Landscape Evolution

LITHOSPHERE

Landscapes are the result of two major sets of processes at work on the surface of the Earth. **Mountain Building** comprises the first main set of landscape processes and includes all new material which is added to the surface of the earth or cause its uplifting, eg. _____

Denudation is the combination of processes which attack, destroy or erode the rocks and landforms of the Earth's surface , eg. _____ . The rocks on the surface are primarily denuded by **water** in its many forms. Rainwater causes rocks to decay, glaciers carve deep valleys, rivers gouge steep valleys whilst, at the coast, the action of the waves and tides create distinctive landforms.

Denudation processes can best be viewed as a series of distinct operations which form an interacting system known as the Rock Cycle :

Weathering -

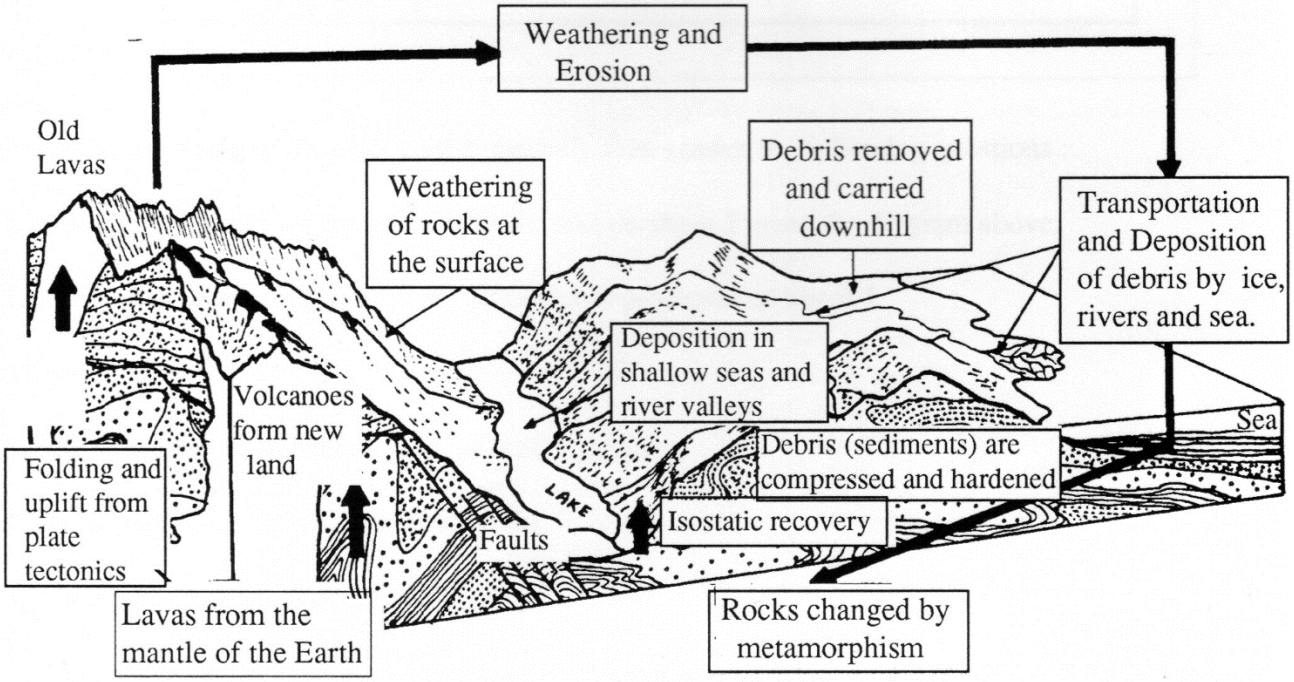
Erosion -

Transportation -

Deposition -

All the processes are dominated by **gravity** since debris or rock fragments are continually removed, carried downslope to be deposited in valleys, lakes or in the sea by agents of erosion, eg. _____.

The Rock Cycle



Landscape Evolution (2)

LITHOSPHERE

As can be seen anywhere in the British Isles, landscapes are a complex assemblage of varying landforms of different origins, ages and types. Their evolution is the result of a combination of mountain building and denudation working on the Earth's surface , over very long periods of time and at different scales.

LANDSCAPE EVOLUTION PROCESSES
different scales in a landscape

EMBROIDERING of Landscape Hundreds of years	Slope processes, Weathering, Human interference
SCULPTING of Landscape Thousands of years	Rivers, Glaciation, Marine erosion, Wind action
READJUSTMENT of Landscape 1-2 million yrs	Ice ages, expansion and contraction of deserts,
CREATION of Landscape millions of years	Orogenies, faulting, folding, intrusions, extrusions

Q Study the diagrams on **sheets 1 and 2** carefully then answer the following questions :

1... Complete the missing information in the text on **sheet 1** using the diagram above.

2... Write your own definitions of the Denudation processes on **sheet 1.**

Answer overleaf :

3... List examples of **debris** or types of rock fragments.

4... Write your own definition of **landscape**.

5... Using the diagram above :

a) Describe the **evolution** of a landscape you have studied
b) Give examples of each **process** listed in the diagram above.

Rock Types

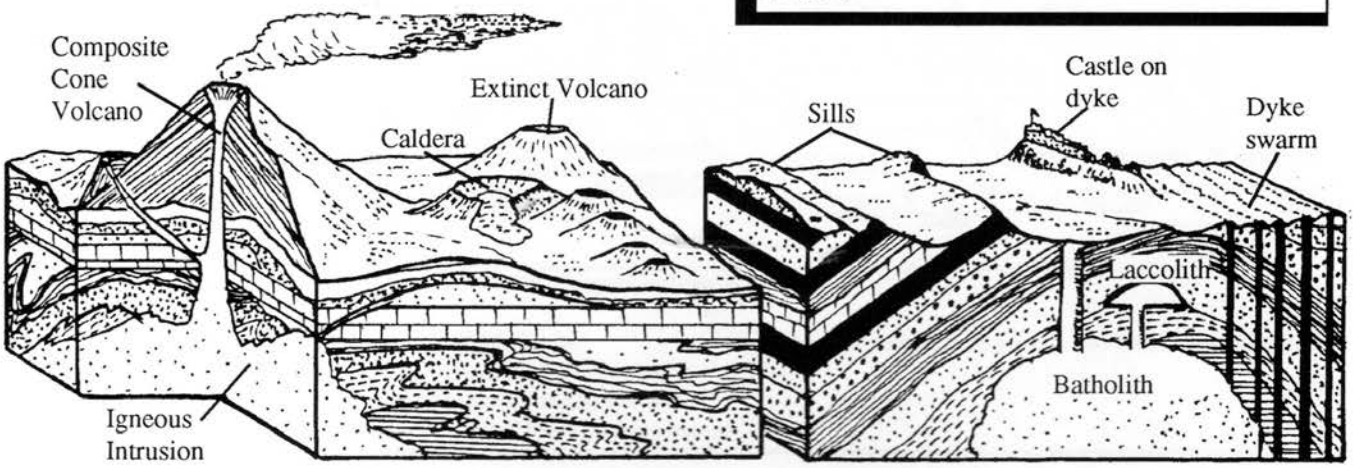
LITHOSPHERE

IGNEOUS (Volcanic or Extrusive)

Volcanoes, the most spectacular displays of energy, are responsible for forming large parts of the Earth's crust. New crust is created both at ridge-boundaries and on land.

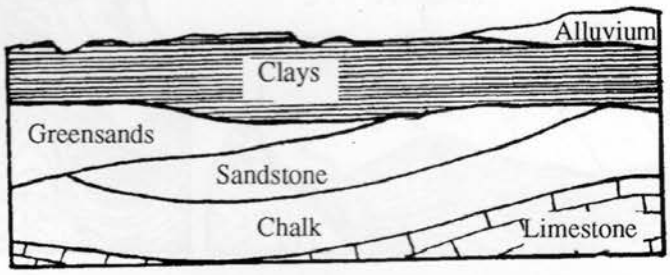
IGNEOUS (Plutonic or Intrusive)

Most magma cools within the Earth's crust, intruded between existing rocks. Batholiths are giant intrusions, deep underground. Thin sheets of magma cool to form sills and dykes. When exposed by erosion, these features may be recognised at the surface.



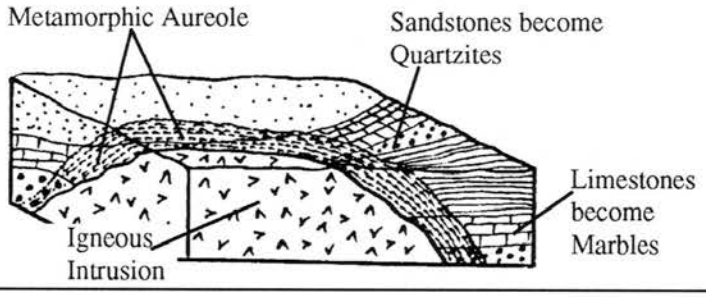
SEDIMENTARY ROCKS

Weathering produces rock, mineral and chemical debris at a place where the original rock was exposed (**in situ**). This material is usually transported to a different site before being deposited as sediment. The material is transported in several ways : by gravity, by water in rivers or in the sea, by glacial ice or meltwater or by the wind. Often these agents of erosion combine to produce movement and deposition. Rock debris deposited in either water or on land eventually forms sedimentary rock...



METAMORPHIC ROCKS

Existing rock types can be changed by a combination of crustal movement, heat and pressure. **Regional metamorphism** occurs around areas affected by massive earthquakes (see map) and periods of intense mountain building (called **Orogenies**). **Thermal** or **contact metamorphism** is associated with igneous activity. Magmas change existing rocks mainly by heat.



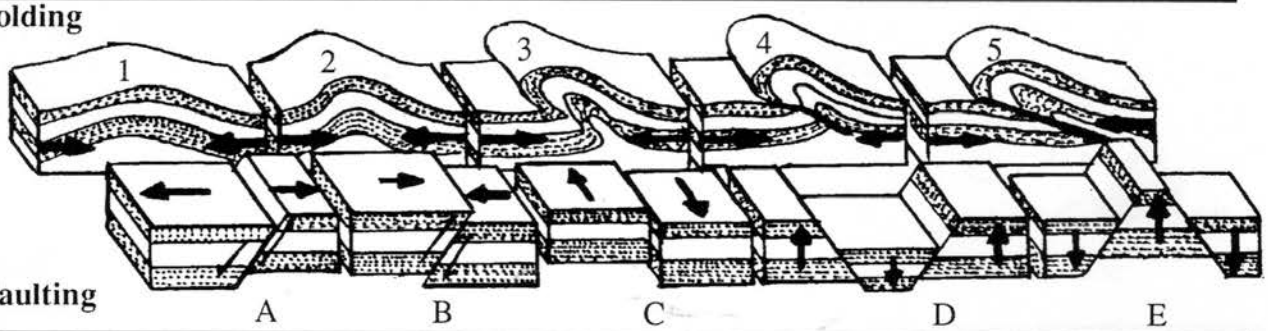
Folds, Faults, Peneplains, Sediments

LITHOSPHERE

FOLDS AND FAULTS

Folds are created by compression in the crust and are usually well developed in sedimentary and igneous (volcanic) rocks.
1..First a simple fold (**anticline**) is created. **2**..Continued compression develops an **asymmetric anticline**.
3..Later a **recumbent** fold forms. **4**..Pressure eventually breaks rock layers to form an **overthrust fold**.
5..A **nappe** forms with continued intense compression and fracturing of strata.

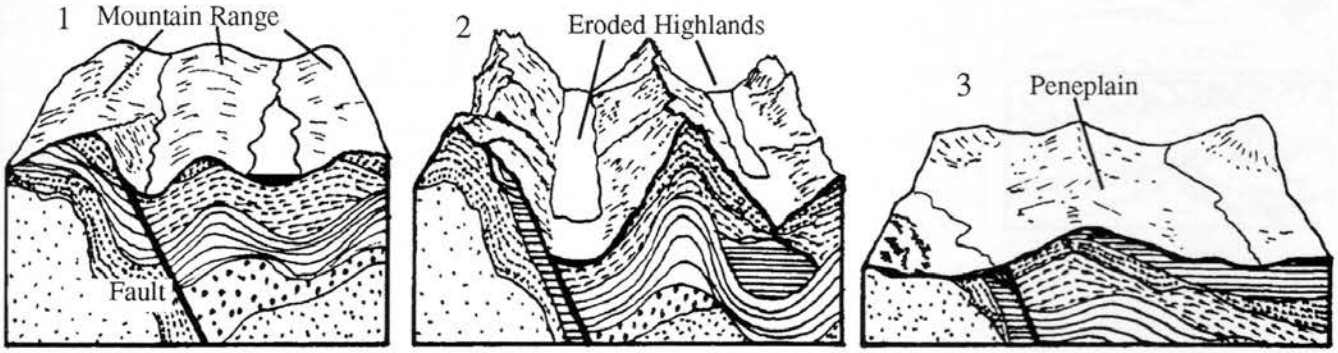
Folding



Faulting

Faults form when rocks can no longer bend under pressure and cracks appear.

A..If the rocks are pulled apart, a **normal fault** forms. **B**..If they are compressed, reverse and **thrust faults** form.
C..**Strike-slip faults** occur where movements take place along fault planes.
D..**Grabens** (faulted valleys) form where block faulting occurs.
E..**Horsts** (block mountains) form where raised block faulting occurs.



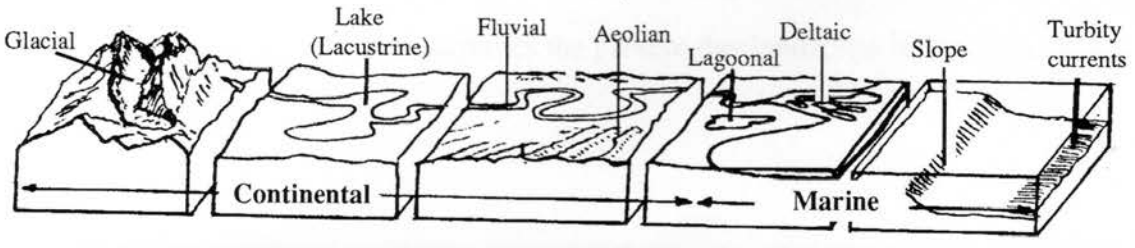
PENEPLAINS

Peneplains are the result of the continual, but long term cycle of erosion which wears down new crustal materials to produce rock debris which in turn is made into more new rock.....

1..Typical mountain range with anticlines, synclines, faults and varied geology.
2..Millions of years of erosion and weathering combine to develop a mature, glaciated landscape.
3..**Peneplain** of old mountain range created by erosion - including remnant mountains and exposed metamorphic rocks.

SEDIMENTATION PROCESSES

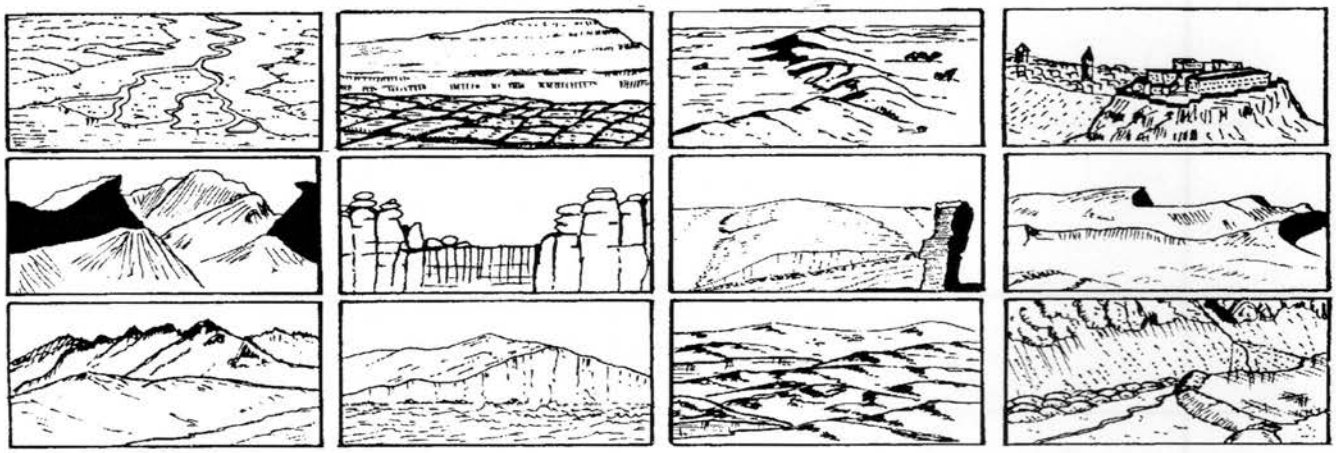
Rock debris created by weathering and erosion are deposited elsewhere as sediments. The sedimentary environments in which they accumulate are shown below and can be either continental or marine. Most deposition and sedimentation occurs at the surface , mostly in shallow sea areas....



The scenery of the British Isles is varied and beautiful and the result of a complex set of interacting processes. The influence of structure and rock type is crucial to the development of the resulting denuded landscapes of the British Isles. MacKinder's **Tees-Exe line** (see map insert) divides the British Isles into Highland and Lowland zones. In general, the North and West of the British Isles has older, harder and more resistant rocks whereas the South and East has youger, softer sedimentary rocks forming alower lying landscape. Because rocks are combinations of minerals, they erode in different ways and at different rates, producing varied landscapes in small areas such as the British Isles.

Tees-Exe line

Landform Sketches



Q

1.. Complete the table on **sheet 6** by :

- **a)** completing all the missing information in **columns** 1 to 3
- **b)** drawing the correct landform **sketch** in the most suitable box (column **4**). Choose from the sketches above.
- **c)** making a list of famous examples for each rock type/scenery for column **5**.

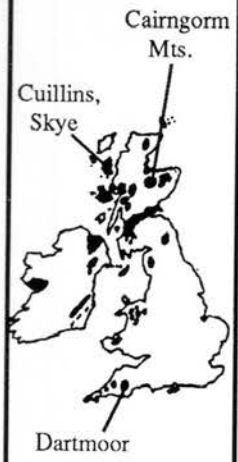
2... Define each of the following terms or phrases : **igneous rocks, sedimentary rocks, sill, metamorphic rocks, plutonic, moraine, schist, gneiss, dyke, tor.**

3... To what extent do you agree with the statement that

"...above all it is rock type that determines the present day landscape in any area..." ?

Geology and Scenery (2)

LITHOSPHERE

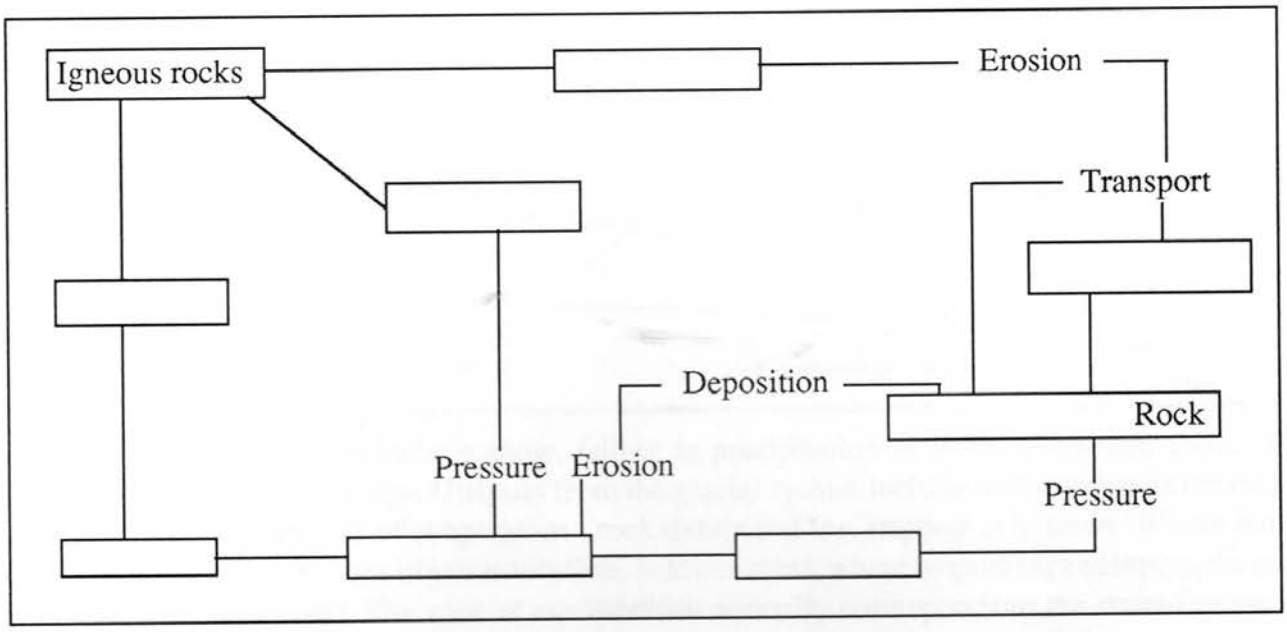
CLASS	ROCK TYPE	ROCKS	SCENERY	EG ?
Igneous Rocks  	Igneous Volcanic rocks commonly produce striking _____ even where their original formation precedes the evolution of the landscape. Volcainic or _____ rocks cool in contact with the air forming hard, resistant rocks in the North & West of the British Isles.	**Basalts** or _____ flows often form jagged peaks & aretes, plateaux & _____		
		Agglomerates are found in volcanic _____. They are often more resistant than any surrounding rocks.		
	Igneous Plutonic rocks are also known as _____ rocks as they form inside the crust, producing large _____ structures. Granites are one of Britain's _____ rocks, intruded deep in the crust. But as the overlying rocks are eroded, the granites slowly become exposed.	**Dolerite** commonly forms _____ (magma intruded between strata) & _____ (across).		
		Granites tend to form high rugged _____ which are the result of intense erosion.		
		Granite _____ occur where jointed granites _____ decompose due to chemical weathering.		
Sedimentary Rocks  	Sedimentary rocks are formed from the _____ of the eroded materials from other rocks, usually in _____. By their nature, sedimentary rocks are younger and softer than their parent rocks and have easily identifiable _____ or layers. Compared to the very old metamorphic rocks (up to 2.8 billion years BP.) the sedimentary rocks of the British Isles are very young (from _____ million years BP). They form most of our _____ scenery. Over the last 400 million years, these rocks have been intensely folded & faulted and are being formed even now....	**Alluvium** (river sediments) are very young rocks.		
		Glacial Drift can be found over most of the British Is and consists of Moraine and Outwash.		
		Chalk forms _____ (Scarp & Vale) in SE ENgland.		
		Sandstones form wide lowland _____, heaths and famous coastlines.		
		Limestones form upstanding blocks and rugged cliffs, barren _____ & gorges.		
Metamorphic Rocks  	Metamorphic rocks are the _____ of the rocks of the British Isles (up to 2.8 billion years old). These extremely hard basement rocks have been exposed by intense erosion. Their exposure is shown on the map..	**Schists** form knobbly high _____ in Scotland & Wales and are highly resistant to erosion.		
		Gneiss forms mainly low lying _____ rock basements in NW Scotland & Ireland.		

Landscapes, Processes and Rocks.

LITHOSPHERE

Q Answer the following questions on a separate sheet of paper.....

1... Copy then complete the **Rock Cycle** diagram below using the following list :
weathering, deposition, sedimentary rock, heat, fusion, metamorphic, erosion.



2... Write a definition for each of the important terms in the box below :

alluvium, aeolian, basalt, debris, deposition, drift, dyke, erosion, extrusive rocks, fault, fold, gneiss, granite, igneous, intrusive rocks, lacustrine, metamorphic, moraine, nappe, pavement, peneplain, plutonic, schist, sill, sedimentary, volcanic, weathering, Tees-Exe Line, denudation

3... Copy the following table, matching the correct heads to tales :

HEADS	TAILS
Basalts	North Downs
Granites	Lewis
Chalk	Edinburgh Castle Rock
Sandstone	Cuillins
Gneiss	Pennines
Schist	Dartmoor
Limestone	The Weald
Vent Agglomerate	NW. Highlands

4... Write an **essay** under the following title :

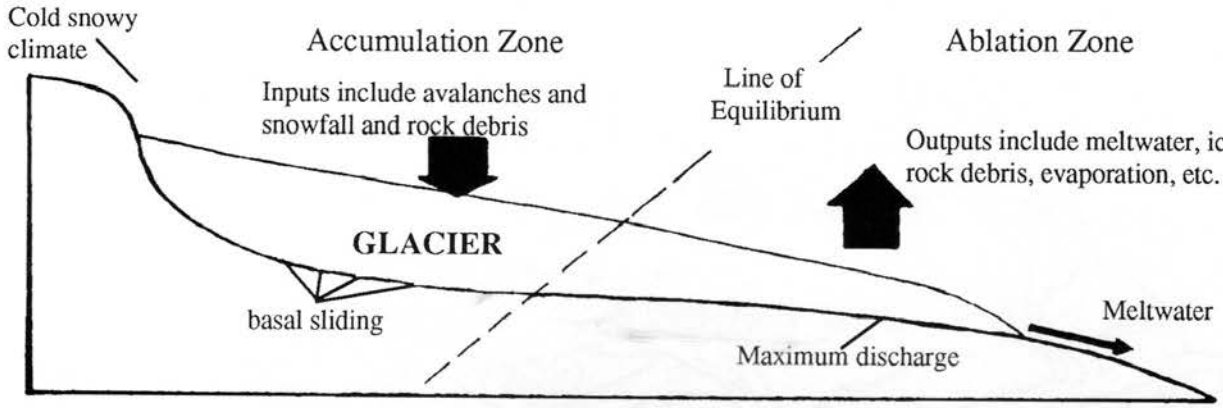
"The landscapes found to the South and East of the Tees-Exe line contrast with those to the North and West of it."

The Glacial System.

LITHOSPHERE

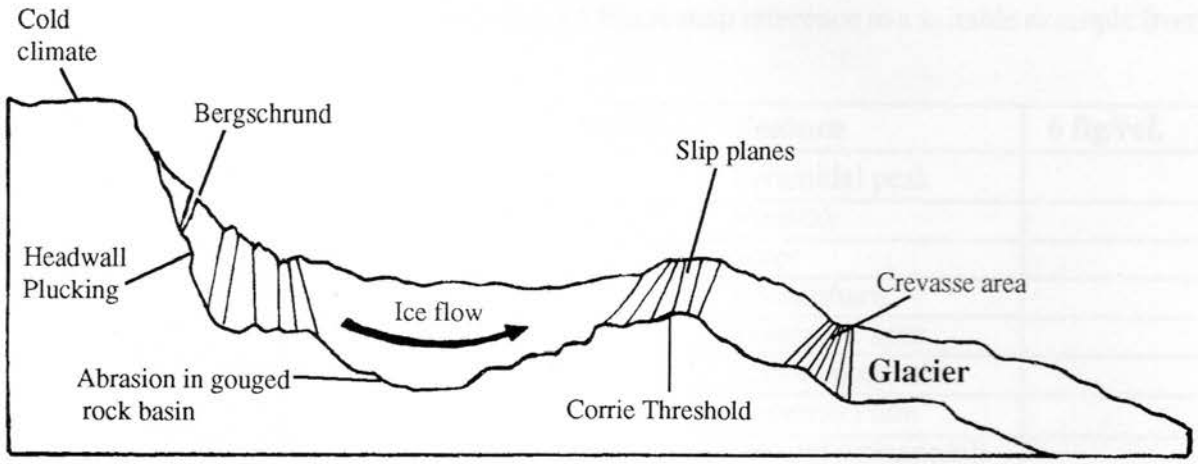
A **glacier** behaves as a system with inputs, processes and outputs (see diagram 1). Glacial activity is a balance between the **accumulation** of snow and **ablation**, or loss, by evaporation and meltwater to river systems.

Diagram 1 : The Glacial System



Inputs to the Glacial system include snow, falling as precipitation or from avalanches above. The glacier is water, as ice ,in **storage**. **Outputs** from the glacial system include water, either as meltwater or as water vapour as a result of evaporation, rock debris and ice, trapped in hollows .Where inputs exceed outputs , there is the zone of **accumulation**. In lower areas, where outputs exceed inputs, the zone of **ablation** (melting exists). The zone of **equilibrium** normally corresponds to the snow-line and is where the rates of accumulation and ablation are equal. Glaciers flow by **basal sliding** and **internal deformation**. Seeping meltwater accumulates at the base of the glacier and the weight of the upper layers of the glacier causes the lower layers to behave as a fluid. The rate of flow varies with the nature of the bedrock, amount of ice and slope.

Diagram 2 : Glacial Flow



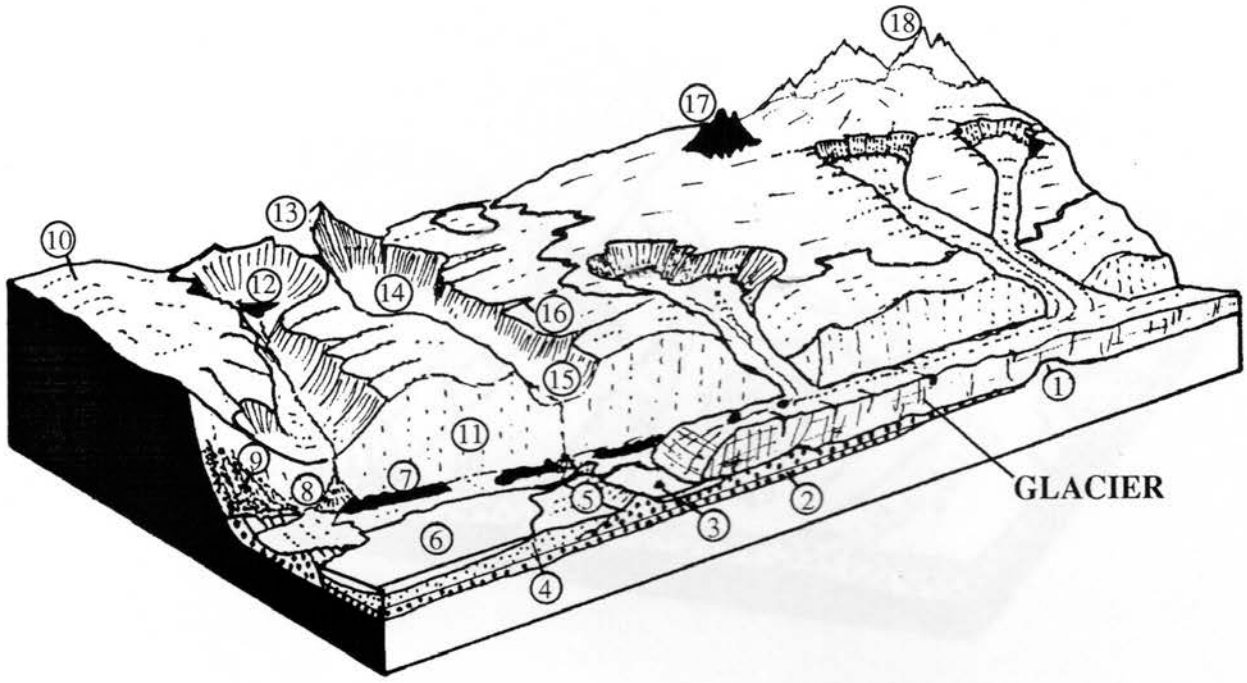
Glacial erosion occurs through **abrasion** (sandpapering) and **plucking** (tearing). Erosion is influenced by rock type and structure and the relief of the area. Generally, abrasion produces smoothed surfaces whilst plucking tends to produce jagged features. Where pressures from the ice above produce extending and compressing flows (see diagram 2) **differential erosion** creates a varied landscape. In the ablation zone, deposition occurs beneath the ice, by dumping at its margins and through meltwater or **fluvioglacial** processes.

Glaciated Mountain Scenery.

LITHOSPHERE

The mountain areas of the British Isles display many characteristic features of glaciated mountains such as those illustrated on the diagram below. Complete the following assignment using any OS. map extract of a glaciated upland area (eg. Aviemore/Cairngorms , Fort William or Torridon, etc).....

LANDFORMS OF GLACIATED MOUNTAIN SCENERY



Q

1..Identify the following features of glaciated mountain scenery by inserting the most appropriate number from the diagram above **and** by giving a 6 figure map reference to a suitable example from the OS map extract you are studying.

Number	Feature	6 fig/ref.	Number	Feature	6 fig/ref.
	Corrie/cirque			Pyramidal peak	
	Arete			Nunatak	
	Post glacial gullies			Scree	
	Hanging Valley			Lochan/tarn	
	Ribbon Loch			Truncated spur	
	Roche Moutonnee			Terminal moraine	
	Lateral Moraine			Outwash Plain	
	Ice-abrade slopes			Ground moraine/till	

Answer on a separate sheet :

2.. Using a suitable table, classify the above features into those which have been formed by : glacial erosion : glacial deposition : post-glacial action and those which are water features.

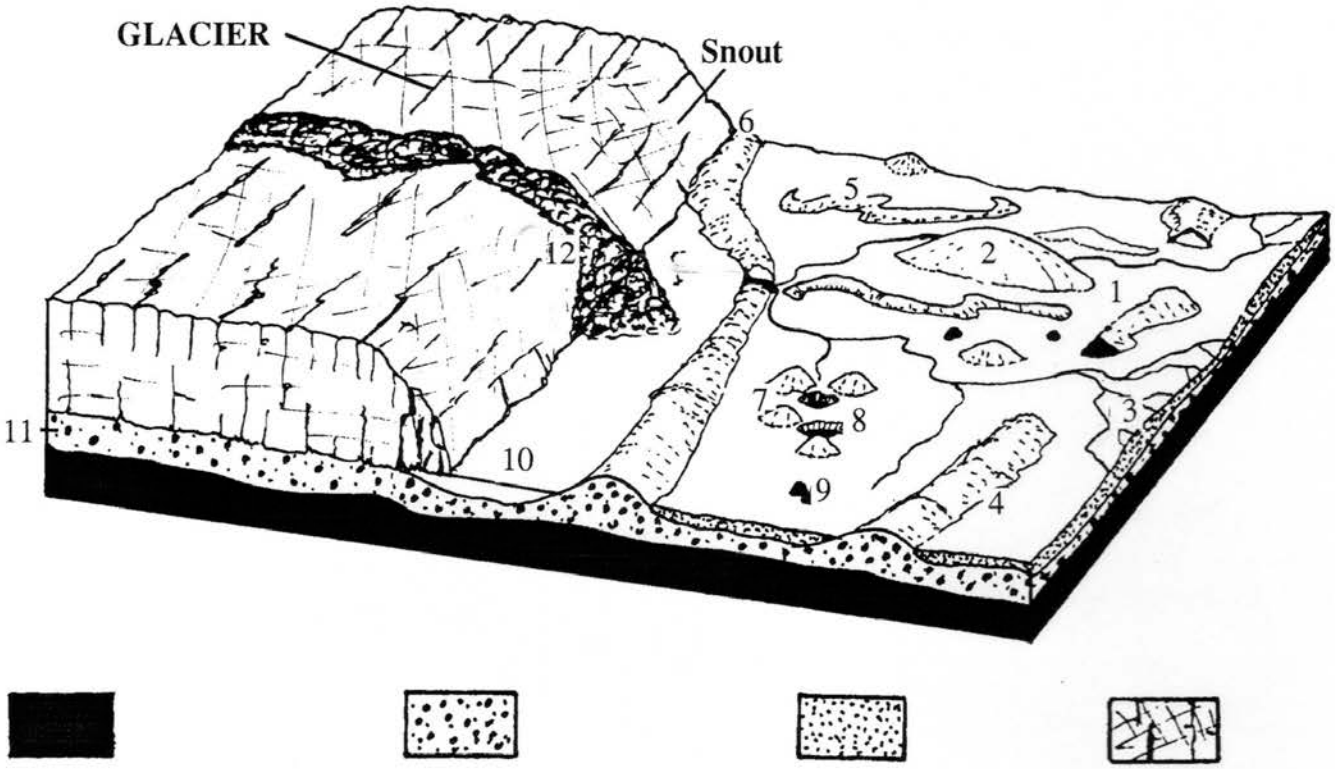
3.. Using relevant diagrams, explain the formation of at least one feature in each classification used in question 2 above.

Glacial Deposition Features.

LITHOSPHERE

Glaciation affected not only the major mountain areas, their summits and slopes but also the great valleys and lowland plains around their fringes. These areas also display many characteristic deposition features such as those illutrated below.....

LANDFORMS OF GLACIAL DEPOSITION



Q

1..Complete the key to the above diagram . **Choose from** : glacial ice, fluvioglacial outwash, boulder clay, bedrock.

2..Identify the following features of glacial deposition by inserting the most appropriate number from the diagram above.

Number	Feature	Number	Feature
	Drumlin		Push moraine
	Esker		Ground moraine
	Outwash plain		Kettle hole
	Terminal moraine		Medial moraine
	Kame		Braided stream
	Moraine-dammed lake		Erratic

3..Using a suitable table, classify the above features into those which have been formed by : fluvioglacial processes : ice deposition and those which are water features.

4..State 3 differences between drumlins and kames.

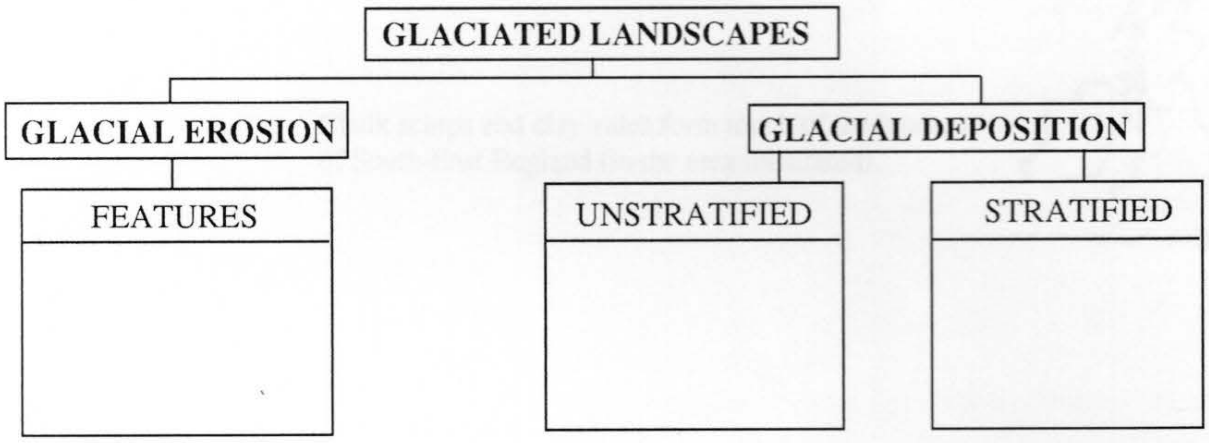
5..Using evidence from the above diagram, suggest a sequence of five stages for the evolution of the landscape shown.

Q

1..Write a full definition for each of the terms or phrases listed in the box below.

cirque	**terminal moraine**	**esker**	**till**	**kame**	**interglacial**	**kettle**
outwash plain	**lateral moraine**	**drumlin**	**arete**	**truncated spur**		
hanging valley	**erratic**	**Pleistocene**	**medial moraine**			
roche moutonnee	**bergschrund**	**Glacial**	**rock basin**	**serac**		
varve line	**glacier**	**ribbon loch**	**abrasion**	**striations**	**ablation**	

2..Copy and then complete a larger version of the table below as a classification of glacial features in the landscape.



3..Choose two examples of features of glacial erosion and two features of glacial deposition. With the aid of suitable diagrams, explain how each of these features was formed.

4..Which factors influence a) the rate of glacial erosion
b) the rate of glacial deposition ?

5..Outline the main differences between moraine and outwash.

6..In the last 18,000 years since the end of the Pleistocene Ice age, many beaches have been raised more than 25 metres above present sea level.

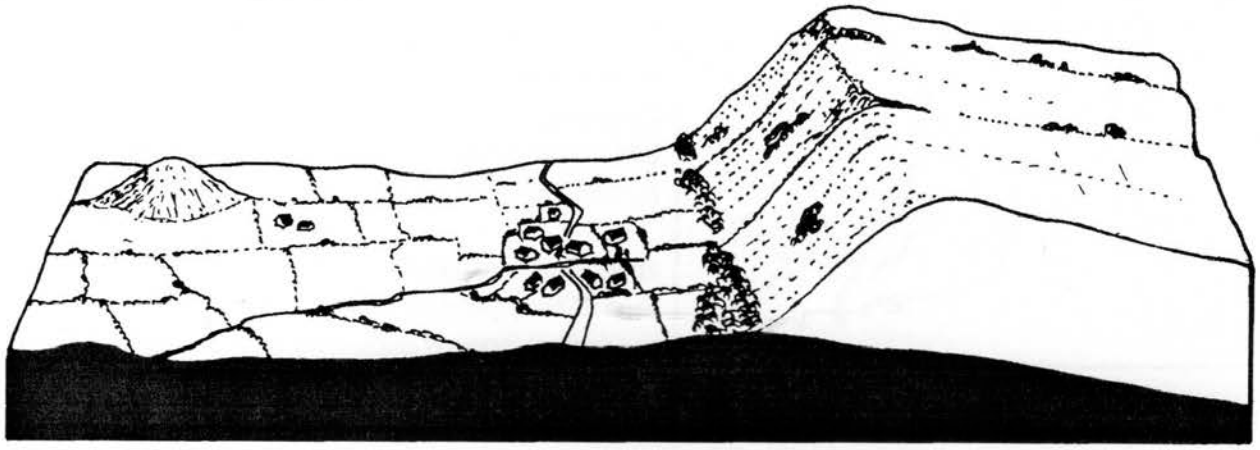
a) What is this process called ?
b) Explain why this has taken place.

Scarp and Vale.

LITHOSPHERE

Chalk landscapes form the North and South Downs and Chiltern Hills of South East England. These areas are often referred to as **Scarpland** - a series of alternating chalk ridges and clay vales such as that shown in the diagram below.

Scarpland



Chalk scarps and clay vales form much of the landscape of South-East England (in the area illustrated).

Q

1..a)What type of rock is chalk ?

b) What are the main properties of chalk ?

2..Copy and complete the following table, matching the correct heads to tails :

Heads	Tails
Scarp	gentle slope
Dip	dry valley
Escarpment	rock through which water cannot penetrate
Vale	remnant of chalk with flint nodules
Coombe	site where water reappears at surface
Outlier	steep slope of exposed chalk
Spring	eroded anticline with a steep slope and a gentle dip slope
Bourne	rock through which water penetrates the pore spaces
Permeable rock	area of clay forming valleys in Scarpland
Impermeable rock	winter stream in a chalk area.

3..In which way is Scarpland a good example of a landscape produced by **differential erosion** ?

4..Identify, by using a your own copy of the above diagram, the main features of structure, rock type and landscape of the area of Scarpland shown.

Mountain Limestone Scenery

Limestone contains at least 80% Calcium Carbonate and has many visible fragments of the fossilized skeletons and shells of the plant and animal life of the ancient seas which covered parts of the British Isles from about 600 million years BP (before present).

Mountain or Carboniferous Limestone exerts a strong influence on the form of landscape. The main reason for this statement is that limestone produces a series of distinctive landforms not found on other rocks and most limestone landscapes produce very prominent edges, scars and pavements.

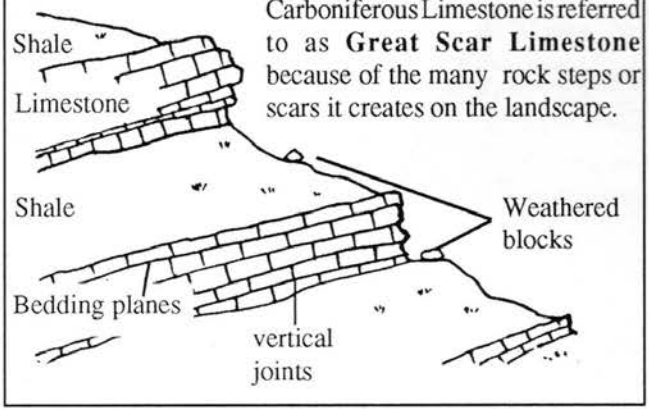
Carboniferous Limestone is found in thick beds separated by virtually horizontal bedding planes with right-angled joints. The limestone is pervious but not porous since water passes along the bedding planes and down the joints but not through the rock pore spaces.

Fig.1 Major areas of Limestone in Britain

Small areas of Carboniferous Limestone are found in Scotland in the Ochil , Pentland and Bathgate Hills. In Europe, major areas are to be found in Yugoslavia and in the Cevennes, France.

KEY Jurassic Limestone
Carboniferous Limestone

Fig.2 Fieldsketch of a Limestone outcrop



Carboniferous Limestone is referred to as **Great Scar Limestone** because of the many rock steps or scars it creates on the landscape.

Carboniferous or Mountain Limestone outcrops extensively in the Pennines of North Yorkshire, the Peak District, the Mendips and the Brecon Beacons of South Wales. In these areas the limestone produces what is known as Karst scenery. The Carboniferous Limestone is a hard, grey sedimentary rock with which certain distinctive landforms are associated . One of the most striking is the limestone pavement, a horizontal area of bare limestone, dissected by widened joints (called grykes) into a series of irregular blocks (called clints). Where persistent widening of a major joint occurs, perhaps by a surface stream sinking underground, a swallow-hole (a funnel-like depression) forms. The effect of groundwater in limestone uplands is to produce caves, stalactites and stalagmites.

Limestone is soluble. Rainwater (a weak carbonic acid) together with humic acids from any covering morrland vegetation, dissolves the limestone and widens the bedding planes and joints. With the lack of surface drainage and little breakdown of bedrock to form soil cover, vegetation tends to be thin or non-exstant. This aids in the frost-shattering of scars and steep slopes producing screes. In Britain, the limestone uplands provide a rolling, plateau-like landscape, devoid of surface drainage. But rivers occupying deep troughs have dissected the limestone uplands into its characteristic block-like landscape.

The limestone is almost horizontally bedded. Gradual solution by water seeping down the vertical joints widens and deepens these cracks into fissures called grykes.

Separated by the grykes are relatively flat topped blocks called clints. Famous limestone pavements are to be found above Malham Cove, Y.Dales.

Fig.3

Karst Landscapes

LITHOSPHERE

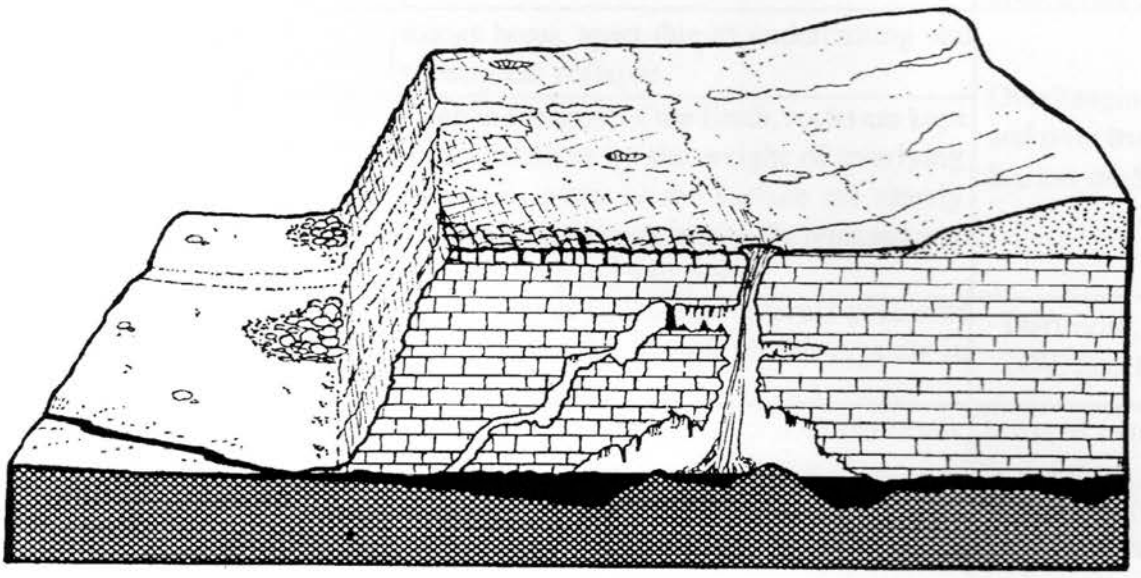
Answer the following questions on Mountain or Carboniferous Limestone areas in the British Isles.

1..Complete the names of the areas of limestone numbered 1 to 6 on fig. 1 (sheet **15**) using the table alongside.

Number	Area
1	
2	
3	
4	
5	
6	

2..Define the term Karst Scenery.

Karst Landscape



3..Using the list below, label the above diagram of Karst Scenery.

cavern, stalagmite, scar, pillar, swallow hole, shake hole, stalactite, joints, pavement, resurgence, pothole, impermeable rock, clint, gorge, gryke, dry valley, bedding planes, limestone plateau, scree, underground stream

Answer on a separate sheet

4..Classify the above list of Karst features into those : caused by surface solution : which are drainage features : which are underground depositional features and those which are the result of underground drainage.

5..Using relevant diagrams, explain the formation of at least one feature in each classification used in question 4 above.

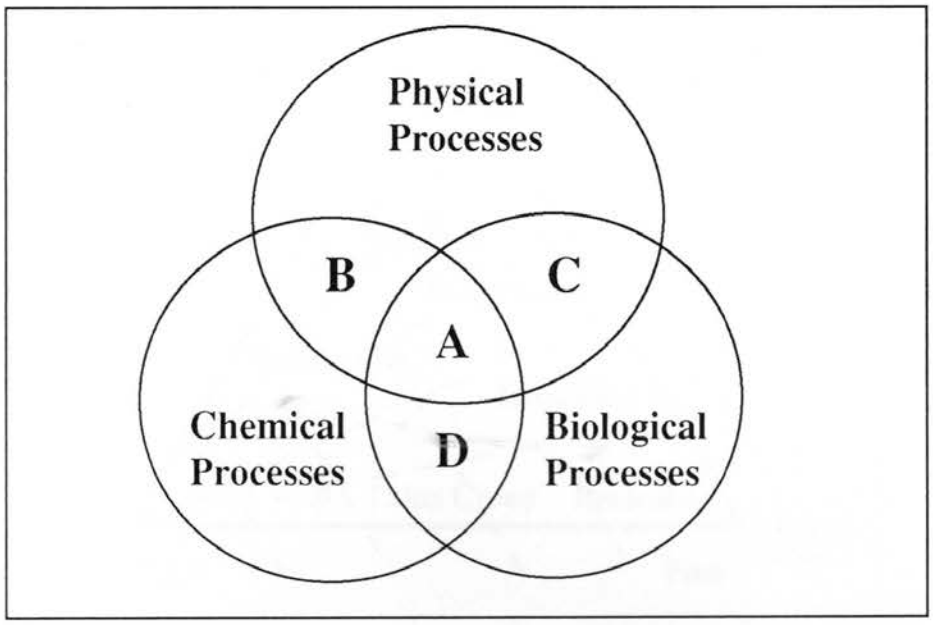
Weathering processes

LITHOSPHERE

Weathering is the small-scale break-down of material in contact with the atmosphere in the same place as it was originally (in situ). The material can be solid or broken rock, or artificial materials or objects. Weathering results in the production of a regolith (a layer of broken materials lying on top of the original material). The top part of the regolith may further develop into soil. The main factors affecting weathering processes are climate, rock type and local factors (eg. vegetation, soil depth and speed of erosion). Weathering can be classified as follows....

Type	Weathering	Effects	Distribution
Physical	Freeze-Thaw	Rocks frost-shatter as water freezes and expands in joints or cracks. Scree is produced.	High altitudes & latitudes, cold with sufficient moisture.
	Exfoliation	Layers of rock peel from the surface due to repeated heating and cooling. Scree-sand is produced.	Tropical arid areas eg. Arizona desert.
	Granular Disintegration	Rocks disintegrate to particles the size of individual minerals due to differential pressure/contraction of minerals.	Arid and semi-arid tropical areas eg. Thar Desert
	Mechanical collapse	Rocks break apart due to undercutting and subsequent collapse.	Overhanging cliffs and river banks, eg Barton-on-Sea.
	Dilation or Pressure release	Deep in the crust of the Earth, rocks are kept under pressure by the weight of overlying rocks. As rocks at the surface are slowly removed, pressure is gradually released and the rocks expand and crack.	
	Salt Weathering	Rocks shatter because of internal pressures increased by the growth of salt crystals in weathered rocks.	Dartmoor, NW. Scotland
Chemical	Solution	Some weathered products or rock materials dissolve.	Areas of exposed limestone.
	Hydrolysis	Due to exchanges between water and minerals, layers peel away from rock spheroidically weathered.	Humid tropical areas and volcanic rocks.
	Oxidation / Reduction	Changes occur with the addition or removal of oxygen in the chemical composition of the rock (in water).	Cliffs and river banks.
	Hydration/ Dehydration	Volume and chemical change with the addition/subtraction of water from the rock.	Shrinking of clays Swelling of shales
Biotic	Growth of roots.	Joints widened in rocks.	Forested areas
	Animal burrowing.	Aeration of soil helps other processes.	Rabbit warrens.
	Humic acids.	Excretions from plant roots and acids from decaying plants causes solution.	Peat bogs, moorlands.
	Enhanced solution.	Respired CO_2 in the soil aids solution.	Vegetated areas.
	Animal attack.	Limpets secrete acids dissolving rocks.	Coastal areas.

Q Study the following method of classifying weathering carefully.



1..a) Using a larger copy of the Venn Diagram above, classify the types of weathering listed on sheet 17 under Physical, Chemical or Biotic Weathering.

b) Suggest ideal types of Weathering for each of the intersecting or overlapping zones **B, C and D**.

c) Write a full definition for zone **A** .

2..In terms of the types of weathering, classify all the following :

tors, rabbits, acid rain, karst, screes, sand, grykes, cliff collapse, tree roots, stalactites, humic acids, kaolin, shrunken clays, limpet acid, widened joints, lichens, swollen shales.

3..Explain clearly the main differences between each of the following :

a) Regolith and soil b) Frost shattering and exfoliation

4..Describe the differences between the main types of physical weathering.

5..Describe 3 factors other than precipitation which affect the type and rate of weathering in the British Isles.

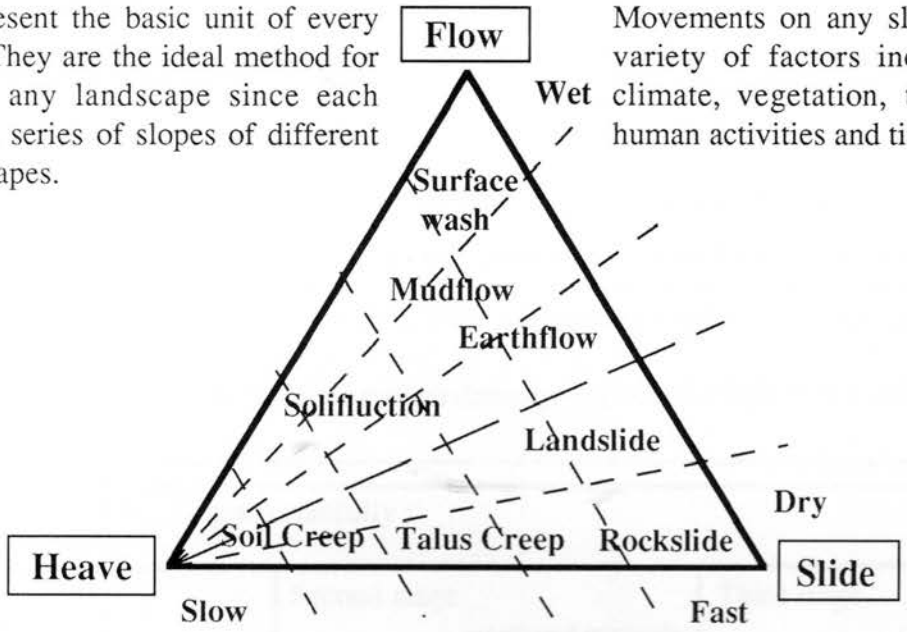
6..Which types of weathering are most likely to attack the rocks in :

Snowdonia, the South Downs, the Mendips, hot deserts, granitic areas, sandy coastal areas, clay vales ?

7..Outline the role of humans in weathering rocks.

Slope Movements

Slopes represent the basic unit of every landscape. They are the ideal method for classifying any landscape since each comprises a series of slopes of different sizes and shapes.



Movements on any slope depend on a variety of factors including geology, climate, vegetation, type of regolith, human activities and time.

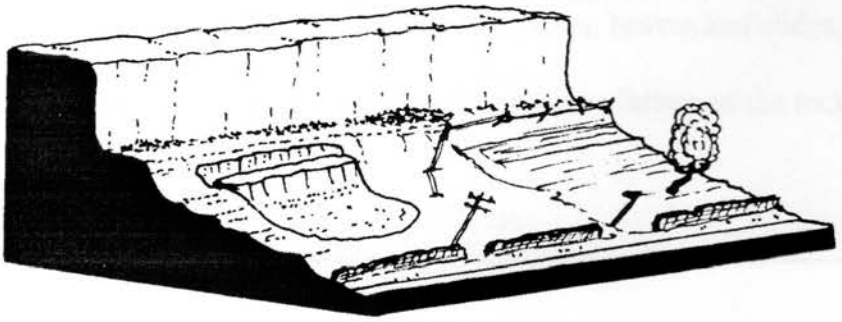
Q

1..Copy and complete a larger version of the diagram below, adding the labels from the diagram above in the most appropriate places :

Extremely Slow 10mm/yr.	Very Slow 1metre/yr.	Slow 1km/yr.	Moderate 1metre/hr.	Rapid 1km/hr	Very Rapid 1m/sec.	Extremely Rapid 100m/sec.
	A			B		
C		D				E

2..Write a brief definition of each of the following types of mass movements :
solifluction, soil creep, mudflow, landslide, rockslide

3..Make your own simple copy of the diagram below and add labels which :
a) identify the following landforms : **talus, lobe, terracettes**
b) identify the various types of mass movements illustrated
c) indicate the main evidence for mass movement on the slopes shown.



Lithosphere Exam style questions.

LITHOSPHERE

Q Answer any **two questions** on separate sheets of paper.

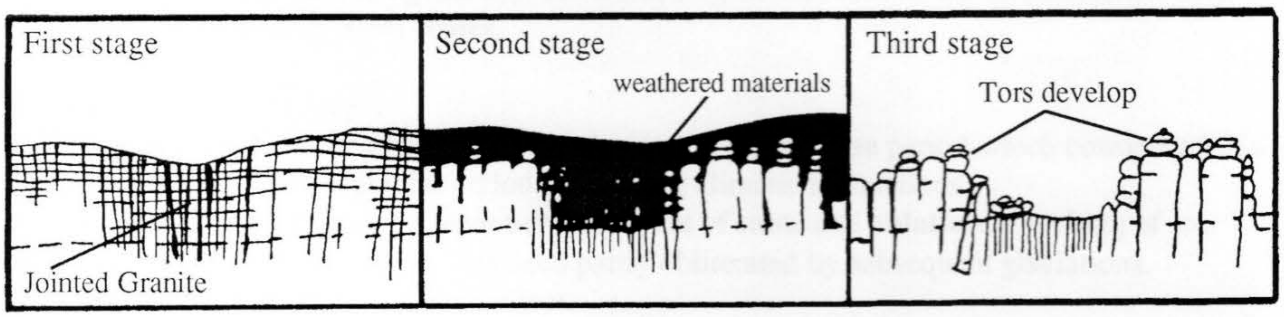
1..Describe and account for the distinctive physical landscape of **one** of the areas listed below. Your answer should refer to structure, rock type, landforms and drainage.

The Yorkshire Dales ; The Cairngorms ; The South Downs (9)

2...a) Draw a labelled sketch or diagram to show the structure, relief and drainage of a **scarp and vale** landscape. (5)

b) Write an explanatory account of the typical drainage pattern of a scarp and vale landscape. (4)

3..Study the following diagram carefully :



a) Describe the processes involved in the formation of a tor. (4)

b) Discuss the relationship between climate and the process of rock weathering in **Carboniferous Limestone** in the British Isles. (5)

4 a) Explain the differences between any **3** of the following rock properties :

permeable, impermeable, pervious, porous. (3)

b) Explain, using sketches or diagrams, the formation of any **3** of the following fetaures of Carboniferous Limestone scenery ;

pavements, sink holes, gorges, stalagmites, shake holes (6)

5 a) Use a suitable diagram to differentiate between the main types of mass movement. (Hint : construct a diagram woth scales which include flows, heaves and slides, etc). (4)

b) Which slope processes operate on a free rock face to cause the failure of the rock and rockfalls ? (2)

c) List the likely main evidence for soil creep on a hillside. (3)

Lithosphere revision summary : 1

LITHOSPHERE

Main idea :

The Lithosphere displays a range of landforms and patterns which can be explained by reference to a variety of different processes on different scales.

British Isles Geology

1.. Major **tectonic** movements together with long periods of intense mountain building and erosion have been common features of Britain's geological development.
2.. Britain's **complex geology** is the product of its varied past and consists of a combination of igneous, sedimentary and metamorphic rock types of varying ages and structures.
3.. All rocks influence the development of the landscapes of which they form the base.
4..Landscapes are a complex mixture of landforms of varying ages and origins.
5.. Landscapes are the result of agents of erosion working on the rocks of the earth's surface over very long periods of **time** at different **scales.**

Glaciated Upland Scenery
1.. Glaciers and ice-sheets occurred in Britain during the **Pleistocene** period which consiststed of a number of **glacial** and **interglacial** periods, reflecting climatic fluctuations.
2.. Glacial activity is a balance between **accumulation** of snow and **ablation** or melting of ice.
3.. Evidence of previous glaciations has been partly obliterated by subsequent glaciations.
4.. Glaciers follow and erode existing valleys.
5.. Most of Britain has been modified by glaciation, especially the uplands, many of which have suffered intense glaciation.
6..Abrasion and **plucking** are the two most important processes of glacial erosion.
7.. Glaciated uplands display features of glacial deposition especially in glacial **troughs**.

Scarp and Vale Scenery

1.. Several **sedimentary rocks** form a topography of scarps and vales in SE.England.
2..Scarpland is a young landscape of steep, limestone or sandstone slopes (scarps) separated by clay valleys (vales).
3.. The structure and scenery of the landscape of SE.England has evolved as a result of a combination of natural processes including tectonic movements, differential erosion and deposition.
4.. Humans have influenced the scenery of scarp and vale areas through draining vales and interrupting the **longshore drift** in the English Channel.

Lithosphere revision summary : 2

Upland Limestone Scenery

1..Upland, Mountain or Carboniferous Limestone forms **Karst** scenery in the British Isles.
2..Karst landscapes are composed of eroded and weathered carboniferous limestone which produces an **angular** landscape, devoid of surface drainage.
3..**Solution** is of major importance in shaping karst scenery producing characteristic limestone pavement features such as clints and grykes, and dissolving sub-surface strata.
4..The **rate of solution** of limestone depends in part upon the amount of Carbon Dioxide present in water acting upon it.
5..**Glaciokarst** is the name given to areas of upland limestone displaying features of glacial erosion.

Weathering

1..Weathering is the **small-scale natural breakdown** of rocks on the surface and can be classified into 3 main types : Physical Weathering, Chemical Weathering and Biotic Weathering.
2..**Physical weathering** leads to rock disintegration, producing large rock fragments.
3..**Chemical weathering** leads to rock decomposition, producing smaller rock fragments.
4..**Biotic or biological weathering** is a combination of both physical and chemical weathering caused by plants and animal action.
5..The unconsolidated weathered rock layer is called **regolith**.

Mass Movements

1..The movement of unconsolidated regolith or debris down a slope by gravity is known as **mass movement** or wasting.
2..Gravity, rock type and structure, slope angle and water content are important in determining the nature of mass movements.
3..Steep slopes produce **rapid** mass movements including rockfalls, landslides, mudflows and slumping.
4..Gentle slopes produce **slower** mass movements including slope wash and soil creep.
5..**Humans** influence mass movements through deforestation, road building and quarrying.

Slopes

1..The relationships between inputs, processes and outputs determine the **angle of any slope**.
2..The angle of a slope is measured with reference to the horizontal and is determined by the horizontal length of the slope and its vertical height.
3..**Slopes in plan** consist of **slope segments**, which have constant angles and are straight, and **slope elements** which are curved. They are either **concave or convex**.
4..Slopes change in time by **declining, retreating or replacing** the original slope. These processes often work in combination on a slope.
5..Perfect balance between the inputs and outputs results in a **graded slope** developing.
6..The majority of slopes are **less than 45 degrees**.