

Tectonic hazards revision



Earthquake – Nepal – An example of a LIC

Effects were severe and response was poor because of lack of money, and poor planning by the Government

- Immediate effects - Death toll 9000 due to poorly constructed housing
- Longer term effects – 3 million homeless due to inaction by Government
- Immediate response – Poor so relied on international AID
- Long term response – Slow so many people living in tents in parks

Tectonic hazards revision



Earthquake – Chile – An example of a NEE

Effects were less severe and response was faster because of more wealth, and better planning by the Government

Immediate effects - Death toll 500 due to better constructed housing

Longer term effects – Some ports severely damaged by Tsunami

Immediate response – Good. Roads cleared, power restored and money raised

Long term response – 200 000 houses built and economy restored

Cross section of the Earth

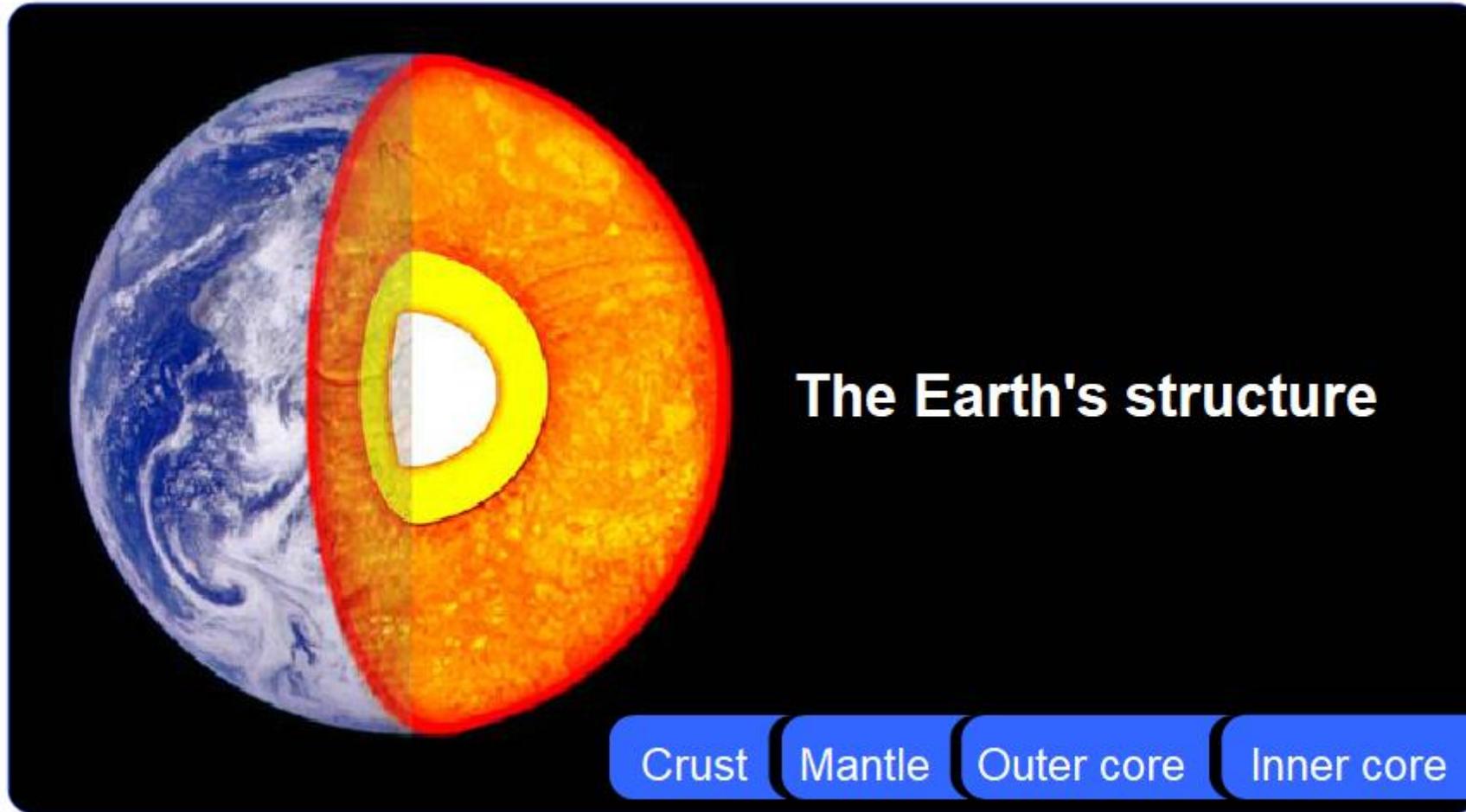
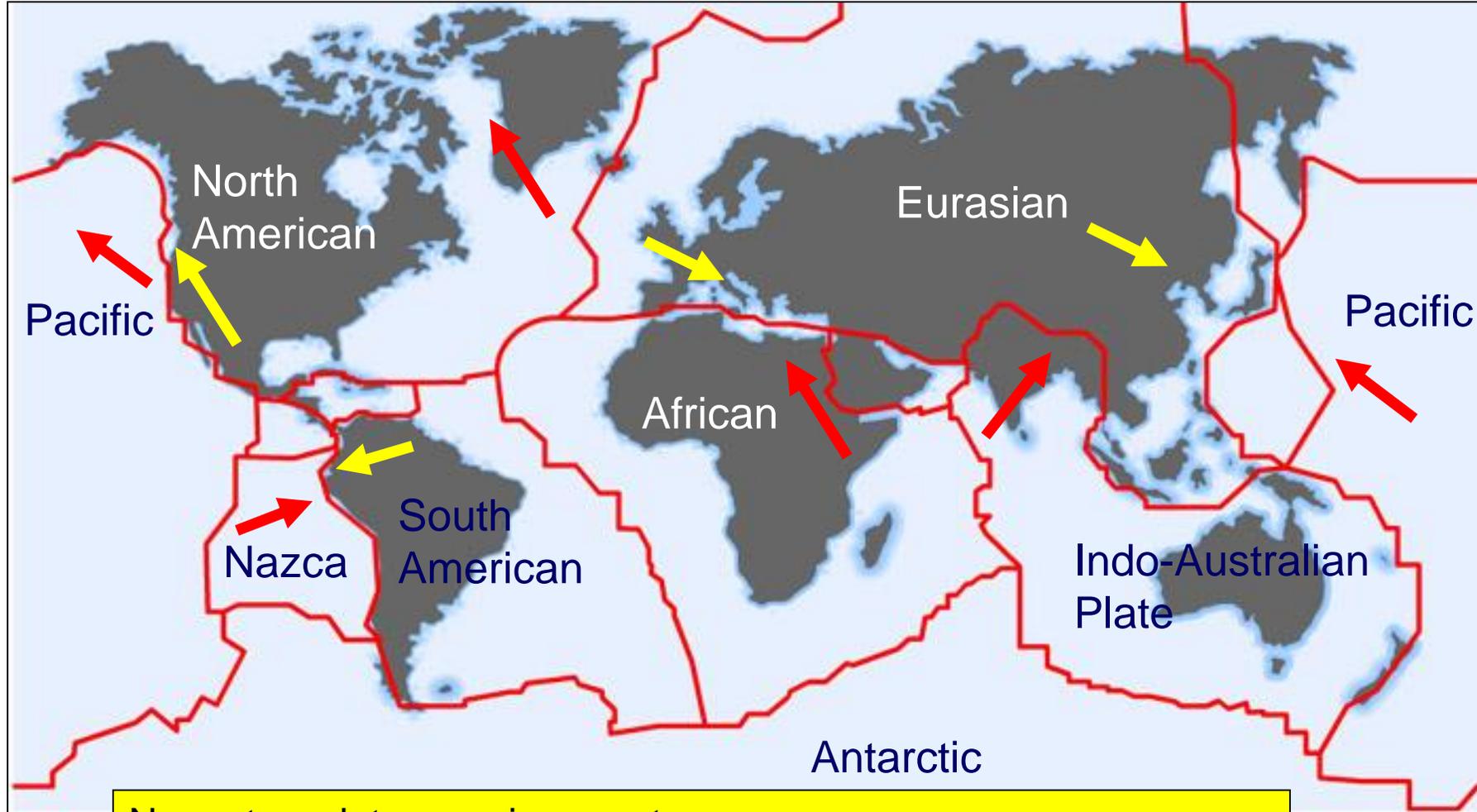


Plate names – Can you remember them yet?

Yr 10 1



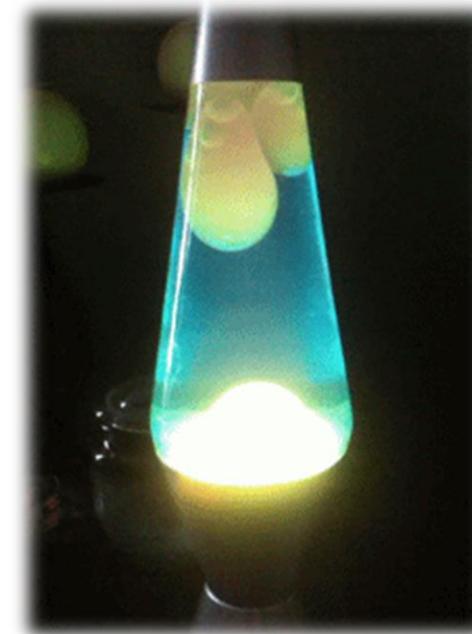
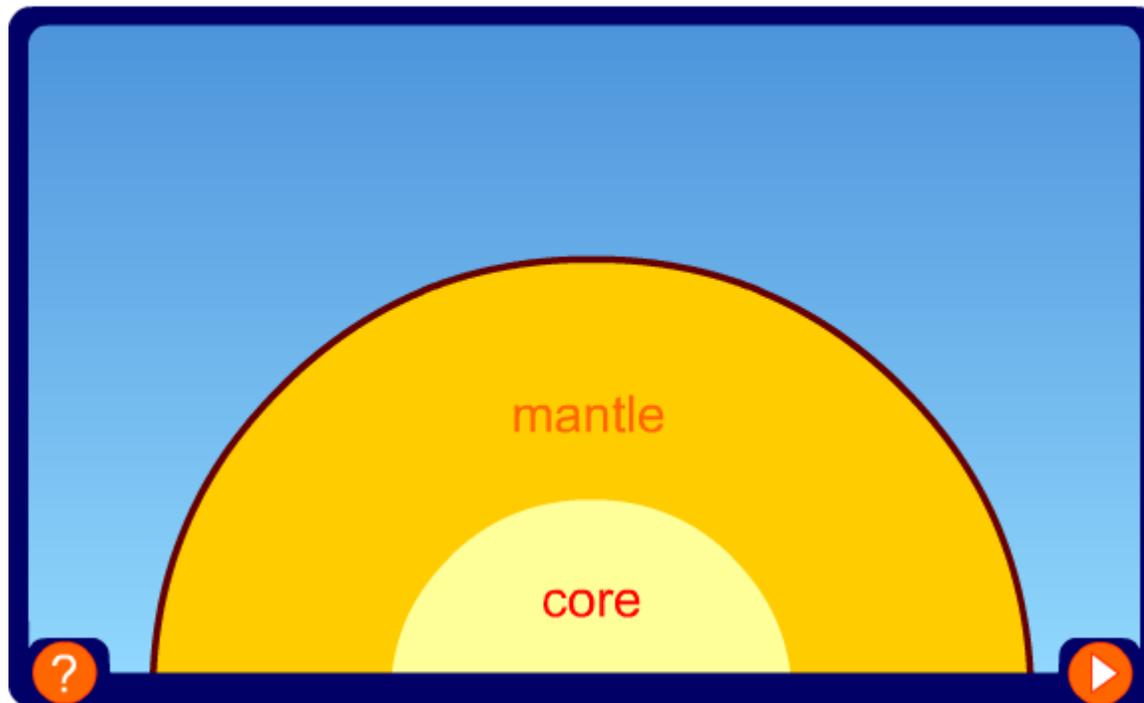
Name two plates moving apart
Name two plates moving together
Name two plates moving from side to side



Why do the plates move?



Magma
Convection currents
Plates
Crust



Explain how convection currents cause the earth's tectonic plates to move [4 marks]

Intense heat from the core heats magma in the mantle
Hot magma in the mantle rises to the underside of the plate
Magma pushes against the plates moving them
Cool magma sinks and the convection cycle repeats

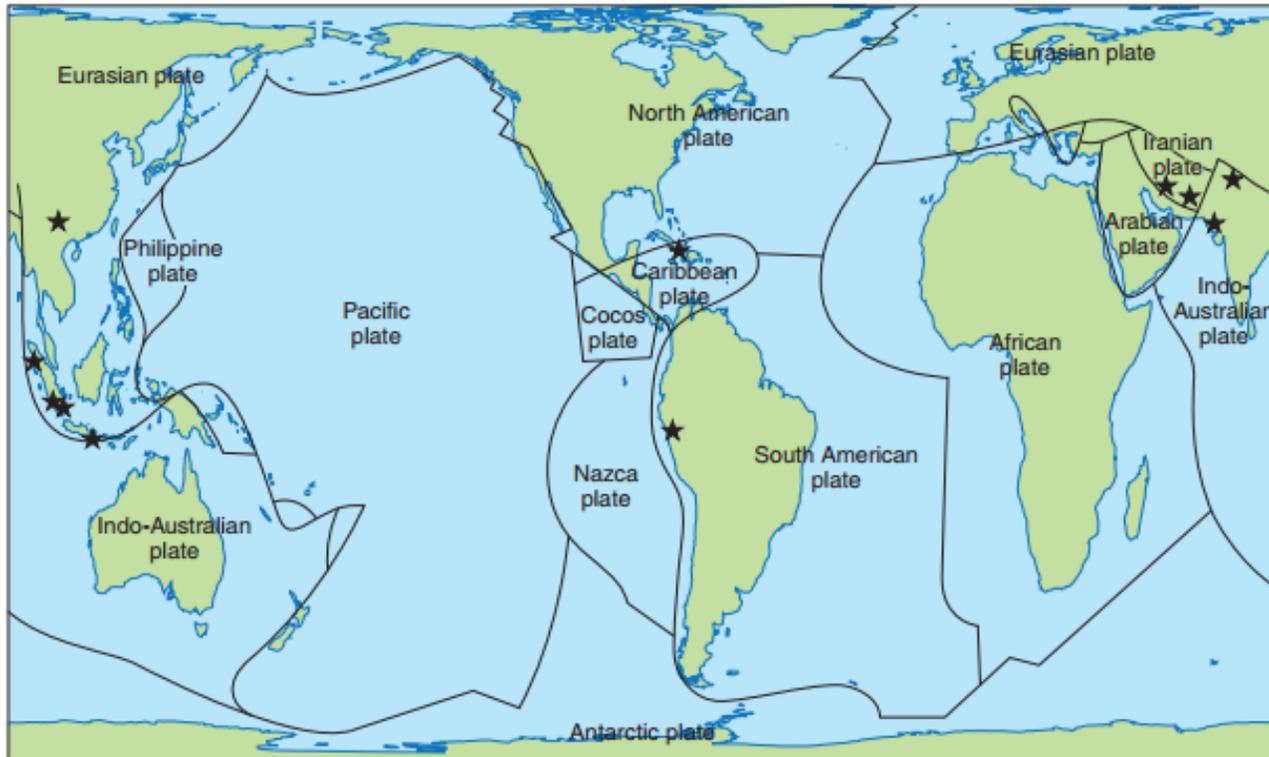
Remember
4 marks = 4
stages



(a) Study **Fig. 8a**, a map showing the locations of the deadliest earthquakes in each year (measured by number of deaths) from 2000 to 2010.

State **three** features of the distribution of the earthquakes shown on **Fig. 8a**.

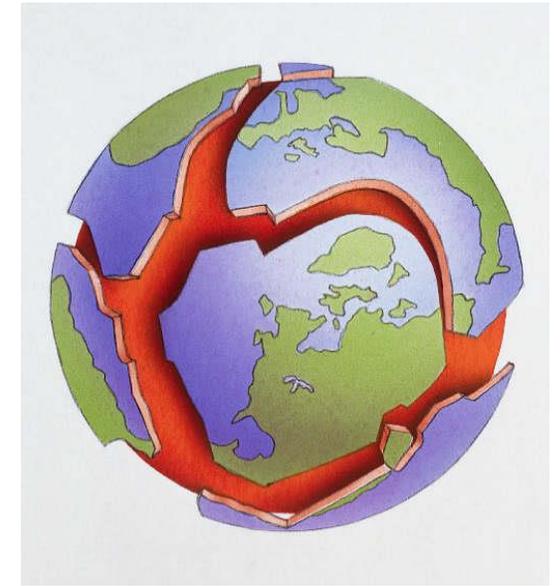
- 1 A cluster of 4 just North West of India around the boundary of the Iranian and Indo-Australian plate
- 2 A single earthquake on the Western edge of the South American plate in central South America
- 3 Along the Eastern edge of the Indo-Australian plate in South East Asia



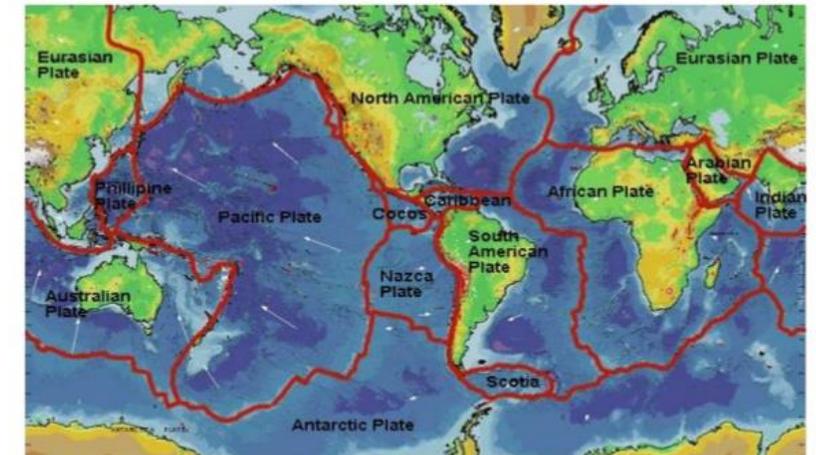
Key:

— = plate boundary

★ = location of earthquakes



Main tectonic plates



Tectonic plate boundaries

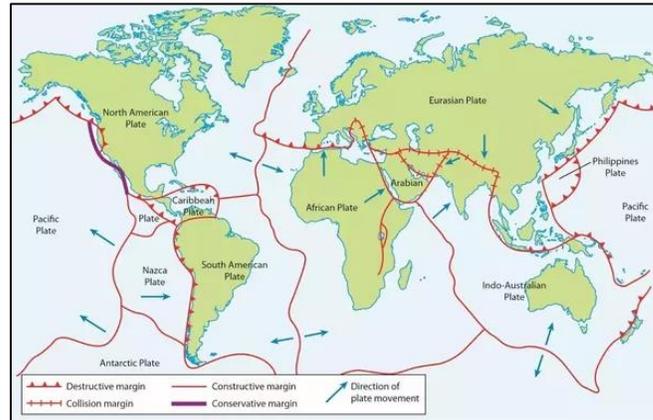


Plate boundaries are where the slowly moving crustal plates meet each other

There are four boundary types

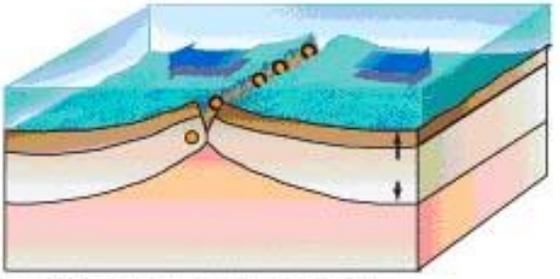
Destructive = **Oceanic and continental plates collide** = Violent earthquakes and volcanoes

Constructive = **Two oceanic plates separate** = Gentle volcanoes and earthquakes

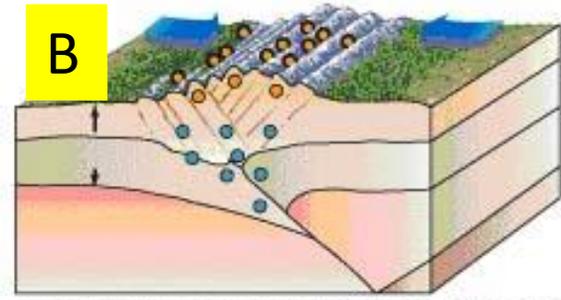
Conservative = **Two plates move side to side** = Violent earthquakes

Collision = **Two continental plates collide** = violent earthquakes

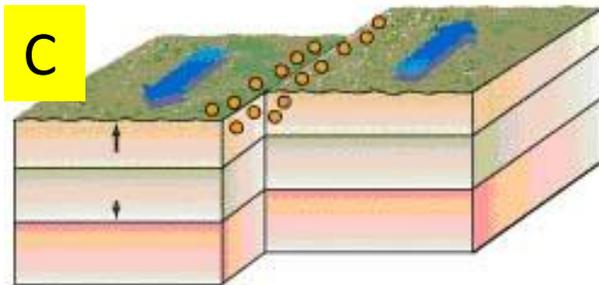
A



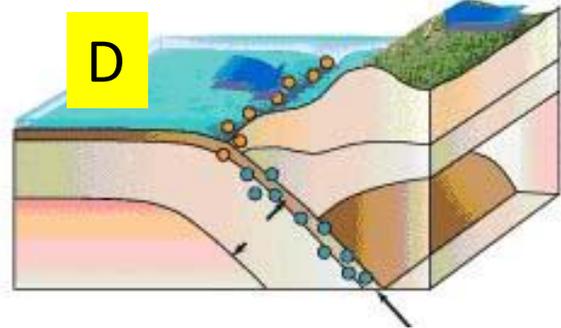
B



C



D



1. Match the plate margin name to the correct image

Destructive boundary

Constructive boundary

Collision boundary

Conservative boundary

A = Constructive

B = Collision

C = Conservative

D = Destructive

4 Use Fig. 6 in the Resource Booklet.

(a) Study Fig. 6, a map which shows plate boundaries in the 'Pacific Ring of Fire'.

(i) Describe the locations of the ocean trenches shown on the map.

Along destructive plate boundaries circling the Pacific

On the Eastern edge of the Nazca plate west of South America

On the Western edge of the Pacific plate, east of the Philippines plate

[3]

(ii) What type of plate boundary is:

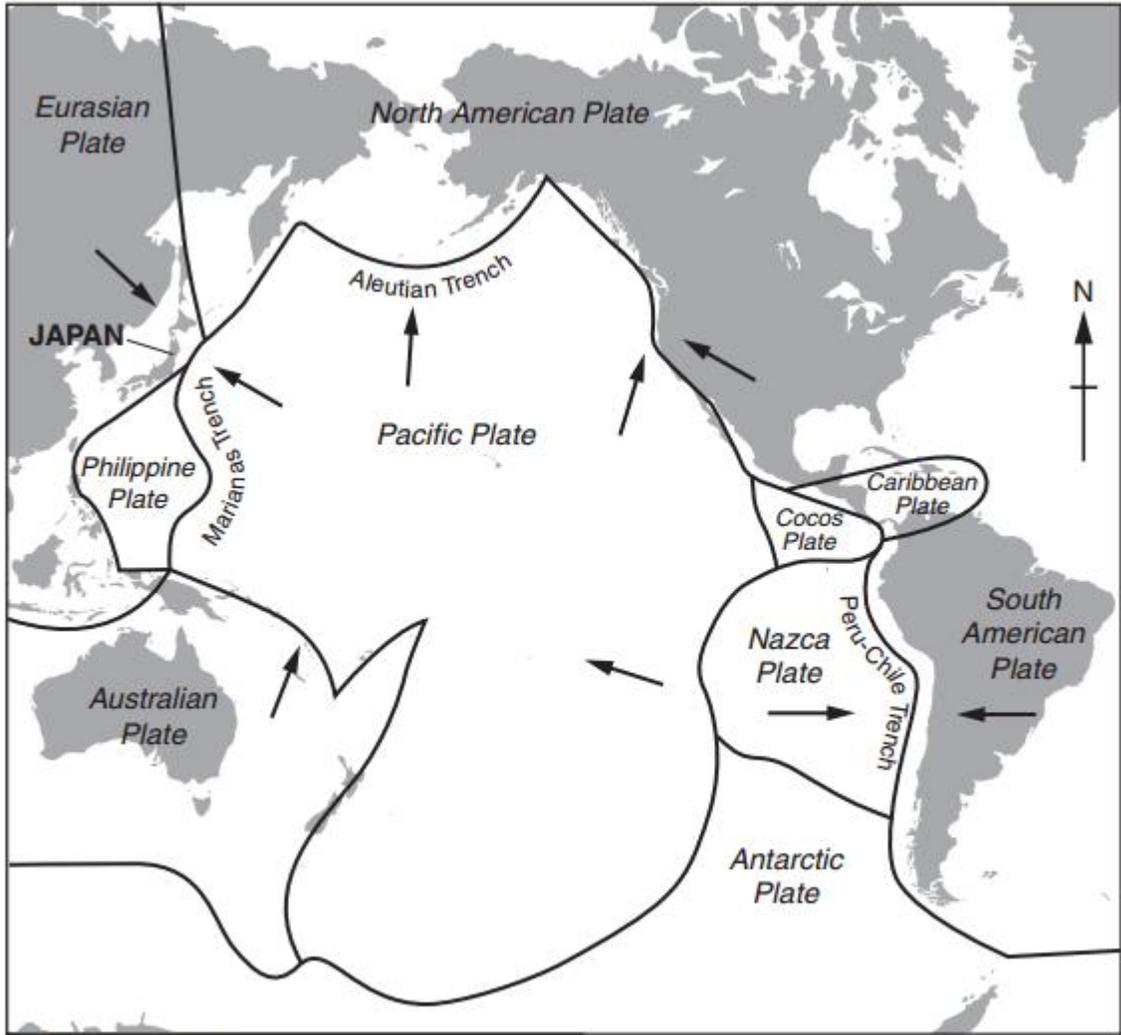
• between the Nazca Plate and the South American Plate?

Destructive

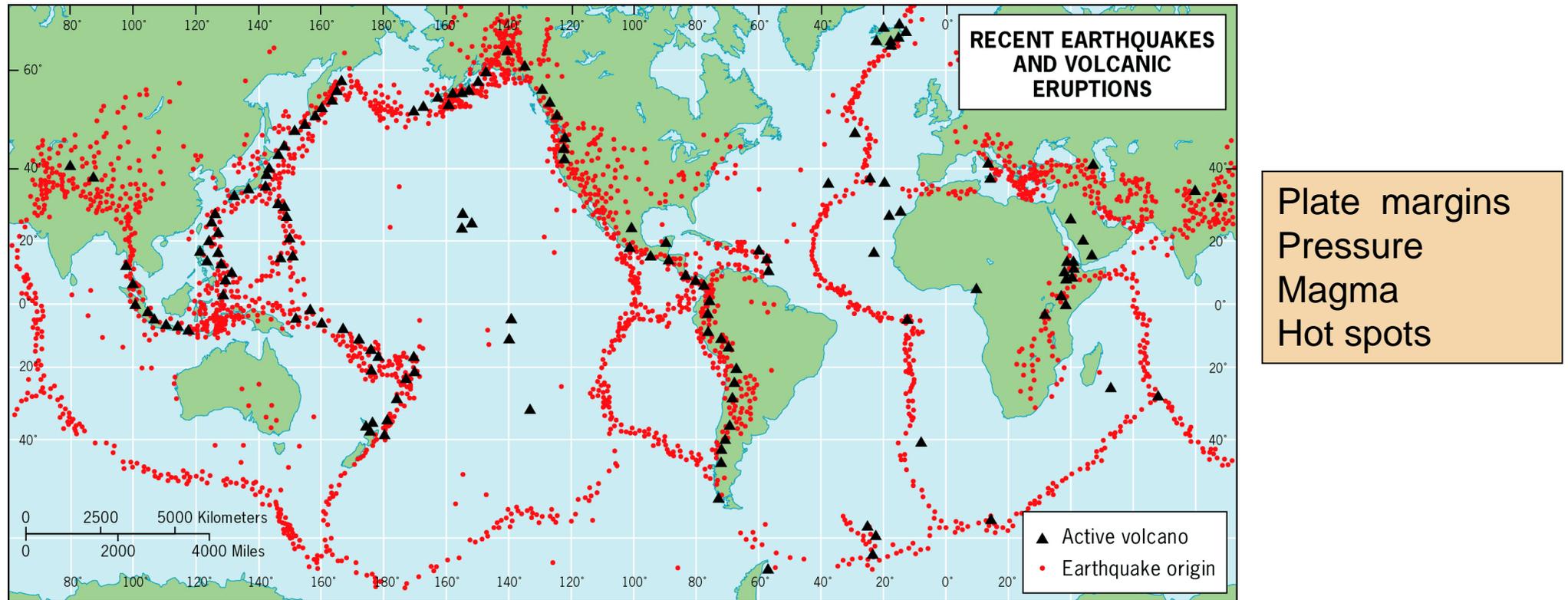
• between the Nazca Plate and the Pacific Plate?

Constructive

[2]



Key ——— plate boundary
 → direction of plate movement



Explain why the majority of earthquakes and volcanoes occur at plate boundaries [4 marks]

Earthquakes are found at plate margins because the plates are grinding together or past each other. They get stuck, pressure builds up, they suddenly slip releasing shock waves.

Volcanoes occur because magma forces itself through weaknesses in the crust at the boundaries caused as the plate move together or apart

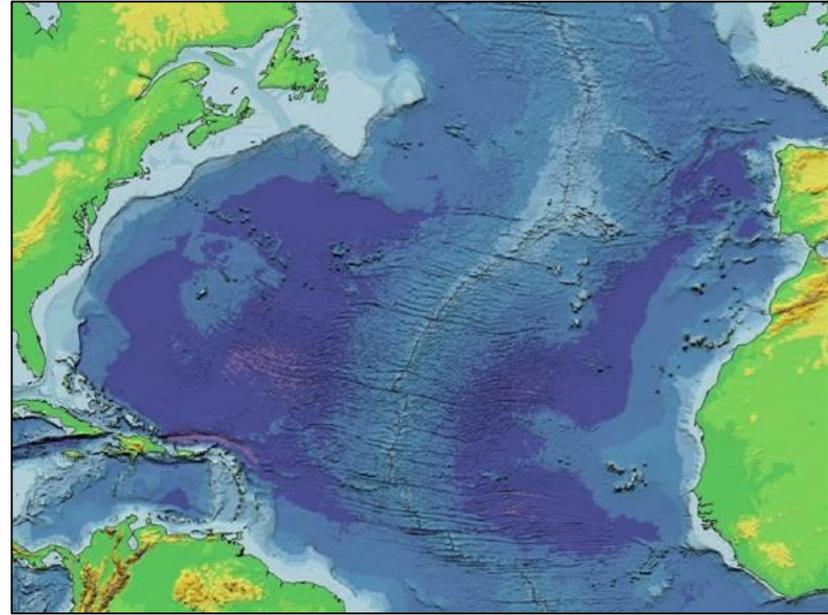
Constructive margins

Explain the physical processes that cause volcanoes along the feature shown in the image [4 marks]

https://www.youtube.com/watch?v=Kg_UBLFUpYQ

Along the Mid Atlantic ridge the North American and Eurasian plates are moving apart along a constructive margin, because of convection currents in the earth's mantle. Magma escapes through the crack (fissure) created. This forms a line of underwater volcanoes

Figure 1 – The Mid Atlantic Ridge, a constructive plate margin

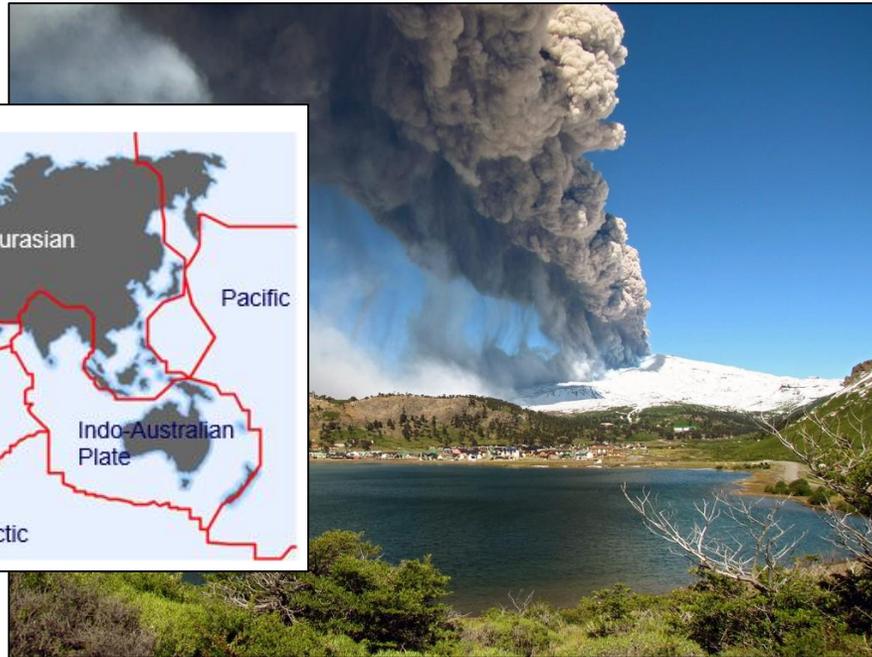
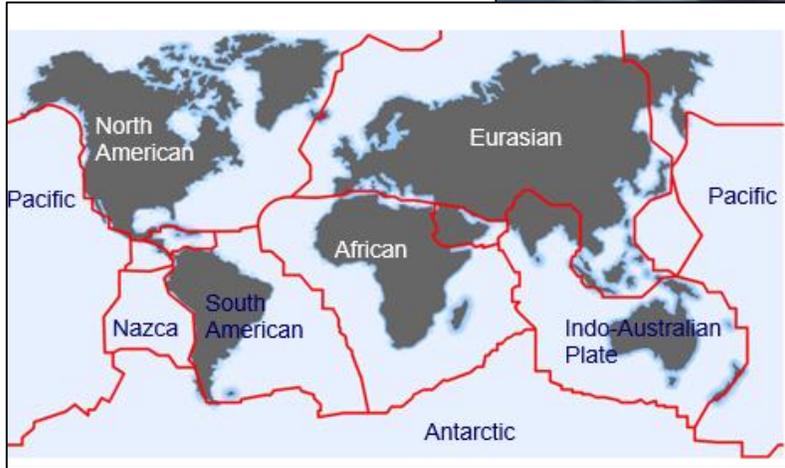


Start at 3:38 and stop video at 4:24 then discuss.

Then watch clip to 5:38

A volcanic eruption caused by the destructive plate boundary between the Nazca and South American plates off the West coast of Chile

Destructive plate boundary



Explain the physical processes that cause volcanoes along the West coast of Chile [4 marks]

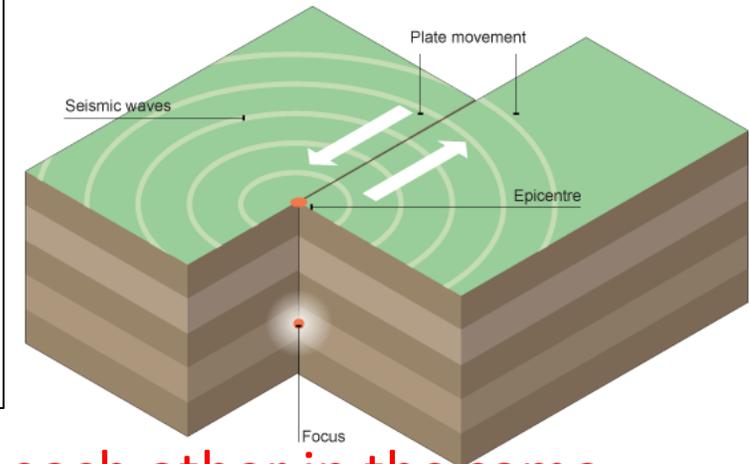
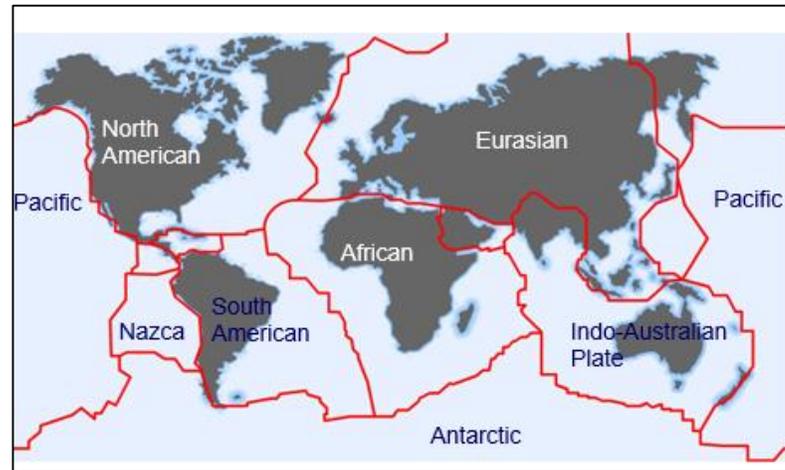
The oceanic Nazca plate is being forced under (subducted under) the continental South American plate at a destructive margin due to convection currents in the earth's mantle

Immense friction and heat from the mantle causes the Nazca plate to melt and form magma which rises through cracks in the South American plate to erupt as violent volcanoes



On the map of the San Andreas Fault, mark with X's where you would expect earthquakes to happen

Explain using the resource the physical processes that cause earthquakes at conservative margins [4 marks]



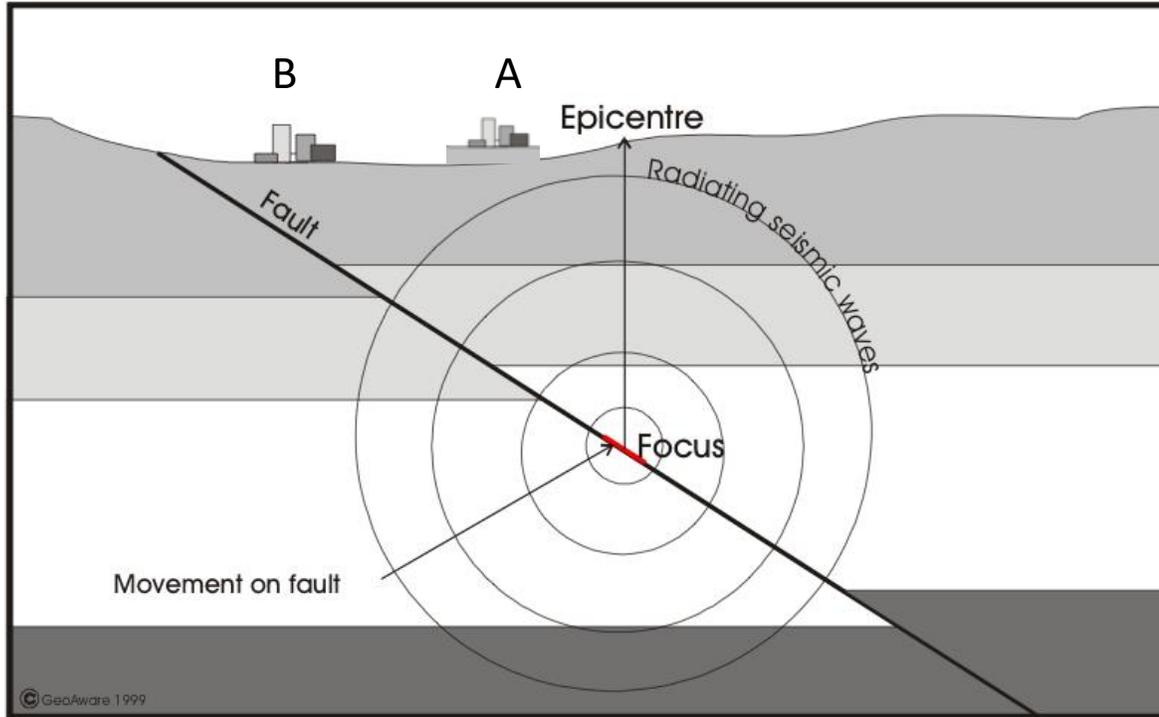
The Pacific plate and the North American plate are moving past each other in the same direction but different speeds along the San Andreas fault (conservative margin)

The plates get stuck due to friction and pressure builds up

The rocks give way and the plates suddenly slip

Energy is released as seismic waves which is an earthquake

Explain why town A was more badly damaged than town B in the earthquake shown above (3 marks)



Town A was more badly damaged than town B because it is closer to the epicentre. (1) This is the point at the surface closest to the focus of the earthquake (1) Seismic waves will be strongest here and reduce in energy the further the distance they travel from the earthquake focus. (1) so town B will be less damaged

Blank box for student response.

Take the test!

An oceanic plate and a continental plate collide at a Destructive margin

Plates become stuck at a conservative margin because of Friction

Shock waves in an earthquake are called Seismic waves

The Mid Atlantic ridge is an example of a Constructive margin

An ocean trench is formed at a Destructive margin

The currents that move the plates around are called Convection currents

Magma changes its name to Lava when it erupts

The point where an earthquake originates is called its Focus

An example of a conservative margin is the San Andreas fault

The term that describes when one plate is forced under another is Subduction

Volcanoes are extremely violent at Destructive margins

Fold mountains are formed due to the Collision of two continental plates

The Atlantic ocean is getting wider due to sea floor spreading at a constructive margin

Destructive margins destroy plates

Iceland is located on a Constructive margin

San Francisco is located on a Conservative margin

Earthquakes happen along Fault lines when plates slip

17/17 = Genius 14/17 = Excellent 11/17 = Passable 8/17 = Focus harder 5/17 = Shocker

Primary effects
Occur because of the shaking

Secondary effects
Occur because of the primary effects

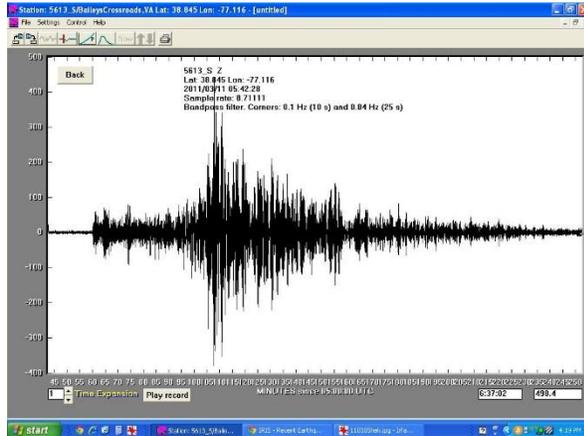
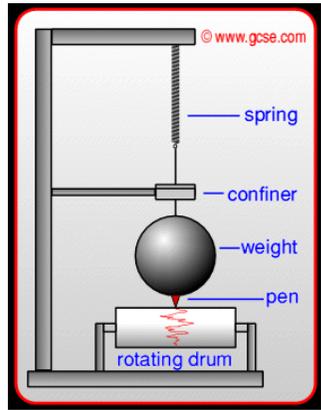


1. Describe and explain two primary impacts of earthquakes (4 marks)
2. Describe and explain two secondary effects of earthquakes (4 marks)

1. Collapsed buildings due to the shaking will cause lots of death and injury to the public due to crushing, increasing the death toll.
 2. Roads are damaged and impassable meaning that emergency services cannot access the scene so the death toll will increase.
-
1. Many people made homeless, creating problems for Governments who need to provide shelter, but also may lead to further deaths from hypothermia or illness in poor weather
 2. Water supplies polluted or damaged could lead to the use of contaminated water and the spread of diseases like Cholera

Earthquake Prediction

Earthquakes are really hard to predict and warn people about so the best method of reducing the impacts is to **plan and protect**

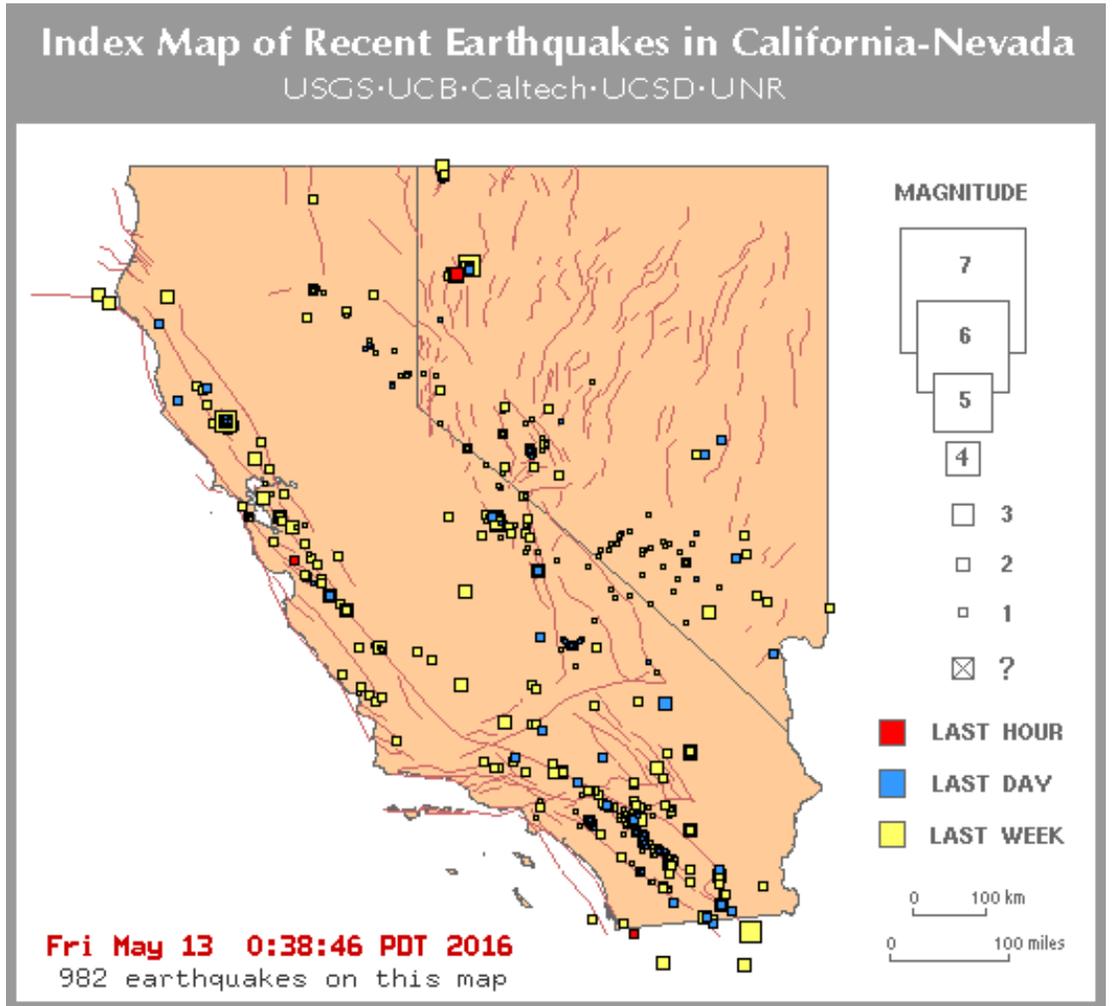


Describe the pattern of earthquake activity shown on this map (3 marks)

Many earthquakes are found along or near the San Andreas faultline

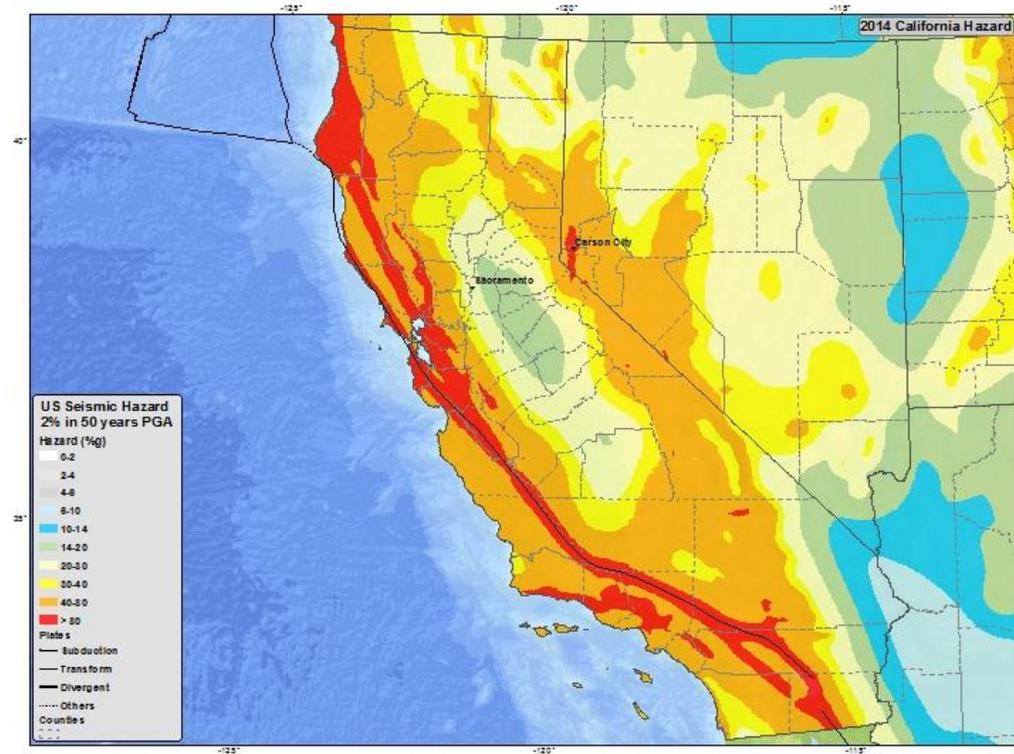
There is a large cluster on the South West end of the faultline

There is a cluster to the east of the faultline in the centre of the map



Planning for tectonic risks - Earthquake risk map of California

Planning
is about avoiding
areas at risk from
earthquakes or by
having strategies in
place to reduce the
impact



Explain how maps like this help to reduce the impact of earthquakes? [4 marks]

Earthquake risk maps show planners areas that are more or less at risk from severe earthquakes using colour coding. meaning building can be avoided in the high risk areas, so property is not destroyed or people put at risk Also, important buildings like hospitals and power stations can be built in safer areas meaning if there is a big earthquake medical care and power can be provided, reducing the death toll.

Information and education

EARTHQUAKE!!!

(Are you prepared?)

Do you know that about 20 earthquakes are recorded daily in the Philippines? Most of these earthquakes however, are weak and are only felt distinctly by an instrument called seismograph. Earthquakes cannot be prepared, but we can prepare for them. Always remember these basic things to do before, during and after a strong earthquake:

BEFORE

The key to effective disaster prevention is planning:

- Know the earthquake hazard in your area
- Follow structural design and engineering practices when constructing a house or building
- Inspect the structural condition of the buildings and houses, strengthen or retrofit if necessary.

Prepare your home, workplace or school:

- Step or hold heavy furniture/cabinets to the walls.
- Check the stability of hanging objects like ceiling fans and chandeliers.
- Insurable items, jewelry, precious and flammable materials should be stored properly in the basement or second stories.
- Always turn off the gas valve when not in use.

Prepare yourself with the drill routes and places where the earthquake, for all life, show, and communication facilities are located. Leave time to use them beforehand.

Prepare a ready emergency supply kit with first aid kit, canned food and can opener, water, clothing, blanket, battery-operated radio, flashlight and extra batteries. Conduct and participate in regular earthquake drills.

DURING

STAY CALM.

When you are INSIDE a structurally sound building or home, "STAY THERE!"

Do the "DUCK, COVER and HOLD"

- Drop quickly upon the floor for each.
- Cluck under a sturdy desk or table, and hold on to it, or protect your head with your arms.
- Stay away from glass windows, shelves, cabinets and other heavy objects.
- Be aware of falling objects. Do not stand and keep your eyes open.

If you're OUTSIDE, move to an open area!

- Stay away from trees, powerlines, poles and concrete structures.
- Move away from steep slopes which may be affected by landslides.
- If you're near the shore and feel an earthquake, immediately get to low-lying, unprotected or sheltered areas. Do not go to the beach.
- If you're in a moving vehicle, STOP and get out! Do not attempt to cross bridges, overpasses, or freeways which may have been damaged.

AFTER

Be prepared for aftershocks.

Obey the building steps, take the fastest and safest way out of the building.

Don't:

- use elevators.
- enter damaged buildings.
- use vehicles unless necessary.
- ...PANIC.

Check:

- yourself and others for injuries.
- doors and windows for damage.
- for leaks of chemical, toxic and flammable materials.
- and spread fires which may spread.

Keep updated on disaster prevention information from battery-operated radio.

Planning and Protection methods

Earthquake resistant buildings



Highly trained search and rescue



Earthquake Drills



Explain two ways that planning can reduce the impact of earthquakes [4 marks]

Having highly trained search and rescue teams means people can be quickly rescued from damaged building's saving lives in the 48 hour rescue window

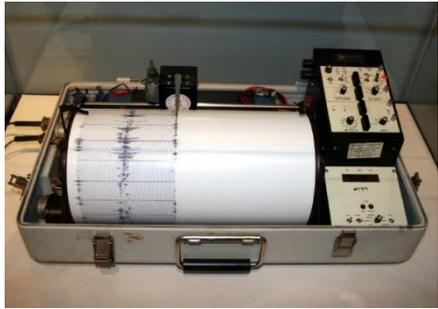
Having earthquake drills in schools reduces panic and makes sure children know the best thing to do in the seconds after a quake, (get under tables) so reducing deaths from falling objects

Evacuation centre



Volcanoes are easier to predict and warn people about so the best method of reducing the impacts is to **evacuate**

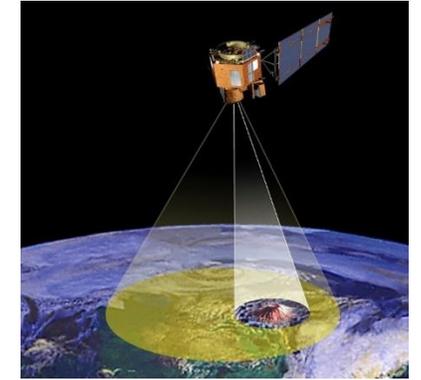
Recording foreshocks with a seismometer



GPS tracking shape of volcano shape



Monitoring heat using thermal imaging



Explain two ways that volcanic eruptions can be predicted [4 marks]

Monitoring sulphur dioxide emissions



Thermal imaging from satellite or helicopters shows whether a volcano is heating up because this can be seen when the magma chamber is filling up before an eruption

Monitoring gas emissions from a volcano

because sulphur dioxide levels increase as the magma chamber fills before an eruption