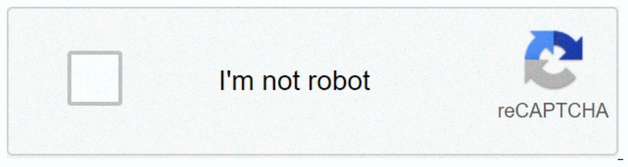

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Finding the epicenter of an earthquake worksheet

To find out where that earthquake occurred, you need to look at your seismogram and know which other at least two more seismographs were recorded as a result of the same earthquake. You will also need a map of the world, ruler, pencil and compass to draw circles on the map. Here's an example of a seismogram: Figure 1 - Our typical seismogram from the past, this time marked for this exercise (from Bolt, 1978). One-minute intervals are marked with small lines printed directly above squiggles produced by seismic waves (in some seismographs, the time may be marked differently). The distance between the beginning of the first P wave and the first wave S tells you how many seconds the waves are from each other. This figure will be used to tell you how much your seismograph is the epicenter of the earthquake. Figure 2 - Use amplitudes to get the magnitude of the earthquake, and the distance from the earthquake to the station. (from Bolt, 1978) Measure the distance between the first wave P and the first wave S. In this case, the first P and S waves are at a distance of 24 seconds. Find a point for 24 seconds on the left side of the chart below and select that point. According to the diagram, this epicenter of the earthquake was 215 kilometers away. Measure the amplitude of the strongest wave. Amplitude is the height of the strongest wave (on paper). In this seismogram, the amplitude is 23 millimeters. On the right side of the chart, find 23 millimeters and select that point. Place the ruler (or true border) in the diagram between the dots marked for the distance to the epicenter and the amplitude. The point at which your ruler crosses the middle line in the diagram indicates the size (strength) of the earthquake. This earthquake was 5.0 magnitude. You just realized how much your seismograph is from the epicenter and how strong the earthquake was, but you still don't know where the earthquake occurred. Here comes the compass, the map and other records of the seismograph. Figure 3 - The point at which three circles intersect is the epicenter of the earthquake. This method is called triangulation. Check the scale on the map. It should look something like a piece of the ruler. All maps are different. On your map, one centimeter can be equal to 100 kilometers or so. Find out how long the distance to the epicenter (centimeters) is on your map. For example, let's say that your map has a scale where one centimeter is equal to 100 kilometers. If the epicenter of the earthquake is 215 kilometers away, it equals 2.15 cm on the map. Using a compass, draw a circle with a radius equal to the number you came up with in a step #2 (the radius is the distance from the center of the circle to its edge). The center of the circle will be the location of your seismograph. The epicenter of the earthquake is somewhere on the edge Circle. 4. Do the same for the distance to the epicenter captured by other seismograms (with the location of those seismographs in the center of their circles). All circles should coincide. The point at which all the circles overlap is the approximate epicenter of the earthquake. Figures 1 and 2 are given in Bolt 1978. All other content is in 2007. Michigan University of Technology. Non-commercial reproduction authorisation. Scientists use triangulation to find the epicenter of an earthquake. When seismic data is collected from at least three different locations, they can be used to determine the epicenter where they intersect. Each earthquake is recorded in many seismographs located in different directions. Each seismograph records the times when the first (P waves) and the second (S wave) seismic waves arrive. From that information, scientists can determine how fast the waves travel. Knowing this helps them calculate the distance from the epicenter to each seismograph. To determine the direction in which each wave traveled, scientists draw circles around the places of the seismograph. The radius of each circle is equal to the known distance to the epicenter. Where these three circles intersect is the epicenter. This post is part of Exploring Earthquakes, a rich collection of resources co-introduced by the California Academy of Sciences and KQED. This material is also available as a free iBooks tutorial and iTunes U course. Don't miss the earthquake, an interactive exhibit at the academy exploring the seismic forces that affect us today and featuring Shake House, an earthquake simulator. To find out where that earthquake occurred, you need to look at your seismogram and know which other at least two more seismographs were recorded as a result of the same earthquake. You will also need a map of the world, ruler, pencil and compass to draw circles on the map. 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To download/print, click the pop-up icon or print icon on the worksheet to print or download. The worksheet will open in a new window. You can download or print using the browser document reader options. This lesson helps students understand the processes used to determine the location of the epicenter of an earthquake and how the magnitude of the Earthquake Richter is determined. Found.

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