

Tectonic Hazards

Paper 1



Tectonic Plates:

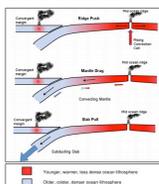
The Earth's crust (top layer) is not a solid shell. It is made up of thick, connecting pieces called tectonic plates.

- Oceanic Crust = 5-10km thick, new crust that is more dense
- Continental Crust = 25-100km thick, old crust that we live on

These plates move, there are two theories for this:

Slab Pull

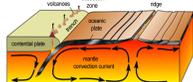
Gravity acts on heavy plates and pulls them apart. This forces one bit of the plate to rise and the oceanic crust bend downwards and slides into the mantle. This is known as subduction.



Convection Currents

A process that transfers heat energy.

- As the magma rises it heats the oceanic crust
- Crust cools and becomes denser and is forced underneath the less dense continental plate which causes subduction



Volcanic Eruption: Mount Merapi-

Mount Merapi is a stratovolcano located in Java one of the most densely populated areas in Indonesia.

Plate boundary - Destructive plate boundary - Indo-Australian subducted beneath Eurasian.

Monitoring - Merapi Volcano Observatory in Yogyakarta City where the level of volcanic alert is adjusted on a daily basis.

Date of eruption: October 2010

Magnitude - VEI 4

Impacts:

- Lahars
- Gases, up to 800°C
- Pyroclastic flows, at speeds of up to 100 km/h

Social: 353 deaths 200,000 homeless	Economic: \$700 million financial loss Increase in prices of food	Environmental: 26,000ha crops in ash 27 million m ² of ash deposited in River Gendol
--	--	--

Responses:

- Short:**
- 320,000 evacuated from a 10km radius
 - 700 emergency shelters
 - Australia donated \$1million
- Long:**
- grants for farmers to replace livestock
 - Arkomiogia (NGO) started a micro-credit scheme to create sustainable hazard proof homes

Small features: Ash Clouds

- explosive eruption throws a mixture of gas, rock and tiny lava pieces high into the air

- Long term health affects
- Volcanic winters
- Makes soil more fertile

EG: Eyjafjallajökull (2010)



Pyroclastic Flow - hot ash, gas and rock that travel fast downside of volcano

- Deadly
- Habitats destroyed

EG: Montserrat (1997)



Lahar - landslide or mudflow, volcanic debris, mud, rock and water. Long term health affects

- Bury or destroy houses
- Fertilisers soil

EG: Mount Pinatubo (2010)



Lava flow - slow moving molten rock Bury or destroy houses

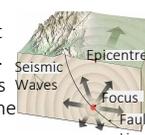
- Burns habitats and buildings
- Geothermal energy

EG: Kilauea, Hawaii



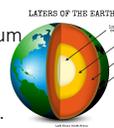
Earthquake:

Caused by friction at tectonic boundaries. Can lead to tsunamis when occur under the sea water.



Structure of Earth:

- Crust = thin (maximum 100 km thick)
- Mantle = s solid, but can flow like a liquid.
- Outer core = liquid iron and nickel
- Inner core = 5,500°C.



Tsunami: Japan

Plate boundary - Destructive plate boundary - The Pacific Plate, subducts under Eurasian Plate

Monitoring - Pacific Tsunami Warning System (PTWS) uses seismographs and ocean buoys to detect earthquakes

Date of tsunami: 11th March 2011

Magnitude - 9M_w

Impacts:

- Social:**
- 20,000 deaths
 - 500,000 homeless



- Economic:**
- \$300 billion



- Environmental:**
- Fukushima nuclear meltdown released harmful radiation impacting local habitats



Responses:

36 Nuclear reactors shut down causing blackouts

Earthquake: Nepal

Plate boundary - Destructive plate boundary - Indian plate subducting beneath Eurasian.

Date: 25th April 2015

Magnitude - 7.3M_w

Impacts:

- 400 aftershocks

Social: 9000 deaths 450,000 homeless	Economic: \$5 billion economic cost Increase in prices of food as no delivery	Environmental: Kathmandu is now 3m further south Avalanches destroyed habitats
---	--	---

Responses:

- Short:**
- 300,000 people from Kathmandu to migrated seek shelter
 - 500,000 emergency shelters
- Long:**
- \$5 million donated in aid
 - fresh food and water still supplied to those in need

TEST YOURSELF

- Name two landforms found at a destructive plate boundary (2 marks)
- Explain why rocks get older the further away from an ocean ridge you travel (3 marks)
- Describe how tectonic processes at a destructive boundary have resulted in the formation of any large-scale feature (4 marks)
- Suggest why the time and date of when an earthquake strikes is important (3 marks)
- Explain why people who live in LICs are likely to be more vulnerable to the impact of tectonic hazards (6 marks)
- Explain two features of an earthquake proof building (4 marks)
- Compare a volcano found at a constructive plate boundary to a destructive plate boundary (6 marks)
- Describe the process that takes place at a destructive plate margin where an oceanic plate meets a continental plate (4 marks)

Why are some places more vulnerable than others?

- Size of vulnerable population
- Population density
- Level of development
- Education
- Early Warning Systems
- Governance
- Communication lines
- Magnitude of volcanic activity
- Quantity of well-trained professionals

Capacity = someone's ability to survive a hazard or recover from it quickly.

Hotspot - Magma plumes that create volcanoes on the surface (eg Mount Kilauea in Hawaii).

Types of volcano:

Shield: Magma with low viscosity and low gas content spreads out across a wide flat field.



Stratovolcano: Steep sided. Made of layers of ash and lava from a number of eruptions.

Cinder cone: smallest volcano made from lava ejected from a single vent



Tsunami: Solomon Islands

Plate boundary - Destructive plate boundary - Pacific and Indo-Australian Plates

Monitoring - Pacific Tsunami Warning System (PTWS) uses seismographs and ocean buoys to detect earthquakes

Date of tsunami: 1st April 2017

Magnitude - 8.1M_w

Impacts:

Social: 52 deaths 1,000 homeless	Economic: \$100 million	Environmental: Flooded 50-70m
---	-----------------------------------	---

Responses:

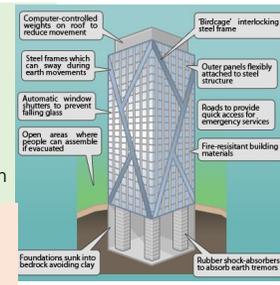
\$54.1 million sent by Australia as in the Solomon Islands they are a Small Island Developing State (SIDS) where 45% of population live in poverty

Largescale features formed by tectonic processes

Plate Boundary	Name of feature:	How is it formed?	Example:
Destructive	Ocean Trench	Subduction takes place	Mariana Trench, Western Pacific
	Fold Mountains	Continental crust is crushed and folded upwards	Andes, South America
Constructive	Ocean Ridge	As lava cools, a ridge is formed under the sea	Mid-Atlantic Ridge
	Rift Valley	Where two continental plates pull apart	Thingvellir, Iceland

Reducing the risk of tectonic hazards:

- Predicting:**
- Seismometer** - measure earthquakes
 - Geomagnetic** - measure the strength of magnetic fields in the rocks
 - Tiltmeter** - used to analyse ground movements
 - Geochemical** - monitor gas emissions
- Preparing:**
- Aseismic buildings
 - Hazard mapping
 - Educating population
- Plan:**
- Avoid building in places of risk



Environmental Issues

Paper 2



Tourism in South Africa-

Limpopo Province, South Africa, has a semi-arid climate and largely unspoilt savanna ecosystem that is a major tourist attraction.

Why need management?	How been management?
-Land degradation by vehicles	-Education
-demand on water	-hunting money goes towards conservation
-demands on food supply	-sustainable buildings

- ### Why is consumerism increasing?
- Mobile technologies
 - Proportion of people in well paid jobs
 - Increase in population
 - Container ships grow
 - Aircraft use bigger and more fuel-efficient engines
 - Undersea cables has improved communication

Tourism in Great Barrier Reef –

The Great Barrier Reef Marine Park in northern Australia. It was the first coral reef ecosystem to be given UNESCO World Heritage Status

Why needs management?	How been managed?
- harvesting the coral for souvenirs	-reef zoning
-Anchors scrape along the reef	-Honeypot sites such as Cairns - Boat length, visitor numbers are restricted



Climate Change in UK:

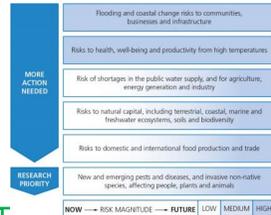
A warmer atmosphere will mean the air masses over the oceans will have greater moisture content.

Short term impacts:

- Food price increase
- Increase in flash flooding
- More extreme weather events (eg: 2003 heatwave)

Long term impacts:

- Economic cost of flooding could rise from £1 billion to £27 billion in 2080
- Severe water shortages by 2050 2.5x greater demand than supply
- 2 metre sea level rise on UK coasts by 2080.



Electronic waste products such as computers and mobile phones
The UN estimates that 50 million tonnes of e-waste annually.

Social	Economic	Environmental
<ul style="list-style-type: none"> • Toxins are in local's food and drink • No safety equipment 	<ul style="list-style-type: none"> • Buy and sell waste to make a living • Non-reliable income – someday may not earn any money. 	<ul style="list-style-type: none"> • Recycling reduces the need to extract raw materials from the environment • Biodiversity impacted

E-waste
Agbogbloshie, Ghana, Kenya = largest e-waste dump in Africa.

TEST YOURSELF

- What do you understand by the term 'consumerism' (2 marks)
- Explain why one biome that you have studied is being destroyed due to consumerism (4 marks)
- 'Destruction of ecosystems is necessary if global interdependence is to continue. How far do you agree with this statement?' (6 marks)
- Give two ways 'agribusiness negatively impacts the environment (4 marks)
- Explain why the disposal of waste impacts the environment (4 marks)
- Describe the long-term impacts of climate change on the UK (4 marks)
- How might people's lifestyles change in the future in a warmer world (4 marks)
- Explain how ecotourism can be an effective strategy in the sustainable management of tropical rainforests. (4 marks)
- Discuss the extent to which food production impacts the natural environment (6 marks)
- Explain if food miles are effective at looking the impact food production has on the environment (4 marks)
- 'The effects of climate change are greater on the environment than on people.' Do you agree with this statement? Justify your decision. (8 marks)

How can we respond to climate change?

Mitigation - reduce or prevent greenhouse gases.
Carbon Capture - capturing CO₂ released by industry or through burning fossil fuels and storing it safely underground.

Afforestation – 73 million trees in the Brazilian Amazon by 2023.

International Agreements – Paris Climate Agreement with the aim to keep increase in temperatures below 2°C.

Adaptation - Responds to the impact of climate change and tries to make populations less vulnerable.

Change in agriculture-

-Move location of farming

-Drought efficient crops

Manage water supply –

-Increase supply

- Water efficient devices

Reduce risk of sea level –

- Thames Barrier to stop water entering

- Build homes on stilts

Ecological Footprint –

The amount of land needed to support a person's lifestyle

- Water use
- Transport use
- Clothes use
- Energy use
- Space to get rid of our waste

Sanjiang Wetlands Project

When = 2005 a 10yr project to restore the wetlands, increase biodiversity and increase local incomes
Cost = \$30 million
What =10,090 hectares if trees have been planted. Farmers complete ecotourism and in curriculum at school
Successful = birds increase by 100,000 and 3,441 hectares of farmland have been converted back to wetland. Farmers earn up to 40x they did before.

Global interdependence -

Worldwide mutual dependence between countries. We rely on other countries to get our food delivered (40% of UK food is imported)



Food in Tropical Rainforest - Palm Oil:

Palm oil is in nearly everything – it's in close to 50% of the packaged products we find in supermarkets. 66 million tonnes of palm oil is used each year.

Borneo:

In 1985, 73% of Borneo was covered in rainforest. By 2005 only 50% was left. As the rainforest is cleared it is replaced with palm oil.

Advantages

- Lower production costs than other oilseed crops
- Less fertiliser and pesticides needed

Disadvantages

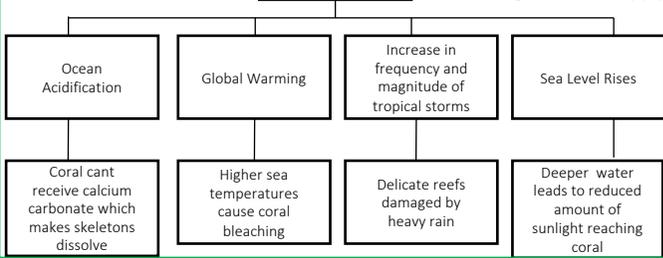
- Clearing land reduces biodiversity
- Jobs go to migrant workers
- Monoculture

Climate change in Australia–

Short term impacts include extreme weather events and coral impacts.

Climate Change in Coral Reefs

Longer term impacts include migration changes and changes in food supply



Sustainable Tourism –

Ethical Tourism = Needs of the locals are considered.
Responsible Travel = Local families benefit economically
Ecotourism = Tourism that has a very low environmental impact

Biological
Economic
improvement
Impact on culture
Increased environmental awareness:

Threats to culture
Relocation of locals
Ecosystem degradation
Jobs provided to locals

Food in Oceans -

Cod Fishing UK-

The EU manages fish stocks in Europe.
- Quota
- Limit on days fishing
Catching too many or small fish leads to fines so fish are often thrown back into the sea, even when they are dead. A minimum net size should also mean that small fish can swim out of the net to escape.

Bangladesh Shrimp farming:

Consumerism:

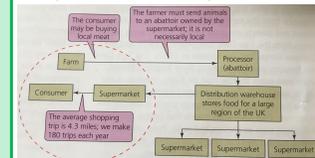
- In 2010, over 3 million tonnes of wild shrimp were by caught
- Fish, including shrimp, are the 2nd largest export for Bangladesh at a value of \$569 million in 2016.

Ecosystem:

- 25 million hectares of mangrove forest have been destroyed
- The mangrove is used as a natural flood defence

Food Miles

A measure of how far food has been transported to get from producer to consumer. Food grown in the UK is transported further now than it used to be due to the growth of large supermarket chains and their complex distribution systems.



MAP SKILLS

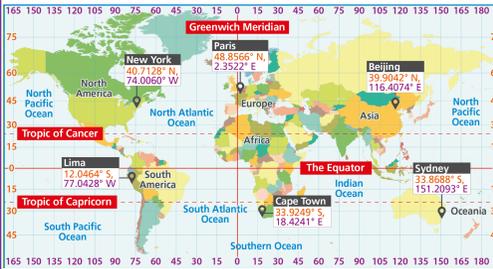


Longitude and Latitude –

Measures in degrees with latitude always written first.

Latitude = distance of a place north or south of the equator

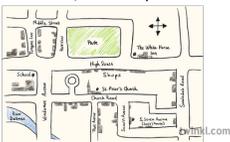
Longitude = distance of a place east or west of the Greenwich Meridian



Sketch Map –

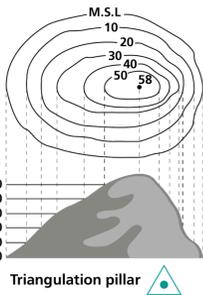
Drawn to produce a simplified version of an OS map

1. Divide your frame into grid squares and write your grid references as reference
2. Draw features from the map
3. Label and annotate the sketch
4. Include a scale, north point and title



Relief:

Contour lines join points of equal altitude. They are usually spaced 5 or 10 meter intervals. The closer the contour lines, the steeper the land.



A spot height shows the altitude of an exact spot on a map. It is represented as a black dot with its altitude next to it.

Proportional Symbol map –

Shapes of different sizes to represent different quantities. The larger the symbol the greater the quantity

1. Calculate the square root of each data point for your map.
2. Choose a maximum radius, e.g. 3 cm. This represents your largest data.

1. For each other data set use the following formula:
Radius = maximum radius x (square root of the value / square root of the largest value)



Dot map –

Uses dots to visually represent the data. Each dot represents a certain number of features. The more dots there are the more there is.



Scale –

Maps show an area reduced in size. This is measured using a scale, which is the ratio of a model to real life dimension.

- Explorer 1:25,000
- Landranger - 1:50,000
- Travel Maps - 1:125,000

This means that the map is 50,000 x smaller than real life.

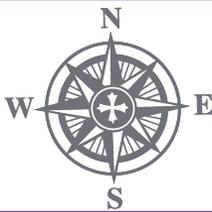
To work out scale – measure the distance with a ruler then multiply the measurement by the scale.



Direction –

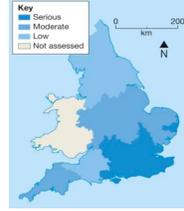
Shown by the four cardinal directions; north, south, east and west

Remember that if the location you are describing is between north and west then the compass direction is north west NOT west north.



Choropleth map –

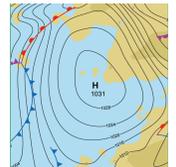
Visually shows patterns or variations across a geographic area. They use different shades of colour to represent ranges.



Isolines–

Isolines link areas to show a common value. Lines are often labelled to show their value

- Contour lines = join points of altitude
- Isobars = join points of atmospheric pressure



Map projection –

Mercator - the standard map for navigation.

Mercator maps are seen to give white nations a sense of supremacy over non-white.



Gall-peters/ Robinson/ Winkel-triple

ANY MAP SHOULD HAVE

- A title
- Key

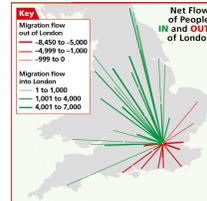


Common OS Map symbols

Roads	Railway	Boundaries	Natural Features	Other
M1 Motorway	Multiple track	National	Water	Building
A35 Dual carriageway	Single track	County	Mud	Places of worship
A30 Main road	Station	National park	Sand	Parking
B30 Secondary road			Woodland	Visitor centres

Desire Lines –

They are straight lines that show the flow of movement from one place to another. The thickness of the line varies to represent the volume of movement.



Flow Line map –

Show the volume of movement between places. The line is proportional in width to the volume of flow. Sometimes arrows can be put on to show flow of direction

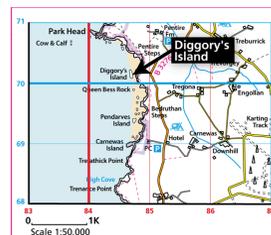


Grid References –

The numbers on the vertical lines are known as **eastings**. The numbers on the horizontal line are known as **northings**. Eastings are always written before northings when stating grid references.. You always read the grid reference from the bottom left hand corner.

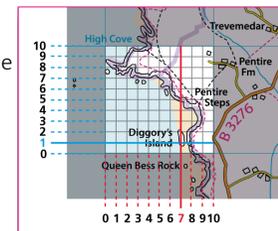
Four figure–

You are looking to find the box that the place is located in. 1. Always go along the corridor to get your easting 2. up the stairs to get northing 3. Where the two points meet in the bottom left hand corner that is your four figure grid reference.

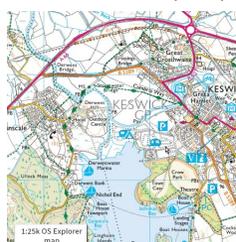


Six figure–

1. Find the four figure grid reference
2. Split the square into a 10x10 grid to work out the eastings and northings on that grid.
3. You add this value to your four figure grid reference.



Ordnance Survey Map:

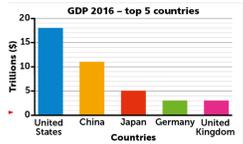


SKILLS



Bar Charts -

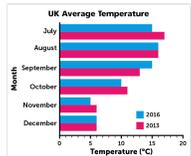
Used to display qualitative and categorical numerical data. It is represented by different size bar charts



Composite – displays proportions with each bar split into categories



Dual – Shows two sets of data for comparison



ANY GRAPH SHOULD HAVE

- A title
- all axis should be labelled

ALWAYS REMEMBER YOUR UNITS

Central tendency –
A single value that is representative of a whole set of data.

Mean – The average sum of values

$$\text{Mean} = \frac{\text{total sum of values}}{\text{number of values}}$$

Mode – Most common value

Median – Middle value

- Order values from smallest to biggest
- Cross one out at either end
- Continue doing so until reach central value

Range - Difference between the highest and lowest

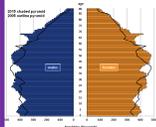
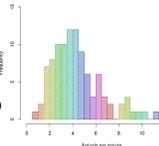
$$\text{Highest} - \text{lowest}$$

Interquartile range – shows the range of the values in the centre.

Lower quartile- upper quartile

Histogram –

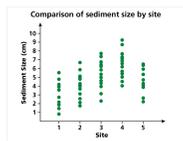
It looks like a bar chart and displays similar continuous data however, there are no gaps between the bars



Population Pyramid –

This shows the various age groups in a population based on gender.

Dispersion Diagrams –



Shows each data value plotted as an individual point against a set of variables or scale.



Selecting and adapting graphs:

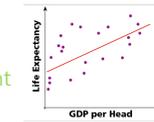
All data should be presented using the correct method. It should always have the following:

- Title and key
- Labelled axis with units of measurement
- Each axis starts at zero

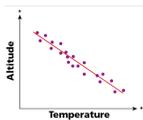
Type of data	Example	Suitable graphs	Justification
Discrete	Data that can be counted and put into categories (eg: shoe sizes)	Bar charts	Each category is different so needs to be represented using a separate bar
Continuous	Data that can be measured (eg: height)	Line graphs	Values are numerical and vary continuously so a line is best to show continuous changes
Percentage	Discrete data where we are interested in a proportion (eg: percentage of people working in different industries)	Pie chart	Visual representation of data so it is useful to make comparisons
Pairs of data	Data where one variable varies in relation to another (eg: wind speed and altitude)	Scatter graphs	Shows a visual correlation between two sets of data

Scatter Graphs –

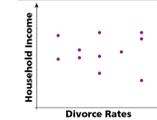
Shows how closely two sets of data are related through a correlation



Positive Correlation –
When plotted points go upward from left to right



Negative Correlation –
When plotted points go downward from left to right.



No Correlation –
The points are random on the graph

Line of best fit – Drawn through the centre of the data points. When the points are plotted close to the line there is a close correlation. When they are spread out on either side of the line, there is moderate correlation.

Line Graph -

Used to display continuous data and help show trends or changes over time. It is plotted as a series of points that are joined up with straight lines.

Pictogram –

Uses pictures to represent the data. All pictures must be the same and be worth a value

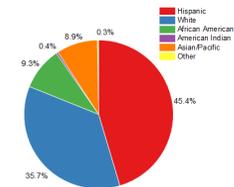
Country	Frequency
Canada	29
China	126
France	39
Germany	27
India	94
Pakistan	26
Russia	60
USA	55

🇺🇸 = 20 million tonnes

Pie Chart –

A circular chart that is split into sections to show proportion.

- Work out the total of all your data
- Divide this total by 360 to get your proportion
- To calculate the angle for each data, multiply your frequency by the answer to step 2.
- Use a protractor to draw each angle onto your pie chart



Percentages are used to express how large or small one quantity is relative to another.

Calculating a % -

- Divide the figure by the total value
- Multiply the answer by 100

Calculating % change –

$$\% \text{ change} = \frac{\text{difference between original value}}{\text{Original value}} \times 100$$

Calculate the % of an amount -

$$\times 100$$

$$\% \text{ increase} = \frac{\text{increase}}{\text{Original number}} \times 100 \quad \% \text{ decrease} = \frac{\text{decrease}}{\text{Original number}} \times 100$$