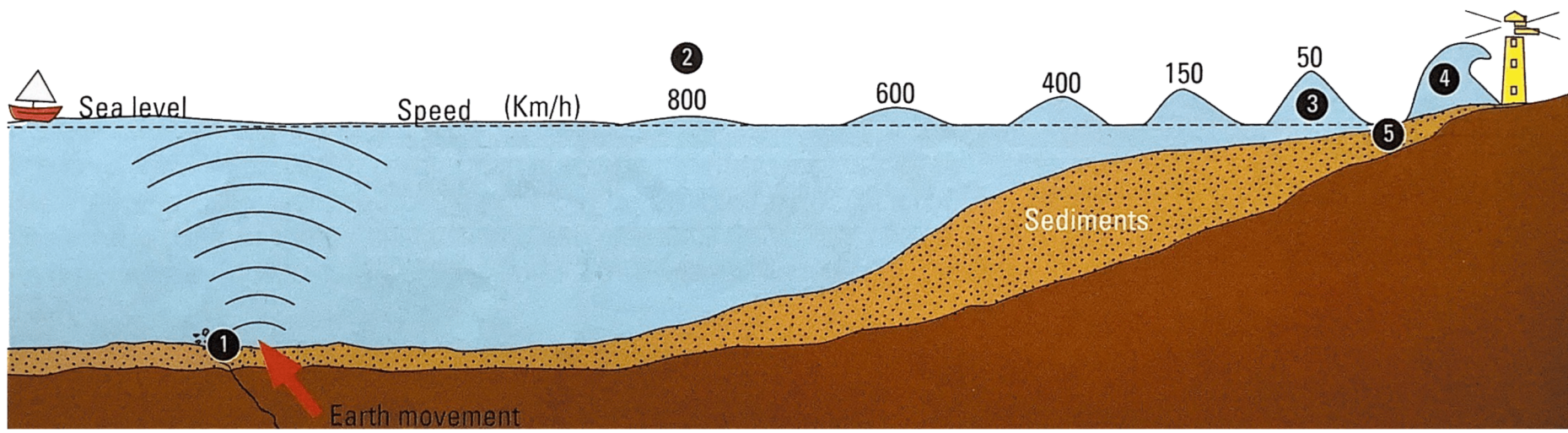


Point	Explain	Example	Link
Tsunamis	It is an unusually <u>large</u> sea which may be formed due to an explosive underwater <u>volcanic eruption</u> .	The <u>2004 9.2</u> magnitude <u>North Sumatra</u> earthquake caused damages to coastal communities in <u>12</u> countries.	Tsunamis can travel long distances and cause widespread destruction at coastal areas when it sweeps inland.
	<div><div><div>1</div><div>Seismic energy from an offshore earthquake forces out a mass of sea water</div></div><div><div>2</div><div>Starting height: < 1 m wave length: 100-150 km speed: 800 km/h</div></div><div><div>3</div><div>Shallower water → greater friction → slows the waves → increase in height</div></div><div><div>4</div><div>Point of impact on the coast → speed: 30-50 km/h height: 15 m</div></div><div><div>5</div><div>Movement of sea floor → causes a void → water rushes to fill in → water is then forced out again → tsunami</div></div></div>		
Disruption of Service	Earthquake vibrations <u>snap pipes</u> and <u>break cables</u> , causing the outbreak of <u>fires</u> .	The earthquake in <u>Kobe, Japan</u> , in <u>1995</u> damaged pipes and transmission lines.	Over a large area, supply of electricity, gas and water are disrupted , leading to a temporary decline in many people's standard of living.
Landslides	Earthquake vibrations <u>weaken slopes</u> of hills and mountains, resulting in landslides. When there is <u>heavy rainfall</u> , the soil becomes saturated, causing the mixed soil debris to flow down the slope.	In <u>1970</u> , an earthquake off the coast of <u>Peru</u> destabilised the slopes of <u>Mount Huascarán</u> , triggering a massive landslide.	Many people will be unable to survive the disaster, thus leading to a high death toll.
Destruction of Properties and Infrastructure	Earthquakes can cause <u>widespread</u> destruction to many homes and <u>cracks</u> to form in roads and bridges.	The earthquake in <u>Tōhoku, Japan</u> , in <u>2011</u> , forced hundreds of thousands of people from their homes, while many roads were damaged.	There will be a severe shortage of housing while transportation is severely disrupted , leading to decreased accessibility. Large amounts of resources would have to be spent on repair works, putting a strain on the government's limited budget.
Loss of Lives	Hazards associated with living in earthquake zones can cause <u>great</u> destruction when an earthquake occurs, <u>threatening</u> the lives of those living there.	<u>28,000</u> people died when the <u>9.0</u> magnitude <u>2011</u> earthquake in <u>Tōhoku, Japan</u> resulted in powerful tsunamis.	When people are unprepared and did not take necessary precautionary measures to minimise damage, there will be loss of lives when an earthquake occurs.

Point	Explain	Example	Link
Massive Destruction by Volcanic Materials	<ul style="list-style-type: none">• <u>Volcanic materials</u> such as lava and pyroclasts are released.• Low-silica lava moves <u>rapidly</u> and flows over <u>long</u> distances.• Volcanic bombs of <u>heated</u> rocks can fall in surrounding areas.	The ongoing eruption of <u>Kilauea</u> in <u>Hawaii</u> since <u>1983</u> has destroyed many homes and highways.	Volcanic materials can lead to widespread damages of property and threaten the lives of those living near volcanic areas.
Landslides and Lahars	<ul style="list-style-type: none">• Due to the structural <u>collapse</u> of a volcanic cone, rock fragments can fall from the volcano (landslides).• Landslides can generate flows of <u>wet</u> volcanic debris (lahars) when pyroclasts mixes with water from melted ice or lakes.	The eruption of <u>Mount St. Helens, USA</u> in <u>1980</u> led to a landslide that was saturated with water, thus forming many lahars.	Landslides and lahars obstruct the flow of rivers, causing floods. Roads may be blocked and rescue efforts are hampered. This leads to the loss of lives.
Pollution	<ul style="list-style-type: none">• Volcanic eruptions eject thick plumes of <u>ash</u> and release harmful <u>gases</u> such as sulfur dioxide.• The fine ash particles can be carried by wind over <u>large</u> distances.	The <u>2010</u> eruption of <u>Eyjafjallajökull</u> in <u>Iceland</u> resulted in a <u>closure</u> of air space over much of <u>Europe</u> as ash particles posed a serious danger to aircraft engines and structures.	Human activities are disrupted , thus affecting the economy of the affected area, while people living near volcanic areas will suffer from severe respiratory problems.

IMPACTS OF TECTONIC HAZARDS

Extent of Earthquake

B

Point	Explain	Example	Link
Magnitude of Earthquake	It is the amount of energy released by earthquakes, measured using the <u>Richter Scale</u> . For <u>each increasing magnitude</u> on the Richter Scale, the impact of earthquake becomes <u>10 times greater</u> .	The earthquake in <u>Valdivia, Chile</u> , in <u>1960</u> , measured at the record high of <u>9.5</u> on the Richter Scale. The destruction impacted <u>thousand</u> of kilometres of land.	Greater magnitudes cause more extensive damage and destruction due to the release of more energy.
Population Density	Earthquakes in <u>sparsely populated</u> areas are likely to affect <u>fewer</u> people than in <u>densely populated</u> areas.	Due to its <u>low</u> population density, the <u>Solomon Islands</u> experience <u>low</u> earthquake damage.	Lower population density results in less casualties and damages as there are less people living in the affected area.
Level of Preparedness	Preparation includes having <u>evacuation plans</u> , <u>trained rescue workers</u> and a range of <u>action plans</u> .	Every year since <u>1960</u> , <u>Japan</u> conducts <u>emergency drills</u> on <u>1 September</u> to commemorate Disaster Prevention Day.	When people are better prepared, they can respond more quickly and efficiently , thus managing the damage caused by earthquakes better .
Distance from Epicentre	The <u>closer</u> an area is to the epicentre, the <u>stronger</u> the shock waves, thus <u>more buildings</u> will topple, causing <u>more extensive</u> damages.	<u>Christchurch</u> suffered more damage during the <u>2011 earthquake</u> than places <u>further away</u> from the epicentre.	Places nearer to the epicentre will experience earthquakes of greater magnitudes, leading to more extensive damages.
Time of Occurrence	It affects the people's <u>chances of survival</u> in an earthquake by determining <u>where</u> people are and <u>what</u> they are doing.	<u>2,400</u> people died when an earthquake occurred around <u>midnight</u> in the <u>Sun Moon lake Region</u> in <u>Taiwan</u> in <u>1999</u> .	When earthquakes occur when most people are sleeping , they will be more likely to be trapped, resulting in more casualties.
Type of Soil	Structures built on <u>saturated</u> and <u>unconsolidated</u> sediments are affected by <u>liquefaction</u> , when the ground becomes <u>unstable</u> and saturated soil flows like a <u>liquid</u> .	In <u>Christchurch</u> , many houses and buildings had to be abandoned due to <u>liquefaction</u> after the <u>2011</u> earthquake.	Saturated and unconsolidated sediments amplify seismic waves, resulting in greater earthquake damages.

Volcanic Areas

Point	Explain	Example	Link
Fertile Soil	Lava and ash from volcanic eruptions <u>break down</u> to form fertile volcanic soil, which are <u>rich</u> in minerals.	The volcanic soils of <u>Java</u> and <u>Bali</u> in <u>Indonesia</u> support the cultivation of crops.	People can farm for crops for subsistence or commercial farming to improve their standard of living.
Precious Stones and Minerals	When the <u>upper</u> layers of volcanic rocks are <u>eroded</u> , precious stones and minerals can be <u>extracted</u> .	Old volcanic rocks at <u>Kimberley</u> in <u>South Africa</u> are one of the world's richest sources of <u>diamond</u> .	Precious stones and minerals are high in demand due to their industrial and scientific uses. Thus, people can mine them to make money .
Tourism	<ul style="list-style-type: none">• Volcanic areas offer a variety of <u>activities</u> for tourists to engage in, such as hiking and camping.• People visit volcanic areas to learn more about their <u>rich history</u>.	<u>Every year</u> , <u>3 million</u> people visit the <u>ruins of Pompeii</u> in <u>Italy</u> .	Companies can profit from the tourism and create more employment opportunities. This improves the standard of living as well as boosting the economy.
Geothermal Energy	Groundwater comes into <u>contact</u> with hot rocks beneath the surface → <u>heats up</u> → erupts as <u>steam</u> → drive <u>turbines</u> → produce <u>electricity</u> .	Over <u>70%</u> of homes in <u>Iceland</u> are heated by volcanic steam.	Harnessing the energy provided by volcanoes increases convenience and improves the welfare of people.

Risks

Benefits

RESPONSES TO EARTHQUAKES

