Curriculum Visions

The Mountain Book

SECOND EDITION

Key to interactive features
Press Teacher's Resources box right to go straight to Contents page.
Click on any item in the Contents to go to that page.
You will also find yellow arrows throughout that allow you to:

- 1A
- go back to previous page
- go forward to next page
- C go back to contents
- I go back to information for that topic

Teacher's Resources Interactive PDF

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Dr Brian Knapp

Curriculum Visions

A CVP Teacher's Resources
Interactive PDF

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Author
Brian Knapp, BSc, PhD

ICT Advisory Teacher
Graeme Schrouder, BEd

Senior Designer
Adele Humphries, BA, PGCE

Editors
Liz Harman and Gillian Gatehouse

Illustrations
David Woodroffe, Nicolas Debon and Julian Baker

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Contents

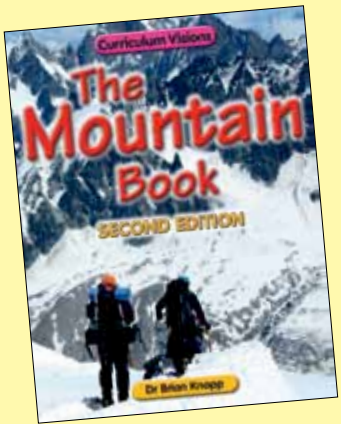
Section 1: Resources

Welcome to the Teacher's Resources for 'The Mountain Book' Second Edition.

The Mountain resources we provide are in a number of media:

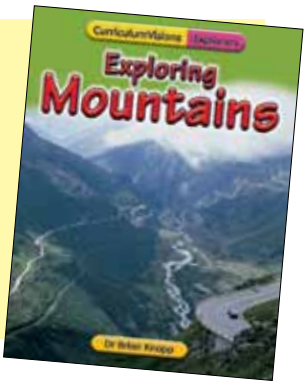
1

You can buy 'The Mountain Book' Second Edition. This is 48 pages long and covers the geographical principles of mountain environments.



2

You can buy the 'Exploring mountains' book which is 32 pages long.



3

You can buy the Mountain PosterCard Portfolio – four posters and a total of 28 A4-sized key diagrams/photographs on two folded, double-sided and laminated sheets.

In addition you can buy the 'How Mountains Work Poster' and the 'Mountains and People Poster'.

4

You can buy the supersaver pack that contains 1 copy of each book and poster, and the Teacher's resources (what you are reading).

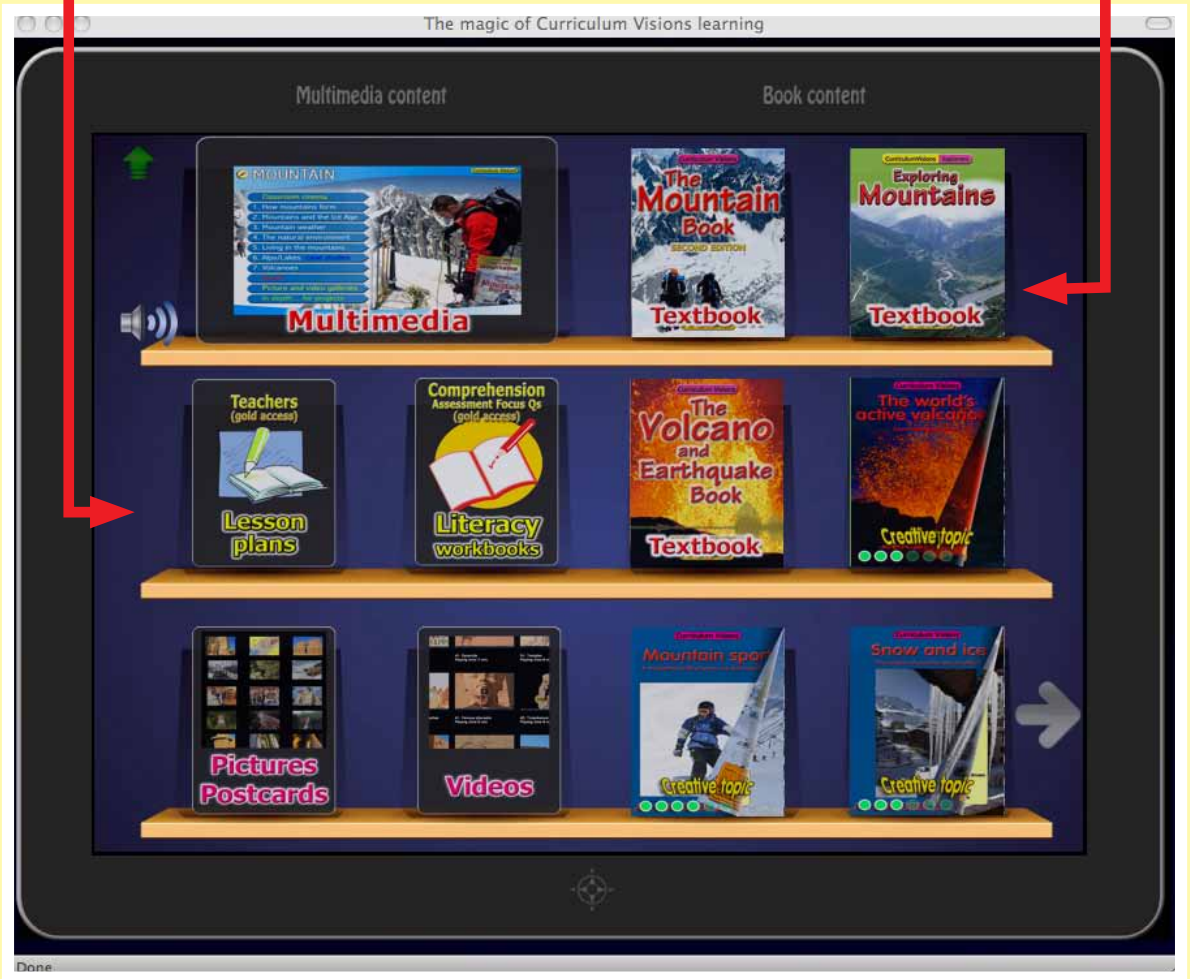
5

Our Learning Centre at
www.curriculumvisions.com
has almost everything you need to teach your primary curriculum in one convenient Virtual Learning Environment.

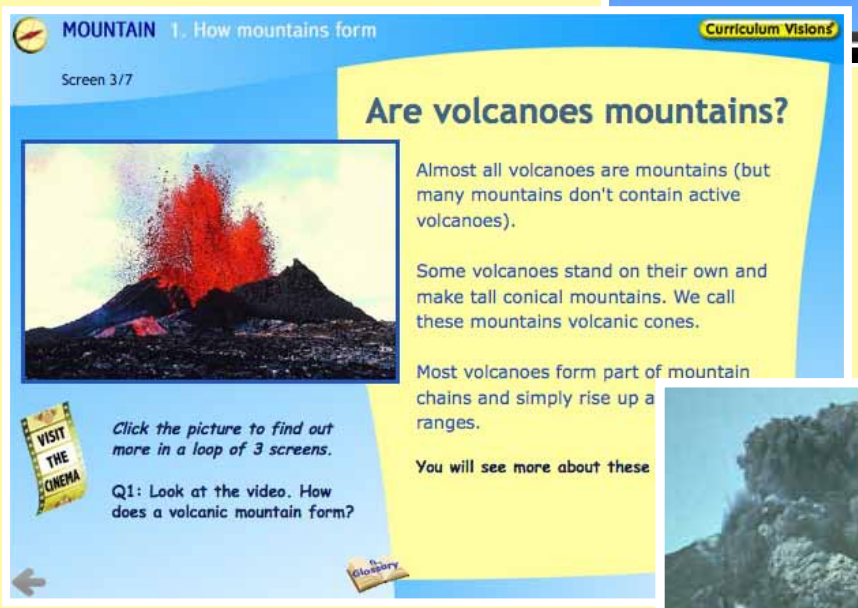
You can use support videos, e-books, picture and video galleries, plus additional Creative Topic books, graphic books called Storyboards, and workbooks. Together they cover all major curriculum areas.

All topics are easily accessible, and there is a built-in context search across all media.

You can also use our printed student books online as part of your subscription to the Learning Centre. There page-turning versions of every printed Curriculum Visions book for use on your whiteboard.



▼ The Mountain home screen



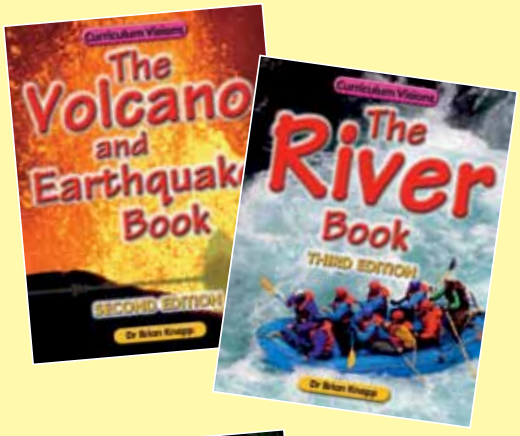
▲ Web site page

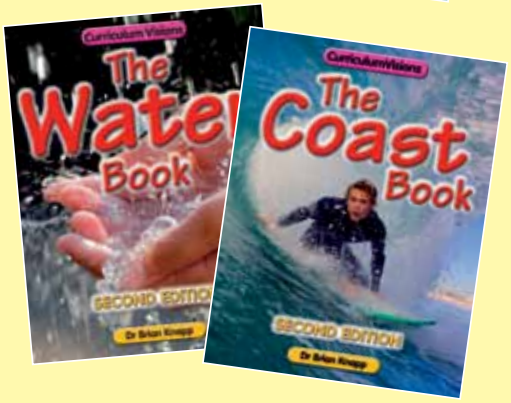
▶ Web site caption

6

The Mountain Mini-Movies CD contains information and examples that enhance the topics covered in The Mountain Book and provides a virtual field trip experience for a variety of mountains and volcanic features. Each mini movie is accompanied by pop-up field notes and a gallery of pictures to copy and paste into projects.

Linked resources





Matching the curriculum

The curriculum asks that students develop knowledge, skills and understanding relating to people, places and environments at different scales, both at home in the United Kingdom, and overseas.

The Mountain Book provides the foundation for you and your students to investigate how and why physical and human features of mountain environments are arranged, how people and places are linked, and how they relate to the wider world.

As with all parts of the geography curriculum, this book on mountain environments seeks to focus on questions like What/Where is it? What is it like? How did it get like this? How and why is it changing?

While covering the subject matter of the curriculum, The Mountain Book also facilitates the development and use of geographical skills.

ICT skills can be incorporated as well, with the aid of the web site or The Mountain and Volcano Project CD. Here students will find all the material they need for projects and case studies in a form that can be copied and pasted into other projects. In this way, students can make use of the wealth of photographs that we are presenting (there are several hundred on the web site and The Mountain and Volcano Project CD and 100 on The Mountain Picture Gallery).

This pack encourages students to consider their own attitudes and values, and those of other people. It also promotes respect for the environment and people's impact on it.

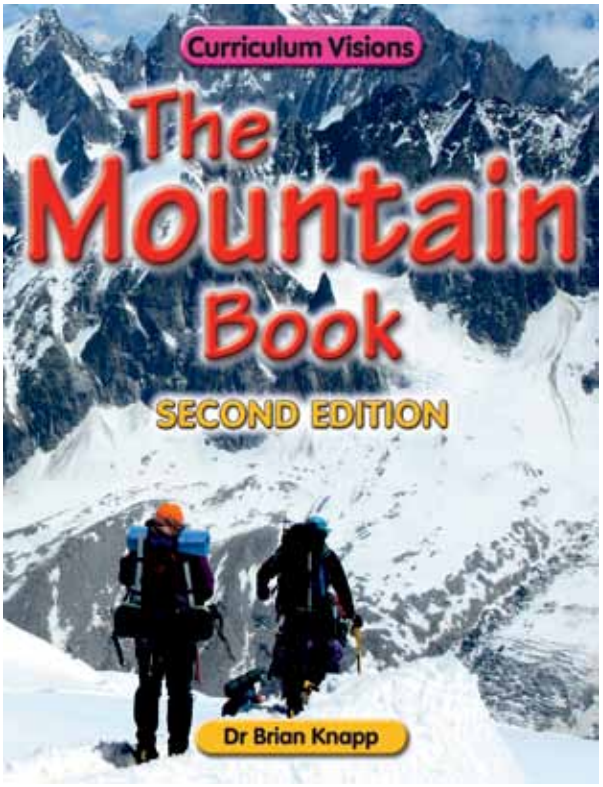
The pack is fundamentally built around the need to address the ideas of 'The Mountain Environment' and 'Understanding People and Places', particularly through the use on the web site or The Mountain and Volcano Project CD for case studies of the English Lake District, the Scottish Highlands, the Welsh Mountains, the Alps, the Himalayas, the Rockies, the Andes and the Hawaiian volcanic islands.

Section 2: 'The Mountain Book' explained

Although the student book – *The Mountain Book* – is clear and simple, a great deal of care and thought has been given to the structure and the content of each double-page spread. The worksheets in section 3 of this *Teacher's Resources* also directly link to the pages in *The Mountain Book*.

It is possible to use *The Mountain Book* and section 3 of the *Teacher's Resources* without reading this section, but we would strongly recommend that you take a short time to familiarise yourself with the construction of the student book.

The Mountain Book begins with a quick visual introduction to the mountain environment. This is followed by sections on the physical environment, weather, the natural environment and how people live in, and impact on, mountain environments.



▲ *The 48-page class book.*

Safety

Please note that on page 2 of *The Mountain Book* there is a passage about mountain safety.

It is important that students know that mountains are beautiful and exciting environments to be in, both for sport such as skiing, and for recreation such as walking and camping.

However, it is equally important that students are made aware of the fact that people who are unfamiliar with an environment often unwittingly place themselves in hazardous situations. Indeed, many accidents would not happen if people always took note of the landscape and weather, and avoided danger.

One of the values of geographical studies is to explain, in a very matter-of-fact way, the nature of mountain processes. This enables students to work out for themselves that some parts of the environment are hazardous. If they learn in this way, they may be more careful about putting themselves in situations where they could be at risk from exposure, flood, rockfall or avalanche.

Contents

The book is organised into chapters and subdivided into double-page spreads. Chapters are shown on the contents page and are colour coded. Matching coloured headers run across each spread. The concept is paralleled by the pages on the web site.

Each spread has a heading, below which is a sentence that sets the scene and draws out the most important theme of the spread. The main text of the page then follows in straightforward, easy-to-follow, double column format.

Words highlighted in **BOLD CAPITALS** in the student book are defined in the glossary on pages 46–47. The majority are technical words important to the subject, but some are simply difficult words. The glossary definitions help to reinforce the meaning of a word that may be slightly ambiguous if taken out of context. Many technical words used by geographers are also used in everyday situations where they may have a different meaning (e.g. crust, fold, vein). A visual dictionary is also given in *The Mountain and Volcano Project* CD.

The glossary words are highlighted on the first page where they are encountered. They may be highlighted again on subsequent pages if they are regarded as particularly important to that page or spread.

Please note that case studies have been especially chosen from various parts of the world. Thus, a spread that deals with the Himalayas may be followed by one on the Rockies and one on The English Lake District. In this way, students will automatically be exposed to a number of contrasting environments. However, it will be especially helpful to remind students to look carefully at the way the pictures and their captions are related to, and often extend, the theme of the spread.

Chapter 1: In this book

Spread 1 (pages 4–5)

The mountain environment

1A 1C 1B 1D

This spread provides a summary of mountain environments.

Points 1–13 identify landscape features, characteristics of the weather, and how people interact with the mountain environment.

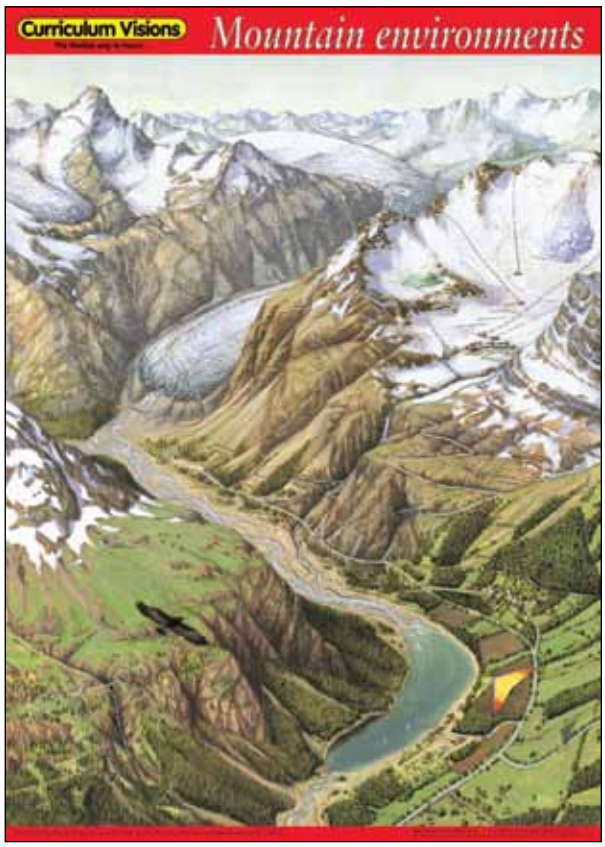
Each of these features is linked to:

- a spread further on in the student book
- worksheets in section 3 of this *Teacher's Resources*
- *The Mountain and Volcano Project CD*
- the web site

The picture on page 5 of the student book (shown above) or the larger version shown on the *Mountain environments poster* (top right) should be used to reinforce the geographical principles encountered as you go through the book. It also provides a focus for revision at the end.

An annotated version of this picture is given on page 29 of this *Teacher's Resources*.

Many of the words shown on page 4 are highlighted as glossary entries (the meaning of each word will become more apparent when it is encountered on the relevant page later in the context of the supporting explanation and information).

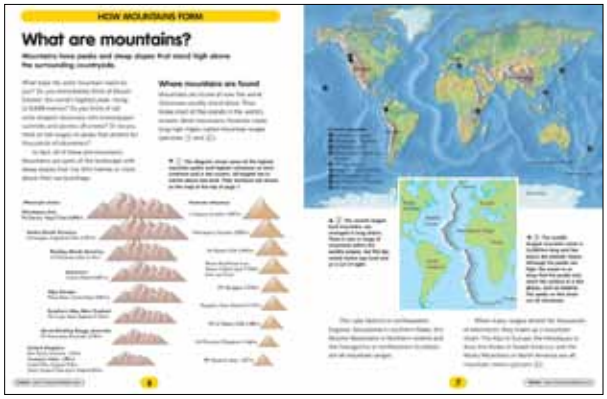


▲ *Mountain environments poster.*

Chapter 2: How mountains form

The material in these two spreads is fundamental to an understanding of all the aspects of mountain environments that will be covered later on.

Spread 2 (pages 6–7)
What are mountains?



2A 2B

This spread explains what mountains are and where they are found. There is a map which shows the mountain ranges of the world, and also a diagram that shows some of the world's highest ranges and peaks. (The web site and *The Mountain and Volcano Project CD* contain the heights and details of many more peaks and mountain chains.)

The spread explains that there are mountains in the sea as well as on land, but that they are mainly submerged. A map shows the pattern of the mountains in the Atlantic Ocean.

When looking at this spread, students are likely to be curious as to how these mountains formed, what has caused the pattern of world mountains, and why mountains are so high. The purpose of the next spread is to answer such questions.

Spread 3 (pages 8–9)
Mountain chains

3A 3B

This spread considers how mountain chains are formed. The focus is on both fold mountains and volcanic mountains.

The terms 'plates' and 'crust' are introduced. A simple demonstration shows how, by using a tablecloth, it is perfectly possible to make a pattern of mountain ranges which looks almost identical to a pattern that you would see from a space shuttle or a satellite. This student-based model can be replicated in class. The movement of the students' hands mirrors the movement of the earth's crust.

The diagram of the structure of the earth will help the more able students to see that the collision of the plates causes a crumpling of mountains and, therefore, explains why they are folded and occur in parallel ranges.

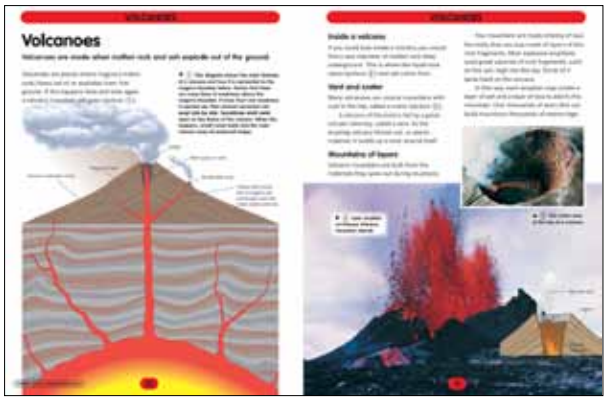
Some mountain chains (usually those where two continents collide) have few volcanoes, while other mountain chains (where continents and ocean plates collide) are mostly volcanic.

Chapter 3: Volcanoes

This section contains more material than in the previous editions of the book. Nevertheless, it is condensed information, and if you require more, then you can find it in *The Volcano and Earthquake Book*.

Spread 4 (pages 10–11)

Volcanoes



4

Although there are two different types of volcano in the world, one which erupts mostly runny lava at splitting boundaries, (like Hawaii) and one that emits mostly ash and gas very violently, at crushing boundaries (like Mt St Helens), we have concentrated here on the cone type called composite, that is a composite of layers of ash interspersed with layers of lava. That is what is shown on page 10 and represents the kind of volcano that causes violent and sudden eruptions as happened, for example, with Mt St Helens in 1980.

The diagram shows a cross section through the composite volcano and shows how it sits on a landscape of other kinds of rock. The other rocks have to be cracked by the pressure in the magma chamber to allow the magma to flow to the surface (where it then becomes called lava or ash,depending on what it does). At the end of the volcano cycle, as the volcano fades away, the volcano may become quieter and then it produces just lava, making it safer to approach. The pictures of the crater on page 11 show volcanoes that are not erupting strongly. Try to ensure that the students recognise the orange lava in the crater of picture 3. This is a very weak form of eruption. You can also see the layers of the composite volcano in the sides of the crater. A more vigorous form of eruption gives lava fountains as shown in picture 2.

Spread 5 (pages 12–13)
Dangerous explosions

5

This spread gives the famous case study of Mt St Helens. There are many photos of this event on the web site.

The idea here is to show how magma is often a sticky liquid under great pressure. The pressure is caused by the vent being blocked from the previous eruption and so when the vent is finally cleared, huge amounts of material come out, just like the air escaping from a balloon when it is pricked. Indeed, you can use this analogy in class by blowing up a balloon and pricking it. The enlarging balloon is the magma chamber. Because it is enlarging you know the volcano is about to become active (this is partly how predictions are made), but as you move a pin into the balloon, you cannot tell exactly when the balloon will burst (predict the actual moment of eruption). As students hear the outrush of air as a 'pop' they can imagine the same happening on a gigantic scale in the volcano. As the liquid rushes to the surface, the pressure drops dramatically and much of the liquid turns to gas (including lots of steam). The other parts remain liquid and get thrown into the air with great force, cooling and solidifying as they go. This is what produces the ash (picture 1). It's a difficult idea and you may also want to demonstrate it by shaking up a fizzy drink bottle then taking the top off.

Chapter 4: Mountains and the Ice Age

Having briefly explained the causes of mountain ranges and their height, the next stage is to explain how they are sculpted by the forces of the weather. The next three spreads concentrate on the work of ice. The work of rivers is also briefly covered, although it is far more extensively dealt with in the companion Curriculum Visions title *The River Book*.

Spread 6 (pages 14–15)
Ice in the mountains

6

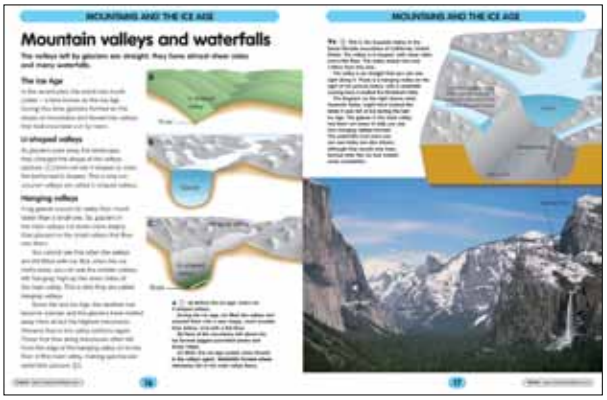
To understand how mountain landscapes are sculpted, it is essential that students know about glaciers. The central diagram shows the main characteristics of glaciers.

It is important to explain how valleys are scoured during an Ice Age and that, because the erosion is on the bottom of the glacier, the valley gradually develops a U shape.

The concept of seasonal frost shattering of the rock above the ice is also explained here. Frost shattering plays an important role in producing jagged peaks and knife-edged ridges.

The following spreads deal with some of the most obvious features of a post-glacial landscape (and thereby explain mountain waterfalls, lakes etc.).

Spread 7 (pages 16–17)
Mountain valleys and waterfalls



7

In other circumstances (for example, in a study of rivers) students may have learnt that, in many parts of the world, waterfalls are the result of differential erosion of hard rock bands. Clearly, in mountains this is often not an appropriate explanation because many waterfalls are created by hanging valleys.

Two diagrams are used to help students understand the concepts involved. The first diagram shows a sequence that demonstrates how glaciers change the shape of valleys.

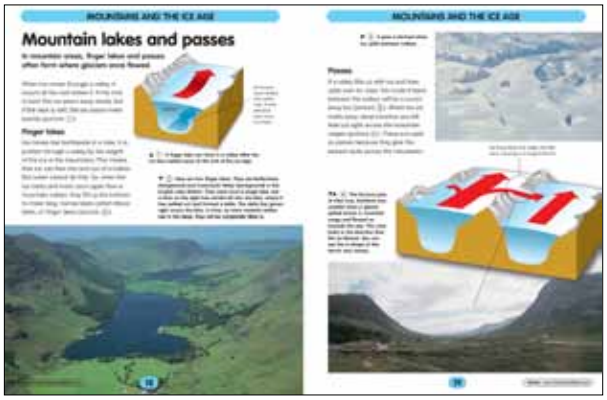
The second diagram reconstructs the environment of the Ice Age. It shows that glaciers flowing in small tributary valleys cut down less effectively than glaciers flowing in major valleys. As a result, when the ice melts, the valleys of the tributary are left higher than those of the main valley.

The diagram is accompanied by a photograph showing a real mountain environment (in this case Yosemite Valley in the Sierra Nevada Mountains of California, USA).

NOTE: This section can be developed by using:

1. ***The River Book***
2. ***The web site* for more information on waterfalls in mountain environments**
3. ***The River and Water Project CD***

Spread 8 (pages 18–19)
Mountain lakes and passes



8

These pages deal with another of the most important and obvious features of mountain landscapes – how mountain lakes and passes are formed.

The English Lake District, the Scottish Highlands and the Welsh Mountains have many examples of ribbon/finger lakes. The diagram on page 18 shows how a glacier can scour soft rocks irregularly, and so leave a trench whose deeper sections are later filled with water, creating lakes.

Mountain passes are vital communications' links, and their presence helps people to travel around in a mountain environment.

Passes are created by ice spilling between valleys. A very simple explanation of how glaciers spill across mountain crests and gouge out passes is presented on page 19, and reinforced with a photograph of the Pass of Glen Coe, Scotland.

When students have completed this spread, they will have an understanding of the nature of the mountain environment, and can better appreciate its impact on the way people use it.

NOTE: This section can be developed by using:

1. ***The River Book***
2. ***The web site***
3. ***The River and Water Project CD***

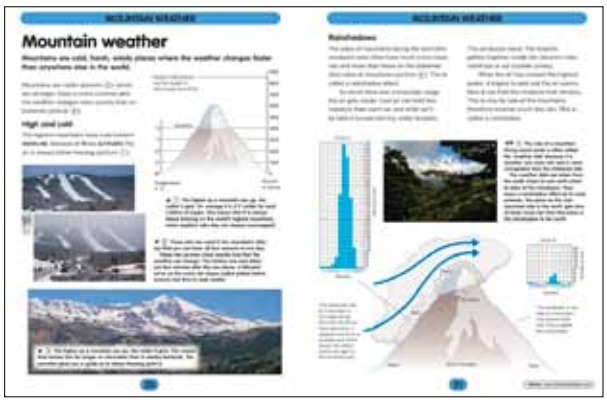
Chapter 5: Mountain weather

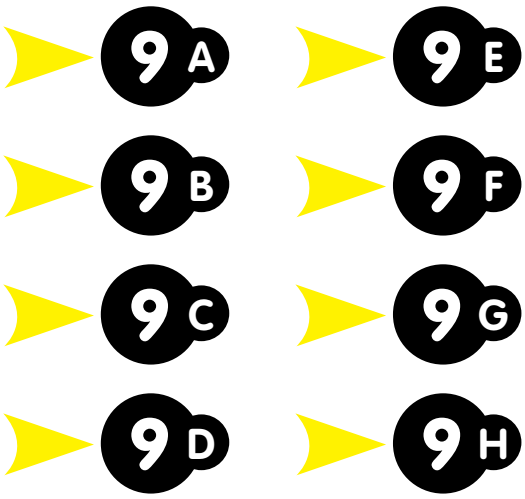
The two spreads that make up this chapter introduce the interaction of landscape and weather. The topics presented are concerned with altitude, rainshadows and microclimates.

You can extend this chapter greatly by using the many case studies on the web site or *The Mountain and Volcano Project CD*. Here you will find that each case study has weather data. Students can be asked to present this data in chart form as a link with Mathematics. Some of this information is also given in the worksheets for spreads 9 and 10.

NOTE: This section can be developed by using the *Weather around the World* book.

Spread 9 (pages 20–21)
Mountain weather





The landscape has an important and sometimes overriding effect on the weather. Weather studies should begin by explaining that:

- temperatures fall with altitude
- moist air rising over mountains cools and sheds much of its moisture
- winds are stronger in mountains than on lowlands
- mountain weather is notoriously changeable (and so potentially hazardous).

The combination of coolness, higher precipitation and increased wind strength, creates a climate significantly different from that in nearby lowland areas.

One of the harder points to explain is that air pressure decreases with altitude, resulting in fewer molecules of gas in a given volume of air. Acclimatisation to prevent altitude sickness is an important factor when visiting mountains (see also spread 16).

In general, the windward side of a mountain has a much higher precipitation than the leeward side. The leeward side becomes a rainshadow area.

This is an important factor in understanding why some parts of a mountain chain, or range, or even an isolated volcano, are much drier than others. Furthermore, it explains why people's use of the land can be very different over short distances.

The example chosen as a focus for the spread is the Himalayas. You can use the data from other mountain ranges as given on the web site or *The Mountain and Volcano Project CD*.

For those using Kathmandu as a case study, the diagrams on this page offer a direct solution to dealing with this mountain climate. More data for that city can be found on the web site/Project CD.

Spread 10 (pages 22–23)
Blizzards and avalanches

10A 10B

Snow is much more bulky than rain, and doesn't seep into the soil, but simply accumulates during the winter. As a result, snowdrifts can bury animals, vehicles, houses and trees. Blizzards are extreme conditions in which wind speeds exceed 50 km/hr.

Snow in the air can be thought of as millions of tiny parachutes, easily caught by the wind and therefore able to drift. When on the ground, however, the points of the snowflakes act like anchors, preventing movement except in high winds. Once the snow is underway, the points of the ice crystals break off, and the snow moves as tiny rounded crystals.

In mountains where there is a great accumulation of snow, one most important feature of mountain weather is the avalanche.

Avalanches present a real danger in many mountain areas (but not the UK).

This spread explains what an avalanche is, why and where it occurs, how it moves down a slope, the damage it causes and how protection can be offered.

It is important to note that avalanches are only important in high snowfall areas, and then mainly in places where there are moderate slopes (gentle enough to allow the snow to build up, and steep enough to allow it to move quickly once disturbed). Avalanches are also specific to some types of landscape, such as mountainside hollows.

Chapter 6: Mountains and leisure

These spreads focus on the interaction of leisure, landscape and weather.

Spread 11 (pages 24–25)

Ski resorts

11

This spread concerns winter sports and the way in which they depend on just the right combination of mountain weather and landscape.

The two crucial elements for skiing are suitable, reliable snow and sunshine. The most popular skiing locations are therefore those with the most suitable weather, those which are easily accessible and those with landscapes that can be made into good pistes. As a result, certain areas will be preferred as skiing resorts over others, the best being more expensive than the others.

Here students learn that when a resource is limited, you have to pay more to be closer to it. This may help explain why some resorts used by school skiing parties are not next to the snow (or are not at the most popular locations).

Spread 12 (pages 26–27)
Camping in the mountains

12

The final spread deals with camping in the mountains and some of the aspects that need to be considered when planning a holiday. This spread is not related to the harshness of winter but to some of the surprises that might be encountered in the summer.

The emphasis here is on the potential of floods, which occur in many areas of mountains during the summer, and which have resulted in many fatalities in the Pyrenees, the Alps, and the Rockies in recent years. It also refers to the prospect of camping in exposed locations, the nature of windchill, and even the possibility of hypothermia in summer.

Chapter 7: The natural environment

This chapter concentrates on the way that wildlife responds to the particular conditions of a mountain environment and the presence of people. The three spreads in this section are divided into plants, animals and the human effects on the environment.

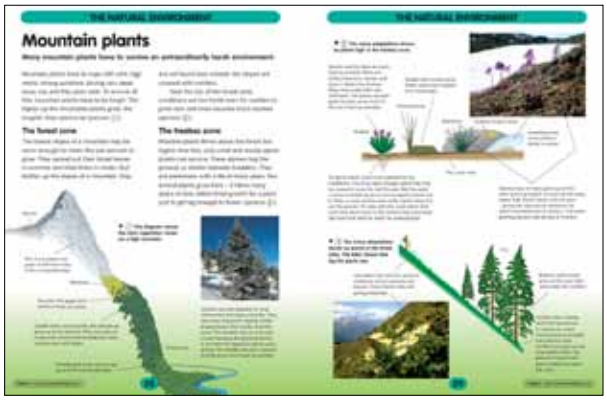
NOTE: This section can be developed by using the following Curriculum Visions resources:

1. ***Living Things in Their Environment***
2. ***Caring for our Environment***

Curriculum Visions Science@School resources for the following topics are also available from the publisher:

1. 6A Adapting and surviving
2. 4B Habitats
3. 2B Plants and animals

Spread 13 (pages 28–29)
Mountain plants



13A 13B

Mountains show clear vegetation zones, which relate to temperature, snowfall and exposure. Four zones are easily identified in the mid-latitudes (it is different in the tropics):

- broadleaved forests at the foot of mountains
- conifers
- meadows, and
- alpine plants close to the permanent snowline.

With increasing altitude, plants have to adapt to cope with strong winds, high snowfalls, frozen ground and a short summer growing season.

Spread 14 (pages 30–31)
Mountain animals

14

The way that animals occupy mountains is not clearly defined into zones in the same way as for plants, because many animals (especially the larger ones) are able to migrate. Small animals can be shown to adopt a different strategy, hibernating in burrows below the snow.

Relatively few animals can survive in the mountain environment because each animal needs a large territory to enable it to find enough food.

The example we have chosen is based on the Rockies, where there is a large area of protected wilderness.

Spread 15 (pages 32–33)
Protecting mountain environments

15

Protecting the mountain environment is obviously a very important topic, and one that can hardly be done justice to in a single spread. As a result, we focus only on the theme of tourist pressure.

Mountains are attractive places for holidays, but when people arrive in a fragile environment they should understand that their impact can be considerable.

At high altitude, plants live in a very stressful environment. Thus, lowland grass (which grows in a less stressful environment) will recover far more quickly from trampling than mountain grass.

Animals are often put under even more stress, this time not just by their natural environment, but also by people. The example used in the book shows the relationship of people visiting mountain areas that have deer.

You can also discuss the more dramatic interaction of people and bears. Bears (which exist in the Alps, Pyrenees, Rockies, etc.) are attracted to areas where people leave food litter. As a result, there can be a conflict between these wild animals and people. Bears (which are partly nocturnal) exploring a camp site for food, can cause damage and sometimes injure people in their tents. When bears invade camps there is often a clamour for them to be shot.

Children could consider techniques for protecting the environment, such as leaving certain areas as wilderness in order to allow wildlife to flourish without our interference.

This kind of decision is also relevant to such things as the use of mountain bikes, and the pressure to build more roads and provide tourists with ever easier access to mountains.

In this respect, pressure on mountains is no different to pressure on lowland wetlands, coral reefs and other fragile parts of our natural environment. The basic importance of caring for the environment in all situations can be stressed.

Chapter 8: Living in the mountains

In this last chapter, six spreads are used to examine the way in which people interact with mountain environments.

Spread 16 (pages 34–35)
Living on the roof of the world

16

This spread introduces students to the Andes, a mountain environment with which they are less likely to be familiar.

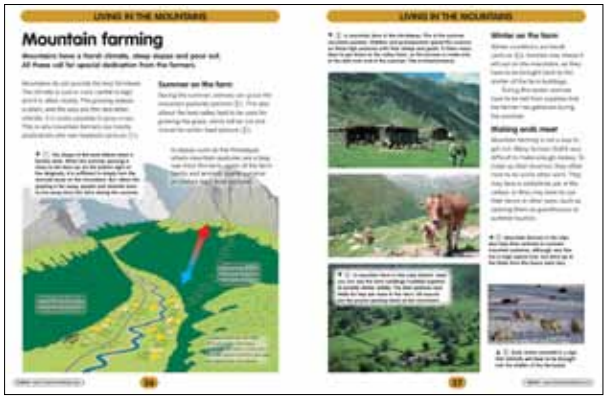
The central – and tourist – part of the Andes is a desert as well as a mountain chain.

This spread, therefore, introduces them to living in, and visiting a very high level mountain environment. It reintroduces the concepts of thin air in the problems of altitude sickness, bright sunshine, very changeable weather, and very cold nights.

Another purpose of the spread is to account for adaptations by native peoples, for example in styles of dress, pointing out that these clothes are a practical and enduring response to the environment in which they find themselves.

This spread also introduces the idea of researching weather data on the Internet (and more quickly on the Curriculum Visions web site or *The Mountain and Volcano Project* CD) and also explains that the nearest weather station to a given mountain environment could well be in a valley or on a plain some way away and, therefore, not a reliable guide to mountain conditions. This will help students to understand that they have to be very careful in their selection of weather data.

Spread 17 (pages 36–37)
Mountain farming



17

Farmers have difficult choices to make in getting the best out of mountain environments. The combination of harsh climates, steep slopes and poor soil means that most farmers need to be pastoralists.

Because the higher slopes will be snow-covered in the winter, traditionally many pastoralists would have gathered their animals in during the autumn and sold most for slaughter. A few would be kept over the winter to act as breeding stock for the next year. In spring, these animals would be taken to rough grazing or higher level pastures.

This change in the area used for grazing is common to low mountains, such as the English Lake District, as well as high ones, such as the Himalayas. The difference is that on high mountains the summer grazing is often very remote from winter fields. As a result, in high mountains transhumance has traditionally been a way of life.

Transhumance is still active in the Himalayas and other mountains in developing countries, but has ceased to exist in more developed countries as alternative ways of making a living have become available.

This spread also explains how farmers in both more developed and less developed countries, need to find alternative uses for their land, for example, for camping and other leisure activities.

Spread 18 (pages 38–39)
Homes for a mountain winter

18

Living through a mountain winter is an interesting topic about which students can develop their own views.

Students could be asked to write about what it would be like to live in isolation, surrounded by snow, for several months.

This spread describes how traditional homes have been adapted to conserve heat and to provide shelter for people and animals.

This is a topic which is particularly well illustrated by focusing on different types of traditional housing in the Alps.

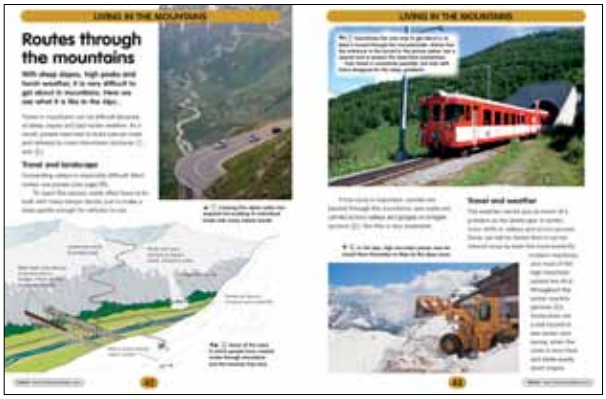
Spread 19 (pages 40–41)
Where towns are found

19

This spread looks at the nature of settlement sites, where people should build their settlement in order to make the most of the weather and also to be in a hazard free location, with low likelihood of avalanches or floods.

Students are introduced to the concept of aspect, that houses should face the morning sun, and mountain and valley winds in the context that cold air sinks from the mountain tops at night and fills the valley floors. As a result, many homes are built facing the morning sun and above the cold, flood-prone, valley bottom.

Spread 20 (pages 42–43)
Routes through the mountains



20

When they begin on this topic, students will already have an idea of the shape of glacial valleys and they will have been introduced to the idea of passes (pages 18–19).

This spread explores how people have to make use of the landscape by careful construction of roads that climb over passes, or have to build tunnels through the mountains. This explains why the number of routes is restricted and why mountain travel can be slow.

The weather is likely to produce long, cold winters, deep snow, blizzards and avalanches. Thus, in the winter months, many of the roads are blocked and people have to adopt alternative strategies, such as making provision to be self-sufficient in food and fuel until routes can be cleared.

Spread 21 (pages 44–45)
Seeking a fortune from the mountains

21

This spread provides a historical perspective on the problems faced by people who arrive in a mountain environment with little knowledge of what to expect.

During the 19th century gold rushes, prospectors were faced with extraordinarily harsh conditions and little money to equip themselves with the necessary provisions and clothing. This spread prompts students to discuss a number of concerns:

- Why should there be gold in mountains?
- Why did people rush to mountains?
- Why did they often have to walk enormous distances from ports and railheads to get to the gold fields?
- Why did so many of them perish?
- How did they destroy the environment where they were working?
- Why did the mountain boom towns grow so quickly and why are they now ghost towns?

You can invite students to make up stories that tell of the hardship involved. Many letters were written by prospectors back to their loved ones, describing the conditions. Students could also try to make up suitable letters. A starting point for this could be the historical information on the web site/Project CD. Go to Rockies, then Map, then Silverton.

Reference
The last three pages of the book contain the glossary and the index.

Glossary (pages 46–47)

The entries in the glossary are listed in alphabetical order. The short definitions are given in simple language for the context in which they are used. They are, therefore, not necessarily the same as definitions given in an encyclopedia or dictionary.

Where necessary, more breadth is given to a definition (to make it encompass other meanings, or make the definition more general).

Index (page 48)
A comprehensive index allows specific subjects to be found. The index can be used to encourage research skills.

Section 3: Photocopiable worksheets for 'The Mountain Book'

Introduction

The photocopiable worksheets in this *Teacher's Resources* have been designed to be a fast and efficient way of working through the study of mountain environments.

It is intended that you photocopy each worksheet and distribute the photocopies for students to complete. The questions are on all worksheets, except those relating to Worksheet 1 (see special instructions below).

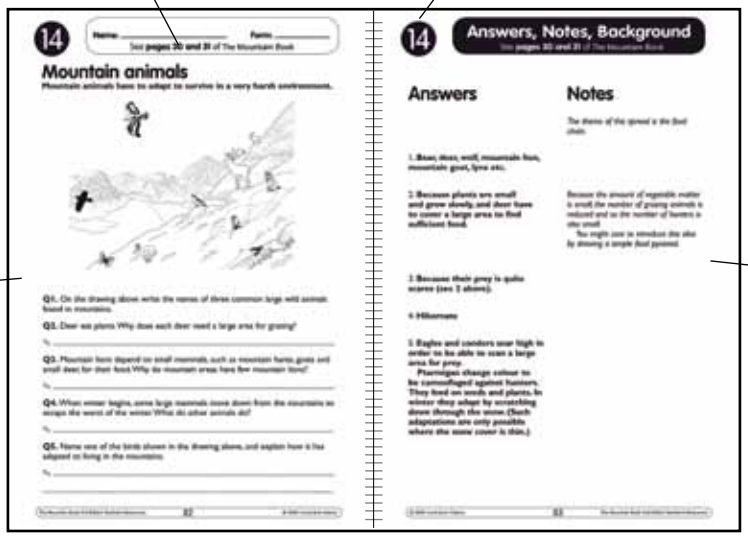
At the head of each worksheet are the relevant pages of *The Mountain Book*. So, 'See pages 8 and 9 of *The Mountain Book*', means that the answers to all of the questions can be found by using pages 8 and 9 of the student book, unless stated on the worksheet. Some of the worksheets also require the use of an atlas, the web site or *The Mountain and Volcano Project CD*. This is stated where appropriate.

Each worksheet has been given a unique number which is in a circle at the top of the page. If there are several differentiated levels for any worksheet, then they are labelled **A**, **B** etc.

The answers face each worksheet. Here you will also find additional information that may help in class discussion.

NOTE: Worksheets relating entirely to the *Mountain and Volcano Project* material can be found in section 5 (pages 106–127) of this *Teacher's Resources*.

Worksheet number – may be differentiated into A, B, C, etc.



The left-hand page is to photocopy and hand out to pupils.

The right-hand page provides the answers and teacher's notes.

Special note about worksheet 1

This worksheet allows you to check that students can isolate features of the mountain environment. To achieve this, several worksheets have been given. Use whichever ones you want.

You could use some of these sheets at the beginning of the course and some at the end as a reinforcement. You can easily also make up your own theme and ask this verbally in class. For whole-class teaching, and for going through the answers, the poster can be used as the equivalent of a 'big book'.

Special note about worksheet 9

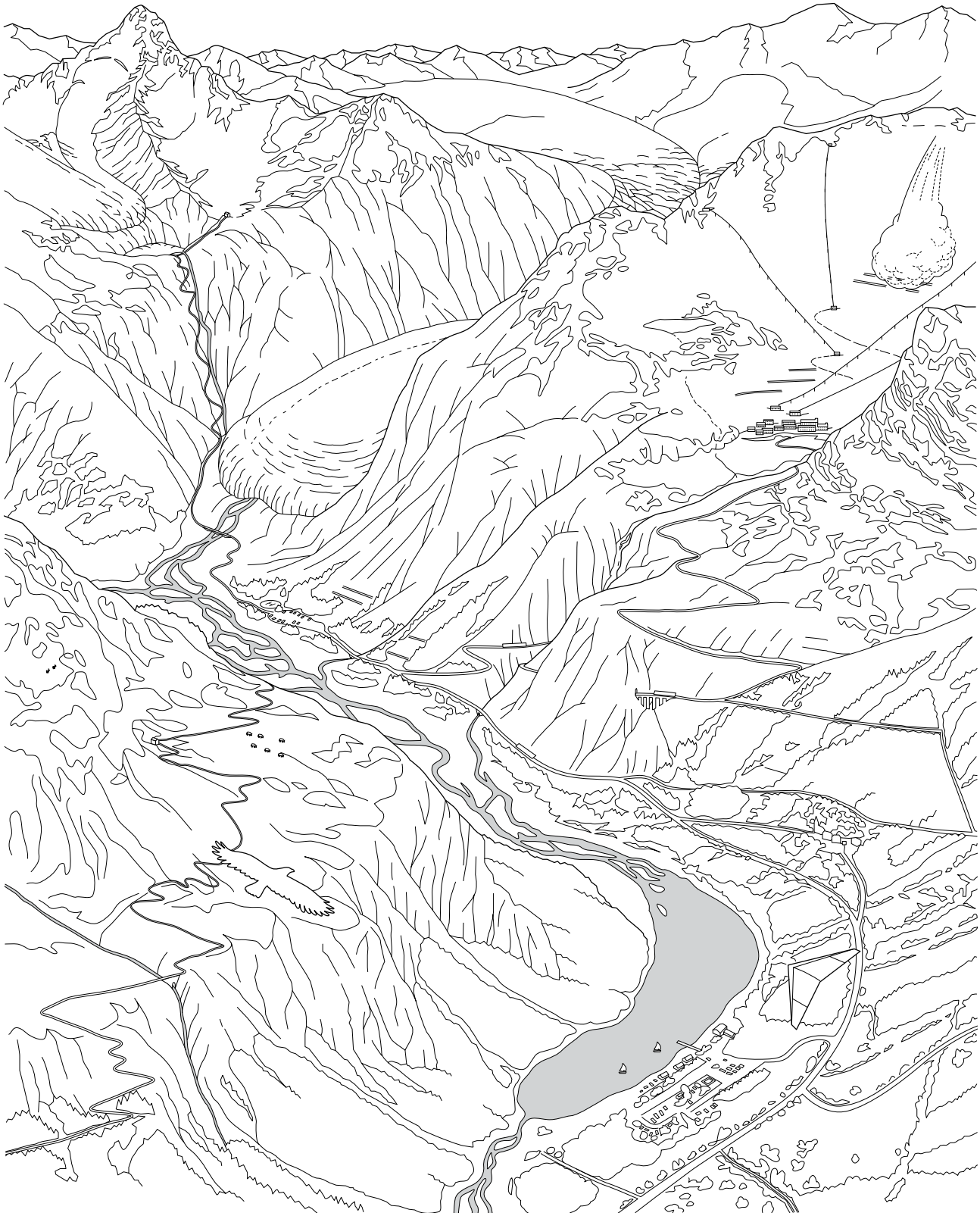
Mountain weather is often discussed in a regional context. To give you the greatest flexibility there are several versions of worksheet 9, with activities focusing on the Lake District, the Scottish Highlands and the Welsh Mountains, the Alps and the Himalayas. Choose from these the worksheets that best suit your lesson plans.

1A

Name: ..... **Form:** .....

See **pages 4 and 5** of The Mountain Book
or **Poster 1:** Mountain environments

Mountain environments

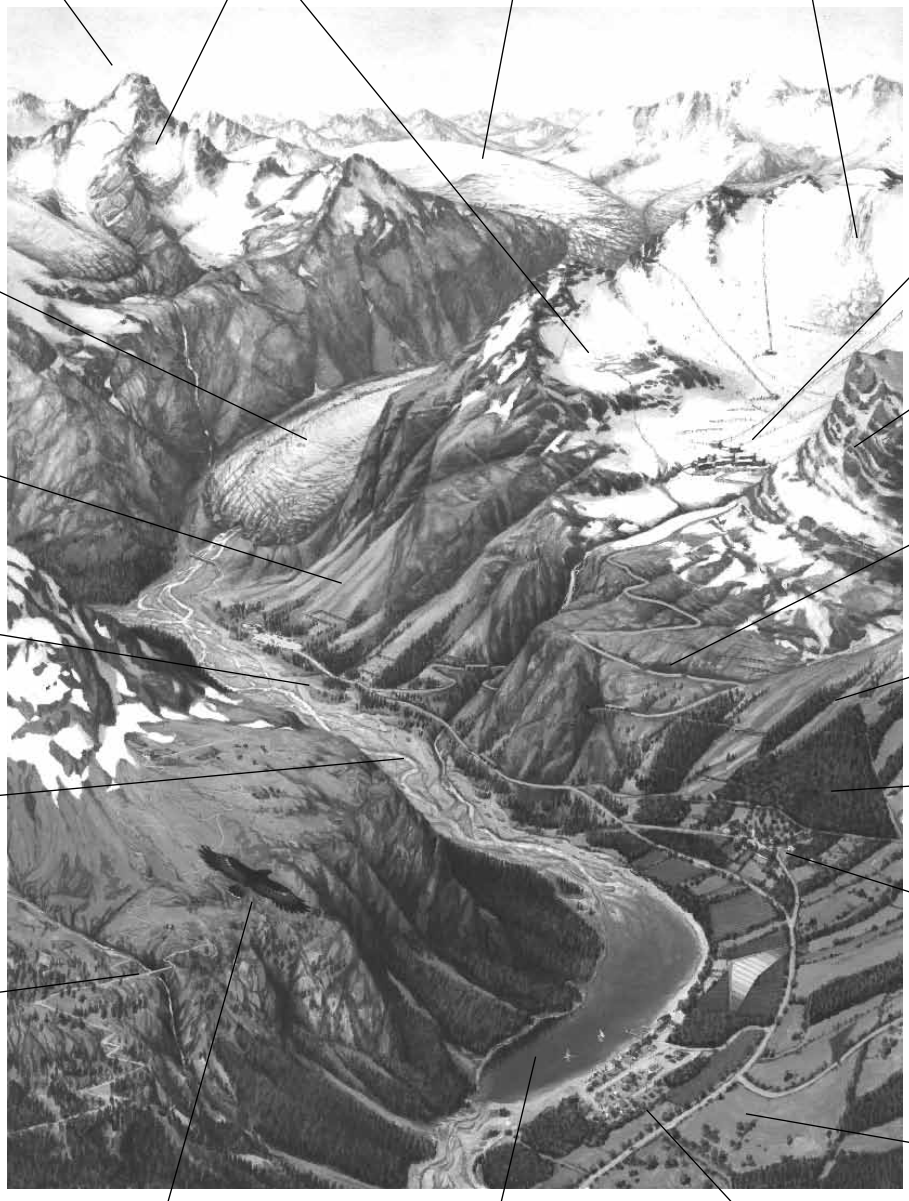


1A Answers, Notes, Background

See **pages 4 and 5** of The Mountain Book
or **Poster 1:** Mountain environments

The worksheet OPPOSITE has been left without any questions to give you the greatest flexibility.

Appropriate themes have been suggested on the following pages.



This is a pyramidal peak (horn) with corries on each side.

There are a number of corries and corrie glaciers.

This is an ice field or ice cap.

An avalanche is shown here. Notice its close connection to ski lifts. This can be the basis of a discussion on safety.

Glacier. Notice the curved lines are where the ice has broken up to give crevasses. The crevasse pattern shows the ice moving faster in the centre than at the ends, an example of natural friction.

This is a high level ski resort with ski lifts, pistes, etc.

Here you can see the structure of the rock, showing broad folds.

This is scree, produced by frost shatter on exposed slopes.

This road has hairpin bends to allow ascent of the steep valley side.

This is a U-shaped valley.

These are trails of former avalanches.

This triangular forest was planted to provide avalanche protection.

This is an alpine meadow. Notice the hiking trails and the way the trail crosses above a waterfall giving the best view of the falls.

Pasture and hayfields in the valley bottom.

This lake has formed in a part of the valley that was scoured deeper than elsewhere, possibly because the rock was softer. The lake is gradually being filled in with river-borne sediment.

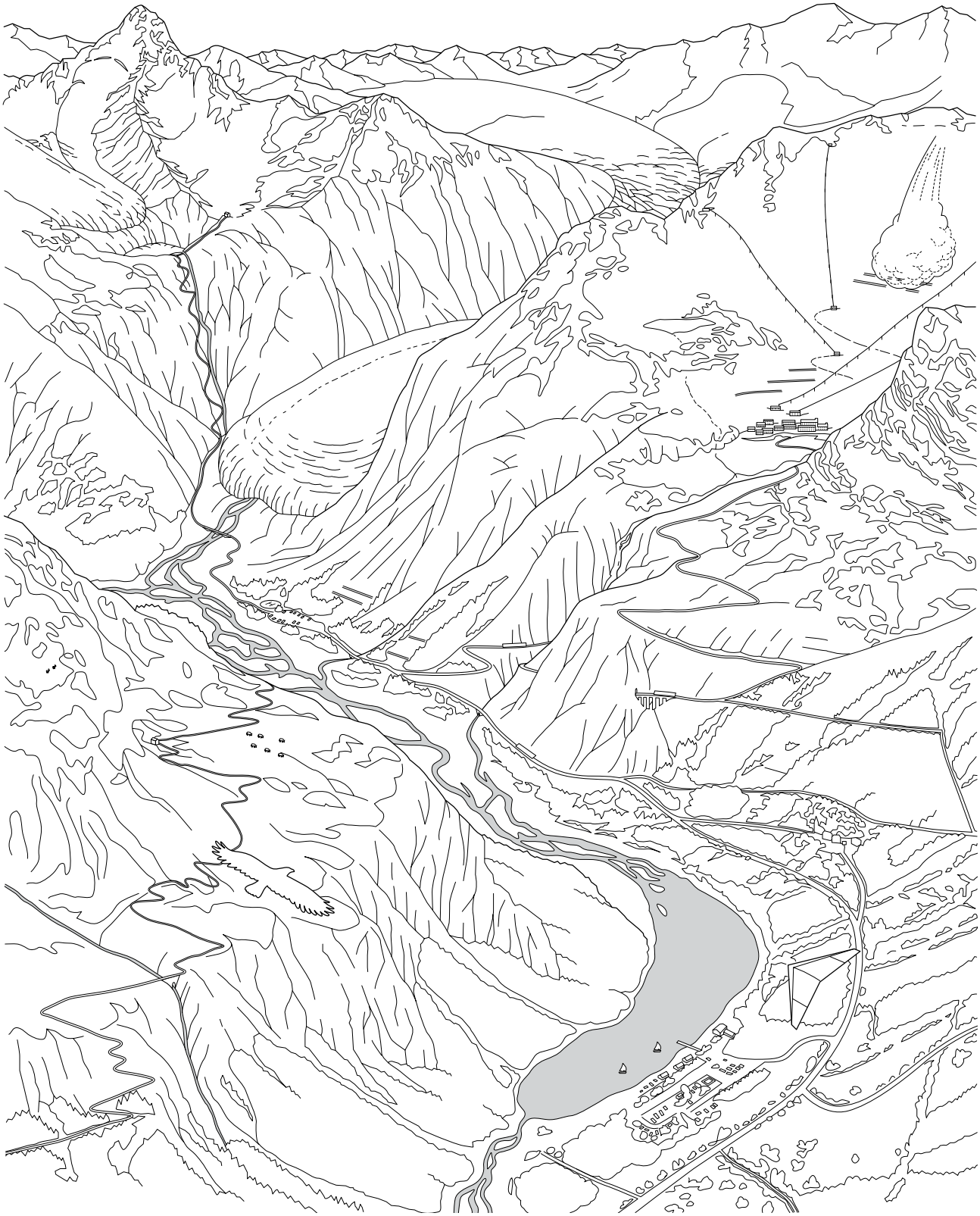
This is a safe campsite location because it is close to a lake whose water levels will not change quickly.

1B

Name: ..... **Form:** .....

See **pages 4 and 5** of The Mountain Book
or **Poster 1:** Mountain environments

Snow and ice



1 B Answers, Notes, Background

See **pages 4 and 5** of The Mountain Book
or **Poster 1:** Mountain environments

Ask students to identify the features connected with either snow or ice, but not both.

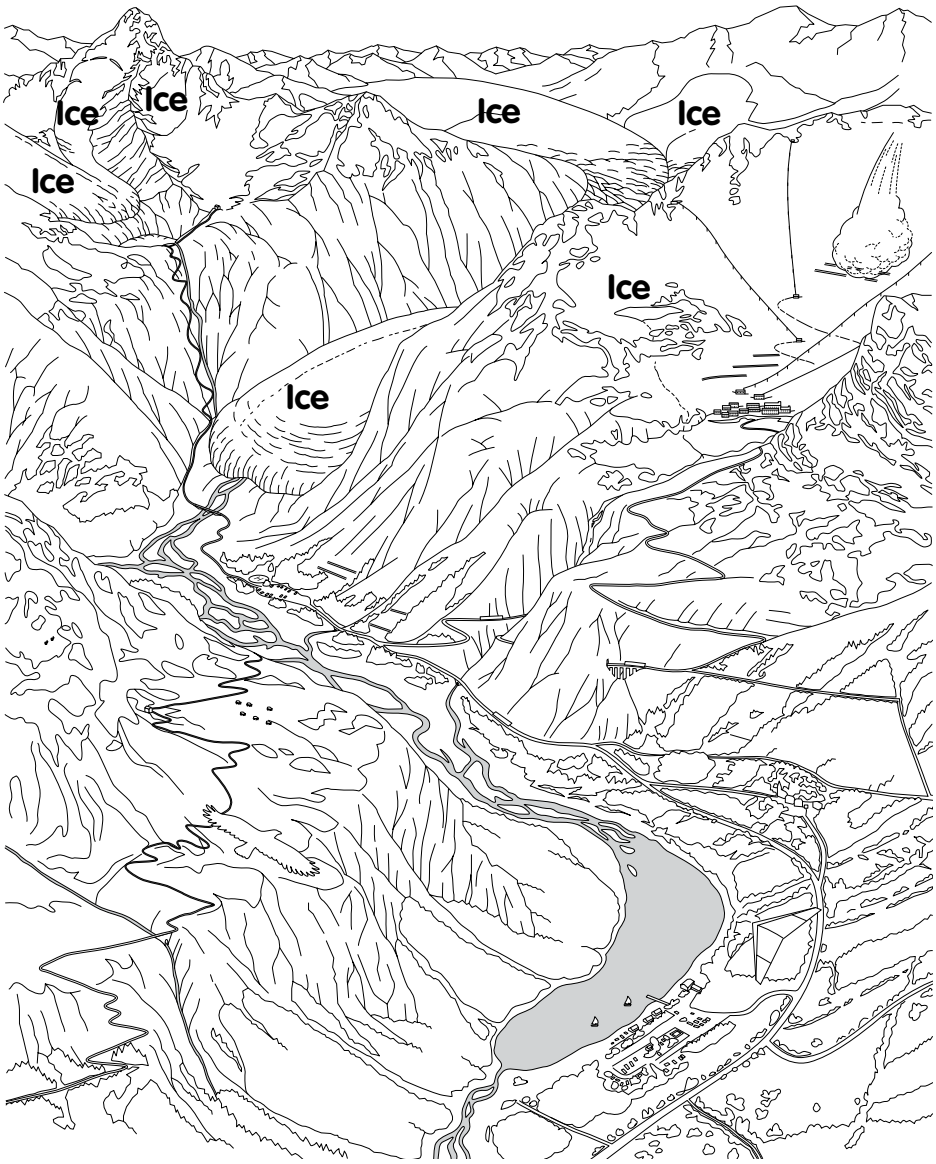
Ask them to colour in all features connected with the chosen theme.

More advanced students can then be asked to describe the pattern they see.

The features are labelled below. The main glacier is in the valley, but there are also glaciers in every mountain hollow, even on the skyline. All other white areas on the colour version are snow.

The purposes of this activity include:

- *identifying snow separately from ice*
- *noticing that snow occurs throughout the year on mountain tops*
- *noticing that ice can occur in the bottoms of valleys beyond the limit of snow*
- *noticing that the settlements do not occur where there is year-round snow and ice (except for ski resorts).*

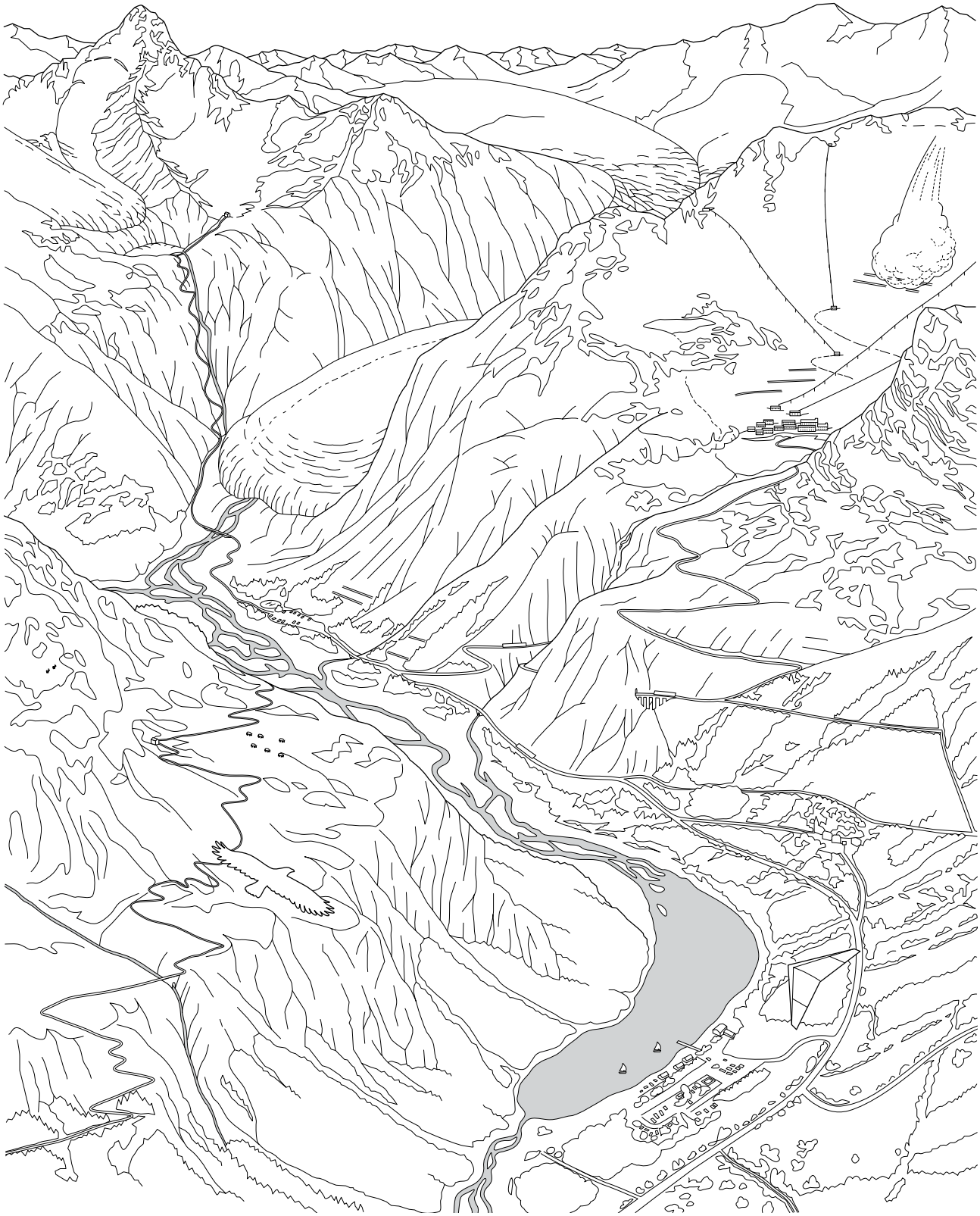


1C

Name: ..... **Form:** .....

See **pages 4 and 5** of The Mountain Book
or **Poster 1:** Mountain environments

Getting around



1C Answers, Notes, Background

See **pages 4 and 5** of The Mountain Book
or **Poster 1:** Mountain environments

Ask students to identify the roads, tracks and footpaths.

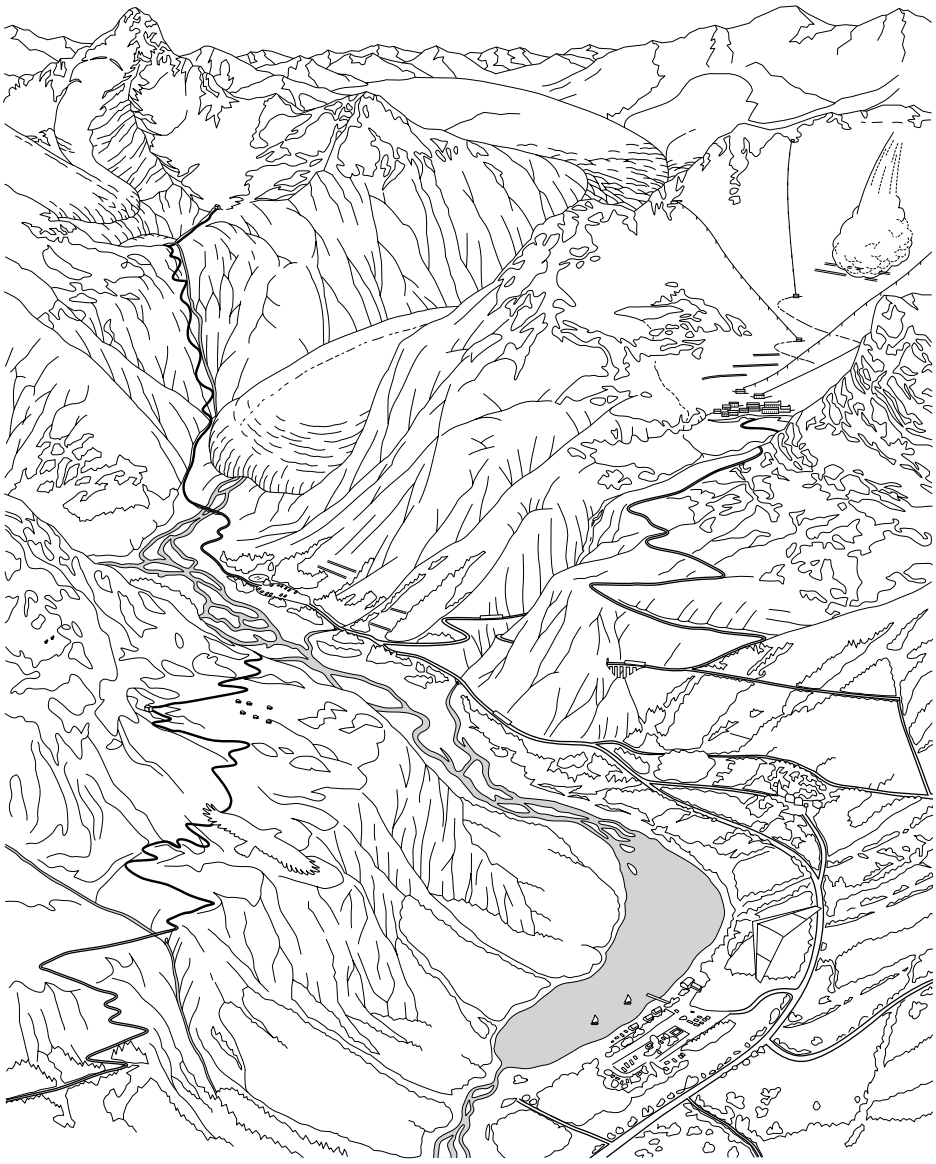
They should be asked to colour in all roads in a different colour from tracks and footpaths.

More advanced students can then be asked to describe the pattern they see.

The roads, tracks and footpaths are marked below.

The purposes of this activity include noticing that:

- *most roads run up and down the valley floor*
- *that some roads climb to higher levels for special purposes (e.g. ski resorts)*
- *footpaths are found on the high-level 'benches' of the mountains because here the walking is easy, and walkers can also get the best views*
- *roads do not often cross rivers*
- *roads avoid areas that might be flooded*
- *roads may need avalanche protection.*

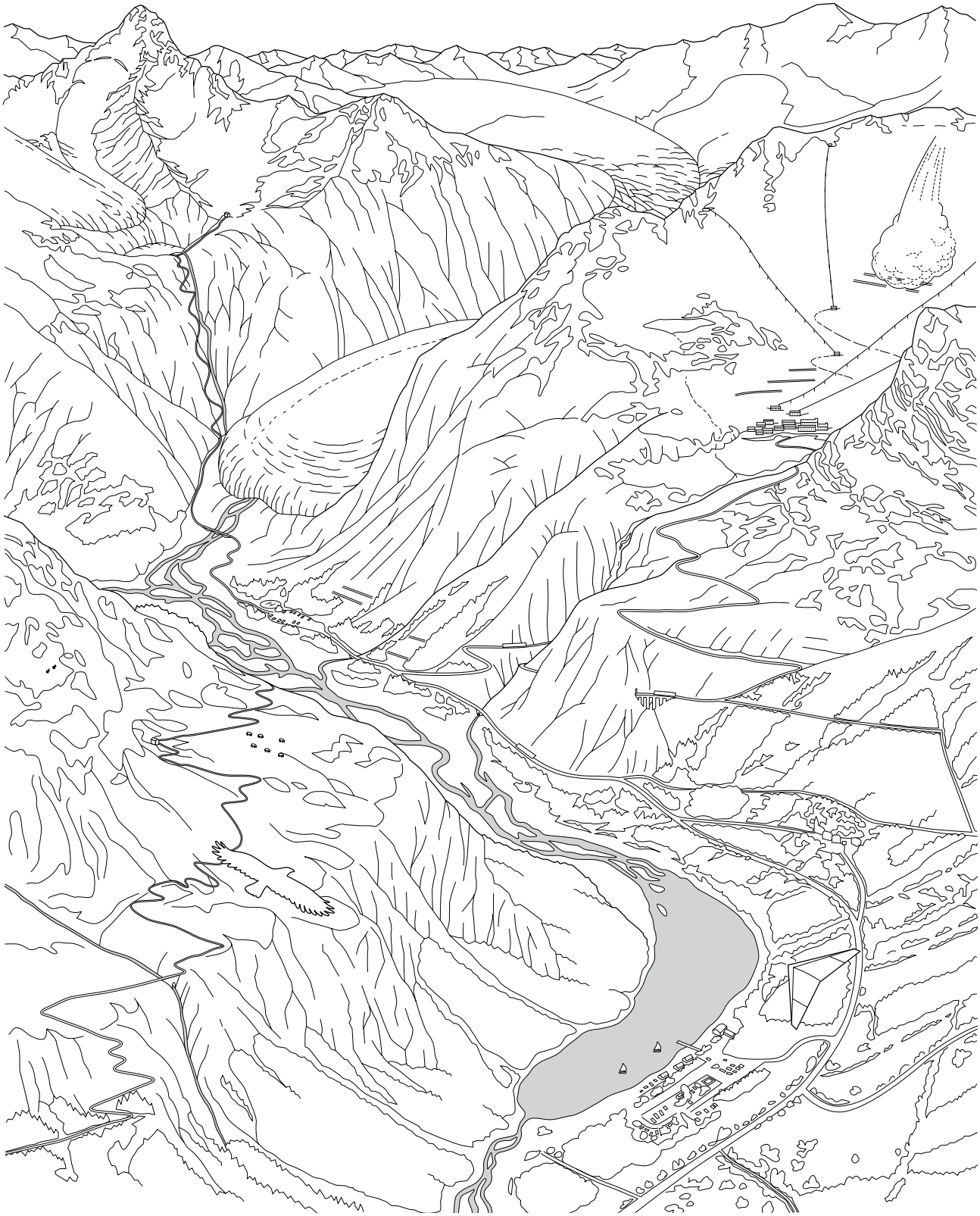


1D

Name: ..... **Form:** .....

See **pages 4 and 5** of The Mountain Book
or **Poster 1:** Mountain environments

People in the mountains



1D Answers, Notes, Background

See **pages 4 and 5** of The Mountain Book
or **Poster 1:** Mountain environments

Ask students to identify the campsite, ski resort and other village.

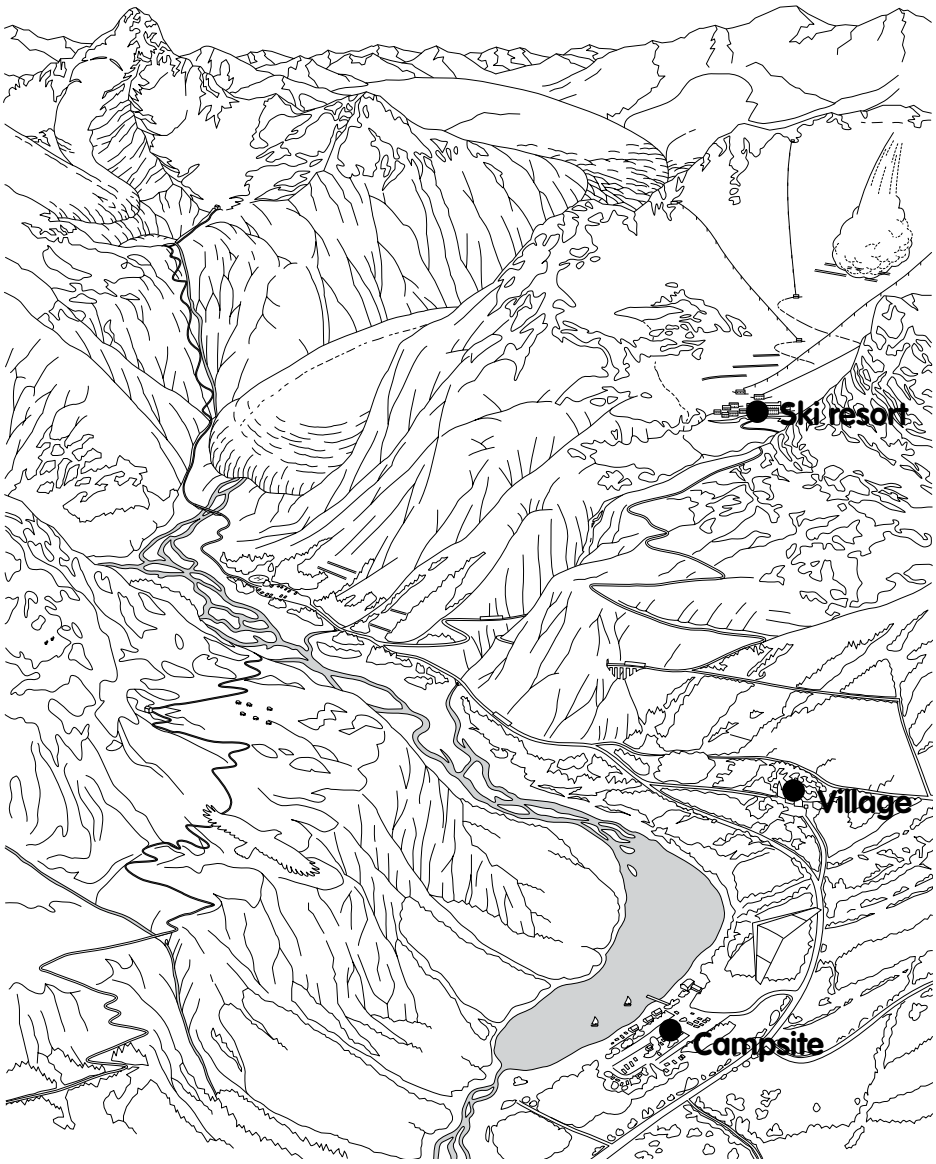
They should be asked to colour in the ski resort in a different colour from the campsite and choose a third colour for the village.

More advanced students can then be asked to describe the pattern they see.

The features are labelled below.

The purposes of this activity include noticing that:

- *camp sites are located in the valley floor close to roads*
- *ski resorts are at much higher levels and require extra effort to reach*
- *villages may also be close to roads in the valley bottom – and therefore some buildings in them (such as hotels) are likely to have a tourist use.*



2A

Name: ..... **Form:** .....

See **pages 6 and 7** of The Mountain Book

What are mountains?

Mountains are features that rise above the surrounding landscape.

Q1. Which is larger, a mountain range or a mountain chain?

✎ .....

Q2. Which is the world's highest mountain and what is its height?

✎ .....

Q3. What is the difference between a volcano and a mountain range?

✎ .....

.....

.....

Q4. Name a mountain range in the United Kingdom, and give the name and height of its highest peak.

✎ ....

Q5. Where is the world's longest mountain chain?

✎ .....

Q6. Give the name of an island that forms the tip of a mountain.

✎ .....

2A Answers, Notes, Background

See **pages 6 and 7 of** The Mountain Book

Answers

1. **A mountain chain.**

2. **Mount Everest 8848 m.**

3. **A volcano is a single, isolated conical mountain produced by outpouring of lava or ash; a range is a line or a group of fold mountains that stand together to make an area of high land.**

4. **Lake District; Scafell Pike 978 m, Scottish Highlands; Ben Nevis, 1344m Welsh Mountains; Snowdon 1085m, Mourne Mountains; Slieve Donard 850m**

5. **In the centre of the Atlantic Ocean.**

6. **Hawaii, Iceland.**

Notes

Mountain chains are made of mountain ranges. It is useful at this point to make sure that students understand that a range of mountains is a continuous area of high land. Mountain ranges usually have specific local names, for example Grampian Highlands, Front Range of the Rockies. The UK has only ranges; mountain chains are much larger features such as the Alps. Within the Alps the ranges all have different names (e.g. Maritime Alps).

The generally quoted height for Everest is 8848 m. However, recent research has found it is actually 2 metres higher than the previously accepted value – as some students may tell you!

Notice that this answer requires information from the map on page 7 as well as the diagram on page 6.

There are many other ocean volcanoes, such as the Azores, Balearic islands (Majorca etc.), that students might know about from their holidays.

Name: ..... Form: .....

See **pages 6 and 7** of *The Mountain Book*

What are mountains?

Mountains occur mainly in long bands over the earth's surface, both on land and in the sea. Single mountains are almost always volcanoes.

Q1. Mark the Andes on to this map using a coloured pencil. Write the word Andes as a label.

Q2. Mark on to your map and label the name of another mountain chain that lies on the edge of a continent

Q3. Draw on to the map the main range of undersea mountains and label it Mid-Atlantic Ridge.

Q4. Find a volcanic island that lies in the middle of the Pacific Ocean. Mark it on the map and add a label.

Q5. On the map mark and write the name of a mountain range that lies entirely within a continent.

2B Answers, Notes, Background

See **pages 6 and 7 of** The Mountain Book

Answers

1. **Andes** (see map below)

2. (see map below)

3. **The Mid-Atlantic Ridge** (see map below)

4. **Hawaii** (see map below)

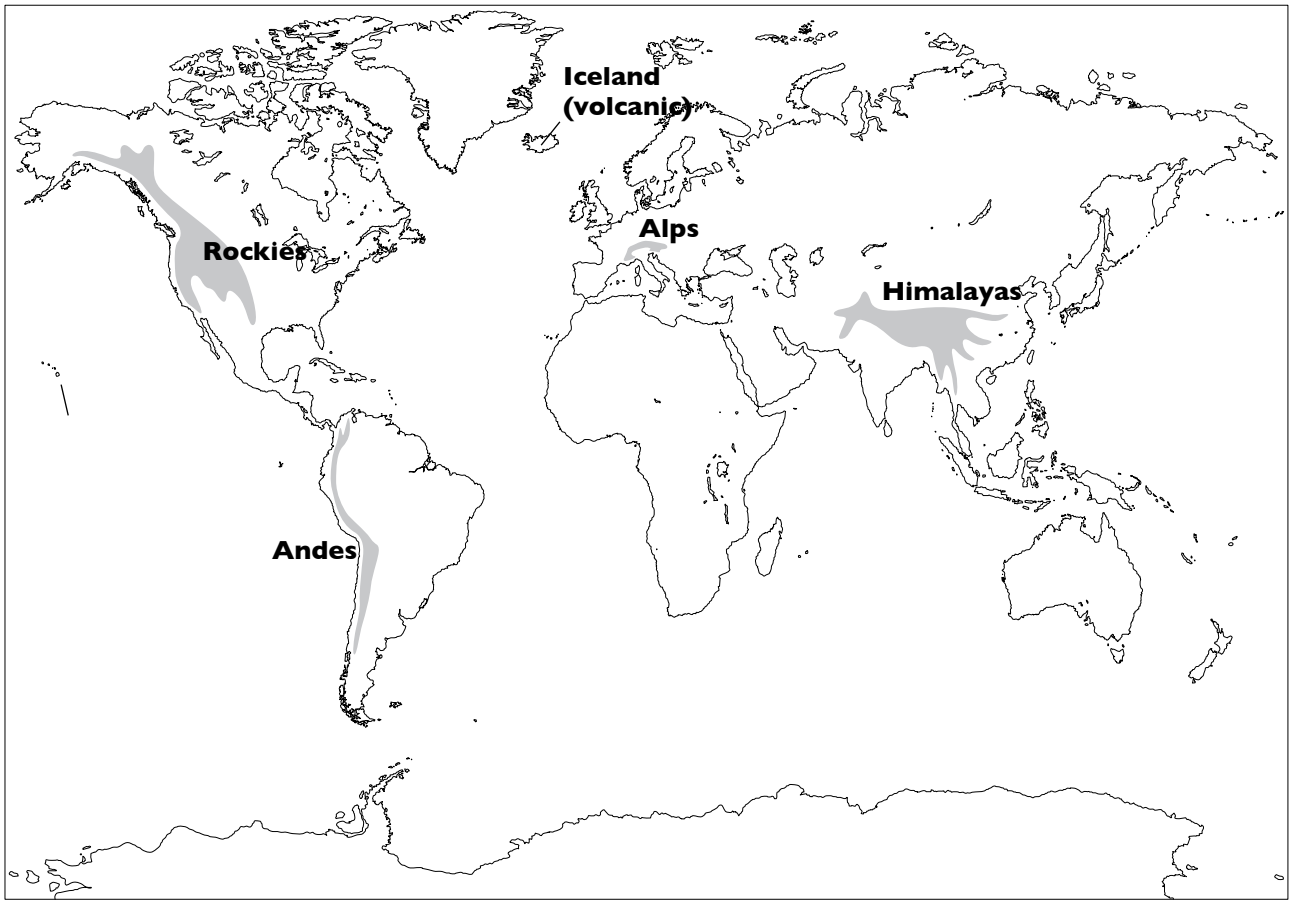
5. **Alps or Himalayas** (see map below)

Notes

This worksheet focuses on map skills.

The Andes are in South America.

The Mid-Atlantic Ridge runs north-south down the middle of the Atlantic Ocean.



3A

Name: ..... **Form:** .....

See **pages 8 and 9** of *The Mountain Book*

Mountain chains

Oceans once existed where we see mountains today. Mountain chains are formed and oceans are squeezed away as continents squash together.

Q1. What is the name of the outer layer of the earth that contains continents and oceans?

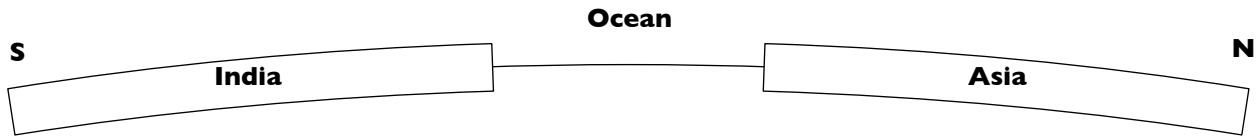
✎ .....

Q2. What happens when two continents collide?

✎ .....

.....

Q3. The diagram below shows a side view of where India and Asia used to be many millions of years ago. Then India began to move towards Asia. Put an arrow on the diagram to show this movement.

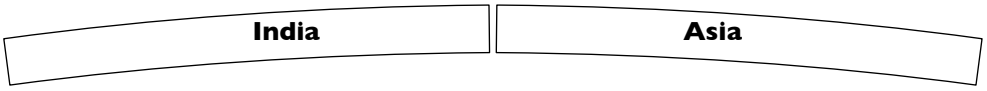


Q4. What happened to the ocean as India collided with Asia?

✎ .....

.....

Q5. Mark on this diagram the place where the Himalayas formed.



Answers, Notes, Background

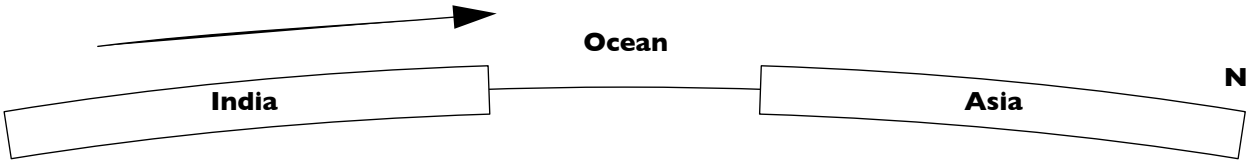
See **pages 8 and 9** of The Mountain Book

Answers

1. **Crust/crustal plates.**

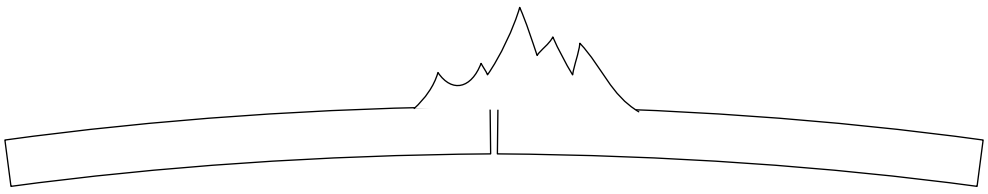
2. **A chain of fold mountains is formed and oceans are squashed away.**

3.



It was squeezed out of the way.

5. **See diagram below.**



Notes

In fact the ocean floor is pushed below the continent.

The important point is that the mountains occurred on the edge of the former continent. Because two continents came together, the mountains now appear to have been formed in the middle of a continent – but they weren't. This is a very important point because it allows us to say that mountain chains are formed by just one process.

Name: ..... Form: .....

See **pages 8 and 9** of *The Mountain Book*

Mountain chains

1. Select an atlas map of Asia, or find the Himalayas map on the web site under 'In-depth... for projects' or on *The Mountain and Volcano Project* CD. (Go to Himalayas and then click 'Map'.)

2. Lay a large tablecloth on a flat surface.

3. You are going to make the cloth crumple up into folds in the shape of the Himalayas and the other mountain ranges of Asia.

4. Each person should put their hands flat on the cloth, as shown on page 9 of *The Mountain Book*.

5. Place your outstretched hands palm-down on the cloth and push the cloth so that it crumples into folds. Now compare the shape you have made with the mountain ranges shown on the atlas map. Push the cloth until you have a curved mountain chain, similar to the pattern shown in the atlas.

6. Now work out who has their hands on 'Northern Asia' and who has their hands on 'India'.

7. Now repeat the activity, forming mountain chains from other continents.

Answers

This is a practical and ideally needs groups of 4 or more. Before starting on this activity, everybody should have looked at picture 4 on page 9 of *The Mountain Book*.

In this demonstration, students can learn how to make quite complex shapes. They learn that by pushing a cloth they cause it to crease and form folds. They can see that by pushing in a number of directions, the folds can be made to form an arc.

Notes

From this demonstration it is possible to see that it is common to find arc-shaped patterns of mountains. Students can imagine which pieces of the earth's crust had to move to make this shape. For example, the Alps and the Himalayas are both arc-shaped, and so were formed by a small piece of crust moving faster and farther than its neighbours. In the case of the Alps it was Italy; in the case of the Himalayas it was India.

Some mountain chains, such as the Rockies, are almost straight. This suggests that the whole side of North America moved uniformly against the Pacific Ocean.

Students can thus come to some very profound scientific conclusions just by pushing a tablecloth about!

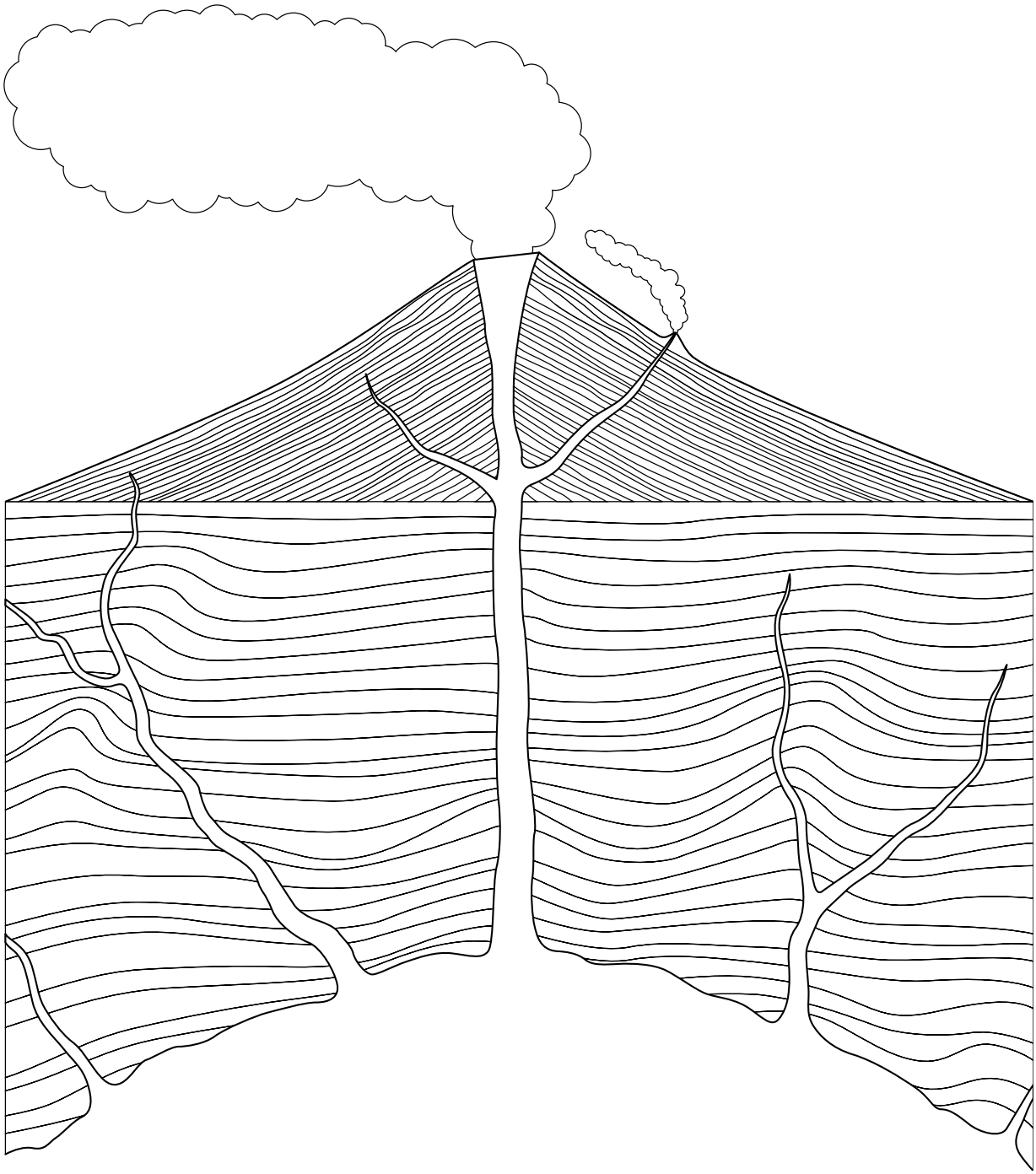
C
I
4

Name: ..... **Form:** .....

See **pages 10 and 11** of *The Mountain Book*

Volcanoes

Most volcanoes are made of a combination of layers of lava and ash.



Q1. On the diagram above, use a coloured pencil to shade in the ground below the volcano.

Q2. Use a different colour to show the layers of ash that make up the volcano.

Q3. Use a further colour to show the layers of lava that make up the volcano.

Answers, Notes, Background

See **pages 10 and 11** of The Mountain Book

Answers

Colouring depends on the student. Most students will be expected to draw alternating bands of lava and ash, following the description in the text.

Notes

Although fissure eruptions can produce a sheet of lava that does not build into a cone, it is simpler at this level to concentrate on volcanoes as special kinds of mountain. The world's biggest volcanoes are also some the world's biggest mountains (although this may not be obvious because many volcanoes rise from the ocean floor (for example, the volcanoes of Hawaii).

By drawing composite volcanoes, students are reinforced with the understanding that volcanic mountains are made from layers of both ash and lava, not just lava.

5

Name: ..... **Form:** .....

See **pages 12 and 13** of *The Mountain Book*

Dangerous explosions

Because magma rises quickly it often gets sprayed out of the crater as fine pieces of rock.

Q1. What size of material is:
(a) a bomb, (b) ash and (c) cinder?

(a) ✎ .....

(b) ✎ .....

(c) ✎ .....

Q2. In your own words explain what this diagram shows.

✎ .....

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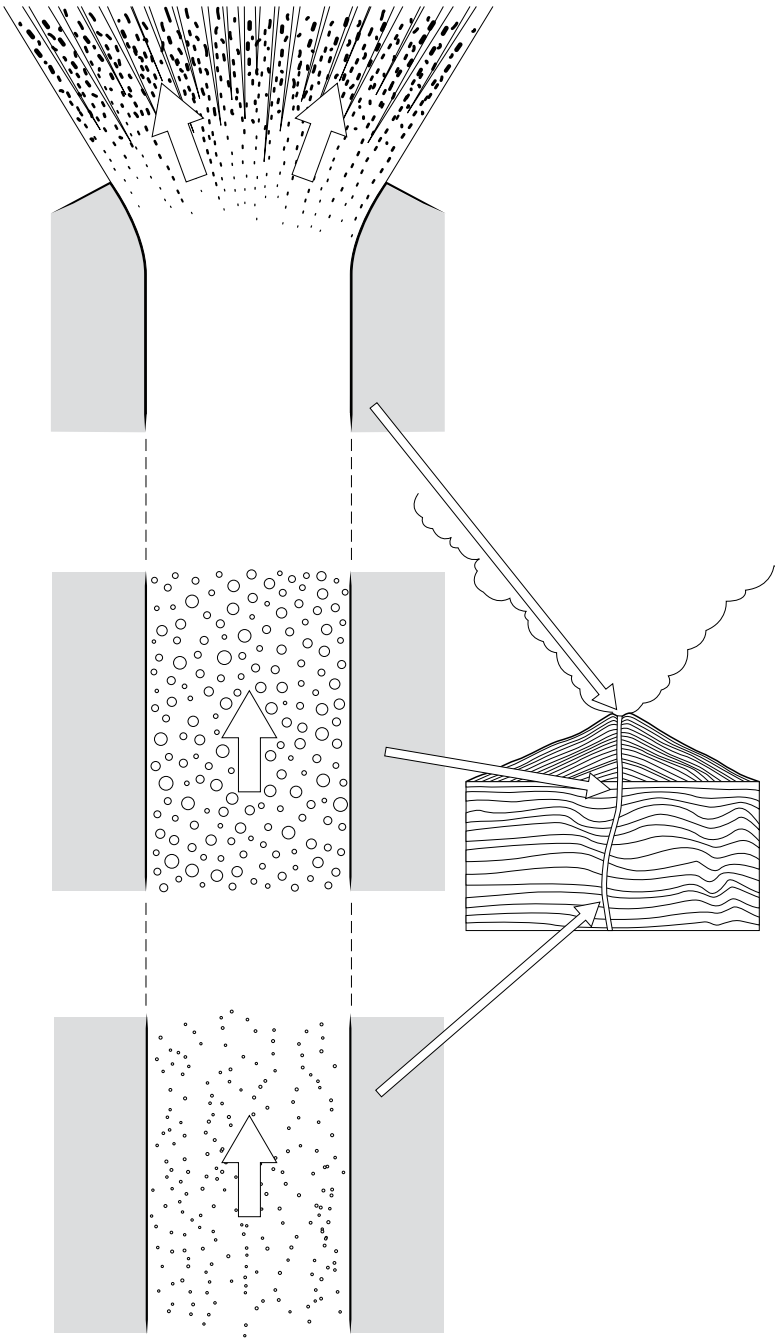


5 Answers, Notes, Background

See **pages 12 and 13** of *The Mountain Book*

Answers

1. **Bombs are large, and can weigh around 500 g. Ash is fine and powdery (the finest powder is actually volcanic dust that does not settle back near the volcano, but this is ignored for the purposes of this book). Cinders are smaller than bombs, weighing around 20 g.**

2. **The diagram shows magma (which is a liquid containing dissolved gases) rising up to the crater and as it does so the pressure decreases and so allows the gases to come out of solution. This creates a frothy mixture which can be sprayed out of the crater. The materials then cool and become the three types of solid mentioned above.**

Notes

You might care to take a fizzy drink bottle, shake it up, and then allow the foam to come out (this is a very messy experiment!). This is essentially what is happening in the vent. The froth cools and produces the solid material that makes ash, cinders and bombs.

6

Name: ..... **Form:** .....

See **pages 14 and 15** of *The Mountain Book*

Ice in the mountains

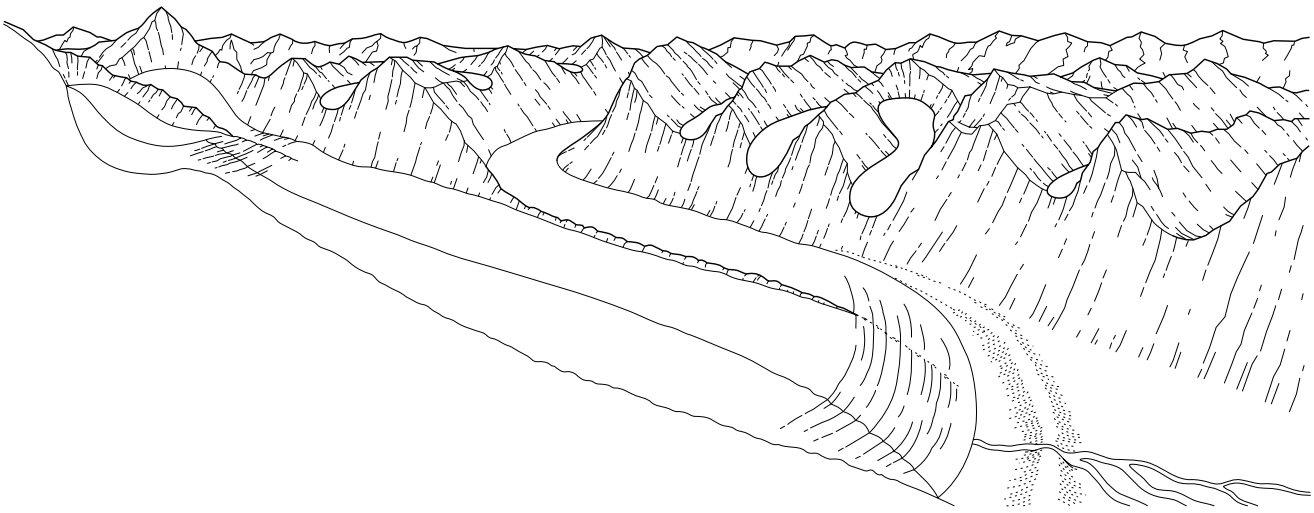
Glaciers scour away at the landscape, changing the shape of valleys and peaks.

Q1. Mark these features on the diagram below

(a) valley glacier

(b) pyramidal peak

(c) the place where the glacier scours rock away



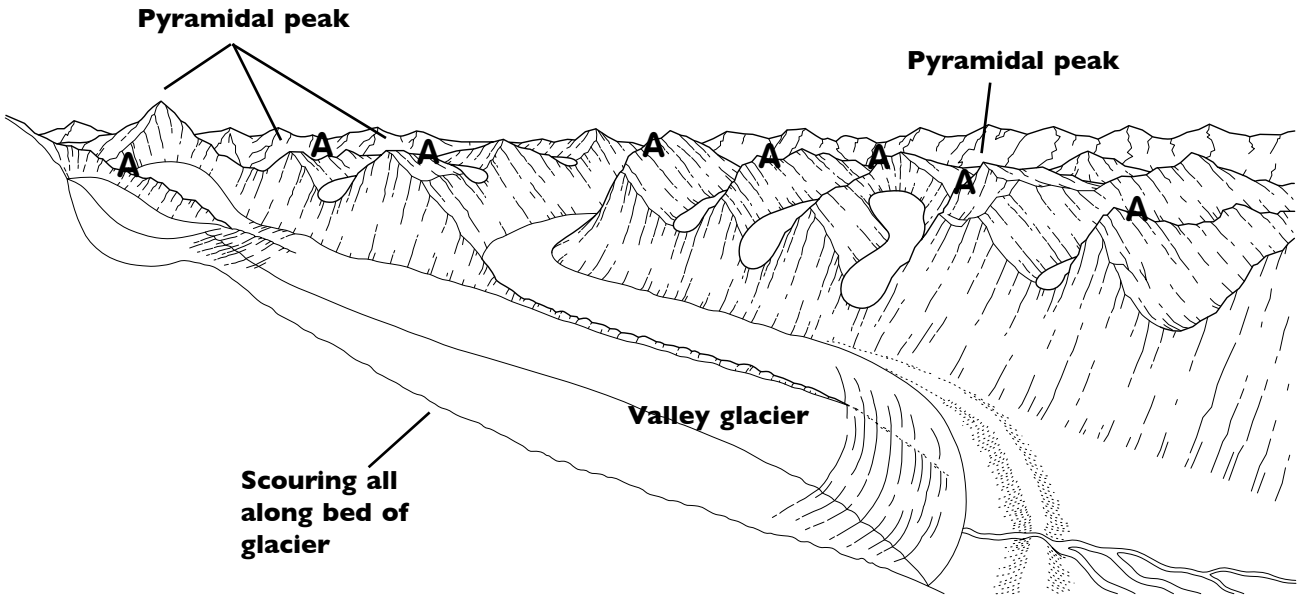
Q2. On the diagram above, add a coloured line along all the places where sharp-sided ridges have been produced.

Answers, Notes, Background

See **pages 14 and 15** of *The Mountain Book*

Answers

1. **See diagram below.**



2. **All of the ridges marked 'A' on the diagram above.**

Notes

7

Name: ..... Form: .....

See **pages 16 and 17** of *The Mountain Book*

Mountain valleys and waterfalls

Many mountain valleys owe their spectacular features to the recent Ice Age.

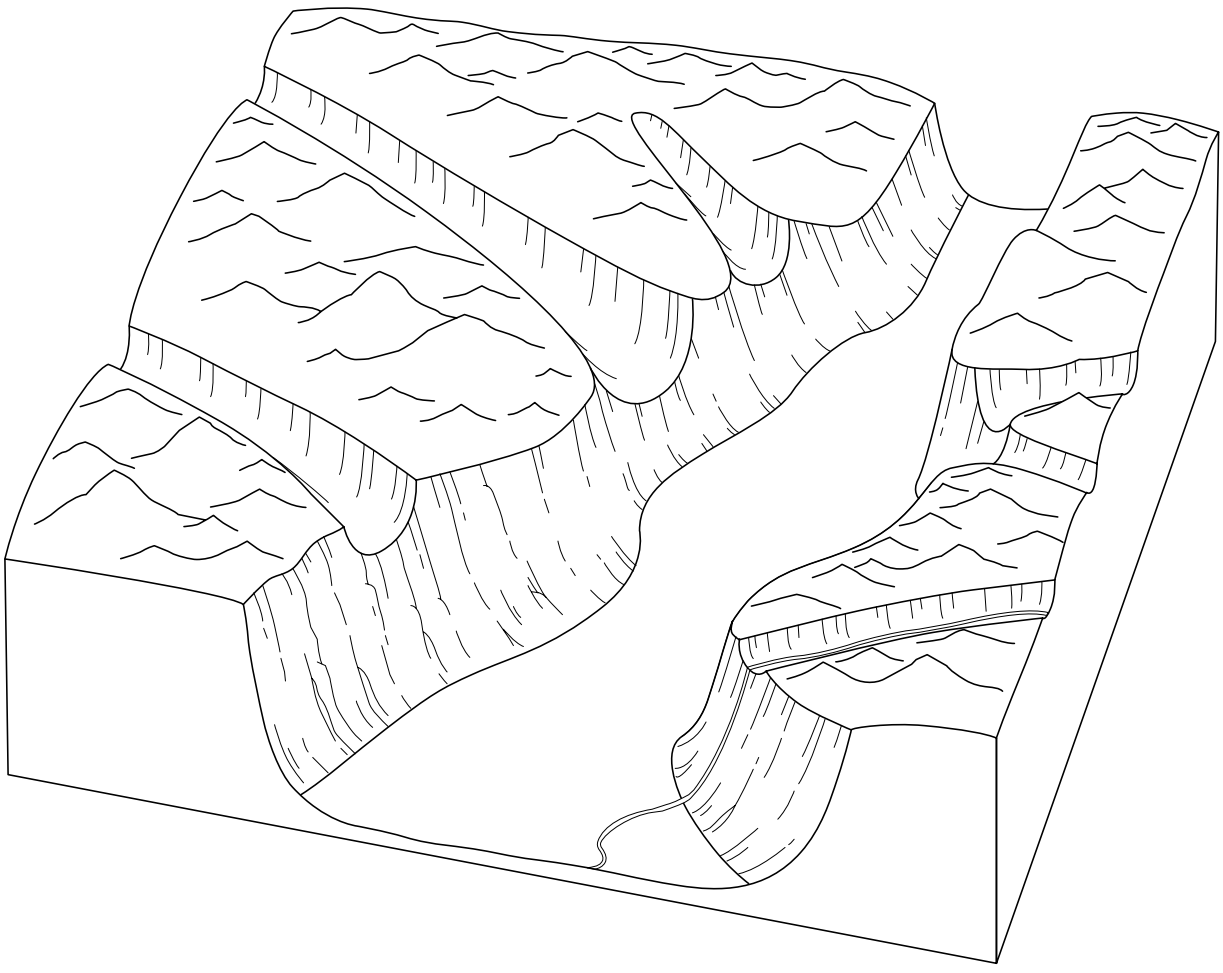
Q1. What letter of the alphabet is used to describe the shape of a valley that was once filled by a glacier?

✎ .....

Q2. What kind of valley produces a waterfall?

✎ .....

Q3. The diagram below shows a valley that has been scoured by ice. The ice has now melted away. Mark in the new rivers and waterfalls. One waterfall has already been drawn in for you.



Answers, Notes, Background

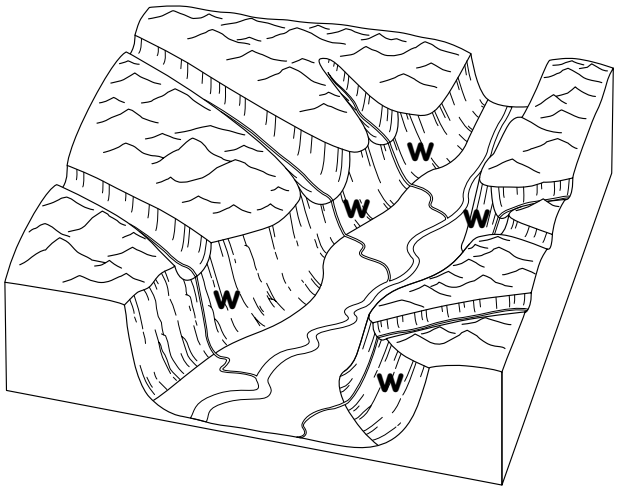
See **pages 16 and 17** of The Mountain Book

Answers

1. **U-shape when seen end-on. The valley is also straight, with none of the sharp twists and turns that are formed in river valleys.**

2. **Hanging valley.**

3. **See diagram below.**



Notes

This diagram gives a good opportunity to show the main features of a mountain environment which has recently been abandoned by glaciers. In general, the Ice Age finished about 10–12,000 years ago, a very short time on the scale of shaping a landscape, and so many landscapes are little altered from this time.

The main features that students should notice are the U-shaped valleys and the hanging valleys from which waterfalls flow.

They will also need to remember these features when tackling later spreads about how the landscape influences the way people use mountains.

You could extend this worksheet, either now or later, by asking students what would happen if a dam were built across this valley – i.e. it would flood the valley and destroy a precious part of the mountain scenery, but at the same time it would stop flooding, and provide water that could be used for power. This is a common issue of how best to use the mountain environment.

Name: .... **Form:** ....

See **pages 18 and 19** of *The Mountain Book*

Mountain lakes and passes

One of the most obvious features of mountain areas are their lakes and passes.

Q1. Why are some mountain lakes called finger lakes?

✎ ....

Q2. What is another term for a finger lake?

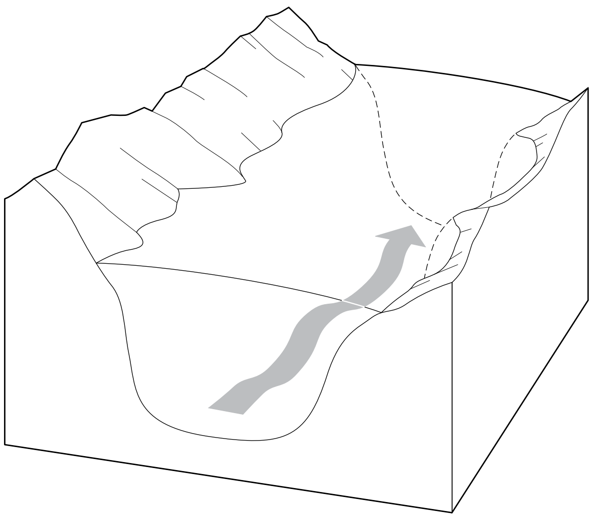
✎ ....

Q3. Was it the action of sandstorms, glaciers or floods that formed most mountain lakes?

✎ ....

Q4. On the diagram below colour the place where you expect lakes to form.

✎ ....



Q5. Name one famous British finger lake.

✎ ....

Q6. How does a pass form?

✎ ....

Q7. Name one famous British pass.

✎ ....

8 Answers, Notes, Background

See **pages 18 and 19** of The Mountain Book

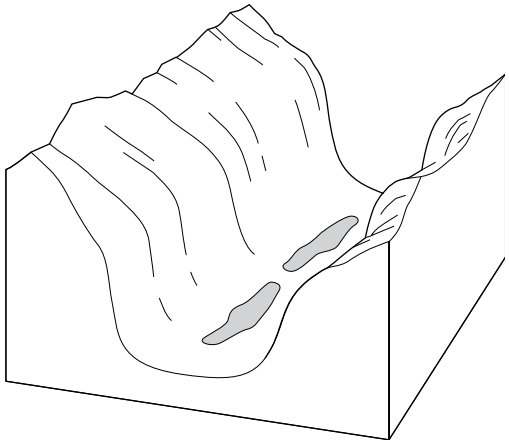
Answers

1. **They are long and narrow and shaped like a finger.**

2. **A ribbon lake.**

3. **Glaciers.**

4. **See the diagram below.**



5. **Buttermere, Crummock Water, Loch Ness, Loch Lomond, Llyn Ogwen, etc.**

6. **When ice spills over the sides of its valley and scours a new valley.**

Glen Coe (Grampian), Llanberis (Snowdon), Kirkstone (Lake District), etc.

Notes

Virtually all lakes in mountainous regions are caused by the effects of glacial erosion. Those in mountainous areas are long and narrow because they are confined by the sides of their U-shaped valleys.

In some cases, lakes have formed against a ridge of glacially-deposited material called moraine (a terminal moraine). This is often the case when a lake forms partly in a mountain region, and also partly on the lowland beyond. The lakes of the Italian Alps (Garda) etc., are classic examples.

In this section make sure that students check to see that what they are describing is a lake, not a reservoir! For example, Thirlmere in the Lake District is a reservoir.

Passes allow people to travel across a mountainous region. The A9 in Scotland follows several passes; the roads through Snowdonia, including the A5, use passes (e.g. Pass of Llanberis), and the majority of roads crossing the Lakeland fells follow passes (e.g. Kirkstone Pass).

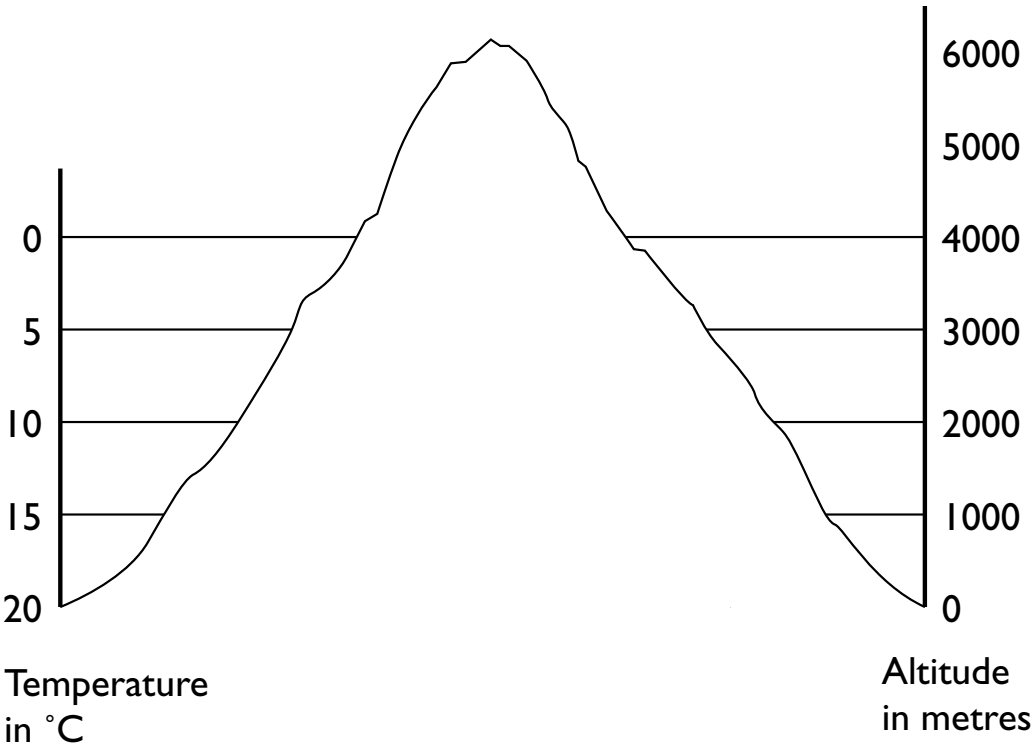
C1 **9A**

Name: ..... **Form:** .....

See **pages 20 and 21** of *The Mountain Book*

Mountain weather

The higher you go up a mountain, the colder it gets.



Q1. In the diagram above you can see that it is 20 °C at the foot of the mountain. Write down the temperature of the air at 1000m, 2000m, 3000m and 4000m.

✎ .....

Q2. By how much does the temperature drop for each 1000m increase in height?

✎ .....

Q3. At what temperature would you expect to find the snowline?

✎ .....

Q4. Mark the snowline on the diagram.

Answers, Notes, Background

See **pages 20 and 21** of *The Mountain Book*

Answers

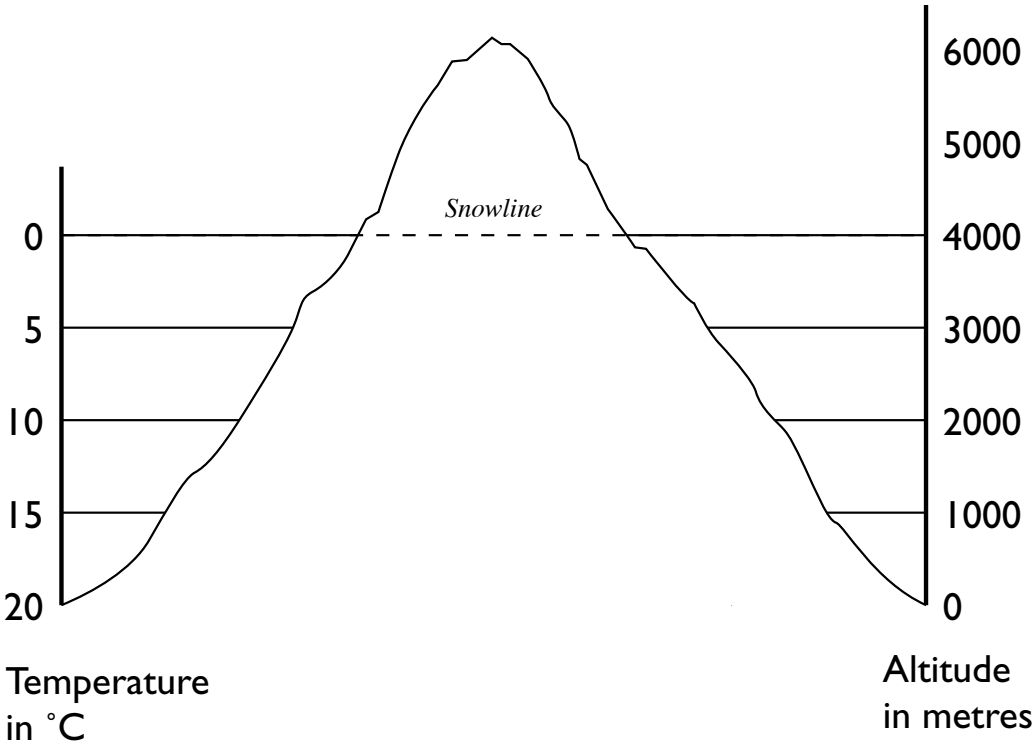
1. **15 °C, 10°C, 5°C, 0°C.**

2. **The temperature falls by 5°C for every 1000m of altitude.**

3. **0 °C.**

4. **See diagram.**

Notes



Name: ..... Form: .....

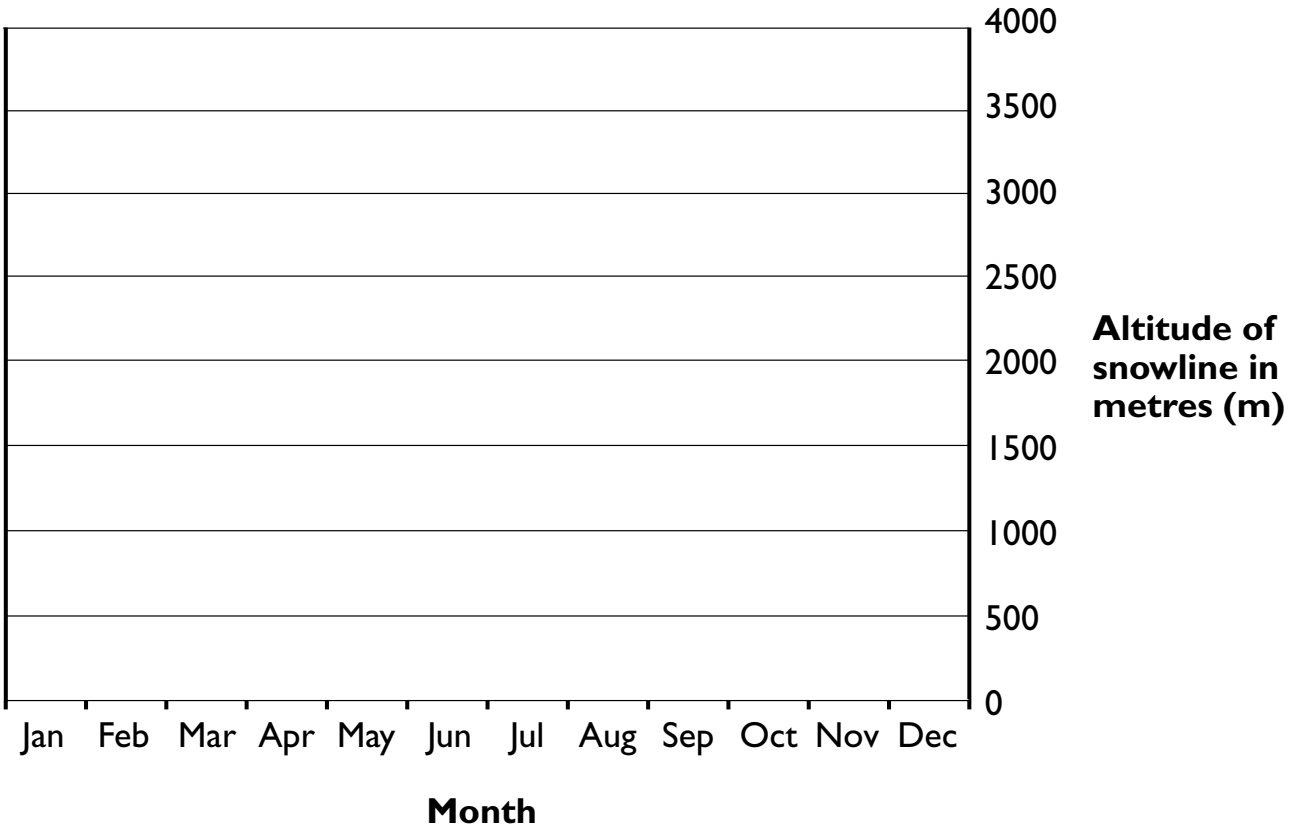
See **pages 20 and 21** of *The Mountain Book*

Mountain weather

The snowline changes height with the seasons.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Snowline (m)	500	500	700	1000	1500	2000	3000	3500	3000	2000	1500	1000

Q1. Plot the data from the table on to the chart below to show the change in height of the snowline with the month.



Q2. In which month is the snowline at its highest?

✎ .....

Q3. In which months is the snowline at its lowest?

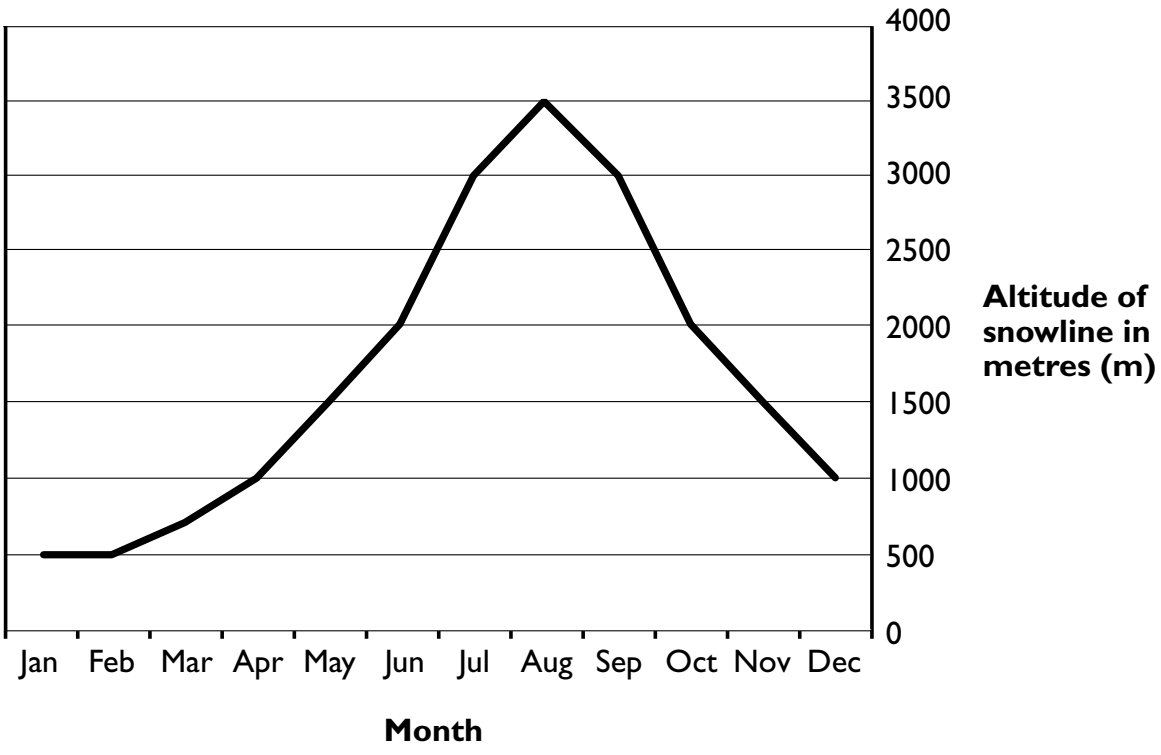
✎ .....

Answers, Notes, Background

See **pages 20 and 21** of The Mountain Book

Answers

1.



2. **August.**

3. **January and February.**

Notes

This gives an opportunity to draw a chart. The student could superimpose it on a picture of a mountain for more effect.

More able students will be able also to note that the snowline stays at the same low level for two winter months (the coldest months of the year) and then begins to rise increasingly rapidly to June, and less rapidly to August. Then the snowline sinks quickly again.

Name: ..... Form: .....

See **pages 20 and 21** of *The Mountain Book*

Weather in the English Lake District

How does the weather change through the year? Find out from these figures for Keswick. Keswick is in a valley at an altitude of about 105 metres.

	Rainfall (mm)	Average temperature (°C)	Hours of sunshine	Days with frost	Days with snow
Jan	**170**	**4**	**35**	**13**	**3**
Feb	**115**	**4**	**60**	**11**	**3**
Mar	**126**	**5**	**95**	**9**	**2**
Apr	**89**	**8**	**139**	**4**	**1**
May	**87**	**12**	**195**	**0**	**0**
Jun	**84**	**15**	**170**	**0**	**0**
July	**85**	**16**	**147**	**0**	**0**
Aug	**120**	**16**	**145**	**0**	**0**
Sep	**137**	**14**	**97**	**0**	**0**
Oct	**176**	**10**	**72**	**2**	**0**
Nov	**174**	**7**	**41**	**6**	**1**
Dec	**175**	**5**	**32**	**10**	**2**

Q1. Look down the rainfall column. Which is the wettest month? Which is the driest month.

✎ .....

Q2. Look down the temperature column. Which are the two warmest months? Which are the two coldest months?

✎ .....

Q3. Look down the sunshine column. Which is the sunniest month? Which is the month with the least sunshine?

✎ .....

Q4. Look down the snowfall column. Write down the months when snow falls most often.

✎ .....

Answers, Notes, Background

See **pages 20 and 21** of The Mountain Book

Answers

1. **October (wettest) and June (driest).**

2. **July and August (warmest) January and February (coldest).**

3. **May (sunniest) and December (least sunny).**

4. **January and February.**

Notes

The data can be used in far more ways than those suggested by the three questions. However, some students will find it challenging enough to locate greatest and smallest from a column of figures, and so these four questions may be all that they can manage.

The more able can plot graphs of the data to show how temperature rises and falls through the year, and to show how the rainfall varies (with late spring being the driest and Autumn being the wettest).

There is a high rainfall and there are many frost days in Keswick. You may like to discuss this in relation to the difficulty of growing crops.

ICT: The data are more fully interpreted on the web site under 'In-depth... for projects' or on The Mountain and Volcano Project CD. Go to Lake District, click on Weather.

Name: ..... Form: .....

See **pages 20 and 21** of *The Mountain Book*

Mountain weather in the Scottish Highlands

How does the rainfall vary with height and seasons in the Grampians? Find out using the data below.

The table on the right shows the monthly rainfall in millimetres for Fort William and Loch Katrine in the Scottish Highlands.

Fort William is at the foot of Ben Nevis on the western side of the Grampians. Fort William is about 20 metres above sea level.

Loch Katrine is on the southeastern side of the Grampians. Loch Katrine is about 244 metres above sea level.

	Fort William	Loch Katrine
Jan	**224**	**249**
Feb	**159**	**179**
Mar	**147**	**150**
Apr	**100**	**121**
May	**90**	**114**
Jun	**107**	**111**
Jul	**126**	**126**
Aug	**152**	**158**
Sep	**175**	**170**
Oct	**201**	**222**
Nov	**202**	**212**
Dec	**235**	**259**

Q1. Which is highest, Fort William or Loch Katrine?

✎ .....

Q2. Which has the highest rainfall in most months, Loch Katrine or Fort William?

✎ .....

Q3. Which is the wettest month of the year?

✎ .....

Q4. Which are the driest months of the year at each place?

✎ .....

Answers, Notes, Background

See **pages 20 and 21** of The Mountain Book

Answers

1. **Loch Katrine.**

2. **Loch Katrine.**

3. **December.**

4. **May for Fort William and June for Loch Katrine.**

Notes

Encourage students to see that higher means more rainfall.

Notice that December is the wettest month in this region. Contrast this with October as the wettest month for the Lake District, and thus show that not everywhere in the country has the same rainfall pattern.

ICT: The data are more fully interpreted on the web site under 'In-depth... for projects' or on The Mountain and Volcano Project CD. Go to Scottish Highlands and click on Weather.

Name: ..... Form: .....

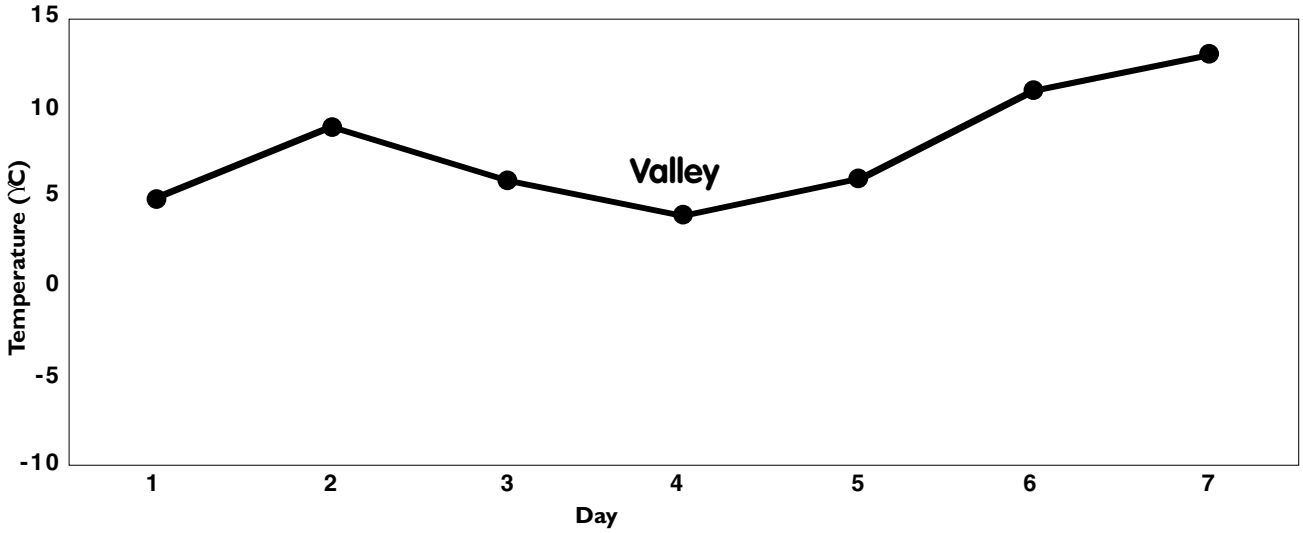
See **pages 20 and 21** of *The Mountain Book*

Mountain weather in the Welsh Mountains

How does the temperature vary during a month? Find out from the figures below.

These figures are average temperatures from two weather stations on the slopes of Snowdon for the first week of March 2000.

Day	Summit 1085 m	Valley 105m
1	-6	5
2	-2	9
3	-6	6
4	-8	4
5	-5	6
6	0	11
7	2	13



Q1. The temperature line for the valley has been drawn for you. Draw a temperature line for the summit station.

Q2. Which of the weather stations is coldest?

✎ .....

Q3. How many days were below freezing at the summit during the week?

✎ .....

Q4. How many days were below freezing in the valley during the week?

✎ .....

Q5. Write a sentence comparing the temperatures on the summit and in the valley.

✎ .....

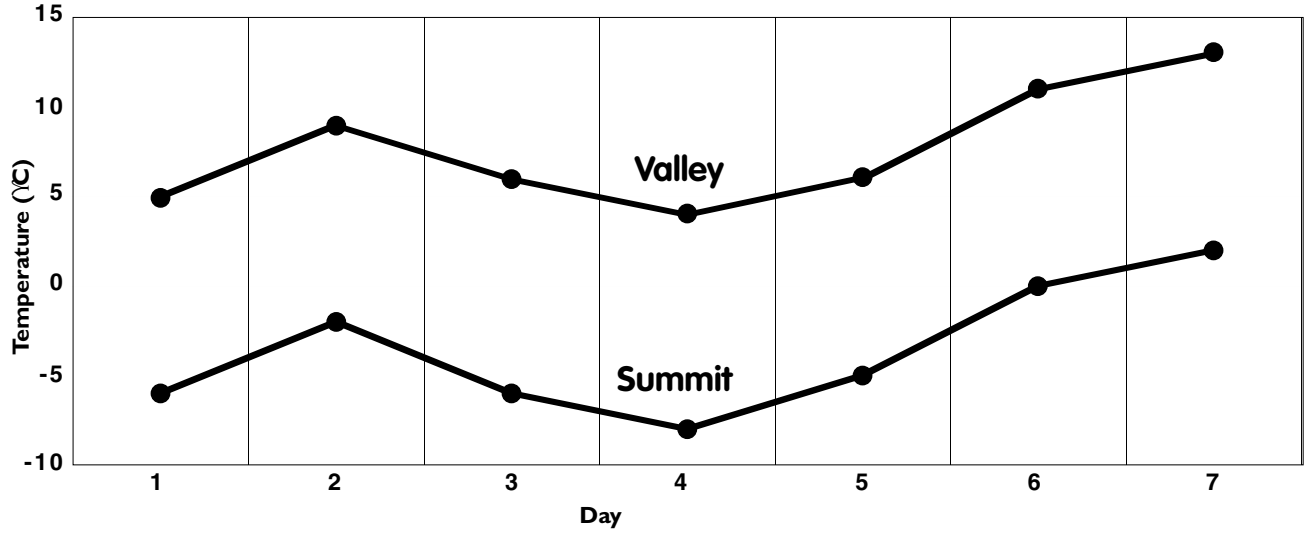
.....

Answers, Notes, Background

See **pages 20 and 21** of The Mountain Book

Answers

1.



2. **Summit.**

3. **5**

4. **0**

5. **It is much colder on the summit than in the valley. It is much frostier on the summit than in the valley.**

Notes

This data is based on material that comes from First Hydro at: http://www.electricmountain.co.uk/weather There is also a livecam at this site.

You could also use the data to discuss the variability of the weather from day to day.

You could go on to discuss the fact that, for example, places with more frosty days have more rocks broken off by frost shatter, and may also have more ice on footpaths, and so be more hazardous for walkers.

ICT: The data are more fully interpreted on the web site under 'In-depth... for projects' or on The Mountain and Volcano Project CD. Go to Welsh Mountains and click on Weather.

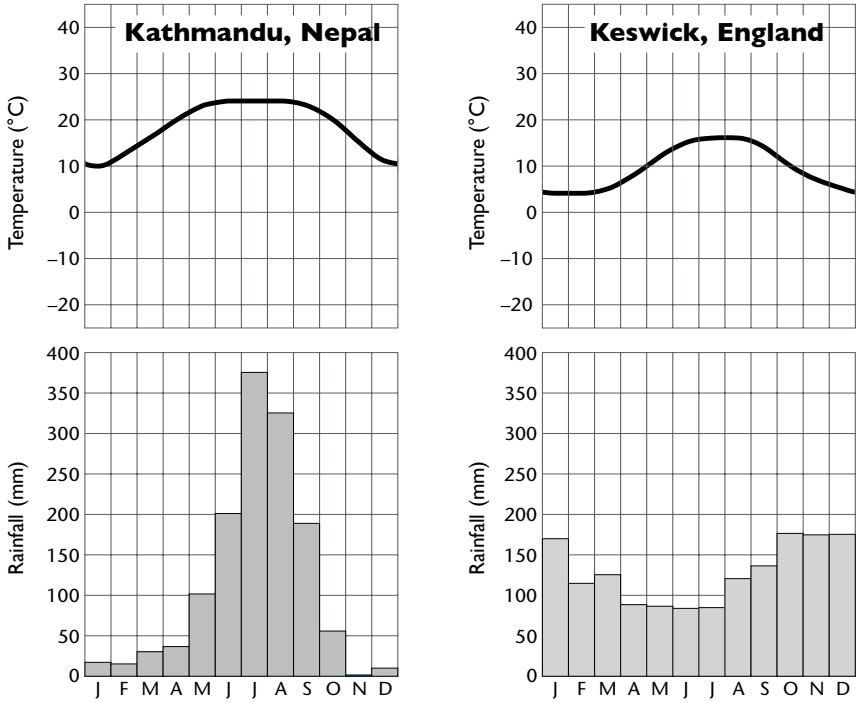
9F

Name: ..... **Form:** .....

See **pages 20 and 21** of *The Mountain Book*

Mountain weather in the Himalayas

The Himalayas are quite close to the equator. The city of Kathmandu is in a valley among these high mountains. How does it compare to Keswick, a town in the English Lake District?



Q1. What is the temperature of the coldest month in Kathmandu (altitude 1337 m)?

✎ .....

Q2. What is the temperature of the warmest month in Kathmandu?

✎ .....

Q3. The warmest month for Keswick, a valley town in the English Lake District (altitude 105 m), is 16°C and the coldest month is 4°C. Write a sentence to compare the coldest and warmest months in Kathmandu with Keswick.

✎ .....

.....

Q4. The rainfall of Keswick varies between 84 mm and 175mm of rain in a month. Look at the rainfall of Kathmandu and describe the highest and lowest rainfalls in that city.

✎ .....

.....

Answers, Notes, Background

See **pages 20 and 21** of The Mountain Book

Answers

1. **The coldest month is 10 °C.**

2. **The warmest month is 24°C.**

3. **The Lake District weather station is about a tenth of the altitude of Kathmandu, and yet the temperatures are much lower. This is the effect of latitude being greater than altitude.**

4. **In general, the rainfall pattern is very different, with the Kathmandu example showing a great extreme with lowest of 2mm and highest of 375mm. This is the effect of the monsoon. The weather in the UK, by contrast, is affected by westerlies throughout the year, and so does not show such great contrasts of wet and dry seasons.**

Notes

Kathmandu is in the mountainous region of Nepal in the Himalayas. It experiences a subtropical climate. It is not particularly high (just higher than the top of Ben Nevis) and so, although temperatures are slightly cooler than more lowland places in northern India, they are still very high compared to Britain.

This data shows that mountains in other parts of the world can have very different kinds of weather.

The other point to note is that, although Kathmandu remains warm all year, the nearby Great Himalayas are so high (over 8000 m) that they are permanently below freezing.

ICT: Kathmandu and Mt Everest are both featured on The Mountain and Volcano Project CD. On the home screen click Himalayas, then click on map, then click on Kathmandu or Everest.

It may be helpful for students to do worksheet 9c in association with this worksheet. It provides the detailed weather data for Keswick.

Name: ..... Form: .....

See **pages 20 and 21** of *The Mountain Book*

Mountain weather in the Alps

The weather in the Alps can be very severe in winter. In the highest peaks it can remain below freezing all year.

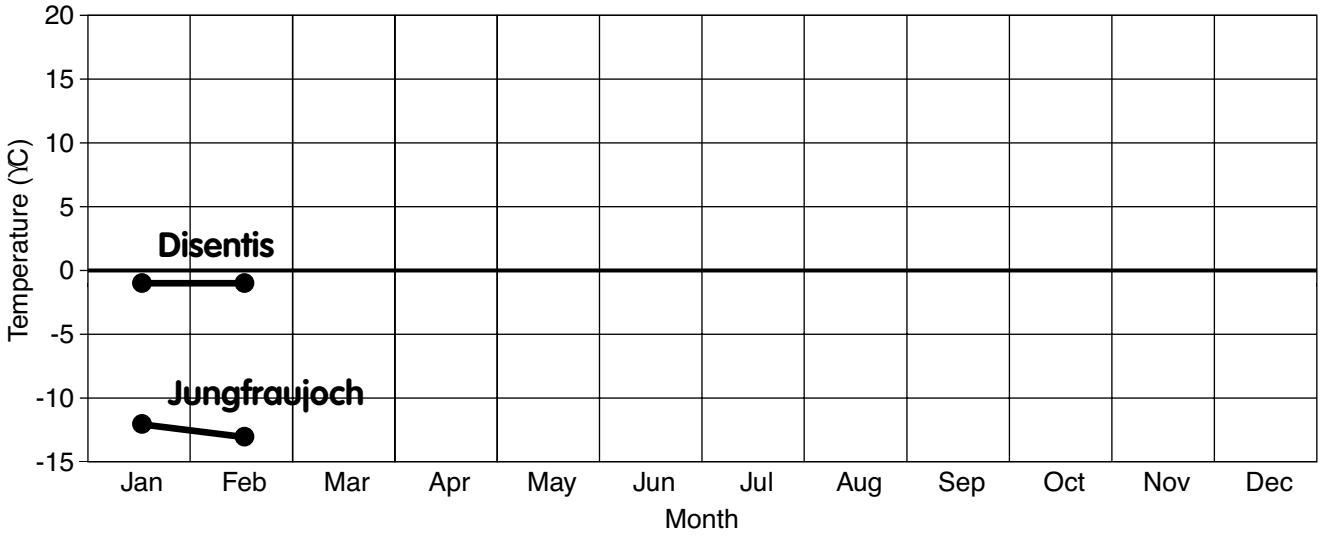
The tables below show the monthly temperature data for two weather stations in the Alps; Disentis is a town in a valley while the Jungfraujoch is one of the highest peaks in Switzerland. The temperatures have been given to the nearest 1°C.

Disentis, Switzerland: 1190m above sea level.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (°C)	-1	-1	2	5	10	13	16	15	13	9	3	1

Jungfraujoch, Switzerland: 3580m above sea level.

Q1. Complete the line chart below for each place to show how the temperature changes through the year. The charts have been started for you.



Q2. Based on this chart, do you think the snow ever melts away from the top of the Jungfraujoch?

✎ .....

Q3. Write a sentence comparing the weather in the valley to that on the peak.

✎ .....

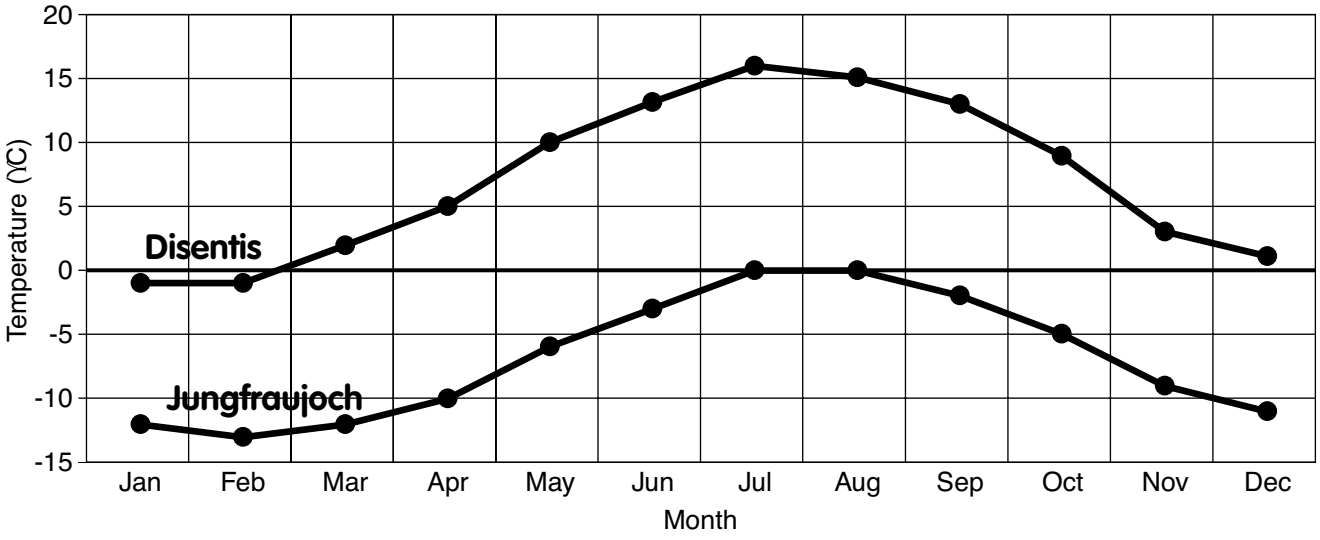
.....

Answers, Notes, Background

See **pages 20 and 21** of The Mountain Book

Answers

1. **See chart below. The temperatures show a rise in the summer and a fall in the winter. Notice especially, that the higher station has very little of the year above freezing.**



2. **Probably just about, as the *average* just reaches freezing, meaning that the temperature will be above freezing during the day. But it is fine for students to answer no at this level.**

3. **It is much warmer in the valley than on the peak. The peak has hardly any of the year above freezing.**

Notes

This worksheet allows students to compare data from a weather station in two very different mountain locations in Switzerland. They can then be compared with the locations in the UK if you wish.

Some students may have difficulty with minus numbers and will need help to understand that minus means below freezing.

There is no need to worry too much about accuracy at this stage. Just understanding that it is below freezing for most of the year is quite enough.

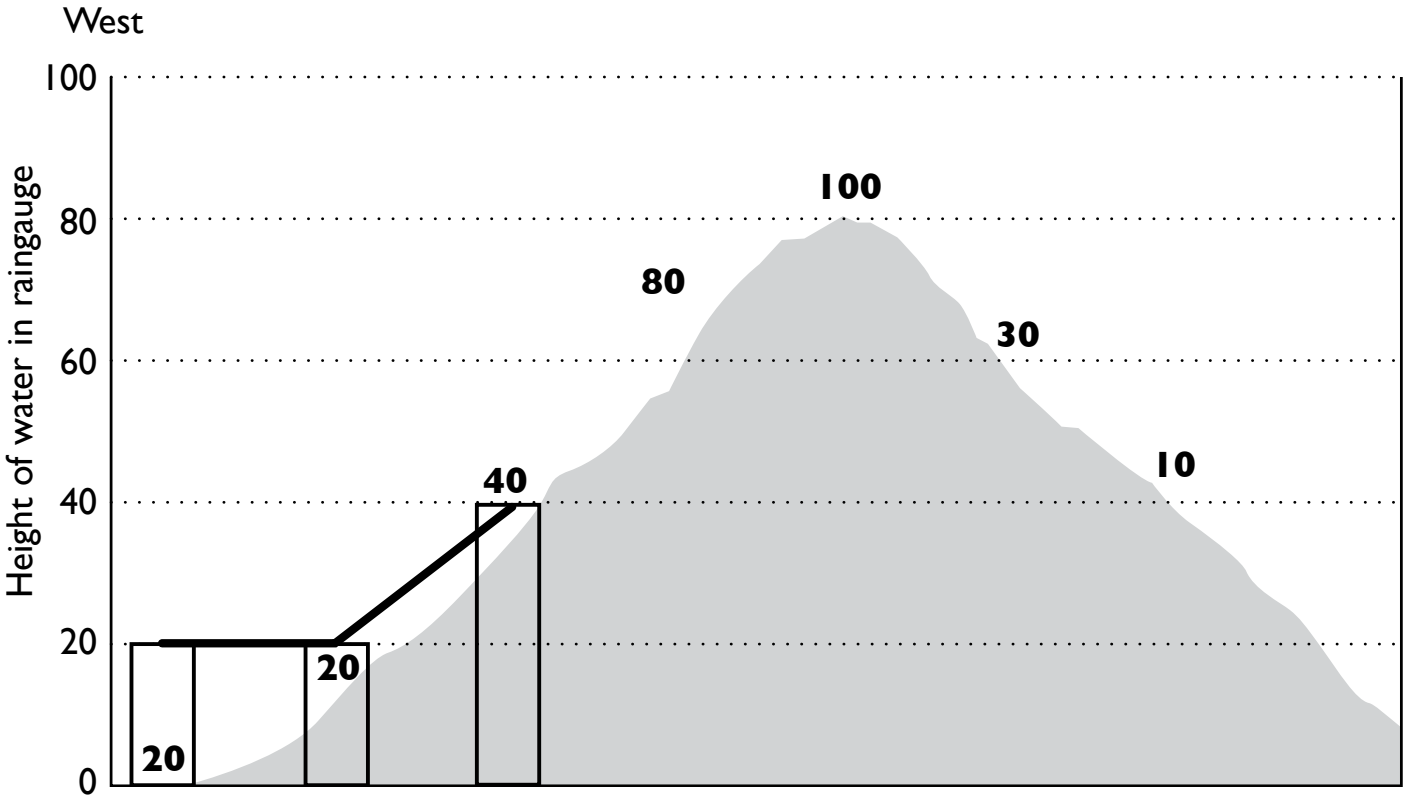
Name: ..... Form: .....

See **pages 20 and 21** of *The Mountain Book*

Rain and drought

Most mountains block the flow of moist air, leaving the lee side of the mountain with much less rain than the windward side.

Q1. The numbers on the diagram below show the height of water (in mm) recorded in raingauges placed on a mountain. Draw the remaining bars to show the amount of rain that fell on the mountain. Then join the centres of the tops of the bars with straight lines.



Q2. What is meant by the term 'rainshadow'?

✎ .....

Q3. Which is the rainshadow side of the mountain in the diagram above?

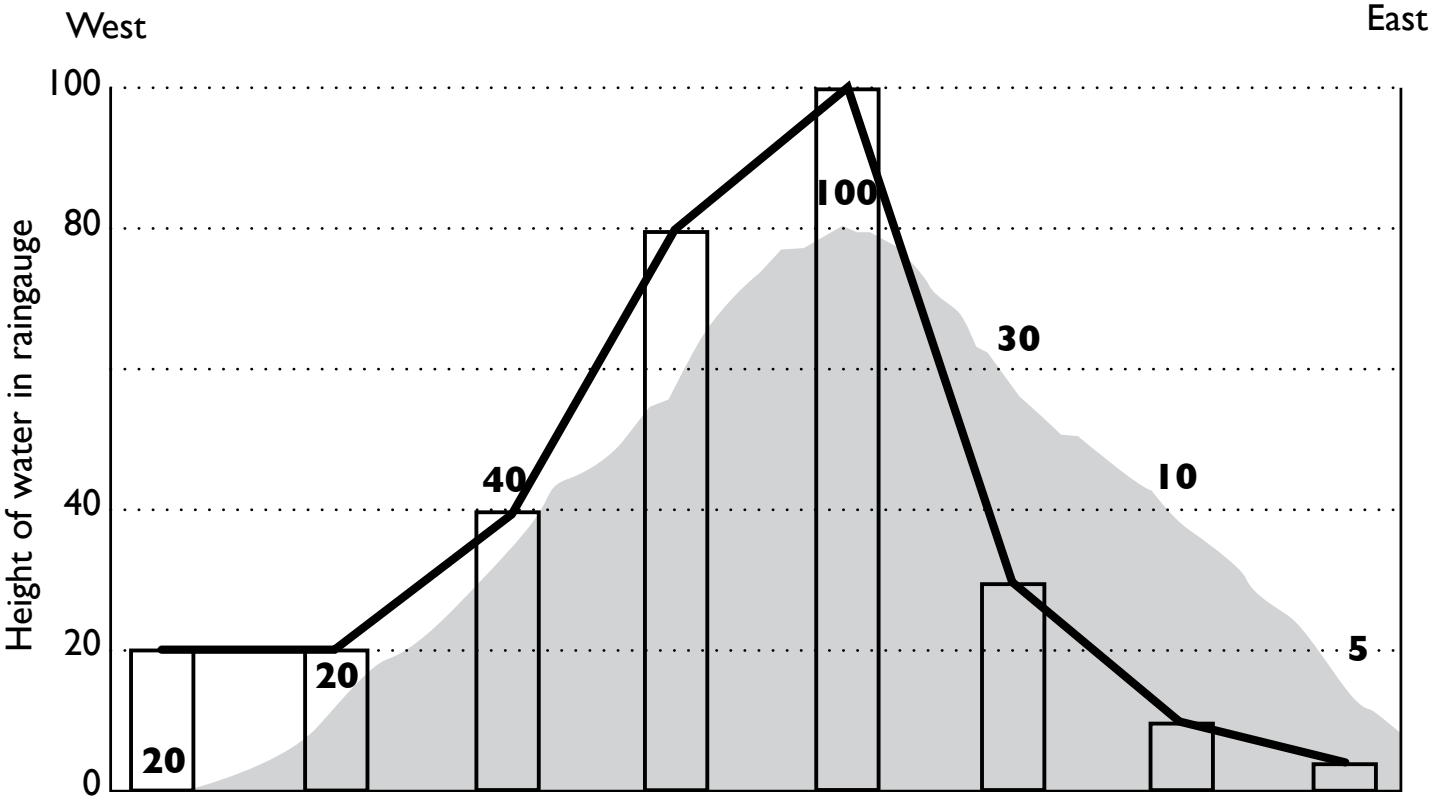
✎ .....

9H Answers, Notes, Background

See **pages 20 and 21** of *The Mountain Book*

Answers

1. **As diagram below.**



2. **The sheltered side of a mountain that receives much less rain than the windward side.**

3. **The side with the least rainfall, i.e. the lee side (the right).**

Notes

Notice that the rainfall falls away sharply on the rainshadow side. This is because the air is sinking and warming and can hold nearly all the remaining moisture. The rain that falls is from the drift of clouds formed on the mountains and carried across the lee side by the prevailing wind.

Name: ..... **Form:** .....

See **pages 22 and 23** of *The Mountain Book*

Blizzards and avalanches

Snow is easily carried by the wind, forming blizzards when the wind is strong. Snow piles up, or drifts, in sheltered places.

Q1. Why is snow so easily carried by the wind?

✎ .....

.....

Q2. How much more bulky is snow compared with rain?

✎ .....

Q3. Snow settles more on the side of trees and buildings facing away from the wind. Look at the snow on the roof in the diagram above. Draw on it which way you think the wind has been blowing.

Q4. Snow settles where the wind is slack. On the diagram above, colour in places where you think snow might pile up.

Q5. Would a fence be useful in helping to prevent snow from drifting onto a road?

✎ .....

.....

Answers, Notes, Background

See **pages 22 and 23** of The Mountain Book

Answers

1. **Because its large surface area makes it act like a parachute.**

2. **Twelve times.**

3. **From left to right.**

4. **Drawings should show snow behind the fences, behind the tree, behind the house. They may also show smaller amounts of snow in front of these obstacles.**

5. **Yes, but only if it is placed some way away from the road, e.g. in a field. Roadside hedges cause snow to pile up on roads, rather than protecting them from snowdrifts.**

Notes

The comparison of the bulk of rain and snow is only a guide, and varies enormously depending on the shape of the snowflakes, and so on. The point is that snow is bulky – and it doesn't disappear after each storm unless the temperature rises above freezing.

Snow is moved by the airflow. Most snow settles on the leeward side of an obstacle, but some also accumulates on the windward side of the obstacle. (Link to Science.) This is shown in the diagram in the student book. It is a more sophisticated point, however, that should only be discussed with the more able students.

Name: ..... **Form:** .....

See **pages 22 and 23** of The Mountain Book

Avalanche

Avalanches move down moderately steep slopes at speeds faster than an express train. They can do great damage.

Q1. What is an avalanche made of?

✎ .....

Q2. What triggers an avalanche?

✎ .....

.....

.....

.....

.....

Q3. The start of an avalanche has been drawn on diagram ❶ on the right. Draw in what happens on diagrams ❷ and ❸.

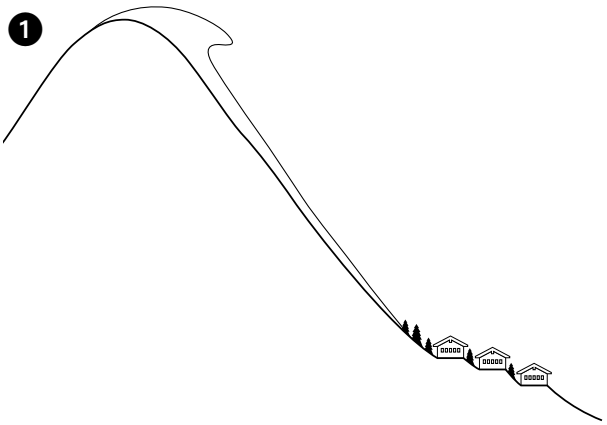
Q4. What happens to the houses?

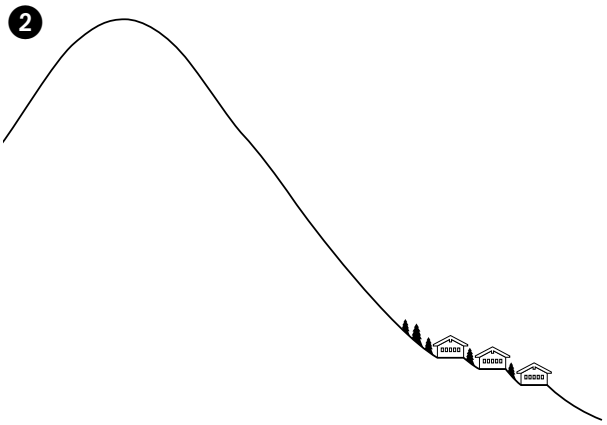
✎ .....

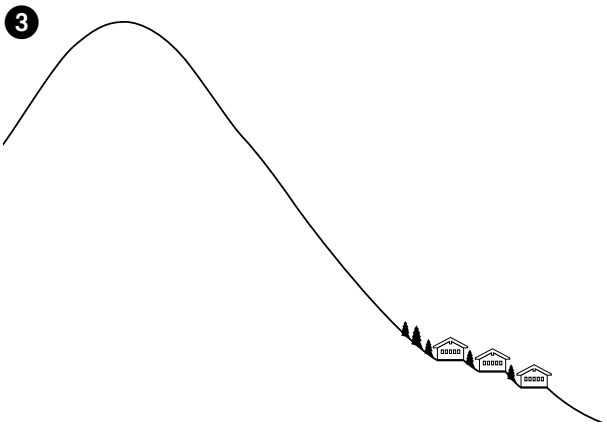
Q5. What is an avalanche fence?

✎ .....

Q6. Mark on the diagram the place where you would build an avalanche fence.







Answers, Notes, Background

See **pages 22 and 23** of The Mountain Book

Answers

1. **Snow**

2. **Any small shock, such as a skier moving over it, and also simple internal melting, or the extra weight of more snow.**

3. **The snow will slump down and, at the same time, the powdered snow will begin to lift to make a cloud. The shock wave ahead of the snow will damage houses. The main avalanche will completely destroy the houses. Notice that there are three drawings here, as opposed to four in the book. Students will therefore not be able to copy directly.**

4. **They are destroyed. The force of the snow simply knocks them down.**

5. **A fence designed to hold snow in place.**

6. **Any point high up on the slope in the place where avalanches start.**

Notes

Avalanches represent the most serious of winter mountain hazards.

There are two aspects to studying avalanches: the way the avalanche happens; and the disaster that is caused if an avalanche hits houses or engulfs people.

The emphasis here should be that a tiny disturbance can have massive knock-on effects. Huge volumes of snow are involved in avalanches. It is the combination of mass of snow and speed that creates the destructive energy.

Snow fences are not needed near the bottom of the slope because, if an avalanche were triggered lower down, it would never gather enough speed to become dangerous.

You may care to read out, or encourage students to read, the book "Avalanche" which is one of the Weather Stories available on the web site ('under In-depth... for projects/Weather Stories') or on the Mountain and Volcano Project CD.

11

Name: ..... **Form:** .....

See **pages 24 and 25** of *The Mountain Book*

Ski resorts

People have to ski where there is snow, but they also want reliable, sunny weather.

Q1. What is a ski resort?

✎ .....

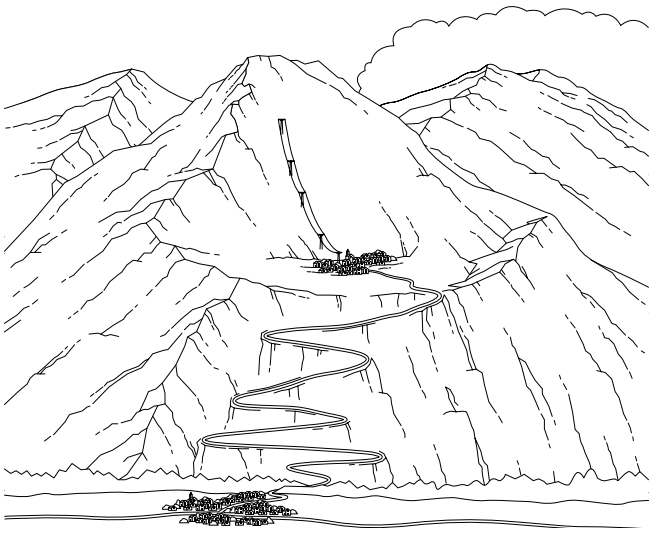
Q2. What is ideal weather for skiing?

✎ .....

Q3. Why are hotels in ski resorts in the high mountains more expensive than those lower down the same mountains?

✎ .....

.....



Q4. Suppose you were staying at a hotel in the lower resort shown in the diagram above. What would the hotel have to provide for you each day so that you could get to the ski area easily?

✎ .....

.....

Q5. What is a piste? Why is most skiing done on pistes?

✎ .....

.....

11 Answers, Notes, Background

See **pages 24 and 25** of The Mountain Book

Answers

1. **It is a (usually small) village or town which is entirely engaged in catering for skiers.**

2. **Cold, sunny weather with few snow storms.**

3. **Because it is more expensive to bring provisions to the higher level resorts. It is also a case of supply and demand. There are limited opportunities for building resorts in high mountain locations.**

4. **Hotels located at some distance from pistes will need to provide transport for guests, for example a minibus service.**

5. **Pistes are snow slopes that have been specially prepared to provide level skiing slopes. They are also chosen because they are safe locations, free from avalanches and other unexpected hazards. Furthermore, their ski lifts, give quick and easy transport back to the top of the piste.**

Notes

People who ski off-piste often face great danger as they may unwittingly ski onto an avalanche-hazard area. The reason they ski off-piste is that off-piste skiing is less crowded and can be more challenging.

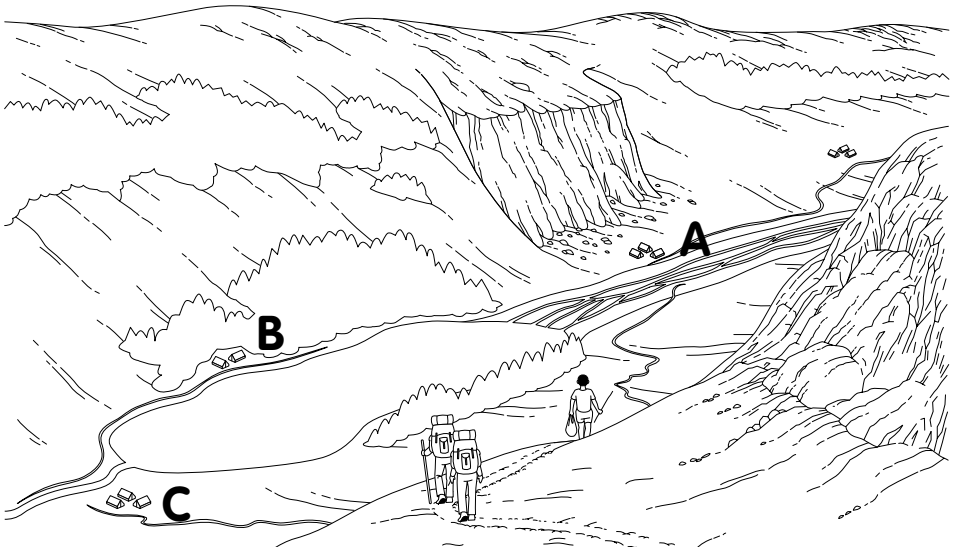
12

Name: ..... Form: .....

See **pages 26 and 27** of *The Mountain Book*

Camping in the mountains

Camping in the mountains in summer can be great fun, but for the unwary it can also have dangers.



Q1. What is a flash flood?

✎ .....

Q2. The diagram above shows a mountain scene with campsites. The campsites are labelled A, B and C.

(a) Is campsite A safe from summer floods? ✎ .....

(b) Is campsite B safe from summer floods? ✎ .....

(c) Is campsite C safe from summer floods? ✎ .....

Q3. Choose one of the sites and explain why it is safe or unsafe.

✎ .....

.....

Q4. If you were walking on the mountains in summer, what weather hazard might occur?

✎ .....

Q5. How would you plan to protect yourself from this hazard?

✎ .....

.....

Answers, Notes, Background

See **pages 26 and 27** of The Mountain Book

Answers

1. **A flash flood is a flood that forms in a mountain valley after a severe summer thunderstorm (cloudburst).**

2 & 3. **Campsites B and C are safe, protected by the large volume of the lake and its ability to hold storm waters. Campsite A is more at risk because it is close to a mountain stream.**

4. **Windchill.**

5. **By carrying some kind of wind and waterproof protective clothing, such as long trousers and a jumper or an anorak. A combination of cold and rain increases the windchill factor because wet clothes take heat from the body during evaporation.**

Notes

This is about safety in mountains during the summer.

Students may be aware that mountains are hazardous in winter, but not as hazardous in summer. In fact, mountains in the UK are usually safe from flooding in summer, but those in Europe and farther afield that have severe thunderstorms are much more at risk. It is worth discussing the differences between the UK and abroad because many students go abroad with their parents for their summer holidays to mountain areas with a higher summer hazard risk than at home.

Recently, stories of flash floods in the Pyrenees and elsewhere have been in the newspapers.

13A

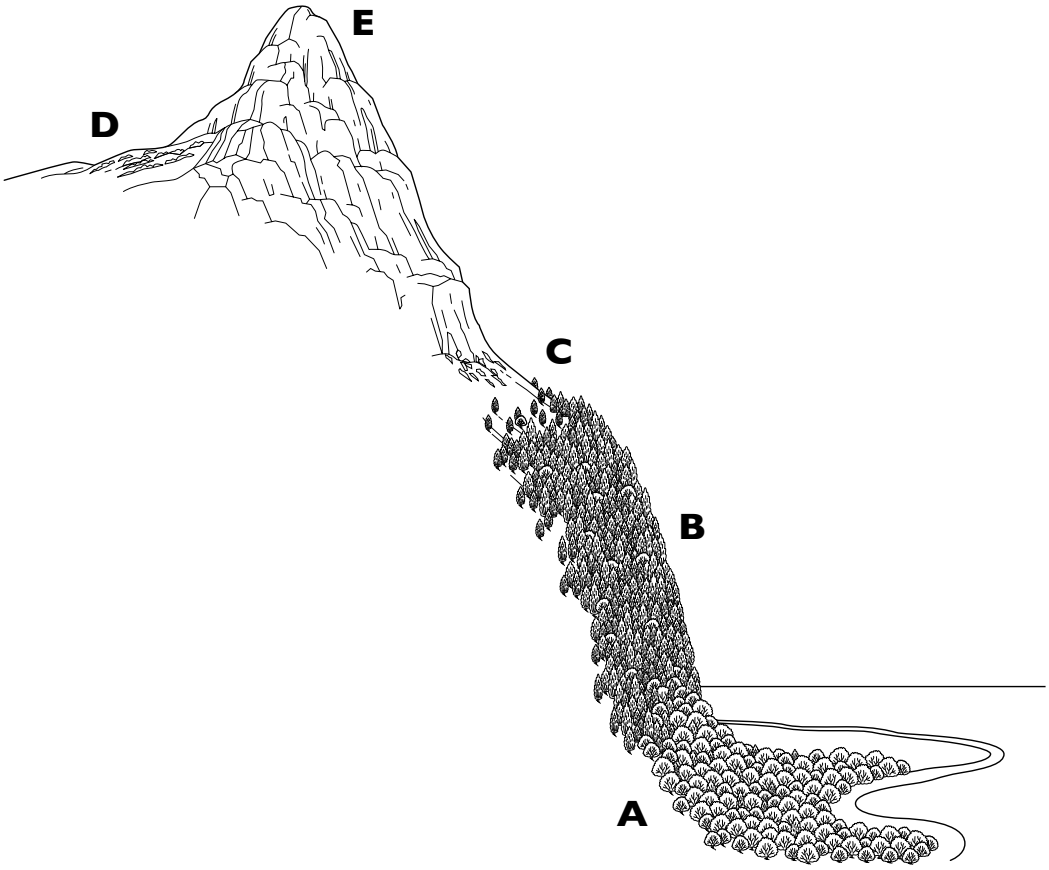
Name: ..... Form: .....

See **pages 28 and 29** of *The Mountain Book*

Mountain plants

Because the weather is always colder and harsher on mountains than in valleys, mountain plants are found in bands, or zones, that change with height.

Q1. Write on the diagram below the kind of plants you would expect to find at A, B, C, D and E.



Q2. If you were to dig down into the soil below the coniferous forest, would you expect it to be thick or thin?

✎ .....

Q3. What happens to the size of trees near the highest level that they will grow?

✎ .....

Q4. Why wouldn't plants grow at heights where snow lasts all year?

✎ .....

.....

13A Answers, Notes, Background

See **pages 28 and 29** of The Mountain Book

Answers

1. **A = Broadleaved forest such as oak.**

   B = Coniferous forest such as spruce and pine.

   C = Alpine meadows with plants such as lupins.

   D = Alpine plants such as edelweiss and heathers.

   E = None, because it is a permanent snowfield.

2. **It would be thin.**

3. **They become small and stunted and grow very slowly.**

4. **There is never an opportunity for plants to warm up to a temperature at which they can grow.**

Notes

In general, most plants need to have some part of the year when the temperature is above 6°C. Growth will usually occur only above this temperature. In cases where there is snow about, but there are snow-free patches, then plants may use the warmer microclimate close to rocks to get a temperature high enough for growth.

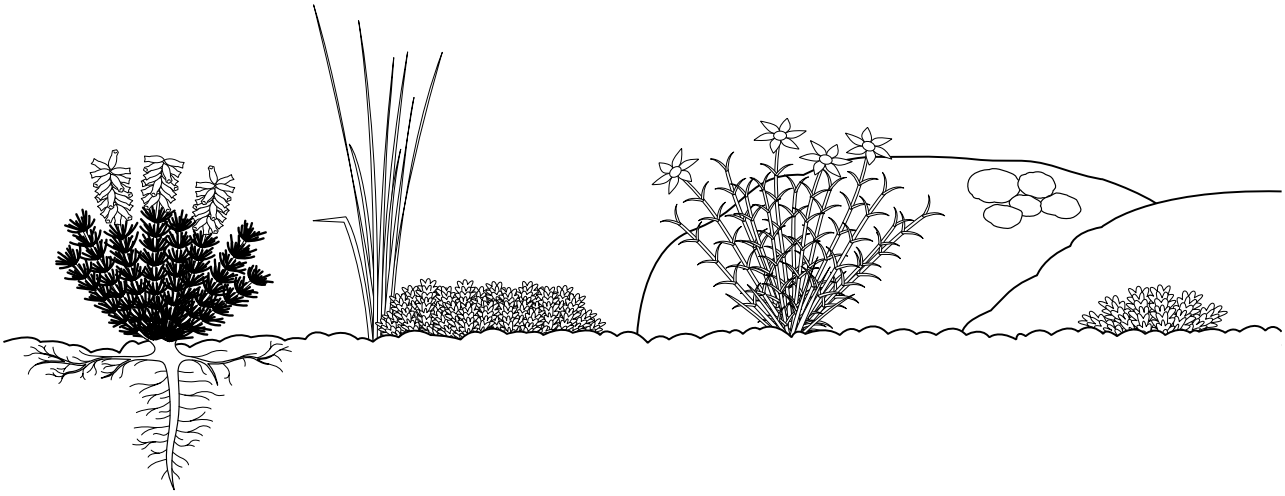
13B

Name: ..... Form: .....

See **pages 28 and 29** of *The Mountain Book*

Mountain plants

Alpine plants live in the harshest conditions of all. They have many features that help them to survive.



A

Q1. The diagram above shows an alpine plant with a deep root (marked **A**). What is this kind of root called?

✎ .....

Q2. Draw on the diagram above what you think the roots look like for the other plants.

Q3. Why do alpine plants have small, tough leaves?

✎ .....

.....

Q4. The growing season is very short where alpine plants grow. Give two examples of how plants make the most of the short season.

✎ .....

.....

Q5. Alpine plants are usually small and hug the ground, growing between rocks and boulders. Why is this?

✎ .....

.....

Answers, Notes, Background

See **pages 28 and 29** of The Mountain Book

Answers

1. **Tap root (designed to reach water in rocky ground, it also acts as an anchor in high winds).**

2. **Students should draw roots similar to A.**

3. **To help hold water against the drying effect of strong winds.**

4. **Flowers bloom early in spring so seeds can set in the short summer.**
   Many plants are evergreen and so do not have to spend time growing a new set of leaves.
   Many are perennials and so do not have to grow from seed.
   Many flower while still covered in snow so they will have pollen ready for insects as soon as the snow melts.

5. **Low height keeps plants out of strong winds and allows them to benefit from the warmer microclimate away from windchill.**

Notes

There are many alpine plants on sale in garden centres and so it is possible to bring examples of these plants into the classroom.

This is also a good subject for cross-curricular studies. The Science syllabus contains a section called "Making plants grow well".

Students may find it surprising to learn that alpines will not grow well in warm conditions and with deep, fertile soils. It could be useful to explain that adaptation for one environment may mean that plants will not be able to thrive in another (even if it is apparently better). For example, many alpines are not lime-tolerant, a property of many fertile soils.

14

Name: ..... Form: .....

See **pages 30 and 31** of *The Mountain Book*

Mountain animals

Mountain animals have to adapt to survive in a very harsh environment.

Q1. On the drawing above write the names of three common large wild animals found in mountains.

Q2. Deer eat plants. Why does each deer need a large area for grazing?

✎ .....

Q3. Mountain lions depend on small mammals, such as mountain hares, goats and small deer, for their food. Why do mountain areas have few mountain lions?

✎ .....

Q4. When winter begins, some large mammals move down from the mountains to escape the worst of the winter. What do other animals do?

✎ .....

Q5. Name one of the birds shown in the drawing above, and explain how it has adapted to living in the mountains.

✎ .....

.....

Answers, Notes, Background

See **pages 30 and 31** of The Mountain Book

Answers

1. **Bear, deer, wolf, mountain lion, mountain goat, lynx etc.**

2. **Because plants are small and grow slowly, and deer have to cover a large area to find sufficient food.**

3. **Because their prey is quite scarce (see 2 above).**

4. **Hibernate**

5. **Eagles and condors soar high in order to be able to scan a large area for prey.**
   Ptarmigan change colour to be camouflaged against hunters. They feed on seeds and plants. In winter they adapt by scratching down through the snow. (Such adaptations are only possible where the snow cover is thin.)

Notes

The theme of this spread is the food chain.

Because the amount of vegetable matter is small, the number of grazing animals is reduced and so the number of hunters is also small.

You might care to introduce this idea by drawing a simple food pyramid.

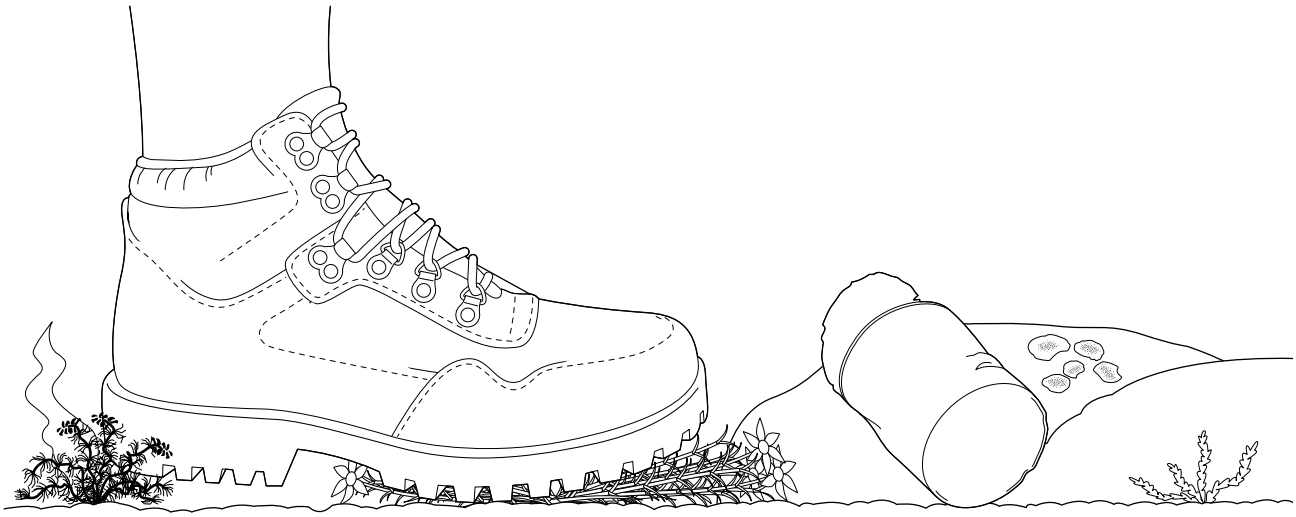
C 15

Name: ..... **Form:** .....

See **pages 32 and 33** of *The Mountain Book*

Protecting mountain environments

Mountain environments are some of the most easily disturbed in the world.



Q1. Look at the drawing above. Name two ways in which people who visit mountain environments can damage them.

✎ .....

.....

.....

Q2. How have people altered the way that animals, like deer, marmots and bears, live?

✎ .....

.....

.....

Q3. Why is it important to preserve a wilderness?

✎ .....

.....

Q4. There is a saying used by conservationists: 'Take only photographs, leave only footsteps!' Design and make a poster to show why this is important in mountain environments.

15 Answers, Notes, Background

See **pages 32 and 33** of The Mountain Book

Answers

1. **They damage fragile plants, causing them to die. They leave litter, which not only looks unsightly but covers up plants, and so stops them getting the light they need to grow. Litter, such as glass, can cut the feet of wild animals. Discarded glowing cigarettes can cause fires.**

2. **People leave food litter which attracts animals. This leads the animals to scavenge for food rather than fending for themselves. To avoid human contact, timid animals may move to more remote locations.**

3. **Because it is an area where few people go and where they cause almost no damage, and wildlife can live in better balance.**

4. **The poster might show things like people taking rare plants away, frightening animals, causing forest fires and leaving litter.**

An example poster, made by copying and pasting from the web site or *The Mountain and Volcano Project CD* is shown on page 129 of this *Teacher's Resources*. An environment poster could easily be made the same way.

Notes

This could be made into one of the most important themes. The students could be asked to imagine how trampling, leaving litter and crushing plants, as well as frightening off animals, or causing a change to their diets, could threaten the environment.

The important steps for making a poster can be spelled out as:

(a) understanding what happens in a natural environment (i.e., the science of how it works, the food pyramid, relationship between plants and weather etc.)

(b) understanding the threats that people pose (by logging, excess recreation in ski areas etc.)

(c) making people aware of the problems

(d) putting forward constructive and positive solutions, rather than negative (don't) solutions. These positive solutions need to focus on what people like to do, and at the same time, adapt them so that people are naturally led away from the most destructive features that their lifestyles might cause. For example if car parks are provided in some places then people will find this a positive thing because it will give them better access, but by not providing them in other areas, some areas will get much less pressure, and so become more wilderness-like, resulting in a more secure habitat. This is a positive solution rather than ring-fencing an area needing protection and then putting up keep out signs.

C
I
16

Name: ..... **Form:** .....

See **pages 34 and 35** of *The Mountain Book*

Living on the roof of the world

Living at very high altitudes is very different from living close to sea level. People need to adapt to the thin air in many ways.

Q1. What is the first thing you would notice about your body if you flew to a place high in the mountains?

✎ .....

Q2. What is altitude sickness?

✎ .....

.....

Q3. Why is it likely that you would need to wear sunglasses?

✎ .....

.....

Q4. Most people wear hats and clothes that cover arms and legs. Give two reasons why they might do this?

✎ .....

Answers, Notes, Background

See **pages 34 and 35** of The Mountain Book

Answers

1. **Difficulty in breathing (because of the thin air).**

2. **Altitude sickness (mountain sickness) causes headache and nausea as a result of lessening oxygen reaching the brain.**

3. **The sun is far brighter than at low altitudes, and the glare can hurt the eyes until the body has had time to adjust. The extremely bright sunshine is a result of the smaller amount of dust and other particles in the air.**

4. **The strong sunlight causes sunburn; the air is cool.**

Notes

This worksheet uses the case study of the Andes. The Bolivian and Peruvian High Andes – the Altiplano is almost a desert. The idea of a desert in the high mountains can seem strange to students, but at the latitude of the tropics, deserts are found, both at high and low altitudes.

ICT: To get more pictures to examine this environment, go to the web site under 'In-depth... for projects' or The Mountain and Volcano Project CD. Click on Andes, then choose the topic weather or a place from the interactive map.

This worksheet gives an opportunity to discuss both climatic and cultural adaptations to living in a high desert. The focus of the student book is on the surprise of the visitor, and how visitors have to learn to adapt. This approach can be used as a vehicle for students to appreciate the ways in which indigenous people have adapted to mountain environments, both in their way of life and in their clothing.

17

Name: ..... Form: .....

See **pages 36 and 37** of *The Mountain Book*

Mountain farming

Farmers living in mountains have to make use of land in valleys and on higher slopes. The higher slopes can be used only in summer.

Q1. Name two things about mountain weather that affect farmers.

✎ .....

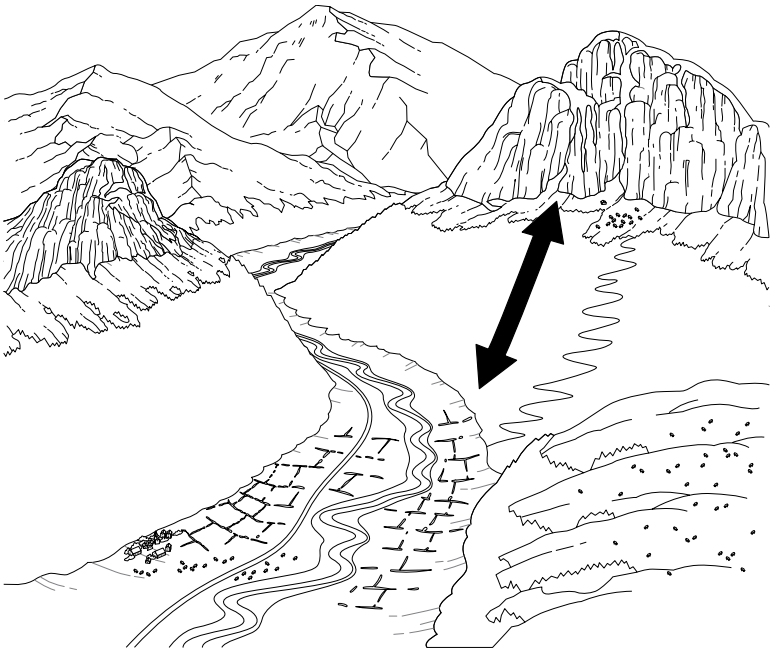
Q2. What are the fields in the valley used for in summer?

✎ .....

Q3. What happens to the farm animals in summer?

✎ .....

Q4. Write a word beside the arrow in the diagram that describes the way people move their animals to mountain pastures each spring and back each autumn.



Q5. Habib is a farmer in the Himalayas. He only has a small farm near his village in a valley. This is where he keeps his animals in the winter, when the mountain meadows are covered with snow. In the late spring, his children and his elderly father walk with their animals to a hut they have built on the high mountain pastures. This is 1500 m higher than the valley bottom, and three days' walk away. Write down what you think it might be like to herd the animals to the mountain pastures, and then what you might do (and might not be able to do) during the summer while you looked after the animals. Write your answer on a separate sheet of paper.

Answers, Notes, Background

See **pages 36 and 37** of The Mountain Book

Answers

1. **In winter: cold, snow, the need to bring animals indoors.**
In summer: high rainfall, short growing season.

2. **For growing grass to make hay for winter feed.**

3. **They are moved to high mountain pastures.**

4. **Transhumance.**

5. **This is a topic that can form part of a literacy hour. Pictures 2 on page 37 of *The Mountain Book* show Habib's environment.**

ICT: There are many pictures of his village on the web site under 'In-depth... for projects' or *The Mountain and Volcano Project CD*. To see them, click on Himalayas, then Map, and then select the location Naranag.

Notes

Note that question 5 requires another sheet of paper.

There are considerable differences between the farming solutions in mountains in different parts of the world. It might therefore be worth telling students which area to consider before they begin this worksheet, or running the worksheet twice, once for a UK mountain and once for a much higher contrasting mountain chain, such as the Alps or Himalayas.

In the case of the UK, the mountains are not high enough for transhumance to be a necessary option, but animals are brought down from the highest grazing lands each autumn, in part for their own protection, and in part because there would not be enough grazing for them. In this respect, therefore, there is common practice between those in the high mountains and those farming UK mountains. (In the past, farmers in UK mountains brought their animals down from the mountains in autumn. It was then traditional to have a livestock sale. Most animals in the sale were then slaughtered because farmers could not provide enough feed for all the stock through the winter.)

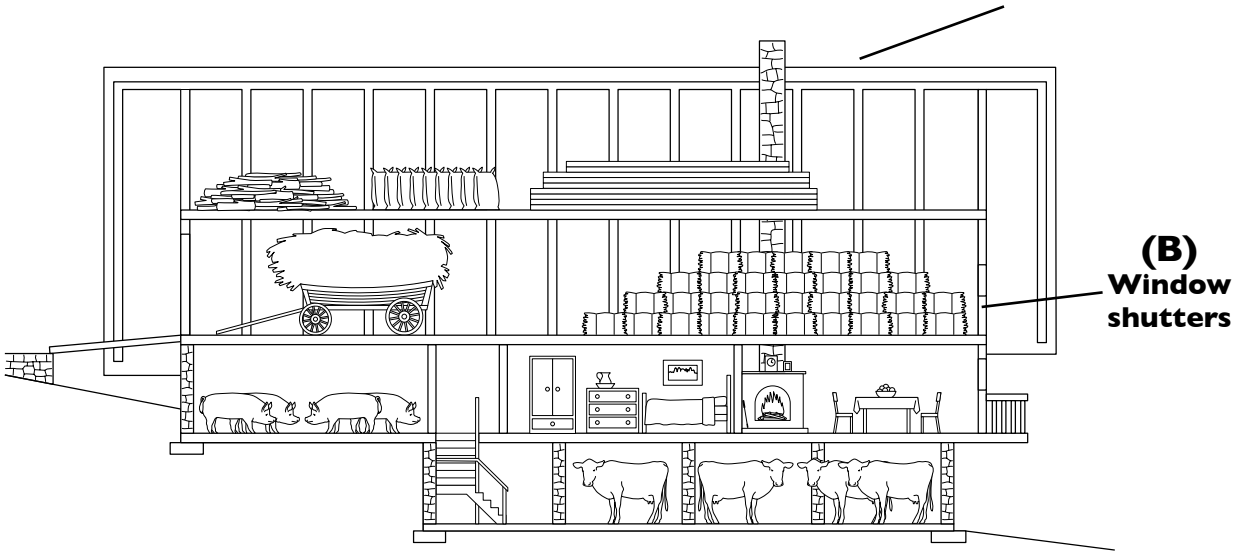
C
I
18

Name: ..... **Form:** .....

See **pages 38 and 39** of *The Mountain Book*

Homes for a mountain winter

Heavy snow and intense cold mean that people in high mountains have to live in special homes.



Q1. Why are fuel bills likely to be higher for people living in mountainous areas than for those who live in the lowlands?

✎ .....

Q2. In the past, people built mountain homes that housed animals and fuelwood as well as people. Why did they do this?

✎ .....

.....

.....

Q3. Look at the diagram above. Explain how the two features of a traditional house, shown in the diagram (A and B), were designed to keep out the cold.

✎ .....

.....

✎ .....

.....

Answers, Notes, Background

See **pages 38 and 39** of The Mountain Book

Answers

1. **Because it is colder.**

2. **Because heavy snowfalls might mean they were trapped in their homes for many weeks and so they needed to get to their animals and fuel. It would also be too cold for animals to live outside. Shared heat between people and animals was also important.**

3. (A) **Snow on the roof acts as an insulating blanket.**
(B) **Shutters across windows help to keep out the cold in the same way as modern double or triple glazing.**

Notes

This worksheet concentrates on traditional alpine houses, because they show clearly a range of simple, low-tech adaptations to mountain conditions.

The high efficiency of modern materials means that modern mountain homes can look surprisingly similar to lowland homes. It is hard, for example, to see the difference between double glazing and triple glazing.

However, it would be profitable to discuss student's ideas about how they might improve the quality of insulation, and link this to science (heat and energy). For example, increasing the thickness of fibreglass roof insulation is a lightweight solution to living in a cold location.

Name: ..... Form: .....

See **pages 40 and 41** of *The Mountain Book*

Where towns are found

For safety and winter warmth, homes have traditionally been built only in special parts of a mountain valley.

Q1. Write down a weather reason for choosing to build on one side of the valley.

✎ .....

Q2. Write down one way in which this would lead people to decide not to build in the bottom of a valley.

✎ .....

Q3. Why would people choose not to build beside a river?

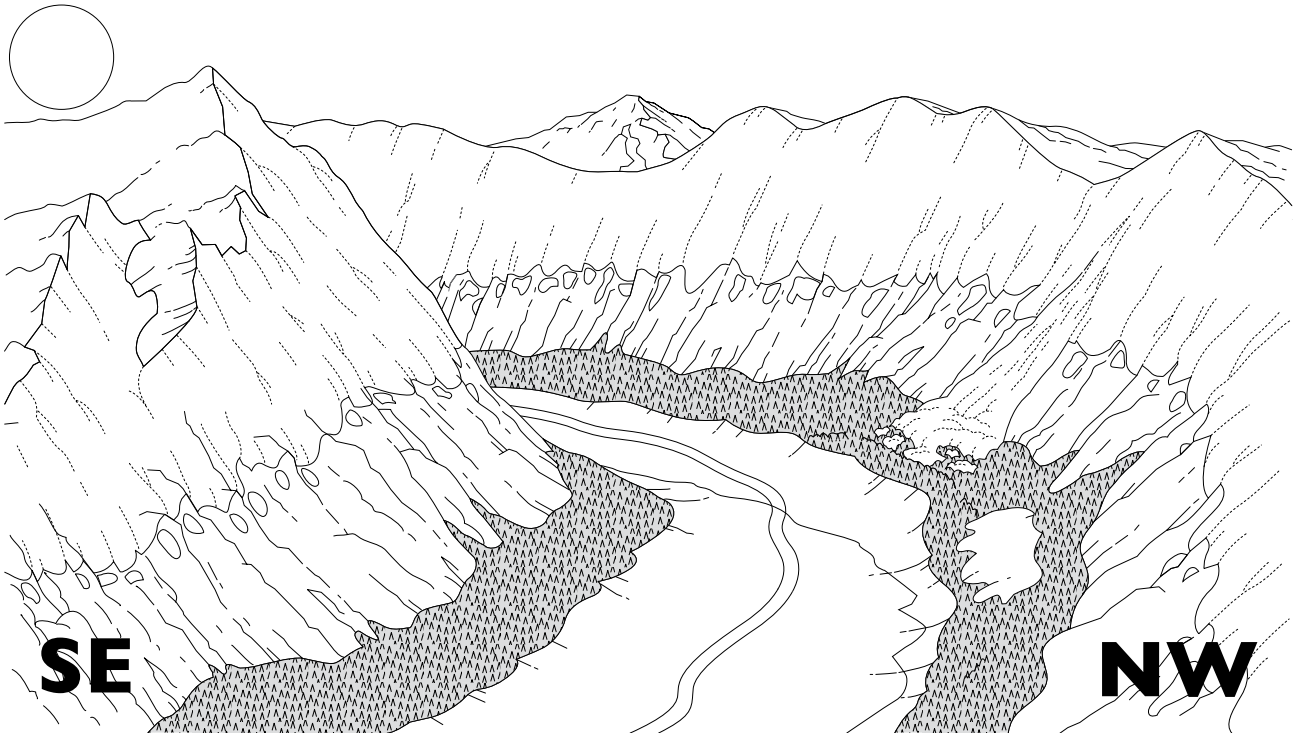
✎ .....

Q4. Name one snow-related hazard that could have a disastrous effect on a town.

✎ .....

Q5. Imagine you are a new settler to a mountain area. Using all of your answers above, mark on the diagram below the place you would choose to build a new village. Explain the reasons for your choice.

✎ .....



Answers, Notes, Background

See **pages 40 and 41** of The Mountain Book

Answers

1. **Facing the morning sun (north side of valley), sheltered from the north wind.**

2. **To keep away from the cold night air that builds up in valley bottoms.**

3. **The risk of spring snowmelt and summer thunderstorm floods.**

4. **Avalanche.**

5. **Anywhere on the right hand side of the valley, just off the flood plain where there is flat land, and away from the avalanche.**

Notes

This topic combines weather and landscape features, but the emphasis is on weather.

This worksheet allows students to imagine they are new settlers and have a choice of locations.

In reality, it is likely that a wide variety of locations would have been chosen, of which some will have proved to be disastrous or uncomfortable, and so the more favoured ones would have expanded, while the less suitable ones would have declined or remained small.

20

Name: ..... **Form:** .....

See **pages 42 and 43** of *The Mountain Book*

Routes through the mountains

Both the harsh winter weather and the steep slopes often make it difficult to travel through mountains.

Q1. What part of the natural landscape allows people to get from one valley to another?

✎ .....

Q2. In what way are roads designed to make it easier for cars get up steep slopes?

✎ .....

Q3. What happens when there are no easy road passes across mountains?

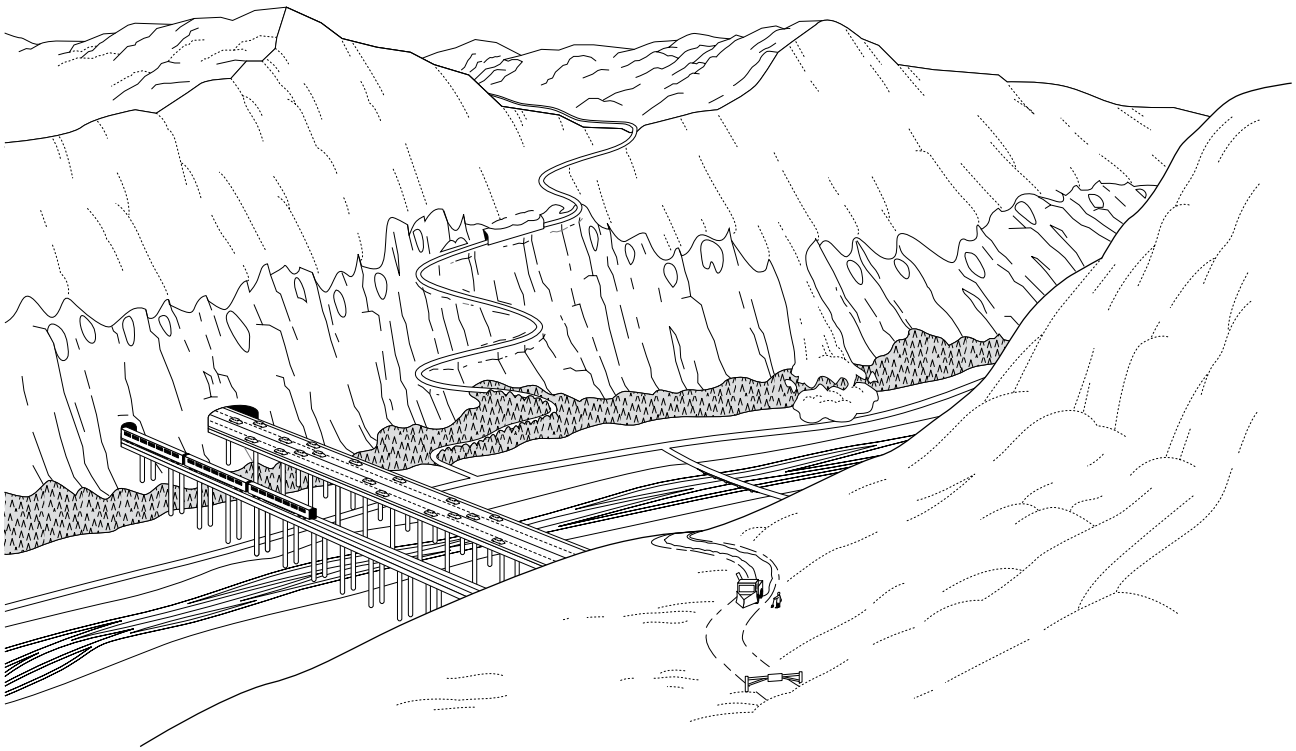
✎ .....

.....

Q4. How do trains get between valleys in mountain areas?

✎ .....

Q5. On the diagram below, mark the way in which weather hazards might affect roads and railways.



Answers, Notes, Background

See **pages 42 and 43** of The Mountain Book

Answers

1. **Passes.**

2. **With hairpin bends.**

3. **People either have to go up and down the valleys (they are dead ends) or they have to blast tunnels through the ridges that separate them.**

4. **By tunnel.**

5. **Students should mark deep snow through passes, avalanches below steep slopes, and ice on steep roads. They should also indicate that railways will be affected by snow.**

Notes

As a preliminary to this worksheet, it might be helpful to remind students of the main physical features of the landscape: steep valley sides and passes between valleys. They will then be prepared for Question 1.

You may also feel it a good idea to discuss how road transport in mountainous areas is often slow because roads have to follow the contours, resulting in many bends and low traffic speeds.

With steep slopes and slow speeds, fuel consumption is high, so that travel in mountains is slow and expensive, even in summer. In winter, deep snow may make it impossible to get about.

Name: ..... Form: .....

See **pages 44 and 45** of *The Mountain Book*

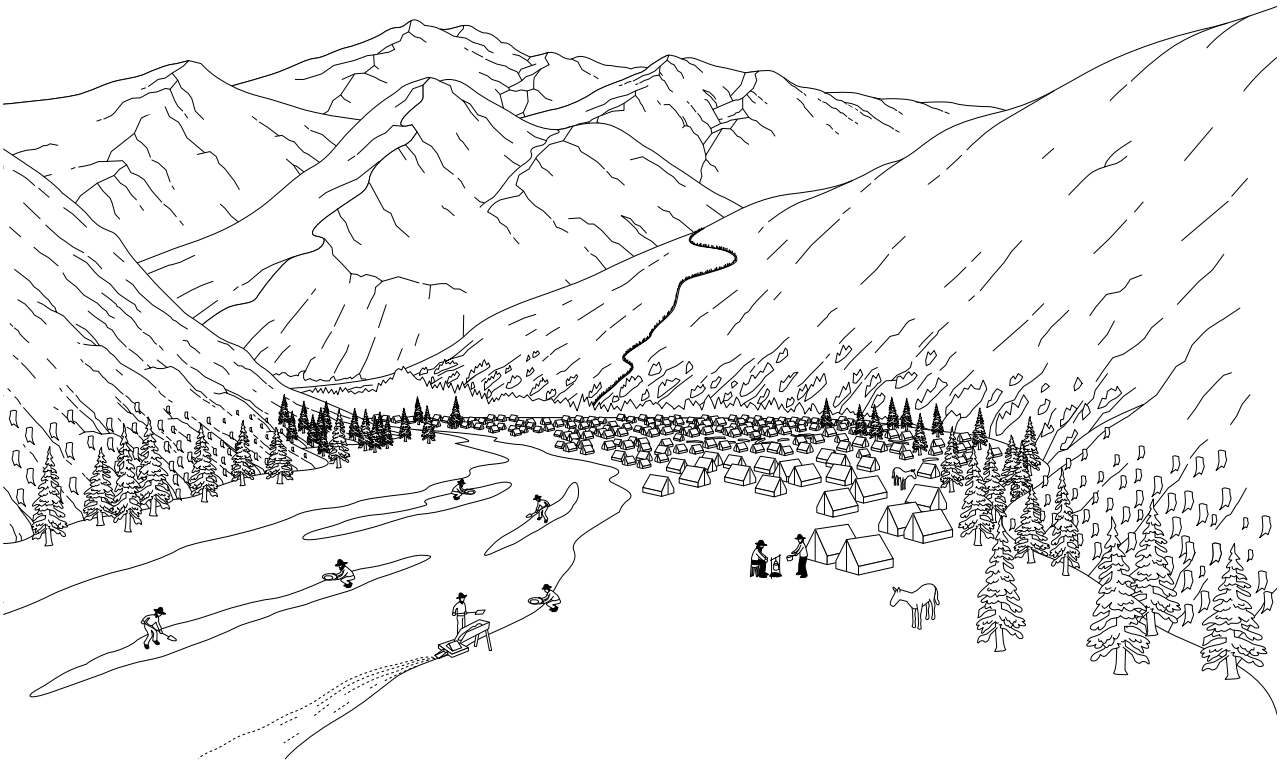
Seeking a fortune from the mountains

Precious metals, like gold, are found mainly in mountains. In the past, discoveries of gold caused huge numbers of people to rush to the mountains to seek their fortunes. Most did not know how hard life would be.

Q1. Is gold found in the rock, lying on the surface, in the soil or in the rivers?

✎ .....

Q2. The drawing below shows what it might have been like in the Klondike area of the Rocky Mountains in summer during the gold rush. What would the changes be in winter? Mark the differences onto the drawing.



Q3. It was 1000km from the nearest seaport to the Klondike. The prospectors could not travel at more than about 2km an hour over the mountain passes and could not do more than 10 hours' travelling a day. How many days might it have taken to reach the camp?

✎ .....

Q4. Why are many places like the Klondike now deserted?

✎ .....

Answers, Notes, Background

See **pages 44 and 45** of The Mountain Book

Answers

1. **In the rock and in the river gravels.**

2. **The ground would be frozen, the river would be frozen, snow would lie to a depth of several metres over the passes, trapping the prospectors in their tents and shacks for many months.**

3. **1000/2 = 500 hours. About 10 hours' travelling a day, means 50 days, say just under 2 months. This gives students an idea of how remote the area is and what an ordeal it must have been for people, their food and their belongings.**

4. **Because the gold was worked out. The areas are so remote and so inhospitable that there is no other reason to be there.**

Notes

This part of the student book and this worksheet are based on the gold rush to the Klondike in the late 19th century. It is almost impossible to imagine the hardship that prospectors had to put up with in these high, northern mountains. The distances they had to walk from the closest ports were formidable; many walked nearly 1000 km to reach the Klondike river and its gold-rich alluvium.

Notice that most mining was done by sieving (panning) the alluvium, rather than digging it from the ground.

Notice, too, that the people who provided the essential services, such as barkeepers and provisions' merchants, often made far more money than the prospectors.

The growth of these towns was phenomenal, but they relied on a single resource, and once it was exhausted, the people left and the abandoned towns became ghost towns.

There are many exciting stores associated with miners and their exploits. Students could be encouraged to imagine how difficult it must have been to live in a tent for a winter lasting eight months!

ICT: To get an idea of what gold/silver rush towns now look like, go to the web site under 'In-depth... for projects' or The Mountain and Volcano Project CD, then click Rockies, then Map, then Silverton, St Elmo or Leadville. The data on Silverton is the most comprehensive.

Section 4: 'The Mountain and Volcano Project CD' explained

Please note some of The Mountain and Volcano Project CD material is also available under 'Geography/Mountain/In-depth...for Projects' as part of the subscription to CurriculumVisions.com.

The specific purpose of *The Mountain and Volcano Project CD* and 'Projects' area of the web site is to enhance the topics introduced in the student book. It is possible to use the student book and the CD/web site independently. However, they are designed to reinforce one another.

The Mountain and Volcano Project CD/web site gives a kaleidoscope of photographs and data which simply couldn't be fitted into the book. Students could begin by clicking on the 'Mountain Tour' button at the start of their course, and then work their way through *The Mountain Book*, at appropriate moments referring to the CD/web either in class or in their own time. They can also use the CD/web as a basis for projects.

Using the CD version

The CD information is browser-based, which means that it can be opened in any browser used to surf the Internet (although it is optimised for Internet Explorer 5 and above).

The purpose of using a browser application is to make the CD content look and feel just the same as it would on the Internet. You can network the CD so that many students can access the data at the same time.

Installing the CD

The Mountain and Volcano Project CD can be used on both Macintosh and Windows-based machines.

Inserting *The Mountain and Volcano Project CD* will usually cause it to start up automatically in Windows. However, this depends on the configuration of your machine and the place where the browser application is kept.

If *The Mountain and Volcano Project CD* does not automatically start up your browser, then do this:

Windows

1. Eject the CD and try again. If it still doesn't start then:
2. Open Internet Explorer.
3. Type Control O and browse until you find your CD drive. In it look for the file 'index.html'. Select this and click OK.
4. Save the home screen as a Favorite for quick location in future.

Mac OS X (Instructions for first time loading)

1. Place the CD into your CD drive.
2. Open Internet Explorer by double-clicking on its icon in the dock.
3. Type (Command) O and browse until you find the CD.
4. Inside the CD scroll down to 'index.html'. Double click on 'index.html' to launch the CD.
   (Important: do not double click directly on index.html – open it from within your browser.)

In all cases, once you have got the disk working, make the home screen of *The Mountain and Volcano Project CD* one of your Favorites and then when you load the disk next time you can find the CD directly from this list.

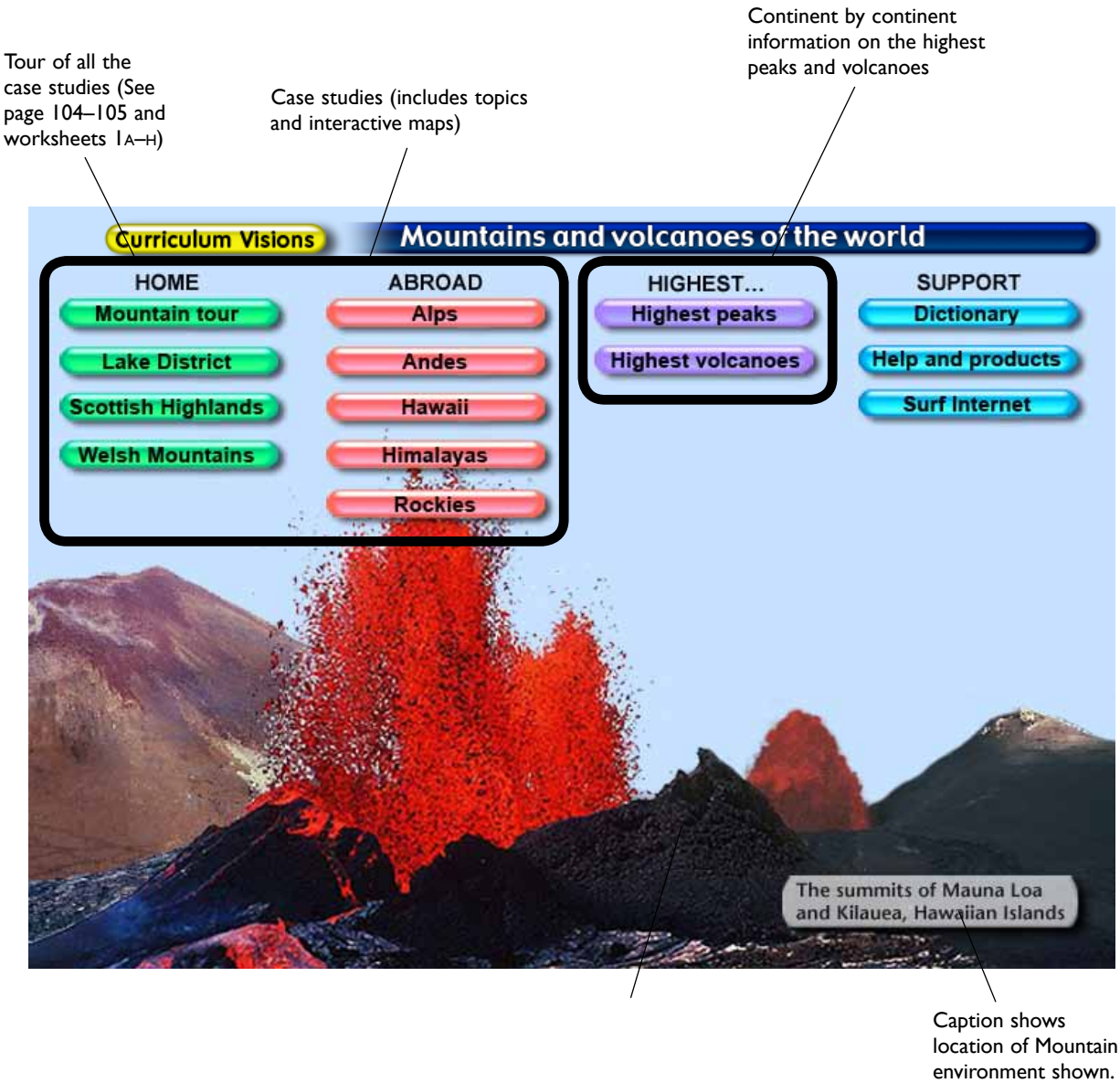
The home screen

The home screen should give students an immediate feel for the nature of the mountain environment through its collage of pictures. The home screen also contains buttons to take students to the various parts of the data. The buttons include the UK and world mountain case studies/tours, further book support and SAT tests, plus continent by continent information on the world's highest peaks and volcanoes.

The case study areas that are given are the English Lake District, the Scottish Highlands, the Welsh Mountains, the Himalayas, the Rocky Mountains, the Andes and the Hawaiian islands. In addition, all the mountain ranges of the world are briefly described under the headings of world's highest peaks and volcanic mountains.

The CD/web site also contains a visual dictionary with the curriculum words appropriate to the mountain topic.

▼ *This screen capture shows the home screen (the background picture will change randomly every time the screen is refreshed.*



Dictionary

You will find this facility on all navigation bars throughout. Whenever students want to know about a curriculum word they should click on this button. The dictionary contains only curriculum words. It is not a global dictionary, but focuses on those words that students will need.

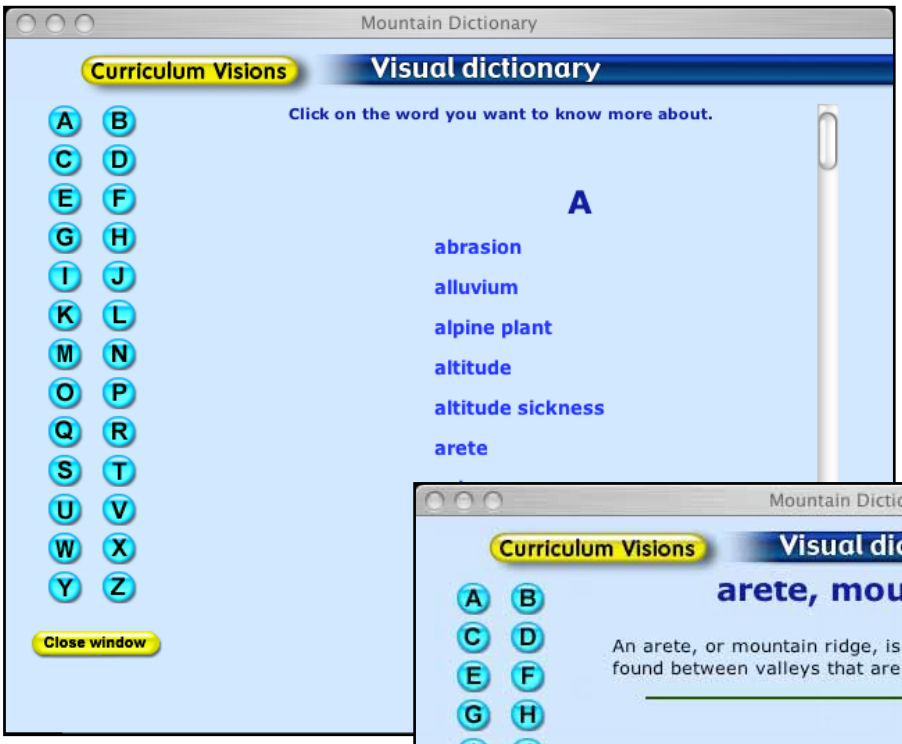
Case studies

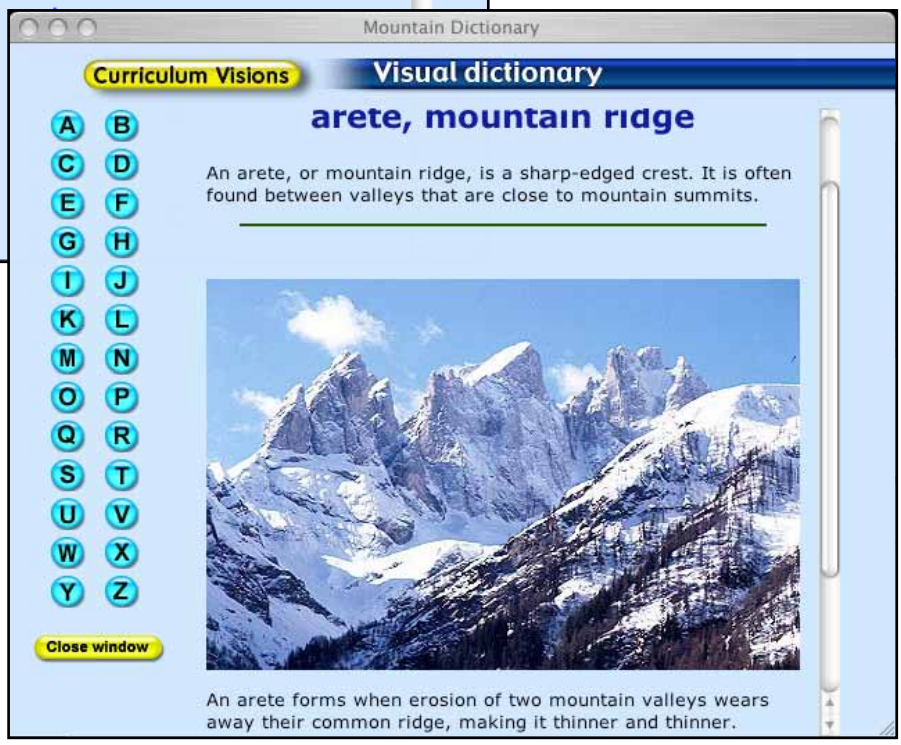
The case studies are accessed through the buttons on the home screen. They each contain information that is organised by topic and by place through an interactive map. There are sufficient case studies and place examples to allow 30 children in a class to end up with more than 30 different projects.

The majority of a student's time may be spent working on a case study. They can use either the interactive map or the topics for this.

You should take them through one of these topics so that they understand the structure of the material. They should know that the same topic structure is used for all case studies. This enables students to make direct comparisons between mountain chains.

There is more than enough material here to occupy students for many hours and therefore it is essential that you help them to understand what is involved, but





◀▼ *These screen captures show the visual dictionary and the entry for 'arete'.*

the most important thing to realise is that all of this information is presented at the right curriculum level and will, therefore, save students having to go searching around the Internet to find suitable material. This is not to say they shouldn't go to the Internet, but we feel they should go to the Internet after they have benefited from the structure provided by our CD/web site.

Interactive map

The interactive map takes students to specific places. These are mainly photo essays of places, together with brief notes. The examples are selected for their geographical content and can be used as part of a project. They are not meant to cover the mountains in a systematic way.

Topics

The topics are a systematic way of going through a case study. The topics are listed on the left-hand side of each screen. These topics are uniform across all mountain regions and consist of:

- landscape
- weather
- seasons
- hazards
- homes and towns
- travelling about
- tourists, and
- environment.

▼ *This screen capture shows the main features of each Case Study.*

▼ *This screen capture shows the main features of each Case Study.*

Each topic consists of a summary page and a more detailed page or pages. This will allow differentiated learning. The pages are accessed by the arrows at the top and the bottom of the text panel.

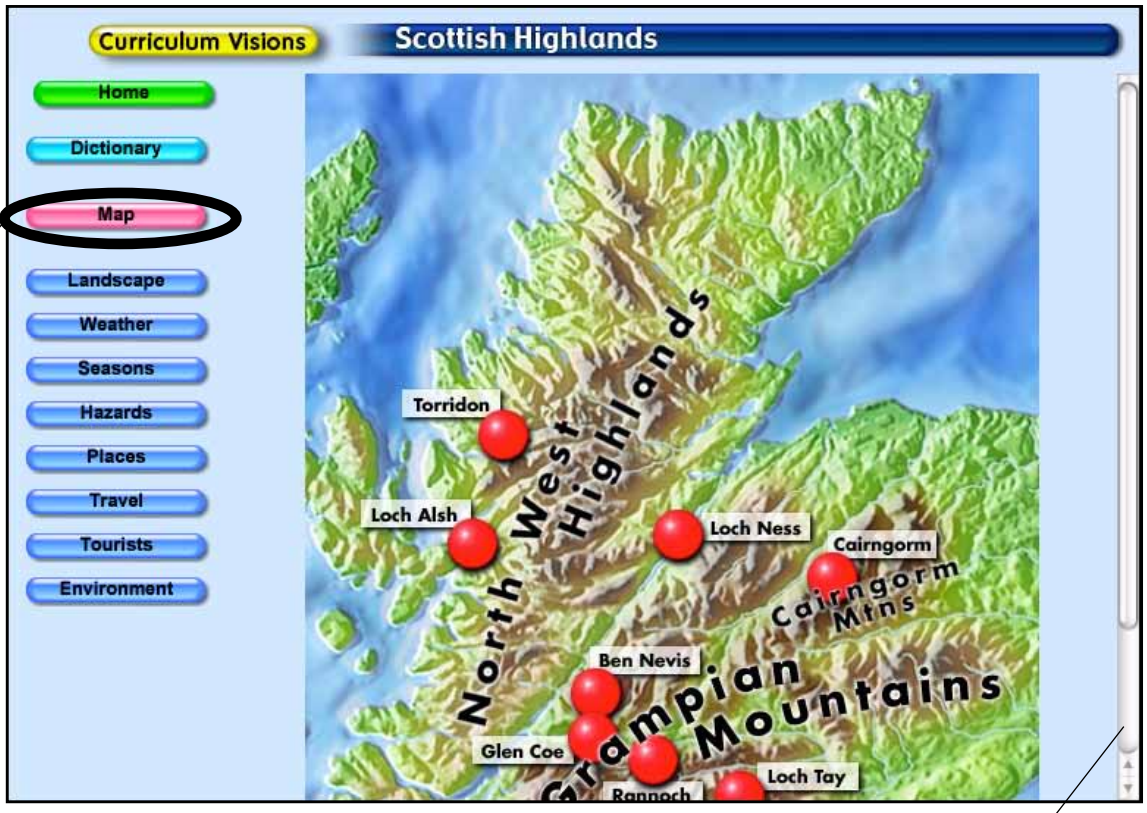
Weather data

Under the Weather theme students will find weather data that can be used to build weather charts. (Some of this information is also in the worksheets.)

Copying text and images

All of the elements are unlocked and can therefore be copied for use in other documents. Simply scroll across text or click on images to copy them in the method that suits you. See page 128 for restrictions that apply.

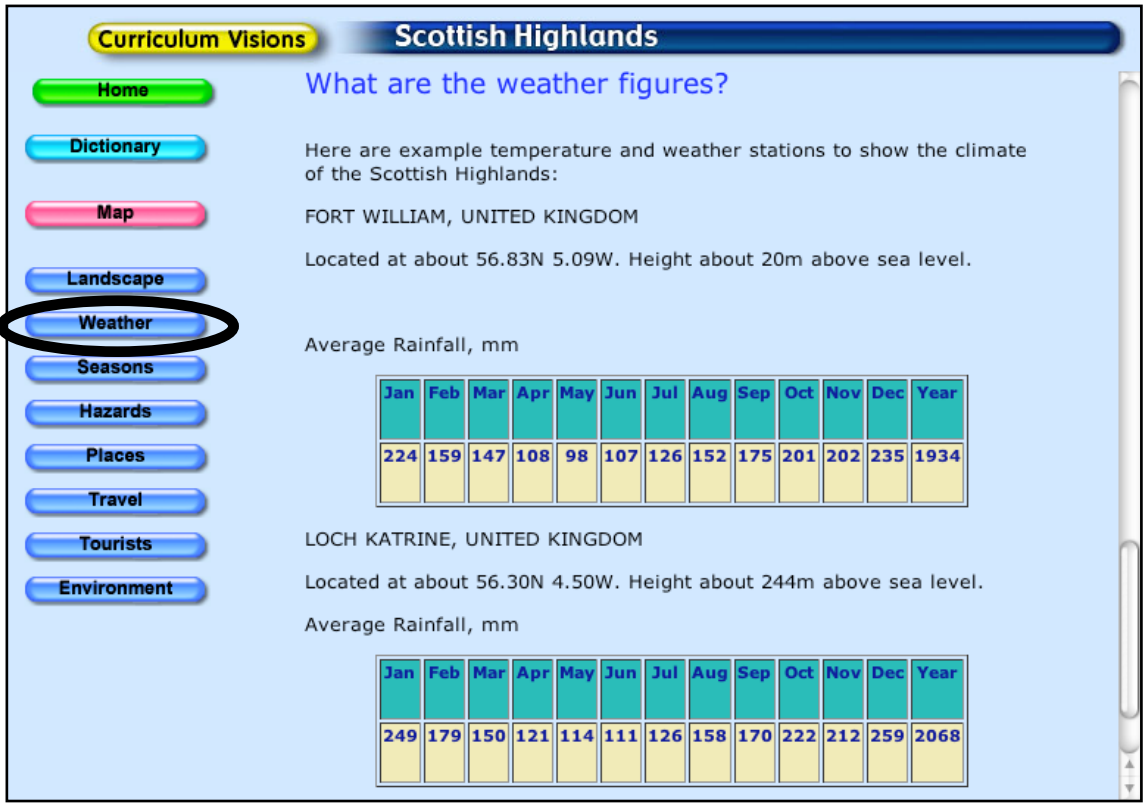
▼ *This screen capture shows the interactive map.*



Click to show the interactive map of this mountain environment.

Scroll using the scroll bars.

▼ *This screen capture is from the weather section of the Scottish Highlands Case Study and shows weather data for Fort William and Loch Katrine.*



Click to show the weather topic.

The Tour: getting a feel for the world's mountain environments

The Tour button allows teachers and students to compare and contrast mountain environments in a systematic way. The tour shows (in order) The English Lake District, The Scottish Highlands, the Welsh Mountains, the Alps, the Andes, the Hawaiian islands, the Himalayas and the Rockies.

At each tour screen it is possible to move directly to the detailed data of that mountain chain.

A commentator gives an introduction to the main features of each mountain range. This is the only part of the CD/web site 'Project' material that has sound, so the rest of the CD can be studied without interrupting others working nearby.

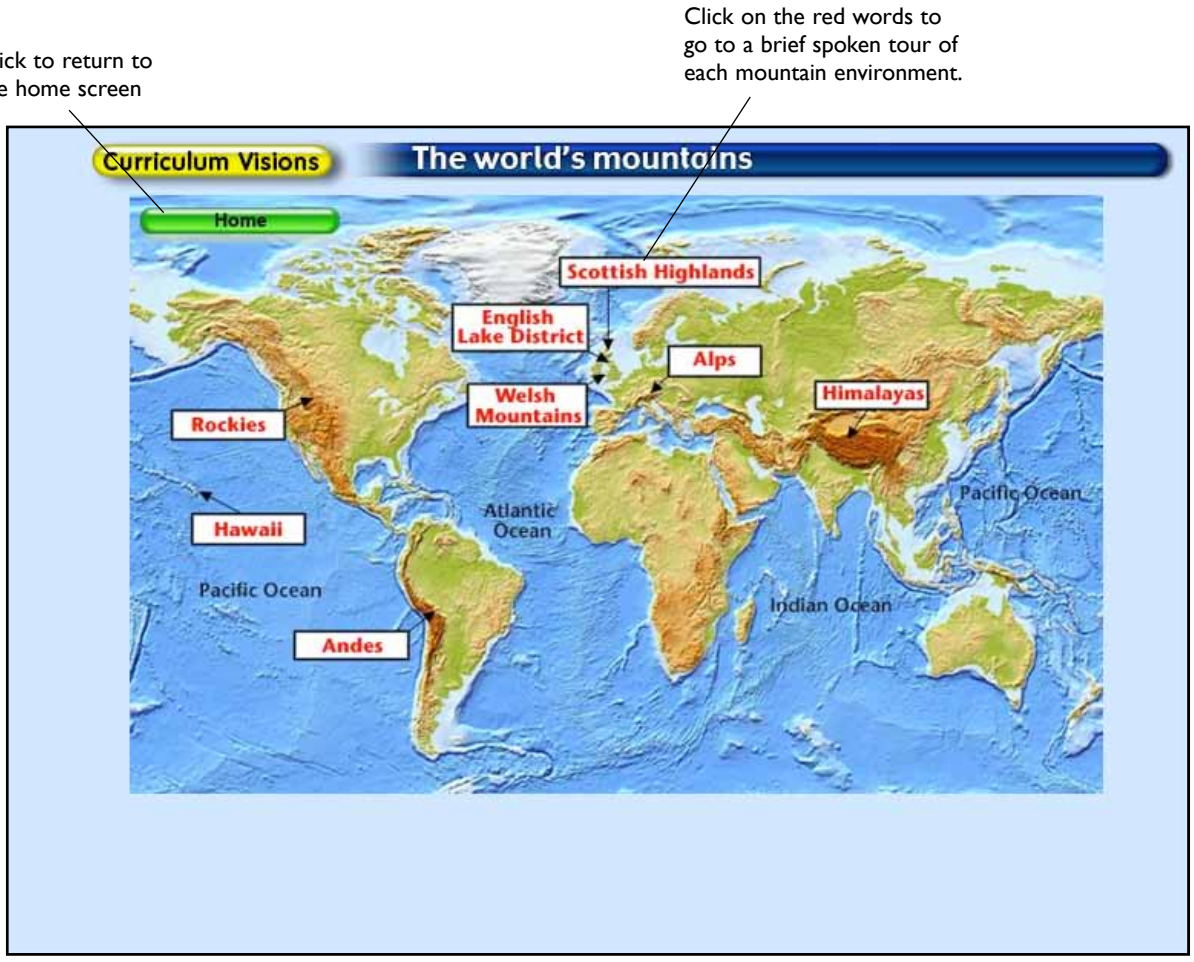
The worksheets on pages 106 to 121 show the principle characteristics of each mountain environment and support what the commentator has said.

Here is a suggestion of the way in which students could be introduced to *The Mountain and Volcano Project CD*/web site:

Begin with a whole class session, starting with the Tour button on the home screen. Students can also be introduced to all the other buttons.

During the tour you could discuss the nature of each environment, the steepness of the hills, the character of the mountains, the type of vegetation, as seem appropriate in the context of your class work. (See following pages, the worksheets and posters for more information on each mountain chain.)

▼ *This screen capture shows the mountain tour main screen. From here you can select each of the eight mountain environment case studies covered.*



The tour will allow students to think of places they may want to study later. This will allow them to say 'I want to do the Rockies' or 'I want to do the English Lake District' or whatever. The tour gives students an informed overview by which they can actually begin this task.

1A

Name: ..... **Form:** .....

See **'English Lake District'** section on the web site or Project CD

Project: Getting to know the English Lake District

Here are some starting points for you to think about:

The English Lake District is a unique place in the world. It is a small area, but in it are packed more lakes than anywhere else of similar size.

The mountains are not high, and yet because they are surrounded by low land, they rise dramatically, with steep, craggy summits.

The English Lake District rises up in the shape of a dome, into which deep valleys have been gouged by rivers and glaciers. The valleys fan out like spokes in a wheel, their lowest parts being filled with long lakes.

The English Lake District takes the full force of the moist winds that rush in from the Atlantic Ocean, so the English Lake District gets a lot of cloudy and often windy weather. But it is also this moisture that makes the grass in the valleys an emerald green colour.

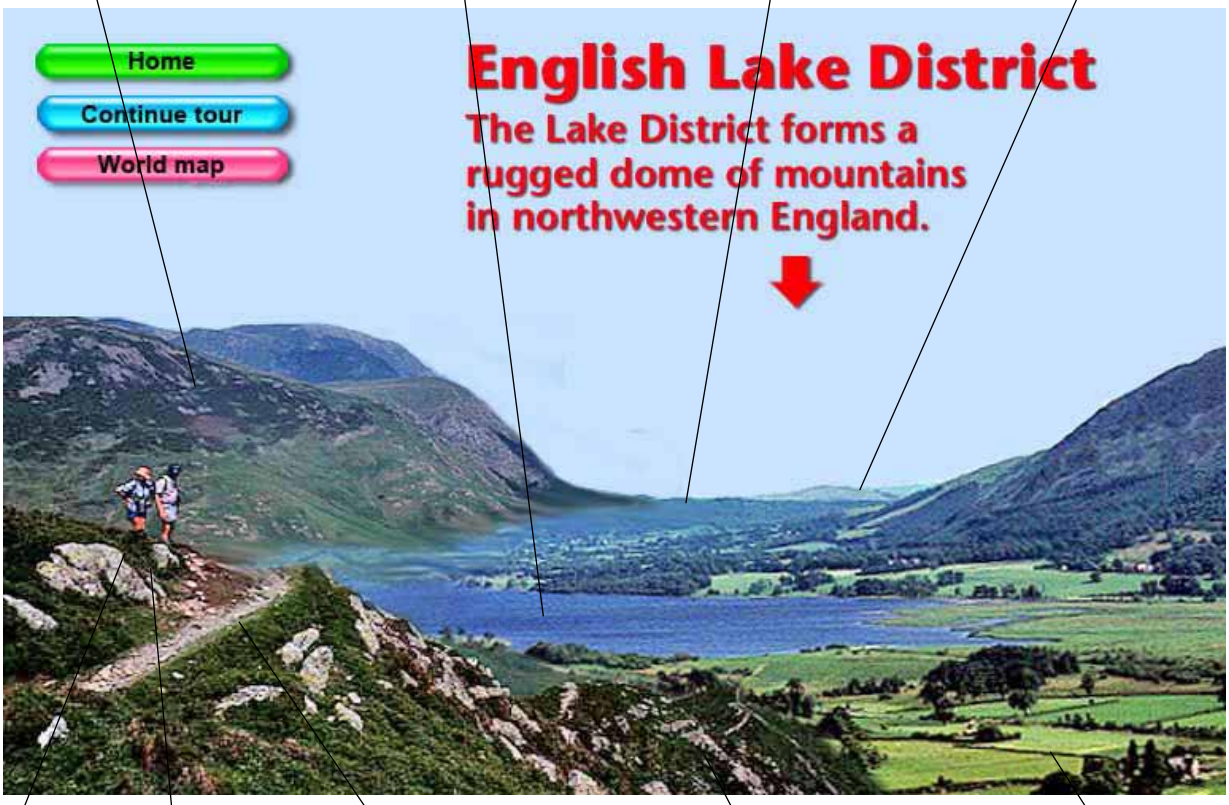
The English Lake District is close to big cities, and it is the most popular countryside area in the United Kingdom, so in summer, especially, its ancient narrow roads and tiny villages can easily get clogged with traffic.

Answers, Notes, Background

See **'English Lake District'** section of the web site or Project CD

Highlights

Use this annotated sheet to help students identify some characteristics of their chosen environment



High fells have cool wet and windy weather only suited to rough grazing.

Lakes fill over-deepened parts of glaciated valleys.

'U'-shaped valleys gouged during the Ice Age.

Fell walkers.

Summer clothing suited to summer days.

Well used footpaths – sometimes overused and eroded – point to heavy use by tourists.

Cultivated fields on fertile flat land that was once a lake bed.

1B

Name: ..... Form: .....

See **'Scottish Highlands'** section on the web site or Project CD

Project: Getting to know the Scottish Highlands

Here are some starting points for you to think about:

The Scottish Highlands are the largest and highest area of mountains in the United Kingdom. They stretch from the northern tip of Scotland, through all the islands to within sight of the lowland cities of Glasgow and Edinburgh.

The Highlands are like a vast mountain tableland. Above this stand the peaks of which Ben Nevis and Ben Macdhui are the highest. Into the tableland, rivers and glaciers have gouged deep valleys, now partly filled with spectacular lochs.

This is a wild, magnificent place, steeped in its own history of people trying to survive against harsh weather and poor soils. It remains one of the least populated parts of Europe.

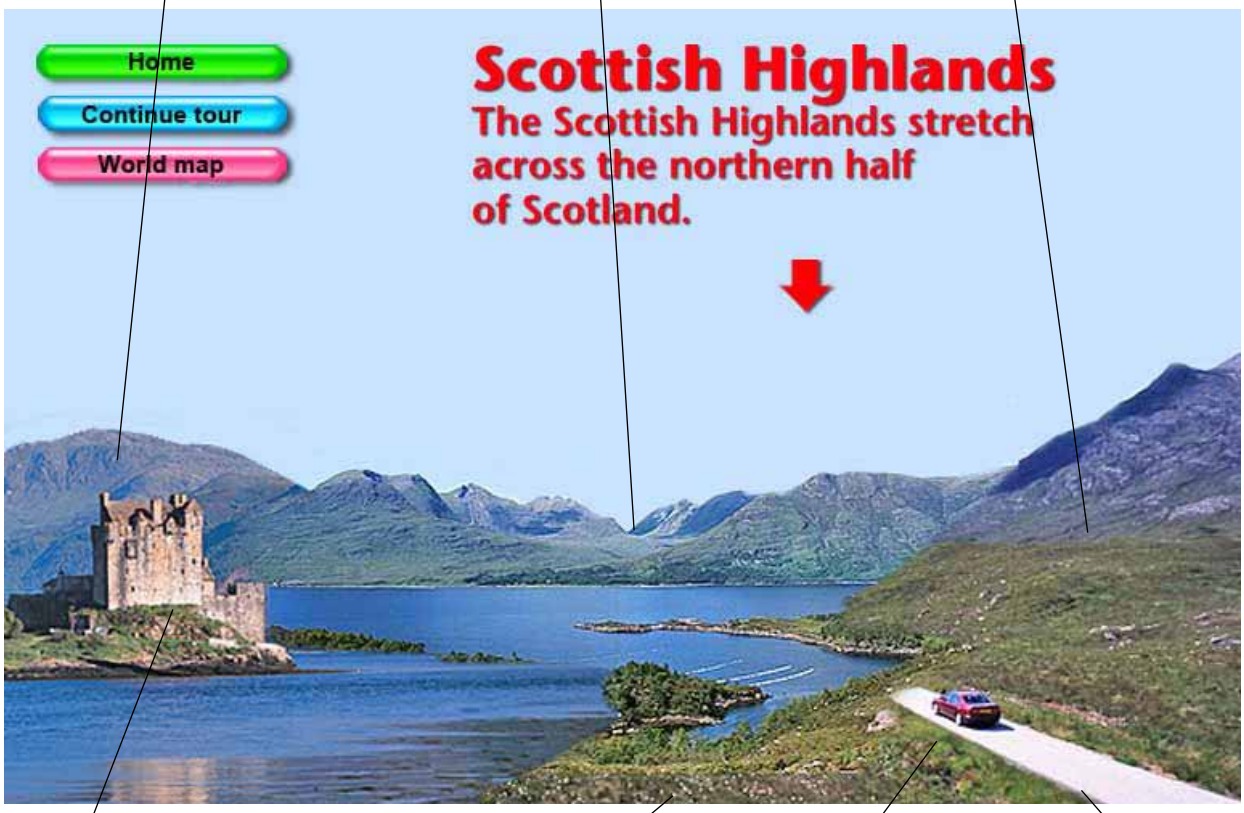
The Highlands are famous for summer touring holidays and are the only part of the United Kingdom where snow lies long enough for winter sports.

Answers, Notes, Background

See **'Scottish Highlands'** section of the web site or Project CD

Highlights

Use this annotated sheet to help students identify some characteristics of their chosen environment



Relatively level and rounded tableland cut into by valleys.

The treeless landscape is the result of deforestation.

Cool, often wet and windy weather means the land is only suited to rough grazing.

Private motor vehicles are the only practicable way of getting about.

Many highland roads are still quite narrow and give tourists a leisurely view of the scenery.

1C

Name: ..... Form: .....

See **'Welsh mountains'** section on the web site or Project CD

Project: Getting to know the Welsh mountains

Here are some starting points for you to think about:

The mountains of Wales stretch like a backbone down the country. The northern group is the tallest and most rugged, and topped by Snowdon, the highest summit in the southern United Kingdom.

The central group is very different – broader, lower and more rounded to look at. Here Plynlimon is the highest summit.

In the south there are yet more mountains – this time in the form of a great wall that stretches from east to west. The highest point of the wall is at Pen y Fan in the Brecon Beacons.

Each of these mountains has its own character and have been used in very different ways. But all of the mountains are rich in minerals and stone and many of the towns and villages have a mining heritage.

Answers, Notes, Background

See **'Welsh mountains'** section of the web site or Project CD

Highlights

Use this annotated sheet to help students identify some characteristics of their chosen environment

Large areas are preserved as National Parks.

Steep mountain sides and wet and windy weather make the highest mountains suitable only for rough grazing.

Mining villages set in mountain valleys.

Cwm and finger lakes fill over-deepened glaciated cwms and valleys.

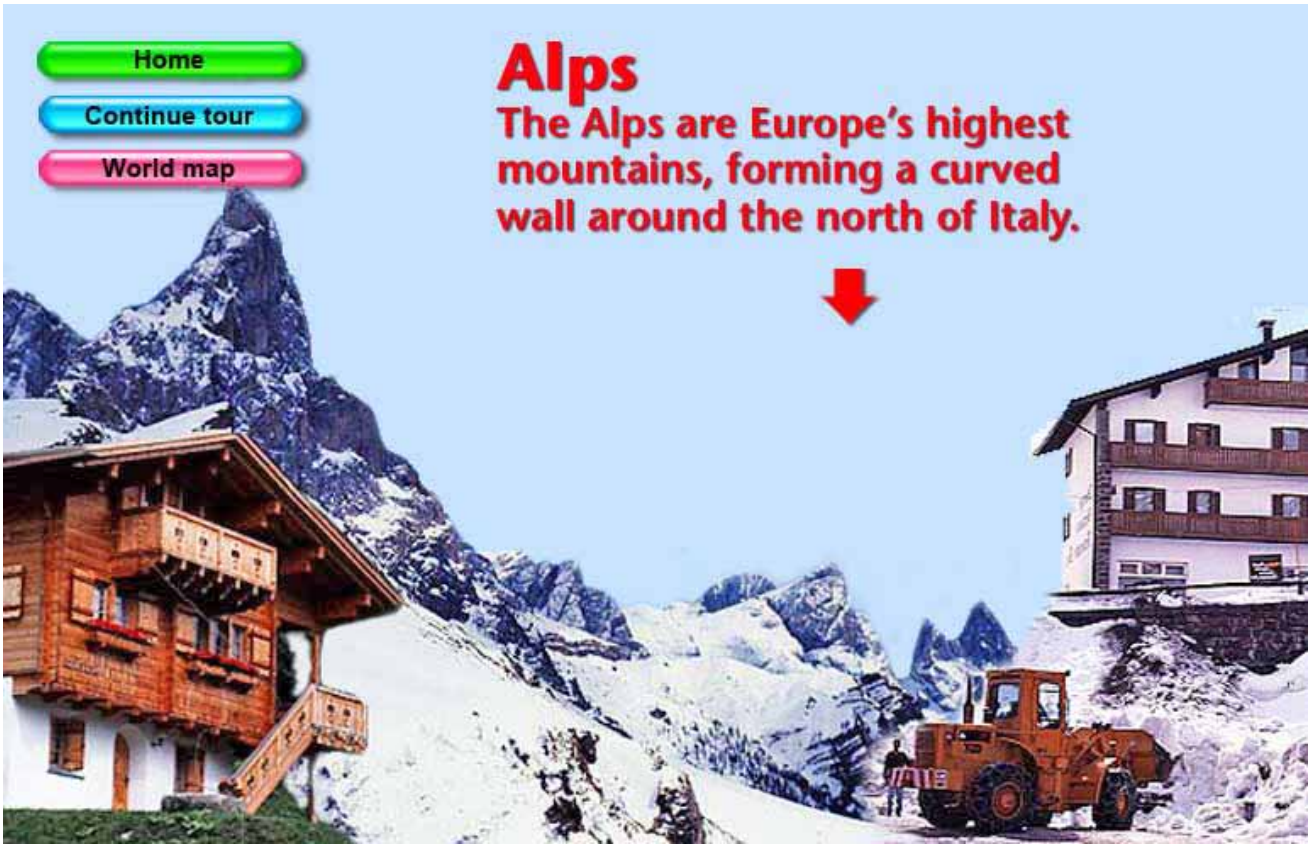
Steep craggy rocks typical of Snowdonia.

1D

Name: ..... **Form:** .....

See **'Alps'** section on the web site or Project CD

Project: Getting to know the Alps



Here are some starting points for you to think about:

The Alps are the chain of mountains in Europe that curve around the north of Italy. They are not the world's highest mountains, but they have some of the most dramatic valleys, with sheer rocky sides.

The Alps act like a wall across Europe. The weather on the northern slopes is far harsher than on the southern slopes.

The Alps have the densest population of any mountain chain. Dotted all over the mountains are towns and villages. The Alps also has more main roads and railway crossings than any other mountain chain. Most cross the high Alps in tunnels driven through the heart of the mountains.

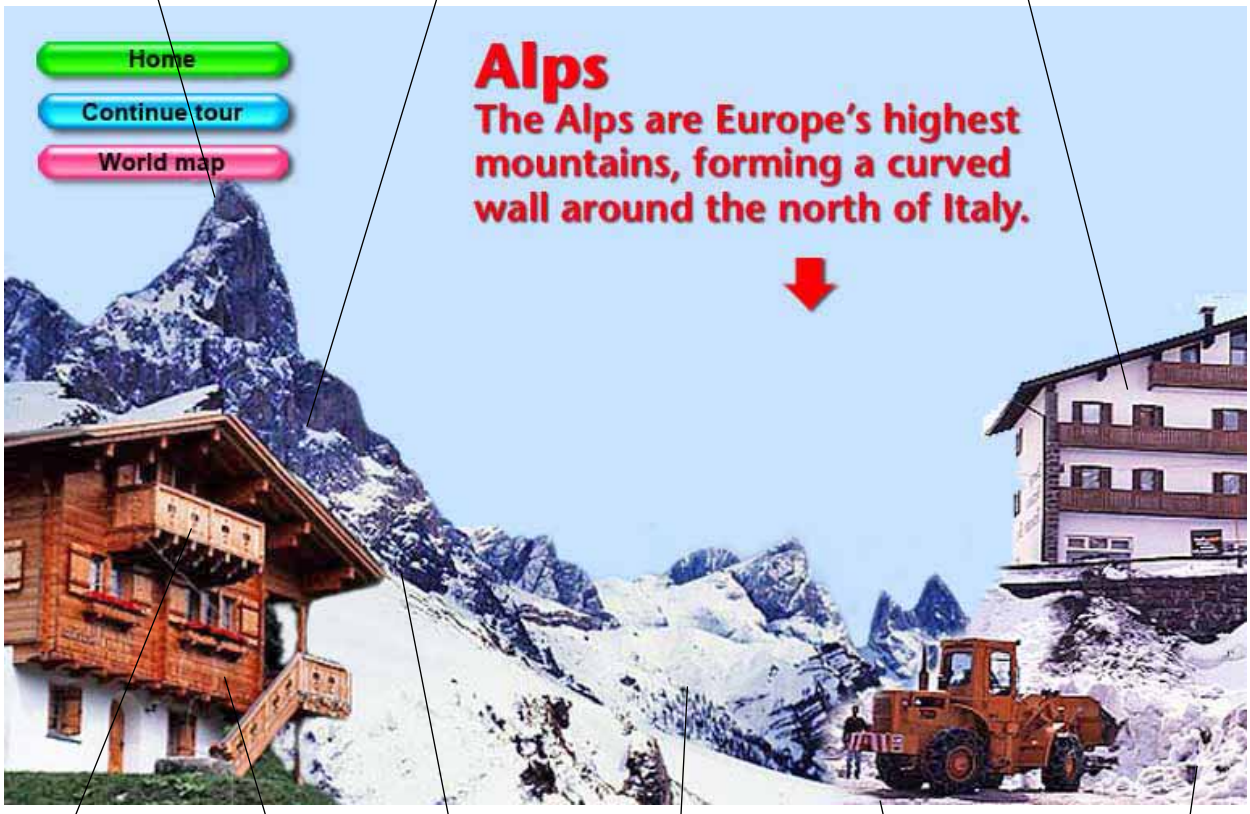
The Alps are very snowy in winter – but are often quite sunny – so they have become Europe's winter playground.

Answers, Notes, Background

See **'Alps'** section of the web site or Project CD

Highlights

Use this annotated sheet to help students identify some characteristics of their chosen environment



Sharp pointed peaks, or horns.

Steep slopes affected by frost shatter.

Many mountain villages have tourist hotels for winter sports.

Precipitous rocky sides.

Use of local building materials (trees).

Wide, deep valleys formed by glaciers.

Many passes are blocked by snow throughout the winter.

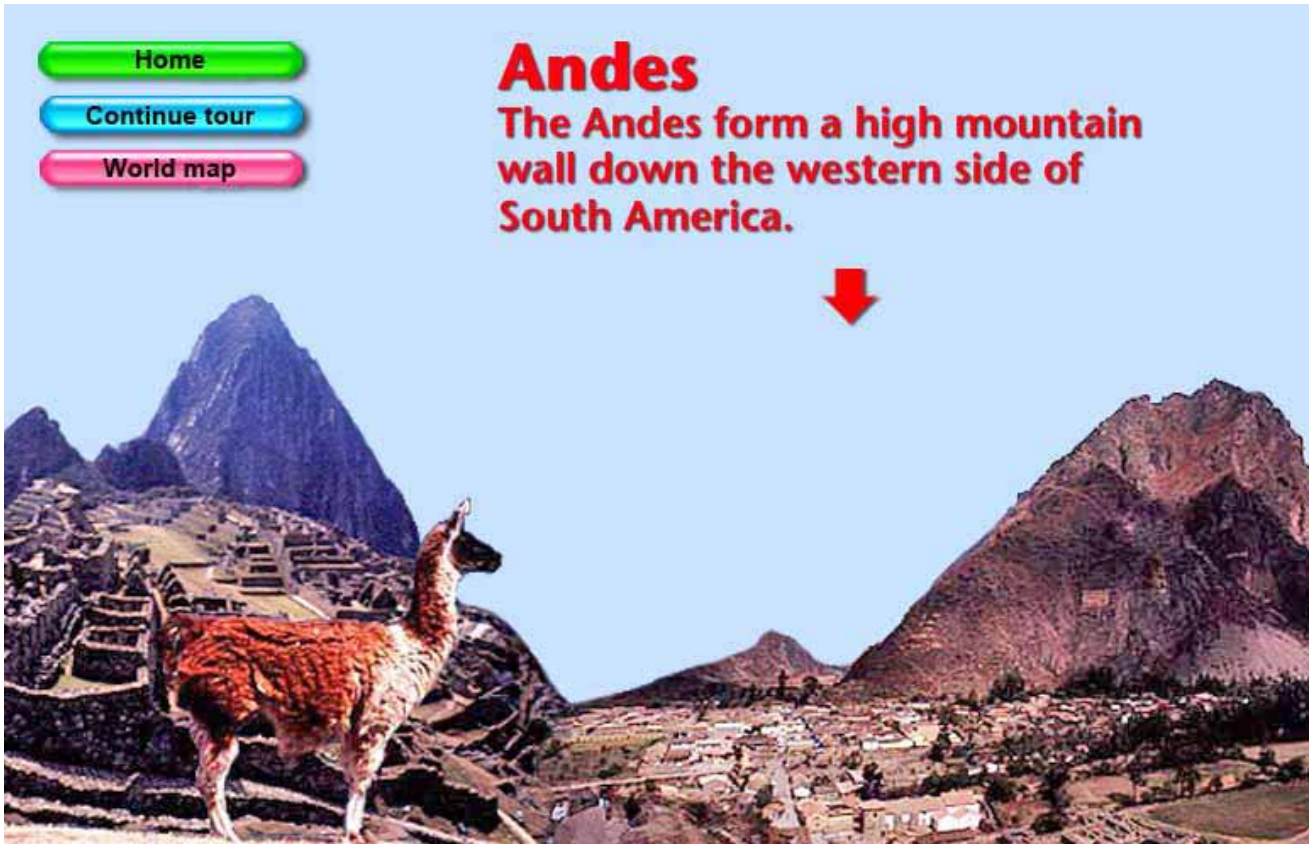
Deep winter snow.

1E

Name: ..... Form: .....

See **'Andes'** section on the web site or Project CD

Project: Getting to know the Andes



Here are some starting points for you to think about:

The Andes are an enormously long chain of fold mountains stretching right down the western side of South America. The Andes also contains explosive volcanoes.

Together they provide a dramatic landscape of towering mountains and deep valleys.

The Andes are in the Southern Hemisphere – so the northern end is in the tropics. This part of the mountains has no winter or summer – the weather is the same on every day of the year.

To the south of this – in countries like Peru – the winds blow off the land and so the mountains get very little moisture – quite different from most other mountains in the world. As a result, this part of the Andes has little snow and few glaciers.

In the far south winds blow onto the mountains from the sea. And although this is not the highest part of the Andes, the mountains here are capped with snow and have great glaciers.

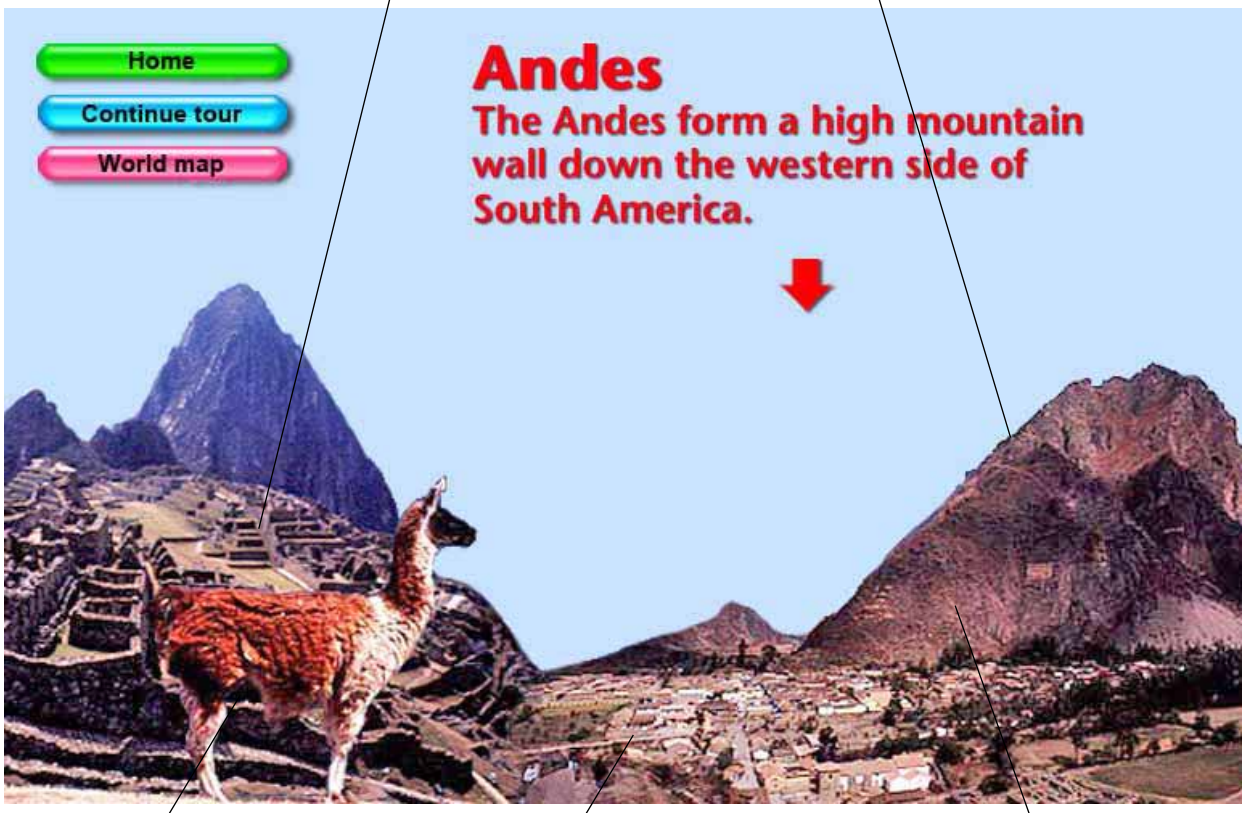
Great civilisations, such as that of the Incas, have grown up in the high Andes. Many people still live and farm here – in some of the highest places in the world.

Answers, Notes, Background

See **'Andes'** section of the web site or Project CD

Highlights

Use this annotated sheet to help students identify some characteristics of their chosen environment



Traces of great civilisations can be found in the Andes.

The mountains have spectacular peaks and deep valleys.

Animals like this llama are adapted to the cold conditions.

Large towns and cities are found in the mountain valleys.

The mountains are bare because they are so dry that few plants can grow.

1F

Name: ..... Form: .....

See **'Hawaii'** section on the web site or Project CD

Project: Getting to know the Hawaiian volcanic mountains

Here are some starting points for you to think about:

If you want to see mountain building in action, there's no better place to look than the Pacific Ocean. There are volcanoes all around the edges of this ocean and a string of them right in the middle.

The volcanoes in the middle of the ocean make up the Hawaiian islands. Each island is the top of a volcano. The volcano on the biggest island (Hawaii) is still active and regularly produces fountains of molten rock.

The dome-shaped volcano that makes Hawaii is the biggest in the world. Although most of it is under water, the tip still rises over 4000m above the sea.

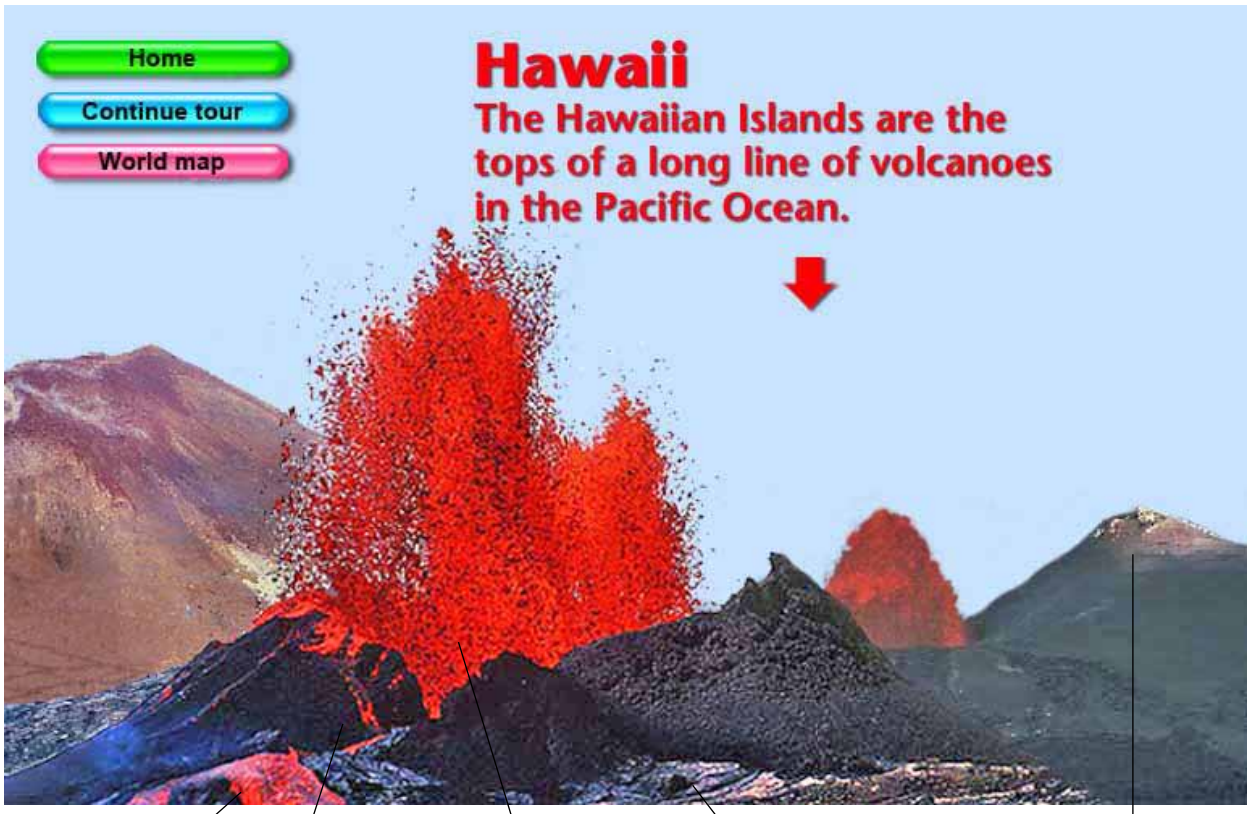
The Hawaiian islands are near the tropics. There is no winter and it is warm throughout the year in low lying areas by the coast. By contrast, because the mountain summits are so high that it is always cold. The highest mountains are also higher than most clouds, so the tops are a desert. The clear, cloudless air on Hawaii makes it an ideal site for one of the world's most important astronomical telescopes.

Answers, Notes, Background

See **'Hawaii'** section of the web site or Project CD

Highlights

Use this annotated sheet to help students identify some characteristics of their chosen environment



Molten rock cools to black basalt rock.

Each eruption helps build the mountain higher.

Parts of the volcano regularly erupt, producing fountains of magma.

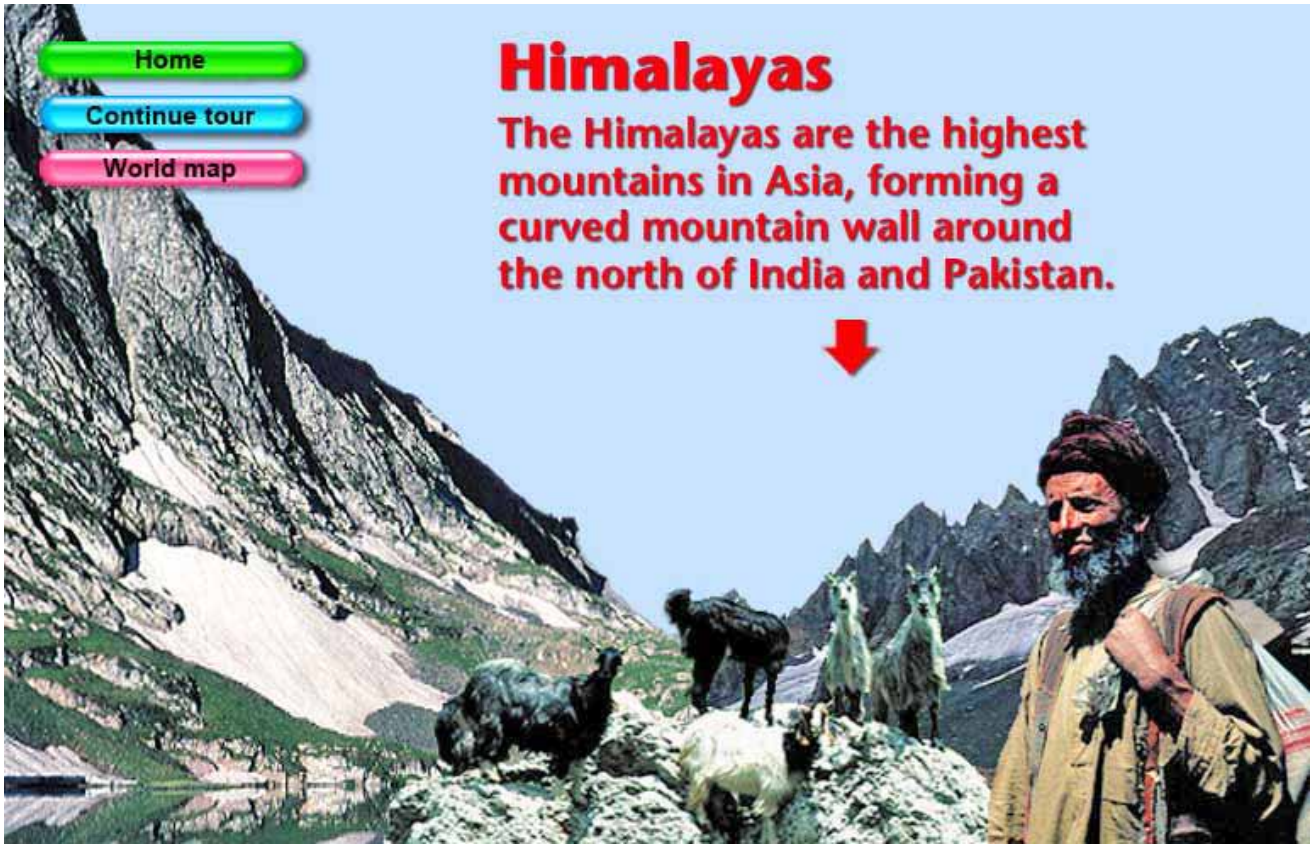
Cones are built from lava.

1G

Name: ..... Form: .....

See **'Himalayas'** section on the web site or Project CD

Project: Getting to know the Himalayas



Here are some starting points for you to think about:

The Himalayas make a vast chain of mountains that curves around the top of India. The Himalayas are called the roof of the world. Here you can find Mount Everest and the world's other highest mountains.

The mountains are so high, and have so few gaps in them, that they block the flow of air – so that whereas the summer weather in India and Nepal to the south is moist and cloudy, the land to the north – Tibet – is like a desert. And while the winters in the south are mild, those in the north are bitterly cold.

It is almost impossible to travel quickly in the Himalayas – there are no railway lines and no main roads. People therefore live in valleys which are quite isolated from one another.

Answers, Notes, Background

See **'Himalayas'** section of the web site or Project CD

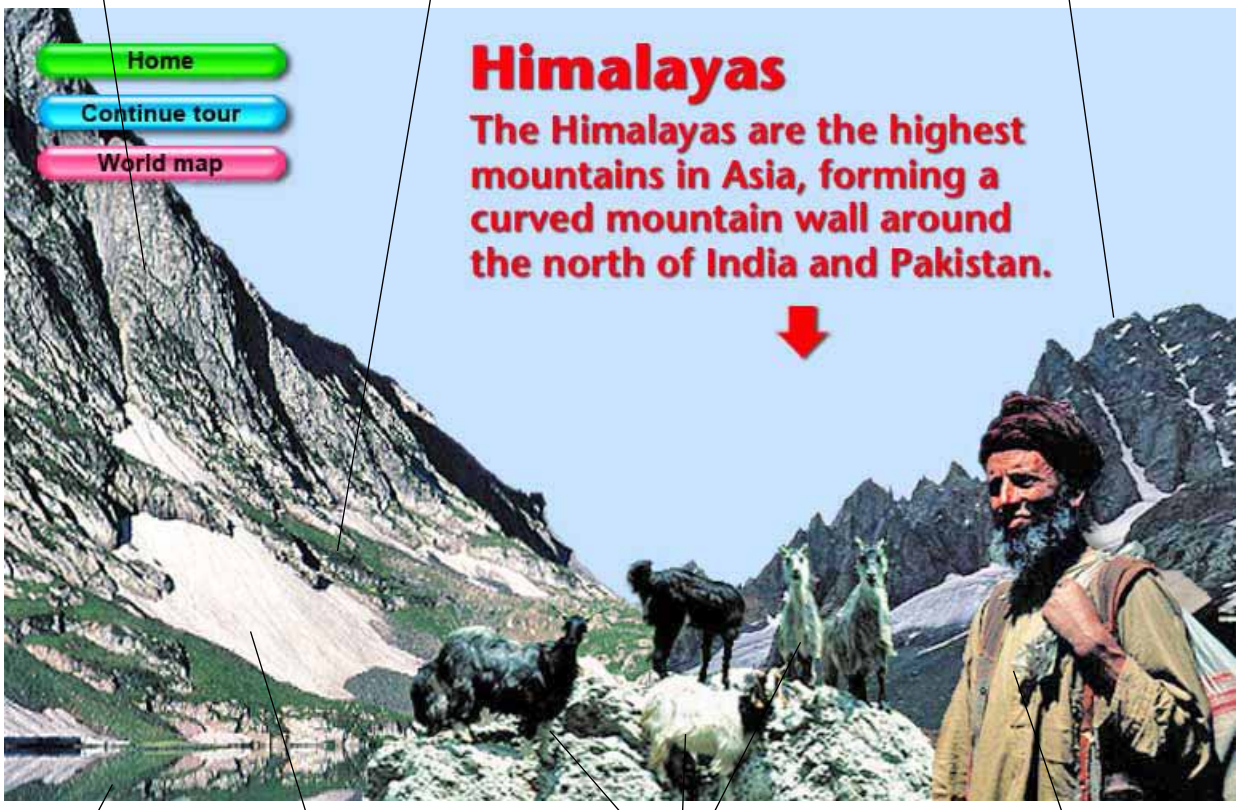
Highlights

Use this annotated sheet to help students identify some characteristics of their chosen environment

High, steep-sided, rocky valley sides.

Forest once covered these slopes, but they were cut down for fuel and to make grazing land.

Sharp-edged, frostbitten peaks.



Lakes occupy basins scoured out by glaciers into the Ice Age.

Goats and sheep are the only animals that can be farmed here.

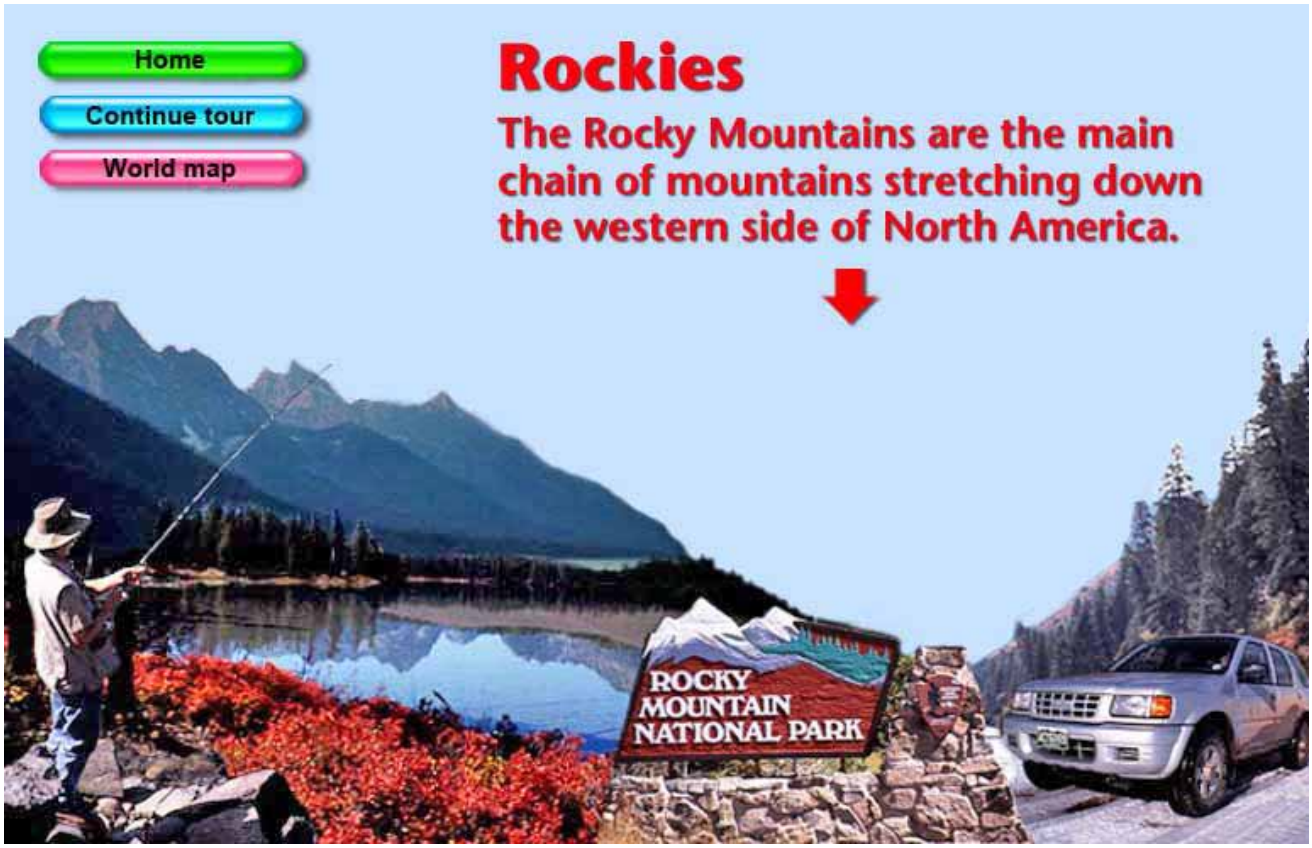
People have grown up to be fiercely independent. Their clothing is an adaptation to hot days and cold nights.

1H

Name: ..... Form: .....

See **'Rockies'** section on the web site or Project CD

Project: Getting to know the Rocky Mountains



Here are some starting points for you to think about:

The Rocky Mountains – or Rockies for short – are a very broad chain of mountains that make up much of the western half of North America.

They are made of many mountain ranges separated by wide basins.

The Rockies split North America into two – waters flowing down the western slopes go to the Pacific Ocean while those flowing down the eastern slopes go to the Atlantic Ocean via the great Mississippi River.

Because they are so long, the Rock Mountains stretch over many climatic belts. Weather conditions in the north – in Canada – are much more harsh than those in the south – in Mexico.

The Rockies have few passes. As a result, the western half of North America is cut off from the eastern half – especially in winter when road passes get blocked by snow.

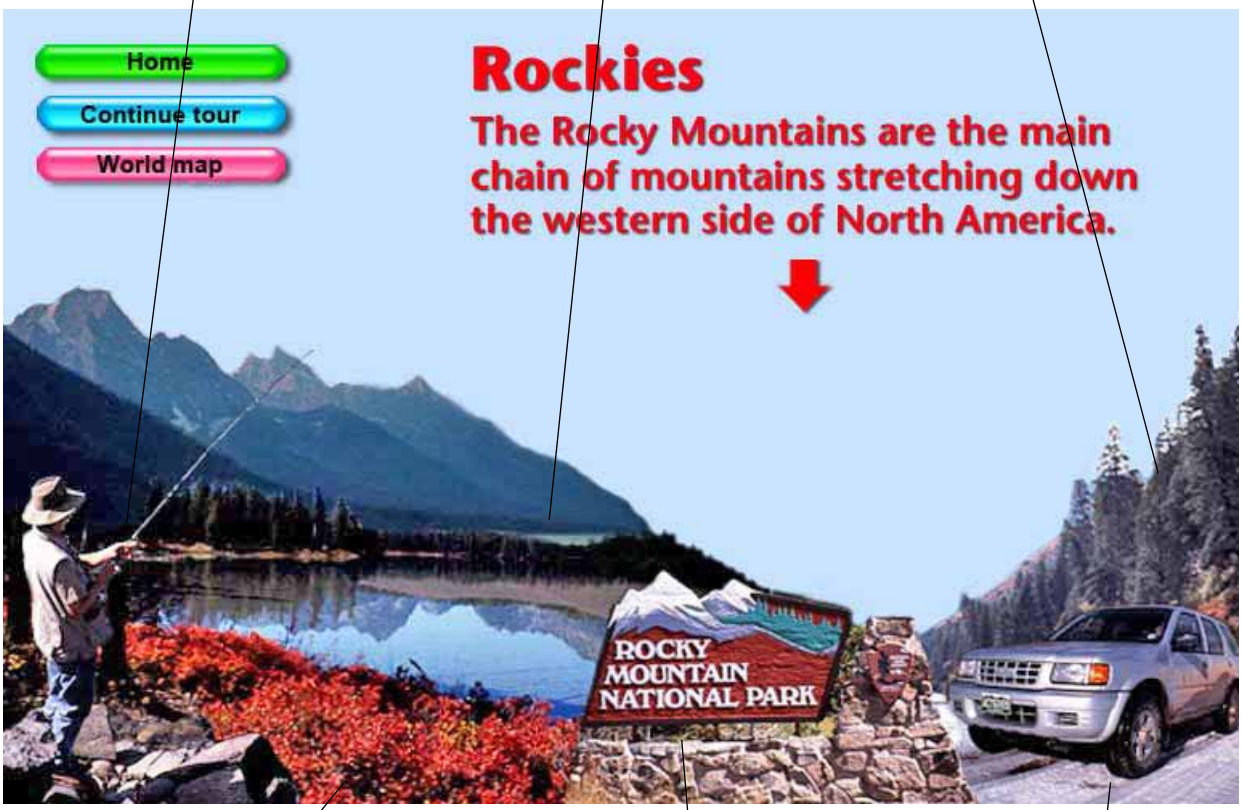
These are some of the least populated mountains in the world. Large areas are still wilderness and have been made into national parks.

Answers, Notes, Background

See **'Rockies'** section of the web site or Project CD

Highlights

Use this annotated sheet to help students identify some characteristics of their chosen environment



Broad mountains separated by wide basins (not valleys).

Most of the lower mountain slopes are heavily forested.

In the north there is a seasonal change of vegetation cover. This shows the autumn (known to Americans as the Fall) colours.

Many large areas have been preserved as national parks.

2A

Name: ..... **Form:** .....

See **'Mountain tour'** section on the web site or Project CD

What are mountains?

The world has a variety of different kinds of mountain chain. To compare them we need to ask the same questions about each one. We will do this with the *Mountain tour* on the web site under 'In-depth... for projects' (or on *The Mountain and Volcano Project CD*). Start the *Mountain tour*, then choose a mountain chain or range from the map.

Q1. Write down the name of your chosen mountain range.

✎ .....

Q2. Write a sentence that describes the shape of the mountains.

✎ .....

.....

.....

Q3. Do the mountains have very steep sides?

✎ .....

Q4. Are there any lakes?

✎ .....

Q5. Do you think farmers use this land? What makes you think so?

✎ .....

Repeat the answers for at least one other example from a different part of the world.

2A Answers, Notes, Background

See **'Mountain tour'** section of the web site or Project CD

Answers

1. **Depends on the range the student is looking at**

2. **Typically high mountains with sharp peaks, or low mountains with rounded summits. Students should only mention shape not people etc.**

3. **Yes**

4. **Yes, in most cases**

5.

Notes

It is important that students become aware of different shapes and height of mountains. Encourage them to describe the summits as these are often their most characteristic feature.

This is an opportunity to start to suggest valley shapes, for example U-shapes.

Lakes occur because of irregular scouring of valley floors by glaciers.

2B

Name: ..... **Form:** .....

See **'Mountain tour'** section on the web site or Project CD

What are mountains?

Mountains have been lifted up by great forces inside the earth, then worn down by rivers and glaciers. Living in this land of steep slopes and harsh weather can be difficult.

INSTRUCTONS

Make a chart of a continent's tallest mountains as follows:

1. Go to the web site (Geography/Mountain/In-depth... for projects) or the home screen of *The Mountain and Volcano Project* CD.
2. Click on the button 'Highest Peaks'.
3. Select one of the continents.
4. Copy out the mountain names and their heights onto a sheet of paper.
5. Open a spreadsheet program.
6. Type in the mountain names in one column and the heights in the next column.
7. Use the program to make a chart.
8. Print the chart.
9. Compare your chart with others in your class who chose different continents.

Answers, Notes, Background

See **'Mountain tour'** section of the web site or Project CD

Notes

This is an intermediate ability task.

The format of the chart will depend on the program you use.

In this intermediate task, the students are not asked to copy and paste between programs but simply to work in the spreadsheet program. They type the data into the spreadsheet manually.

See advanced version for copy and paste.

2c

Name: ..... **Form:** .....

See **'Mountain tour'** section on the web site or Project CD

What are mountains?

Mountains have been lifted up by great forces inside the earth, then worn down by rivers and glaciers. Living in this land of steep slopes and harsh weather can be difficult.

INSTRUCTONS

Make a chart of the world's tallest mountains as follows:

1. Go to the web site (Geography/Mountain/In-depth... for projects) or the home screen of *The Mountain and Volcano Project* CD.
2. Click on the button 'Highest Peaks'.
3. Select all of the text using the text tool.
4. Open a spreadsheet program such as Excel.
5. Paste the data. The data appears as a double column list.
6. Remove words that are not mountain names.
7. Copy the numbers into a column to the right of the mountain names.
8. Scroll over the names column and the number column.
9. Select 'new chart'. This displays all the mountains as a bar chart.
10. Print the chart.
11. Compare your chart with others in your class who chose different continents.

Answers, Notes, Background

See **'Mountain tour'** section of the web site or Project CD

Notes

Section 6: ICT using 'The Mountain and Volcano Project CD'

by **Graeme Schrouder**, ICT Advisory Teacher

The Mountain and Volcano Project CD is a data-based CD which is accessed through the Internet browsers Netscape Communicator® or Internet Explorer® in which all of the elements are unlocked and can therefore be copied for use in other documents. The same information is available free when you subscribe to the Professional Zone at www.curriculumvisions.com under Geography/Mountain/In-depth... Projects).

The material available is ideal for simple ICT work. (Please note: Schools purchasing *The Mountain and Volcano Project CD* may copy material for use in their school only, for non-commercial purposes only. A single user licence allows only one person to use the CD at a time; a network licence permits multiple use, with no restriction within a single school.)

The ICT curricula specify a range of skills and techniques that are required to be learnt. The type of skills required are set out below. An asterisk indicates that these skills can be practised directly within *The Mountain and Volcano Project CD*/web site. The learning outcomes on the Scheme of Work grids on pages 131 to 134 also show how ICT Curriculum can be satisfied.

Links to the ICT Curriculum

1. Progressive knowledge, skills and understanding

Finding things out; *Students are required to:*

- Talk about information they need to know and how they can find and use it (e.g. searching within CD ROM).
- Prepare information for development using ICT (e.g. finding information from different sources, including CD ROMs).
- Search using menus/index.
- Navigate a CD ROM.
- Use hot/hyperlinks to navigate a CD ROM.
- Access and collect information when undertaking an enquiry for a specific purpose.

2. Developing ideas

- To develop and refine ideas by bringing together, organising and reorganising text, tables and images as appropriate (e.g. dtp).
- Keyboard skills.
- Font and font size/colour for effect.
- Spell check.
- Cut and paste.
- Combine text and graphics.
- Reinforce formatting of text to indicate relative importance.
- Use of minimize and maximize on Windows programs.
- Use different display features (e.g. fact boxes and annotated diagrams).
- Work in columns.
- Leaflet layout.

3. Share and exchange information in a variety of forms (e.g. displays/posters)

- Skills list as above for 2 (wp and dtp).

To be sensitive to the needs of the audience and think carefully about the content and

Variety in the Lake District

See ancient history...

Climb up above fantastic lakes and get superb views of this dramatic landscape...

Enjoy the fresh air and relax by the famous lakes...

▲ *This starting point to a poster was created in just a few minutes by copying and pasting the pictures from the web site or The Mountain and Volcano Project CD using the English Lake District material. It is an easy step for the students to add more text.*

quality when communicating information (e.g. work for presentation to other pupils, writing for parents, publishing on the Internet).

- Skills list as above for 2a/3a (wp and dtp) plus multimedia authoring);
- * Have an increasing awareness of the intended audience; recognise features of good page design.
- * Choose and integrate elements (text, graphics, sound) into presentation.
- Produce a diagram that shows the links between different pages.
- Create buttons to link pages.
- Choose elements from the presentation and develop the organisation and structure to convey intention efficiently in relation to audience.

4. Reviewing, modifying and evaluating work as it progresses

- * Review what they and others have done to help develop ideas.
- * Describe and talk about the effectiveness of the work with ICT, comparing it with other methods (e.g. impact made by poster).
- *Talk about how they could improve work.

5. Breadth of study

- *Work with a range of information.
- *Work with others to explore a variety of information sources and ICT tools.

The Scheme of Work grids on pages 131 to 134 show the learning objectives, activities, subject links, resources and learning outcomes for years 4–6. These can be used as a basis for evaluating where to use the web site or CD. For example, the weather data contained in the sections on The English Lake District, The Scottish Highlands, The Welsh Mountains, The Alps, The Andes, The Himalayas, The Hawaiian Volcanoes and The Rockies can all be used to develop the Modelling Learning Objectives of Year 6.

Appropriate ICT Curriculum Level Descriptors

Level 2

- Use ICT to present findings.
- Enter, save and retrieve work.
- Use ICT to help generate, amend and record work and share ideas in different forms, including text, tables and images.

Level 3

- Use ICT to save information and to find and use appropriate stored information following straightforward lines of enquiry.
- Use ICT to generate, develop, organise and present work.

Level 4

- Add to, amend and combine different forms of information from a variety of sources.
- Use ICT to present information in different forms and show they are aware of the intended audience, and the need for quality in presentation.
- Use ICT-based models and simulations to explore patterns.

Level 5

- Use ICT to structure, refine and present information in different forms and styles for specific purposes and audiences.
- Assess the use of ICT in their work and reflect critically in order to make improvements in subsequent work.
- Explore the effects of changing the variables in an ICT-based model.

Year 4

ICT Skill-based Learning Objectives Word Processing/DTP	Activities	Subject Link	Resources	Learning Outcomes
• To be able to delete, insert and replace text. • To be able to use cut and paste within applications to reorder text. • Combine text and graphics • To be able to use a spellchecker • To be able to amend text using find and replace. • To develop an increasing awareness of intended audience.	*QCA 4A Writing for different audiences (eg, simple newspaper style articles related to different areas of topic research).* Link with Geography topics; creating own project notes/information to share findings. Making project book cover sheets and/or section headings.	English Humanities	MS Word MS Publisher Newspaper articles CD ROMs	Can cut, copy and paste, move within document to produce a coherent sequence of events. Begin to combine simple text and graphics. Can delete, insert and replace text to improve clarity and create mood. Show increasing awareness of intended audience – Recognise features of good page design. *Most children will be able to use the advanced features of a word processor to help them match their work to their audience.*

Year 5

ICT Skill-based Learning Objectives Word Processing/DTP	Activities	Subject Link	Resources	Learning Outcomes
• To be able to format text to indicate relative importance. • To be able to justify text where appropriate. • To be able to use Word Art • To be able to maximize/minimize Windows programs. • To be able to cut and paste between applications. • To be able to delete/insert and replace text to improve clarity and mood. • To be able to choose and then integrate elements (text, graphics, sound) into a presentation.	Create posters linked to different sections of research. Discuss how the layout, font, styles and size can make it easier for the onlooker to take in the most important information. Create a big book, one page per group. Incorporate student and images from a CD Rom or the Internet. Graphical images created in Colour Magic or Paint on the topic. Design and create an advertisement using a combination of media (e.g. travel/tourist promotion for a specific region/area).	English Humanities	MS Word MS Publisher Colour Magic Paint CD ROMs Hot Dog Junior Illuminatus Power Point	Can format and justify text to show importance. Can use Word Art. Can cut and paste information between applications. Can integrate different elements into a simple presentation *Most children will be able to organise, refine and present a multimedia page, which incorporates images, sounds and student.*

Year 6

ICT Skill-based Learning Objectives Word Processing/DTP	Activities	Subject Link	Resources	Learning Outcomes
• To be able to work in columns • To be able to use various display features to communicate to an audience: e.g. fact/definition boxes annotated illustration leaflet layout.	Design and create a range of publications linked to a topic e.g. newsletter, holiday brochure, magazine, leaflets etc. that use the more advanced features of a DTP package.	English Humanities	MS Word MS Publisher	Can work in columns Can use various display features (e.g. fact boxes, etc. to convey information to intended audience). *Most children will be able to use the more advanced features of a DTP package to increase their efficiency when matching their work to their audience.*
Multi-Media Authoring: • To be able to create a diagram that shows the links between different pages. • To be able to create buttons to link pages. • To be able to choose elements for a presentation, to develop the organisation and structure to convey intention to an audience.	*QCA 6A Multimedia presentations* Produce a presentation (web pages/multimedia) involving images, text, sound, which promotes travel and/or tourism for a specific area within a geographical study. The children should first design their pages in draft on paper showing how the pages link, and describe their audience and how they will access the presentation.	English Humanities	Hot Dog Junior Illuminatus Front Page Express Publisher	Can design and create a multimedia presentation. Can create links between pages. Can choose appropriate design elements to develop structure and organisation *Most children will be able to organise, define and present a set of linked multimedia pages which incorporate images, sounds and text.*

Year 6

ICT Skill-based Learning Objectives Word Processing/DTP	Activities	Subject Link	Resources	Learning Outcomes
● To be able to work in columns ● To be able to use various display features to communicate to an audience: e.g. fact/definition boxes annotated illustration leaflet layout.	Design and create a range of publications linked to a topic e.g. newsletter, holiday brochure, magazine, leaflets etc. that use the more advanced features of a DTP package.	English Humanities	MS Word MS Publisher	Can work in columns Can use various display features (e.g. fact boxes, etc. to convey information to intended audience). *Most children will be able to use the more advanced features of a DTP package to increase their efficiency when matching their work to their audience.*
Multi-Media Authoring: ● To be able to create a diagram that shows the links between different pages. ● To be able to create buttons to link pages. ● To be able to choose elements for a presentation, to develop the organisation and structure to convey intention to an audience.	*QCA 6A Multimedia presentations* Produce a presentation (web pages/multimedia) involving images, text, sound, which promotes travel and/or tourism for a specific area within a geographical study. The children should first design their pages in draft on paper showing how the pages link, and describe their audience and how they will access the presentation.	English Humanities	Hot Dog Junior Illuminatus Front Page Express Publisher	Can design and create a multimedia presentation. Can create links between pages. Can choose appropriate design elements to develop structure and organisation *Most children will be able to organise, define and present a set of linked multimedia pages which incorporate images, sounds and text.*

Section 7: 'The Mountain Picture Gallery' explained

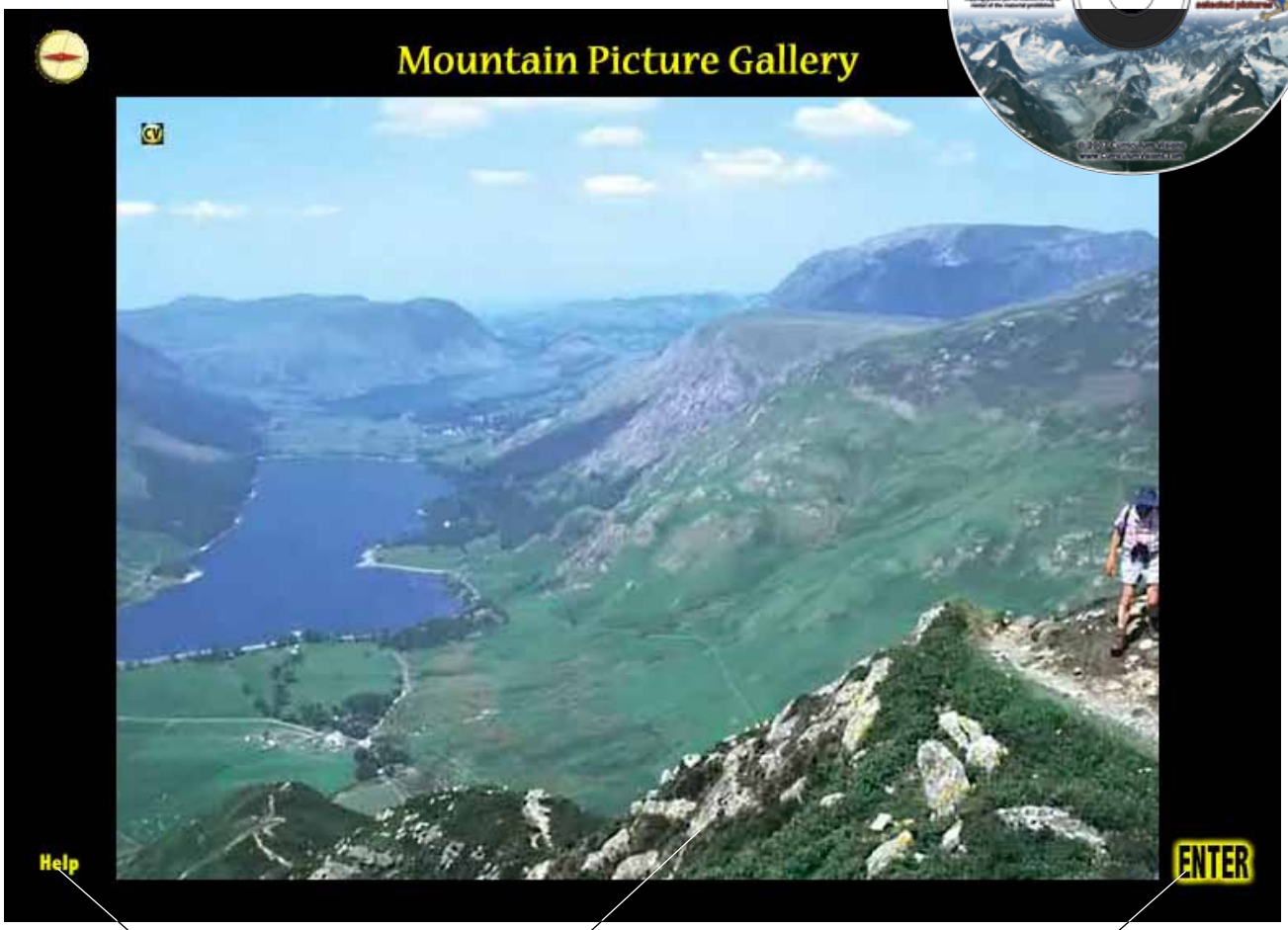
The Mountain Picture Gallery is available for separate purchase on CD or online when you subscribe to www.curriculumvisions.com. It requires the plug-in divX (from www.divX.com) to run the introduction animation. The gallery contains 100 photographs and diagrams that can be used for any curriculum area, such as literacy, but the images have been specially selected for the mountain topic. Many of the pictures are in *The Mountain Book* allowing you to integrate your teaching and reinforce key geography concepts.

Using the CD version

As with *The Mountain and Volcano Project CD*, the information in *The Mountain Picture Gallery* on CD is browser-based, which means that it can be opened in any browser used to surf the Internet (although it is optimised for Internet Explorer 5 and above).

A browser application makes the CD content look and feel just the same as it would on the Internet. You can network the CD (provided you have bought a licence) so that many students can access the data at the same time.

▼ This is the startup screen for The Mountain Picture Gallery on CD *(the appearance of the gallery and its contents may vary from that shown)*.



Introductory 'movie' displaying some of the pictures in the gallery.

Click here to go straight into the gallery with the thumbnail view of all 100 pictures.

Installing the CD

The CD can be used on both Macintosh and Windows-based machines.

Inserting the CD will usually cause it to start up automatically in Windows. However, this depends on the configuration of your machine and the place where the browser application is kept.

If the CD does not automatically start up your browser, then do this:

Windows

1. Eject the CD and try again. If it still doesn't start then:
2. Open Internet Explorer.
3. Type Control O and browse until you find your CD drive. In it look for the file 'index.html'. Select this and click OK.
4. Save the home screen as a Favorite for quick location in future.

Mac OS X (Instructions for first time loading)

1. Place the CD into your CD drive.
2. Open Internet Explorer by double-clicking on its icon in the dock.
3. Type (Command) O and browse until you find the CD.
4. Inside the CD scroll down to 'index.html'. Double click on 'index.html' to launch the CD.
   (Important: do not double click directly on index.html – open it from within your browser.)

In all cases, once you have got the disk working, make the home screen of *The Mountain Picture Gallery* one of your Favorites and then when you load the disk next time you can find *The Mountain Picture Gallery* directly from this list.

Using the Picture Gallery

The home screen

(*See opposite for illustrations of the screens described below.*)

When you enter the gallery you see thumbnails of all 100 pictures.

If you click on any of the pictures in the gallery it will show as an enlarged 'pop-up' view. Clicking on this pop-up picture will take you back to the gallery with the thumbnail view.

Each picture has a simple caption underneath it. At the end of each caption you are given a number of options:

...More... brings up an extensive caption describing the picture and additional information including cross links to other topics. This description helps children with observation and interpretation skills. It is ideal for literacy tasks.

...Enlarge... places the picture in a larger frame.

...Postcard... arranges the selected image into a postcard format, complete with humorous 'stamp' and space for the children to write their own message. Just trim to the shape shown and fold the piece of paper over.

You can create a postcard with any one of the 100 pictures in the gallery. Once again an ideal literacy aid.

Copying text and images

All of the elements are unlocked and can therefore be copied for use in other documents. Simply scroll across text or (right) click on images to copy them in the method that suits you.

Index

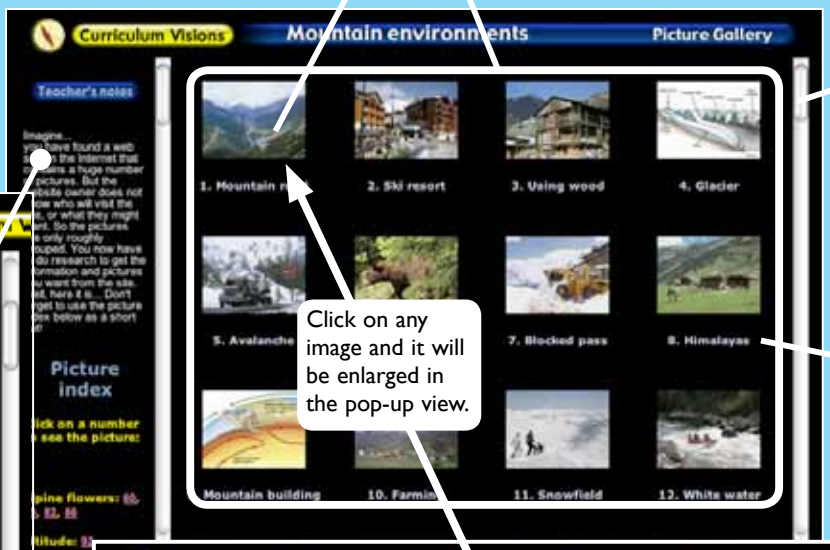
This displays an alphabetical listing of key words on the left panel. If you click on any corresponding image numbers shown after the key word then the relevant picture will be displayed in the pop-up view on the right.

Teacher's notes

The Teacher's notes section provides a printable PDF file giving advice on using the Picture Gallery, and yet more information on each of the pictures contained within it.

▼ The main screen and related links.

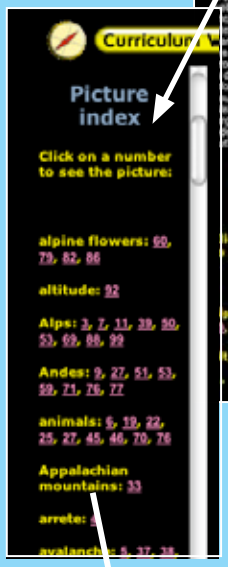
Main screen
Click any thumbnail picture in the gallery to see a pop-up view.



Scroll down the text using the scroll bar.

Click on any image and it will be enlarged in the pop-up view.

Picture captions are extended in the pop-up view.

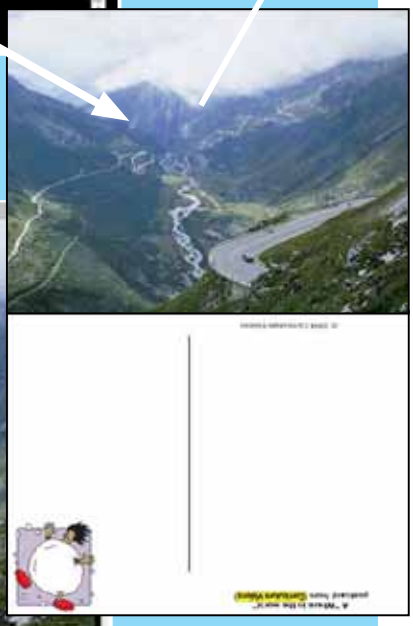


Click on the pop-up image to return to the home screen.

View the index
Key words with links to related images in the gallery.

Teacher's notes includes a PDF providing further information for teachers.

Postcard
Turn any one of the 100 pictures into a postcard and print it for use in literacy or geography tasks!



More provides a description of the image and additional background information.

Enlarge displays the image in a larger view.