

Time: 3 hours

Marks: 225

**Question 1**

1. Answer this question on a new sheet of paper.

1.1. Match the term in Column A with the correct description in Column B. Write only the question number and the corresponding answer.

(15)

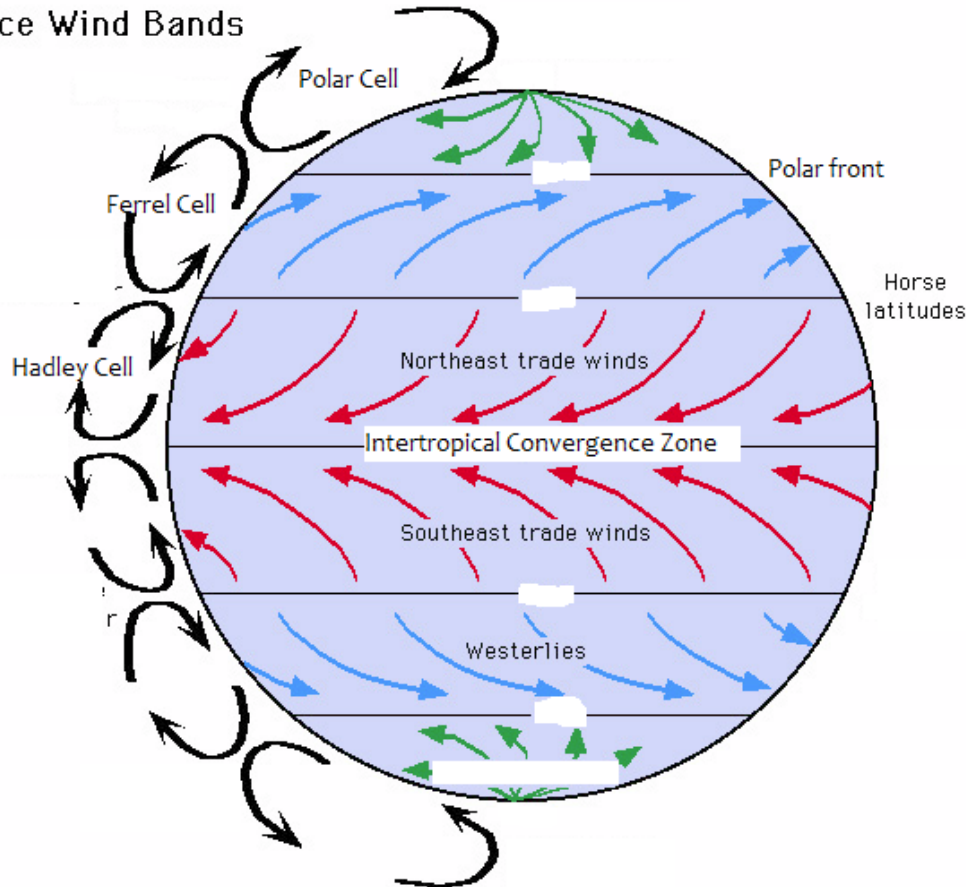
<b>Column A</b>	
1.1.1	Knickpoint
1.1.2	Ferrel cell
1.1.3	Topography
1.1.4	Coriolis effect
1.1.5	Batholith
1.1.6	Jet stream
1.1.7	Anti-cyclone
1.1.8	Canyon
1.1.9	Basalt
1.1.10	Heat equator
1.1.11	Backwasting
1.1.12	Albedo
1.1.13	Insolation
1.1.14	Cuesta basin
1.1.15	Net radiation surplus

<b>Column B</b>	
A.	Slopes eroding back parallel to their original position
B.	The point where the pediment joins the talus, or a change in slope gradient
C.	A narrow, variable band of very strong, predominantly westerly air currents encircling the globe several kilometres above the Earth
D.	Intertropical convergence zone
E.	An atmospheric cell lying between 30° and 60° N and S
F.	An example of a volcanic igneous rock
G.	A deep, narrow valley in an arid area
H.	A large-scale circulation of winds around a central high pressure
I.	Circular-shaped cuesta ridges with the scarp slopes facing outwards
J.	Incoming solar radiation
K.	An accumulation of heat from the sun
L.	The relief of the land
M.	The amount of solar radiation reflected off the Earth's surface
N.	An effect whereby a mass of moving air moving in a rotating system experiences a force perpendicular to the direction of motion and to the axis of rotation
O.	The largest and deepest of intrusive igneous features

## 1.2. Climate

1.2.1. Refer to the figure below and then state whether the following statements are true or false. Write only the question number and your answer. (7)

## Surface Wind Bands



Adapted from Duxbury, Alyn C. and Alison B. Duxbury. *An Introduction to the World's Oceans*, 4/e.  
Copyright © 1994 Wm. C. Brown Publishers, Dubuque, Iowa.

Source: <http://addeyans-geography.weebly.com/global-atmospheric-circulation.html>

- 1.2.1.1. The intertropical convergence zone is located along the equatorial low-pressure belt.
- 1.2.1.2. A zone of high pressure is located between the polar and Ferrel air-circulation cells.
- 1.2.1.5. Rain, thunderstorms and tropical cyclones occur frequently in the Hadley air-circulation cell.
- 1.2.1.8. The sub-tropical high pressure belt is located between the Hadley and Ferrel air-circulation cells.
- 1.2.1.9. The westerlies are winds that form as a result of air movement from a low- to a high-pressure cell.
- 1.2.1.10. The force that causes air to deflect to the left in the Southern Hemisphere is known as the Coriolis force.
- 1.2.1.13. A geostrophic wind blows across isobars due to friction.

1.2.2. Refer the synoptic chart on page 5 and then answer the questions that follow.

1.2.2.1. Give two pieces of evidence that prove that this chart shows typical summer conditions over South Africa. (2)

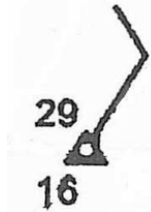
1.2.2.2. Locate the 30° line of latitude.

a. Name the global pressure belt located along this line of latitude. (1)

b. Name the two surface pressure cells associated with this line of latitude in South Africa. (2)

c. Explain why this global pressure belt is separated into two pressure cells on the Earth's surface but remains as a single pressure belt in the upper atmosphere. (2)

1.2.2.3. Locate the weather station at Durban, also shown below.



a. Describe the weather being experienced in Durban on this day. (4)

b. Account for the lack of cloud cover reading on this day. (1)

1.2.2.4. Locate the weather station at Upington, redrawn below.



a. Give the cloud cover at Upington on this day. (1)

b. Describe the temperature and moisture of the tropical continental air mass that is located at Upington. (2)

c. In a short paragraph, account for the semi-desert climate region in which Upington is located. (3)

1.2.5. El Niño

1.2.5.1. Draw a rough sketch to show the differences in the rainfall patterns during El Niño and La Niña. (6)

1.2.5.2. Describe the way in which El Niño causes droughts in the eastern part of South Africa. (2)

1.2.5.4. Discuss three human activities in the eastern part of South Africa that contribute to the worsening impact of droughts in the region. (3)

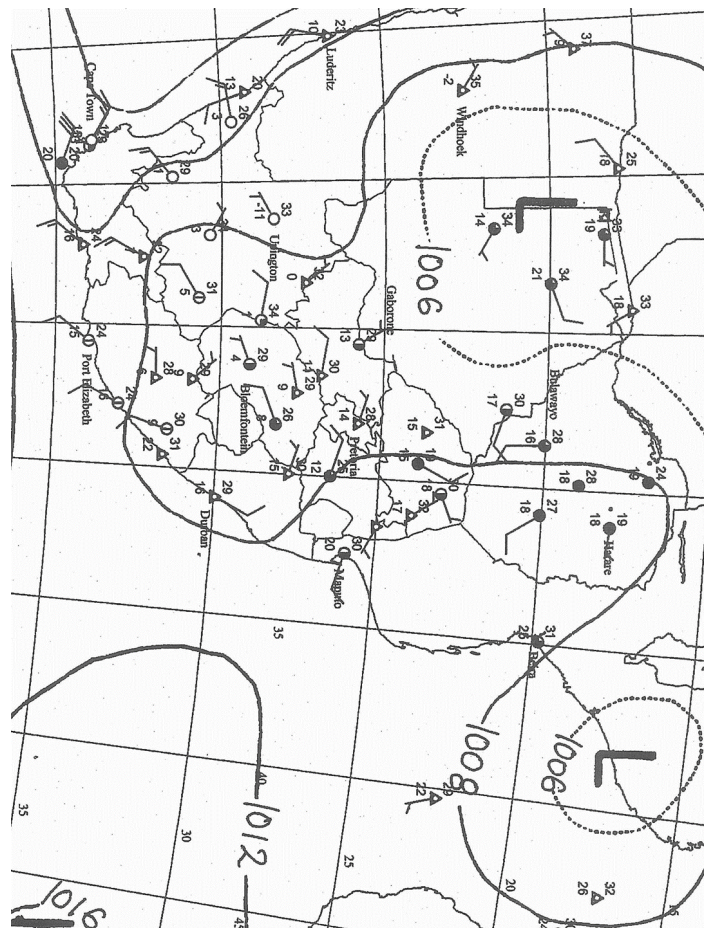
1.2.4.5. Outline the difference between drought and desertification. (2)

1.2.6. Refer to the image below and then answer the questions that follow.



Source: <https://www.theguardian.com/global-development/gallery/2016/oct/07/lives-devastated-el-nino-drives-drought-mozambique-in-pictures>

- 1.2.5.1. Describe the environmental conditions experienced by people living in Mozambique. (2)
- 1.2.5.2. Explain why the impact of droughts in Mozambique is more severe than in a more economically developed country such as South Africa. (4)
- 1.2.5.3. Suggest and explain three measures Mozambique can take to reduce the impact of drought in the country. (6)



## 1.3. Geomorphology

1.3.1. Select the correct word or phrase from those given in brackets to make the sentence correct. Write only the question number and correct word/phrase. (5)

- a. Mesas and buttes are commonly found (in the Northern Cape / on the coastal plain).
- b. The plateau of South Africa is highest in the (west / east).
- c. The (Little Karoo / Great Karoo) lies on the (coastal plain / plateau) between the (Southern Cape coastline and Langeberg Mountains / Langeberg Mountains and Swartberge Mountain Ranges).

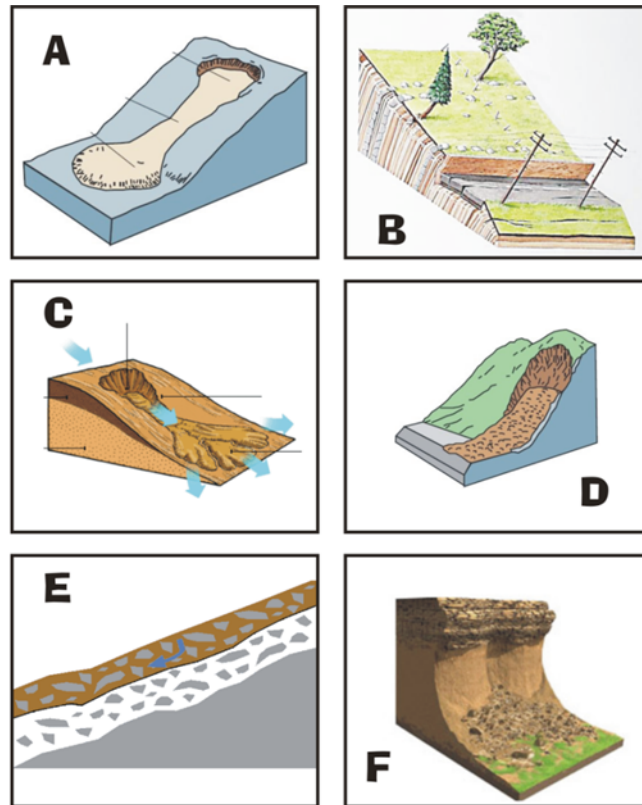
1.3.2. Study the photograph below and then answer the questions that follow.



Source: S. Thompson

- 1.3.2.1. Identify the landform shown in the photograph above. (1)
- 1.3.2.2. Give a reason for your answer in 1.3.2.1. (1)
- 1.3.2.3. Where in South Africa (which province) are these landforms most commonly found? (1)
- 1.3.2.4. Draw a labelled sketch to show the four slope elements that are shown on the photograph above. (4)
- 1.3.2.5. Describe the types of mass movement that are associated with each slope element. (4)
- 1.3.2.6. Name the original landform that preceded the landform shown in the photograph. (1)
- 1.3.2.7. State the name and describe the process associated with the geomorphological process that is responsible for the erosion of the original landform to what is seen in the photograph. (3)

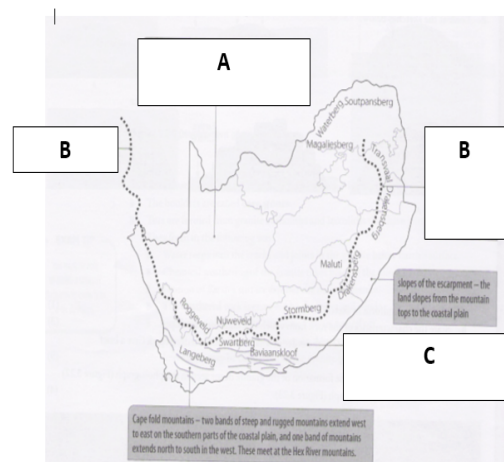
1.3.3. Study the figure below that indicates different mass movement landforms.



- 1.3.3.1. List the different forms of mass movement A to F. (6)
- 1.3.3.3. Which two of the above types of mass movement can be classified as flowage? (2)
- 1.3.3.5. Outline how each of mass movements A and F form. (4)
- 1.3.3.6. "In areas where humans have affected the stability of slopes, the probability of mudflows and landslides is increased." Fully account for this statement. (3)
- 1.3.4. Refer to the figure below, showing the topography of South Africa, and answer the questions that follow.

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1.3.4.1. Identify by naming each of the areas labelled A, B and C. (3)

1.3.4.2. Describe a characteristic of feature A. (1)

1.3.4.3. Define the term 'strata'. (1)

1.3.5 Read the extract below and then answer the questions that follow.

On 30 July 2014, a landslide occurred in the village of Malin in the Ambegaon taluka of the Pune district in Maharashtra, India. The landslide, which hit early in the morning while residents were asleep, was believed to have been caused by a burst of heavy rainfall, and killed at least 151 people. The landslide was first noticed by a bus driver who drove by the area and saw that the village had been overrun with mud and earth. In addition to those dead, more than 160 people, and possibly up to 200, were believed to have been buried in the landslide in 44 separate houses. Rains continued after the landslide, making rescue efforts difficult.

*Source: [https://en.wikipedia.org/wiki/2014\\_Malin\\_landslide](https://en.wikipedia.org/wiki/2014_Malin_landslide)*

1.3.5.1. Define the term 'mass movement'. (1)

1.3.5.2. What was the cause of the Malin landslide? (1)

1.3.5.3. As a member of the rescue and rebuilding team you are required to make a list of the four needs of the victims:

a. immediately after the disaster, and (4)

b. a few months later. (4)

## Question 2

2. Start this question on a new page.

2.1. Define the following terms: (10)

2.1.1. Hogsback

2.1.2. Hadley cell

2.1.3. Cuesta

2.1.4. Polar front

2.1.6. Intertropical convergence zone

2.1.7. Isobar

2.1.8. Weather

2.1.9. Inclined strata

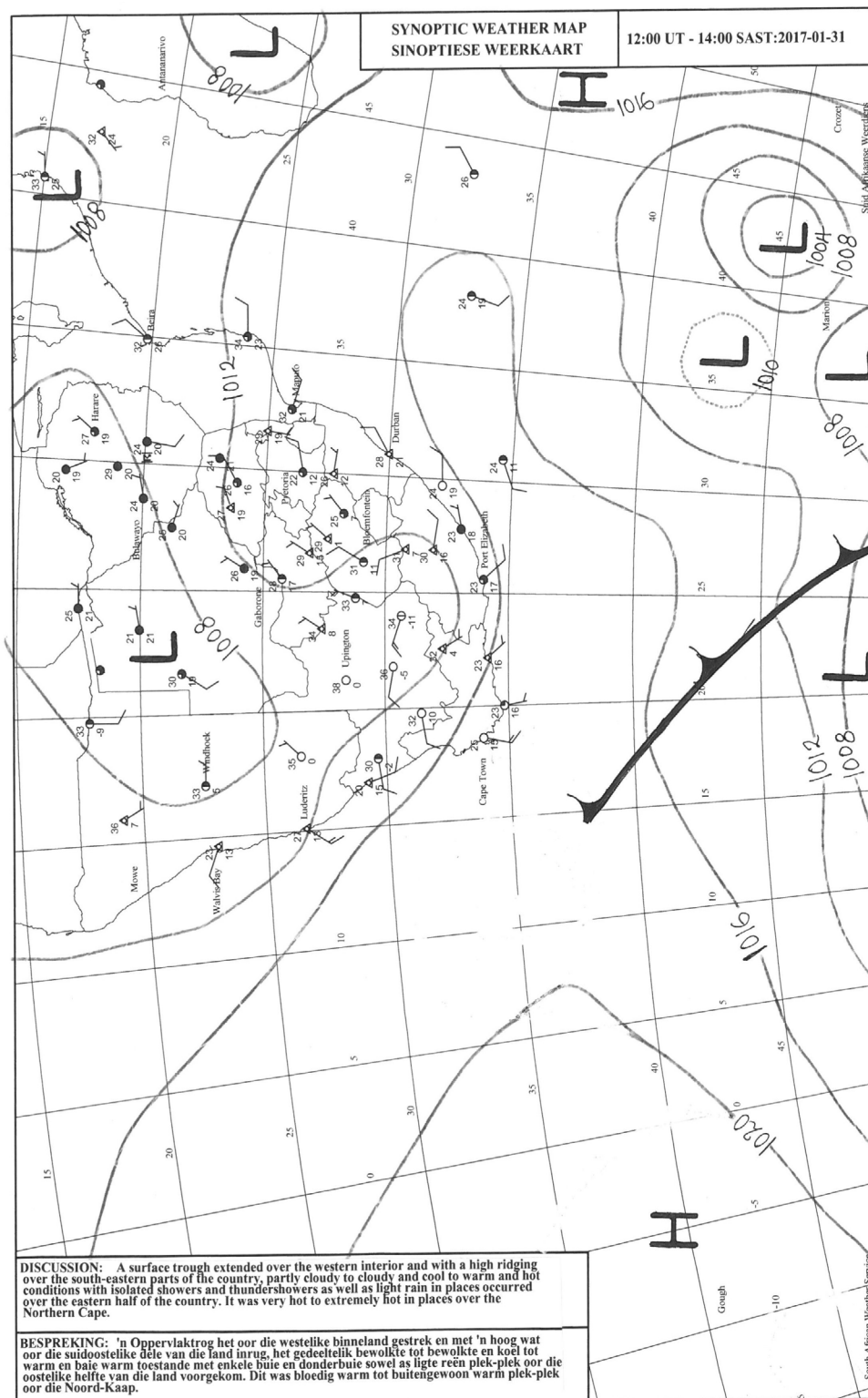
2.1.10. Mudslide

2.1.11. Soil creep

- 2.2. Refer to the synoptic chart on page 9 and then answer the questions that follow.
- 2.2.1. What is the isobaric interval on this map? (1)
  - 2.2.2. Where will the wind speed be greater – at A or at B? How do you know this? (2)
  - 2.2.3. Find Gough Island and Marion Island. At which of these places is the wind almost geostrophic? Give a reason for your answer. (2)
  - 2.2.4. What would be the direction of the geostrophic wind at B? (1)
  - 2.2.5. Draw a sketch to show the forces that would be operating on it. Label the isobars in your sketch and put in the lines of latitude and longitude. (5)
  - 2.2.6. What weather is currently being experienced in Port Elizabeth? (5)
  - 2.2.7. What is the pressure at D and E? (2)
  - 2.2.8. Which features of the global circulation are the pressure systems centred at D and E? (2)
  - 2.2.9. Name these pressure systems. (2)
  - 2.2.10. What is the pressure at F? (1)
  - 2.2.11. Is this a high pressure or low pressure? (1)
  - 2.2.12. What information from the chart, besides the date, tells you that this is winter? (2)
  - 2.2.13. Why is it overcast at Cape Town? (1)
  - 2.2.14. What is likely to happen to the temperature at place C in the next 24 hours? (1)
  - 2.2.15. Give a reason for your answer in 2.2.14. (1)
  - 2.2.16. Look at the station models near to G.
    - a. What is the cloud cover at these places? (1)
    - b. Explain why there is the amount of cloud you observed. (2)
  - 2.2.17. Describe and account for the difference in temperature between Durban and place K on the west coast. (4)
  - 2.2.18. Is the flow of wind around the high-pressure system at E clockwise or anticlockwise? (1)
  - 2.2.19. If you stood with your back to the wind at I, would the high pressure be on your left or your right? (1)
- 2.3. Differentiate between maritime and continental air masses. (2)

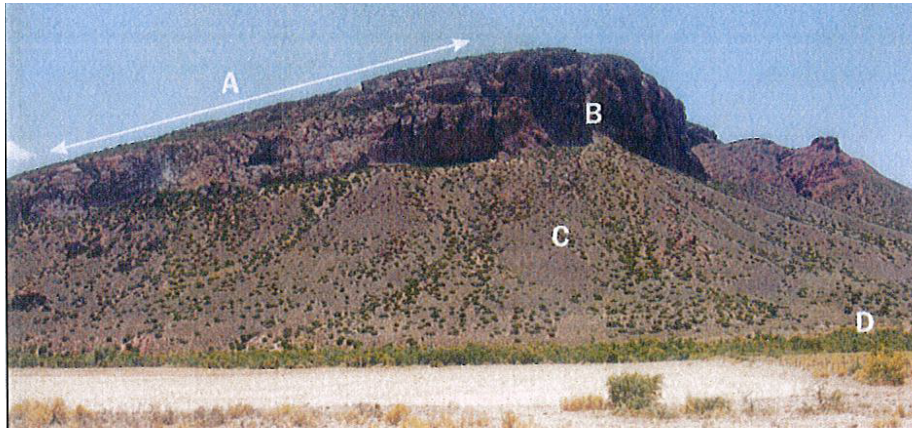


2.4. Explain how winds are formed by referring to the pressure gradient, pressure gradient force and Coriolis force. Use diagrams to help you answer this question. (6)



2.5. Discuss the general weather being experienced over South Africa on this day. (4)

2.6. Study the figure below and then answer the questions that follow.



2.6.1. State why the landform shown in the figure above is called a homoclinal ridge. (2)

2.6.2. Identify the slope elements marked A and B. (2)

2.6.3. B and C represent layers of different rock types.

a. State which layer (B or C) is less resistant to erosion. (1)

b. Give a reason for your answer in a. above. (1)

2.6.4. The slope from B to D is concave in shape. Draw a simple sketch to show how a concave slope would appear on a topographic map. (2)

2.7. Study the landform below and then answer the questions that follow.



2.7.1. Identify the landform shown in the figure above. (1)

2.7.2. Describe two points to explain how this landform was formed. (2)

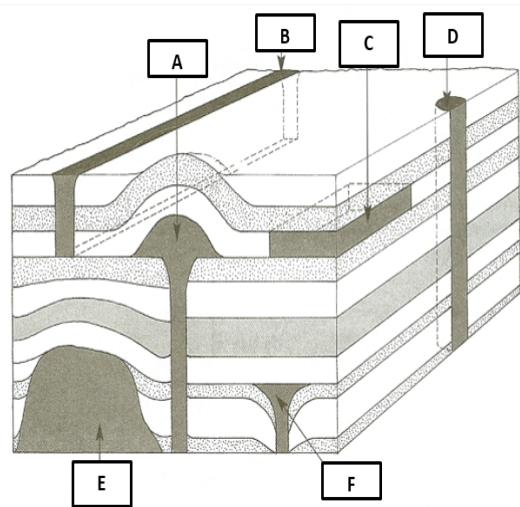
2.7.3. Over many thousands of years the landform changes and becomes smaller.

a. Draw a diagram to show how this landform becomes smaller over time. (2)

b. Give this process a name. (1)

c. State the names of the previous larger landform and the resulting smaller landform. (2)

2.8. The following diagram shows intrusive features. Refer to the diagram and then answer the questions that follow.



2.8.1. Identify by naming each feature labelled A to F. (6)

2.8.2. Over time, feature E is exposed to the surface of the Earth. Name this new exposed landform and give an example. (2)

2.8.4. Differentiate between intrusive and extrusive features. (2)

2.9. Refer to the photograph below and then answer the questions that follow.



Source: IEB, 2008

2.9.1. Define the term 'mass movement'. (1)

2.9.2. Explain the causes of soil creep. (2)

2.9.3. As a farmer who owns this land, write a report in which you:

- Describe the effects of this mass movement on your farmlands, (2)
- Describe the effects of this mass movement on your farming infrastructure, and (2)
- Suggest solutions to this problem. (4)

2.10. Read the extract below and then answer the questions that follow.

## **Mudslide in rural Afghanistan kills hundreds, including rescuers**

### **Rescue operation under way as thousands of homes buried in Badakhshan province**

Sat, May 3, 2014, 01:00

Hundreds of people were buried alive in a remote northern corner of Afghanistan yesterday when a mudslide swept through a village and a second collapse then trapped neighbours who had rushed to help, according to local officials.

Thousands of tons of soil and rocks broke from a hill in Badakhshan district near the Tajik border, creating a wave of mud that destroyed everything in its path.

"There are around 1 000 houses in Aab Barik, 300 were buried when this happened, then 600 local people who live in the site went to help but unfortunately the hill collapsed a second time," said provincial governor Shah Waliullah Adib.

Badakhshan is poor and fairly isolated, and although the landslide hit not far from the provincial capital, it was in a dangerous area with patchy communication links and a heavy insurgent presence.

If the governor's estimate of the toll is confirmed, it would make the landslide the country's deadliest natural disaster since 1998, when two earthquakes each killed several thousand people.

A member of parliament from the province, Mohammad Zakria Sauda, said: "At first a small part of the hill came down. And then, when people went to help, the other big part came down. Casualties could be as many as 1 000 people. Children and women are stuck under the soil."

Source: [www.irishtimes.com](http://www.irishtimes.com)

- 2.10.1. Explain why the mudslide occurred. (1)
- 2.10.2. Account for the high death toll. (1)
- 2.10.3. Discuss the social impacts of the mudslide. (3)
- 2.11. With the aid of a neatly annotated diagram, explain the development process of a tor and state the type of rock that is associated with tors. (8)