Name: Date: Period:

**Using the Modified Mercalli Scale to**

**Locate an Epicenter**

Earthquakes are classified using different scales. The Richter scale is a measure of the energy released during the earthquake. The Modified Mercalli scale is a measure of the amount of damage done by the earthquake. Scientists record responses from many people who experience the earthquake and assign a value from I (1) to XII (12). These numbers are plotted on a map and used to locate the epicenter of the earthquake. This method is based on the idea that the area closest to the epicenter will suffer the most damage.

**Strategy**

You will read simulated reports of people’s earthquake experiences and then assign Modified Mercalli scale values to these reports. You will plot these values on a map and locate the epicenter of the earthquake.

**Materials**

colored pencils

**Procedure**

**1.** Read the Modified Mercalli scale in Table 1 so you become familiar with the descriptions.

**2.** Read the list of experiences from the various cities in Table 2. Assign a Mercalli value to each of the descriptions. Then write each value on the map (Figure 1) next to the corresponding city.

**3.** Use colored pencils to draw lines that connect cities having the same Mercalli value.

**4.** Use the pattern you have drawn to estimate where the epicenter is located.

**Data and Observations**

**Table 1**

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**Table 2**

**Figure 1Questions and Conclusions**

**1.** What cities were closest to the epicenter of the earthquake? How did you determine this?

**2.** Approximately how wide was the zone with a rating of V or higher?

**3.** What happens to the intensity of the earthquake and its corresponding damage to land and buildings as the distance from the epicenter increases?

4. What are some possible sources of error when using the Modified Mercalli scale to locate the

epicenter of an earthquake?

**Strategy Check**

Can you determine Mercalli values?

Can you locate the exact earthquake epicenters?

**SCALE OF EARTHQUAKE INTENSITIES WITH APPROXIMATELY CORRESPONDING MAGNITUDES**

|  |  |  |
| --- | --- | --- |
| **MERCALLI INTENSITY** | **DESCRIPTION** | **RICHTER MAGNITUDE** |
| **I.** | *INSTRUMENTAL*: detected only by seismographs | **3.5** |
| **II.** | *FEEBLE*: noticed only by sensitive people | **4.2** |
| **III.** | *SLIGHT*: like the vibrations due to a passing train; felt by people at rest, especially on upper floors | **4.3** |
| **IV.** | *MODERATE*: felt by people while walking; rocking of loose objects, including standing houses | **4.8** |
| **V.** | *RATHER STRONG*: felt generally; most sleepers are awakened and bells ring | **4.9 - 5.4** |
| **VI.** | *STRONG*: trees sway and all suspended objects swing; damage by overturning and falling of loose objects | **5.5 - 6.0** |
| **VII.** | *VERY STRONG*: general alarm; walls crack; plaster falls | **6.1** |
| **VIII.** | *DESTRUCTIVE*: car drivers seriously disturbed; masonry fissured; chimneys fall; poorly constructed buildings damaged | **6.2** |
| **IX** | *RUINOUS*: some houses collapse where ground begins to crack, and pipes break open | **6.9** |
| **X** | *DISASTROUS*: ground cracks badly; many buildings destroyed and railway lines bent; landslides on steep slopes | **7.0 - 7.3** |
| **XI** | *VERY DISASTROUS*: few buildings remain standing; bridges destroyed; all services (railways, pipes and cables) out of action; great landslides and floods | **7.4 - 8.1** |
| **XII** | *CATASTROPHIC*: total destruction; objects thrown into air; ground rises and falls in waves | **> 8.1** |

**DIRECTIONS:** Determine the Modified Mercalli Scale intensity and Richter magnitude of each of described earthquakes. Use the tables abo to guide your answers.

1. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing cars may rock slightly. The vibration feels similar to the passing of a truck.

MERCALLI\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RICHTER\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Damage is negligible in buildings of good design and construction: slight to moderate in well-built ordinary structures; considerable damage in poorly build or badly designed structures; some chimneys broken.

MERCALLI\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RICHTER\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Not felt except by a very few under especially favorable conditions.

MERCALLI\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RICHTER\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Felt by all, many frightened. Some heavy furniture is moved; a few instances or fallen plaster. Damage slight.

MERCALLI\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RICHTER\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Damage slight in specially designed structures; considerable damage in ordinary substantial building with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.

MERCALLI\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RICHTER\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Define the Mercalli Intensity Scale:

Define the Richter Magnitude Scale: