page protector
- **Red, blue, green** and black sharpie pens
- Printer to copy the **base map**
- Scissors
- Binder clips

The Set-up:

- Print map
- Cut on dotted line
- Fold page protector in half

The Clean-up:

- Put away pens
- Save the map for next month's STEM Connection

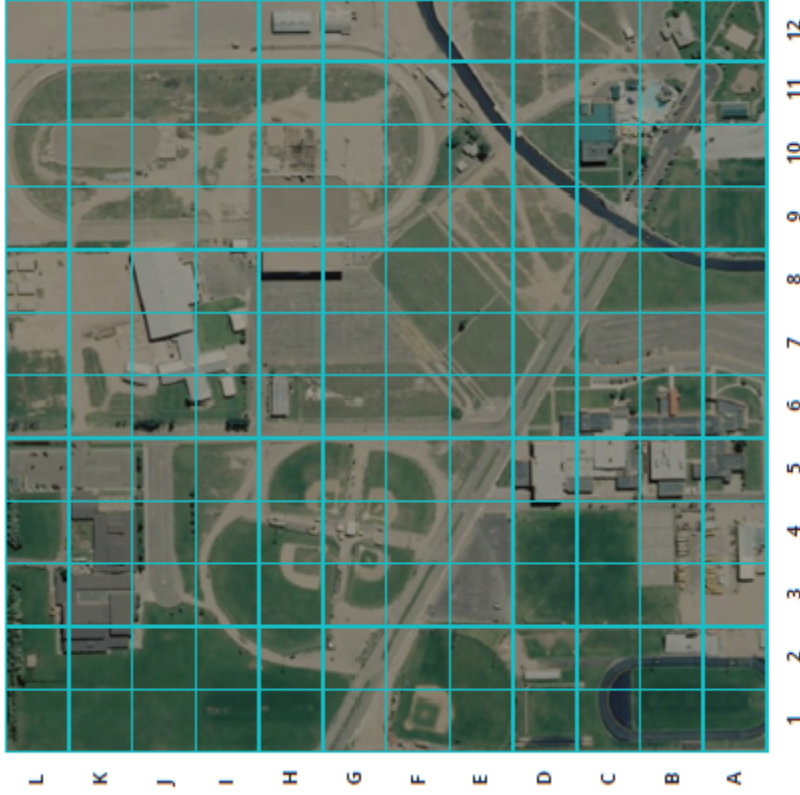
Power Words

- **base map:** a map showing the background reference information, such as roads, political boundaries or landforms onto which specific information is added*
- **coordinates:** a set of values that define the location of a point or line in space relative to other points: Cartesian coordinate systems use x and y values (and sometimes z in 3D systems) and geographic coordinate systems use latitude and longitude to locate points
- **geographic information systems (GIS):** an integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships and model spatial processes: GIS provides a framework for gathering and organizing spatial data and related information so that it can be displayed and analyzed
- **spatial data:** related to or existing in space*; in GIS, related to a location on earth

* From ESRI GIS Dictionary: <http://support.esri.com/en/knowledgebase/GISdictionary/browse>
Other definitions from NYSD 2013 Maps and Apps Youth Guide Glossary



BASE MAP OF STERLING, COLORADO



TRASH DATA CHARTS

Layer 1: Plastic Bottles

	Y Coordinate	X Coordinate	# of Bottles
1	B	2	2
2	B	10	3
3	C	6	4
4	C	10	2
5	G	4	7
6	H	4	1
7	I	6	4
8	J	3	6
9	J	4	12
10	J	5	4

Layer 2: Aluminum Cans

	Y Coordinate	X Coordinate	# of Cans
1	A	10	2
2	B	2	3
3	F	1	3
4	G	4	7
5	H	7	3
6	H	8	10
7	I	8	3
8	J	3	4
9	J	4	3
10	J	5	2

Layer 3: Paper Goods

	Y Coordinate	X Coordinate	# of Paper Items
1	A	7	3
2	B	7	6
3	C	7	4
4	C	10	3
5	H	8	2
6	I	8	2
7	J	3	5
8	J	4	6
9	J	5	3
10	K	5	2

Layer 4: Non-Recyclable Trash

	Y Coordinate	X Coordinate	# of Items
1	C	6	3
2	F	5	5
3	G	5	7
4	H	5	8
5	I	11	5
6	J	3	1
7	J	4	2
8	J	5	1
9	J	11	4
10	K	11	5

C

Layer _____: