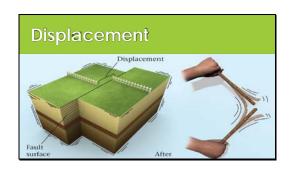
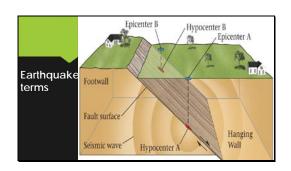
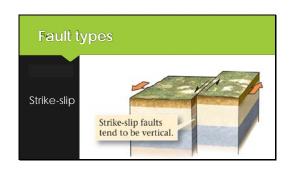
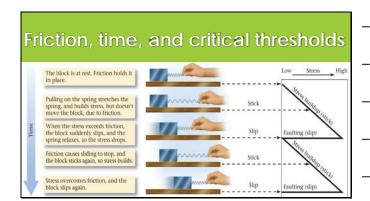


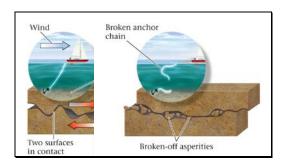

	Location	Number of Deaths	1964 1963	Anchorage, Alaska Skopje, Yugoslavia	1,000
2011	Tohoku, Japan (tsunami)	20,000	1962	Iran	12,000
2011		20,000	1000000		
2010	Christchurch, New Zealand Haiti	230.000	1960	Agadir, Morocco	12,000
2010	Concepcion, Chile	1,000	1960	Southern Chile	6,000
2008	Sichuan, China	70.000	1948	Turkmenistan, USSR	110,000
2008	Pakistan	80,000	1939	Erzincan, Turkey	40,000
2004	Sumatra (tsunami)	230,000	1939	Chillan, Chile	30,000
2003	Barn, Iran	41,000	1935		
2001	Bhui, India	20,000		Quetta, Pakistan	60,000
1999	Calaraca/Armenia, Colombia	2,000	1932	Gansu, China	70,000
1999	Izmit, Turkey	17,000	1927	Tsinghai, China	200,000
1995	Kobe, Japan	5,500	1923	Tokyo, Japan	143,000
1994	Northridge, California	51	1920	Gansu, China	180,000
1990	Western Iran	50,000			
1989	Loma Prieta, California	65	1915	Avezzano, Italy	30,000
1988	Spitak, Armenia	24,000	1908	Messina, Italy	160,000
1985	Mexico City	9,500	1906	San Francisco	500
1983	Turkey	1,300	1896	Japan	22,000
1978	Iran	15,000	1000000		
1976	T'ang-shan, China	255,000	1886	Charleston, South Carolina	60
1976	Caldiran, Turkey	8,000	1866	Peru and Ecuador	25,000
1976	Guatemala	23,000	1811-12	New Madrid, Missouri (3 events)	few
1972	Nicaragua	12,000	1783	Calabria, Italy	50,000
1971	San Fernando, California	65	0.00000		
1970	Peru	66,000	1755	Lisbon, Portugal	70,000
1968	Iran	12,000	1556	Shen-shu, China	830,000







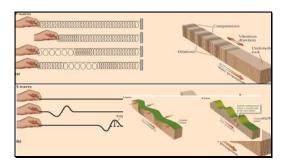


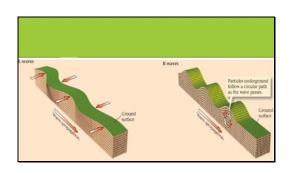
## Measuring the Energy of an Earthquake

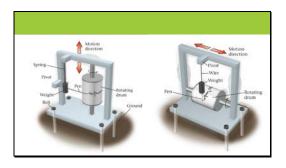
ORichter Magnitude Scale

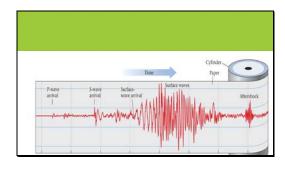
OModified Mercalli Scale (Intensity)



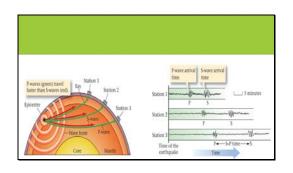


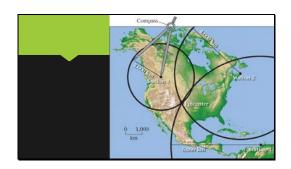



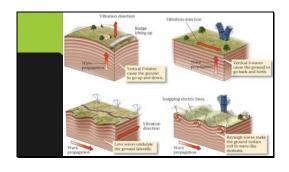




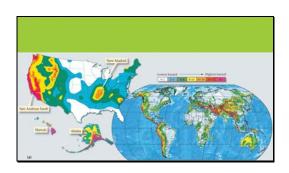
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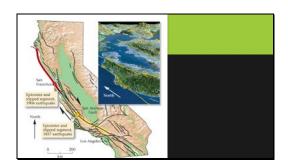







ммі	Destructiveness (Perceptions of the Extent of Shaking and Damage)	VIII	Many chimneys and factory smokestacks topple; heavy furniture overturns; substantial buildings sustain some damage, and poorly built buildings suffer severe damage.
1	Detected only by seismic instruments; causes no damage.	IX	Frame buildings separate from their foundations; most buildings sustain damage, and some buildings collapse; the ground cracks, underground
11	Felt by a few stationary people, especially in upper floors of buildings; suspended objects, such as lamps, may swing.	×	pipes break, and rails bend; some landslides occur. Most masonry structures and some well-built wooden structures are destroyed; the ground severely cracks in places; many landslides occur
111	Felt indoors; standing automobiles sway on their suspensions; it seems as though a heavy truck is passing.		along steep slopes; some bridges collapse; some sediment liquifies; concrete dams may crack; facades on many buildings collapse; railways and roads suffer severe damage.
IV	Shaking awakens some sleepers; dishes and windows rattle.	ХI	Few masonry buildings remain standing; many bridges collapse; broad fissures form in the ground; most pipelines break; severe liquefaction of
V	Most people awaken; some dishes and windows break, unstable objects tip over; trees and poles		sediment occurs; some dams collapse; facades on most buildings collapse or are severely damaged.
	sway.	XII	Earthquake waves cause visible undulations of
VI	Shaking frightens some people; plaster walls crack, heavy furniture moves slightly, and a few chimneys crack, but overall little damage occurs.		the ground surface; objects are thrown up off the ground; there is complete destruction of buildings and bridges of all types.
VII	Most people are frightened and run outside; a lot of plaster cracks, windows break, some chimneys topple, and unstable furniture overturns; poorly built buildings sustain considerable damage.		





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## Intra-plate Earthquakes

- O Deeply buried
- OTypically do not break the ground surface.
- OStrong rock with few breaks
  - OTransmit seismic waves rapidly
  - Olncreased ground motion
    - OIncreased surface damage

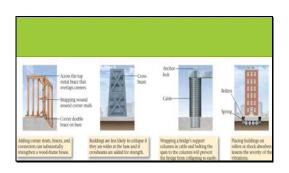
## The 1812 New Madrid Earthquake

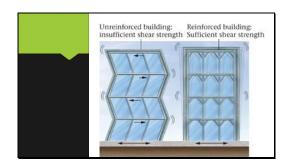
**0**8.2 MM

- O Caused church bells to ring in Washington D.C. (630miles away)!
- OChanged the course of the Mississippi River







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