Name _____ Period:_____Date:_____EN___

ONLINE EXERCISE: EARTHQUAKES

I. **Make Your Own Earthquake**

Go to http://tlc.discovery.com/convergence/quakes/interactives/makeaquake.html

1. Choose the following conditions and make an earthquake.
   Ground; Stable **P**reparation: Reinforced Material **M**agnitude: Quake (5.0-6.9)

   Describe what happens.

2. Keeping Preparation and Magnitude the same, make an earthquake on loose, gravelly soil
   Ground: Loose **P**reparation: Reinforced Material **M**agnitude: Quake (5.0-6.9)

   Describe what happens.

   Based on what you have observed, how does ground type affect damage?

3. Your company's headquarters is built in a coastal area. What type of construction is needed to keep your building standing upright during a "Superquake"?

II. Shaking Maps

Go to the Association of Bay Area Governments (ABAG) site at http://quake.abag.ca.gov/pickcity.html to view shaking hazard maps for earthquakes in the Bay Area.

1. Choose "Entire Bay Area" and select "Entire San Andreas (1906 Quake)". Click on "view map." What parts of the Bay Area experienced Mercalli levels IX and X?

   Why did these areas experience a high degree of shaking?

2. Select "North + South Hayward ". Now pick the city in which you live (find your street!). Based on the attached summary, describe the damage that your neighborhood would experience if a magnitude 6.9 earthquake occurred on the Hayward Fault.

	Description of Shaking Severity	Summary Damage Description Used on 1995 Maps	MODIFIED MERCALLI INTENSITY SCALE http://www.abag.ca.gov/bayarea/eqmaps/doc/mmi.html Full Description
I.	.	.	Not felt. Marginal and long period effects of large earthquakes.
II.	.	.	Felt by persons at rest, on upper floors, or favorably placed.
III.	.	.	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV.	.	.	Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV, wooden walls and frame creak.
V.	Light	Pictures Move	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.
VI.	Moderate	Objects Fall	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken (visibly, or heard to rustle).
VII.	Strong	Nonstructural Damage	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments). Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.
VIII.	Very Strong	Moderate Damage	Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
IX.	Violent	Heavy Damage	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations.) Frame structures, if not bolted, shifted off foundations. Frames racked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluvial areas sand and mud ejected, earthquake fountains, sand craters.
X.	Very Violent	Extreme Damage	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
XI.	.	.	Rails bent greatly. Underground pipelines completely out of service.
XII.	.	.	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.

Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces.
Masonry B: Good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces.
Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces.
Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.