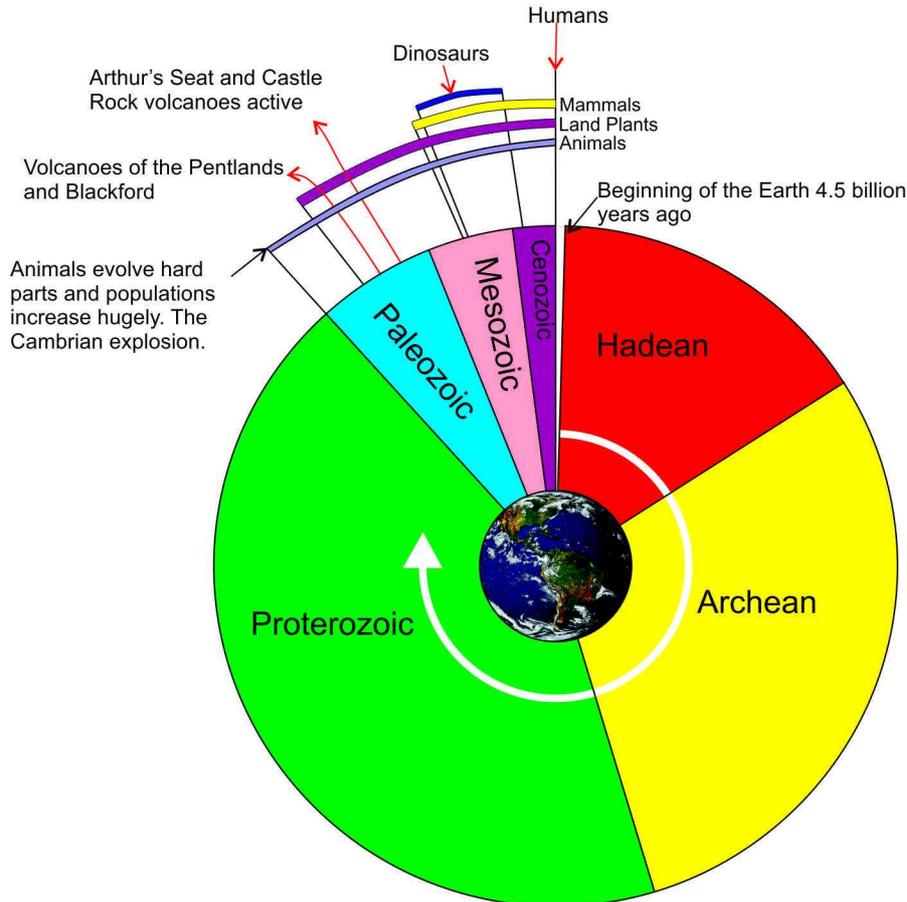


## Teacher's Copy

These questions are a suggestion and can be cut down or expanded if required.

## Geological Time



Q) How old is the Earth?

A) 4.55 billion years old

Q) Why did the "Cambrian explosion", where millions of new species suddenly appeared in the fossil record, actually happen?

A) Species evolved hard parts for the first time.

Q) How long was there between volcanism in the Pentlands and Arthur's Seat?

A) Around 50 million years

Q) How long have humans been around?

A) 5 million years

Q) What was life like in Edinburgh 20,000 years ago?

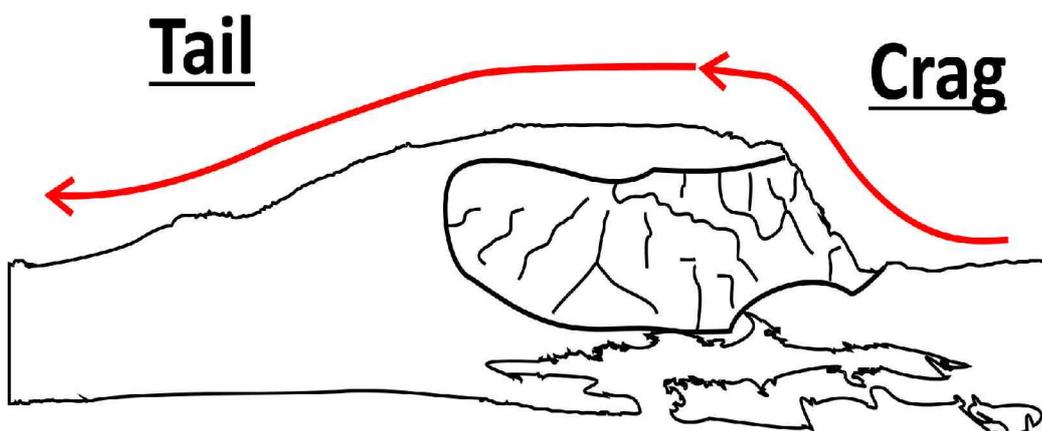
A) Very cold! The ice age was in full swing.

## The Observatory

1. Can tell what type of rock the Observatory and its walls are made of?
  - a. Sedimentary
  - b. Igneous
  - c. Metamorphic (there is no metamorphic rock seen in Edinburgh)
2. What is the rock made up of and can you give the rock a name?
  - Grains of sand it's a sandstone
3. Why is some of it a red colour?
  - Iron in the rock weathers and oxidises to  $Fe^{2+}$  giving it a 'rusty' colour. (The sandstone formed in an arid environment, the red colour is characteristic of this environment. They are part of the "Old Red Sandstone" group.)
4. Sandstone isn't very hard as rocks go, so why build out of it, instead of using a harder rock?
  - It is very easy to cut into blocks, this means that the blocks can fit together almost perfectly and less cement is required which ultimately strengthens the building.

## Corbie's Craig

1. Draw the outline of Corbie's Craig, the note on your sketch the important features of the craig. Can you draw the direction of the ice?



(Ice direction in red. The important features are the steep slope to the west and shallow slope to the east, the view towards the craig from stop 2 is south.)

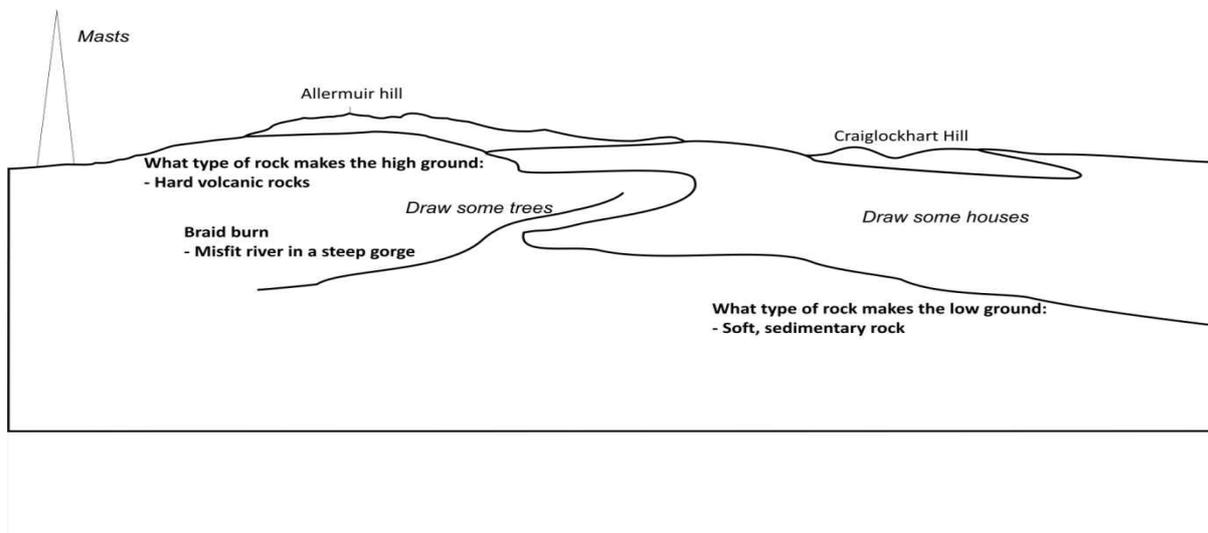
2. What type of weathering occurs on a) the steep side and b) the shallow side of the craig?

- a. Plucking
  - b. Abrasion
3. On the right of the path (looking up slope) is a small outcrop of a dark rock, this is the same rock as Corbie's Craig. Can you describe its features? (E.g its colour or what it is made of.) Is it harder or softer than the red Observatory sandstone?
- It is a dark rock, purplish red in colour, made of very fine grained minerals that are difficult to see. It breaks off into fairly sharp blocks.
  - It is very much harder than the Observatory sandstone.

## The summit

### Pentlands

1. Draw some more important features onto the sketch and fill in the blanks.



2. Why is the housing estate built where it is?
  - It's a wide area of flat land.
  - The gorge and hills are difficult to build on and they are now protected from development by designating them as reserves.
3. How were the rocks that the Pentland Hills and Braid and Blackford Hills are made of formed?
  - Volcanoes, they are lava flows.
4. What would the environment have looked like?
  - A desert with mountains and volcanoes. Like the centre of Chile.

### Arthur's Seat

1. What is Arthur's Seat?

- An ancient volcano

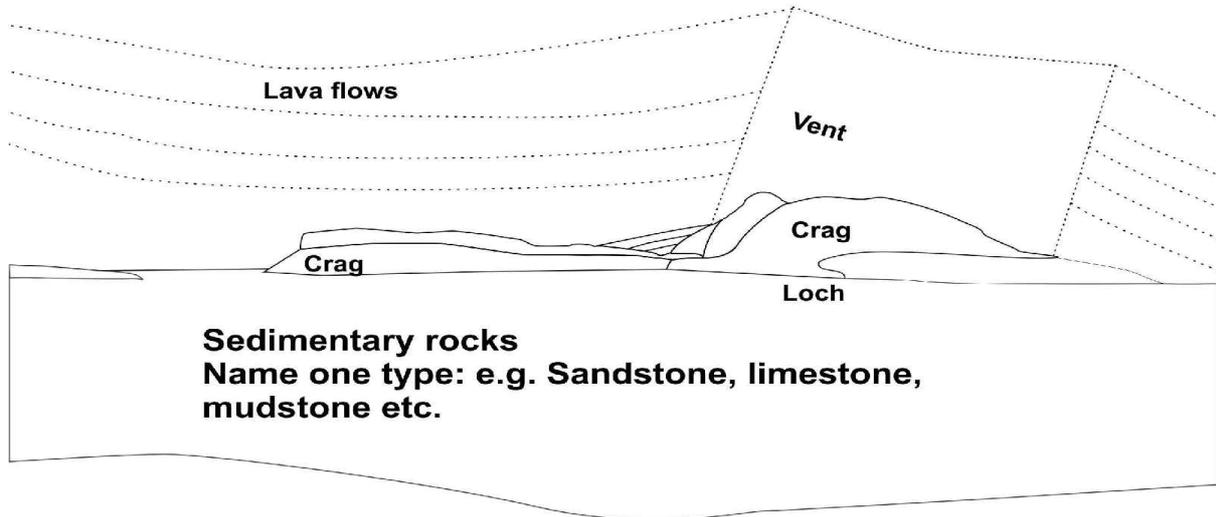
2. Fill in the blanks. Can you draw where more of the volcano's lavas and ash would have been? And where is the crag and tail (can you see them both)?

Why is the volcano tilted?

A) Ancient mountain building causes folding and tilting of the rock.

Why is the top missing?

A) Eroded away by ice



3. The castle should be visible to the north. Why would you build a castle here?

- Good defensive position, hard rock, access to water.

4. Why did Edinburgh become the capital?

- The sea and a large river is close by and the castle protected the early citizens.
- (Glasgow is missing a good castle and Stirling is missing the sea).

5. What was the environment like when Arthur's Seat and Castle Rock were active?

- Warm and wet. The ground was low and swampy, the sea flooded the land occasionally.

## Wall Rocks

1. On the wall at the bottom of the hill, can you see any rocks you recognise? If so, where were they?

- Yes, sandstone (may be moss covered or sandy in colour) and the hard purple rock.

2. What is the purple rock?

- A volcanic rock. Andesite. From Corbie's
3. There is a third rock. Describe it.
    - A very black rock. It breaks into rounder, more 'lumpy' blocks than the sharp andesite and the white to green sandstone. It is a trachyte.

The two dark rocks are volcanic in origin (lavas), the Pentlands and Blackford hill are both made up hundreds of lava flows of these rock types.

### Scree slopes

1. Describe the rocks that are within the scree slopes. Do they change size in the slope?
  - The rocks are angular and can be large in size. The blocks may decrease in size down slope because as the rocks move down slope they abrade and become smaller. They may increase in size because large blocks can tumble down slope faster.
2. Sketch the shape of the slope and the crag.
  - The sketch should show a fan shape with a crag at the top (if present). If a crag isn't present, ask why this is the case.

### Braid Burn

1. Sketch the burn and valley. Is the river too small for the valley?
2. The bridge is relatively new. Why is this?
  - Flooding destroyed the old one.
3. Can you see some flood defenses?
  - The bridge has outlet pipes and it is built strongly.
  - There are further flood defenses downstream.

### Blackford Quarry

1. What rock were they taking from the quarry?
  - The purple andesite.
2. Why?
  - Road building or aggregates (gravel).
3. Was the quarry any bigger? If it was, why is it now this size?
  - Yes, the quarry was used as a landfill for many years. Now the community forest is planted over it.

4. What is the quarry used for now?

- Climbing is the main activity here, some bolts are seen at the top (close to the cliff top and up a steep slope - not recommended for groups).

### **Agassiz Rock**

1. Can you see any of the glacial striations (scratches from the rocks carried within the ice) that proved glaciers were once in Scotland?

- Probably not! Years of people climbing on the rock (bouldering) and some fires underneath has destroyed them but you may be lucky...

If you walk back to the Observatory through the 'community wood', remember you are walking over an old quarry that became a landfill and is now a wood! To the east is a golf course on old farm land, you can see some farmland still remaining to the south, on Braid Hill.