

Shake Table

Materials

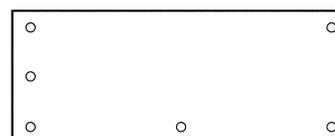
- Box lid or shallow box with flaps removed
- Flat piece of cardboard, 1" to 2" smaller than box
- Rubber bands (4)
- Paper clips (4)
- String, two 12" pieces
- Single-hole punch or ball-point pen

Procedure

The Shake Platform

1. Punch a hole in each corner of the piece of cardboard 1/2" from both edges.
2. Locate the center of one long side of the cardboard and punch a hole 1/2" from outside of edge.
3. Locate the center of one short side of the cardboard and punch a hole 1/2" from outside of edge. You now have a total of six holes in the cardboard.

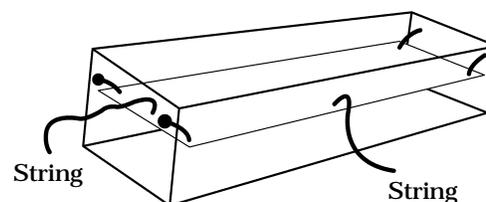
The Shake Platform



The Shake Box

4. Punch two holes in each of the short sides of the box 1" down from the top and 1" from each corner to correspond with the holes in the flat piece of cardboard. You now have four holes in the box.
5. Locate the center of one long side of the box and punch a hole 1" down from the top.
6. Locate the center of one short side of the box and punch a hole 1" down from the top. You now have a total of six holes in the box.
7. Attach rubber bands and secure them to the cardboard by feeding them through the holes in the corners and looping them through themselves.
8. Attach rubber bands -- and therefore the entire cardboard platform -- to the box by feeding the free ends of the rubber bands through the holes in the corners of the box and securing them with paper clips outside the box (see diagram). The platform now should be suspended or "floating" inside the box.
9. Tie a string to the middle hole of one short side and one long side of the platform, and feed it through the corresponding hole in the box. By pulling the strings side-to-side, lateral shaking will be simulated.

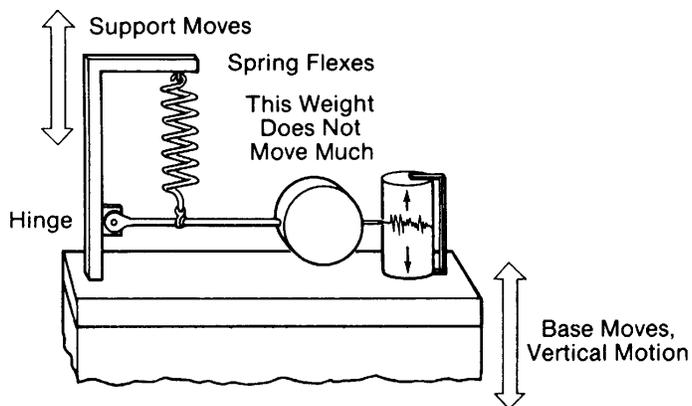
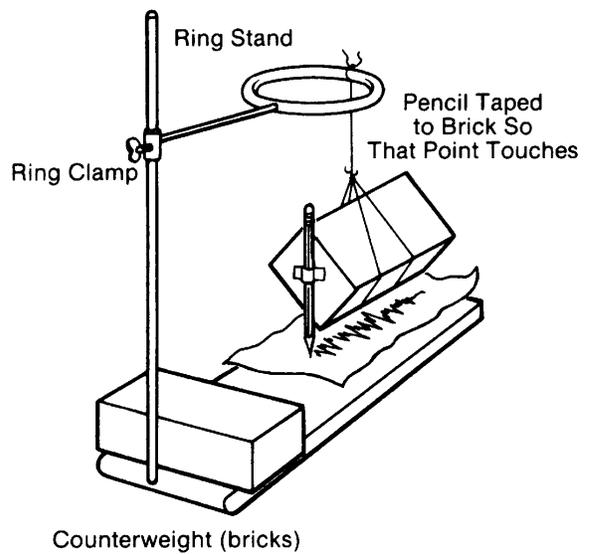
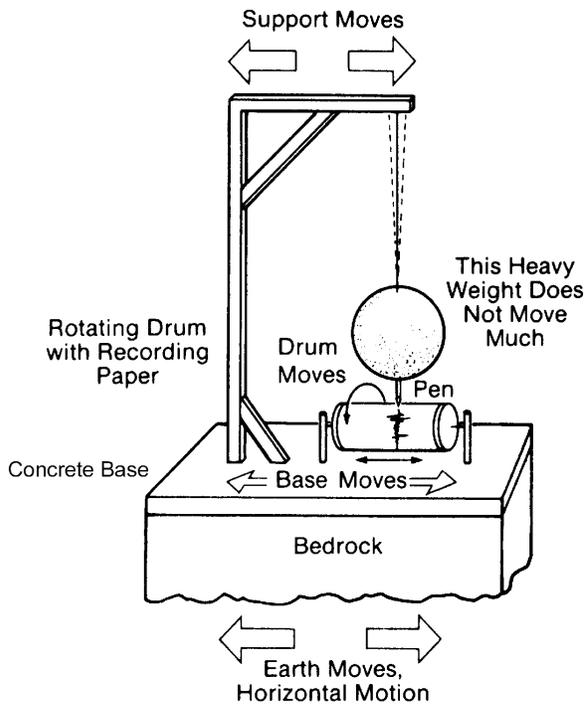
The Shake Box



Modified Mercalli Scale

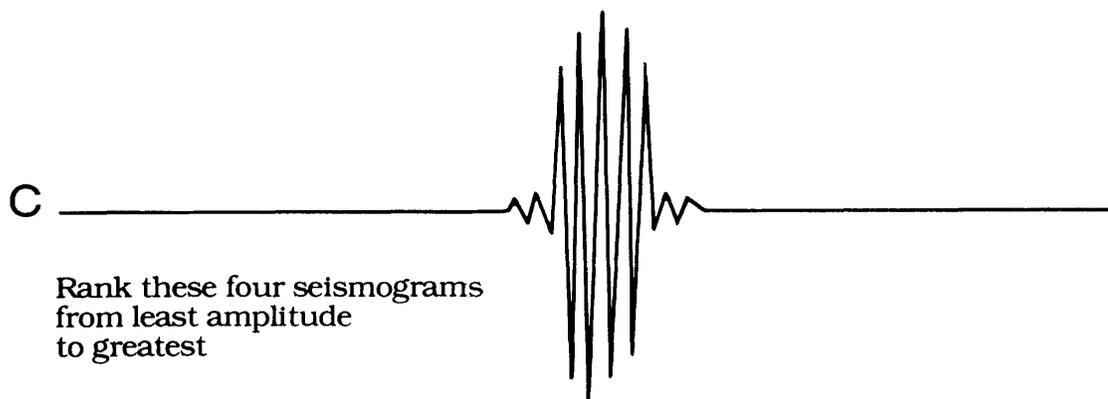
- I.** People do not feel any Earth movement.
- II.** A few people might notice movement if they are at rest and/or on the upper floors of tall buildings.
- III.** Many people indoors feel movement. Hanging objects swing back and forth. People outdoors might not realize that an earthquake is occurring.
- IV.** Most people indoors feel movement. Hanging objects swing. Dishes, windows, and doors rattle. The earthquake feels like a heavy truck hitting the walls. A few people outdoors may feel movement. Parked cars rocked.
- V.** Almost everyone feels movement. Sleeping people are awakened. Doors swing open or close. Dishes are broken. Pictures on the wall move. Small objects move or are turned over. Trees might shake. Liquids might spill out of open containers.
- VI.** Everyone feels movement. People have trouble walking. Objects fall from shelves. Pictures fall off walls. Furniture moves. Plaster in walls might crack. Trees and bushes shake. Damage is slight in poorly built buildings. No structural damage.
- VII.** People have difficulty standing. Drivers feel their cars shake. Some furniture breaks. Loose bricks fall from buildings. Damage is slight to moderate in well-built buildings, considerable in poorly-built buildings.
- VIII.** Drivers have trouble steering. Houses that are not bolted down might shift on their foundations. Tall structures such as towers and chimneys might twist and fall. Well-built buildings suffer moderate damage. Poorly-built structures suffer severe damage. Tree branches break. Hillsides might crack if the ground is wet. Water level in wells might change.
- IX.** Well-built buildings suffer considerable damage. Houses that are not bolted down move off their foundations. Some underground pipes are broken. The ground cracks. Reservoirs suffer serious damage.
- X.** Most buildings and their foundations are destroyed. Some bridges are destroyed. Dams are seriously damaged. Large landslides occur. Water is thrown on the banks of canals, rivers, lakes. The ground cracks in large areas. Railroad tracks are bent slightly.
- XI.** Most buildings collapse. Some bridges are destroyed. Large cracks appear in the ground. Underground pipelines are destroyed. Railroad tracks are badly bent.
- XII.** Almost everything is destroyed. Objects are thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move.

Seismographs



Seismogram Worksheet

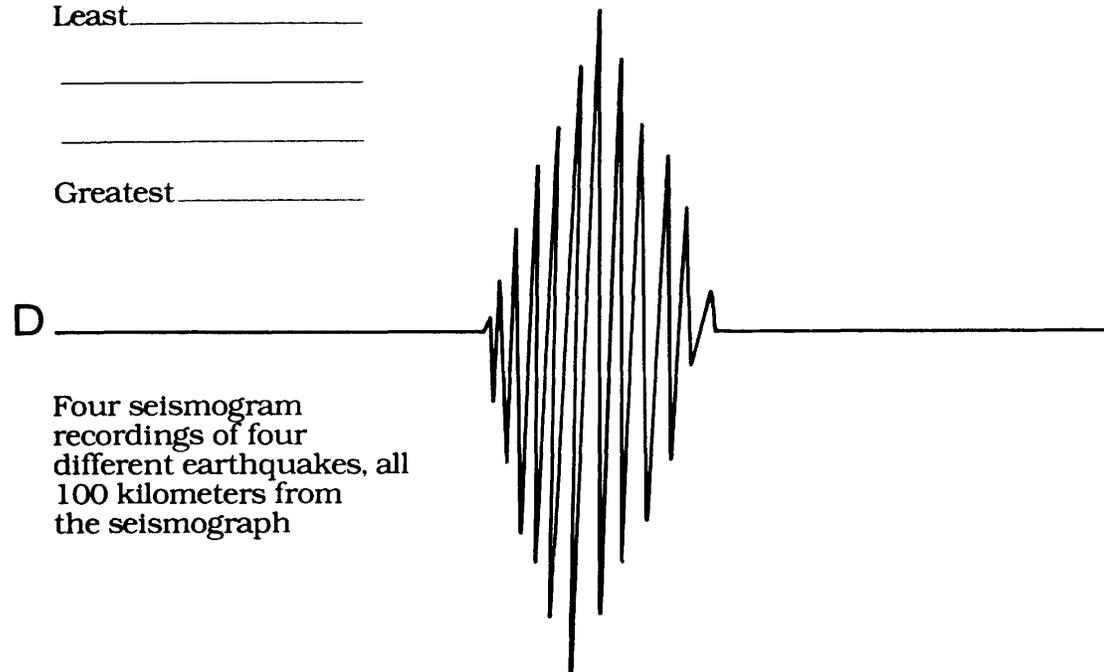
Name _____



Rank these four seismograms from least amplitude to greatest

Least _____

Greatest _____

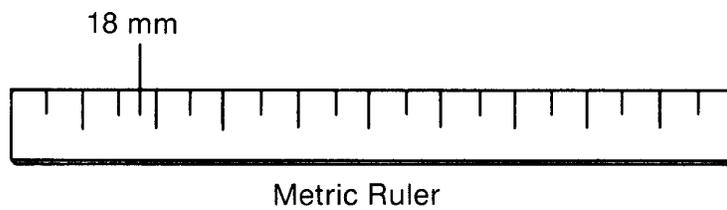
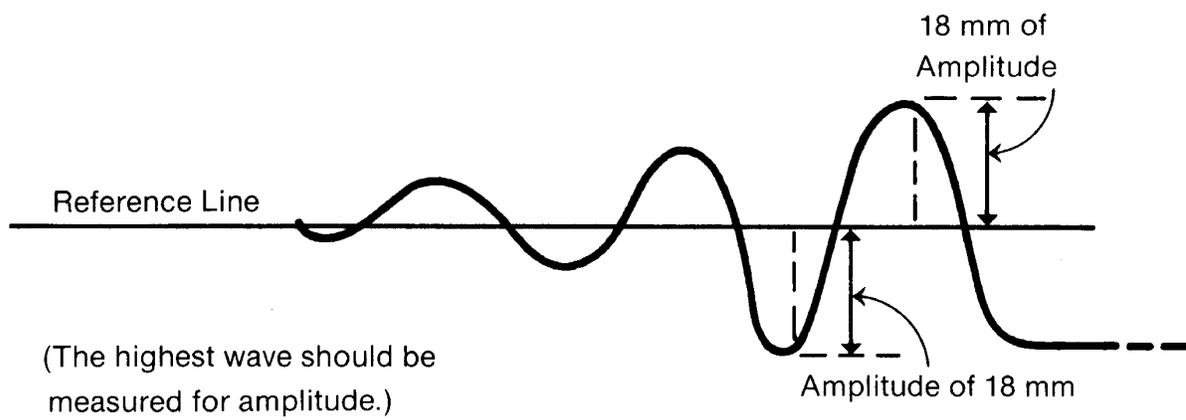


Four seismogram recordings of four different earthquakes, all 100 kilometers from the seismograph

Earthquake Magnitude and Energy

Magnitude	TNT Energy Equivalent	Example (approximate)
1.0	6 ounces	Small blast at a construction site
1.5	2 pounds	
2.0	13 pounds	Average quarry blast
2.5	63 pounds	
3.0	397 pounds	Smallest earthquake commonly felt
3.5	1,000 pounds	
4.0	6 tons	Small atomic bomb
4.5	32 tons	Average tornado
5.0	199 tons	
5.5	500 tons	Massena, NY quake, 1944
6.0	6,270 tons	
6.5	31,550 tons	Northridge, CA quake, 1994
7.0	199,000 tons	Hebgen Lake, MT quake, 1959
7.5	1,000,000 tons	Mount St. Helens eruption, 1980
8.0	6,270,000 tons	San Francisco, CA quake, 1906
8.5	31,550,000 tons	Anchorage, AK quake, 1964
9.0	199,999,000 tons	Chilean quake, 1960

Seismogram Showing Amplitude



Earthquake Severity Worksheet

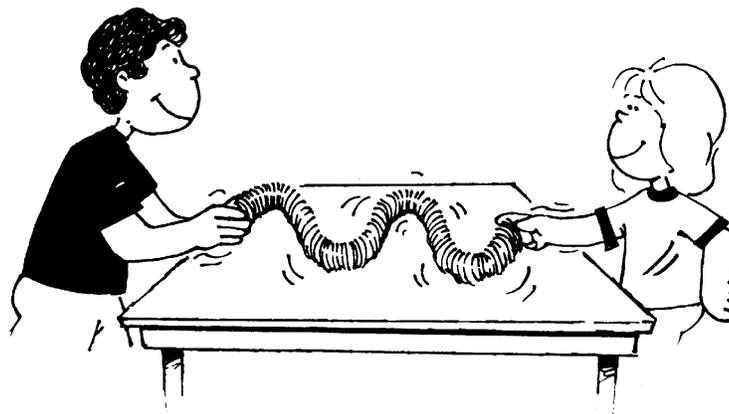
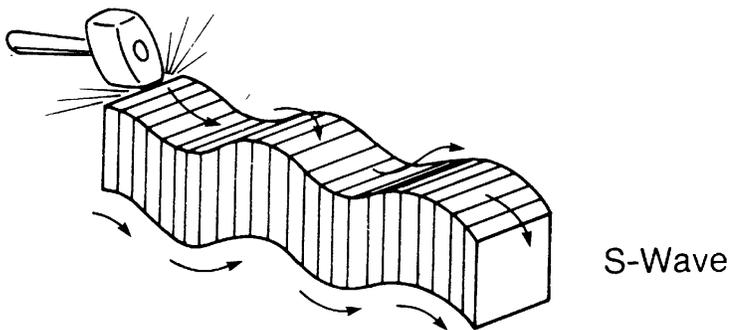
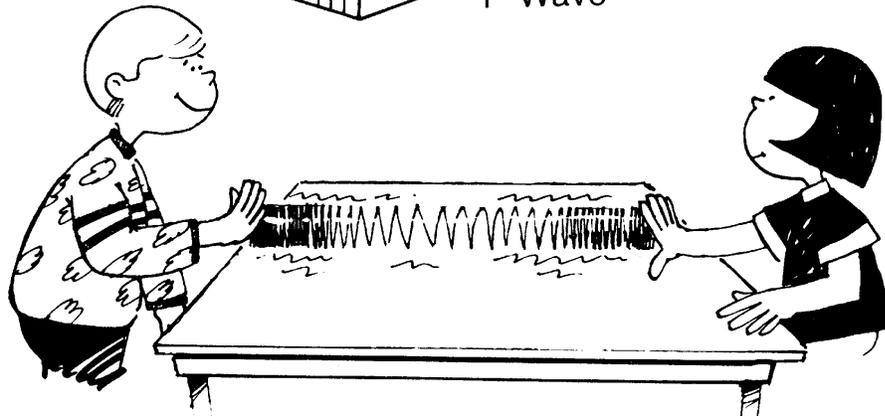
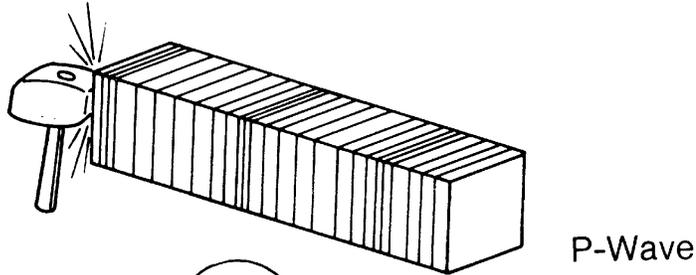
Name _____

Magnitudes	Earthquake Effects	Estimated Number Per Year Worldwide
1.0–3.0	Generally not felt but recorded.	
3.1–4.0	Often felt, but only minor damage.	
4.1–6.0	Slight damage to buildings.	
6.1–6.9	Can be destructive in places where people live.	
7.0–7.9	Major earthquake. Causes serious damage.	
8.0 or greater	Great earthquake. Total destruction to nearby communities.	

Choose which answers belong in the last column.

Answers:	20	15,000	3,000,000
	120	50,000	1

P-Wave Motion and S-Wave Motion



The S-Wave Machine

Pull the end of a cut rubber band through the hole and tie it to a washer.

Shoebox

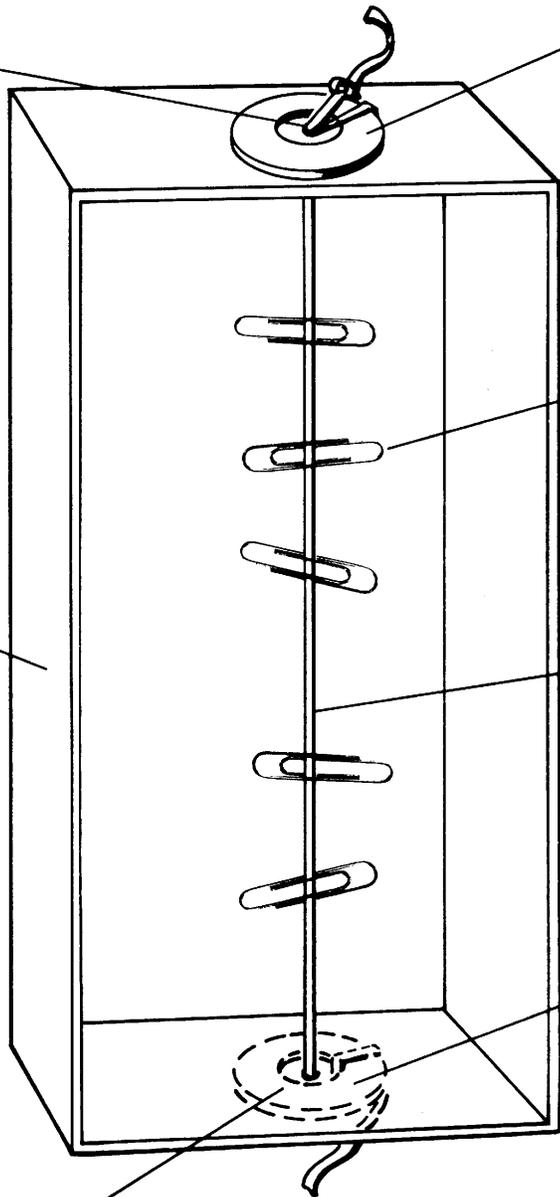
Pull the rubber band taut through the hole.

Metal Washer

Paper Clips

Rubber Band

Metal Washer



KWAT Television Script

Jake Wilde: “We interrupt our regularly scheduled programming on KWAT to bring you a special bulletin. This is KWAT news anchor, Jake Wilde. Moments ago the town of Wattsville was shaken by a strong earthquake. Residents in the KWAT broadcast area are invited to call our emergency response number, 555-KWAT, and give us your name, your location, and a brief summary of what you experienced during the quake. Stay tuned for the latest reports of what your neighbors saw and felt. To report your observations, call 555-KWAT. We have caller number 1 on the line.”

Caller 1: “Hi, this is Charles from the hospital. We only had slight to moderate damage in the new, well-built Children’s Care building. The building containing most of our records was old and poorly built; damage there was considerable.”

Caller 2: “Hello my name is Roy, and I’m calling from the RQB Ranch. We were just sitting around the kitchen table, when suddenly coffee sloshed out of all our cups. Several cabinet doors opened up and dishes fell and broke.”

Caller 3: “Hi, this is Carmen at Long Valley Boutique. We have a mess here. When the quake struck, it moved all of our wall displays, and all our little ceramics fell and broke.”

Caller 4: “Hi Jake, I’m Susan calling from the Faithful Church. When the earthquake struck, our bell tower collapsed.”

Caller 5: “Hi. This is Jo from Southside City Junior High School. Students felt it and did the drop, cover, and hold drill. We only had slight damage to the building, just some cracked plaster in the walls. A few pictures also fell.”

Caller 6: “Hey Jake, this is Hank and I’m calling from the basement of the First Bank in the center of Wattsville. This old building has partially collapsed and people are trapped down here. Please send help.”

Caller 7: “Hi, this is Fernando. I work at the Sunrise Senior Center. Many of our clients were frightened. All our supplies fell off the shelves.”

Caller 8: “Hello Jake, this is Debbie. We were picnicking at the Great Bend Park. When the quake struck, it woke up Granny and we saw trees and the flagpole swaying back and forth.”

Caller 9: “Hi, this is Lee Quon. When the quake hit, I was at Hot Springs Ranch visiting friends. Nearly everyone felt it. All the doors that were open, slammed shut.”

Caller 10: “Hi Jake, this is Ben. I was at Blue Lake Resort when all the cars in the parking lot started rocking back and forth.”

KWAT Television Script (cont'd.)

Caller 11: “Jake, this is Gene at White Water Manufacturing. All the heavy furniture in the showroom was moved by the quake, and some of the plaster cracked and fell off the walls.”

Caller 12: “Hi, this is Diana calling from Happy Slurps Ice Cream. Over here, we thought that a big truck had hit the building.”

Caller 13: “Hi Jake, this is Ken at River City Video. Our whole collection of tapes is on the floor and all our posters fell off the walls.”

Caller 14: “Hi, this is Maria and I’m calling from Plants-R-Us. During the quake, all our hanging plants were swaying and all our windows were rattling.”

Caller 15: “Hi Jake, this is David from Wattsville University. Everyone in our class felt the quake, and some of the older, more poorly built buildings suffered considerable damage.”

Caller 16: “Hello Jake, this is Steve from the South End Mall. All the shoppers were having a hard time standing during the quake. We had a lot of breakage, especially in our furniture shops.”

Caller 17: “Hey Jake! Jed here. Over at the Roundup Truck Stop, the trucks were shaking with the quake. The drivers at the gas pumps had to hold on to the pumps to keep standing.”

Caller 18: “Hi Jake, this is Jenny. When the quake struck we were mowing lawns at the West Side Subdivision. We saw trees and bushes shake and everyone was finding it difficult to walk.”

Caller 19: “Hi Jake, this is Juan at White Water Pets. During the quake water sloshed out of all our small aquariums. That sure woke up any sleeping fish!”

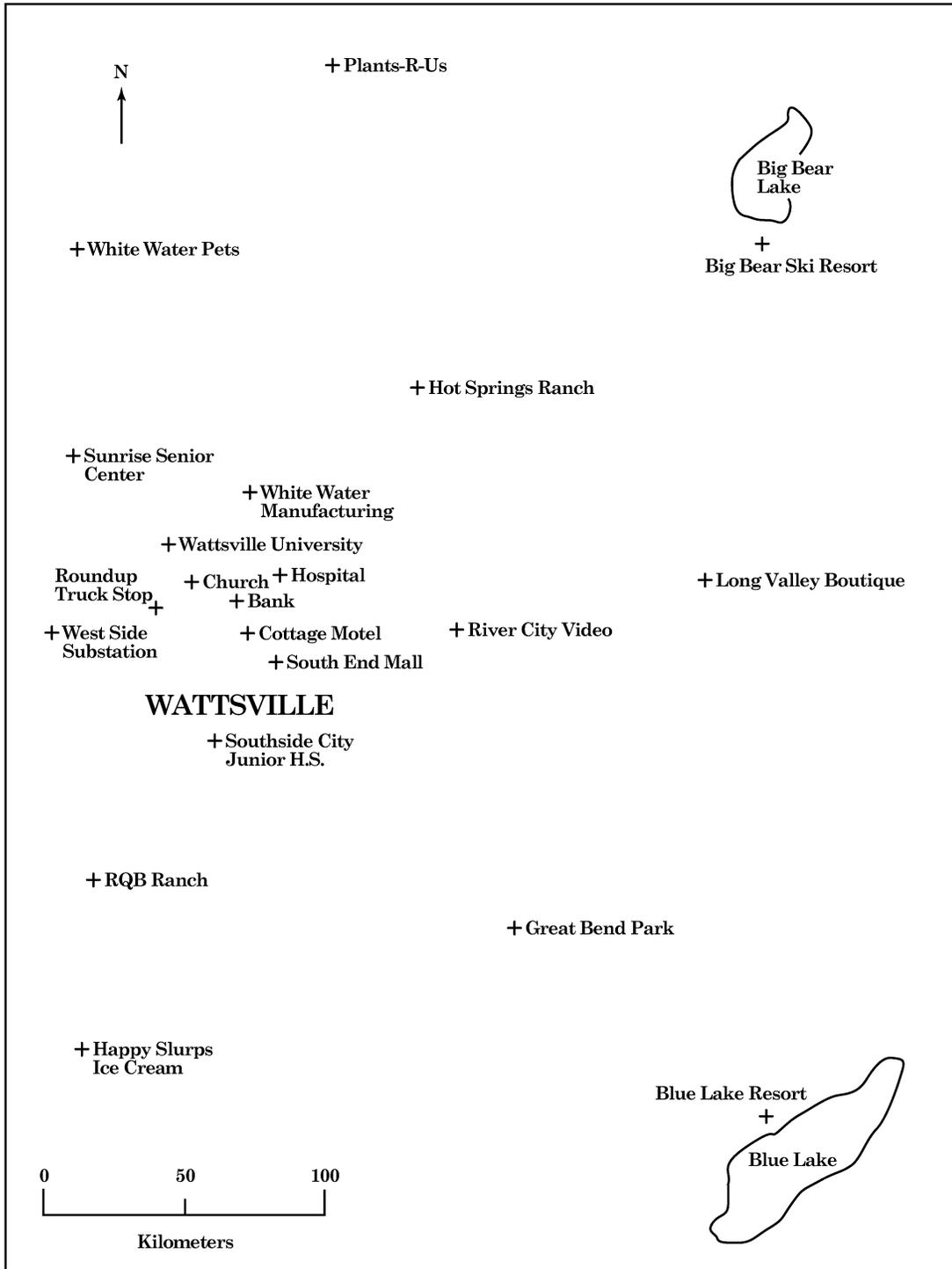
Caller 20: “Hello Jake, this is Martha at the Cottage Motel. All our customers were frightened. Nearly all of our little cottages moved off their foundations and the water level in our well dropped at least a foot.”

Caller 21: “Hi Jake, this is Marty up at Big Bear Ski Resort. The quake rattled our dishes and windows. I saw some parked cars rocking. Most folks who were outdoors, didn’t feel the shaking.”

This activity was adapted from FEMA 253, Seismic Sleuths - A Teacher's Package for Grades 7-12.

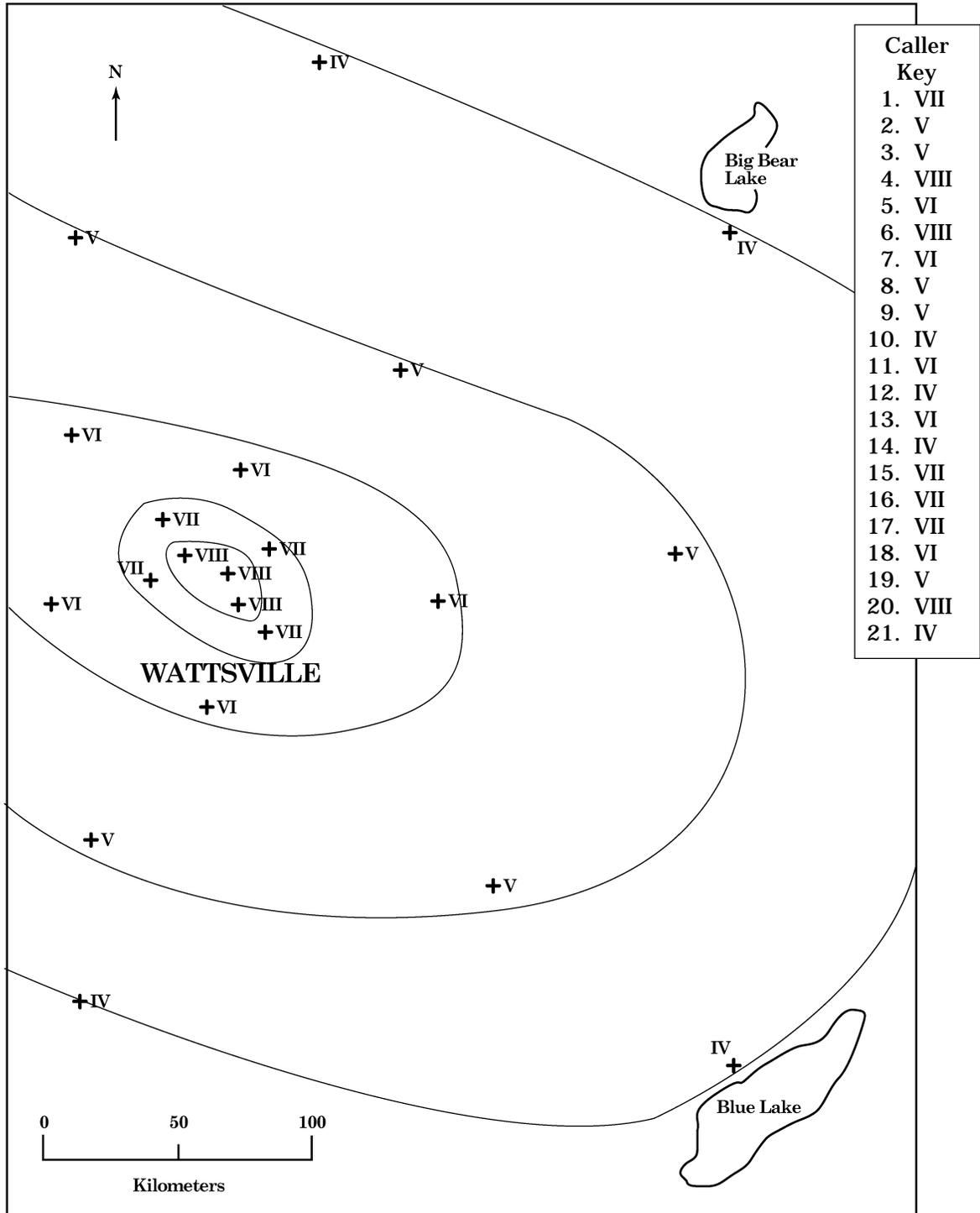
Wattsville Map

Name _____



Wattsville Map Key

Name _____



Note: Isoseismal lines and locations may vary.