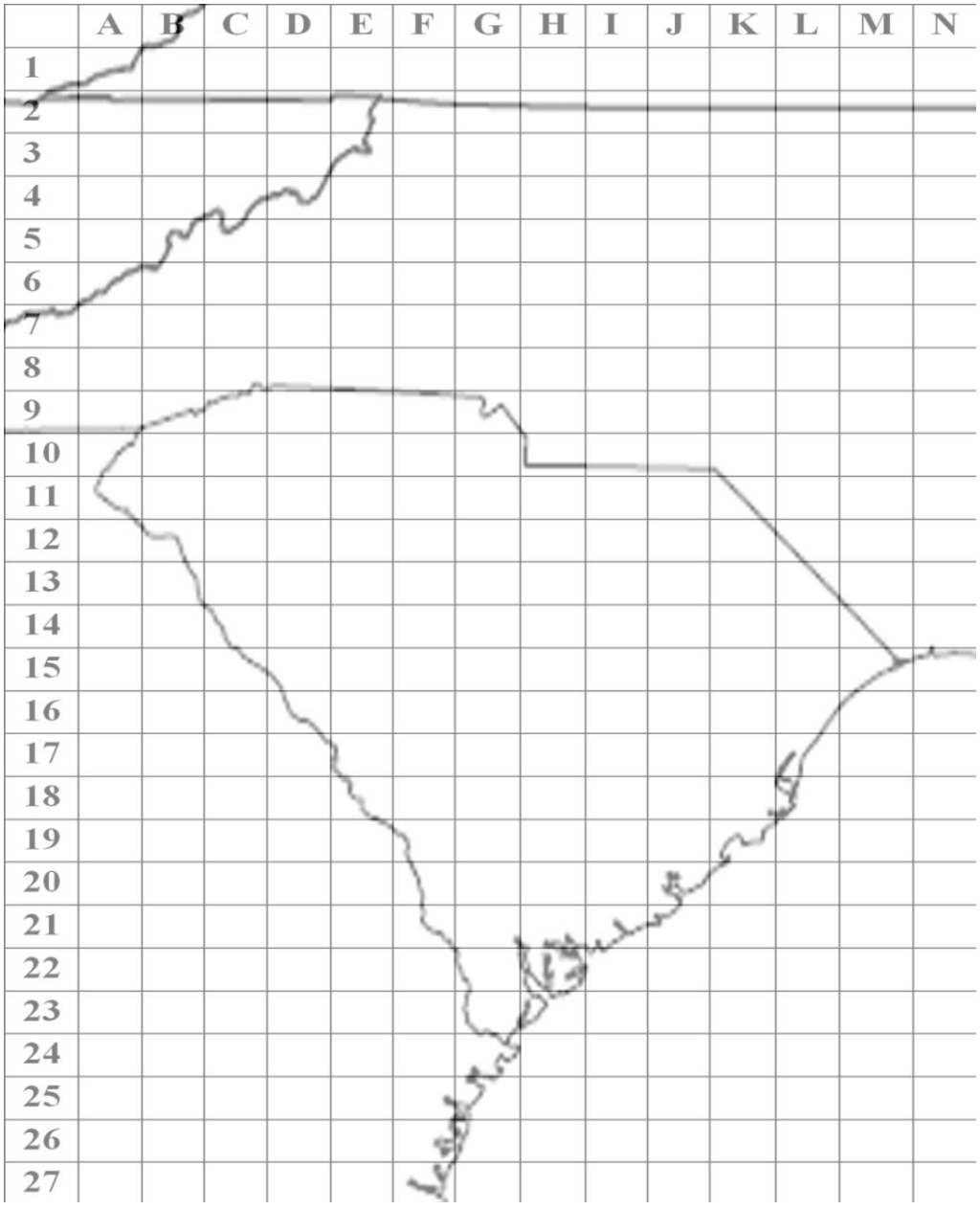
Science
Lab: Modified Mercalli Scale

Names:
Period:

Purpose: To demonstrate the use of the Modified Mercalli Earthquake Intensity Scale.
Materials: Eyewitness Description sheet, Mercalli Descriptions, Map/Question Sheet
Directions:

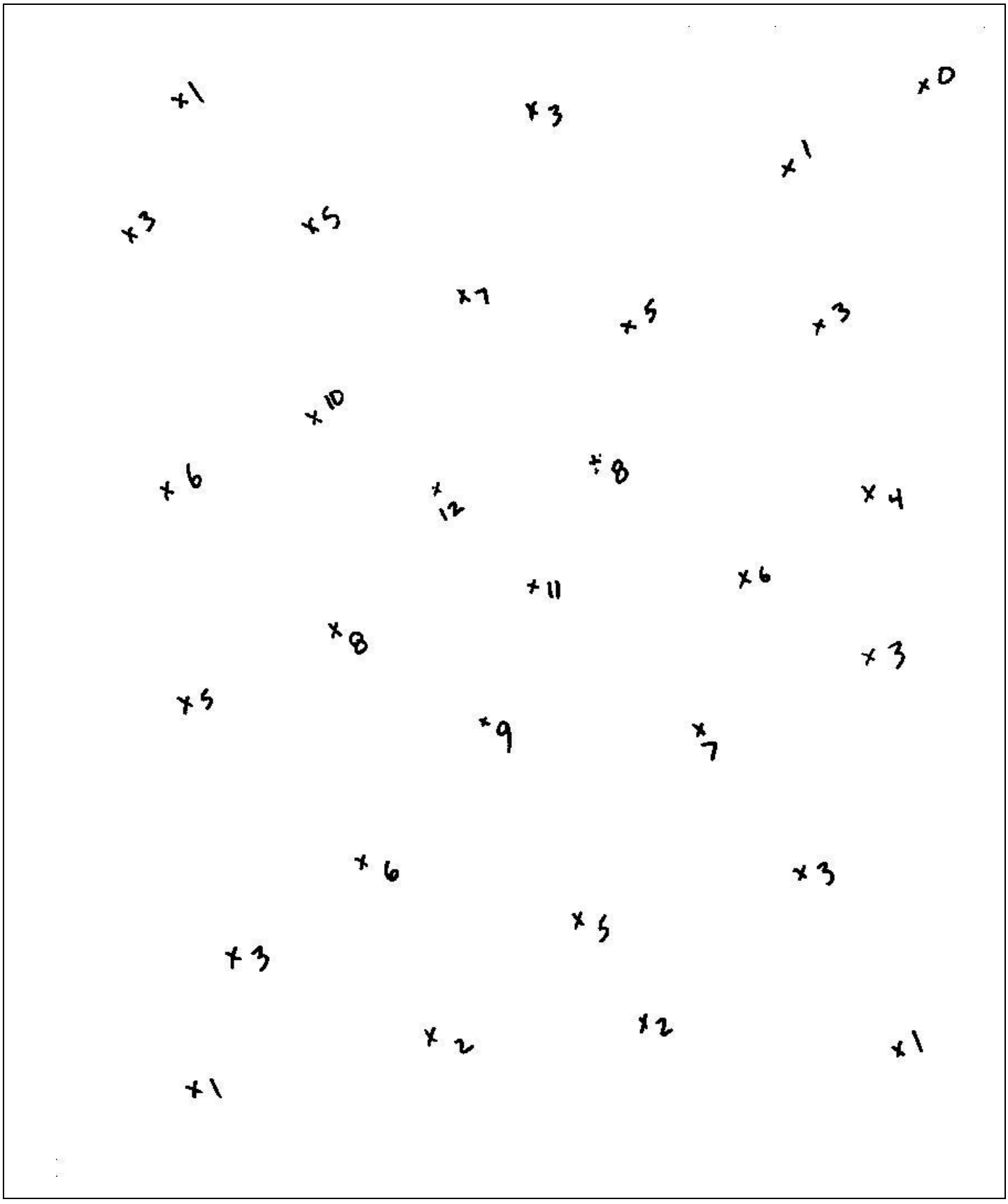
1. Read an eyewitness account of the earthquake.
2. Compare it to the Mercalli Descriptions. Find the numbered description that best matches the eyewitness account. Note: Mercalli Magnitudes are normally in Roman numerals.
3. Write the Mercalli number in the center of the location box for the description on the map.



4. Draw isoseismal lines to indicate where similar effects could be felt. Use units of 2.
5. Put a star (★) where you think the epicenter was.
6. If each square is approximately 33 km., what is the least distance that you would have to be away from the epicenter and not feel any of its effects? (How far is it from your star to a 1 contour?) What do you think is the greatest distance you could be to feel it?

Practice Contouring Data

Contour lines connect points having the same value. Connect points having the same values with curved lines. Use a contour interval of 2. Start with 4s then 6s, 8s, 10s, 12s, and then 2s and 0s. Interpolate values if there are none. For example, between 3 and 5 a 4 would be halfway. Between a 1 and 5 the 4 would be closer to the 5 and so on.



EYEWITNESS ACCOUNTS

a. Mr. Kent, (C7) said he was puzzled at feeling a vibration like a passing, truck, even though there was no road nearby.

b. Mrs. Sebastian, housewife (E16), thought her refrigerator was out of order when she felt a vibration as she walked through the kitchen.

c. Mrs. Watts, a science teacher at Brawley School (C9), found the chalkboard wobbling as she wrote. Dr., Brew, Vice Principal, noticed his coffee cup rattling in its saucer on the table

d. Mr. Pirelli, who was lying on a couch because of a pulled muscle at the Reading Leisure Center, felt a weak tremble (C19).

e. Mr. Smith (D15) said, "I went outside because I thought a truck had crashed and caused my dishes to rattle. We need some sort of investigation into this affair."

f. The grandfather clock belonging to Charlie Sanders (G8) stopped at 2:04 p.m. after the whole house rocked rapidly for 20 seconds.

g. Mr. Keaton, a retired man (A9) noticed a very faint vibration as he took his afternoon nap, but thought it was due to a weak chair spring.

h. Mrs. Heynie, a patient in bed in the Tonopah Community Hospital (E2), became aware of a slight tremor as she laid in the upstairs ward.

i. Mr. Buzby, postmaster at a Post Office (D11), reported feeling vibrations that caused objects to fall off shelves.

j. Bubba Johnson was stunned to see the textile factory chimney collapse as he stood in the street after rushing out of the bait store. (E11)

k. Several golfers in the clubhouse (I5) noticed some wobbling, but were unsure if it was an earthquake.

l. Campers sitting outside felt a feeble motion. (I14)

m. Miss Sanchez, a teacher, (H7) noticed her classroom maps swayed and had her students get under their desks in case there was an earthquake.

n. Alarmed at the vibrating floor as she entered her house, Miss Oliver (F10) stood under her doorframe for safety and saw her car bouncing in the driveway. Afterward she noticed a fine crack running up her wall.

o. Jeff (F8) called a local radio station to check if an earthquake had just occurred after he awoke to the noise of objects falling off his shelves.

MERCALLI SCALE OF EARTHQUAKE INTENSITY

Intensity	*Description of earthquake intensity*
1	Cannot be felt by people. Can only be detected by instruments.
2	Feeble. Felt by people who are standing; still or laying; on beds.
3	Slight. Feels like the vibrations of a passing truck. Can be felt indoors as wobbling or rattling. Most people would not think that it is an earthquake.
4	Moderate. Felt indoors. Feels as though a heavy ball is hitting the walls. Hanging objects swing. Standing objects rocks or sway. Windows, doors, and dishes rattle.
5	Fairly strong. Felt outdoors. People who are asleep are awakened by it. Liquids move and spill. Pendulum clocks stop and doors swing.
6	Strong, Felt by everyone. People run outdoors in fright. People walk unsteadily. Things fall off shelves. Furniture move.
7	Very strong. General alarm. Walls crack, furniture break. People walking cannot stay upright. Car drivers notice the effects.
8	Destructive. Car drivers are seriously disturbed. Poorly built houses are badly damaged. Factory chimneys collapse. Branches break off trees. Steep slopes crack.
9	Ruinous. General panic. Reinforced buildings are badly damaged. Pipes and reservoirs break and leak. Loose, sandy areas crack.
10	Disastrous. Ground cracks badly. Railway lines bend. Landslides occur on steep slopes. Water is thrown out of lakes. Some bridges are damaged.
11	Very disastrous. Few buildings remain standing. Bridges are destroyed. All services such as railways, pipes, and cables are out of action. Large landslides and floods occur.
12	Catastrophic. Total destruction. Objects thrown into the air. Ground rises and falls in waves.

Teacher Information Sheet

This activity is based on one that was given at a previous NSTA conference a while ago. The shape of the data is drawn from an actual earthquake that occurred near Union, SC on January 1, 1913. The information is from SC Geological Survey Bulletin 40 by T. R. Visvanathan in 1980.

I start the activity in the classroom by handing out the pages 1 and 2 with the Practice Contouring Data Sheet. I place a transparency of the Practice Contouring Data Sheet on the overhead and lead the students through the contouring of the data as per the instructions on the sheet starting with a 2 contour. What the data is of is irrelevant. It could be temperature in a room or elevations, the point is by contouring it we can see patterns that may not be obvious at first glance.

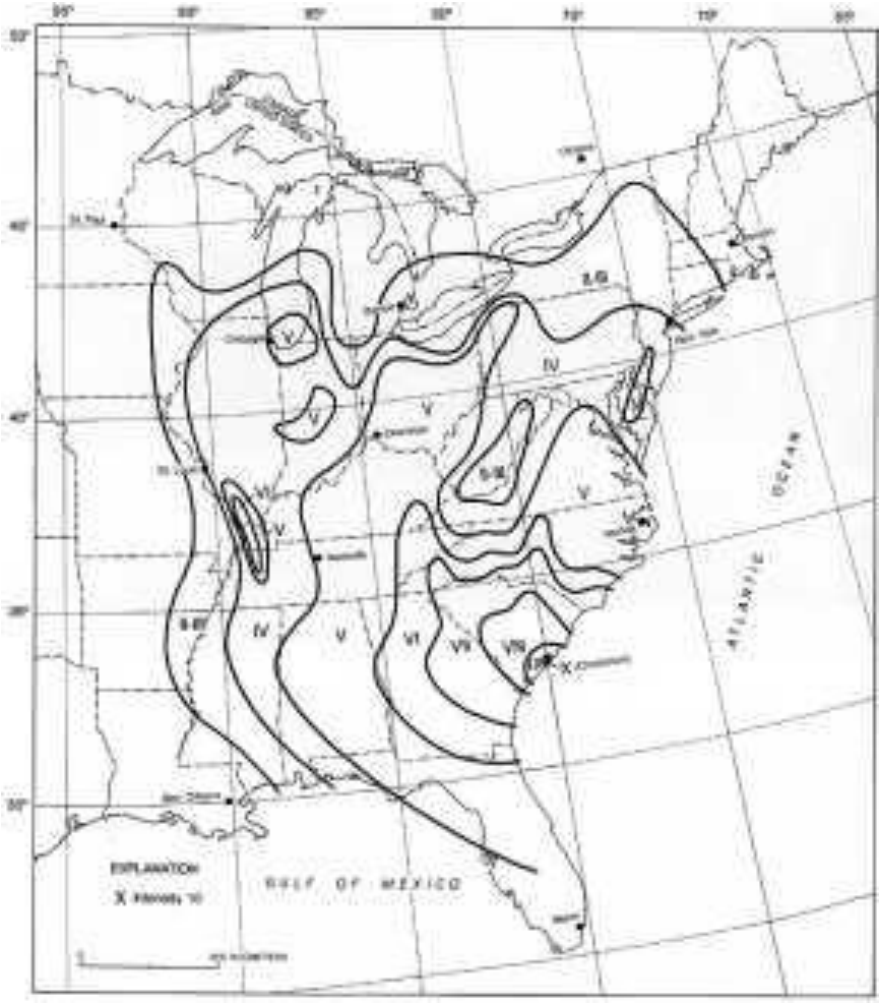
After completing the contouring activity we then break into pairs to have the students read the Eyewitness Accounts and plot the data on the map. After plotting the data they then answer the questions.

This is an authentic activity. After earthquakes the USGS collects eyewitness accounts, analyzes the accounts and then creates maps depicting the data. Teachers can demonstrate this by going to the National Earthquake Information Center website.

http://earthquake.usgs.gov/eqcenter/recenteqsww/ or
http://earthquake.usgs.gov/regional/neic/

To see the Mercalli Intensity maps click on the side bar selection "Did you feel it?"

You can find isoseismal maps for historic earthquakes. Below right is for the 1886 Charleston Earthquake.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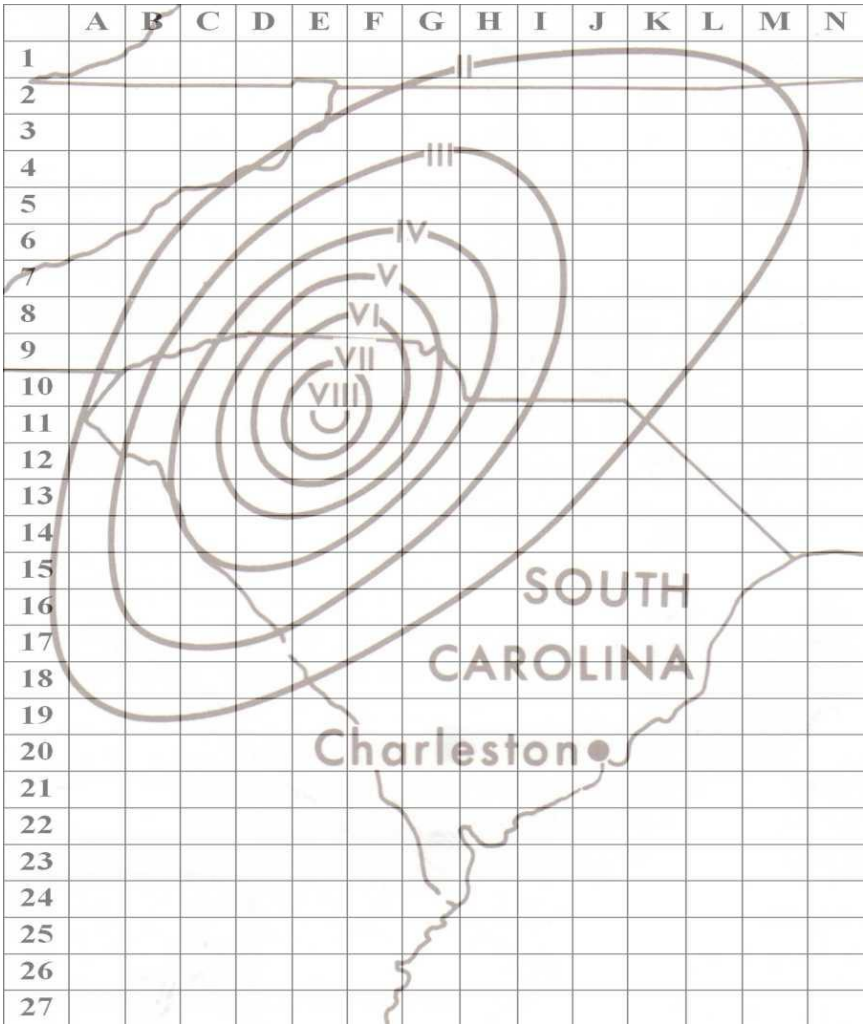
VI
VII
VIII
ATLANTIC OCEAN
GULF OF MEXICO
EXPLANATION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CAROLINA
Charleston