GETTING READY FOR PACK

A Level Geography

We are delighted you have chosen to study A Level Geography at Haywards Heath College

WHAT YOU WILL STUDY	
Unit/Topic	**In year one you will study:** 1. Tectonics 2. Regeneration 3. Coasts 4. The NEA (Coursework) 5. Globalisation

WHAT YOU NEED	
Fieldwork	**Tuesday 24th September** – Shoreham (physical geography) **Tuesday 12th November** – Brighton or Portsmouth (human geography) **31st March (Monday to Thursday)** – Data Collection for Geography Coursework (The NEA) along the Sussex Coastline. Students attend 3 out of the 4 days according to the title chosen for coursework.
Equipment	General stationary.
Essential Textbooks	Geography for Edexcel A Level Year 1 and AS second edition Student Book (Geography for Edexcel A Level second edition): Amazon.co.uk: Digby, Bob: 9781382046947: Books

ENRICHMENT	
Trips	• Iceland – February 2025 (optional)
Guest Speakers	• University of Portsmouth • The Geographical Association
Events	• STAR Awards

SUMMER WORKING TASK INFORMATION
Completion Date: First Lesson Week Commencing 9th September.
This pack will help you make the best possible start to studying this subject. The tasks in this pack should take you about 4-6 hours to complete. The tasks are designed to get a bit more difficult as you work through them as they are preparing you for studying at a higher level and to become an effective independent learner. You should try to get as far as you can working on your own but if you do need help, please email us at **info@haywardsheath.ac.uk** telling us which Getting Ready For pack you are working on and what help you need. Help is available throughout the summer holidays.

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How will this work be marked…?

Q1 – Give 1 reason + use the phrase ‘this leads to…’ twice to extend your answer. This will lead to 3 ideas (3 points)

e.g. Point – Explain - Explain

Q2 – 11 points per place (33 points)

Q3 – (2 points)

Q4 – (10 points) for completion of this task *(to include a 50-word explanation or equivalent in labels). This task is about ‘having a go’ and ‘being creative’. We are looking for good ideas!*

Q5 – (12 points) *This task is about ‘thinking around’ a point and expressing this in a written format. You are able to use internet research for ideas but should write in brackets where this comes from, and you should not directly copy from any resources. It can be useful to reflect on the consequences of not study tectonic hazards.*

Total = (60 points)

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Volcanoes and Earthquakes

‘ the architects of our planet’

Volcanoes, Earthquakes and Tsunami’s are called tectonic hazards as they are driven by plate tectonics

Introduction Clip:

Earth's Hidden Volcanos | A Perfect Planet | BBC Earth (youtube.com)

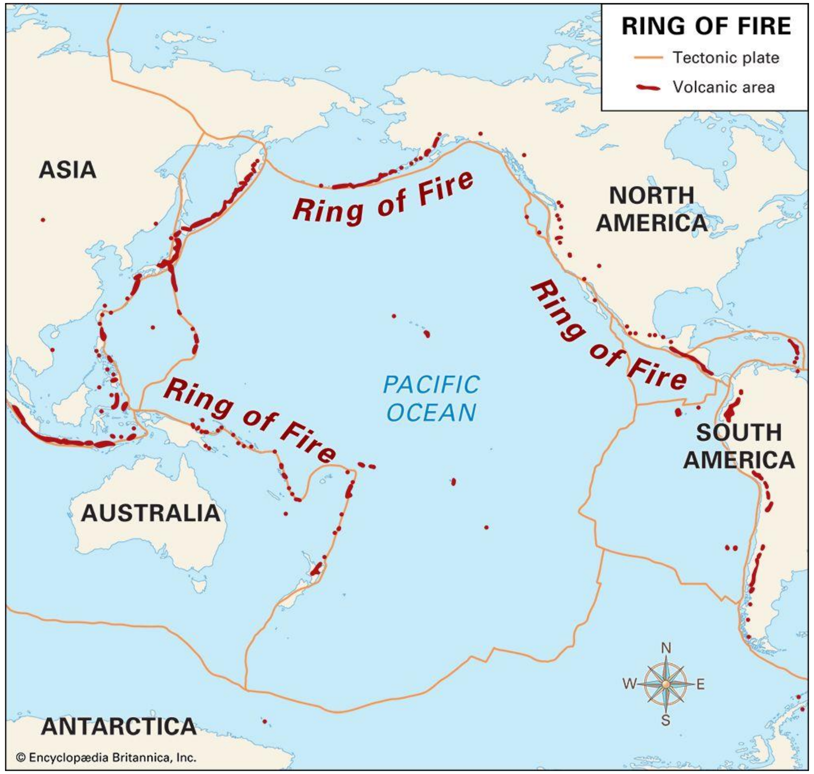

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PLATE TECTONICS

by John Edwards

We believe the Earth to be about 5 billion years old. That long ago it would have been a mass of gas and molten rock. As the Earth cooled, different materials began to separate out. More dense materials such as iron started to form the core of the Earth. Lighter materials such as silicates floated to the surface.

Distinct layers began to form in the Earth, which are still present today. The outer or surface layer, the **crust**, is on average only 20 km in depth. The zone of rock beneath the crust is the **mantle**. This is composed mainly of nickel and iron, and is approximately 3,000 km in depth. The layer beneath the mantle is the **core**. Much of the core is iron and nickel, which is liquid because it is so hot. This is called the **outer core**. The centre of the Earth is called the **inner core**, which is also made of iron and nickel. The inner core is solid because the rocks are under so much pressure, even though the temperature is 5,000°C.

The theory of plate tectonics

The crust is not continuous over the surface of the Earth, but is broken into a series of massive **plates**. Although it is not apparent, these plates are in constant motion (Figure 1). The average rate of movement is between 1 and 10 cm per year. The North American and Eurasian plates, for example, are moving apart, while the African and Eurasian plates are colliding.

Until the mid-19th century, we had little knowledge about the dynamic nature of the Earth. Then scientists began to investigate the possibility that the continents moved across the surface of the Earth. The main initial reason for this was the apparent 'fit' of the coastlines of South America and Africa. It was a German meteorologist, Alfred Wegener, who proposed the theory of **continental drift**. He suggested that all the continents had originally been joined together as one landmass, after which they had separated and slowly drifted along the ocean floors to their current locations.

Wegener investigated the apparent match of the coastlines of South America and Africa. The evidence was supported by the rocks in the two continents. The mountains running across South Africa appeared to match those in Argentina, and there were many similarities in the types of rock found in the two locations. In addition to this, similar fossils were found on either side of the Atlantic Ocean.

Despite the strength of the evidence, Wegener's ideas were not generally accepted at the time. It was not until later that new evidence was found to support and develop the theory of continental drift. Scientists by now had a much better understanding of the structure of the ocean floors. It was clear that new ocean crust was continually being created in zones in the middle of the oceans. **Sea-floor spreading** was used to modify Wegener's original ideas. The continents were moving, but the creation of crust along mid-ocean ridges was the driving force, rather than the continental landmasses floating on the ocean floors. The **theory of plate tectonics** had been established.

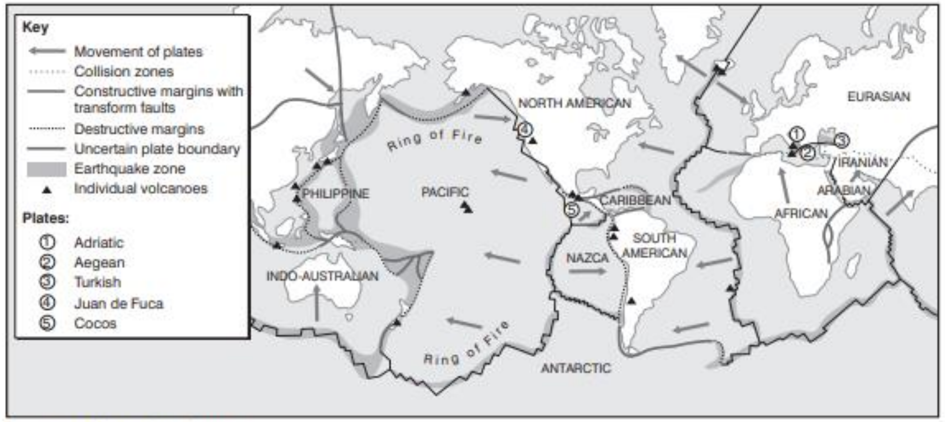

Figure 1: **The Earth's plates**

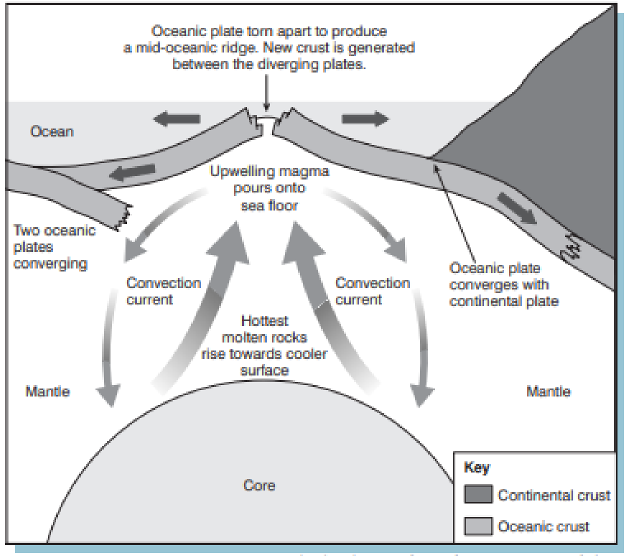

Figure 2: **Convection currents provide the driving force for movement of the Earth's plates**

It is heat from within the Earth that powers the movement of the plates on its surface. At temperatures of over 1,000°C, the rocks of the mantle near to the core become 'plastic' and start to flow towards the surface. It is only the high pressure of rocks in the crust above that stops them from melting in the heat. Nearer the surface the rocks cool, flow sideways and then return towards the core. The rocks of the Earth's mantle form giant **convection currents** (Figure 2).

The sideways movement of rocks just beneath the crust causes the plates on the surface to move. Although this may be as little as 1 cm per year, over millions of years this movement has completely changed the pattern of land and sea on the Earth's surface.

Break-up of a super-continent

The theory of plate tectonics suggests that, working backwards from the present day, it is likely that all of the continents were once joined as a huge super-continent called **Pangaea**. This was surrounded by a giant ocean called the **Panthalassa Ocean**. Figure 3 shows the positions of present-day continents within Pangaea. Notice how little Africa has altered in all this time, but how far India had to travel before it became a part of Asia.

Pangaea broke into two new continents called **Laurasia** and **Gondwanaland**, shown in Figure 4. Europe, Asia and North America were all joined together as Laurasia. Gondwanaland was made up of Africa, Australia, South America and Antarctica. Until 150 million years ago, India still remained a part of this landmass.

After Laurasia and Gondwanaland broke apart, the continental landmasses started to drift further apart. By 130 million years ago, the shape of our present-day continents was beginning to be

Figure 3: **The super-continent of Pangaea, 250 million years ago**

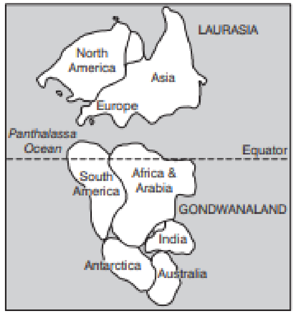

Figure 4: **Laurasia and Gondwanaland**

recognisable. The Atlantic Ocean had started to develop as Europe and North America drifted apart. Antarctica was moving south towards its current location, and India was on its way to crash into Asia.

Plate boundaries

The Earth's plates may move very slowly in human terms, but it is this movement that is responsible for some of the most spectacular landscapes and hazards on our planet. It is at the edges of the plates, where two or more meet, that these processes take place.

There are three types of plate boundary. These are:

1. **Divergent** (or **constructive**) **boundaries:** this is where plates move apart.
2. **Convergent** (or **destructive**) **boundaries:** this is where plates collide.

3 **Transform** (or conservative) **boundaries:** this is where plates slide horizontally past one another.

Divergent boundaries

Divergent boundaries occur where two plates move away from each other. They are pushed apart by molten rock, or **magma**, rising from the mantle beneath the crust

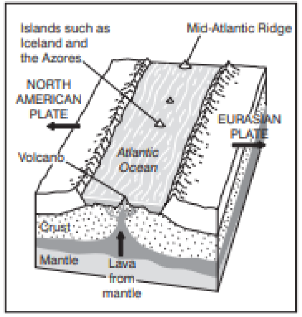

Figure 5: **A divergent plate boundary**

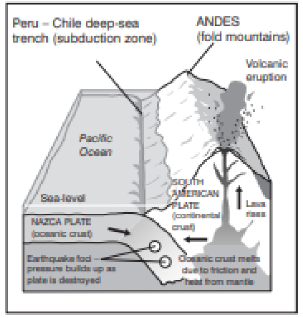

Figure 6: **A destructive boundary where oceanic and continental plates meet**

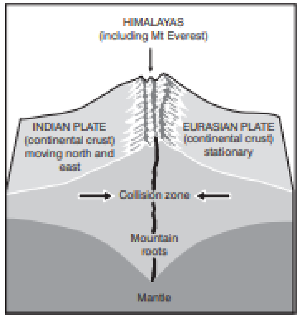

Figure 7: **The collision of two continental plates**

(see Figure 5). As soon as the magma reaches the surface it solidifies, forming new crust. This is why this type of plate boundary is sometimes called a **constructive** boundary.

Convergent boundaries

Convergent boundaries occur where two or more plates collide. The type of collision depends on the nature of the plates involved. However, a part of the Earth's crust is 'lost' during this process, this plate boundary is called a **destructive** boundary.

- **Where ocean and continental plates collide**

The Nazca plate to the west of South America is an oceanic plate. It is colliding with the South American plate, which is a continental plate. As it does so, the Nazca plate is forced down underneath the South American plate (see Figure 6). This is called a **subduction zone**, and the destruction of the crust is why this type of boundary is sometimes called a **destructive** plate boundary. As the plates meet, a deep trench forms at the bottom of the ocean. These **ocean trenches** form the deepest parts of the oceans. The Peru–Chile trench, for example, runs for thousands of kilometres along the eastern Pacific Ocean where the Nazca and South American plates meet. It ranges from 8 to 10 km in depth.

As the oceanic plate is forced downwards, violent collisions take place between the two plates. These are earthquakes. When the crust carries on descending it melts, due to friction and the higher temperatures as it enters the Earth's mantle. Some of this newly formed magma rises to the surface in the form of volcanoes. The continental plate is also forced upwards as the oceanic crust is forced underneath. In the case of the South American plate, this has resulted in the formation of the Andes Mountains.

- **Where ocean plates collide**

Where two oceanic plates meet, one is usually pushed underneath the other. The processes are the same as when oceanic and continental plates meet. A subduction zone is formed, along with an ocean trench. There are earthquakes as the plates collide, and the melting crust rises to the surface to form a line of volcanoes. This time, there is no landmass and so the volcanoes end up forming a string of volcanic islands called an **island arc**. The islands of the Caribbean, and the Aleutian Islands near Alaska, were formed in this way.

- **Where continental plates collide**

When two continental plates meet, they collide and are buckled upwards to form **fold mountains**. Neither plate is pushed downwards, or subducted (see Figure 7).

Transform boundaries

Not all of the Earth's plates are moving apart or crashing into one another. Some plates slide horizontally against each other, at transform boundaries. No crust is created or destroyed at these boundaries, which is why they are sometimes called **conservative** plate boundaries (see Figure 8).

This means that there are no volcanoes at these boundaries. Earthquakes do occur, however, as the plates tend to stick then slip violently rather than sliding smoothly against each other.

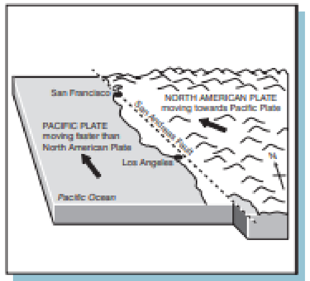

Figure 8: **A transform plate boundary**

Task 1: Iceland

Iceland is at the boundary of the Eurasian and North American plates. The island is part of the Mid Atlantic Ridge.

Iceland Continental Divide (GEOGRAPHY) (youtube.com)

Q1. In Iceland in 2010 the eruption of Eyjafjallajökull was problematic, use the link below to explain the main reason why.

Why Iceland's Minor Volcano Is a Major Problem | TIME

Please Watch…

[What determines the impact of an earthquake? - YouTube]

Task 2

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Research each of the three tectonic hazards below. For each consider why it was problematic? Answer questions 1-4 for each hazard (the points in brackets next to each question refer to how many statements you need to make for that question e.g. 1 point = 1 line or idea) You will need to answer Q2 parts 1-4 for each tectonic hazard listed in red.

Tectonic Hazards:

Mt Merapi 2010 (Volcano)

Haiti 2010 (Earthquake)

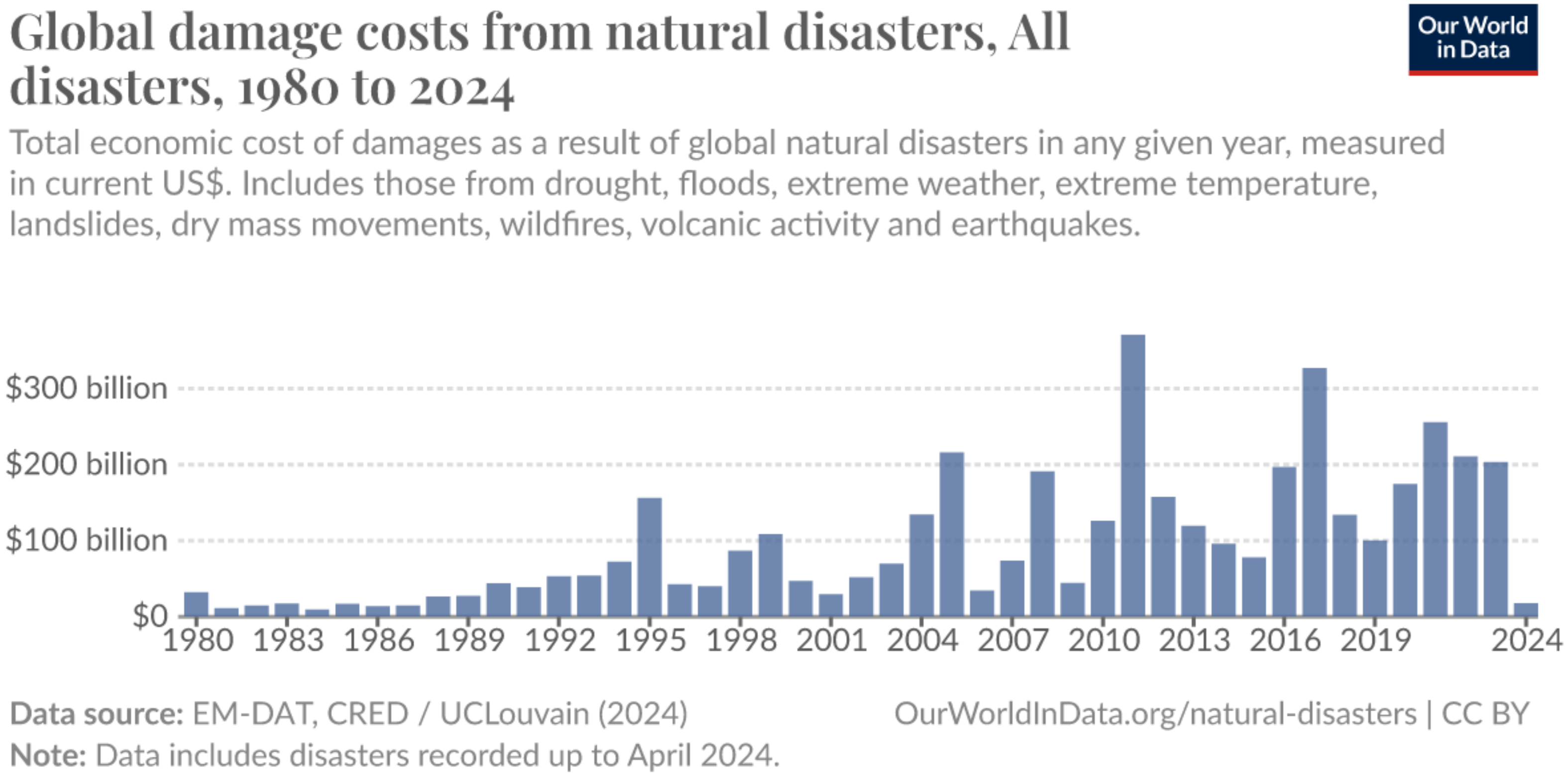
The Japanese Tsunami 2011 (Tsunami) – on the 'Ring of Fire'

Question 2

1. Which areas were affected? Please name a town/village/state (1)
2. Who was most affected? *Name a group within the population*.* Explain why they were most adversely affected (2)
3. What was the role of the government? *(What did they do or not do?) Either list 4 things the government did or did not so or find 2 things to explain e.g. the government…which led to…* (4)
4. What did aid organisations do? *Name two things and explain these. Consider the actions of two organisations/charities* (4)

**e.g. Those who live along the coastline, the elderly…*

Task 3



Thinking beyond the resource…

Q3. Why might the figures in 2024 be low? (2 reasons)

Note: This graph includes volcanoes, earthquakes and tsunami's (tectonic hazards) as well as hydrometeorological (weather related) hazards.

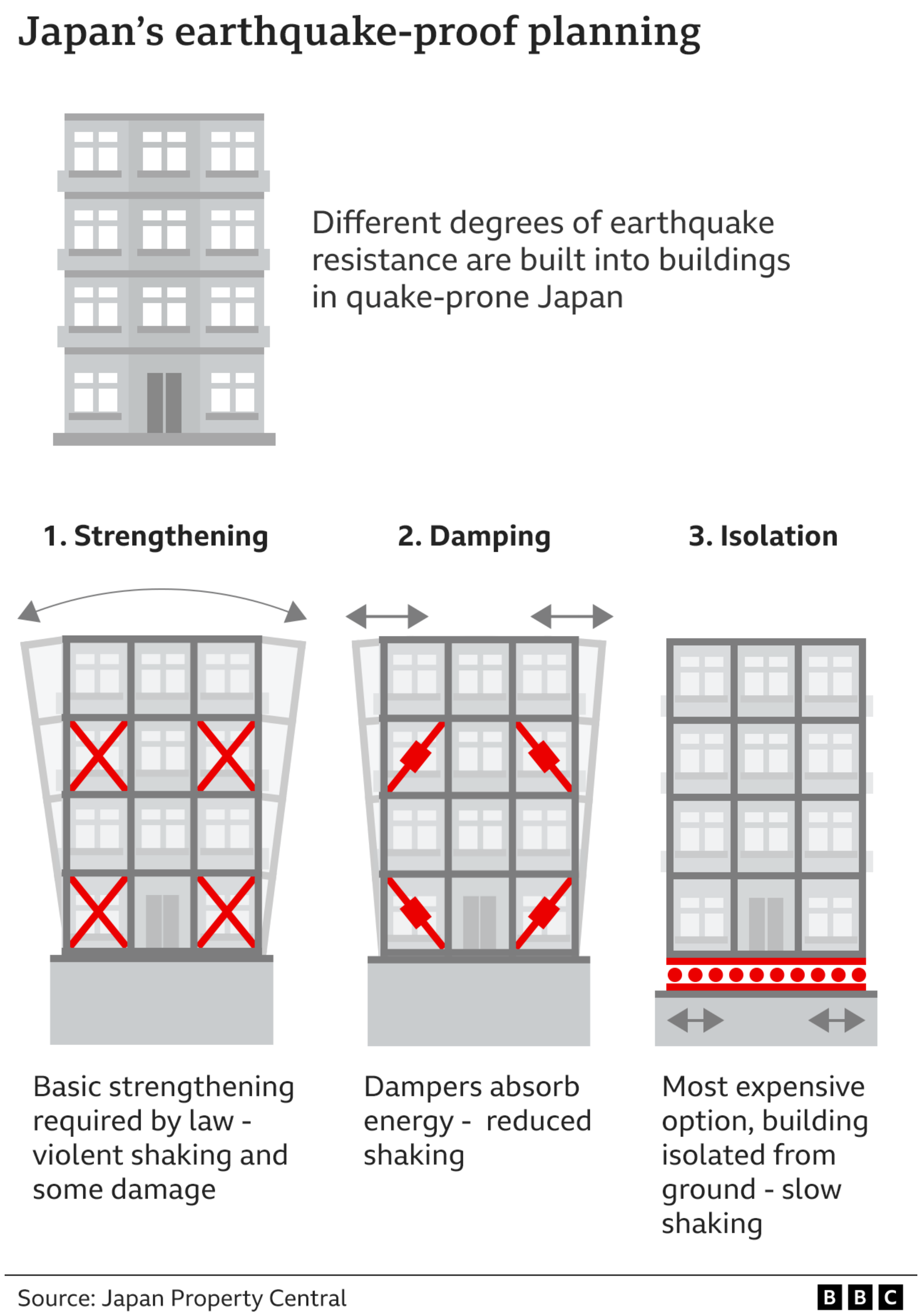
Building and structural vulnerability

A well-known saying states that "earthquakes don't kill people, buildings do". The vast majority of suffering results from the collapse of buildings or structures, such as bridges and elevated highways. In the 1989 Loma Prieta earthquake near San Francisco, 41 of the 67 deaths resulted from the collapse of the Nimitz Highway when the top storey of a double-decker freeway collapsed onto the storey below.

In wealthy areas where earthquakes are common, building materials and appropriate designs can minimise loss of life. This was certainly the case with the Loma Prieta earthquake where very few people were killed. However, despite the implementation of strict building regulations in recent decades, older properties remain vulnerable; it was the collapse of many such houses in Kobe, Japan in 1995 that led to the high death toll of over 6,300.

In poorer parts of the world building design is often inadequate and, although building design standards might be officially in place, regulations are rarely enforced. This was certainly the case in Mexico City when in 1985 several modern high-rise buildings collapsed as concrete crumbled and thin steel cables tore apart. The 12-storey central hospital collapsed like a pack of cards losing two thirds of its height as ceilings fell onto the floors below, crushing its inhabitants. In all, some 30,000 people were killed. In Turkey in 1998, some of the 20,000 buildings that collapsed killing 14,500 people were found to have seashells instead of pebbles in the concrete mix!

In areas where earthquakes are infrequent, precautions will understandably be very limited or even non-existent. It is in these areas often well away from plate margins where the suffering can be greatest. In 1993 a powerful earthquake measuring 6.4 on the Richter scale struck Khillari in central India. It was totally unexpected and the stone houses with their heavy insulating roofs collapsed killing some 10,000 people. Four months later, in January 1994, a slightly more powerful earthquake (6.6 compared to 6.4) hit the well-prepared city of Los Angeles killing just 40 people.



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Task 4

Q4.

Use 10 lolly sticks, 5 pieces of wool (10cm each), blue tac plus **three** more resources of your choice to…

1. Research a unique design of an earthquake proof building
2. Make a small model of this (10cm height maximum)
3. Bring this into college for your first lesson back. It would be best to attach 50 words on the main points to explain the design of the model (attach this to the base).
4. You should reinforce with Sellotape/masking tape for the journey into college ☺

…Please take a picture of this and place this within your answers so that it can be marked.

Task 5

- This is an open writing task however you will need to include data from any research you have done in previous tasks. You can also use your own knowledge.

Question 5 – Why is it vital to study tectonic hazards for future populations? (12)

Step 1 - **Create a one-line introduction**, which is the most important reason to study tectonic hazards?

Step 2 - **Create three paragraphs**. Each paragraph should include;

a) A reason why the study of tectonic hazards is important

b) Facts to support this reason

c) Whether each idea is more or less important than your other ideas and why? E.g. *'this idea is more effective in LIC's or HIC's'* **or** *'this idea is more short or long term'* **or** *'this idea is more local or global in its impact'*

Step 3 - **Have an ending statement** which repeats the 1^{st} line with once piece of evidence (a bit like a summary)

1-4 marks = Good points have been made but you do not add facts/ideas or comment on how important each answer is.

5-8 marks – Good points are made; facts are used to justify these. Good use of geography key words. You have discussed rich (HIC's) and poor (LIC's) countries and have covered steps 1-3 above.

9-12 marks – You have done everything for 5-8 marks and have shown one or two pieces of interesting wider research.

Extension – You can argue that other 'global issues' linked to physical geography are more pressing if you know of any e.g. Climate Change AND you can add any ideas not included within this PowerPoint

Further Reading…

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Plate tectonics and earthquake prediction – RGS – The Japanese Tsunami

The Geological Society (geolsoc.org.uk) – The 'Pioneers of Plate Tectonics'

Groundbreaking discovery suggests some earthquakes alter tectonic plates – Geographical – New Studies on the impacts of earthquakes

The Incredible Power Of Planet Earth | Compilation | BBC Earth Science (youtube.com)

Please note – That this A Level course has been 'reviewed' for September 2024 which means that a few small changes have been made to update the specification. In light of this I recommend that you wait for a newer version of the revision guide to be published. Please see the first slide for the newer copy of the textbook.