Geography

HOMEWORK

7D Extreme Weather

and a review of **Rivers**.

Name

Tutor Group

Teacher

The homework booklet contains essential reading on

- Ten global locations with **extreme weather** and a review of **river processes and features**.

Your homework will be set and reviewed on ☑

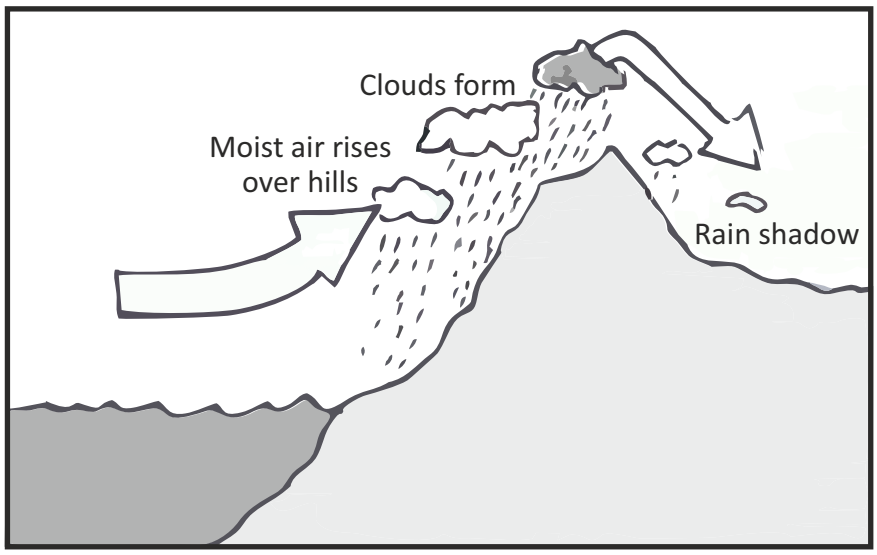
☐ Monday ☐ Tuesday ☐ Wednesday

☐ Thursday ☐ Friday

People ● Places ● Pattern ● Process

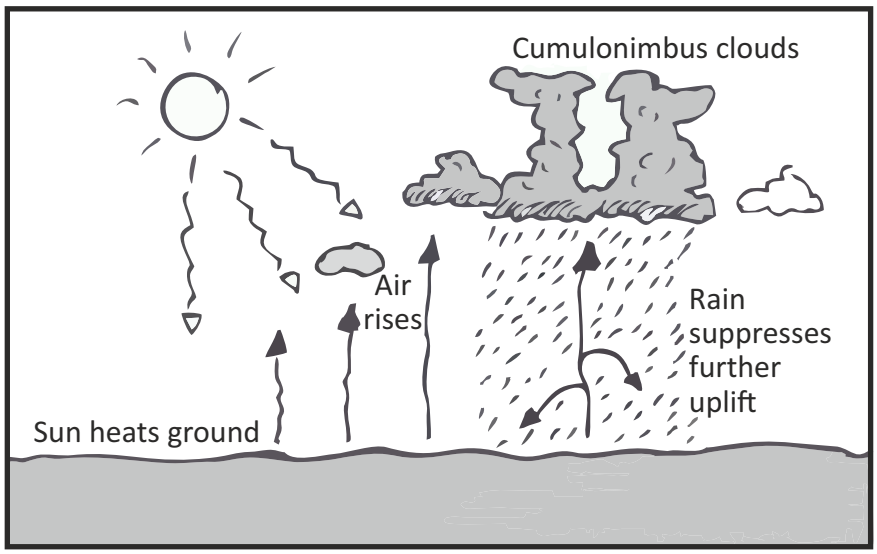
Three types of Rain

Relief rainfall



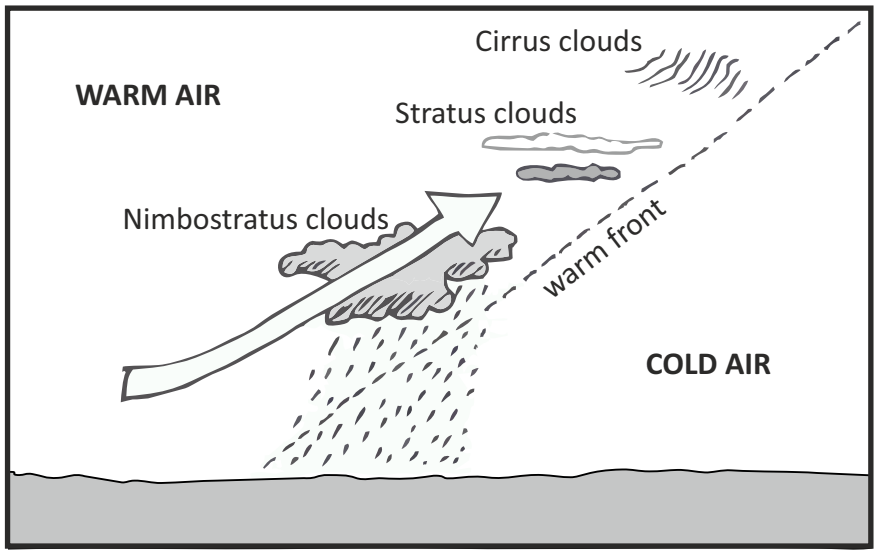
When moist air which has passed over seas is forced to rise over mountains, the air expands and cools. Water vapour condenses into cloud droplets and rain falls on the windward slope. As the descends the lee slope it warms and cloud droplet evaporate creating a rain shadow.

Convectional rainfall



On warm summer days, the Sun's rays heat the ground. This warms the air above which expands and begins to rise. As the air rises and cools any water vapour will condense to form cloud droplets. Rapid uplift of moist air results in thunderstorms. Rain cools the ground and uplift stops until the ground is warmed again.

Frontal rainfall



When two air masses with different characteristics meet a front is created. The warmer, less dense air rises over the colder, denser air. As the air rises and cools, water vapour condenses into cloud droplets and rain falls along the front. High on the front cloud droplets condense into ice crystals so do not fall as rain.

Extreme weather Part 1: The coldest places on Earth.

In some places on Earth the latitude, altitude, ocean currents and atmospheric circulation combine to create extreme weather conditions. For Homework 1 you must read about the **Dome Fuji** and **Vostok bases** in Antarctica which have extremely cold weather conditions. You should be ready to answer questions about them next week.

Extreme cold, #10. Dome Fuji, Antarctica. 77° 19′ 00″ S, 39° 42′ 00″ E

Dome Fuji is located in Queen Maud Land in eastern Antarctica and is the highest ice dome on the planet. **At an altitude of 3,810m, Dome Fuji is also the coldest place on Earth.** Summer temperatures rarely rise above -30 °C and winter temperatures fall below -80 °C. The coldest temperature every recorded was -93.2°C. **The ice dome is a cold desert** with an equivalent of just 25mm of precipitation each year. This falls as tiny ice crystals rather than true snow.

A Japanese research station has operated at Dome Fuji since 1995. Drilling deep into the ice and removing the ice as core samples can be used to describe the temperature and atmospheric conditions when that water fell as tiny crystals many thousands of years ago. **Ice cores have now been drilled to a depth of over 3,000 metres with the ice extracted dating back over 750,000 years.**

Extreme cold, #9. Vostok Station, Antarctica. 78°27′58″S 106°50′54″E

Vostok Station was established as a scientific research base by the Russians in 1957. It is occupied all year round by between 25 and 13 scientists and engineers. **It is situated at an altitude of 3,488m** in an area known as Princess Elizabeth Land. Vostok is 1,285 km from the South Pole but closer to the geomagnetic pole.

The station has sub-zero temperatures all year round. Annual precipitation is only 22 millimetres, which all falls as snow over around 26 days each year, so it is also one of the driest places on Earth. The average summer temperature is just −32°C falling to an average winter low of −68°C. **Vostock is the second coldest location on Earth, with the lowest recorded temperature being −89.2°C.**

The highest recorded temperature at Vostok was −14.0°C. Despite the dark Antarctic winter, Vostok is one of the sunniest places on Earth. **The base has the highest average sunshine totals for any calendar month on the planet**: 709 hours of sunshine in December, or 23 hours a day. In contrast Vostok also has the lowest sunshine hours: **during the polar night, between May and August, the base has zero hours of sunshine each and every day.**

Homework Nº2: Set date Check date

Learning about the meaning and spelling of key weather words.

For **Homework 2** you must read the following key words and definitions and practise the spelling. You must be ready to spell these words and remember what they mean for next week's homework check.

Practise the spellings on the next page. Fold this page along the dotted line to hide the words while you spell them.

Weather (wea- ther)	The day to day condition and changes in atmospheric conditions.
Climate (cli-mate)	Long term pattern of weather measured over a 30 year average.
Atmosphere (at-mo-sphere)	The layer of gases, mostly composed of nitrogen and oxygen, surrounding the planet.
Evaporation (e-vap-or-ation)	The process by which liquid water becomes a gas - water vapour - often as a result of heat.
Condensation (con-den-sa-tion)	The process by which water vapour becomes liquid, forming droplets, as a result of cooling.
Depression (de-pres-sion)	An area of low pressure associated with strong winds, rain and changeable weather.
Anticyclone (an-ti-cy-clone)	Area of high pressure associated with clear skies and stable weather conditions.
Microclimate (mi-cro-cli-mate)	A small area, as a garden with a distinctive climate, different to the surrounding area.
Air mass (air mass)	A large body of air with distinctive characteristics taken from its region of origin.
Hurricane (hur-ri-cane)	An intense low pressure weather system, with winds over 100km/h, formed over tropical seas.

Practise your spellings

Practise your spellings on this page. Write the word above the definition and then check you've spelt it correctly. If you get it wrong you can try again.

The day to day condition and changes in atmospheric conditions.

Long term pattern of weather measured over a 30 year average.

The layer of gases, consisting mostly of nitrogen and oxygen, surrounding the planet.

The process by which liquid water becomes a gas - water vapour - often as a result of heat.

The process by which water vapour becomes liquid, forming droplets, as a result of cooling.

An area of low pressure associated with strong winds, rain and changeable weather.

Area of high pressure associated with clear skies and stable weather conditions.

A small area, as a garden with a distinctive climate, different to the surrounding area.

A large body of air with distinctive characteristics taken from its region of origin.

An intense low pressure weather system, with winds over 100 km/h, formed over tropical seas.

For **Homework 3** you must read about the **windiest and driest places on Earth** and be ready to answer questions on them next week.

Extreme wind, #8. Commonwealth Bay, Antarctica. 66° 00′ S, 142° 40′ E

Commonwealth Bay is a 48km-wide coastal bay between Point Alden and Cape Gray in Antarctica. Lying 2,700 km south of Tasmania, the Bay was discovered in 1912 by the Australasian Antarctic Expedition, who named it after the Commonwealth of Australia. **The bay is the windiest place on Earth with an average annual wind speed of 80 kilometres per hour**. Winds regularly exceed 240 kilometres per hour.

Storms are caused by a katabatic wind, a concentrated flow of cold air moving down steep slopes off the Antarctic ice shield towards the sea. In the summer there may be periods of relative calm but during winter the storms are especially strong. They may last for days at a time but may start and end abruptly. Storms can sometimes be accompanied by powerful whirlpools in waters of the bay.

Despite the extreme weather, the coast of **Commonwealth Bay is an important breeding ground for Emperor and Adelie penguins.** These, in turn, provide food for the predatory leopard seal.

Extreme wind, #7. Wellington, New Zealand. 41° 21′ S, 174 ° 48′ E

Chicago, USA, may be known as the “Windy City” but that record, according to the World Meteorological Society, lies 13,400 kilometres to the south west in Wellington, capital of New Zealand. **Wellington sits on the Cook Strait, a passage between New Zealand's North and South islands.** The winds of the Roaring Forties, which spin uninterrupted from South America thousands of kilometres to the west, are funnelled into this 22 km-wide gap. This creates a “river of wind” that rocks the boats in the harbour day and night, at an average of 25km/h. **Wellington’s strongest recorded gust of 250km/h was measured on Hawkins Hill in 1962, just a few kilometres from the city centre.** Many people enjoy the wind as it blows pollution away from the city making it feel fresh and clean.

Wellington doesn't just have to put up with the wind. It also lies in an active earthquake zone. **Each week the Wellington region experiences as many as 5,000 earthquakes with a magnitude greater than 3 on the Richter scale.** The worst earthquake to hit Wellington, on 23 January 1855, measured 8.2 on the Richter scale. Thankfully just 4 out of the city's 6,000 people were killed, as Wellington's mostly wooden buildings flexed in the shockwaves.

Today, Wellington residents hope they can again ride out another 'big one.'

New Zealand authorities have set out to ensure that the country's government will ride out any large quake. **The New Zealand Parliament Building now sits atop 417 base isolators, shock absorbers for the building** ,which should help it move in time with a powerful earthquake rather than shaking to pieces.

Extreme aridity, #6. McMurdo Dry Valleys. 77° 28' S 162° 31' E

The McMurdo Dry Valleys are a row of largely snow-free valleys in Antarctica. They are found in Victoria Land bordering the Ross Sea, 5,000km south of New Zealand. The Dry Valleys experience extremely low humidity and the surrounding mountains prevent the inflow of ice from nearby glaciers. **As a result, the region is one of the world's most extremely arid deserts, with snowfall amounting to as little as 3mm (rainfall equivalent) each year.**

The Dry Valleys are home to Lake Vida, an intensely saline lake covering 6.8 square kilometres. **The lake became famous in 2002 when a research team announced the discovery of 2,800-year-old bacteria preserved in an ice core**. The microbes reanimated upon thawing, developed and were able to reproduce. Also in the valleys is the Onyx River. Fed by glacial meltwater, **the Onyx is just 32 km long but also holds the record as Antarctica's longest river**.

Extreme aridity, #5. Arica, Atacama Desert, Chile. 18° 29' S 70° 20' W

The driest city on Earth may sound like an unpopular place to live, but the **Chilean city of Arica has a population of 220,000**. It is known as the City of Eternal Spring. **Close to the Atacama Desert on the Pacific coast of South America, Arica has an average annual rainfall of less than 1mm.** Despite the arid climate and tropical location, temperatures are kept cool by the cold Pacific waters washing against the city's beaches. **Temperatures range from an average high of 26°C in January to a low of 14°C in July.**

Arica acts as a port for the landlocked country of Bolivia, with imports travelling up through the Andes Mountains to the Bolivian capital of La Paz. The Arica –La Paz railway closed in 1996 but plans are underway to reopen the 440km line as a tourist attraction. **Many Bolivian tourists travel to the Pacific to enjoy Arica's 20 km of beaches.** Some of those beaches are famous for their waves and attract international surfers, many of whom travel to Arica to surf a special wave known as 'El Gringo.'

Homework N°5: Set date Check date

For **Homework 5** you must read about the **hottest** and **wettest** places on Earth and be ready to answer questions on them next week.

Extreme heat, #4. Al-Aziziyah, Libya. 32° 31' 51" N 13° 01' 16" E

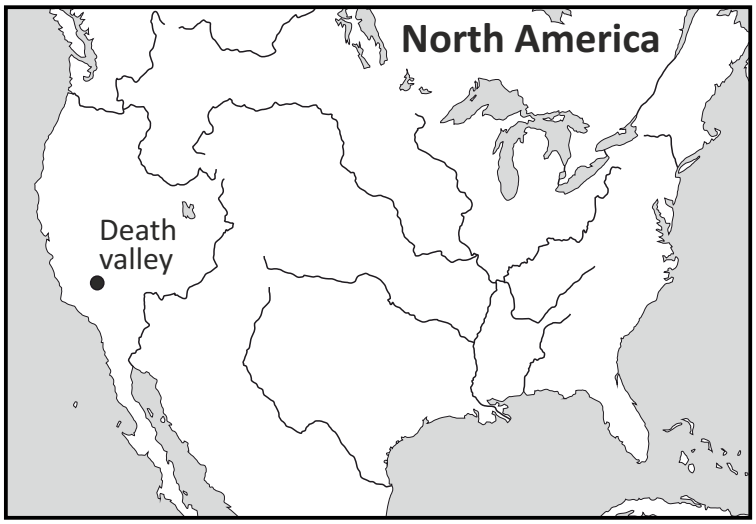
On September 13th 1932 Al-Aziziyah become the hottest place on Earth. A thermometer at an Italian base had recorded **a temperature of 58°C**, the highest temperature ever recorded in the shade. Al-Aziziyah lies 41 km south-west of the Libyan capital of Tripoli where temperatures regularly soar to 56°C. **The 22,000 residents of Al-Aziziyah don't just have to put up with the heat. In the winter temperatures fall to -2°C under the clear desert skies.**

Ninety years after taking the record for the hottest place on Earth, Al-Aziziyah was stripped of the title by the World Meteorological Society after an investigation concluded an ancient thermometer and inexperienced personnel resulted in misread data. The record passed to Death Valley in the USA.

Extreme heat, #3. Furnace Creek, USA. 36° 27' 29" N 116° 52' 15" W

Furnace Creek, California, in now officially the hottest place on Earth with a daytime record temperature 56.7°C, recorded in 1913. The 'town', with a permanent population of just 22, acts as one of the main tourist entrances to Death Valley a scorching stretch of land which marks the boundary between the Great Basin and Mojave deserts. Amazingly, Furnace Creek has a golf course, where the 'Heatstroke Open' is held. At the centre of Death Valley is the Badwater Basin, 86 metres below sea level. Here summer temperatures regularly reach 46°C but can plunge below freezing in January. **The coldest temperature recorded in Furnace Creek was -9°C.**

Having officially become the hottest place on Earth, 90 years after the event, **some scientists are now questioning the validity of the Death Valley reading.** One scientist suggested that a sandstorm at the time of the recording had blown superheated sand against the weather station, raising the temperature of the thermometer to record breaking highs. However, for the time being the record stands, until another location successfully claims the title of hottest place on Earth.



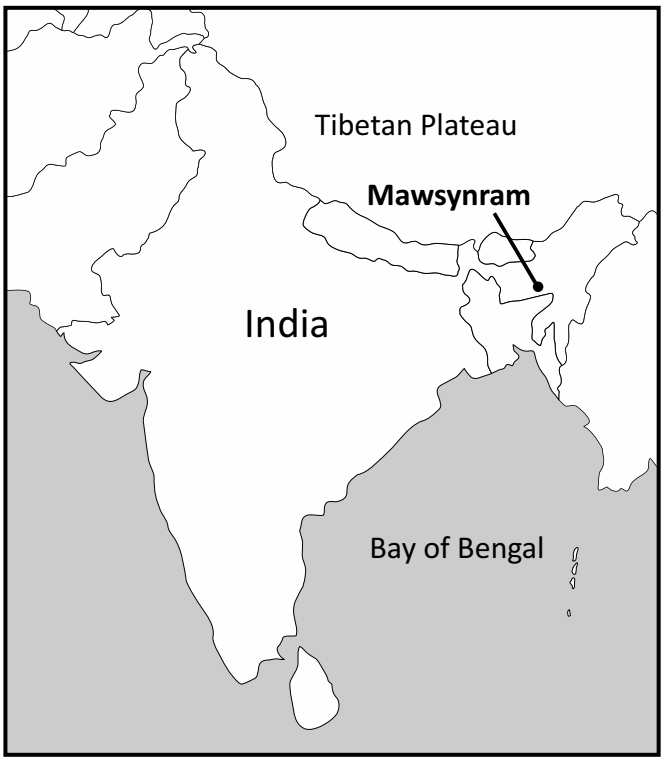
Extreme precipitation, #2. Tutendo, Colombia. 5° 45' 00" N 76° 32' 20" E

With a population of just 1,000, **the little village of Tutendo in Colombia has perhaps one of the most predictable climates on the planet.** Temperatures stay at around 27°C all year round. Night-time temperatures fall by only a few degrees. Even more predictable is the rain, which falls almost every day. While most rain falls during the two rainy seasons, even during the 'dry seasons' it may rain for twenty days each month. **Average annual rainfall amount to 11,779mm**.

Rising air at the Equator creates a low-pressure zone called the Sub-Tropical Convergence Zone (ITCZ). This air has travelled over warm seas or tropical rainforests and is saturated with moisture. As the air rises at the ITCZ it cools and the moisture condenses into dense clouds, the source of Tutendo's heavy rain.

Extreme precipitation, #1. Mawsynram, India. 25° 17' 51" N 91° 34' 57" E

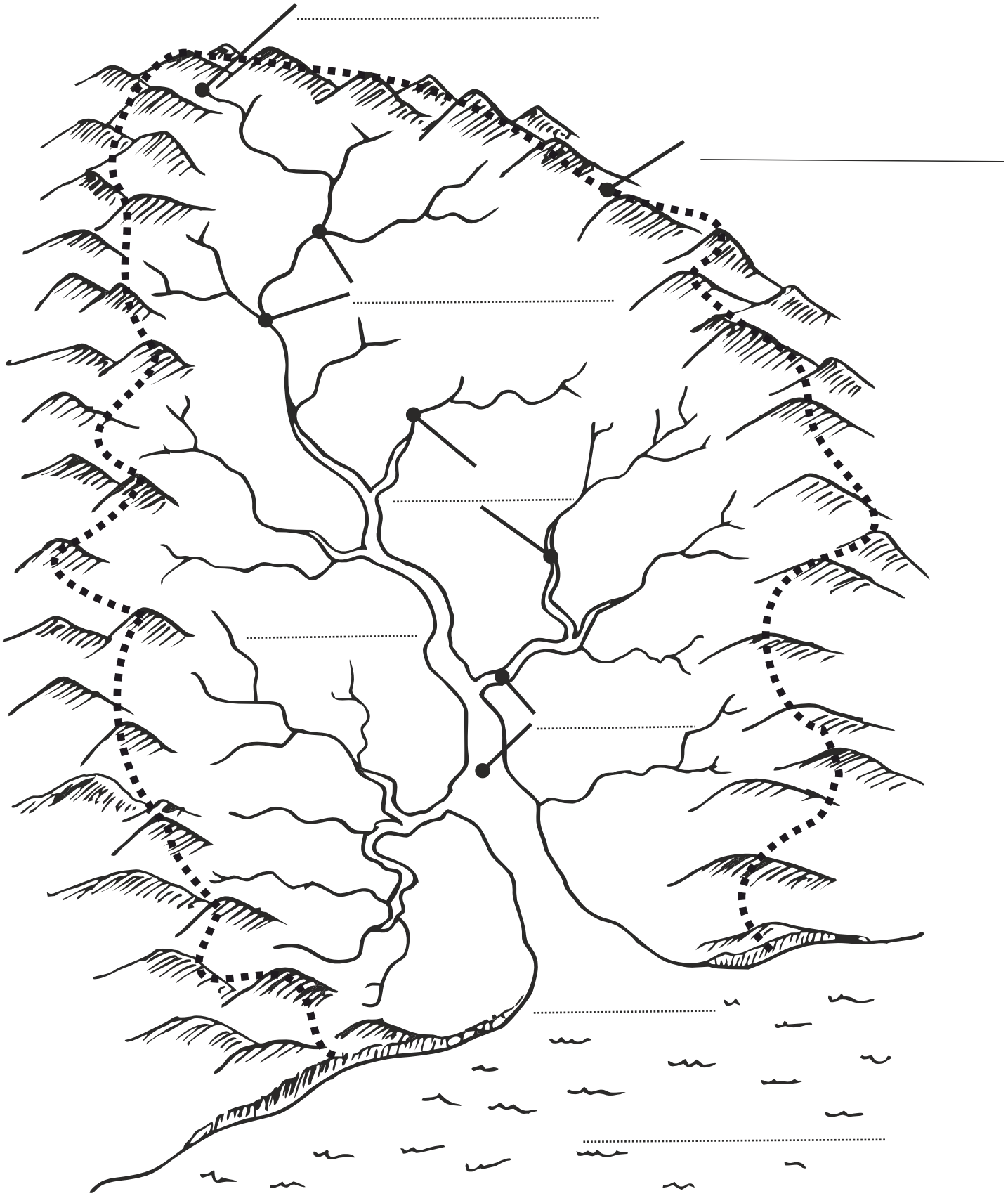
When monsoon climates combine with high mountain ranges the result is torrential downpours of rain. At an altitude of 1,400 metres, in the Khasi foothills of the eastern Himalayas lies the town of **Mawsynram, perhaps the wettest place on Earth**. The average annual rainfall of this north east Indian village is 11,871mm. Mawsynram really does have reason to talk about the weather, with an average over annual rainfall over nine times that of Bolton! Mawsynram receives most of its rainfall during the summer monsoon. The village gets a rest from the rain during the relatively dry season, which runs from December to February. **July is the wettest month where upwards of 2.4 metres of rain fall, twice the annual average for Bolton.**



During the monsoon, intense low pressure over the Tibetan Plateau to the north draws in moist, warm air off the Bay of Bengal. The air is compressed into a narrow zone by the Khasi Hills, concentrating the moisture. At this warms air rises over the hills its cools, the water condenses into clouds and the rain pours down. **1985 was the wettest year on record in Mawsynram with 26,000 mm of rain**, enough to drown the t-mac building three times over.

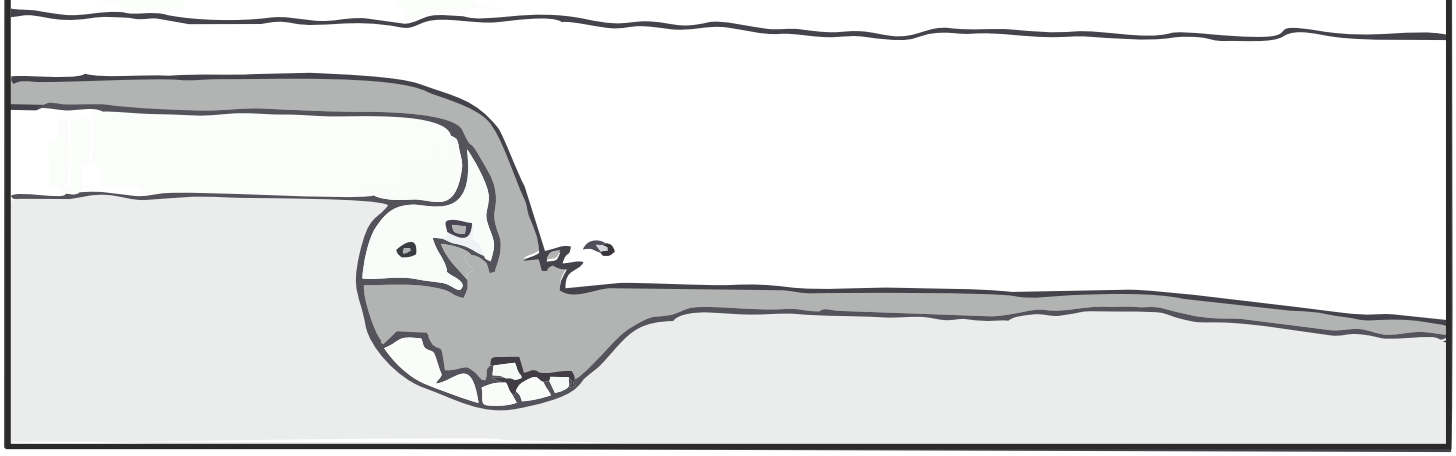
Rivers Review, #1. Features of a river basin

label the diagram below with the correct label from the following list: Mouth, Source, Channel, Confluence, Flood plain, Tributary.



Rivers Review, #2. Waterfalls

Add labels to the diagram to show the main features of a caprock waterfall. Include: **resistant rock**, **less-resistant rock**, **plunge pool** and **gorge**.



Rivers Review, #3. Erosion and transportation

Draw arrows to connect the erosion and transportation words below with their correct definition. One has been done for you.

Abrasion	Process of erosion where the channel banks and bed are worn away by the moving water.
Attrition	Process of erosion as rocks rub and grind against the channel bed and bed load wearing it way, .
Hydraulic action	Erosional process by which rocks are chemically changed to become less-resistant or soluble.
Solution	Process of erosion resulting from the collision of moving sediment.

Traction	Process of transportation by which sand grains bounce or 'leap frog' along the channel bed.
Saltation	Process of transportation by which soluble minerals are carried as dissolved ions.
Suspension	Process of transportation by which large rocks are rolled or dragged along the channel bed.
Solution	Process of transportation in which fine silts and clays are carried within the water column.

Homework Reviews: 1 to 3

Review Number 1: The coldest places on Earth		✓ ✗
1		
2		
3		
4		
5		
Review Number 2: Weather words	score	
1&2		
3&4		
5&6		
7&8		
9&10		
Review Number 3: Earth's windiest and driest places	score	
1		
2		
3		
4		
5		
	score	

Homework Reviews: 4 to 5

Review Number 4: Earth's hottest and wettest places

		✓ ✗
1		
2		
3		
4		
5		
	score	

Review Number 5: River features and procresses

1		
2		
3		
4		
5		
	score	

GEOGRAPHY Homework

7D

WEATHER

Extreme weather around the world

People ● Places ● Pattern ● Process