Earth Science Worksheet

Assignment # _____

Name:_____Date:_____Period:_____

The Richter Scale

<u>Directions for questions 1-4</u>: Use the information below and the Richter Nomograms to fill in the chart.

1. A seismic station located 60 km from the epicenter of an earthquake, recorded the maximum height of the S-waves to be 50 mm. What was the Richter magnitude of this earthquake?

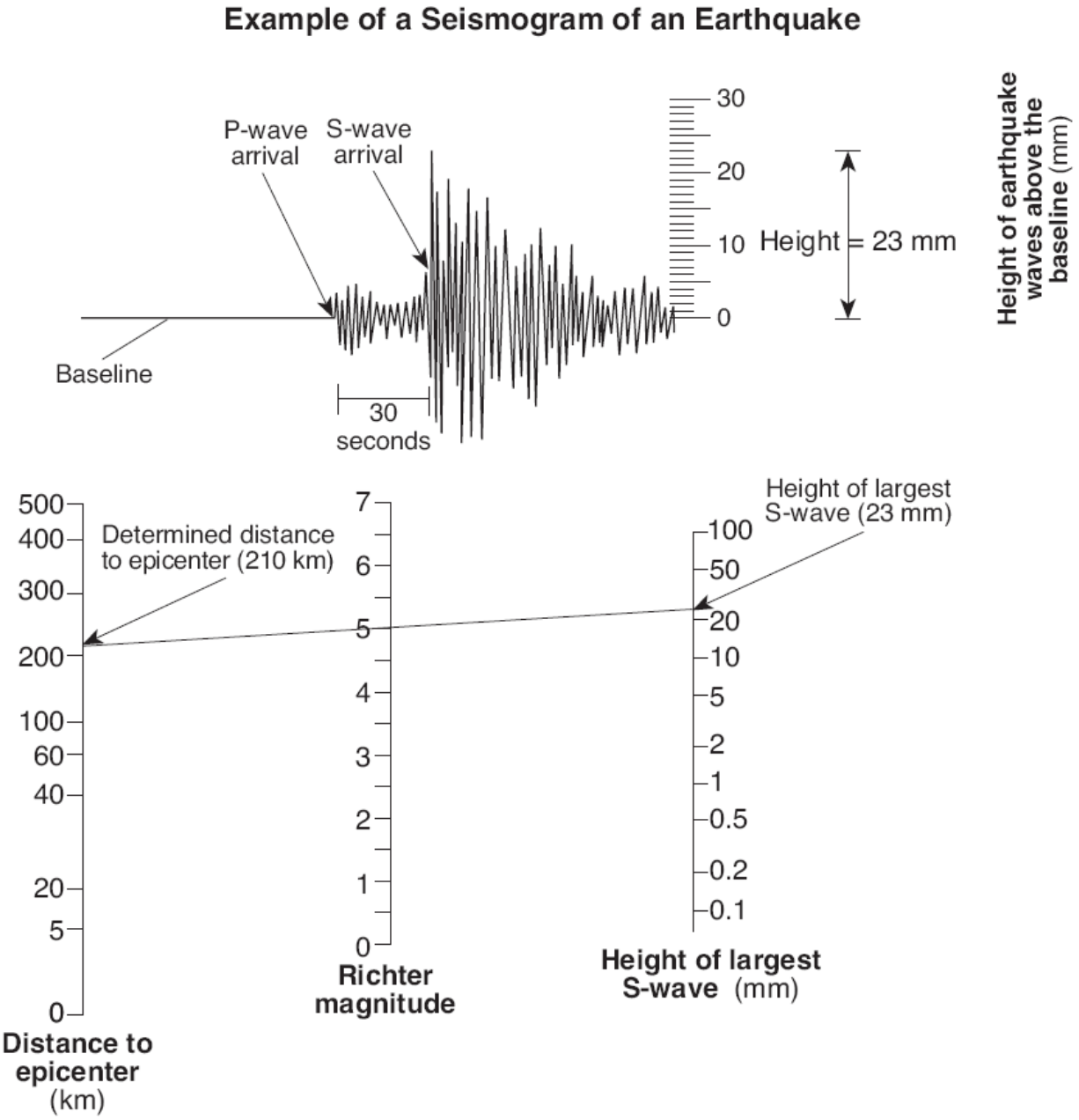
2. An earthquake with a Richter magnitude of 6.0 caused an S-wave of 20 mm to be recorded on a seismograph. How far from the epicenter was the seismograph?

3. What would be the maximum height of an S-wave, if an earthquake with a Richter magnitude of 1.5 was detected at a distance of 5 km. from the epicenter?

4. What magnitude earthquake would produce an S-wave of 1.0 mm at a distance of 100 km. from the epicenter?

Question	Distance to Epicenter (km.)	Richter Magnitude	Height of S-wave (mm.)
1			
2			
3			
4			

5. Using the handout on the Richter Scale, list the observable results of the earthquake in question #1.



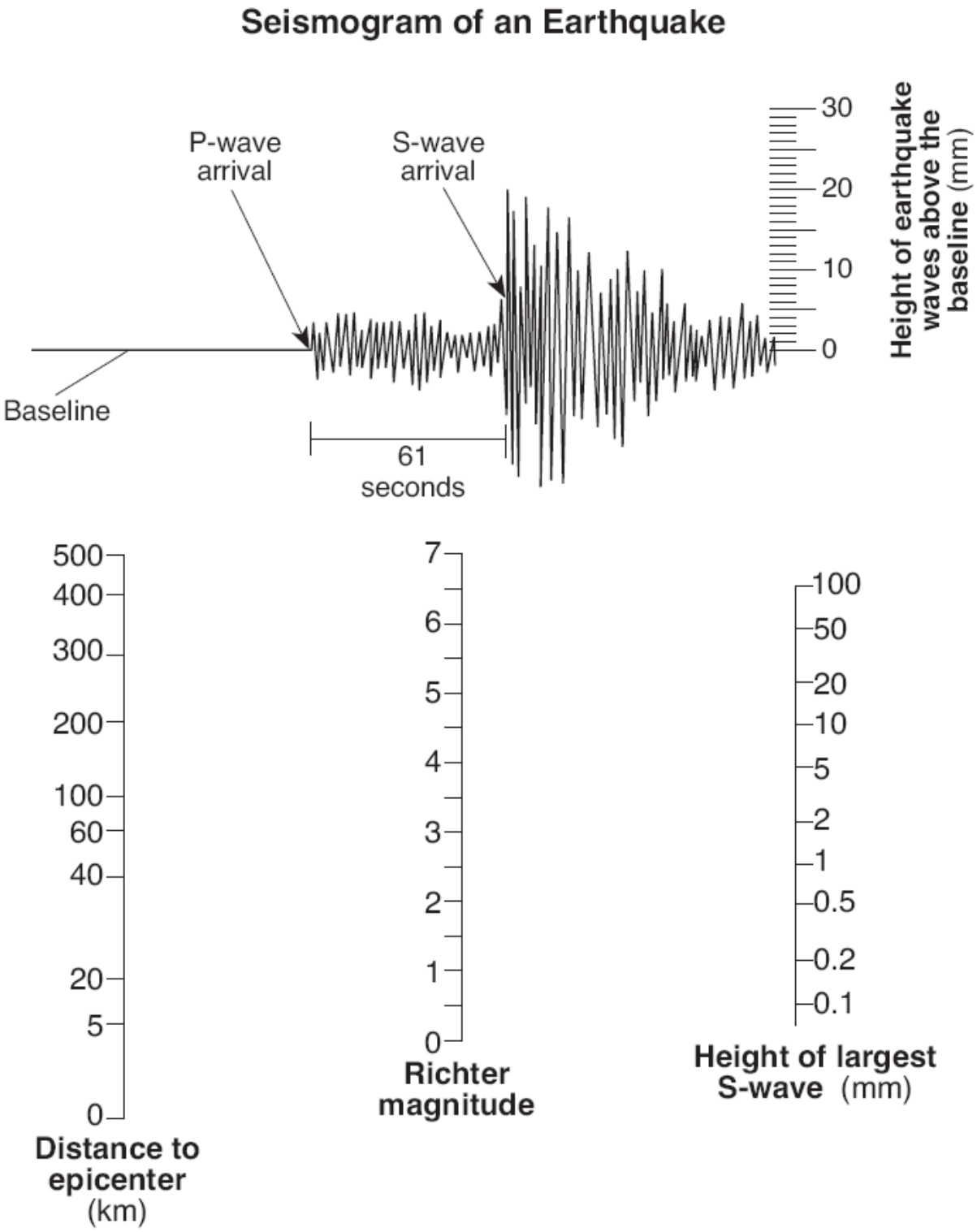
Instructions for determining Richter magnitude:

• Determine the distance to the epicenter of the earthquake. (The distance in the example is 210 kilometers.)

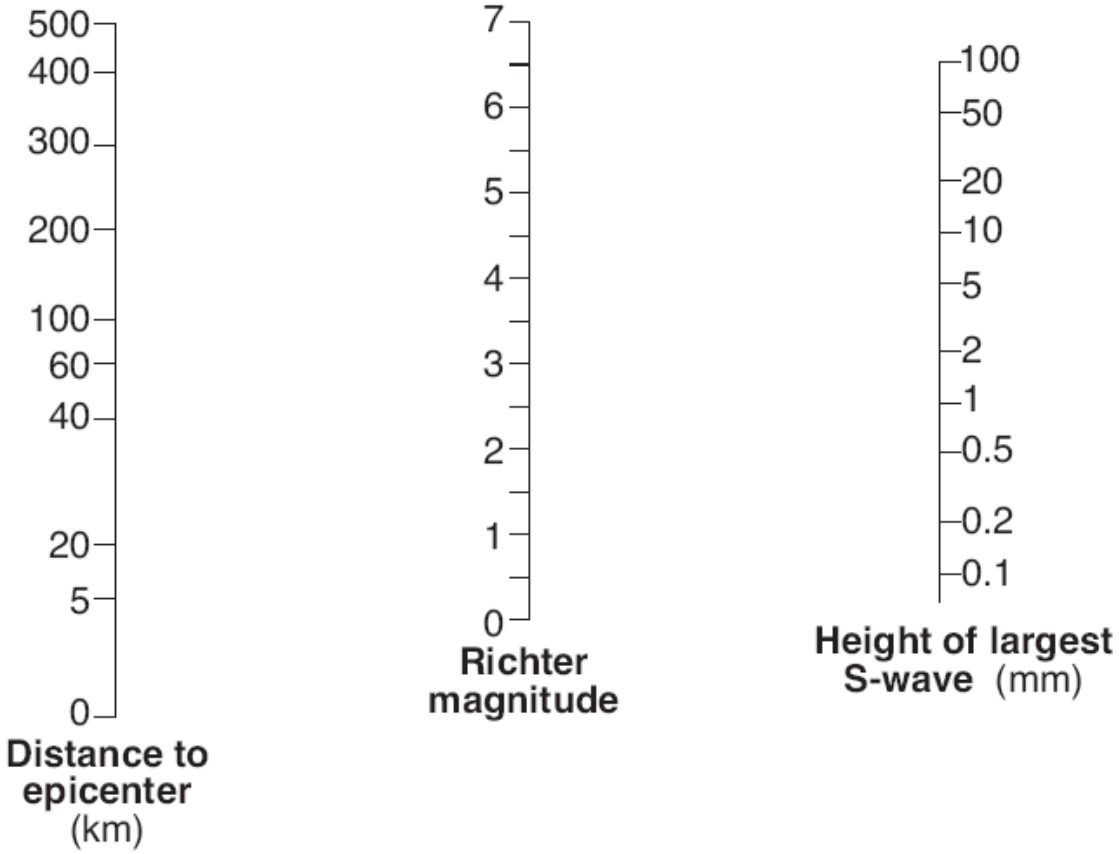
• Measure the maximum wave height of the *S*-wave recorded on the seismogram.
(The height in the example is 23 millimeters.)

• Place a straightedge between the distance to the epicenter (210 kilometers) and the height of the largest *S*-wave (23 millimeters) on the appropriate scales. Draw a line connecting these two points. The magnitude of the earthquake is determined by where the line intersects the Richter magnitude scale.
(The magnitude of this example is 5.0.)

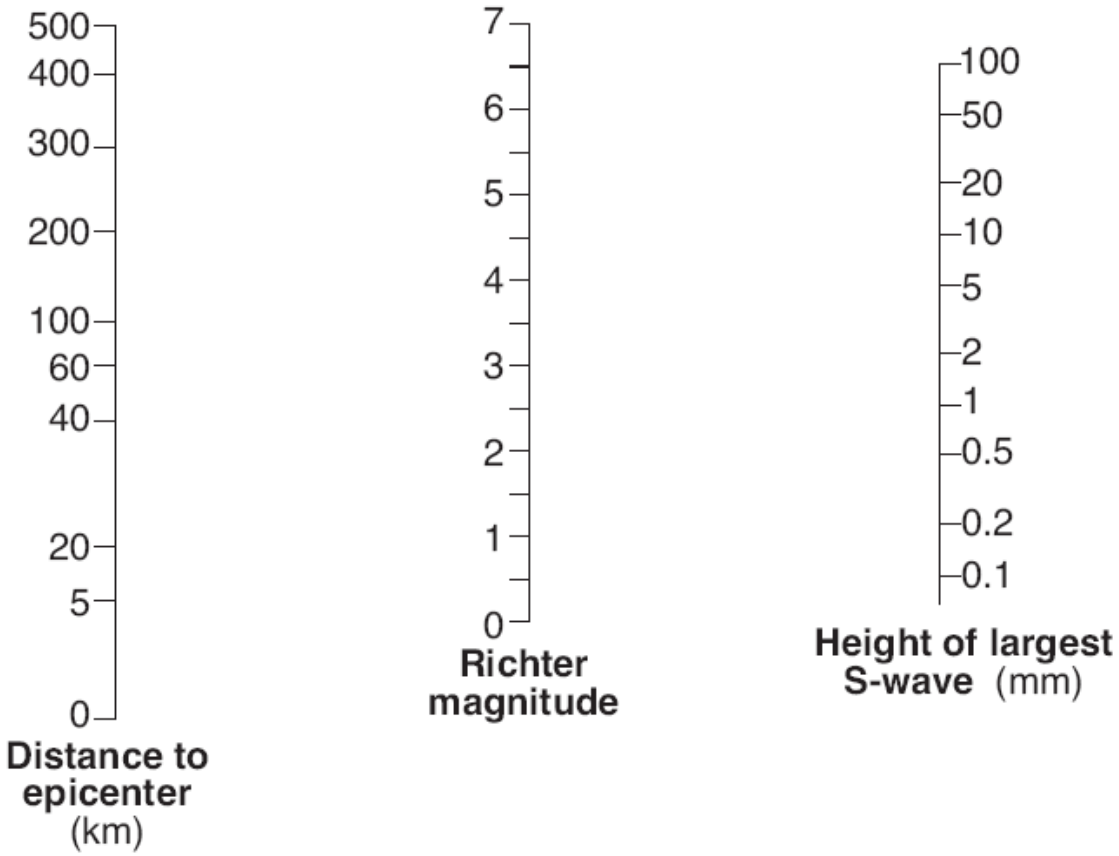
Try the following for practice:



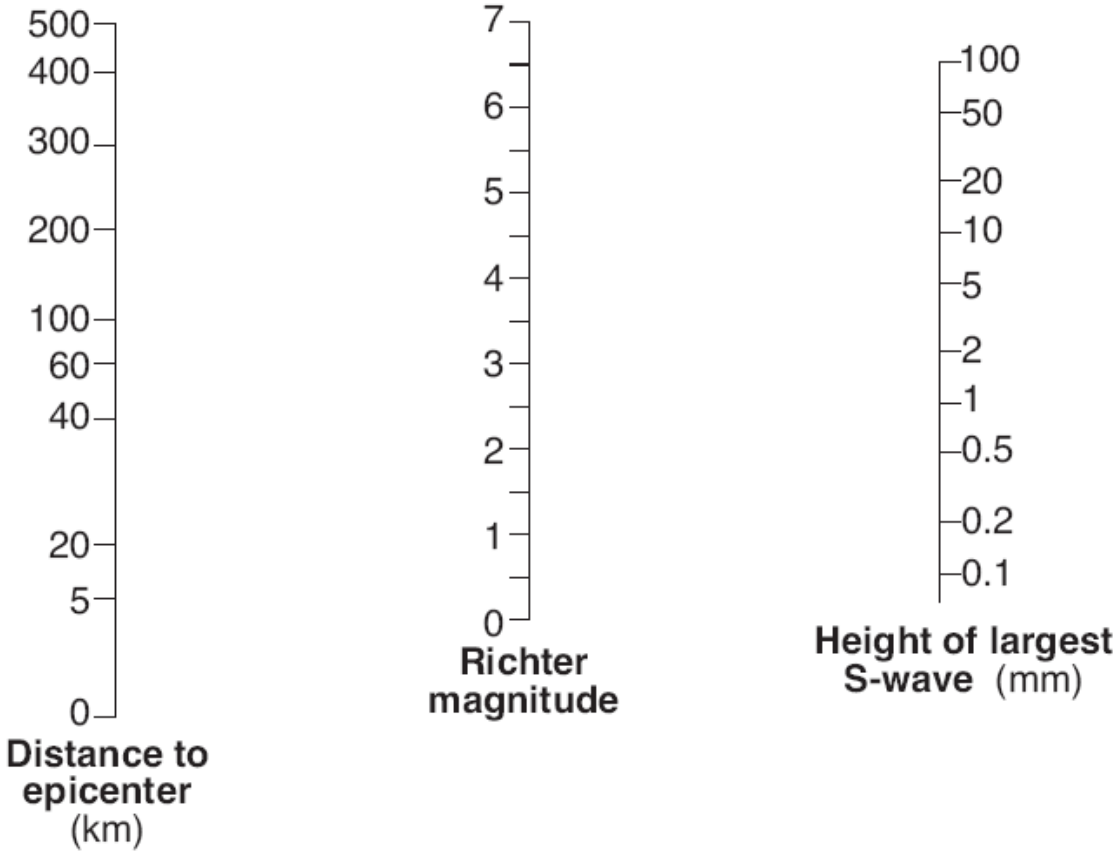
1.


500
400
300
200
100
60
40
20
5
0
Distance to epicenter (km)
7
6
5
4
3
2
1
0
Richter magnitude
100
50
20
10
5
2
1
0.5
0.2
0.1
Height of largest S-wave (mm)

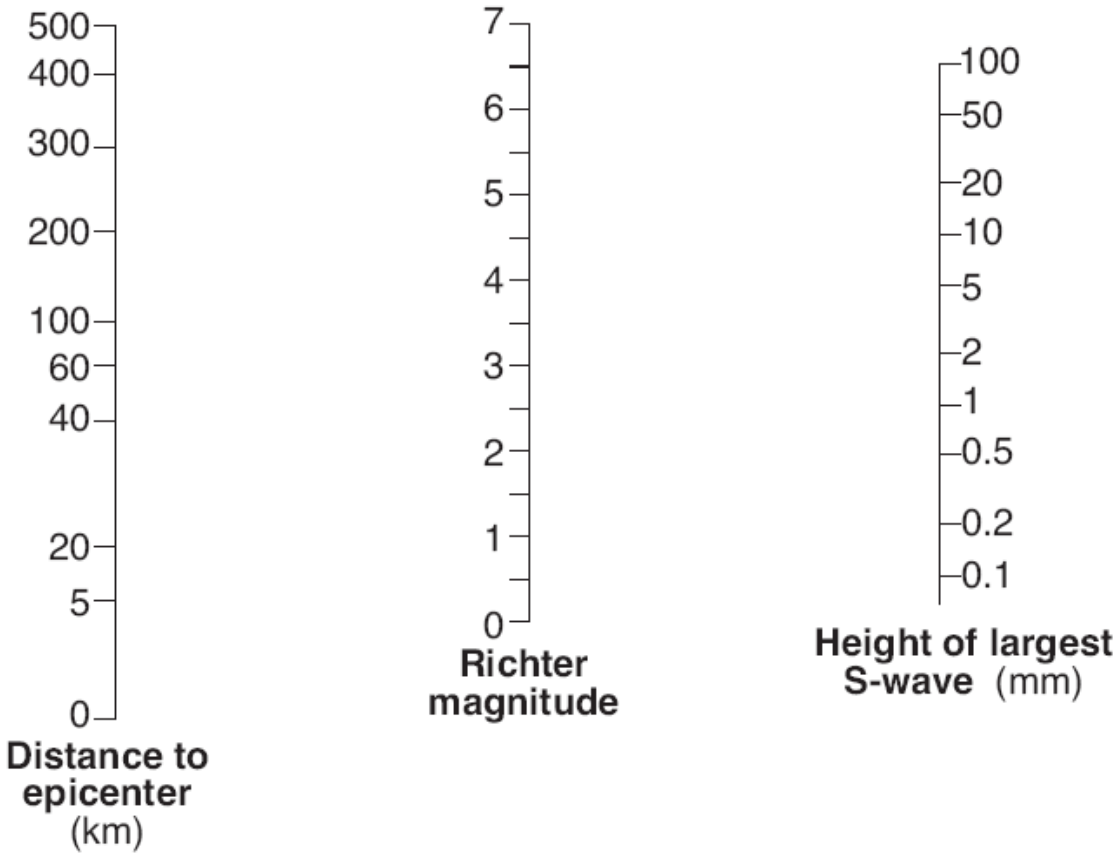
2.


500
400
300
200
100
60
40
20
5
0
Distance to epicenter (km)
7
6
5
4
3
2
1
0
Richter magnitude
100
50
20
10
5
2
1
0.5
0.2
0.1
Height of largest S-wave (mm)

3.


500
400
300
200
100
60
40
20
5
0
Distance to epicenter (km)
7
6
5
4
3
2
1
0
Richter magnitude
100
50
20
10
5
2
1
0.5
0.2
0.1
Height of largest S-wave (mm)

4.


500
400
300
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0
Distance to epicenter (km)
7
6
5
4
3
2
1
0
Richter magnitude
100
50
20
10
5
2
1
0.5
0.2
0.1
Height of largest S-wave (mm)

EARTH SCIENCE

Earthquake Magnitude

Richter Scale

Magnitude	***Strength (10x as great as previous magnitude)***	***Results***
1	0	Not felt by people; no damage to structures.
2	10	Not felt by people; no damage to structures.
3	100	Felt by people; some rattling of windows and dishes.
4	1,000	Slight damage to structures.
5	10,000	"Minor" earthquake; some damge to structures.
6	100,000	Some damage to reinforced concrete; breakage of windows, dishes, and glassware.
7	1,000,000	Severe damage to structures; cracks in the ground; damage extending 10 km from epicenter.
8	10,000,000	"Great" earthquake; total destruction near epicenter; large chunks of landscape moved out of place; damage extending 200 km from epicenter.

Modified Mercalli Intensity Scale

I	Instrumental: detected only by instruments	VII	Very strong: noticed by people in autos Damage to poor construction
II	Very feeble: noticed only by people at rest	VIII	Destructive: chimneys fall, much damage in substantial buildings, heavy furniture overturned
III	Slight: felt by people at rest Like passing of a truck	IX	Ruinous: great damage to substantial structures Ground cracked, pipes broken
IV	Moderate: generally perceptible by people in motion Loose objects disturbed	X	Disastrous: many buildings destroyed
V	Rather strong: dishes broken, bells rung, pendulum clocks stopped People awakened	XI	Very disastrous: few structures left standing
VI	Strong: felt by all, some people frightened Damage slight, some plaster cracked	XII	Catastrophic: total destruction

Earth Science Worksheet

Assignment # _____

*Name:*_____*Date:*_____*Period:*_____

* must change data and scale on Nomograms to use this version!

The Richter Scale

Directions for questions 1-4: Use the information below, the Richter Nomograms, and the Earth Science Reference Tables to fill in the chart.

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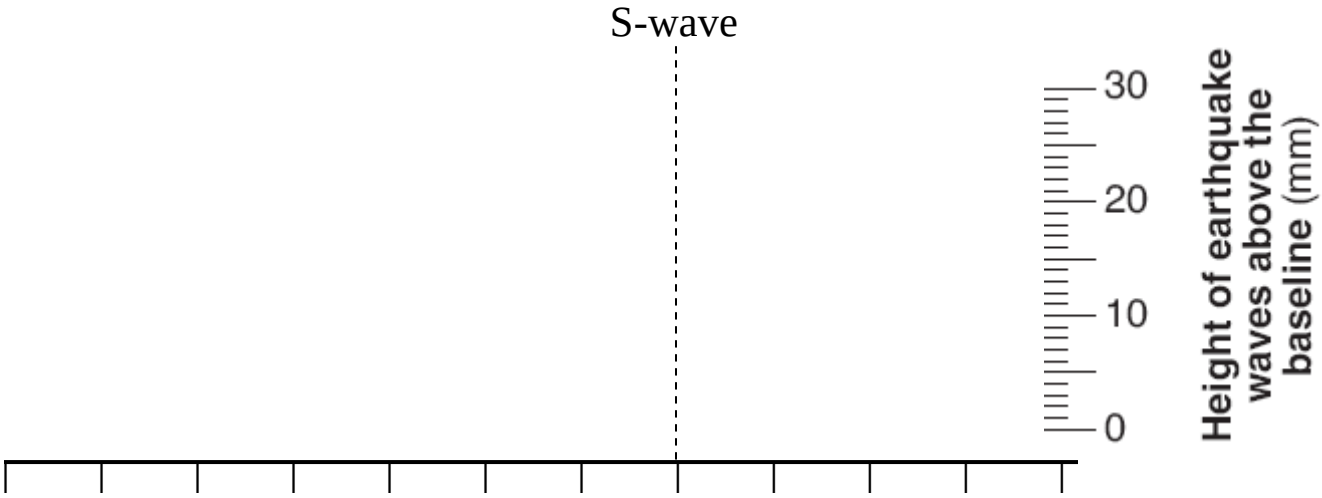
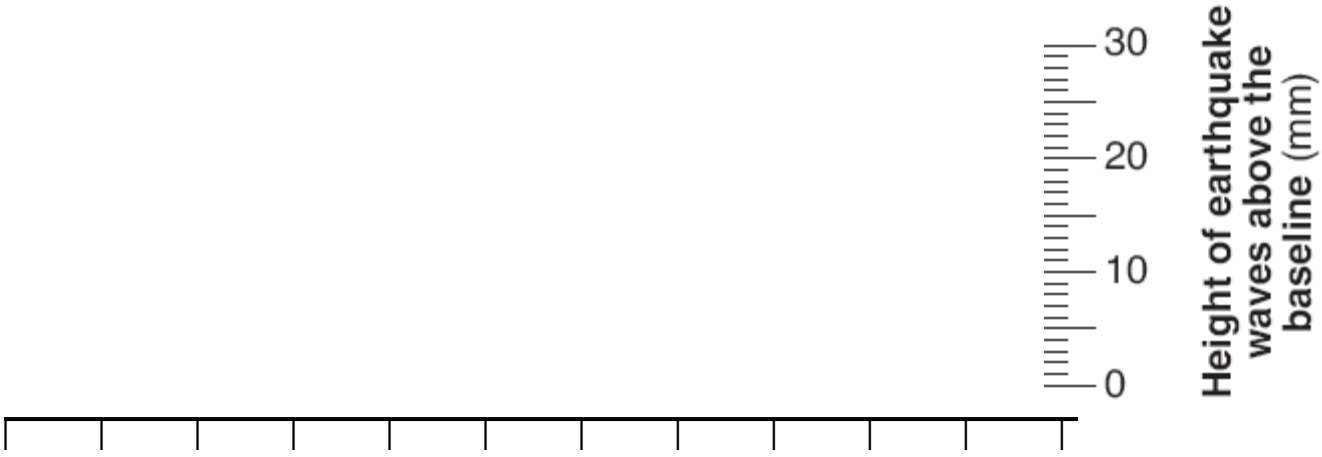
Question	Distance to Epicenter (km.)	Richter Magnitude	Height of S-wave (mm.)	Time Between P-wave and S-wave (sec.)
1				
2				
3				
4				

5. Using the handout on the Richter Scale, list the observable results of the earthquake in question #1.

6. In the spaces provided, draw a seismogram for each of the earthquakes listed in the chart.



Time between P-wave and S-wave (seconds)



Time between P-wave and S-wave (seconds)