

## Paper 1: Physical geography mark scheme

| Question number | Answer                                                                      | Mark       |
|-----------------|-----------------------------------------------------------------------------|------------|
| <b>1(a)</b>     | <b>AO1 (1 mark)</b><br>C Movement of water through the rocks below the soil | <b>(1)</b> |

| Question number | Answer                            | Mark       |
|-----------------|-----------------------------------|------------|
| <b>1(b)(i)</b>  | <b>AO1 (1 mark)</b><br>B Abrasion | <b>(1)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                | Mark       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>1(b)(ii)</b> | <b>AO1 (1 mark)</b><br>Award 1 mark for any of the following. <ul style="list-style-type: none"> <li>• Climate/temperature/rainfall (1).</li> <li>• Slope/gradient (1).</li> <li>• Geology/resistance of rocks (1).</li> <li>• Altitude (1).</li> <li>• Aspect (1).</li> <li>• Velocity/energy (1).</li> </ul> Accept any other appropriate response. | <b>(1)</b> |

| Question number  | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Mark       |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>1(b)(iii)</b> | <b>AO1 (1 mark)/AO2 (1 mark)</b><br>Award 1 mark (AO1) for a point about physical weathering and 1 mark (AO2) for further explanation, up to a maximum of 2 marks. <ul style="list-style-type: none"> <li>• Rocks on the valley side expand when hot and contract when cold (1). If a rock is heated and cooled many times, this can result in cracks forming and/or pieces of rock breaking off (1).</li> <li>• The wind can blow tiny grains of sand against a rock (1), which can result in the rock wearing away (1).</li> <li>• When water gets into rocks in the river valley and freezes, it expands (1), which can result in it pushing the crack further apart until it breaks the rock (1).</li> </ul> Accept any other appropriate response. | <b>(2)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Mark       |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>1(c)</b>     | <p style="text-align: center;"><b>AO2 (2 marks)/AO3 (2 marks)</b></p> <p>Award 1 mark (AO2) for a factor that may have led to this river regime and a further 1 mark (AO3) for its impact on the river regime shown on Figure 1a, up to a maximum of 2 marks each.</p> <ul style="list-style-type: none"> <li>Discharge is much lower in the period May/June to October as rainfall is normally lower than at other times of the year (1). This means that there will be less surface run-off into the river (1).</li> <li>Discharge is much lower in the period May/June to October because there might be higher temperatures (1). This means that more of the water in the river is evaporated (1).</li> <li>Discharge is higher in the period November to April because there might be less vegetation growing in the area at that time of year (1). This reduces the amount of interception (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(4)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Mark       |
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| <b>1(d)</b>     | <p style="text-align: center;"><b>AO2 (3 marks)</b></p> <p>Award 1 mark for identification of an impact and 2 marks for development and further explanation, up to a maximum of 3 marks.</p> <ul style="list-style-type: none"> <li>In villages in the developing world, people have many uses for river water (1), e.g. washing bodies/washing pots/disposing of human waste (1). This means that people in the next village will have to drink this polluted water (1).</li> <li>Smoke from chimneys/cars can contain harmful chemicals (1), such as those which create acid rain (1). These can find their way into the water supply via surface run-off/throughflow/groundwater flow (1).</li> <li>Farmers spray chemicals onto fields and crops to maximise yields (1), such as pesticides to kill insects (1), which can soak into the soil/get washed into the river when it rains (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(3)</b> |

| Question number | Answer                                                                                                                                                    | Mark       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>1(e)</b>     | <p style="text-align: center;"><b>AO3 (1 mark)</b></p> <p>Award 1 mark for the following.</p> <ul style="list-style-type: none"> <li>Levee (1)</li> </ul> | <b>(1)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Mark       |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1(f)            | <p style="text-align: center;"><b>A01 (1 mark)/A02 (3 marks)</b></p> <p>Award 1 mark for initial point (A01), and 3 further marks (A02) for the extension of this point up to maximum of 4 marks.</p> <ul style="list-style-type: none"> <li>Waterfalls occur where a band of hard rock overlies a softer rock (1). This softer rock is eroded more quickly than the harder rock (1) and, over time, this creates an overhang of hard rock (1). This overhang is unsupported so it collapses (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(4)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1(g)            | <p style="text-align: center;"><b>A03 (4 marks)/A04 (4 marks)</b></p> <p><b>Marking instructions</b></p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p><b>Indicative content guidance</b></p> <p>The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p><b>A03</b></p> <ul style="list-style-type: none"> <li>Different types of geology have different effects on the rates of infiltration and run-off into a river following a rainfall event.</li> <li>Permeable rocks and soils (such as limestone) absorb water/allow water to pass through easily, so surface run-off is rare because a greater amount of infiltration takes place.</li> <li>Impermeable rock and soils (such as shales) are more closely packed. Rainwater cannot infiltrate so water reaches the river more quickly via surface run-off/overland flow.</li> <li>In rural areas, land use can affect infiltration rates and, therefore, the hydrograph for a river.</li> <li>Areas of woodland and forest will have higher interception rates than areas of arable or pastoral farming. This increased interception will increase the time it takes for the rainfall to reach the river, increasing lag times and reducing the steepness of the rising and receding limbs on a hydrograph.</li> <li>Areas of little vegetation or deforestation will mean that there is less interception and the rain reaches the ground faster. The ground is likely to become saturated and surface run-off will increase.</li> </ul> |

| <p><b>AO4</b></p> <ul style="list-style-type: none"> <li>Figure 1d shows that river Q is located in an area of permeable rock. Also, Figure 1c shows that it has a larger lag time and a low peak discharge of just over 20 cumecs.</li> <li>Figure 1d shows that rivers P and R are on impermeable rock. This is supported by the steep rising limbs and shorter lag times for these rivers in Figure 1c.</li> <li>Figure 1d shows that rivers P and R are located in areas of the same geology (impermeable rock), but the two rivers are located in areas of different vegetation.</li> <li>As river P has the 'flashier' hydrograph (Figure 1c), it is concluded that in this area, geology is having a greater impact on a river's discharge compared to types of vegetation.</li> </ul> |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Mark       | Descriptor                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>0</b>   | No rewardable material.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Level 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>1–3</b> | <ul style="list-style-type: none"> <li>Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3)</li> <li>Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)</li> </ul> |
| <b>Level 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>4–6</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)</li> <li>Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)</li> </ul>      |
| <b>Level 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>7–8</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)</li> <li>Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)</li> </ul>               |

| Question number | Answer                                         | Mark       |
|-----------------|------------------------------------------------|------------|
| <b>2(a)</b>     | <b>AO1 (1 mark)</b><br>B Beach nourishment (1) | <b>(1)</b> |

| Question number | Answer                                        | Mark       |
|-----------------|-----------------------------------------------|------------|
| <b>2(b)(i)</b>  | <b>AO1 (1 mark)</b><br>A Hydraulic action (1) | <b>(1)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                            | Mark       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>2(b)(ii)</b> | <b>AO1 (1 mark)</b><br>Award 1 mark for any of the following. <ul style="list-style-type: none"> <li>• Sliding (1).</li> <li>• Slumping (1).</li> <li>• Rotational slip (1).</li> <li>• Rock fall (1).</li> <li>• Mud flow (1).</li> </ul> Accept any other appropriate response. | <b>(1)</b> |

| Question number  | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Mark       |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>2(b)(iii)</b> | <b>AO1 (1 mark)/AO2 (1 mark)</b><br>Award 1 mark (AO1) for a point about biological weathering and 1 mark (AO2) for further explanation, up to a maximum of 2 marks. <ul style="list-style-type: none"> <li>• Animals burrow into cracks (1) and, over time, this widens the cracks, causing the rocks to break apart (1).</li> <li>• Algae/lichens/bacteria/mosses often grow on rock surfaces (1) and produce weak acids that can convert some of the minerals to clay (1).</li> <li>• Weeds/plant roots can get into cracks of rocks and grow from there (1). As the plant grows bigger, the roots grow bigger and deeper, which widen the cracks and splits up the rock (1).</li> </ul> | <b>(2)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Mark       |
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| 2(c)            | <p style="text-align: center;"><b>A02 (2 marks)/A03 (2 marks)</b></p> <p>Award 1 mark (A02) for a factor that could affect the rate of retreat and a further mark (A03) for its impact on the coastline, shown on Figure 2a, up to a maximum of 2 marks each.</p> <ul style="list-style-type: none"> <li>Coastal retreat is generally higher in the south because waves could be stronger there (1), possibly because areas in the north are protected by Flamborough Head (1).</li> <li>Coastal retreat is generally higher in the south because the geology/rocks might be less resistant than those further north (1), which means that they will be eroded more quickly by the waves (1).</li> <li>Variations in coastal retreat are possibly the result of different amounts of coastal management (1), which could increase or decrease coastal processes/longshore drift (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(4)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Mark       |
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| 2(d)            | <p style="text-align: center;"><b>A02 (3 marks)</b></p> <p>Award 1 mark for identification of a cause and 2 marks for development through further explanation, up to a maximum of 3 marks.</p> <ul style="list-style-type: none"> <li>There has been a sudden rise in sea level (1) caused by a storm surge/very strong winds (1), which push the water on an ocean's surface on top of more water (1).</li> <li>Rising sea levels (1) due to climate change/isostatic rebound (1) will mean that more low-lying areas are vulnerable (1).</li> <li>An area can flood if there is a tsunami (1) resulting from an earthquake/volcanic eruption/meteor impact (1), which causes a major displacement of water in the ocean and, consequentially, coastal flooding (1).</li> <li>Some coastal settlements have developed on reclaimed land (1), which is characteristically low-lying and flat (1), so a small rise in sea level from a mild storm surge is enough to flood it and cause extensive damage (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(3)</b> |

| Question number | Answer                                                                                                                                                                | Mark       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 2(e)            | <p style="text-align: center;"><b>A03 (1 mark)</b></p> <p>Award 1 mark for the following.</p> <ul style="list-style-type: none"> <li>Wave-cut platform (1)</li> </ul> | <b>(1)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Mark       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 2(f)            | <p style="text-align: center;"><b>A01 (1 mark)/A02 (3 marks)</b></p> <p>Award 1 mark for initial point (A01), and 3 further marks (A02) for the extension of this point up to maximum of 4 marks.</p> <ul style="list-style-type: none"> <li>A spit develops where there is a sudden change in the shape of the coastline (1), such as at a headland/river estuary (1). Longshore drift deposits material away from the coastline (1) and continues to do so in this direction, leading to the growth of a spit (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(4)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| 2(g)            | <p style="text-align: center;"><b>A03 (4 marks)/A04 (4 marks)</b></p> <p><b>Marking instructions</b><br/>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p><b>Indicative content guidance</b><br/>The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p><b>A03</b></p> <ul style="list-style-type: none"> <li>• Natural landward migration of a coastal ecosystem may result from a rise in sea level, extreme weather and particularly high spring tides.</li> <li>• Mangrove forests are often cleared to make room for agricultural land, human settlements and infrastructure, such as a harbour. More recently, mangroves have been cleared for tourist developments, shrimp aquaculture and salt farms.</li> <li>• Trees in coastal ecosystems are cut down for a range of different reasons, such as for firewood, construction wood, woodchip and pulp production, charcoal production and animal fodder.</li> <li>• In some coastal areas, afforestation and replanting programmes are replacing those trees that have been cut down but, in some parts of the world, it is no longer sustainable, threatening the biodiversity of the ecosystem.</li> <li>• Dams and irrigation systems can reduce the amount of water in some coastal ecosystems, changing the salinity level of water in the area. If salinity becomes too high, several animal and plant species may not be able to survive and biodiversity falls. In addition, increased erosion due to land deforestation can massively increase the amount of sediment in rivers.</li> <li>• A growing use of chemical fertilisers, pesticides, and other toxic man-made chemicals carried by river systems from sources upstream, can kill animals living in mangrove forests, while oil pollution can smother mangrove roots and suffocate the trees.</li> </ul> <p><b>A04</b></p> <ul style="list-style-type: none"> <li>• Figure 2c shows the natural landward migration of mangrove and the negative impact of building a sea defence, such as a sea wall. The sea wall, while protecting some areas from a rise in sea level, has prevented further landward migration.</li> <li>• Figure 2d shows an example of planning for the development of tourism, as some countries are in the process of doing. Despite some of the mangrove ecosystem remaining, much of it may be cut down to make way for new infrastructure.</li> <li>• Figure 2e shows how the growth in shrimp production in Thailand, Vietnam and Indonesia has a negative relationship with the size of the mangrove forest in these countries.</li> </ul> |

| Level          | Mark       | Descriptor                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <b>0</b>   | No rewardable material.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Level 1</b> | <b>1–3</b> | <ul style="list-style-type: none"> <li>Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3)</li> <li>Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)</li> </ul> |
| <b>Level 2</b> | <b>4–6</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)</li> <li>Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)</li> </ul>      |
| <b>Level 3</b> | <b>7–8</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)</li> <li>Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)</li> </ul>               |

| Question number | Answer                                  | Mark       |
|-----------------|-----------------------------------------|------------|
| <b>3(a)</b>     | <b>AO1 (1 mark)</b><br>D Earthquake (1) | <b>(1)</b> |

| Question number | Answer                                                                   | Mark       |
|-----------------|--------------------------------------------------------------------------|------------|
| <b>3(b)</b>     | <b>AO1 (1 mark)</b><br>B There is a plume of magma below the surface (1) | <b>(1)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                        | Mark       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>3(c)(i)</b>  | <p style="text-align: center;"><b>AO1 (1 mark)</b></p> <p>Award 1 mark for any of the following:</p> <ul style="list-style-type: none"> <li>• Training/educating people (1).</li> <li>• Emergency drills (1)</li> <li>• Availability of emergency kits (1).</li> <li>• Earthquake-proof building design (1)</li> <li>• Roads and bridges specially strengthened (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(1)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Mark       |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>3(c)(ii)</b> | <p style="text-align: center;"><b>AO1 (1 mark)/AO2 (1 mark)</b></p> <p>Award 1 mark for identification of a reason and a further mark for an explanation of the reason, up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> <li>• Management / security of local water supplies (1) so that sanitation conditions are improved (1).</li> <li>• Use of emergency aid to help people with injuries (1) which means that treatment of people should save lives (1).</li> <li>• NGOs donating food / shelter to affected people (1) so that they are protected from exposure and weather conditions (1).</li> <li>• Burying any dead who suffered from the collapse of buildings (1) to stop the spread of diseases (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(2)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Mark       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 3(d)            | <p style="text-align: center;"><b>AO2 (2 marks)/AO3 (2 marks)</b></p> <p>Award 1 mark (AO3) for identification of an idea from the data in Figure 3a and a further mark for an explanation of the reason (AO2), up to a maximum of 2 marks each:</p> <ul style="list-style-type: none"> <li>Countries with HHD have the most significant proportion of people affected (56,774,000) (1) because they have higher vulnerability due to a greater number of cities that can be affected by earthquakes (1).</li> <li>Asia and Americas have the greatest numbers of people affected compared to other regions (1). This may be due to the larger numbers of people living there (1).</li> <li>Places with VHHD have the lowest numbers of people affected (1) as they may have best earthquake warning systems / largest number of earthquake-proof buildings reducing injury (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(4)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Mark       |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 3(e)            | <p style="text-align: center;"><b>AO2 (3 marks)</b></p> <p>Award 1 mark for identification of an impact and 2 marks for development through further explanation, up to a maximum of 3 marks.</p> <ul style="list-style-type: none"> <li>People can be killed by pyroclastic flows (1) as they travel so fast that people cannot outrun them (1) and so they are burnt to death or choke to death (1).</li> <li>Pyroclastic flows damage/destroy buildings, roads, crops, stock (animals) and woods (1), which could lead to the long-term evacuation of an area (1) and, therefore, to a decline in the local economy (1).</li> <li>Mudflows (lahars) often cause a lot of damage to the environment (1) as a result of the boulders/logs carried within them crushing everything in their path (1). People caught in the path of a lahar have a high risk of death from severe crush injuries, drowning or asphyxiation (1).</li> <li>Lava flows burn or bury everything they come across (1). They may also start fires, which are a lot more dangerous for the environment around the volcano (1), and kill more people than the lava flow itself (1).</li> <li>Ash falls can cause houses and buildings to collapse (1). People and animals may die due to a lack of oxygen (1). Huge problems are created for the aviation industry (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(3)</b> |

| Question number | Answer                                                                                                                                                                                                                                | Mark       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 3(f)            | <p style="text-align: center;"><b>A03 (1 mark)</b></p> <p>Award 1 mark for any of the following.</p> <ul style="list-style-type: none"> <li>Fertile soils/high crop yield/growing crops (1)</li> <li>Beautiful scenery (1)</li> </ul> | <b>(1)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Mark       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 3(g)            | <p style="text-align: center;"><b>A01 (1 mark)/A02 (3 marks)</b></p> <p>Award 1 mark for initial point (A01), and 3 further marks (A02) for the extension of this point up to maximum of 4 marks.</p> <ul style="list-style-type: none"> <li>Two tectonic plates move/converge together (1). The denser plate is subducted/pushed under and sinks into the mantle (1) where it melts due to the intense friction/pressure/heat (1). Some of this molten material can erupt through the surface as a volcano (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(4)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3(h)            | <p style="text-align: center;"><b>A03 (4 marks)/A04 (4 marks)</b></p> <p><b>Marking instructions</b></p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p><b>Indicative content guidance</b></p> <p>The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p><b>A03</b></p> <ul style="list-style-type: none"> <li>Some countries in the world that experience earthquakes have a high level of economic development so can afford to spend more money on improving the country's infrastructure, e.g. earthquake-proof buildings, warning systems and rescue services, than countries at a lower level of development.</li> <li>Countries that, with effective warning systems, rescue services, medical services, education systems and building design, tend to have less damage from an earthquake.</li> <li>Countries that are less economically developed cannot afford to spend as much money to protect themselves from earthquakes, so it is likely that these areas will have a higher death toll, even if the magnitude of an earthquake is the same as the magnitude in a more-developed country.</li> </ul> |

- More-developed countries can afford to spend money on prediction methods, such as GPS satellite (when data is sent from satellites to computers with information such as plate movement and changes in the earth's surface). In the developing world, communication systems may be underdeveloped, so the population may not be well educated about what to do in the event of an earthquake.
- Construction standards tend to be poorer in less-developed countries. Homes and other buildings suffer serious direct damage when the disaster occurs. Buildings collapsing result in high death tolls. Evacuation and other emergency plans are also difficult to put into action due to limited funds and insufficient resources. Clearing up can be difficult. There may not be enough money to rebuild homes quickly and safely, which leads to many people being forced to live in emergency housing or refugee camps – which can increase the death toll.

#### **AO4**

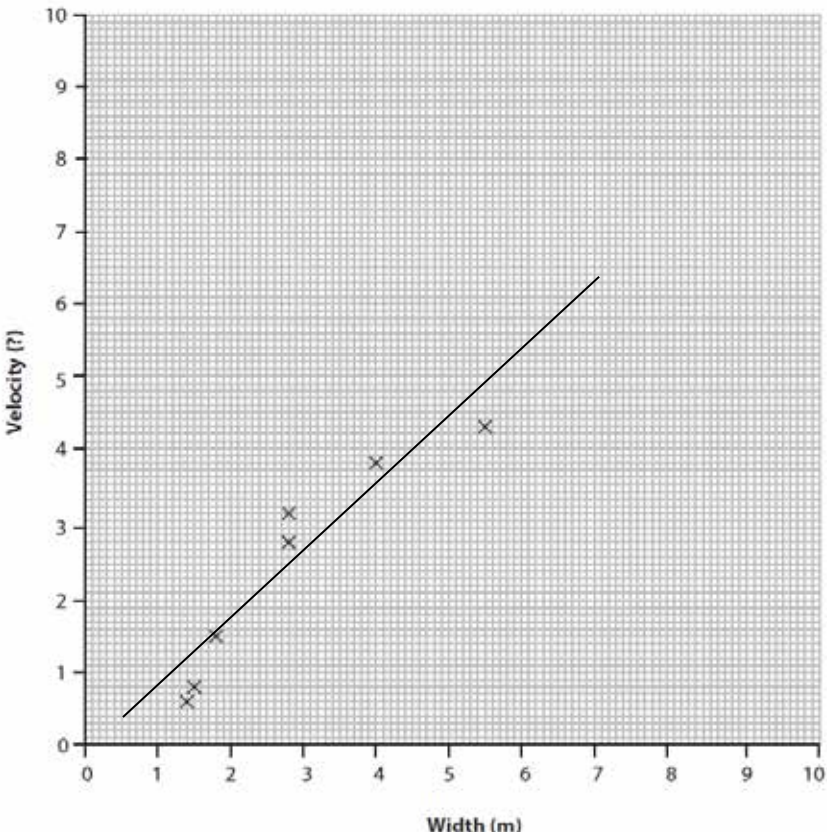
- Figure 3c shows that the earthquake in China had a much larger magnitude (7.9) compared with Haiti (7.0). Italy's earthquake had the smallest magnitude (6.3) and the lowest number of deaths (295). This suggests that there might be a relationship between magnitude and deaths.
- Figure 3c shows that, despite having a smaller magnitude than China, the earthquake in Haiti led to the largest number of deaths (230 000) – more than double that experienced in China (87 476).
- Figure 3c shows that Italy's earthquake had both the smallest amplitude and magnitude, whereas China had both the largest amplitude and magnitude.
- Figure 3c shows many collapsed buildings, with almost total devastation in Haiti and China as a result of the earthquakes. On the other hand, the photograph for Italy does show some buildings still standing and rescue services on the scene, which may explain the smaller number of deaths in that region.
- Figure 3c shows that Italy has the highest GDP per capita, which could be used to explain why it had so few deaths from the earthquake. China has a higher GDP per capita than Haiti, which might explain why, despite a large earthquake, there were fewer deaths.

| Level          | Mark       | Descriptor                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <b>0</b>   | No rewardable material.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Level 1</b> | <b>1–3</b> | <ul style="list-style-type: none"> <li>Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements that are supported by limited evidence. (AO3)</li> <li>Uses some geographical skills to obtain information with limited relevance and accuracy, which supports few aspects of the argument. (AO4)</li> </ul> |
| <b>Level 2</b> | <b>4–6</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)</li> <li>Uses geographical skills to obtain accurate information that supports some aspects of the argument. (AO4)</li> </ul>      |
| <b>Level 3</b> | <b>7–8</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)</li> <li>Uses geographical skills to obtain accurate information that supports all aspects of the argument. (AO4)</li> </ul>               |

| Question number | Answer                                  | Mark |
|-----------------|-----------------------------------------|------|
| 4(a)(i)         | <b>A03 (1 mark)</b><br>B        m/s (1) | (1)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                     | Mark |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 4(a)(ii)        | <b>A04 (2 marks)</b><br>Working to show the correct addition of the total width:<br>$1.4 + 1.5 + 1.8 + 2.1 + 2.8 + 2.8 + 3.5 + 4.0 + 5.5 = 25.4$ (1)<br>The division of this number by 9, the total number of sampling sites, arriving at a mean, to one decimal place, of 2.8 (1).<br>Maximum of 1 mark for correct answer but no working shown.<br>Accept any other appropriate working. | (2)  |

| Question number | Answer                                                      | Mark |
|-----------------|-------------------------------------------------------------|------|
| 4(a)(iii)       | <b>A04 (2 marks)</b><br>Award 1 mark for each correct plot. | (2)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                  | Mark       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 4(a)(iv)        | <p style="text-align: center;"><b>A04 (1 mark)</b></p> <p>Award 1 mark for an accurate line of best fit that shows that width increases with velocity.</p> <p style="text-align: center;">Channel variable (units)</p>  <p style="text-align: center;">Width (m)</p> | <b>(1)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Mark       |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 4(a)(v)         | <p style="text-align: center;"><b>A03 (2 marks)</b></p> <p>Award 1 mark for a reason for the relationship and a further 1 mark through description or explanation, up to a maximum of 2 marks.</p> <ul style="list-style-type: none"> <li>• An increase in velocity will cause more (hydraulic) erosion (1), which will cause the channel to widen (1).</li> <li>• Wider rivers could have a larger hydraulic radius (1), which means that there is less friction, increasing velocity (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(2)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Mark |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 4(b)            | <p style="text-align: center;"><b>A03 (4 marks)</b></p> <p>Award 1 mark for an advantage of systematic sampling and a further 1 mark for an explanation of this advantage, up to a maximum of 2 marks.</p> <p>Award 1 mark for a disadvantage of systematic sampling and a further 1 mark for an explanation of this disadvantage, up to a maximum of 2 marks.</p> <p>Advantages:</p> <ul style="list-style-type: none"> <li>• it is more straightforward than random sampling (1) as a random sampling grid doesn't necessarily have to be used as sampling, it just has to be at uniform intervals (1)</li> <li>• sampling sites are an equal distance apart along the stretch of the river (1), which means that good coverage of the river can be more easily achieved than using random sampling (1)</li> <li>• sample sites are an equal distance apart (1), which ensures that no part of the river is under- or over-sampled (1).</li> </ul> <p>Disadvantages:</p> <ul style="list-style-type: none"> <li>• this systematic sampling strategy is more biased than random sampling (1) as not all parts of the river have an equal chance of being selected (1)</li> <li>• this systematic sampling strategy doesn't use existing information (1), which means that it might lead to under- or over-representation of a particular pattern (1)</li> <li>• significant changes along the river might be missed (1), which might skew the results/give a slightly biased representation (1).</li> </ul> <p>Accept any other appropriate response.</p> | (4)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4(c)            | <p style="text-align: center;"><b>A03 (4 marks)/A04 (4 marks)</b></p> <p><b>Marking instructions</b></p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p><b>Indicative content guidance</b></p> <p>The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p><b>A03</b></p> <ul style="list-style-type: none"> <li>• Accuracy is about making judgements about how close conclusions are to the actual changes occurring in the river environment where the fieldwork was carried out.</li> <li>• Accuracy of conclusions will be most likely linked to evaluation of the data collection methods.</li> <li>• Recognition of the extent to which there were equipment errors, e.g. faulty or uncalibrated equipment, and/or operator errors, e.g. misinterpreting the data being recorded, and how this might have affected the accuracy of the results.</li> <li>• Recognition of whether there were issues with the design of the data collection and/or sampling methodologies, which may be flawed in terms of the location/number of sites (spatial), the time of year (temporal), or the equipment chosen.</li> <li>• A supported judgement is reached about the accuracy of conclusions, drawing on evidence such as strengths, weaknesses, alternatives and relevant data.</li> </ul> <p><b>Do not credit responses that make reference to how far the conclusions can be trusted (validity of conclusions) or the extent to which the investigation can be repeated to obtain the same results/conclusions (reliability).</b></p> <p><b>A04</b></p> <ul style="list-style-type: none"> <li>• There is evidence of using different skills and techniques to measure changes in a river channel.</li> <li>• There is evidence of using different skills and techniques to analyse data and reach conclusions about changes occurring in a river channel.</li> <li>• There is evidence of using different skills and techniques to evaluate conclusions about changes occurring in a river channel.</li> <li>• There is evidence of own fieldwork conclusions, i.e. reference to field data collected by the student.</li> </ul> |

| Level          | Mark       | Descriptor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <b>0</b>   | No rewardable material.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Level 1</b> | <b>1–3</b> | <ul style="list-style-type: none"> <li>Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)</li> <li>Few aspects of the enquiry process are supported by the use of geographical skills to obtain information, which has limited relevance and accuracy. Communicates generic fieldwork findings and uses limited, relevant geographical terminology. (AO4)</li> </ul> |
| <b>Level 2</b> | <b>4–6</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)</li> <li>Some aspects of the enquiry process are supported by the use of geographical skills. Communicates fieldwork findings with some clarity, using relevant geographical terminology occasionally. (AO4)</li> </ul>                   |
| <b>Level 3</b> | <b>7–8</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)</li> <li>All aspects of the enquiry process are supported by the use of geographical skills. Communicates enquiry-specific fieldwork findings with clarity, and uses relevant geographical terminology consistently. (AO4)</li> </ul>             |

| Question number | Answer                          | Mark |
|-----------------|---------------------------------|------|
| 5(a)(i)         | <b>A03 (1 mark)</b><br>A mm (1) | (1)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                              | Mark |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 5(a)(ii)        | <b>A04 (2 marks)</b><br>Working to show the correct addition of the total width:<br>$15.4 + 13.5 + 12.8 + 12.1 + 10.8 + 6.8 + 6.5 + 6.0 + 5.5$<br>$= 89.4$ (1)<br>The division of this number by 9, the total number of sampling sites, arriving at a mean, to one decimal place, of 9.9 (1)<br>Maximum of 1 mark for correct answer but no working shown.<br>Accept any other appropriate working. | (2)  |

| Question number | Answer                                                      | Mark |
|-----------------|-------------------------------------------------------------|------|
| 5(a)(iii)       | <b>A04 (2 marks)</b><br>Award 1 mark for each correct plot. | (2)  |

| Question number | Answer                                                                                                                                                                                                                                                               | Mark |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 5(a)(iv)        | <p><b>A04 (1 mark)</b></p> <p>Award 1 mark for an accurate line of best fit that shows that the beach sediment long axis size increases with gradient.</p> <p style="text-align: center;">Beach variable (units)</p> <p style="text-align: center;">Gradient (°)</p> | (1)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Mark |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 5(a)(v)         | <p><b>A03 (2 marks)</b></p> <p>Award 1 mark for a reason for the relationship and a further 1 mark through description or explanation, up to a maximum of 2 marks.</p> <ul style="list-style-type: none"> <li>• Sites where beach particles are smaller are more easily compacted (1), which means the beach gradient will be smaller/more gently sloping (1).</li> <li>• There is less friction when waves are passing over smaller sediment (1) so more material will be carried back down the beach (1).</li> <li>• Areas of larger beach sediment allow more water to pass through (1), decreasing the effect of backwash erosion and increasing the formation of sediment into a steeply sloping beach (1).</li> </ul> <p>Accept any other appropriate response.</p> | (2)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Mark       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 5(b)            | <p style="text-align: center;"><b>A03 (4 marks)</b></p> <p>Award 1 mark for an advantage of systematic sampling and a further 1 mark for an explanation of this advantage, up to a maximum of 2 marks.</p> <p>Award 1 mark for a disadvantage of systematic sampling and a further 1 mark for an explanation of this disadvantage, up to a maximum of 2 marks.</p> <p>Advantages:</p> <ul style="list-style-type: none"> <li>• it is more straightforward than random sampling (1) as a random sampling grid doesn't necessarily have to be used as sampling, it just has to be at uniform intervals (1)</li> <li>• sampling sites are an equal distance apart along the beach profile (1), which means that good coverage of the beach can be more easily achieved than using random sampling (1)</li> <li>• sample sites are an equal distance apart (1), which ensures that no part of the beach profile is under- or over-sampled (1).</li> </ul> <p>Disadvantages:</p> <ul style="list-style-type: none"> <li>• this systematic sampling strategy is more biased than random sampling (1) as not all parts of the beach profile have an equal chance of being selected (1)</li> <li>• this systematic sampling strategy doesn't use existing information (1), which means that it might lead to under- or over-representation of a particular pattern (1)</li> <li>• significant changes along the beach profile might be missed (1), which might skew the results/give a slightly biased representation (1).</li> </ul> <p>Accept any other appropriate response.</p> | <b>(4)</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5(c)            | <p style="text-align: center;"><b>A03 (4 marks)/A04 (4 marks)</b></p> <p><b>Marking instructions</b></p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p><b>Indicative content guidance</b></p> <p>The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p><b>A03</b></p> <ul style="list-style-type: none"> <li>• Accuracy is about making judgements about how close conclusions are to the actual changes occurring in the coastal environment where the fieldwork was carried out.</li> <li>• Accuracy of conclusions will be most likely linked to evaluation of the data collection methods.</li> <li>• Recognition of the extent to which there were equipment errors, e.g. faulty or uncalibrated equipment, and/or operator errors, e.g. misinterpreting the data being recorded, and how this might have affected the accuracy of the results.</li> <li>• Recognition of whether there were issues with the design of the data collection and/or sampling methodologies, which may be flawed in terms of the location/number of sites (spatial), the time of year (temporal), or the equipment chosen.</li> <li>• A supported judgement is reached about the accuracy of conclusions, drawing on evidence such as strengths, weaknesses, alternatives and relevant data.</li> </ul> <p><b>Do not credit responses that make reference to how far the conclusions can be trusted (validity of conclusions) or the extent to which the investigation can be repeated to obtain the same results/conclusions (reliability).</b></p> <p><b>A04</b></p> <ul style="list-style-type: none"> <li>• There is evidence of using different skills and techniques to measure coastal processes and form.</li> <li>• There is evidence of using different skills and techniques to analyse data and reach conclusions about coastal processes and form.</li> <li>• There is evidence of using different skills and techniques to evaluate conclusions about coastal processes and form.</li> <li>• There is evidence of own fieldwork conclusions, i.e. reference to the field data collected by the student.</li> </ul> |

| Level          | Mark       | Descriptor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <b>0</b>   | No rewardable material.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Level 1</b> | <b>1–3</b> | <ul style="list-style-type: none"> <li>Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)</li> <li>Few aspects of the enquiry process are supported by the use of geographical skills to obtain information, which has limited relevance and accuracy. Communicates generic fieldwork findings and uses limited relevant geographical terminology. (AO4)</li> </ul> |
| <b>Level 2</b> | <b>4–6</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)</li> <li>Some aspects of the enquiry process are supported by the use of geographical skills. Communicates fieldwork findings with some clarity, using relevant geographical terminology occasionally. (AO4)</li> </ul>                  |
| <b>Level 3</b> | <b>7–8</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)</li> <li>All aspects of the enquiry process are supported by the use of geographical skills. Communicates enquiry-specific fieldwork findings with clarity, and uses relevant geographical terminology consistently. (AO4)</li> </ul>            |

| Question number | Answer                          | Mark |
|-----------------|---------------------------------|------|
| 6(a)(i)         | <b>A03 (1 mark)</b><br>c mb (1) | (1)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                  | Mark |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 6(a)(ii)        | <b>A04 (2 marks)</b><br>Working to show the correct addition of the total width: $30 + 35 + 50 + 70 + 85 + 100 + 125 + 140 + 80 = 715$ (1).<br>The division of this number by 9, the total number of days, arriving at a mean, to one decimal place, of 79.4 (1)<br>Maximum of 1 mark for correct answer but no working shown.<br>Accept any other appropriate working. | (2)  |

| Question number | Answer                                                      | Mark |
|-----------------|-------------------------------------------------------------|------|
| 6(a)(iii)       | <b>A04 (2 marks)</b><br>Award 1 mark for each correct plot. | (2)  |

| Question number | Answer                                                                                                                                                                                                                 | Mark |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 6(a)(iv)        | <p><b>A04 (1 mark)</b></p> <p>Award 1 mark for an accurate line of best fit that shows wind speed increases with air pressure.</p> <p>Weather variable (units)</p> <p>Wind speed (knots)</p> <p>Air pressure (hPa)</p> | (1)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Mark |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 6(a)(v)         | <p><b>A03 (2 marks)</b></p> <p>Award 1 mark for a reason for the relationship and a further 1 mark through description or explanation, up to a maximum of 2 marks.</p> <ul style="list-style-type: none"> <li>When air pressure is lower, warm air will rise (1) and cooler air will often move in to replace it more quickly, leading to stronger winds (1).</li> <li>When air pressure is higher air is descending (1), which reduces the formation of cloud and leads to lighter winds (1).</li> </ul> <p>Accept any other appropriate response.</p> | (2)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Mark |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 6(b)            | <p style="text-align: center;"><b>A03 (4 marks)</b></p> <p>Award 1 mark for an advantage of systematic sampling and a further 1 mark for an explanation of this advantage, up to a maximum of 2 marks.</p> <p>Award 1 mark for a disadvantage of systematic sampling and a further 1 mark for an explanation of this disadvantage, up to a maximum of 2 marks.</p> <p>Advantages:</p> <ul style="list-style-type: none"> <li>• it is more straightforward than random sampling (1) as systematic sampling just has to be at uniform intervals during the time period (1)</li> <li>• sampling times are equally spaced out during the weather event (1), which means that good coverage of the event can be more easily achieved than using random sampling (where under- or over-representation may occur) (1)</li> <li>• sampling times are evenly spaced (1), which ensures that no part of the weather event is under- or over-sampled (1).</li> </ul> <p>Disadvantages:</p> <ul style="list-style-type: none"> <li>• this systematic sampling strategy is more biased than random sampling (1) as not all parts of the day/week have an equal chance of being selected (1)</li> <li>• this systematic sampling strategy doesn't use existing information (1), which means that it might lead to under- or over-representation of a particular weather event (1)</li> <li>• significant changes during a weather event/throughout the year might be missed (1) which might skew the results/give a biased representation (1).</li> </ul> <p>Accept any other appropriate response.</p> | (4)  |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6(c)            | <p style="text-align: center;"><b>A03 (4 marks)/A04 (4 marks)</b></p> <p><b>Marking instructions</b></p> <p>Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p><b>Indicative content guidance</b></p> <p>The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include the following.</p> <p><b>A03</b></p> <ul style="list-style-type: none"> <li>• Accuracy is about making judgements about how close conclusions are to the actual changes occurring in the hazardous environment where the fieldwork was carried out.</li> <li>• Accuracy of conclusions will be most likely linked to evaluation of the data collection methods.</li> <li>• Recognition of the extent to which there were equipment errors, e.g. faulty or uncalibrated equipment, and/or operator errors, e.g. misinterpreting the data being recorded, and how this might have affected the accuracy of the results.</li> <li>• Recognition of whether there were issues with the design of the data collection and/or sampling methodologies, which may be flawed in terms of the location/number of sites (spatial), the time of year (temporal), or equipment chosen.</li> <li>• A supported judgement is reached about the accuracy of conclusions, drawing on evidence such as strengths, weaknesses, alternatives and relevant data.</li> </ul> <p><b>Do not credit responses that make reference to how far the conclusions can be trusted (validity of conclusions) or the extent to which the investigation can be repeated to obtain the same results/conclusions (reliability).</b></p> <p><b>A04</b></p> <ul style="list-style-type: none"> <li>• There is evidence of using different skills and techniques to measure the physical processes involved in an extreme weather event.</li> <li>• There is evidence of using different skills and techniques to analyse data and reach conclusions about physical processes involved in an extreme weather event.</li> <li>• There is evidence of using different skills and techniques to evaluate conclusions about physical processes involved in an extreme weather event.</li> <li>• There is evidence of own fieldwork conclusions, i.e. reference to field data collected by the student.</li> </ul> |

| Level          | Mark       | Descriptor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <b>0</b>   | No rewardable material.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Level 1</b> | <b>1–3</b> | <ul style="list-style-type: none"> <li>Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)</li> <li>Few aspects of the enquiry process are supported by the use of geographical skills to obtain information, which has limited relevance and accuracy. Communicates generic fieldwork findings and uses limited relevant geographical terminology. (AO4)</li> </ul> |
| <b>Level 2</b> | <b>4–6</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)</li> <li>Some aspects of the enquiry process are supported by the use of geographical skills. Communicates fieldwork findings with some clarity, using relevant geographical terminology occasionally. (AO4)</li> </ul>                  |
| <b>Level 3</b> | <b>7–8</b> | <ul style="list-style-type: none"> <li>Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)</li> <li>All aspects of the enquiry process are supported by the use of geographical skills. Communicates enquiry-specific fieldwork findings with clarity, and uses relevant geographical terminology consistently. (AO4)</li> </ul>            |

