SENIOR SECONDARY IMPROVEMENT PROGRAMME 2013

education

Department: Education

GAUTENG PROVINCE

GRADE 12

GEOGRAPHY

TEACHER NOTES

CONTENTS

TEACHER NOTES

SESSION 8

TOPIC: GEOMORPHOLOGY CONSOLIDATION

!

Teacher Note: In the prelim and final papers the geomorphology section is equally mixed with climatology in the first two questions in Section A. You need to ensure that the learners know this work well to get good marks for section A in the final exam. They must also be able to apply their knowledge as there are some interpretation questions where they need to understand the processes involved in geomorphology and climatology. These applications also apply to the mapwork interpretation. Learners must put in a lot of effort to get to know this part of the work well. They must know the facts, and they will not get marks for vague answers.

LESSON OVERVIEW

1.   Typical exam questions: 55 minutes
2.   Review/solutions/memo: 35 minutes

SECTION A: TYPICAL EXAM QUESTIONS

**QUESTION 1:   30 minutes   50 marks   *(Source: Focus exam bank adapted.)*

1.1   Various possible answers are provided for each question. Write the **letter only** of the correct answer next to the corresponding number.

1.1.1   A watershed is …

   A   a large amount of rainwater flowing over the surface as overland flow or sheetflow.

   B   the upper level of the zone of groundwater saturation in permeable rocks.

   C   the high ground separating one drainage basin from another.

   D   a pass or valley through a mountain that is followed by a river

1.1.2   A trellis drainage pattern develops on …

   A   rocks of uniform or homogeneous resistance and in an area of uniform gradient.

   B   inclined strata which are unequally resistant to erosion or in areas where there are parallel fold mountains.

   C   igneous rocks that have joints and cracks indicating lines of weakness.

   D   domes where streams flow outwards and downhill.

1.1.3   A hydrograph for an urban area has a shorter lag time and higher flood peak because,

   A   there is more run off and less infiltration in urban areas.

   B   there is less run off and more infiltration in urban areas.

   C   drainage basins in urban areas are usually pear shaped.

   D   there are higher stream orders in urban areas.

1.1.4   River capture can be caused by …
   A   a knickpoint on a concave river profile.

   B   a windgap that rejuvenates river flow.

   C   river terraces that join at the elbow of capture.

   D   increased headward erosion due to steeper gradient and/or larger volume.

1.1.5   A river has a graded profile when …
   A   laminar flow causes erosion.
   B   turbulent flow causes rapids and waterfalls.
   C   equilibrium has been achieved due to a balance between erosion, transportation and deposition.
   D   erosion is greater than deposition because of rejuvenation.   (5 x 2) (10)

1.2   Carefully study the following flow chart model of fluvial runoff which follows:

1.2.1   Define these fluvial terms:

   a) Infiltration
   b) Stream discharge
   c) Baseflow   (3 x 2)(6)

1.2.2   Explain how widespread soil erosion in the catchment area of this river system would influence surface runoff.   (2 x 2)(4)

1.2.3   During drought periods with water restrictions, many residents sink boreholes to obtain water. Predict the long-term impact of boreholes on baseflow and ultimately stream discharge.   (2 x 2) (4)
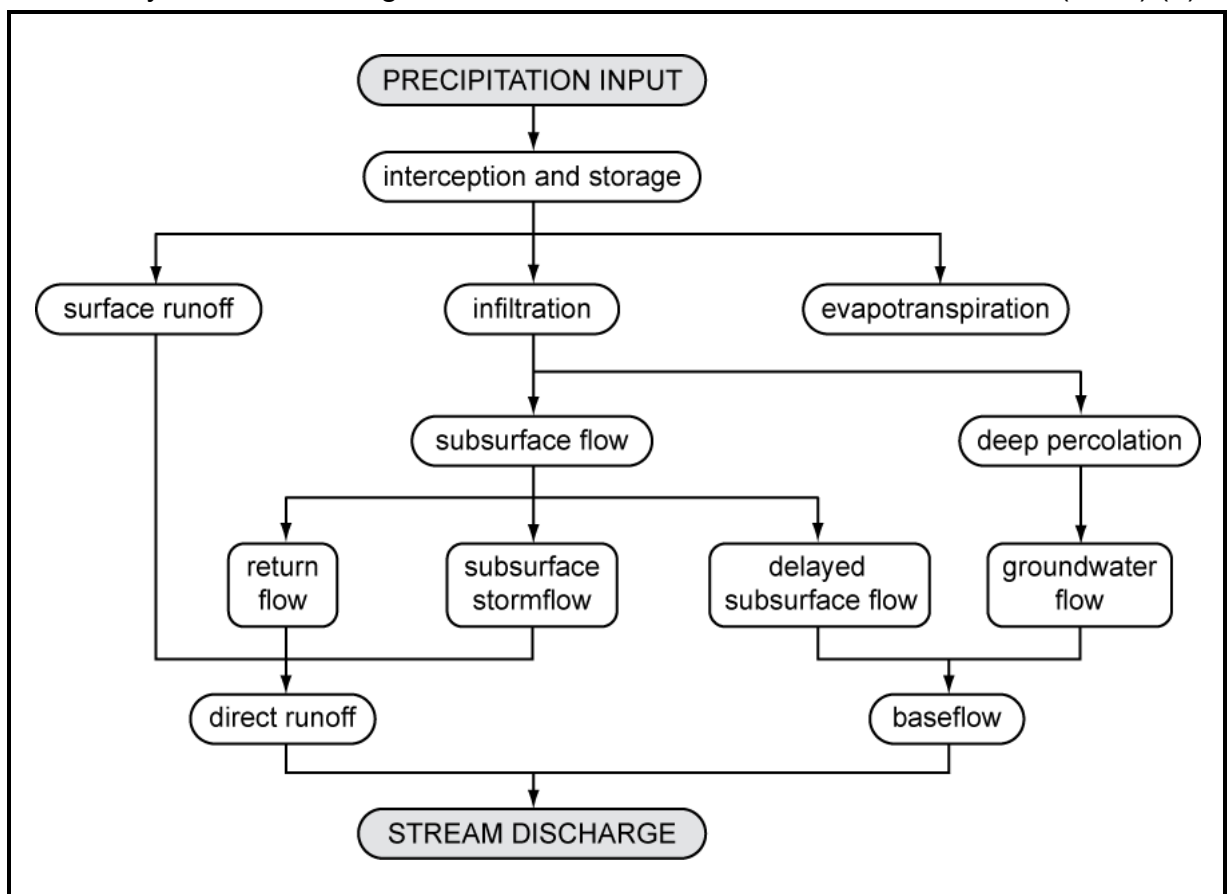
Source: Adapted from: Knighton, David. 1998 *Fluvial Forms and Processes* .Arnold Publishers.

Carefully study the following diagram showing 'before' and 'after' models of landscape development before answering the questions below.
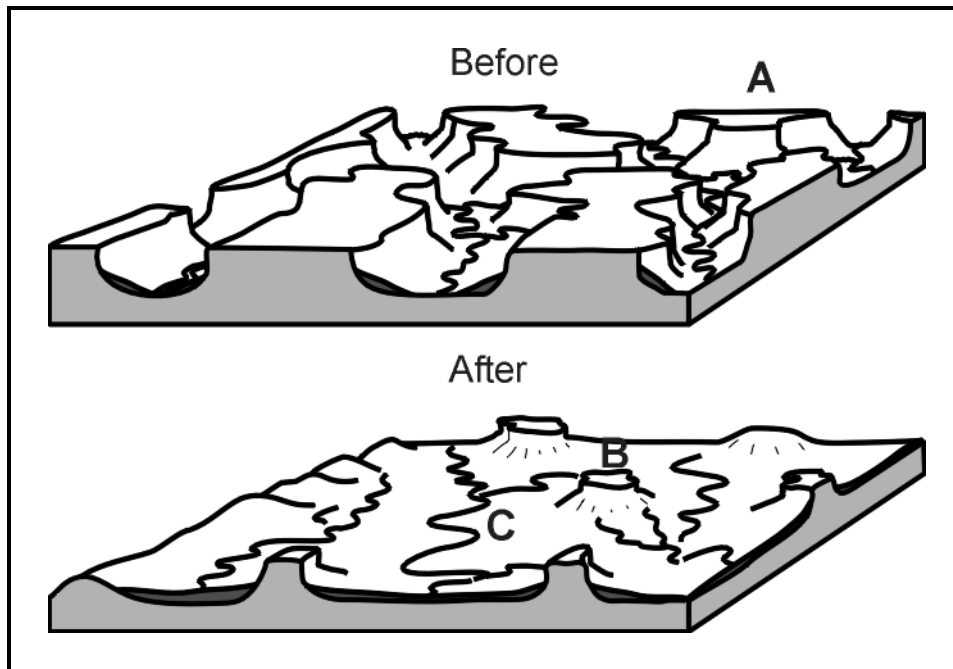
1.2.4   Identify landforms labelled A, B and C.   (3 x 1) (3)
1.2.5   Use the diagram as a guide and discuss how this landscape developed. (4 x 2) (8)

1.2.6   Study the diagram on the following page that shows river capture of the
         Tano River by the Volta River in Ghana. The point of capture was north
         of Wenchi. Answer the questions that follow:
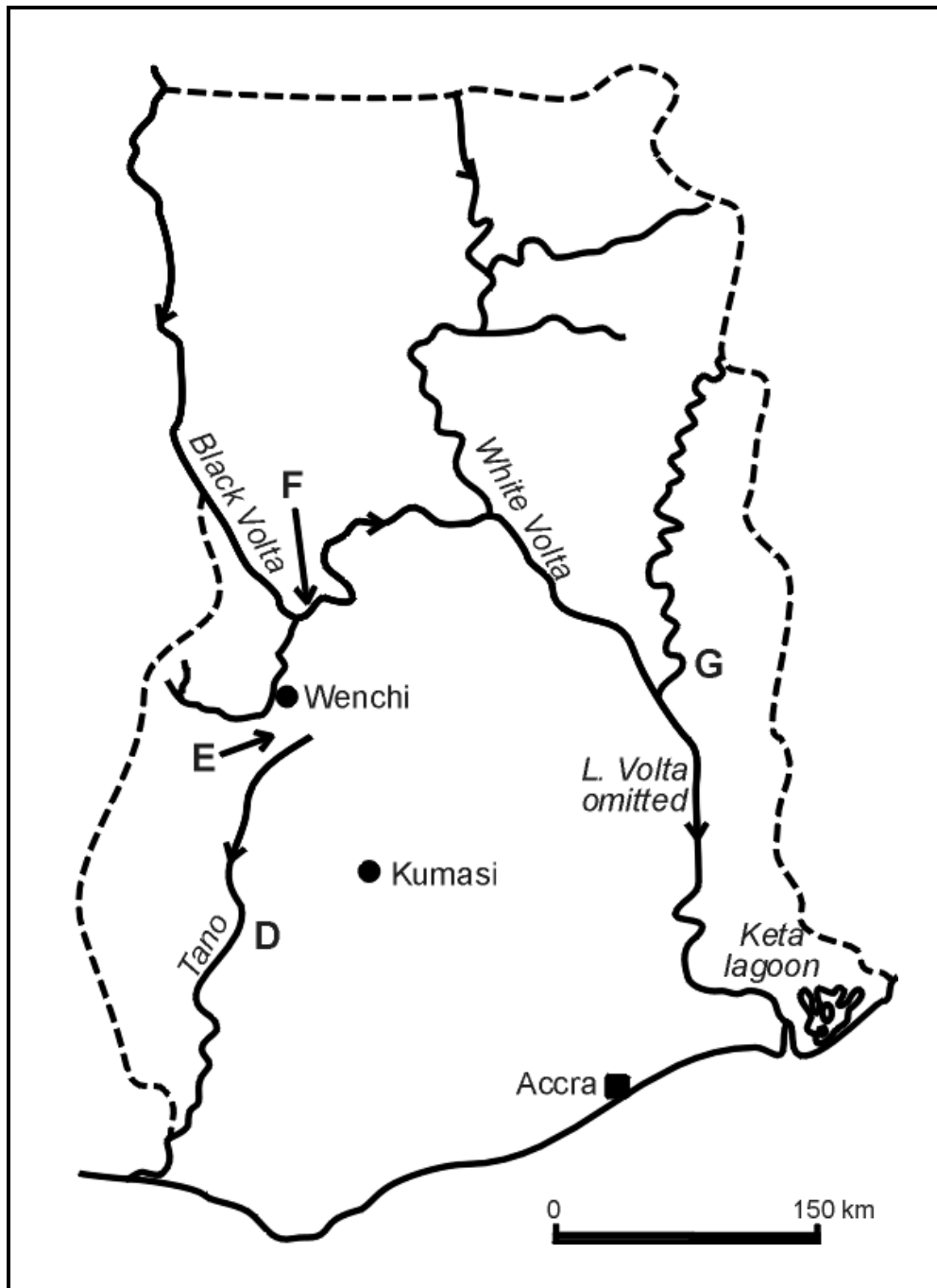
1.2.6   Identify the components of river capture labelled D, E, F and G.   (4 x 2) (8)
1.2.7   List **THREE** factors that could have lead to the Volta River 'capturing' the
         waters of the Tano River.   (3 x 2) (6)
1.2.8   Which of the two rivers (Volta or Tano) would have the greater discharge
         as they flow into the sea?   (1)
                                                                                         [50]

HINTS: Remember that the sketches are very important. You must be able to apply work
you have done in class to a new sketch or map. Read the introductory paragraphs to
questions carefully – they often contain some direction to what is expected in the answers.

QUESTION 2:   **64 minutes**   **63 marks**   *(Source: combination of different text books and past papers.)*

2.1.   The following statements are all related to physical geography. Indicate whether the following statements are TRUE of FALSE. Write only 'true' or 'false' next to the question numbers.

2.1.1. The misfit river is the river that loses water after river capture/piracy has occurred.
(1 x 2) (2)

2.1.2. A waterfall may develop at the elbow of capture after river capture/piracy has occurred.   (1 x 2) (2)

2.1.3. In between parallel lying, homoclinal ridges a trellis drainage pattern is most likely to develop.   (1 x 2) (2)

2.1.4. The tributaries of the main stream in a dendritic drainage pattern are all short.
(1 x 2) (2)

2.1.5. A watershed separates drainage basins.   (1 x 2) (2)

2.2.   North-east of Port Elizabeth one finds the settlement of Seymore that is surrounded by a landscape similar to the one illustrated in Figure 2.1 below.

Figure 2.1

Resistant/Weerstandbiedend
Non-resistant/Nie-weerstandbiedend
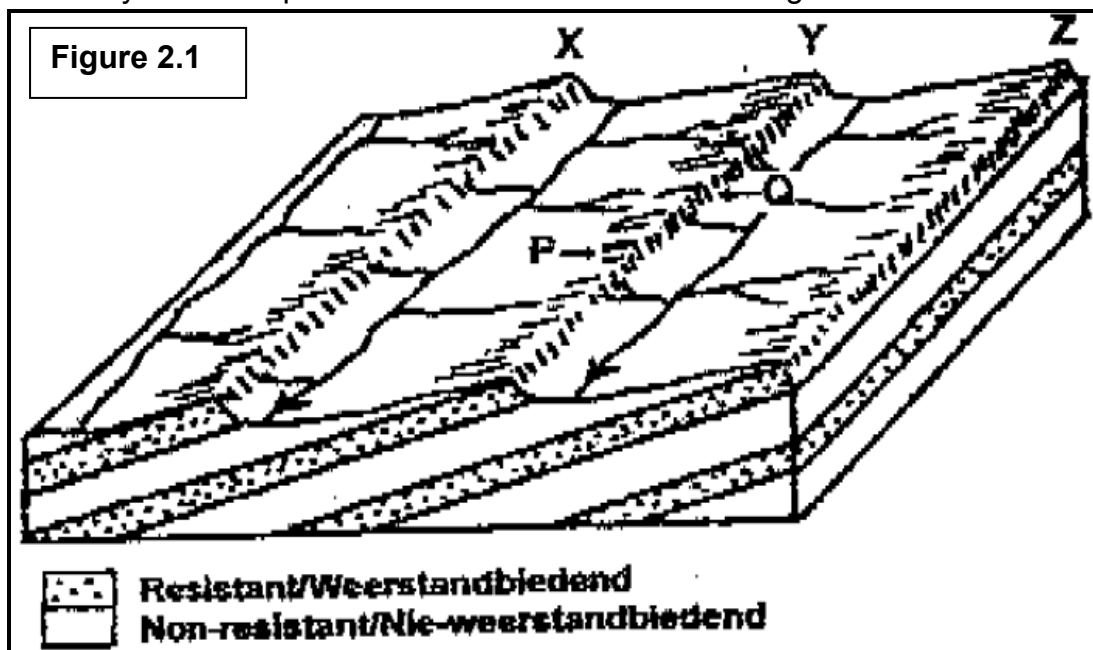
2.2.1. Is the landscape illustrated in figure 2.1 associated with inclined or horizontal strata?
(1)

2.2.2. Identify landform Y.   (1)

2.2.3. Identify slopes P and Q associated with landform Y.   (2 x 2) (4)

2.2.4. Explain how the underlying rock structure resulted in the development of landform Y.   (3 x 2) (6)

2.2.5. a)   Which slope, P or Q, is more suitable for human settlement?   (1 x 2) (2)
        b)   Give one reason for your answer in Question 2.2.5.(a)   (1 x 2) (2)

2.2.6. Explain why the landscape illustrated in Figure 2.1. is suitable for agricultural activities.   (2 x 2) (4)

2.3.   The nature of the landscape illustrated in Figure 2.1 lends itself to the process of river capture/piracy. Figure 2.2 below shows a landscape before and after river capture/piracy.
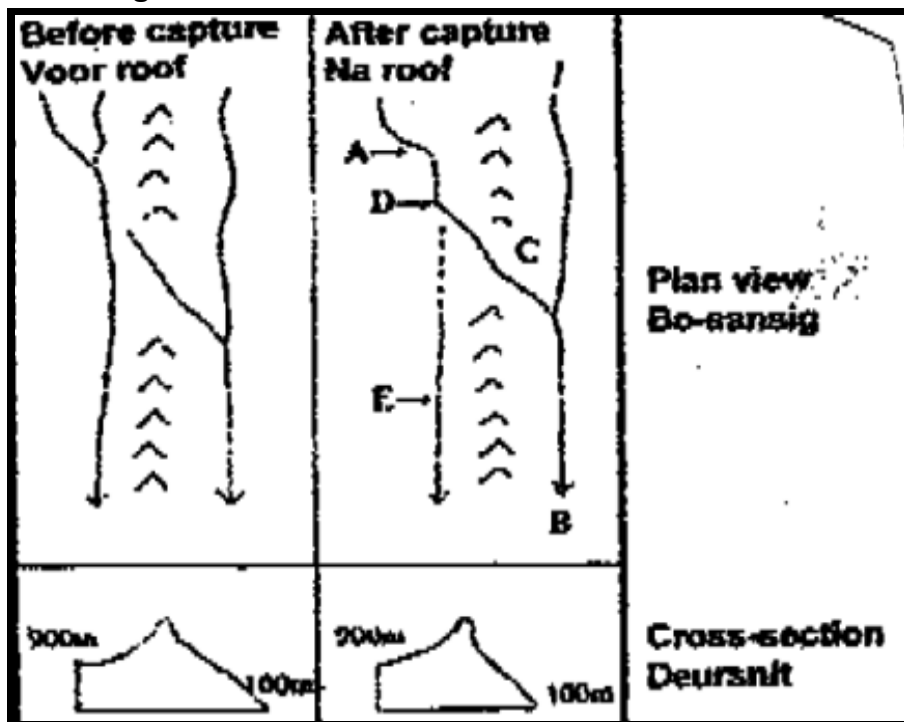
Figure 2.2

2.3.1. Identify the features of river capture/piracy labelled A, B, D and E.   (2 x 2) (4)
2.3.2. Explain the process of river capture/piracy with reference to Figure 2.2.   (3 x 2) (6)
2.3.3. Explain why flooding will occur more often in river B after river capture/piracy has taken place.   (2 x 2) (4)
2.3.4. Indicate how river capture/piracy will change the ability of river B to erode the landscape.   (1 x 2) (2)

2.4.   Surrounding the South-Western Cape to the north and east are the parallel lying Cape Fold Mountains. These mountain ranges develop a typical drainage pattern with their own unique microclimate.

2.4.1   Refer to Figure 1.1A on the following page showing the drainage pattern in the Cape Fold Mountains.

Figure 1.1 A

Impermeable/Ondeurlaatbaar
Permeable/Deurlaatbaar
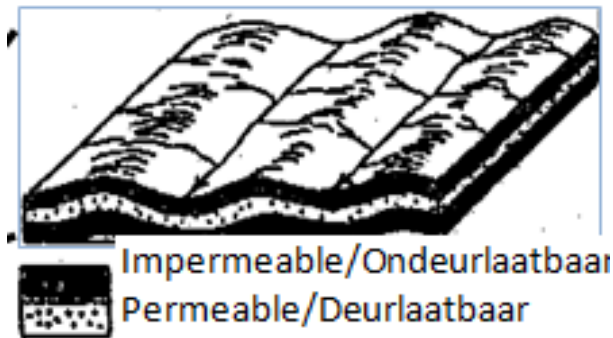
a)   Identify the drainage pattern illustrated in Figure 1.1A.   (1)
b)   Give ONE reason for your answer in Question 2.5.1.(a)   (1 x 2) (2)
c)   Explain why this drainage pattern is characteristic of the Cape Fold
         Mountains.   (2 x 2) (4)
d)   Excluding a trellis and dendritic drainage pattern, name any other pattern
               that you have studied.   (1 x 2) (2)
e)   Explain why a high run-off and low infiltration will occur in the illustrated
         landscape.   (2 x 2) (4)
f)   Name and describe any other factors that will result in a high run-off and
         low infiltration.   (2 x 2) (4)
                                                                                                    [63]

SECTION B: SOLUTIONS AND HINTS TO SECTION A

QUESTION 1

1.1.1   C ✓✓   (2)
1.1.2   B ✓✓   (2)
1.1.3   A ✓✓   (2)
1.1.4   D ✓✓   (2)
1.1.5   C ✓✓   (2)
                                                                                                    [10]

1.2.1   a)   Infiltration: movement of water through soil into the ground ✓✓

           b)   Stream discharge: quantity of water flowing in a river ✓✓

           c)   Baseflow: the flow of water entering stream channels from groundwater ✓✓

                                                                                           (3 x 2) (6)

1.2.2   Widespread soil erosion would increase surface runoff; ✓✓ there would be less vegetation (which aids infiltration) and ground would be bare favoring runoff (which in turn would increase soil erosion). ✓✓There would also be more silt in the runoff. ✓✓   (2 x 2) (4)

1.2.3   Bore holes pump water up from underground. If this removal of water increased, there would be less baseflow ✓✓ and ultimately less stream discharge. ✓✓   (2 x 2) (4)

1.2.4   A: mesa ✓
        B: butte ✓
        C: pediplain; plain; pediment ✓   (3 x 1) (3)

1.2.5   This landscape is an example of a landscape influenced by horizontal rock strata. ✓✓

        Horizontal layers of resistant cap rock (e.g. dolerite, quartzite, basalt) protected the softer layers below (e.g. sandstone); ✓✓

        These rock layers also caused landforms (e.g. mesas, buttes) to have flat tops. ✓✓

        The landscape evolved over millions of years by rivers wearing the landscape down (and back). ✓✓

        Eventually the landscape will be eroded away with perhaps only a few small remnants remaining. ✓✓   (4 x 2) (8)

1.2.6   D: beheaded river, misfit stream ✓✓
        E: wind gap/river gravels/dry gap ✓✓
        F: elbow of capture ✓✓
        G: capturing river, pirate stream, captor ✓✓   (4 x 2) (8)

1.2.7   Any three of the following:

        Softer/ less resistant rock, ✓✓
        Geological weakness (e.g. crack, joint, fault), ✓✓
        Increased precipitation, ✓✓
        Increased discharge, ✓✓
        Increased gradient, ✓✓
        Rejuvenation ✓✓   (3 x 2) (6)

1.2.8   Volta ✓   (1)

                                                                                     [40]

                                                                                     [50]

QUESTION 2

2.1.1   True ✓✓
2.1.2.   True ✓✓
2.1.3.   True ✓✓
2.1.4.   False ✓✓
2.1.5.   True ✓✓   (5 x 2) [10]

2.2.1.   Inclined ✓   (1)
2.2.2.   Homoclinal ridge ✓   (1)
2.2.3.   P – Dip slope ✓✓
           Q – Scarp slope ✓✓   (2 x 2) (4)
2.2.4.   Inclined sedimentary rock ✓✓
           With hard and soft rock which is exposed to the surface, ✓✓
           The soft rock is eroded and the hard rock remains as a low ridge called a
           dip slope, ✓✓
           The steeper slope is called the scarp slope. ✓✓   (3 x 2) (6)
2.2.5.   a)   P✓✓   (2)
           b)   P is more gradual   ✓✓   (2)
2.2.6.   Vineyards and agriculture on the gentle slopes/ ✓✓
           Contour ploughing/ ✓✓
           Steep slopes forests. ✓✓   (2 x 2) (4)
2.3.1.   A – captive / captured river / Pirated stream✓
           B – Captor river / Pirate stream✓
           D – Elbow of capture ✓
           E – Misfit river ✓   (4)

2.3.2. The energetic fist order stream erodes back into the mountain, ✓✓
       It may be weaker rock / more rain / more water in river ✓✓
       Headward erosion cuts through watershed, ✓✓
       Stream lengthens itself and catching hold of the older river on a higher
       slope. ✓✓   (3 x 2) (6)
2.3.3. It has more water in it, ✓✓
        Increased its hydrological drainage basin ✓✓   (2 x 2) (4)
2.3.4. It will increase as there is more water in it / increased volume. ✓✓   (1 x 2) (2)
2.4.1. a)   Trellis ✓   (1)
       b)   Parallel streams with short tributaries   ✓✓   (1 x 2) (2)
       c)   Formed in sedimentary rocks with band of resistant and weak rocks. ✓✓
              Main river forms in valleys, short tributaries join from the mountains. ✓✓
                                                                               (2 x 2) (4)
       d)   Rectangular, angular, deranged, radial, barbed etc. ✓✓   (1 x 2) (2)
       e)   Impermeable rock ✓✓ at the surface does not allow water to infiltrate ✓✓
              and, therefore, increases the runoff. ✓✓   (2 x 3) (6)
       f)   Sparse vegetation✓✓ – infiltration does not take place etc ✓✓
              Steep slopes ✓✓ - water runs down to fast to allow for infiltration ✓✓
              Saturated soils ✓✓ - water cannot infiltrate wet soil ✓✓
                                                [Any ONE with reason]   (1 x 2) (2)
                                                                               [61]

SECTION C: HOMEWORK

QUESTION 1:   30 minutes   40 marks   *(Source: SBA 2010)*

The hydrograph on the next page depicts the Tugela River during a storm. Refer to the hydrograph to answer the questions below.

1.1.   Define the following terms:
     (a)   Discharge   (1 x 2) (2)
     (b)   A flood   (1 x 2) (2)
     (c)   Flood Peak   (1 x 2) (2)
     (d)   Hydrograph   (1 x 2) (2)
     (e)   Velocity   (1 x 2) (2)

1.2   Provide labels for A, B, D and E respectively.   (4 x 2) (8)
   (Choose from the following: Lag time/Rising limb/Peak discharge/Base flow)

1.3   Describe the relationship between discharge and rainfall illustrated in the flow hydrograph.   (2 x 2) (4)

1.4   List THREE factors that will affect the velocity (speed) of a river.   (3 x 2) (6)

1.5   Predict what would happen to the volume of water in the river after a storm has stopped.   (1 x 2) (2)

1.6   When the lag time is long and the peak flow is low, on a hydrograph, this indicates high infiltration. Discuss the factors that result in high infiltration in a short paragraph (12 lines).   (5 x 2) (10)

                                                                          [40]
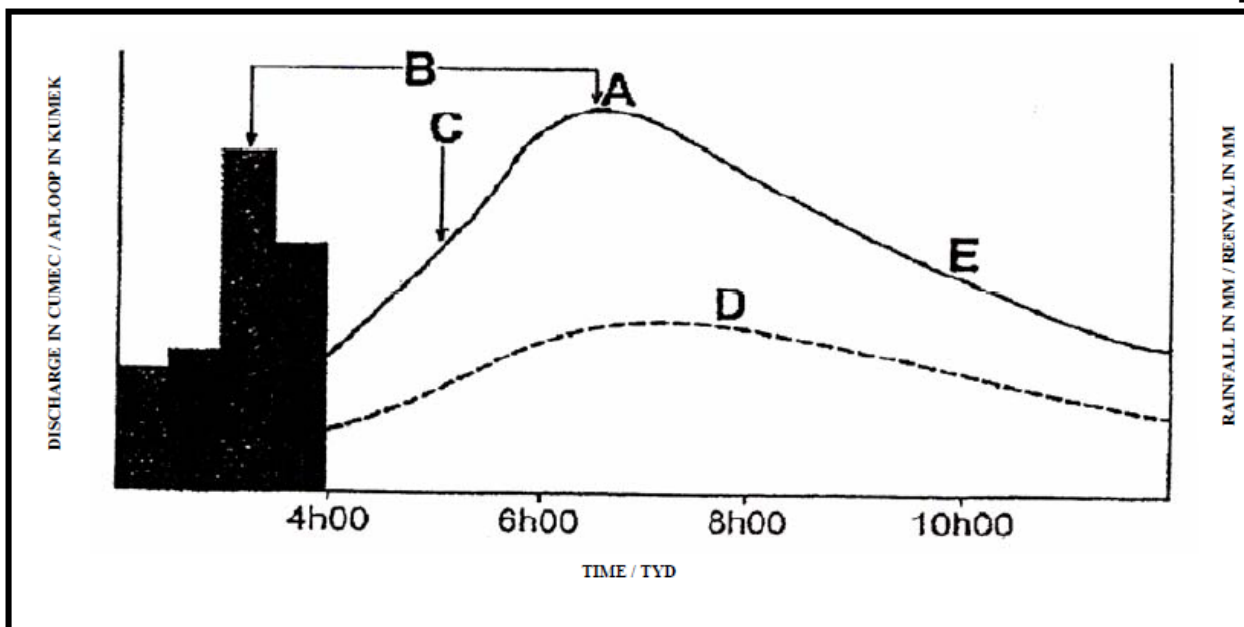
**QUESTION 2:**   **30 minutes**   **50 marks**   *(Source: Focus Exam bank)*

2.1   Various possible answers are provided for each question. Write the **letter only** of the correct answer next to the corresponding number.

2.1.1   Which factor will **not** affect the balance between erosion and deposition in a river with a graded profile?

A   A change in stream load

B   A change in climate

C   River capture

D   A drop in sea level

2.1.2   The main factors determining to which extent a river is able to deepen its course is:

(i)   Gradient

(ii) Flow

(iii) Load

(iv) Stream channel characteristics

Select the correct option.

A   (i) and (ii)

B   (iii) and (iv)

C   (i) and (iv)

D   (i), (ii), (iii) and (iv)

2.1.3   An antecedent river valley …

A   is older than the geological structure through which it carves its route.

B   has a superimposed drainage system.

C   had to carve into the underlying structure because the river valley was too deeply carved.

D   stretches across a resistant rock layer which is older than the river valley itself.

2.1.4   Features that can form as a result of rejuvenation are …

(i)   incised meanders.

(ii) valleys within valleys.

(iii) knickpoint waterfall.

(iv) river terraces.

Select the correct combination

A   (i), (ii) and (iv)

B   (ii), (iii) and (iv)

C   (i), (ii) (iii) and (iv)

D   (i), (ii) and (iii)

2.1.5. The most dominant process in the youth stage of a river is:

　A　Deposition
　B　Downward erosion
　C　Lateral erosion
　D　Weathering　　　　　　　　　　　　　　　　　　　　　　　　　(5 x 2) [10]

2.2　Study the following longitudinal river profile along the Congo River in Africa.
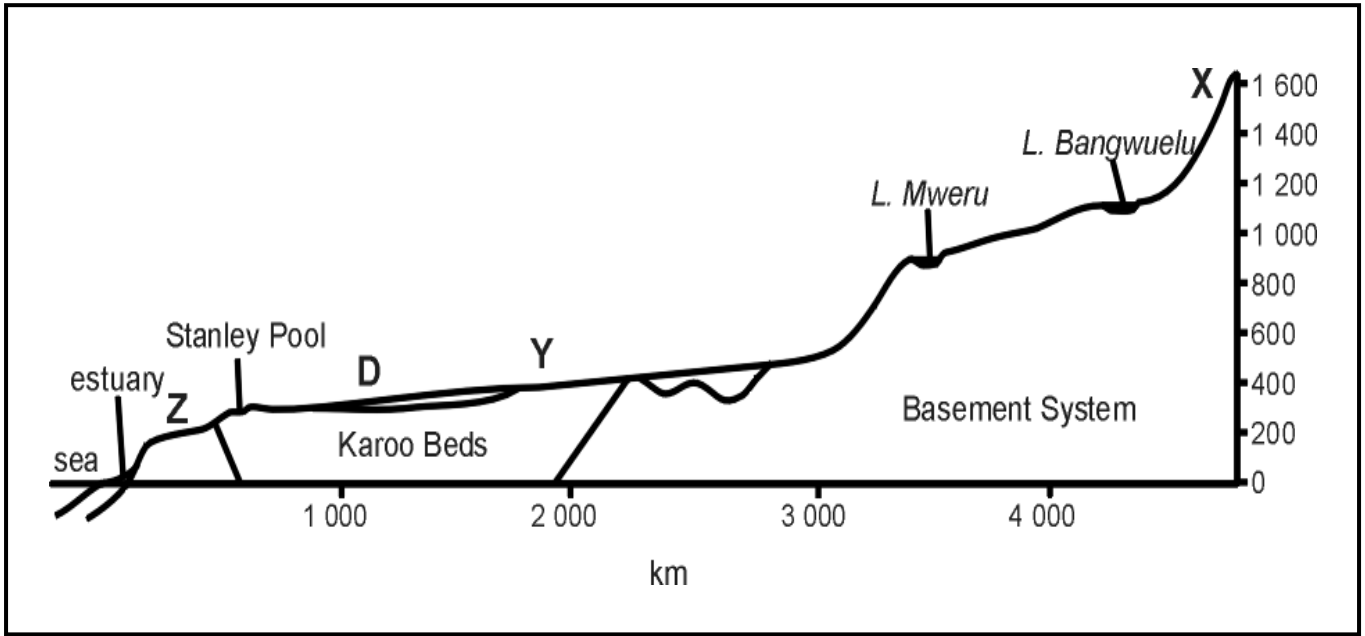
2.2.1　Copy the river profile onto your answer book and on it indicate:

　a) One temporary base level　　　　　　　　　　　　　　　　　(1 x 2) (2)
　b) One knick point　　　　　　　　　　　　　　　　　　　　　(1 x 2) (2)
　c) Permanent base level　　　　　　　　　　　　　　　　　　　(1 x 2) (2)

2.2.2　Copy and complete the following table to compare the characteristics of the Congo River at point X and Y:

Fluvial characteristics	Point X	Point Y
Stream width		
Stream load		
Stream volume		
Stream velocity		
Type of stream flow		

(10 x 1)(10)

2.2.3　Does the longitudinal river profile of the Congo River show a graded river profile? Support your answer with evidence from the longitudinal river profile.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(3 x 2) (6)

2.2.4　River braiding occurs at point Z. Using an annotated sketch (drawing with labels), demonstrate how such features form.　　　　　　　　　(4 x 2)(8)

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2.2.5   A dam is being constructed across the Congo River at point D. Write a
         report for the Minister of Water Affairs in which you:

         Outline the fluvial changes in the river both upstream and downstream of
         the dam wall, **and** list the benefits of the dam.   (5 x 2)(10)
                                                                              [50]

SECTION D: SOLUTIONS TO HOMEWORK
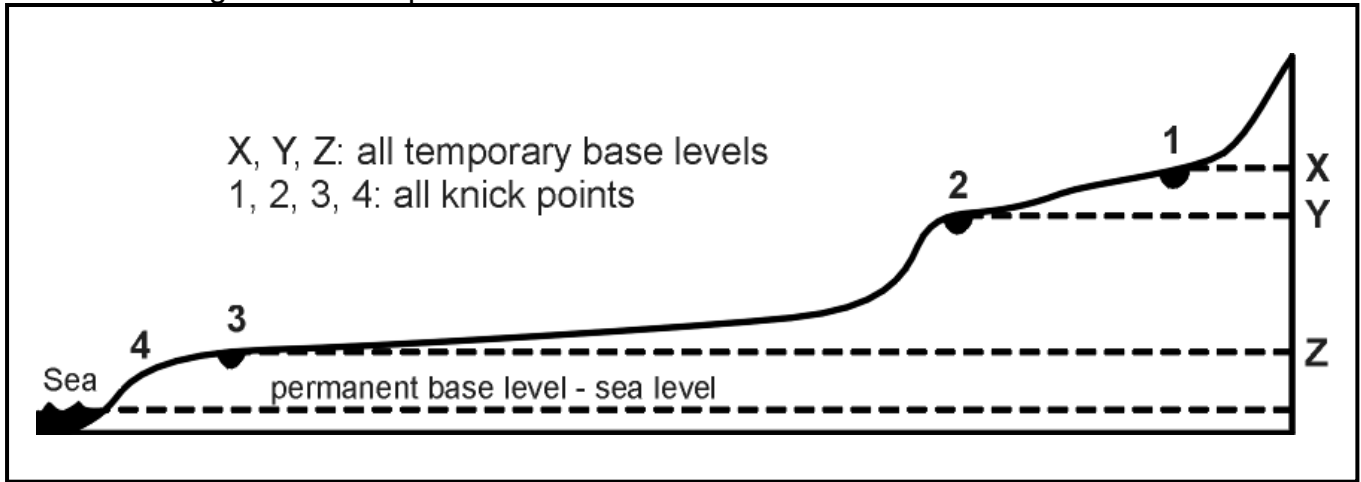

QUESTION 1

1.1   (a)   Discharge – the volume of water in a river passing at any given point
              in a certain time – measured in cumecs. ✓✓   [Concept]   (1 x 2) (2)
       (b)   Flood - when peak discharge exceeds channel capacity/More rainfall
              than the average for the area for a few consecutive years ✓✓
                                                                  [Concept]   (1 x 2) (2)
       (c)   Flood peak – the greatest volume in a river, after rain.   [Concept   (1 x 2) (2)
       (d)   Hydrograph – graph showing the discharge of a river. ✓✓
                                                                  [Concept]   (1 x 2) (2)
       (e)   Velocity – speed of a river in a certain direction. ✓✓   [Concept]   (1 x 2) (2)

1.2   A – Peak discharge ✓✓
       B – Lag time ✓✓
       C – Rising limb ✓✓
       D – Base flow ✓✓   (4 x 2) (8)

1.3   The discharge increases as the amount of rainfall increases ✓✓ – as rainfall
       decreases so does the discharge decrease✓✓   (2 x 2) (4)
1.4   Gradient/steep slopes – faster flow ✓✓
       Volume of water – lots of water flow faster ✓✓
       Shape of river channel – straight will have faster flow ✓✓
       Roughness of river channel – laminar flow is faster✓✓
       Non-porous rocks – faster flow ✓✓   [Accept ANY three]   (3 x 2) (6)

1.5   The volume would gradually decrease ✓✓   (1 x 2) (2)

1.6   If the gradient of slopes is gentle, the water will run off slower and infiltrate
       more ✓✓
       Vegetation cover traps and slows run off down – therefore, more infiltration ✓✓
       Permeable surfaces will allow water to infiltrate – therefore, less run off ✓✓
       Porous soil allows water to pass through – therefore, more infiltration ✓✓
       If there is little water in the soil, more infiltration will take place ✓✓
       Gentle, soaking rain leads to more infiltration ✓✓
       Gentle slopes will allow for more infiltration ✓✓   [Any FIVE factors] (5 x 2) [10]
                                                                                      [40]

QUESTION 2

2.1.1   A ✓✓   (2)
2.1.2   D ✓✓   (2)
2.1.3   A ✓✓   (2)
2.1.4   C ✓✓   (2)
2.1.5   B ✓✓   (2)
                                                                        [10]

2.2.1   Longitudinal river profile

X, Y, Z: all temporary base levels
1, 2, 3, 4: all knick points

permanent base level - sea level

- One temporary base level / waterfall/dam/ rapid / lake ✓✓   (1 x 2) (2)
- One knick point / waterfall/dam/ rapid / lake ✓✓   (1 x 2) (2)
- Permanent base level – sea level ✓✓   (1 x 2) (2)

2.2.2

| Fluvial characteristics	Point X	Point Y
Stream width	Narrow, 'V' shape, steep sides ✓	More open 'U' shape, gentle sides ✓
Stream load	Large boulders, stones, large-grained sand, mixed ✓	Fine silt (dissolved and in suspension) ✓
Stream volume	Less water ✓	Far greater discharge ✓
Stream velocity	Quite fast ✓	Greatest velocity ✓
Type of stream flow	Predominantly turbulent ✓	Mainly laminar ✓

(10 x 1) (10)

2.2.3   No, profile is ungraded ✓✓ – there are several 'obstructions' in the
profile (e.g. Lake Mweru, Lake Bangwuelu, Stanley Pool) , ✓✓
knickpoints present (just below Lake Mweru). A graded profile is
perfectly smooth and concave. ✓✓   (3 x 2) (6)

2.2.4   River braiding   (4 x 2) (8)
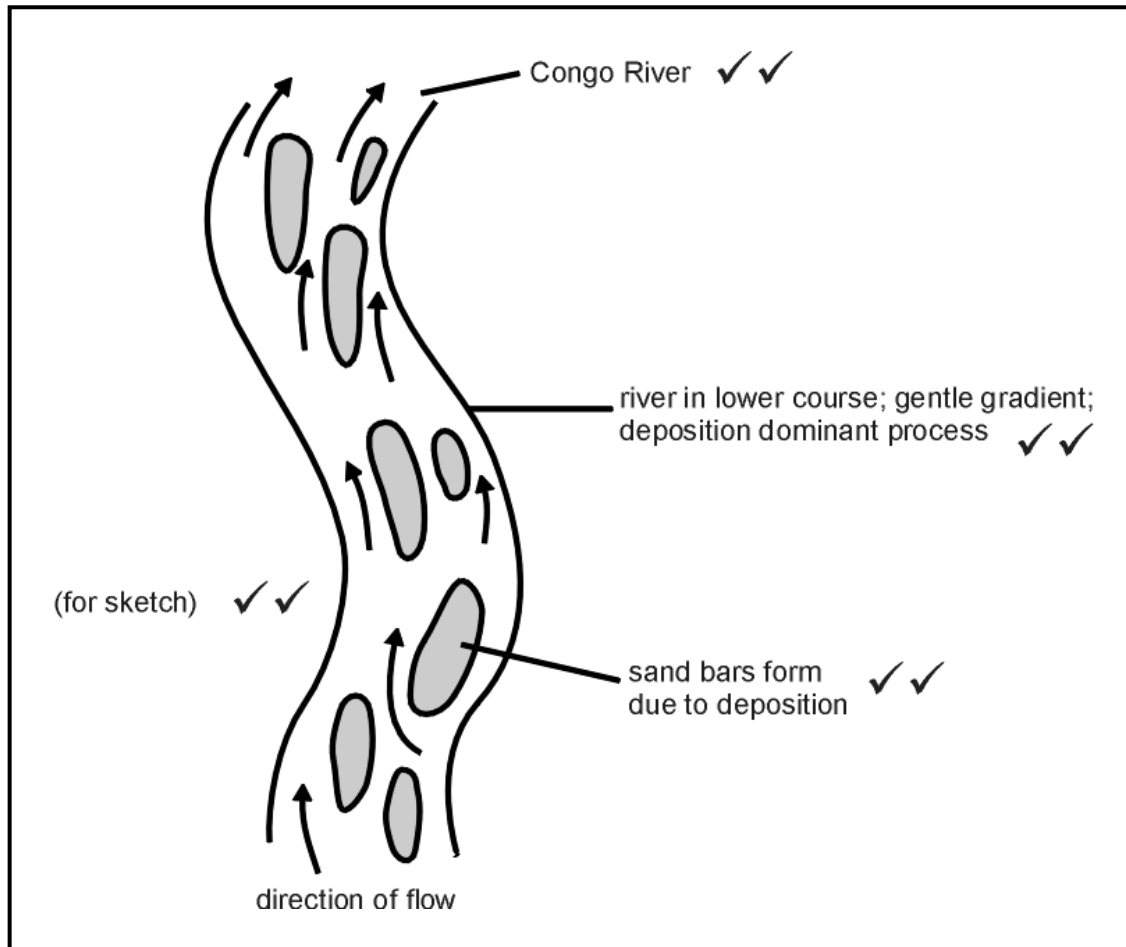
2.2.5   **Written in the form of a report for the Minister of Water Affairs:**

- **Fluvial changes upstream:** river velocity will be 'checked' (halted/impeded) and the dam will deposit load, silt will build up behind dam wall, water will build up behind dam wall, and river width and depth will increase ✓✓ ✓✓ ✓✓

- **Fluvial changes downstream:** dam could force river to run dry – river could cease to exist; when water released from dam (or during flood) river will be rejuvenated – velocity will increase, more erosion ✓✓ ✓✓ ✓✓

- **Benefits of dam:** irrigation for farmers, water for domestic/industrial use, recreation (tourism – fishing, sailing, boating, water skiing, etc. – good income earner), possible energy source (hydro-electricity)✓✓ ✓✓ ✓✓   (5 x 2) (10)

[50]

SESSION 9

TOPIC: CLIMATOLOGY, GEOMORPHOLOGY AND MAPWORK CONSOLIDATION EXERCISES

SECTION A: TYPICAL EXAM QUESTIONS

QUESTION 1:   30 minutes   50 marks   *(Various class notes and past papers)*

1.1   Various possible answers are provided for each question. Write the **letter only** of the correct answer next to the corresponding number .

1.1.1   The movement of air towards a low pressure is called:
    A   Divergence
    B   Adiabatic
    C   Anabatic
    D   Convergence

1.1.2   The atmospheric cell found on either side of the equator is the:
    A   Ferrel Cell
    B   Mid-latitude Cell
    C   Tropical cyclone
    D   Hadley Cell

1.1.3   The ITCZ is the convergence of:
    A   Polar Easterlies
    B   Westerlies
    C   Tropical Westerlies
    D   Tropical Easterlies

1.1.4   Winds that converge at the polar front are:
   A   Westerlies and tropical easterlies
    B   Polar easterlies and westerlies
    C   Polar westerlies
    D   Polar easterlies and tropical westerlies

1.1.5   The anticlockwise change in direction of wind with the passing of a mid-latitude cyclone over Cape Town is called:
    A   Backing
   B   Veering
    C   Converging
    D   Rotating   (5 x 2) (10)

1.2   Study the accompanying synoptic weather map and answer the questions that follow:
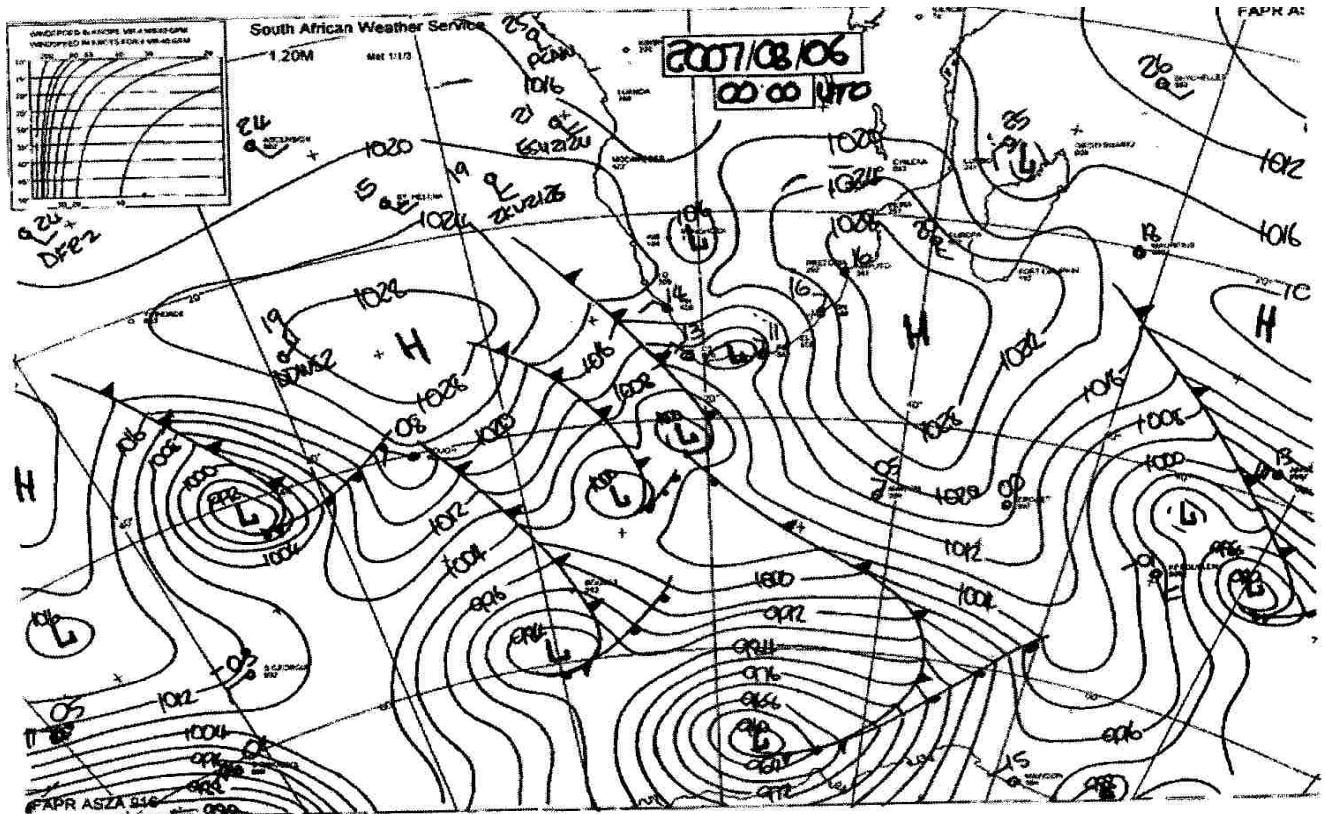
1.2.1	Suggest the season giving two reasons for your answer.	(3 x 2) (6)
1.2.2	Estimate the pressure over Cape Town.	(1 x 2) (2)
1.2.3	Describe the wind over Cape Town and give a full account or explanation.	(4 x 2) (8)
1.2.4	How will the weather over Cape Town change in the next 12 hours?	(3 x 2) (6)
1.2.5	To the west of South Africa are a series of cold fronts. What do we call a series of frontal depressions?	(1 x 2) (2)

1.3   The following diagram shows the passage of a hurricane in the Carribean Sea.
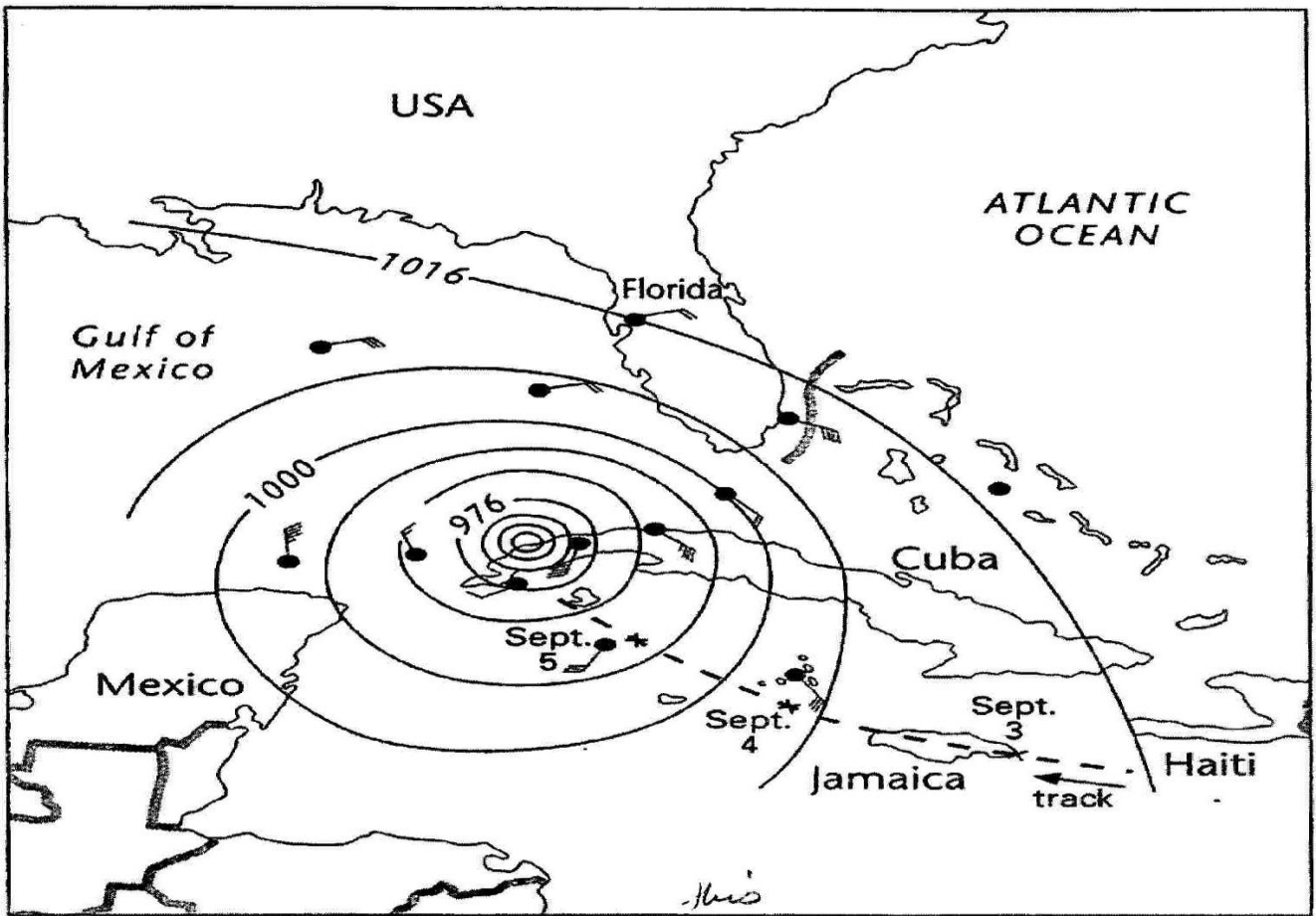
1.3.1 In which hemisphere can this hurricane be found?   (1 x 2) (2)

1.3.2 What is the difference between a tropical storm and a tropical
       cyclone?   (1 x 2) (2)

1.3.3 Describe and account for the path taken by the hurricane.   (4 x 2) (8)

1.3.4 Predict, giving reasons, the course the hurricane will probably take
       over the next few days.   (2 x 2) (4)
   [50]

QUESTION 2:   **40 minutes 50 marks**   *(Various class notes and past papers)*

2.1   Choose a description from COLUMN B that matches an item in COLUMN A.
   Write only the letter (A-L) next to the question number (2.1.1 – 2.1.5).

COLUMN A	COLUMN B
2.1.1 Abstraction	A the cold front merges with the warm front and the warm sector is lifted off the ground
2.1.2 Captured river	B the erosion of a slope at a constant angle
2.1.3 Scarp retreat	C air that moves up a slope during the day
2.1.4 Soil creep	D the very slow downward movement of soil under the influence of gravity
2.1.5 Base level of erosion	E the lowest level to which a river will erode
	F the lengthening of a river course by the river cutting backwards towards its source
	G the inward horizontal flow of air towards its source
	H the tendency of air moving across the rotating surface of the earth to be deflected
	I warm, dry winds that flow down the escarpment
	J a river that is diverted and loses water
	K a watershed is cut back and lowered by highly erosive rivers
	L air that is warmer than its environment will continue to rise

(5 x 2) (10)

2.2   Figure A below shows the longitudinal profile of a stream before rejuvenation has taken place. Figure B shows the longitudinal profile of the same stream after rejuvenation has taken place.
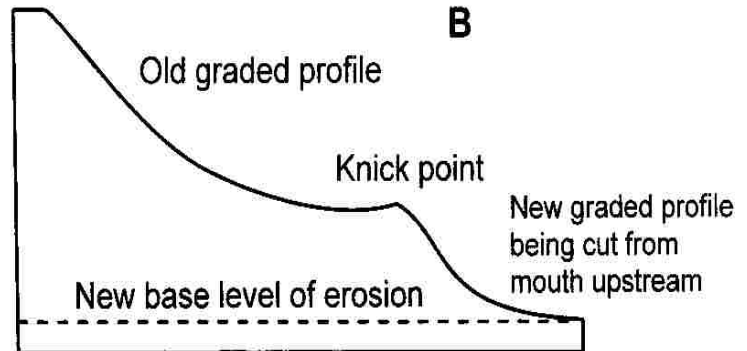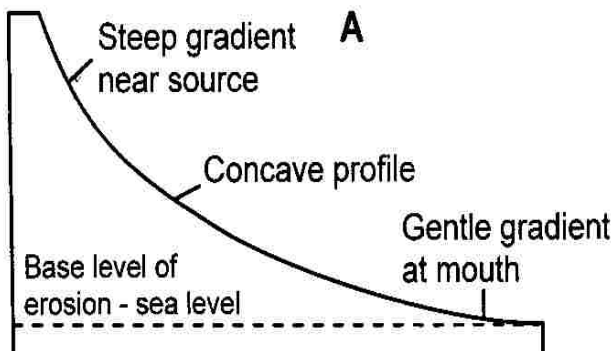
2.2.1. The longitudinal profile illustrated in Figure A is that of a graded stream. What is meant by a *graded stream?* (1 x 2) (2)

2.2.2 With reference to figure A, give ONE piece of evidence to support the Statement that the longitudinal profile of a graded stream is being illustrated. (1 x 2) (2)

2.2.3 Explain why a graded stream develops a concave longitudinal profile. (2 x 2) (4)

2.2.4 What is meant by the term *rejuvenation*? (1 x 2) (2)

2.2.5 What feature in figure B indicates that rejuvenation has taken place? (1 x 2) (2)

2.2.6 Give TWO reasons why a stream can rejuvenate itself. (2 x 2) (4)

2.2.7 Is the knick point waterfall shown in figure B an example of a permanent or a temporary base level of erosion? (1 x 2) (2)

2.2.8 Give a reason for your answer to Question 2.2.7. (1 x 2) (2)

2.3 Study the following sketch map of the Zambezi River Basin. Answer all the questions that follow.
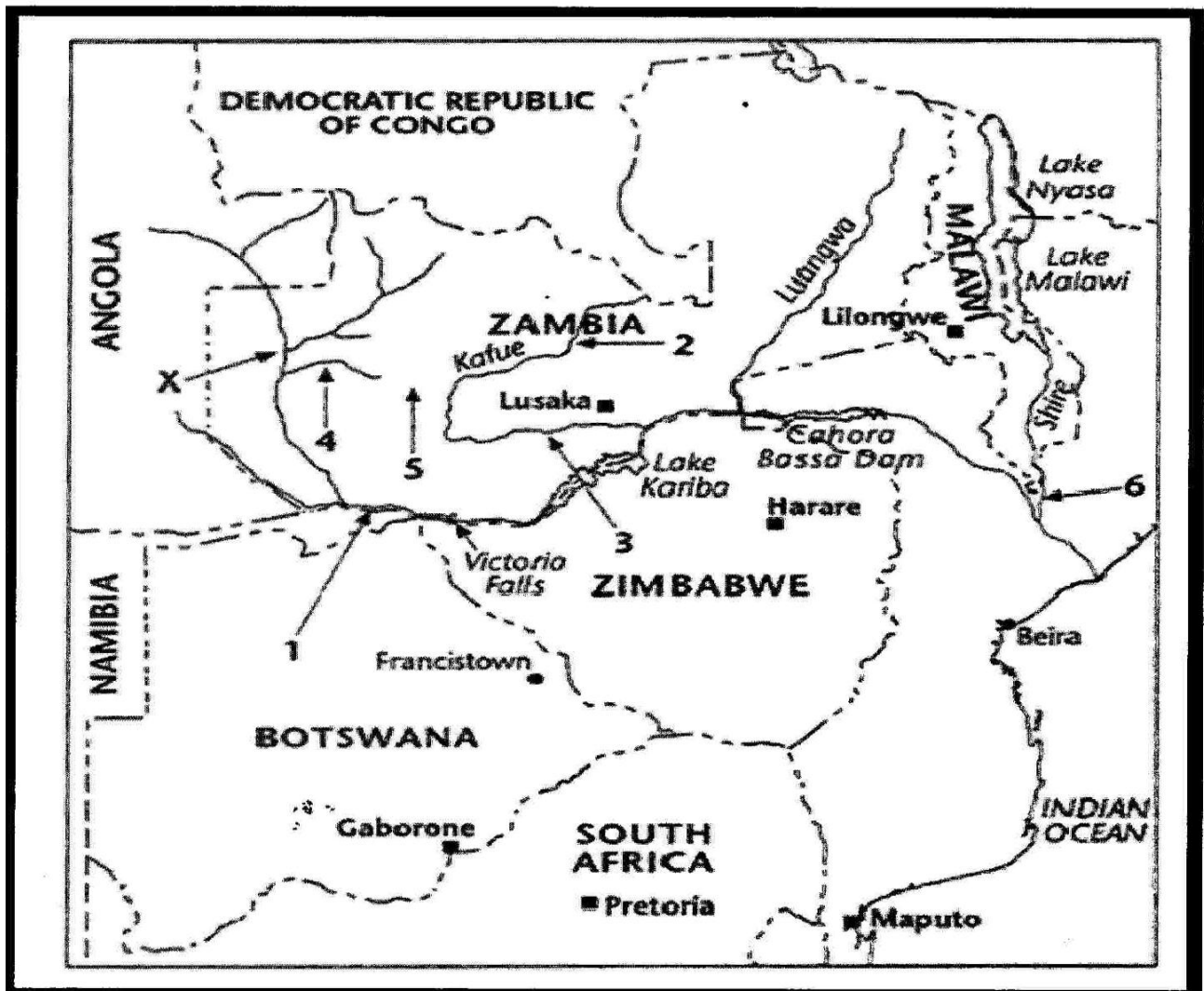
2.3.1 What is the probable underlying geology of this area?   (1 x 2) (2)
2.3.2 Name TWO different types of temporary base levels found on this map. (2 x 2) (4)
2.3.3 Draw labelled sketch cross profiles to contrast the shape of the valley:
       (a) Upstream of the Victoria Falls   (1 x 2) (2)
       (b) Downstream of the Victoria Falls   (1 x 2) (2)
2.3.4 What is the stream order up to the point marked 1.   (1 x 2) (2)
2.3.5 Name the features at numbers 2, 3, 4 and 5 that are characteristic of
       stream capture.   (4 x 2) (8)
                                                                            [50]

QUESTION 3:   **20 minutes**   **17 marks**   *(Various class notes and past papers)*

Carefully study the 1:50 000 topographical map extract 2829AC Harrismith and the
accompanying 1:10 000 othophoto extract 2829AC 3 Harrismith

3.1   What is the latitude of spot height •2281 in H2?   (1)
3.2   State if it is possible (under normal conditions), for a person standing at
        spot height •1747 (E3) to see the cemetery on Wessdoll farm (C4). Give a
        reason for your answer.   (2)
3.3   What is the approximate area of the outlined part of the orthophoto map
        Marked B? (in square meters).   (1)
3.4   A person walks in a straight line from spot height •1786 (G4) to
        trigonometrical station (trig beacon) Δ298 (H3).
3.4.1   Along what type of slope is the person walking?   (1)
3.4.2   What is the bearing a person would follow when walking in a straight line
        from spot height •1786 (G4) to trigonometrical station Δ298 (H3)?   (1)
3.4.3   What is the gradient of the person's walk?   (3)
3.4.4   If a person walks in a straight line (from •1786 to Δ298) at an average
        speed of 2km per hour, approximately how long will the walk take?   (1)

3.5   Study the unnamed river that rises on Platberg at D (H1) to where it leaves
        the map. Also study the Nuwejaarspruit from E (A4) to F (A2). Compare
        the fluvial characteristics of these rivers and the valleys in which they flow.
        Tabulate your answer.   (4)

3.6   Which map projection is usually associated with large-scale topographical
        maps?   (1)
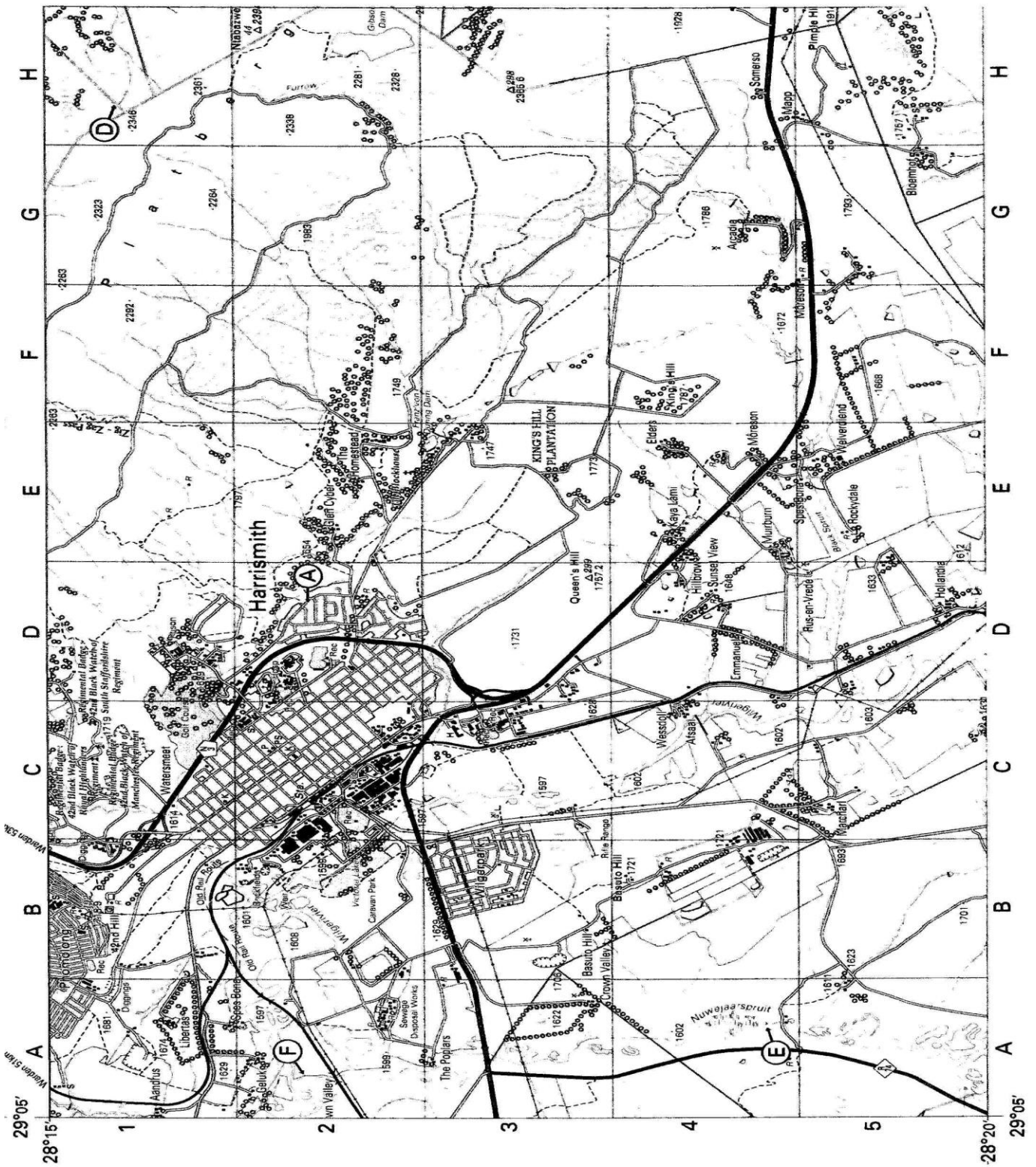3.7   What makes spatial data different from other data? Elaborate.   (2)
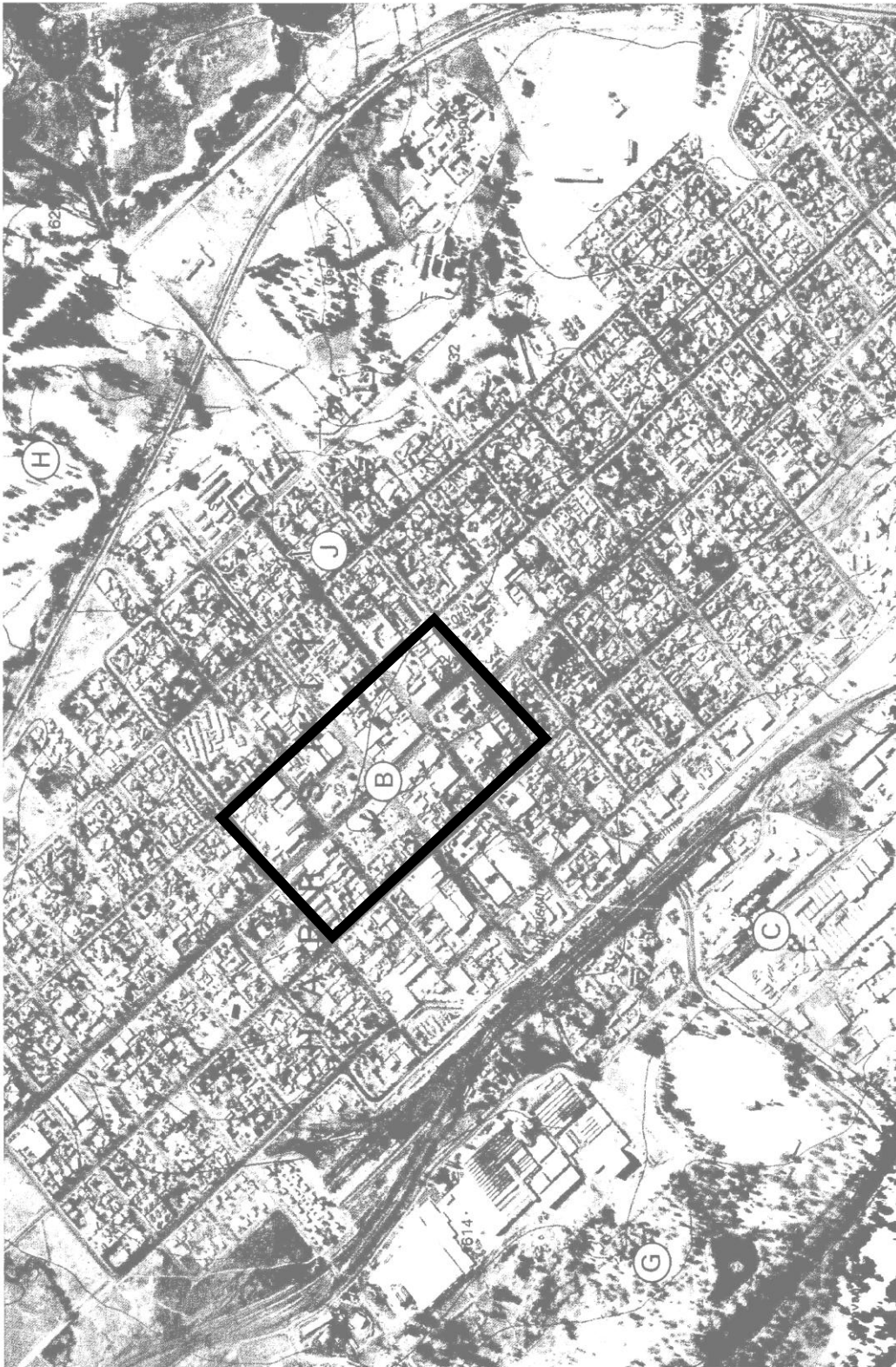   [17]

Plate 1

1 : 50 000 topographical HARRISMITH

24

Plate 2   1 : 10 000 orthophoto HARRISMIT-

SECTION B: SOLUTIONS AND HINTS TO SECTION A

QUESTION 1

1

1.1.1 D√√

1.1.2 D√√

1.1.3 D√√

1.1.4 B√√

1.1.5 A√√   (5 x 2) (10)

1.2

1.2.1 Winter√√

       Date√√

       Cold front far north√√

       OR

       (Low temperatures√√)   (Any 2 reasons)   (3 x 2) (6)

1.2.2 1010mb/hPa√√   (1 x 2) (2)

1.2.3 NW√√

       15 knots√√

       Clockwise rotation around LP√√

       Geostrophic wind√√   (4 x 2) (8)

1.2.4 Winds will veer to South West√√

       Rain will occur√√

       Temperature will drop√√   (3 x 2) (6)

1.2.5 Family(ies) √√   (1 x 2) (2)

1.3

1.3.1 Northern hemisphere√√   (1 x 2) (2)

1.3.2 A storm is mild and can lead to the development of a
       cyclone√√   (1 x 2) (2)

1.3.3 It moved from east to west √√and away from the equator√√

       Tropical easterlies drove it√√

       Centrifugal force pushed it away from the equator√√   (4 x 2) (8)

1.3.4 It will move northwards and if it reaches the westerlies√√ it will move
       eastwards causing it to dissipate√√   (2 x 2) (4)

                                                                            [50]

QUESTION 2

2.1

2.1.1 K√√

2.1.2 J√√

2.1.3 B√√

2.1.4 D√√

2.1.5 E√√   (5 x 2) (10)

2.2

2.2.1 When an equilibrium / balance has been reached between erosion
and deposition in the stream√√   (1 x 2) (2)

2.2.2 Smooth, concave longitudinal profile√√
OR
Longitudinal profile steep in upper reaches and gradual in lower reaches
(Any ONE)   (1 x 2) (2)

2.2.3 Needs more energy to overcome high friction index in upper reaches
and to transport large stream load particles√√
Needs less energy to overcome low friction index in lower reaches and
to transport small stream load particles√√   (2 x 2) (4)

2.2.4 Stream gains energy and starts to erode downwards into the
landscape (concept) √√   (1 x 2) (2)

2.2.5 Knickpoint waterfall√√   (1 x 2) (2)

2.2.6 (Any TWO)
- Increased precipitation√√
- Increase in volume of water√√
- Stream capture√√
- Reduction in vegetation increases run-off√√
- Drop in sea-level√√
- Isostic uplift of land√√   (2 x 2) (4)

2.2.7 Temporary√√   (1 x 2) (2)

2.2.8 In time the waterfall will be eroded away√√   (1 x 2) (2)

2.3

2.3.1 Uniformly resistant rock probably horizontal sedimentary rock√√   (1 x 2) (2)

2.3.2 (Any TWO)
Lake Kariba√√ , Victoria Falls√√, or dam   (2 x 2) (4)

2.3.3 (a)

Open V √√   (1 x 2) (2)

(b)

Closed V √√   (1 x 2) (2)

2.3.4 3√√   (1 x 2) (2)

2.3.5 2 = captured stream√√
3 = elbow of capture√√
4 = Misfit stream√√
5 = river gravels or wind gap√√   (4 x 2) (8)

[50]

QUESTION 3

3.1   28º16'40"S √   (1)

3.2   No √ Intervening high ground (Queens Hill) √   (2)

3.3   5,1 cm x 3,1 cm
       (5,1 x 100) x (3,1 x 100)
       510m x 310m
       158 100m²√   (1)

3.4

3.4.1 Concave slope√   (1)

3.4.2 41º√   (1)

3.4.3 Gradient = $\dfrac{VI}{HE}$

       $= \dfrac{2365,5 - 1786}{4,6cm}$ √

       $= \dfrac{579,5}{4,6 \times 500}$

       $= \dfrac{579,5}{2300}$

       $= \dfrac{579,5 \div 579,5}{2300 \div 579,5}$ √

       $= \dfrac{1}{3,968}$

       = 1: 3,968 √   (3)

3.4.4 2 hours 15 minutes √   (1)
       (4,6cm x500
       2300m
       Walks at 2km per hour
       2000m an hour
       300m ÷ 2000 takes 15 minutes
       2 hr 15 min)

3.5   (Any FOUR) √√√√   (4)

Unnamed river	Nuwejaarspruit
Concave longitudinal profile	Flat longitudinal profile
Flows down steep gradient	Flows down gentle gradient
Upper course	Lower/middle course
No flood plain	Wide flood plain
Has no ox-bow lakes	Has ox-bow lakes
Slower flowing	Faster flowing
Turbulent flow	Laminar flow

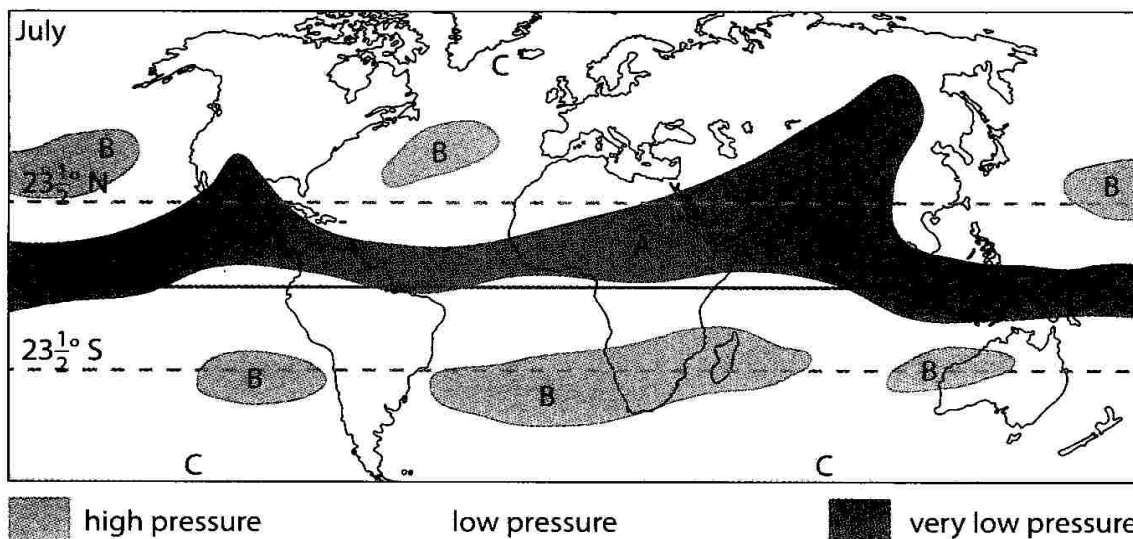3.6   Transverse Mercator projection√   (1)

3.7   They store location in some way√
       (Any ONE)
- As coordinates√
- As addresses√
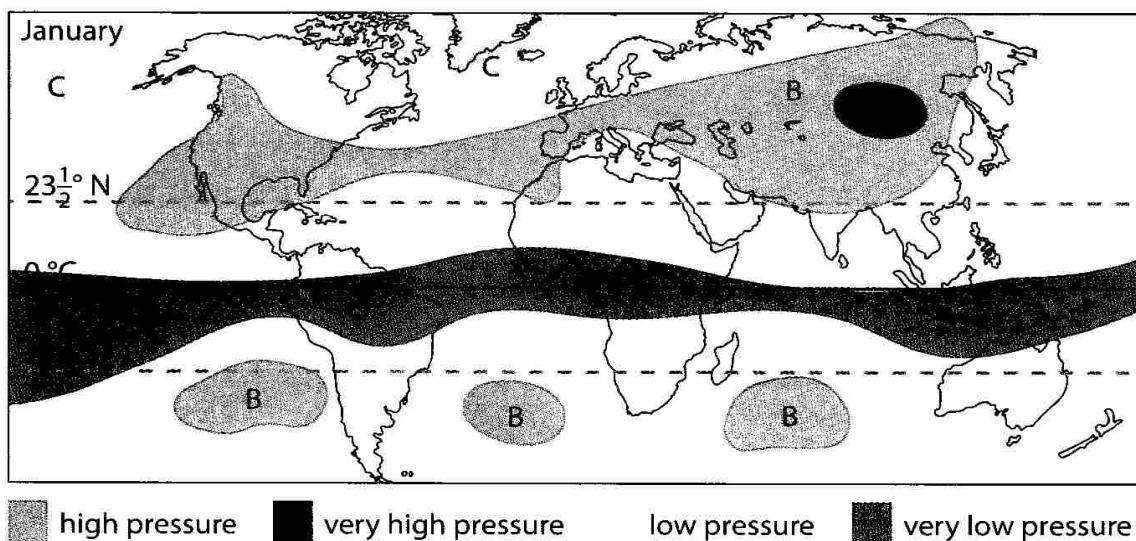- As place names√   (2)

[17]

SECTION C: HOMEWORK

QUESTION 1:   **30 minutes**   **40 marks**   *(Source: Previous NCS papers adapted)*

1.1   Study the maps of the pressure systems in July and January below before
       answering the questions that follow.

Pressure systems in July


Pressure systems in January

1.1.1 Name pressure belts A, B and C respectively.   (3 x 1) (3)

1.1.2 What can be noticed with regard to the position of pressure belt A in
       July and its position in January?   (1 x 2) (2)

1.1.3 Why does this pressure belt take up these positions?   (1 x 2) (2)

1.1.4 Why does this pressure belt extend particularly far north over North America
       and Asia in July?   (1 x 2) (2)

1.1.5 What has replaced this pressure belt in Asia in January?   (1)

1.1.6 Why does this occur?   (1 x 2) (2)

1.1.7 Why does pressure B consist of three cells over the ocean in the southern
       hemisphere in January?   (1 x 2) (2)

1.1.8 What name is given to the latitudes influenced by pressure belt B?   (1)
                                                                                    [15]

1.2   Look at the satellite image below and then answer the questions that follow.
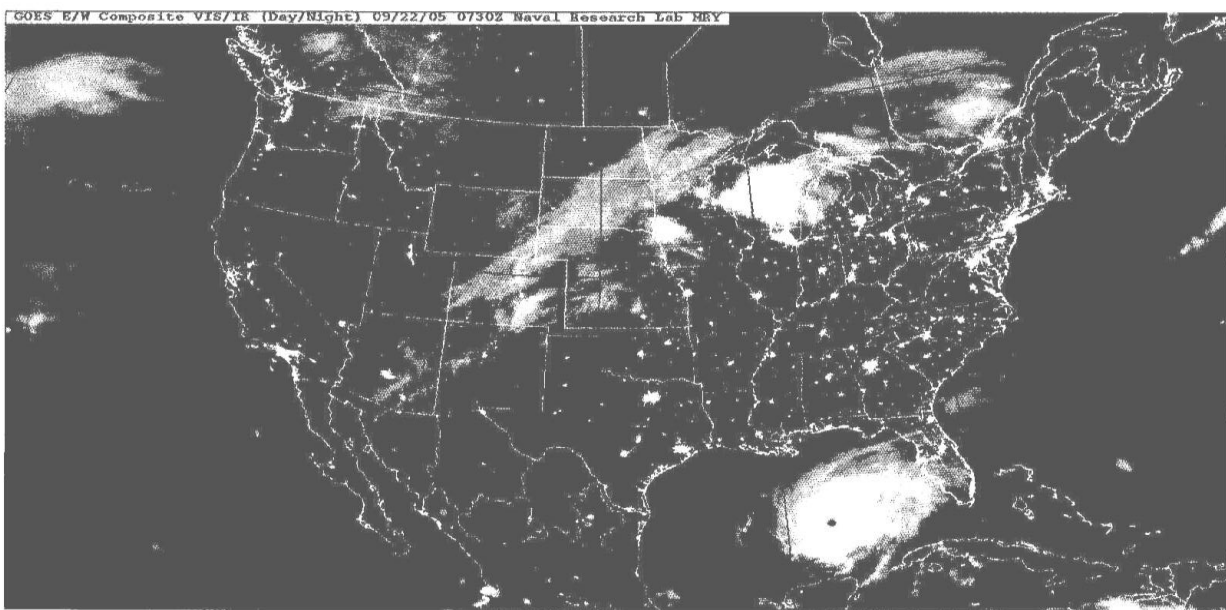
Satellite image showing Hurricane Katrina moving towards New Orleans: 29 August 2005

1.2.1 How many hurricanes had occurred prior to Hurricane Katrina in this hurricane
       season? Motivate your answer.   (2 x 1) (2)

1.2.2 How does this satellite image show that New Orleans is in the Northern
       Hemisphere?   (1 x 2) (2)

1.2.3 Describe and give reasons for the weather conditions in the eye of the
       hurricane.   (4 x 1) (4)

1.2.4 State the direction from which the hurricane came, and predict the direction
       in which it will move within the next 12 hours.   (2 x 1) (2)

1.2.5 Explain why the hurricane will dissipate as it moves over the land.   (5)
                                                                                    [15]

1.3   Study the contour sketch and illustrations below and answer the questions
        that follow.
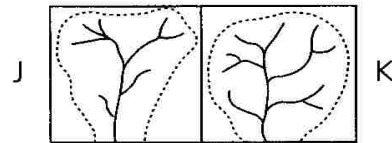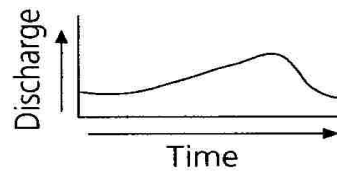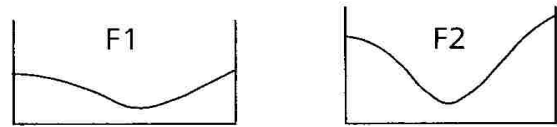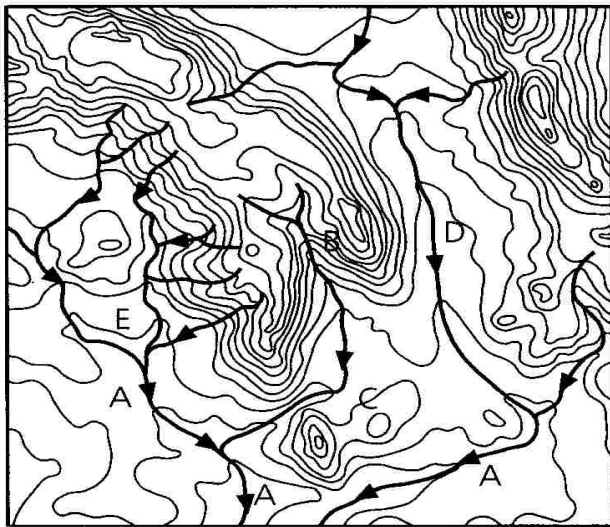
1.3.1   How many major drainage basins are present on the map?   (1 x 2) (2)
1.3.2   Briefly explain how you would determine the drainage density of one
        of the drainage basins.   (1 x 2) (2)
1.3.3   Which one of the cross-profiles, F1 and F2, would you expect to find at
        B? Give two reasons for your answer.   (1+1 x 2) (3)
1.3.4   What type of drainage pattern would you expect to find at C?
        Give one reason for your answer.   (1+1 x 2) (3)
                                                                         [10]

QUESTION 2:   30 minutes 50 marks   *(Source: Previous NCS papers adapted)*

2.1   The diagram below is a cross-section through the ITCZ in June at Kano in
        West Africa
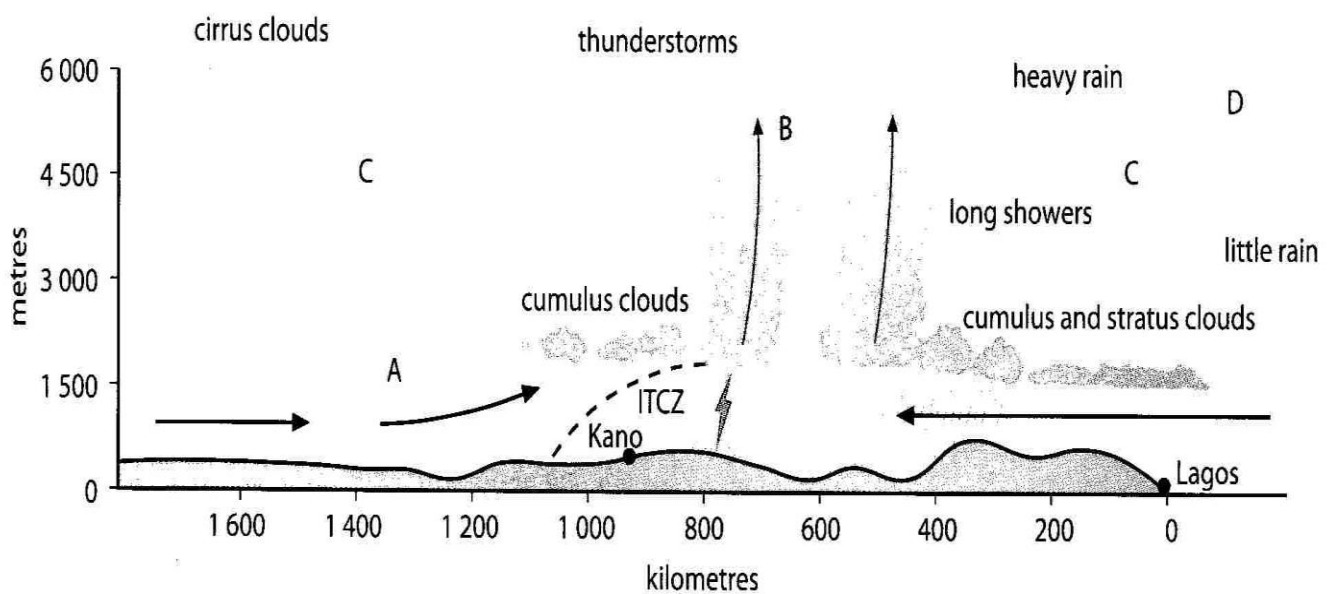
2.1.1   What does ITCZ stand for?   (1)
2.1.2   Why is the rising of air so strong at the ITCZ?   (1 x 2) (2)
2.1.3   Identify the winds at A.   (1)
2.1.4   Identify the type of clouds at B.   (1)
2.1.5   Which three-dimensional primary cell is found at C?   (1)
2.1.6   Does Kano lie in the northern or southern hemisphere?
        Motivate your answer.   (2 x 1) (2)
2.1.7   Why is there 'little rain'at D?   (1 x 2) (2)
                                                                                      [10]

2.2   Study the synoptic chart below and then answer the questions that follow.
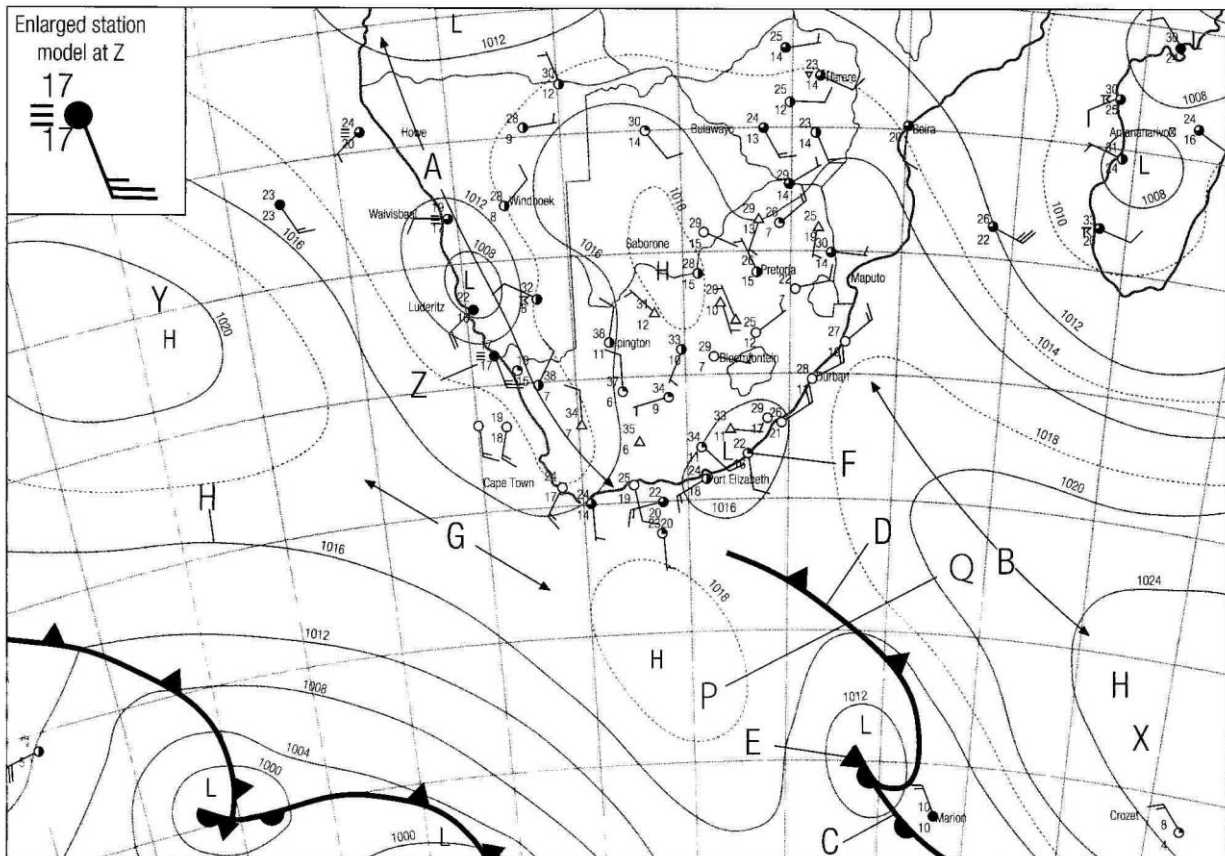
2.2.1   Give the correct synoptic terms for the features labelled A to H respectively.
                                                                              (8 x ½) (4)
2.2.2   Name the two high-pressure cells labelled X and Y respectively.   (2 x 1) (2)
2.2.3   To which pressure belt do X and Y belong?   (1)
2.2.4   Describe all air movement and weather associated with the cells of pressure
        named in the previous question.   2 x 2) (4)
2.2.5   Use the station model to describe the weather at station Z.   (6 x ½) (3)
2.2.6   What two factors shown on this synoptic chart indicate that this is a summer
        chart?   (2 x 1) (2)
2.2.7   C, D and E are part of a larger synoptic feature. Identify this feature and, giving
        a reason, predict the direction in which it will move.   (3)
2.2.8   Draw a sketch cross-section from P to Q to show the weather that is associated
        with feature D.   (5)
                                                                                      [24]

2.3   Study the longitudinal profile from west to south-east of the Congo River, found below. The Congo River is a perennial river. Answer the questions that follow.
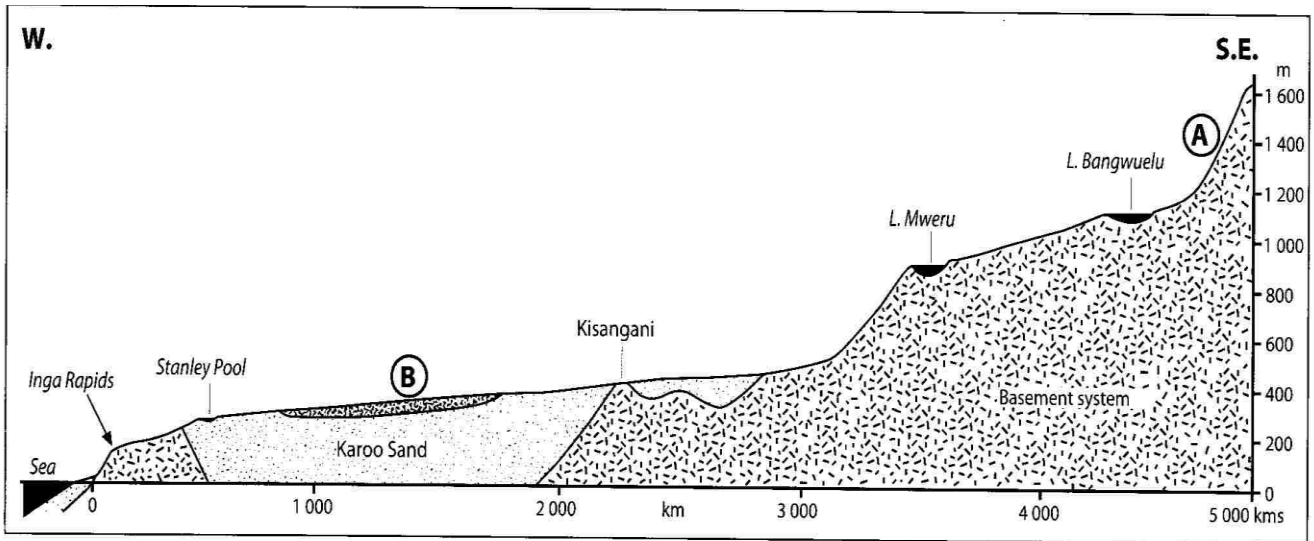
The longitudinal profile of the Congo River

2.3.1 With reference to the profile, define (a) longitudinal profile and (b) local base level.   (2 x 1) (2)
2.3.2 Compare and contrast the type of river flow that you would expect at A and B along the profile.   (2 x 2) (4)
2.3.3 The Inga Rapids are the site of a planned hydroelectric power scheme. Give two advantages of this site for such a scheme.   (2 x 1) (2)
2.3.4 Imagine a drop in sea level by 200 meters. Draw the new longitudinal river profile of the Congo River to show this, and clearly label the features that would probably result.   (4)
                                                                                                [12]

2.4   The illustration below shows a cross-section through a structural landscape. Study it and then answer the questions that follow.
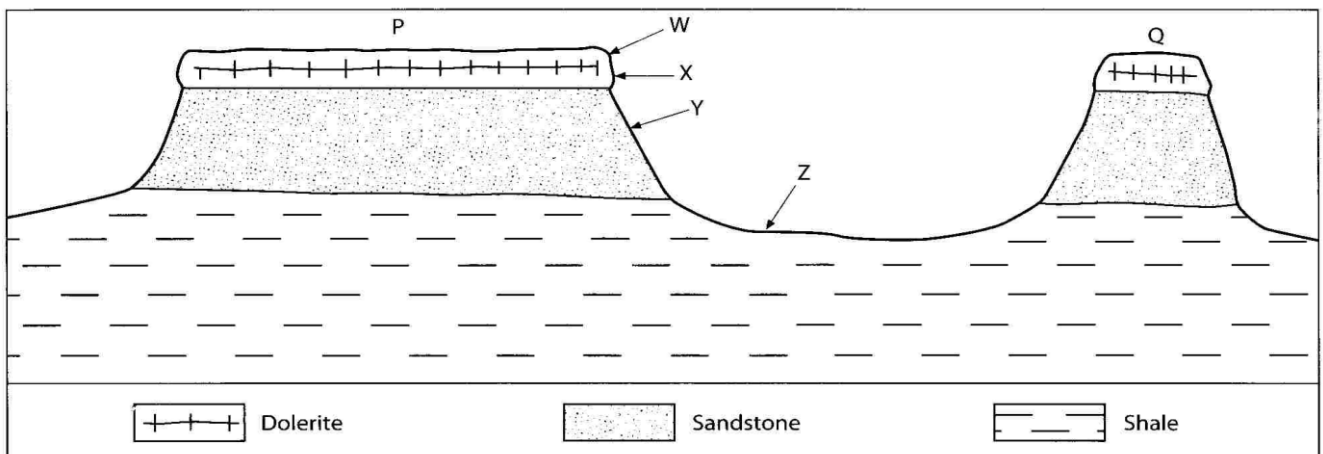
2.4.1 Identify the landforms indicated by P and Q respectively.   (2 x 1) (2)
2.4.2 List the four slope forms labelled W, X, Y and Z respectively.   (4 x ½) (2)
                                                                                                [4]

SECTION D: SOLUTIONS TO HOMEWORK

QUESTION 1

1.1

1.1.1   A - Equatorial low pressure√
        B - Sub- tropical high pressure√
        C - Sub-polar low pressure√   (3 x 1) (3)
1.1.2   It lies north of the equator in July, especially over the landmasses; it lies
        south of the equator in January√   (1 x 2) (2)
1.1.3   The pressure belts follow the movement of the overhead sun, moving
        northwards during the northern hemisphere summer when the sun is
        overhead at the Tropic of Cancer, and southwards in the southern hemisphere
        summer when the sun is overhead at the Tropic of Capricorn. √√   (1 x 2) (2)
1.1.4   These are large landmasses that are intensely heated in summer, and
        This results in the low pressure extending further north. √√   (1 x 2) (2)
1.1.5   There is a large high-pressure over the land. √   (1)
1.1.6   It is winter, and the large landmass is cold, causing a thermal high
        Pressure to coincide with the sub-tropical high pressure that is now in its
        more southerly position. √√   (1 x 2) (2)
1.1.7   It is summer in the southern hemisphere, and the landmasses are hot,
        causing low pressures to develop. This restricts the descending air and
        interrupts the development of the sub-tropical high pressures. √√ (1 x 2) (2)
1.1.8   The horse latitudes√   (1)
                                                                         [15]

1.2
1.2.1   10√ as hurricanes are named alphabetically from the start of the hurricane
        season. K is the eleventh letter of the alphabet.√   (2 x 1) (2)
1.2.2   The cloud cover indicates an anti-clockwise convergence of air towards the
        eye √√   (1 x 2) (2)
1.2.3   The sky is clear√; it is warm and calm√. This is because divergence in the
        upper atmosphere√ causes air to descend in the eye.√   (4 x 1) (4)
1.2.4   The hurricane has come from the south-east. It has therefore moved in a
        north-westerly direction. It will now begin to veer towards the north-east. √√
                                                                       (2 x 1) (2)
1.2.5   Hurricane Katrina will start to dissipate as it is no longer supplied with moisture
        from the ocean√. There is therefore no longer condensation and a supply of
        latent heat to provide energy for the system√. Friction with the land will also
        cause the winds to slow down and weaken Coriolis force√. The air will move
        towards the central low pressure√, and pressure in the centre of the hurricane
        will start to rise.√   (5)
                                                                         [15]

1.3
1.3.1 Two√√   (1 x 2) (2)
1.3.2 Divide the total length of all the streams in the basin by the area of the basin√√
                                                                                                  (1 x 2) (2)
1.3.3 F2√ as it has a narrow valley with steep sides√√   (1+1 x 2) (3)
1.3.4 Radial pattern√ as the streams would radiate outwards from the koppie
                                                                                                  (1+1 x 2) (3)
                                                                                                  [10]
                                                                                    TOTAL: [40]

QUESTION 2

2.1
2.1.1 Inter-Tropical Convergence Zone√   (1)
2.1.2 Intense radiational heating and strong convergence of the tropical
         easterlies√√   (1 x 2) (2)
2.1.3 Tropical easterlies√   (1)
2.1.4 Cumulonimbus√   (1)
2.1.5 Hadley cell√   (1)
2.1.6 Northern hemisphere√ as it is June and therefore it is summer in the
         Northern hemisphere. The ITCZ lies over Kano√   (2 x 1) (2)
2.1.7 D has little rain as it lies in the area of the sub-tropical high pressures
         where air is descending and heating adiabatically√√   (1 x 2) (2)
                                                                                                  [10]

2.2
2.2.1 A – trough of low pressure(½); B – ridge of high pressure(½); C - warm front(½);
         D – cold front(½);E – occluded front(½); F – coastal low pressure(½);
         G – saddle of pressure(½); H – isobar (1016 hPa) (½)   (8 x ½) (4)
2.2.2 X – South Indian high pressure√; Y – South Atlantic high pressure√   (2 x 1) (2)
2.2.3 Sub-tropical high-pressure√   (1)
2.2.4 Air subsides in an anti-clockwise direction, and diverges from the high
         pressure. √√ There will be no cloud cover owing to the adiabatic heating
         of the air√√   (2 x 2) (4)
2.2.5 Air temperature and dewpoint are both 17°C(2x½), and so there is fog or
         mist(½) as the air is saturated; the sky is totally overcast(½); there is a
         SE wind(½) of 25 knots(½).   (6 x ½) (3)
2.2.6 The trough of low pressure over the land√, the southerly position of the South
         Indian high pressure, and the more southerly position of the frontal depressions√
                                                                                                  (2 x 1) (2)
2.2.7 It is a frontal depression or mid-latitude cyclone√. It will move in an easterly
         direction√ as it is carried by the westerly winds√.   (3)

2.2.8
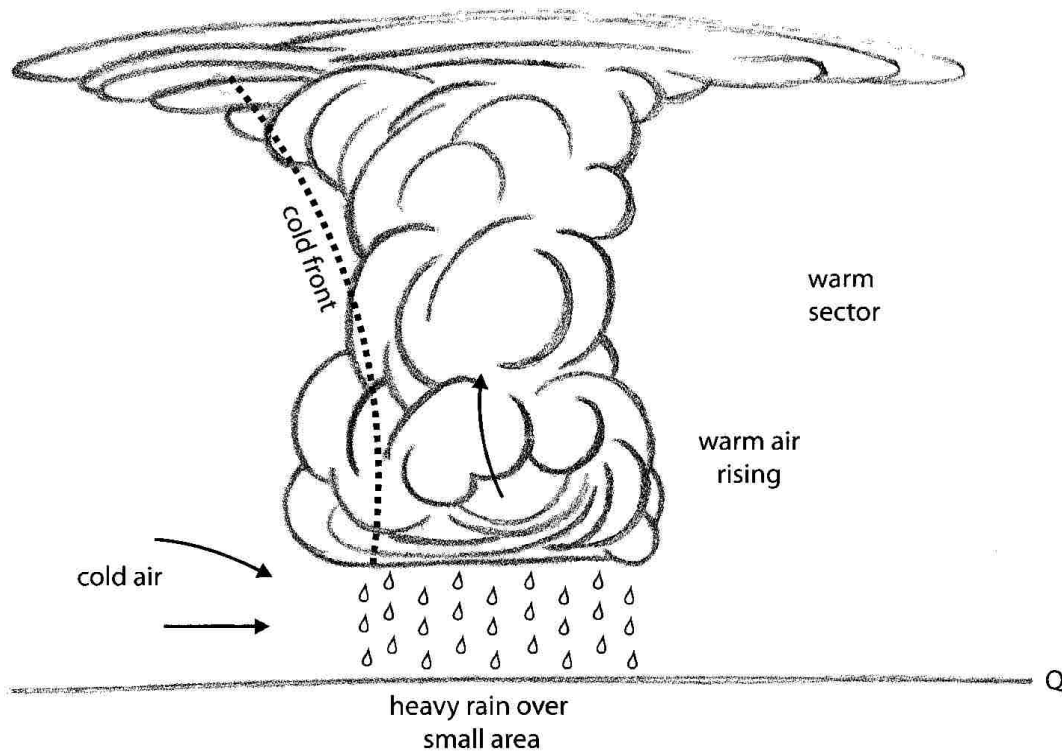
(5)
[24]

2.3

2.3.1 (a) a longitudinal profile shows a section of the river from its source to
        its mouth. √
        (b) Local base level is the temporary limit to the vertical
        erosion of the river, e.g. Lake Mwera and Lake Bangwuelu. √ It can also
        be a resistant rock structure across the course of the river.   (2 x 1) (2)

2.3.2 A – turbulent flow because of the steep slopes and uneven bed of the river,
        which are found in the upper course of the river√√
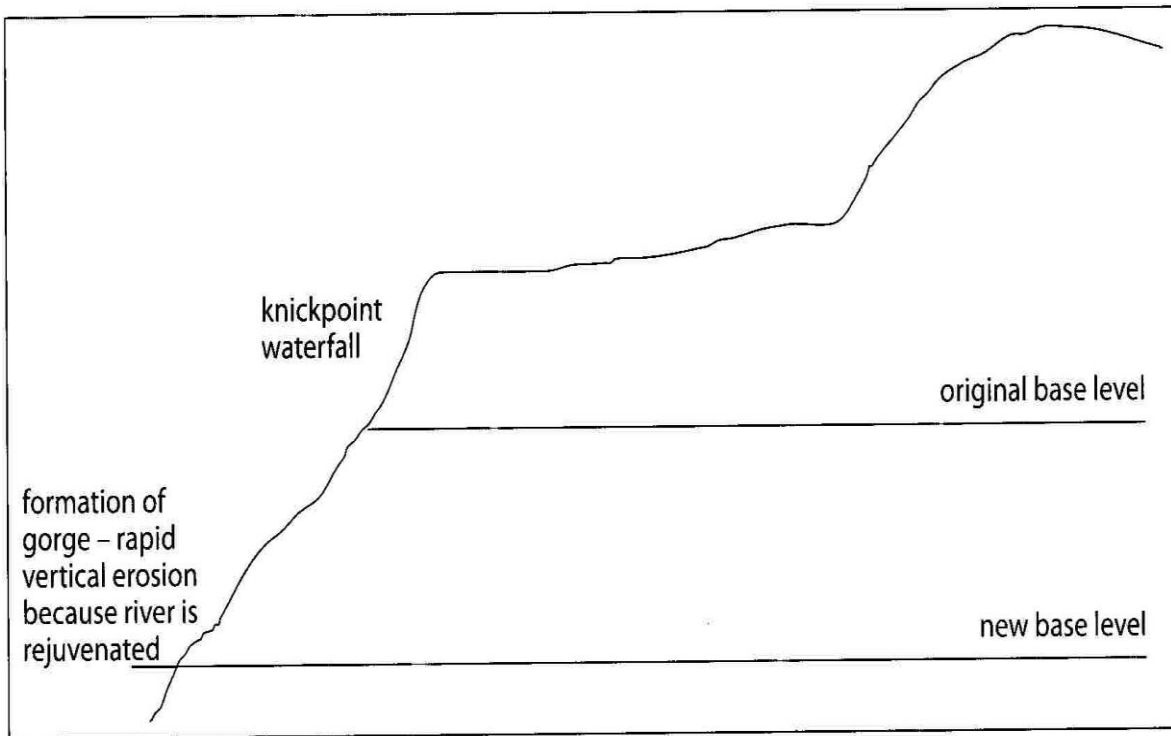   B – laminar flow as the slope is gentle and the bed is more even.
        There is less friction, and the water flows in layers – fastest in the middle,
        and slower next to the river bed. √√   (2 x 2) (4)

2.3.3 Steep gradient and, therefore, greater water speeds to drive the turbines√
        Constant flow of water, as this is a permanent river. √   (2 x 1) (2)

2.3.4

(4)
[12]

2.4
2.4.1 P – mesa; √   Q - butte√   (2 x 1) (2)
2.4.2 W – crest(½);   X – cliff(½);   Y – talus(½);   Z- pediment(½)   (4 x ½) (2)
[4]
TOTAL: [50]

SESSION 10

TOPIC: CLIMATOLOGY, GEOMORPHOLOGY AND GIS CONSOLIDATION EXERCISES

LESSON OVERVIEW

1.   Typical exam questions: 55 minutes
2.   Review/solutions/memo: 35 minutes

! **Teacher Note:** In the prelim and final papers the geomorphology section is equally mixed with climatology in the first two questions in Section A. You need to ensure that the learners really know their work well to get good marks for section A in the final exam. They must also be able to apply their knowledge as there are some interpretation questions where they also need to understand the processes involved in geomorphology and climatology. These applications also apply to the map work interpretation. They must put in a lot of effort to get to know this part of the work well. They must know the facts and they will not get marks for vague answers.

SECTION A: TYPICAL EXAM QUESTIONS

QUESTION 1:   **40 minutes**   **60 marks**   *(Source: NCS Feb/March 2010)*

1.1   Refer to FIGURE 1.1 showing a weather system that often occurs along the
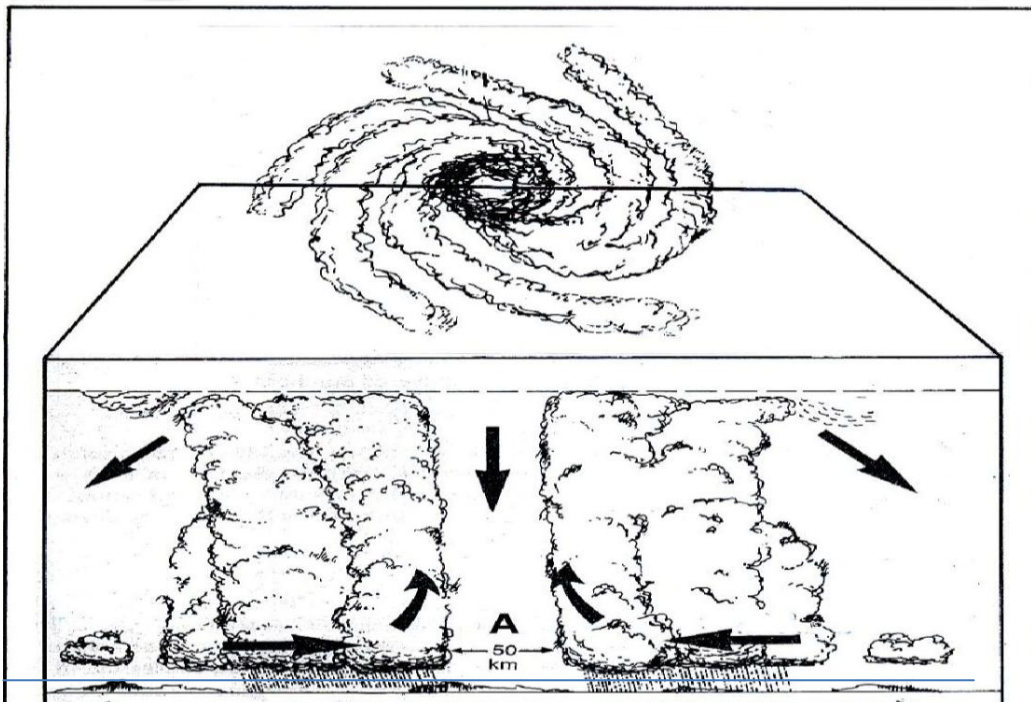   east coast of Southern Africa.

Figure 1.1

Various options are given as possible answers to the questions that follow. Choose the answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.5) for example 1.1.6 A.

    1.1.1   The diagram illustrates a …

         A   mid-latitude cyclone.
         B   coastal low pressure.
         C   line thunderstorm.
         D   tropical cyclone.

    1.1.2   The following air movements are associated with the illustrated weather system along the coast of Southern Africa:

         A   Subsidence, convergence, clockwise rotation, uplift
         B   Uplift, divergence, anticlockwise rotation, subsidence
         C   Uplift, divergence, clockwise rotation, subsidence
         D   Subsidence, divergence, anticlockwise rotation, uplift

    1.1.3   The main cloud types associated with this weather system are … clouds.

         A   cumulonimbus
         B   cumulus
         C   cirrus
         D   nimbostratus

    1.1.4   The following conditions will exist at **A**:

         A   Cloudless, low pressure, windless
         B   Cloudless, high pressure, windless
         C   Cloudy, low pressure, light rain
         D   Cloudy, high pressure, heavy rain

    1.1.5   The weather system is in the … stage of development.

         A   initial/formative
         B   immature
         C   mature
         D   decaying/dissipating   (5 x 2) [10]

  1.2   FIGURE 1.2 on the following page shows a berg wind that often occurs along the south coast of South Africa. Use your knowledge of berg winds and also refer to FIGURE 1.2 to answer the questions below.

Figure 1.2
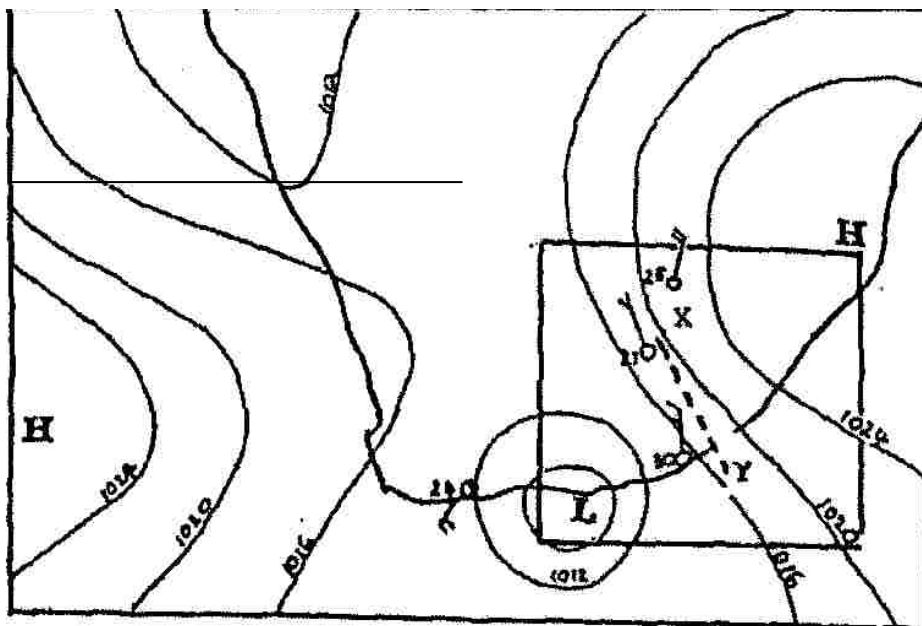
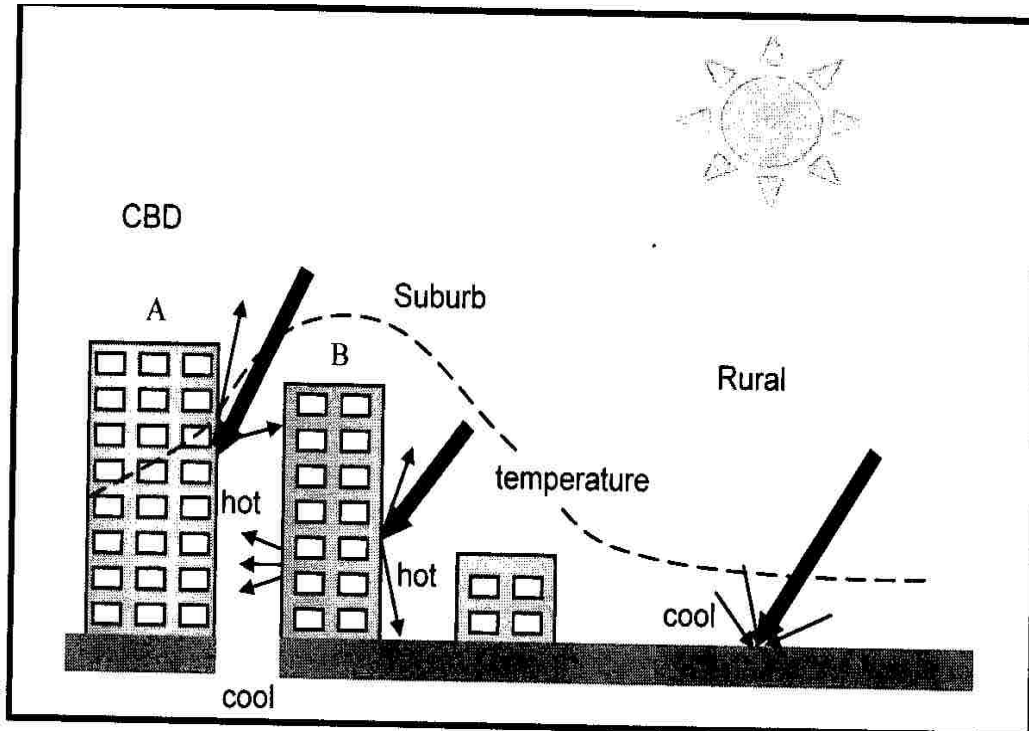1.2.1   In the diagram name the cell which is having the biggest impact on
weather conditions?   (1 x 2) (2)

1.2.2   Explain and account for the impact it is having on temperatures.
(You should make use of a diagram to help explain your answer).   (4 x 2) (8)
[10]

1.3   Refer to Figure 1.3 on the following page, which shows a typical South African city.

FIGURE 1.3

1.3.1   What do we call this type of weather phenomena?   (1 x 2) (2)
1.3.2   What is the sketch trying to depict by means of the large arrows?
                                                                                (1 x 2) (2)
1.3.3   What factors are responsible for higher temperature over the CBD?
                                                                                (3 x 2) (6)
1.3.4   Explain the air circulatory pattern experienced during the day.   (2 x 2) (4)
1.3.5   Why is pollution over this city worse in winter than in summer?
                                                                                (3 x 2) (6)
                                                                                     [20]

1.4
1.4.1   What is the Kyoto protocol?   (2 x 2) (4)
1.4.2   How can third world nations reduce climate change?   (3 x 2) (6)
                                                                                     [10]

1.5   Provide suitable explanations for the following terms:

1.5.1   Hadley cell
1.5.2   ITCZ
1.5.3   Adiabatic heating
1.5.4   Latent heat
1.5.5   Aspect   (5 x 2) [10]
                                                                                     [60]

QUESTION 2:   30 minutes   40 marks
(Source NCS Feb/March 2010 and various previous papers)

2.1   Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number

        2.1.1 An aquifer is a rock that is impermeable and does not allow water to move through it.

        2.1.2 A flow hydrograph records how much water passes a given point in a given period of time.

        2.1.3 A periodic river is a river that only flows in the rainy season when it receives ground water.

        2.1.4 Rocks that are uniformly resistant and exposed to the same type of weathering will weather at different rates.

        2.1.5 Core stones are rounded stones that are exposed after erosion to make up a tor.   (5 x 2) (10)

2.2   Define the following terms:
        2.2.1 Drainage basin   (1 x 2) (2)
        2.2.2 River system   (1 x 2) (2)
                                                            [4]

2.3   The following hydrograph depicts the Zambezi River shortly before it enters the Indian Ocean
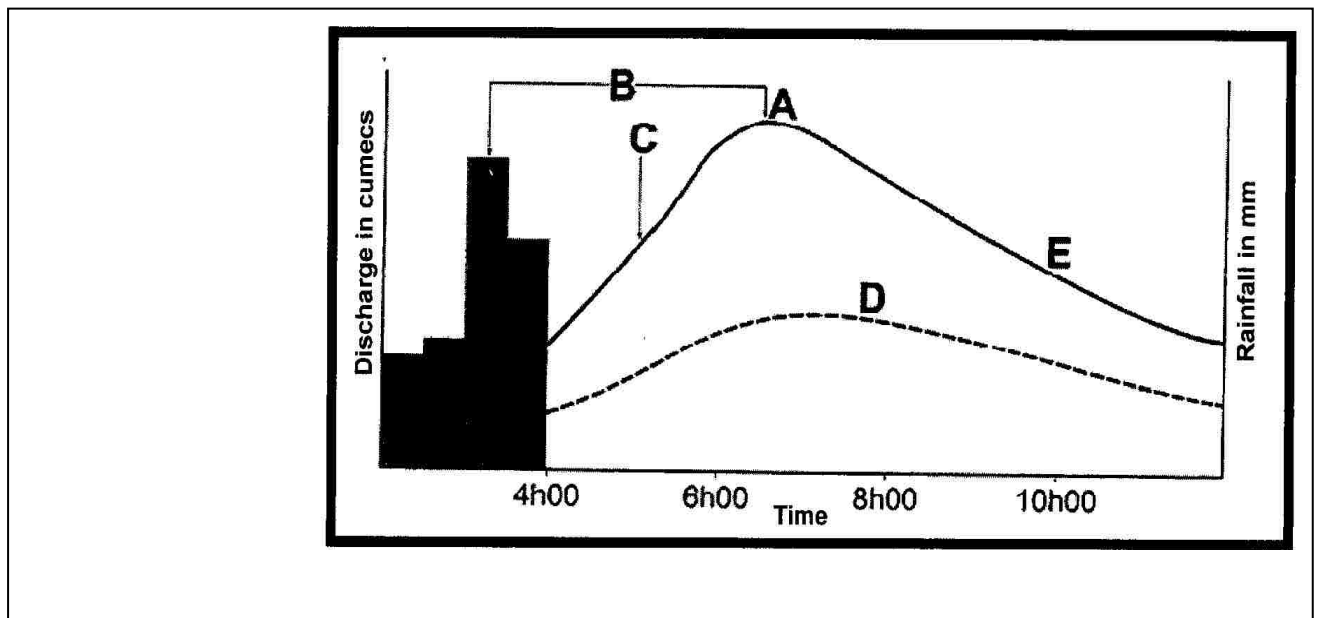
        2.3.1 Supply labels B, A and D.   (3 x 2) (6)
        2.3.2 At what approximate time did the maximum rainfall occur?   (1 x 2) (2)
        2.3.3 Account for the difference in shape between lines C and E.   (2 x 2) (4)

2.3.4 Supply the correct name of the place where two tributaries
join each other.   (1 x 2) (2)
2.3.5 List the factors that will influence how quickly line D increases.   (5 x 2) (10)
2.3.6 Define what is meant by a flood.   (1 x 2) (2)
[26]
[40]

QUESTION 3:   20 minutes   20 marks   *(Source: NCS Feb/March 2010)*

GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

3.1   Name any TWO components of GIS.   (2 x 2) (4)

3.2   Identify any example of a polygon feature, a line feature and a point feature
respectively, on any topographical map.   (3 x 2) (6)
3.3   Explain what is meant by data integration.   (1 x 2) (2)
3.4   Name ONE problem that was experienced with data integration prior to
the introduction of GIS.   (1 x 2) (2)
3.5   Of what importance is data integration to a geographer?   (1 x 2) (2)
3.6   What is a database?   (1 x 2) (2)
3.7   Why is it sometimes necessary to manipulate data in a database?   (1 x 2) (2)
[20]

SECTION B: SOLUTIONS AND HINTS TO SECTION A

QUESTION 1

1.1.1 D √√
1.1.2 A √√
1.1.3 A √√
1.1.4 A √√
1.1.5 C √√   (5 x 2) [10]

1.2.1 Coastal low pressure √√   (1 x 2) (2)
1.2.2 Air descends the plateau √√
Warms adiabatically √√
Subsiding air does not allow for condensation to take place √√
It is dry since it is an offshore wind √√
It decreases atmospheric humidity √√
[Any FOUR. Must refer to temperature and humidity, and use
a diagram]   (4 x 2) (8)
[10]

1.3.1 Heat Island√√   (1 x 2) (2)
1.3.2 The angle of the sun's rays (aspect)   (1 x 2) (2)
1.3.3 Artificial materials like to absorb heat√√
Metals and glass reflect heat√√
Combustion processes√√
Pollution traps long wave radiation√√ (any THREE)   (3 x 2) (6)
1.3.4 During the day the heat dome rises in altitude√√ which allows fresh
clean fresh air to be fed into the city. √√   (2 x 2) (4)

1.3.5   In winter the inversion layer is lower√√ causing pollution to be
        concentrated√√ close to the ground. In winter more pollution is
        emitted by the burning of wood and fossil fuels. √√   (3 x 2) (6)
                                                                                    [20]

1.4
1.4.1   An international convention held in 1997√√ where it was agreed to reduce
        greenhouse emissions. 137 countries signed it. √√   (2 x 2) (4)
1.4.2   Reduce the burning of wood and fossil fuels√√
        Look at using cleaner fuels such as gas, solar wind power√√
        Protect natural environment, especially deforestation√√   (3 x 2) (6)
                                                                                    [10]

1.5
1.5.1   Air that rises near the equator and descends at ±30º from the equator√√
1.5.2   Inter-tropical convergence zone is an area of intense solar heating that moves
        north and south with the seasons. √√
1.5.3   Air that warms up as it is compressed√√
1.5.4   When water vapour condenses it releases heat into the atmosphere which
        is called latent heat√√
1.5.5   The relationship between the ground and the angle of the sun's rays√√
                                                                            (5 x 2) [10]
                                                                                    [60]

QUESTION 2
2.1
2.1.1   False√√
2.1.2   True√√
2.1.3   True√√
2.1.4   False√√
2.1.5   True√√   (5 x 2) [10]
2.2

2.2.1   The total area drained by the river system √√   [Concept]   (1 x 2) (2)
2.2.2   The main river and all its tributaries √√   [Concept]   (2 x 1) (2)
                                                                                    [4]

2.3
2.3.1   B – lag time√√
        A – peak flow / run-off√√
        D – base flow√√   (3 x 2) (6)
2.3.2   Just before 4h00√√   (1 x 2) (2)
2.3.3   Shape of drainage basin caused rising limb to be steep. C is
        the rising limb and is increasing rapidly because of the shape
        of the drainage basin. √√ D is the falling limb and indicates a
        gradual decrease in volume√√   (2 x 2) (4)
2.3.4   Confluence√√   (1 x 2) (2)
2.3.5   Gradient√√
        Amount of vegetation√√
        Intensity of rainfall√√
        Height of water table√√
        Rock type√√   (5 x 2) (10)

2.3.6 Situation that develops when a river overflows its banks
       and covers areas with water that is usually not covered
       by water√√   [Concept]   (1 x 2) (2)
                                                                     [26]
                                                                     [40]

QUESTION 3

3.1
       ⌐ Hardware √√
       ⌐ Software √√
       ⌐ Data √√
       ⌐ People √√
       ⌐ Procedures √√
       ⌐ Network √√   [Any TWO]   (2 x 2) (4)

3.2   <u>Polygon feature</u>:
          cultivated land √√
          woodland √√
          sewage disposal works √√
          cemetery √√
          slimes dam √√
          mine dump √√
          <u>Line feature</u>:
          built-up area √√
          non-perennial river √√
          other road √√
          national route √√
          track/hiking trail √√
          <u>Point feature</u>:
          railway line √√
          fountain √√
          trees √√   [Any ONE for each type of feature]   (3 x 2) (6)

3.3
3.3.1 The integration of data from different maps into one map which summarises
      the overlaying process √√   [Concept]   (1 x 2) (2)

3.3.2 Maps have different scales √√
      Different map projections are used on maps √√
      Different geo-referenced maps are used √√
                                                   [Any ONE]   (1 x 2) (2)
3.3.3 A summary of integrated data is produced which makes it easier to
       analyse data √√   (1 x 2) (2)

3.4   A storage system with linked tables √√
          OR
      Data is stored in tables which are linked to other tables √√
                                                   [Concept]   (1 x 2) (2)

3.5 Correct distortions √√
    Sharpen definition √√
    Ensure colour consistency√√
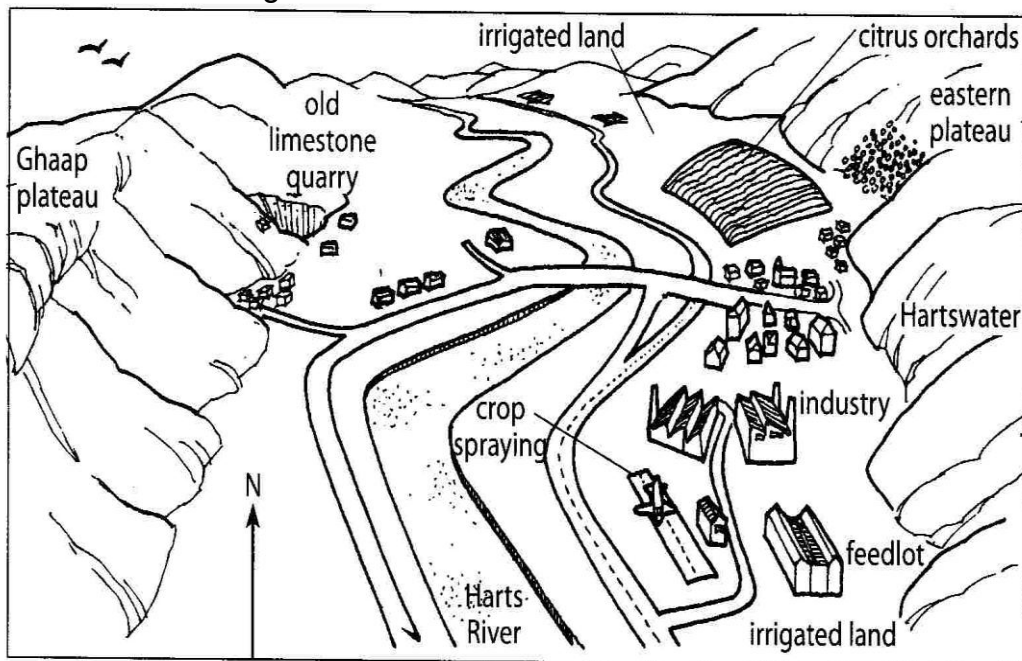   Correct latitude and longitude registration √√
    Makes data more manageable √√   [Any TWO]   (1 x 2) (2)
                                                                      [20]

SECTION C: HOMEWORK

**QUESTION 1:   30 minutes 50 marks**   *(Source: X-Kit Geography Gr. 12 FET Phase)*

1.1   Study the field sketch below and then explain, from a local climate point of view, each of the following:

1.1.1 Why are citrus orchards, which are damaged by frost, grown on the slopes of this valley?   (1 x 2) (2)

1.1.2 Why does a blanket of fog and smog cover this valley on some winter mornings?   (2 x 2) (4)

1.1.3 What is the reason for the residential areas of Hartswater being affected by industrial pollution in the afternoon?   (2 x 2) (4)

1.1.4 Why are the residential sites on the hill popular for settlement?   (1 x 2) (2)

1.1.5 What are the reasons for temperatures in Hartswater being a little warmer than the surrounding farmlands?   (Any THREE) (3 x 2) (6)
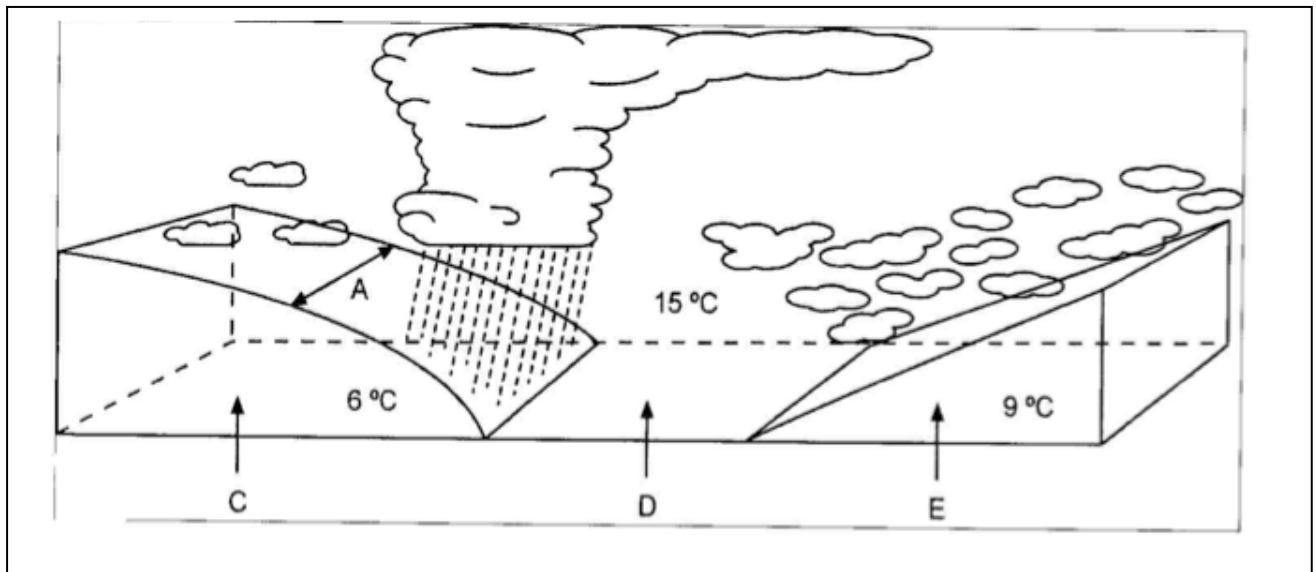   **[18]**

1.2   Study the diagram below and answer the questions that follow.
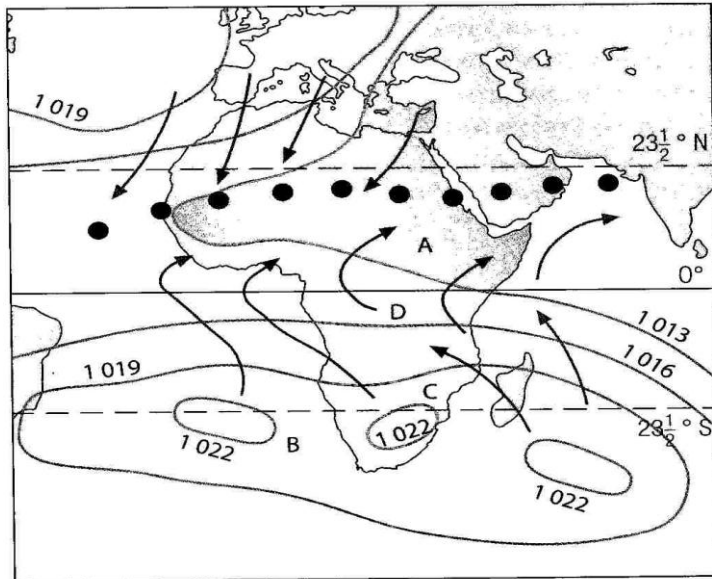
1.2.1   Name the feature shown by ••••••   (1 x 2) (2)
1.2.2   Name the pressure at A.   (1 x 2) (2)
1.2.3   Name the pressure belt at B.   (1 x 2) (2)
1.2.4   Why has this belt split into three cells?   (2 x 2) (4)
                                                                                   [10]

1.3   The figure below illustrates a cross-section through the mature stage
      of a mid-latitude cyclone

1.3.1   Which letter marks the cold front?   (1 x 2) (2)
1.3.2   In a table, draw up a comparison of the warm and cold fronts of a
        mid-latitude cyclone in its mature stage. Include the following aspects:
          • Steepness of front
          • Associated cloud types
          • Type of rainfall   (3 x 2) (6)
1.3.3   What is the sector called at D?   (1 x 2) (2)
1.3.4   What is the sector called at E?   (1 x 2) (2)
1.3.5   How does the weather experienced at position E differ from that
        experienced at position D?   (3 x 2) (6)

1.3.6 The diagram illustrates a mid-latitude cyclone in the mature stage.
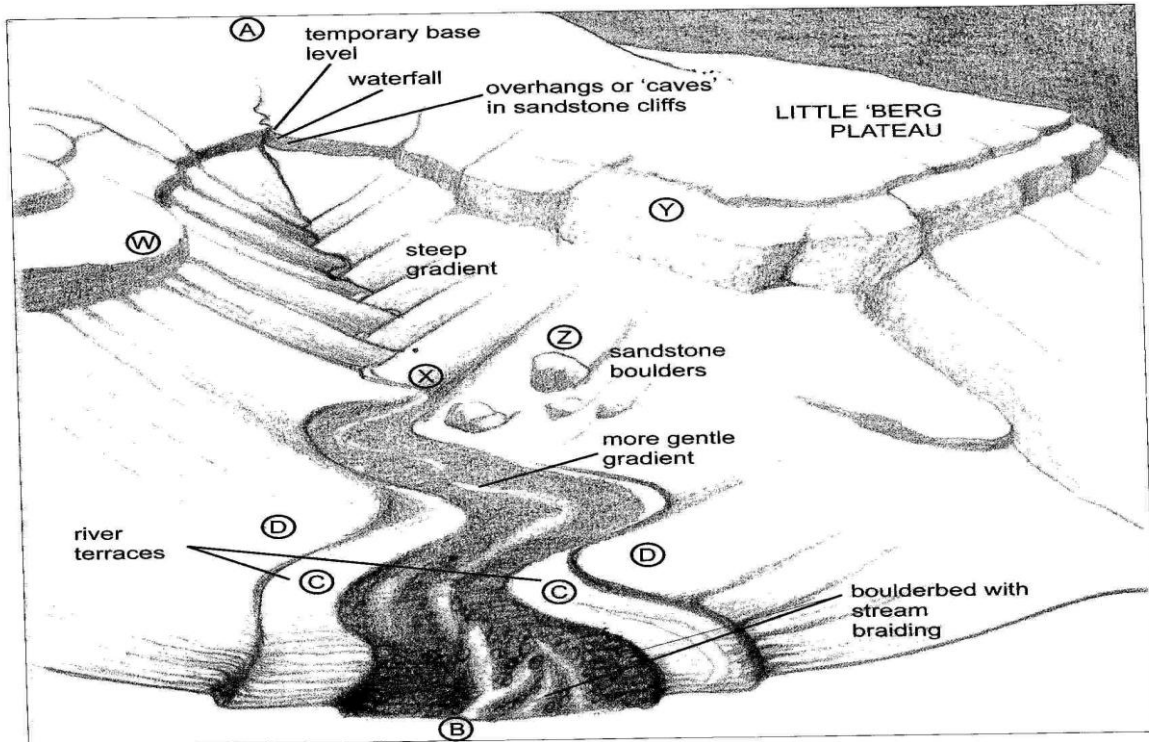What is the next stage and what processes have taken place? (1 + 3) (4)
[22]
[50]

QUESTION 2: **30 minutes 50 marks** *(Source: X-Kit Geography Gr. 12 FET Phase)*

2.1 Study the diagram below and answer the questions that follow.

2.1.1 With reference to the diagram explain the terms 'temporary base level'
and 'stream braiding'. (2 x 2) (4)

2.1.2

 (a) Draw a simple longitudinal profile of this river from A to B, and label the
   waterfall. (4)
 (b) Does the longitudinal profile from A to B show a graded profile?
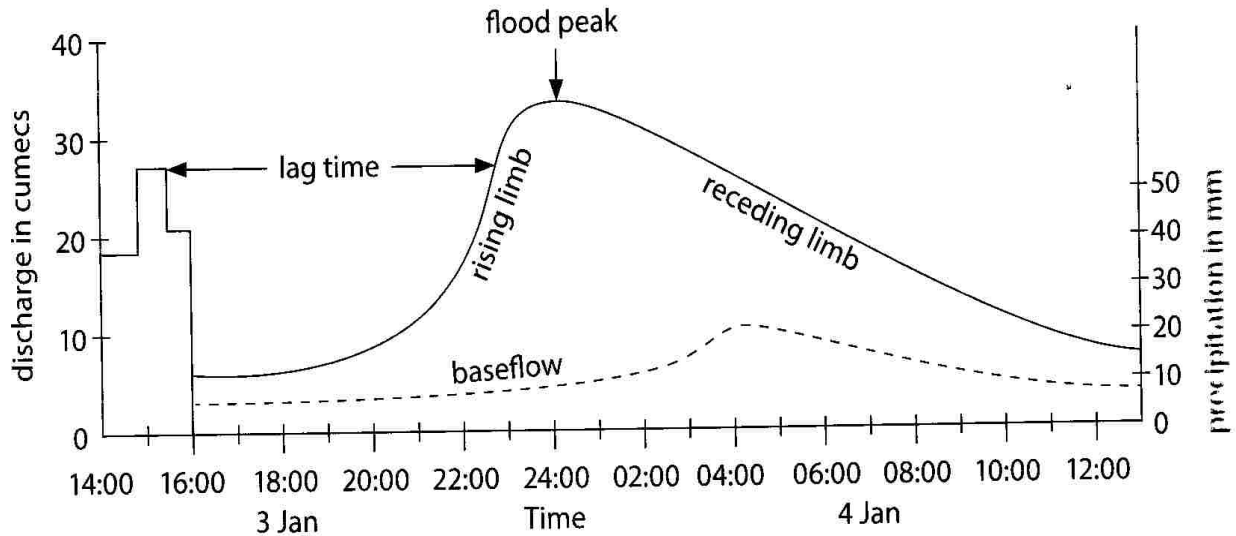   Explain your answer. (2 x 2) (4)

2.1.3 The river terraces at C are evidence that this river has been rejuvenated.

 (a) Explain the term rejuvenation. (1 x 2) (2)
 (b) Using an annotated sketch, describe how the process of rejuvenation
   led to the formation of these river terraces. (3 x 2) (6)
[20]

2.2   Look at the figure below and answer the following questions:

2.2.1 When did the maximum rain occur?   (1 x 2) (2)
2.2.2 What was the discharge of the river before the storm occurred?   (1 x 2) (2)
2.2.3 What was the height of the flood peak?   (1 x 2) (2)
2.2.4 What is the lag time?   (1 x 2) (2)
2.2.5 How long did it take for the river discharge to drop from the flood peak
       to what it was before the storm took place?   (1 x 2) (2)
                                                                                          [10]

2.3   Look at the illustration below and answer the questions that follow
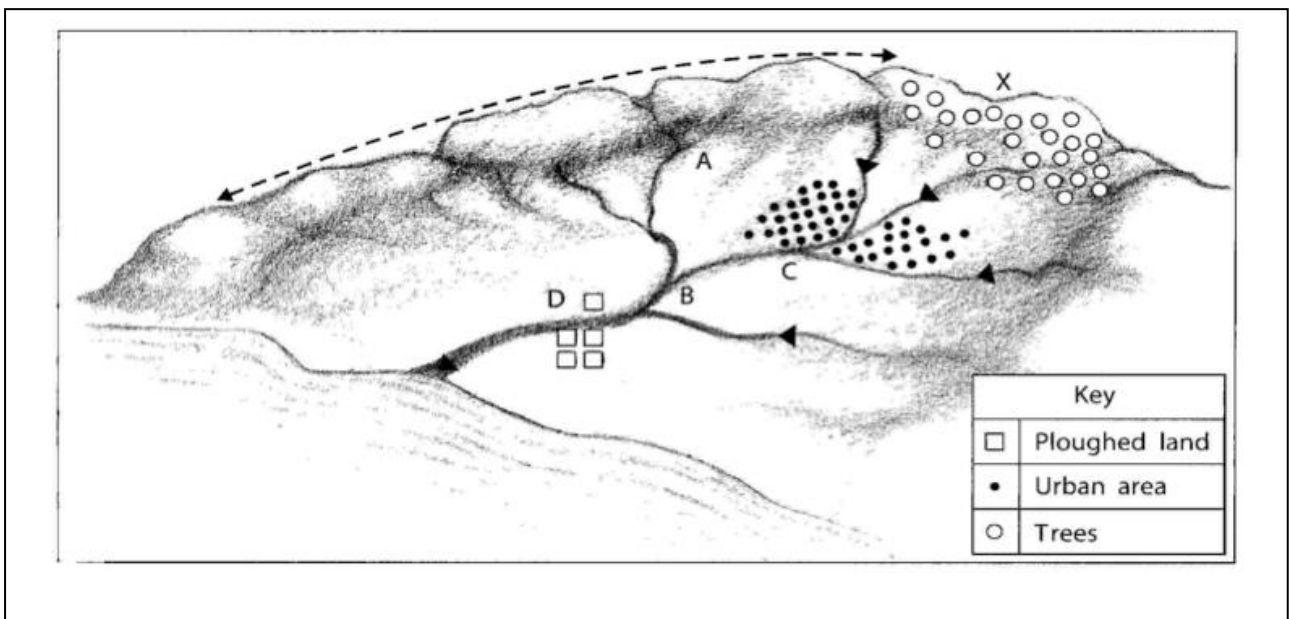
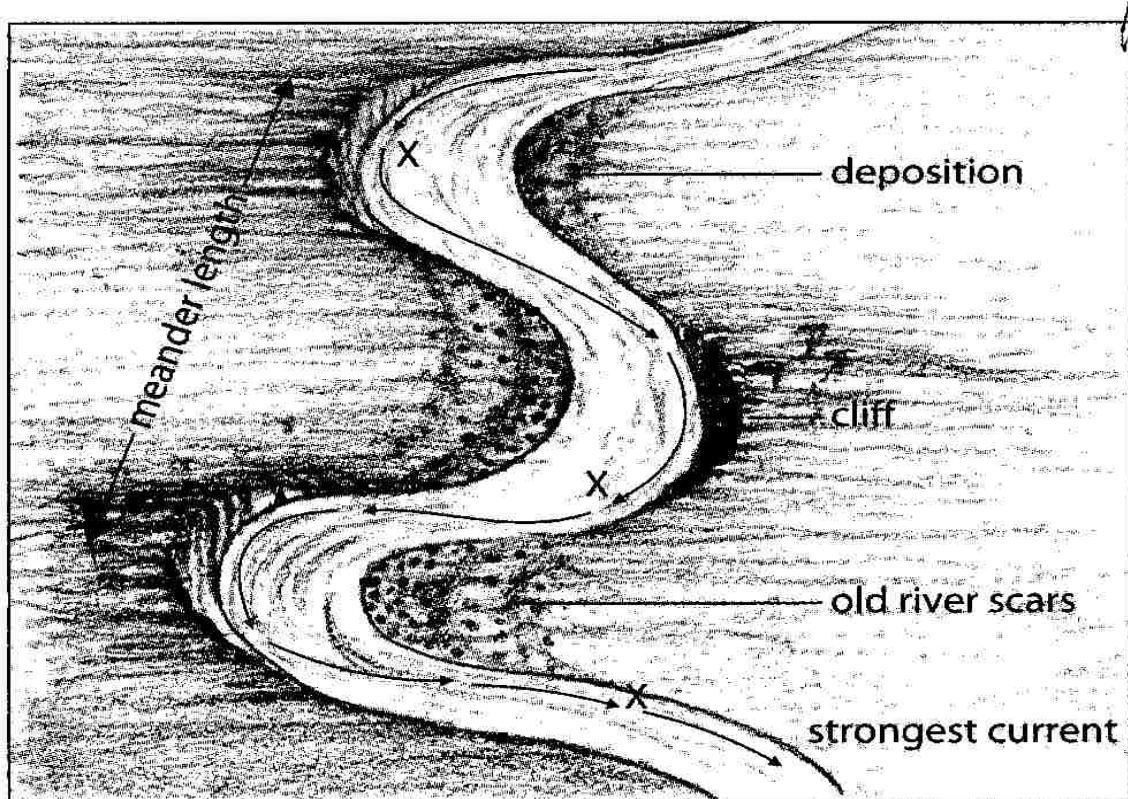2.3.1 Explain in what way and why the energy characteristics of the river will change
       between A and B.   (2 x 2) (4)
2.3.2 Explain, with motivation, the reason for the great amount of silt in the river
       at C.   (2 x 2) (4)
2.3.3 How and why will the volume of the river change downstream of D?   (2 x 2) (4)
2.3.4 In what way and why will the energy change if deforestation takes place
       at X?   (1 x 2) (2)
                                                                                          [14]

2.4   Look at the illustration below and answer the questions that follow.
2.4.1 What term is given to the pattern of the river?   (1 x 2) (2)
2.4.2 Study the pattern made by the river current at X in the illustration. What
       do you notice about the position of the current and the river bank that it
       is related to?   (2 x 2) (4)

                                                                                            [6]
                                                                                            [50]

SECTION D: SOLUTIONS TO HOMEWORK

QUESTION 1

1.1

1.1.1 The slopes of the valley are warmer at night. The valley floor has frost
       owing to katabatic airflow and the formation of the temperature inversion.
       Mid-slope lies in the warm thermal belt.√√   (1 x 2) (2)

1.1.2 Air close to the valley floor cools at night, reaches dew point
       temperature, and results in condensation. .√√
       Fog mixes with smoke to form smog. √√   (2 x 2) (4)

1.1.3 Factories lie south of Hartsworth.√√
       In the afternoon a valley or an anabatic wind causes pollution to
       be blown northwards.√√   (2 x 2) (4)
1.1.4 These areas lie in the warm thermal belt, and are warmer than the
       valley floor in winter. √√
       The areas are out of the valley, and are not affected by smog.√√   (1 x 2) (2)

1.1.5   Human activities, for example, industry, create heat.√√
        Tarred roads absorb heat. .√√
        Evaporation cooling occurs in the rural areas.√√
        A pollution blanket traps radiation from the earth's surface. √√
        Building cause a multiple reflection of heat.√√
        Buildings increase the surface area, which is heated. .√√
                                                        [Any THREE]   (3 x 2) (6)
                                                                             [18]

1.2
1.2.1   ITCZ.√√   (1 x 2) (2)
1.2.2   Equatorial low pressure.√√   (1 x 2) (2)
1.2.3   The sub-tropical high pressure.√√   (1 x 2) (2)
1.2.4   The land is cold in winter, but the ocean is warm. √√
        This reinforces the existence of the sub-tropical high pressure over
        the land, but there is a lower pressure over the ocean. .√√   (2 x 2) (4)
                                                                             [10]
1.3
1.3.1   A.√√   (1 x 2) (2)

1.3.2

	Warm front	Cold front
Steepness	Gradual√	Steep√
Cloud types	Ci, Cs, As, Ns√	Cb√
Rainfall	Gentle, over wide area√	Intense, over small area√

                                                                             (3 x 2) (6)

1.3.3   Warm sector√√   (1 x 2) (2)

1.3.4   Warm front√√   (1 x 2) (2)

1.3.5   E – cool, 9ºC√, cloudy√, gentle rain√

        D – warm, 15ºC√, clear√, sunny√   (3 x 2) (6)

1.3.6   The warm sector narrows√. The cold front overtakes the warm front –
        starting in the LP centre and then moves progressively outwards. √
        The cold air wedges in under the warm air and isolates the warm air from
        the earth's surface. √ The process is called occlusion and the front which
   is formed is called an occlusion front. √   (1+ 3) (4)
                                                                             [22]
                                                                             [50]

QUESTION 2

2.1.1   Temporary base level: the level to which the stream can erode while the irregularity across its course still exists. The stream cannot erode below the level of the waterfall until the waterfall has been eroded away and a smooth concave profile is created. √√

Stream braiding: as the stream flows onto its developing floodplain, its velocity decreases and the stream loses energy and deposits its load. Some of this deposition may form islands in the channel, and the stream becomes braided. √√

(2 x 2) (4)

2.1.2   (a)
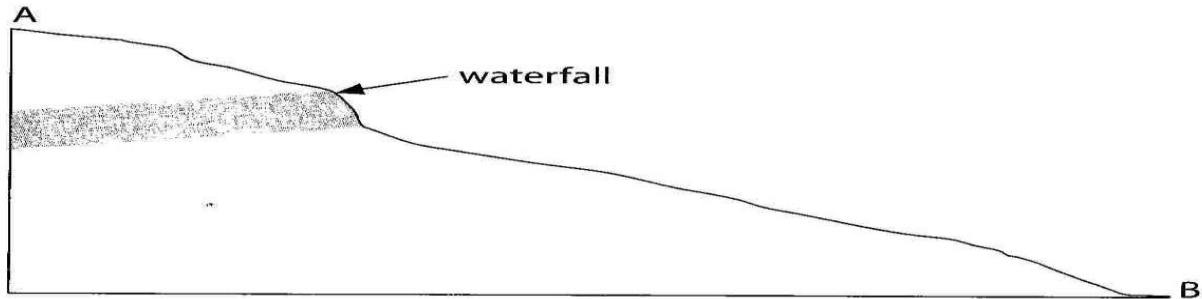
(4)

(b)   No √√– a graded profile is a smooth concave profile with no irregularities along the course. In this profile the waterfall causes an irregularity. √√
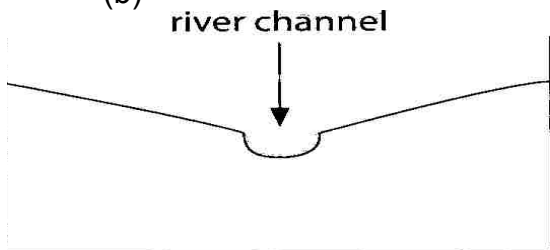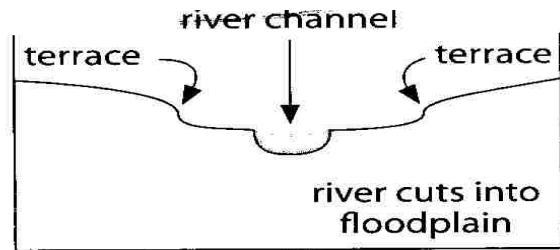
(2 x 2) (4)

2.1.3

(a)   Rejuvenation is a revival of a stream's ability to erode vertically. √√

(1 x 2) (2)

(b)

Before rejuvenation the river erodes laterally

Rejuvenation – the river erodes vertically

(2 x 3) (6)
[20]

2.2
2.2.1   15h00√√   (1 x 2) (2)
2.2.2   7-8 cumecs√√   (1 x 2) (2)
2.2.3   32 – 33 cumecs √√   (1 x 2) (2)
2.2.4   8 – 9 hours √√   (1 x 2) (2)
2.2.5   12 – 13 hours √√   (1 x 2) (2)
[10]

2.3
2.3.1 Although the gradient is steeper at A, the channel is small and there is little
       volume. The friction index will be high, and the river will use a lot of its
       energy to overcome friction. The flow will, therefore, not be fast, and the river will
       not have a lot of energy to cause erosion of the channel√√
       At channel B, the gradient is more gradual, but the channel is larger and
       probably deeper. There will be more water in the channel as the water from
       the tributaries has been added to the main stream. There will be less friction,
       and so the river will have more energy and will flow faster. This will result in
       erosion of the channel√√   (2 x 2) (4)
2.3.2 There is bare soil at C√√, and sheet flow will carry silt into the river√√
                                                                                    (2 x 2) (4)
2.3.3 The volume will increase downstream of D√√, as the concrete and
       tar of the urban area will result in less infiltration of rain, and this
       water will flow into the river√√   (2 x 2) (4)
2.3.4 Energy will increase if there is deforestation as the volume of the river
       will increase as there will be greater run-off and less infiltration. √√   (1 x 2) (2)
                                                                                    [14]
2.4
2.4.1 Meandering√√   (1 x 2) (2)
2.4.2 The stronger current swings to the outer bend, and erosion is greatest here.
       Undercutting and the collapse of the river bank from an undercut slope or
       river cliff. √√
       The water is deepest here, and the flow is fastest√√   (2 x 2) (4)
                                                                                    [6]
                                                                                    [50]

SESSION 11

TOPICS: CLIMATOLOGY, GEOMORPHOLOGY AND MAPWORK CONSOLIDATION

!

Teacher Note: In the prelim and final papers the geomorphology section is equally mixed with climatology in the first two questions in Section A. The learners need to know their work really well to get good marks for Section A in the final exam. They must also be able to apply their knowledge as there are some interpretation questions where they need to understand the processes involved in geomorphology and climatology. These applications also apply to the mapwork interpretation. They must put in a lot of effort to get to know this part of the work well. They must know the facts and they will not get marks for vague answers. Question 3 is specifically directed at testing their calculation skills..

LESSON OVERVIEW

1.   Typical exam questions: 55 minutes
2.   Review/solutions/memo: 35 minutes

SECTION A: TYPICAL EXAM QUESTIONS

QUESTION 1:   40 minutes   60 marks
*(Source: NCS Feb/March 2009 and other past papers)*

1.2   Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.1.1 – 1.1.5).

   1.1.1 The anabatic winds blow during the daytime.
   1.1.2 The katabatic winds are also known as mountain winds.
   1.1.3 The downward flow of wind in a valley is known as anabatic air flow.
   1.1.4 These katabatic winds only occur during cloudy nights.
   1.1.5 The heat loss from the earth's surface is as a result of terrestrial radiation
                                                                    (5 x 2) (10)

1.2   Study the synoptic weather chart on the following page (Figure 1.2). Answer the questions that follow.

Figure 1.2
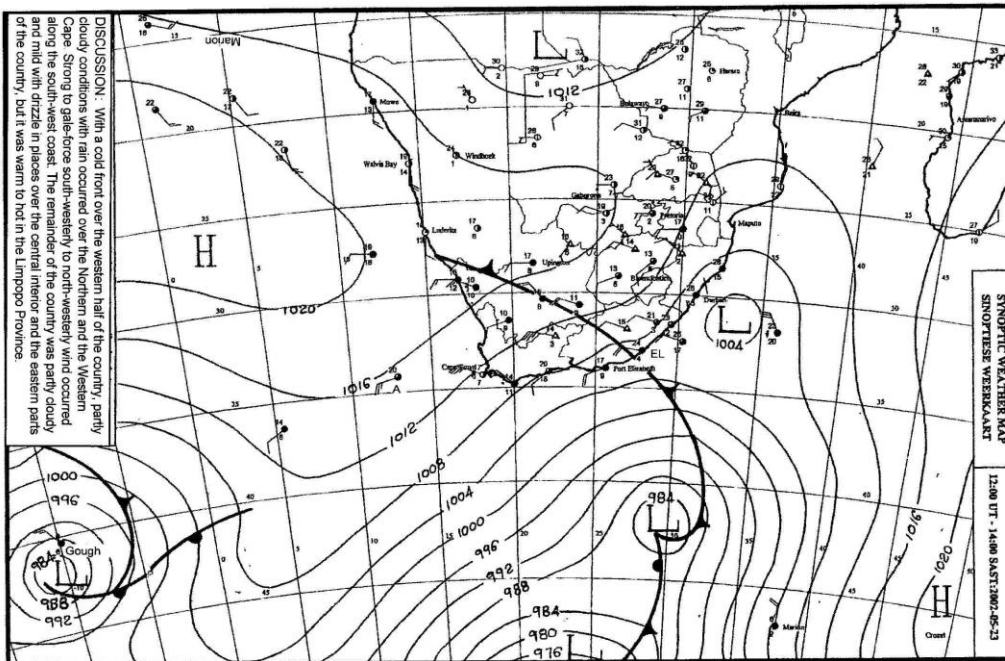
1.2.1 Describe and account for the wind at the weather station marked A.   (5 x 2) (10)
1.2.2 What is the dominant weather system depicted on this synoptic
chart?   (1 x 2) (2)
1.2.3 Compare the weather stations at Port Elizabeth and East London.
What are the differences between the two stations?   (6 x 1) (6)

1.3 Figure 1.3 depicts a typical South African weather patterns.

Figure 1.3
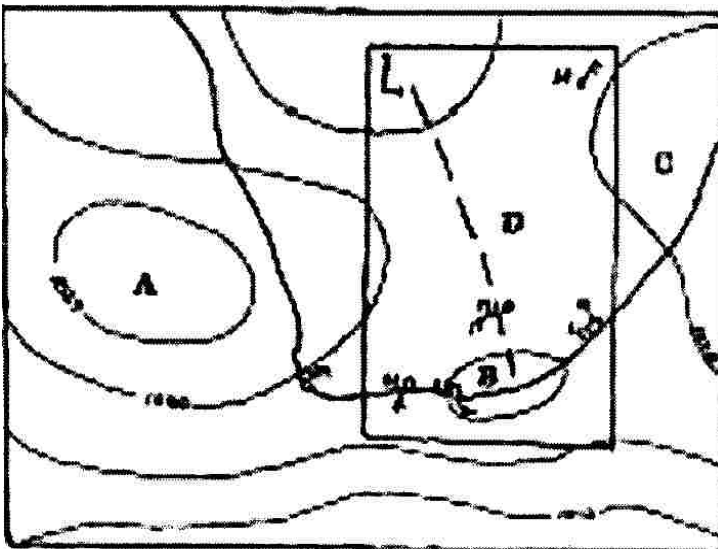
1.3.1 Name the weather phenomena shown in Figure 1.3.   (1 x 2) (2)
1.3.2 During which season do you expect to experience this pattern?   (1 x 2) (2)
1.3.3 Explain how this feature is formed.   (3 x 2) (6)
1.3.4 What name is given to the band of low pressure that extends across
         the South African interior along which line thunderstorms develop? (1 x 2) (2)
1.3.5 Do line thunderstorms develop on the eastern or western side of
         the band of low pressure mentioned in QUESTION 1.3.4?   (1 x 2) (2)

1.4   The table below indicates the smoke concentration at several South
       African cities. Answer the following questions:

| URBAN AREA	MONTHLY POLLUTION mg/m³	
	SUMMER	WINTER
Johannesburg (central)	0,08	0,195
Johannesburg (suburbs)	0,02	0,08
Pretoria	0,05	0,165
Durban	0,05	0,14
Cape Town	0,035	0,125
East London	0,05	0,125

1.4.1 In which urban area in the RSA does one find:
         (a) the highest smoke concentration?   (1 x 2) (2)
         (b) the lowest smoke concentration?   (1 x 2) (2)
1.4.2 Explain the differences in smoke concentration in your answer to
         1.4.1(a) and (b) by referring to the relationship between smoke
         concentration and the occurrence of a heat island.   (3 x 2) (6)
1.4.3 Explain the following statement:
         "*There is a marked difference between the smoke concentration of all
         urban areas in the RSA during the summer and winter months.*"   (4 x 2) (8)
                                                                          [60]

QUESTION 2:   30 minutes 52 marks *(Source: NCS Feb/March 2009 and various
                                        previous papers)*
2.1   Provide suitable definitions for the following:
2.1.1 Abstraction
2.1.2 Incised river
2.1.3 Talus
2.1.4 Soil creep
2.1.5 Slip-off slope   (5 x 2) (10)

2.2   Study the diagrams below and answer the questions that follow:

Figure 2.2
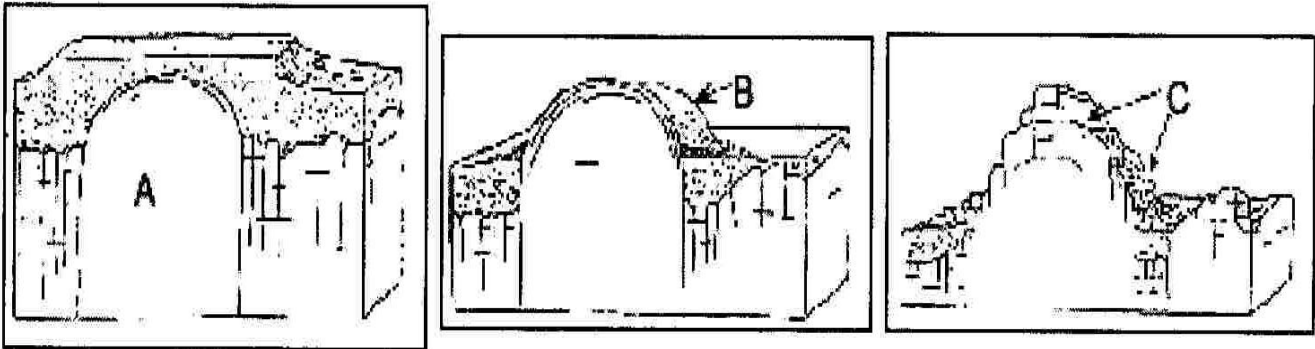

2.2.1   With what type of underlying geological structure and rock are A, B and C
        associated?   (2 x 2) (4)
2.2.2   Identify the three landforms indicated by A, B and C respectively.   (3 x 2) (6)
2.2.3   Identify ONE factor that influences the infiltration of water.   (1 x 2) (2)

2.3   Study FIGURE 2.3 based on fluvial processes and drainage basins.
        After heavy rainfall in this drainage basin, the river will not reach its
        discharge peak immediately. This difference in time between the
        rainfall peak and the discharge peak is known as the lag time.

Figure 2.3
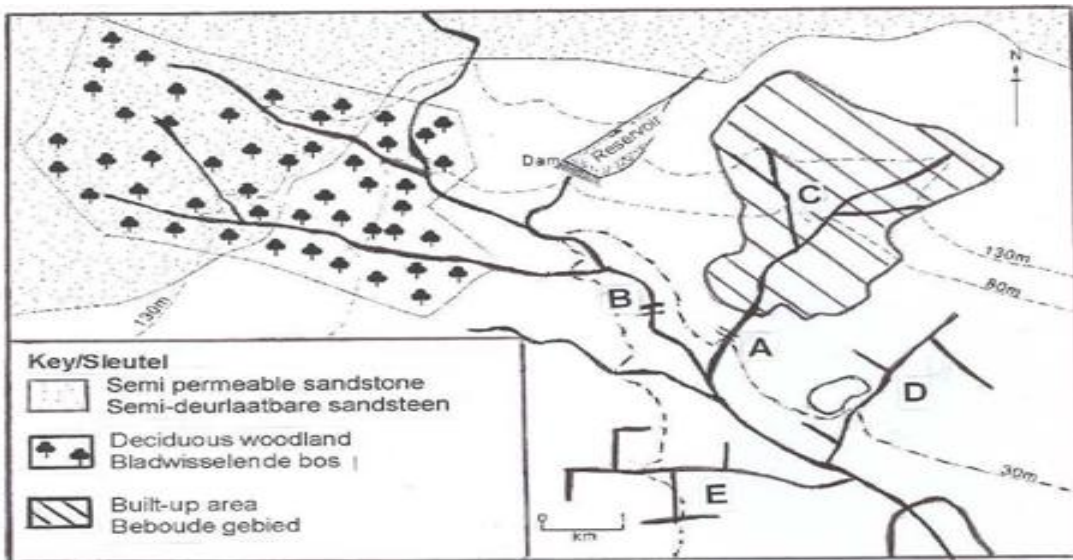
2.3.1   Identify the drainage patterns at D and E respectively.   (2 x 2) (4)
2.3.2   Give ONE example of a natural feature that will restrict the river's
          discharge.   (1 x 2) (2)
2.3.3   Give ONE example of a man-made feature that will restrict the
          river's discharge.   (1 x 2) (2)
2.3.4   Suggest TWO positive effects that the deciduous woodland (forest)
          is likely to have on the catchment area.   (2 x 2) (4)
2.3.5   Explain why there is a lag time between peak rainfall and peak
          discharge.   (2 x 2) (4)
2.3.6   Where, at station A or station B, will the lag time be longer?   (1 x 2) (2)
2.3.7   Explain your answer to QUESTION 2.3.6.   (1 x 2) (2)

2.4   Rocks have different types of strata which give rise to unique landforms.
        Use FIGURE 2.4 to observe some of these landforms and answer the
        questions that follow.

        2.4.1   Identify the features (landforms) labelled **E** and **F**.   (2 x 2) (4)

        2.4.2   Give ONE difference between feature (landform) **E** and **F**.   (1 x 2) (2)

        2.4.3   Of what value is this landscape to man? Give TWO reasons.
                  (2 x 2) (4)
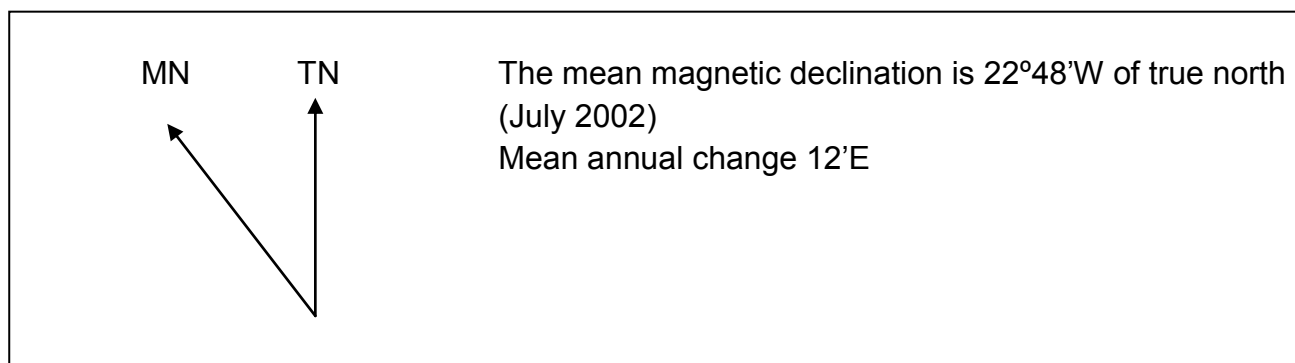   [52]

Figure 2.4
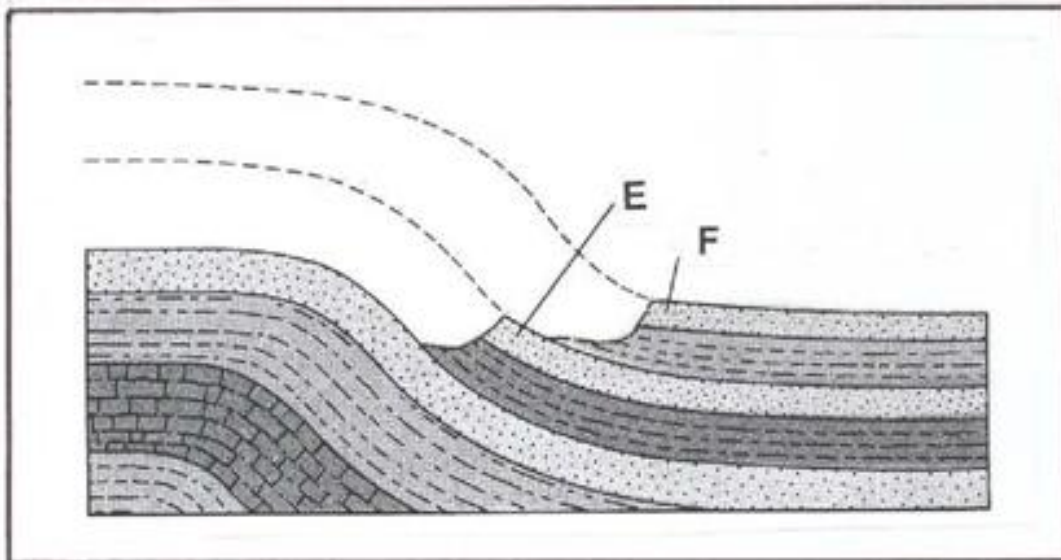
QUESTION 3   20 minutes   20 marks

(Source: Adapted exercise Senior Geography Grade 12)

This question is aimed at testing your calculation capabilities in mapwork. Most learners lose the majority of their marks in the calculation section of the mapwork paper (Paper 2).

Refer to the 1: 50 000 topographical map of Harrismith, and answer the questions that follow:

MN   TN   The mean magnetic declination is 22°48'W of true north (July 2002)
Mean annual change 12'E

3.1   Calculate the straight line distance from A (D2) to Δ299 (D3), in km.   (2)
3.2   Determine the bearing from Ⓔ (A4) to •1747(E3).   (2)
3.3.   Determine the current magnetic bearing from Ⓔ (A4) to •1747 (E3). Show all
calculations.   (8)
3.4   Calculate the area of the map, in km². Show all calculations.   (5)
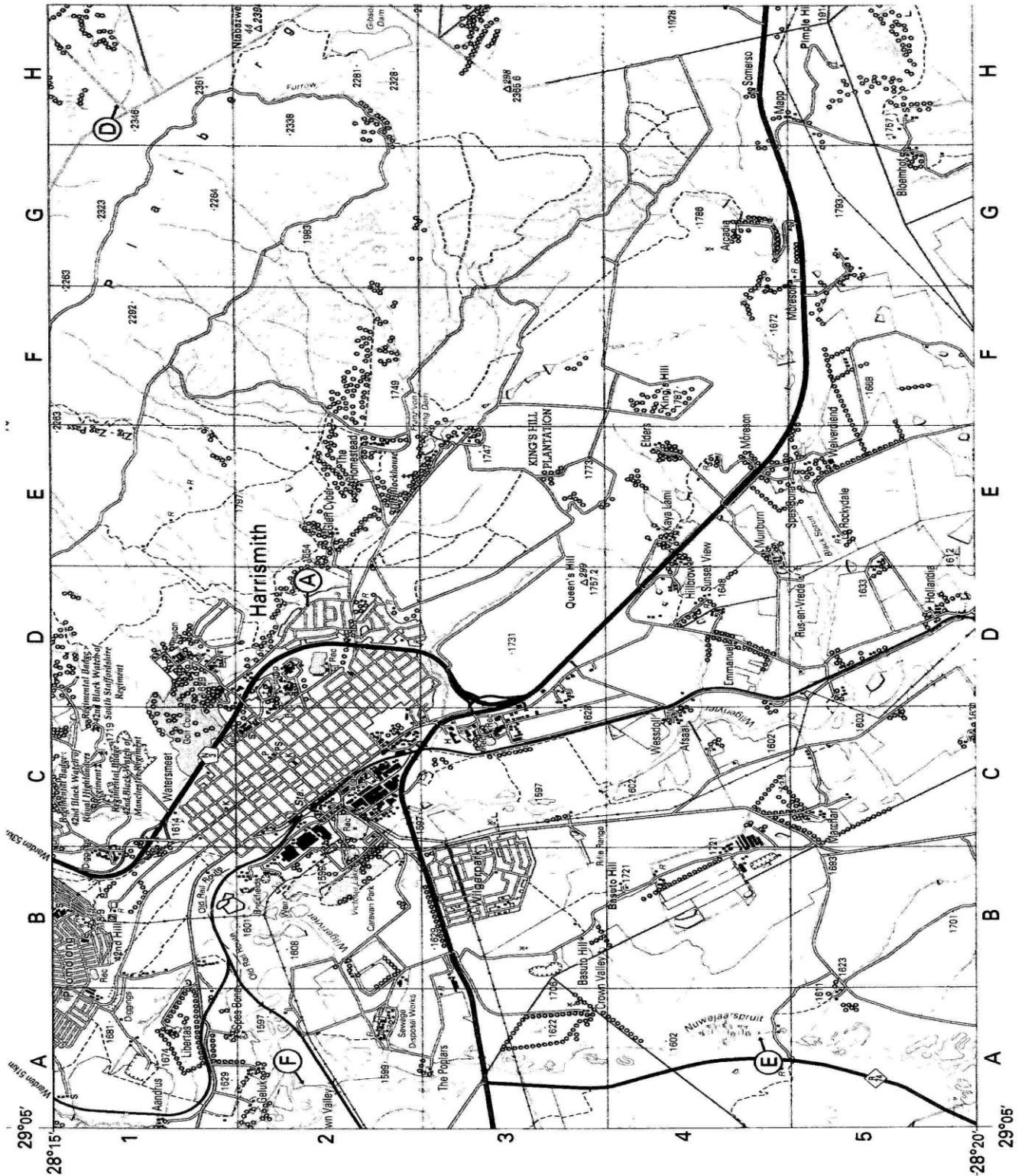3.5   What is the gradient from •1721(B4) to Δ299 (D3).   (3)
[20]

Plate 1

1 : 50 000 topographical HARRISMITH

SECTION B: SOLUTIONS TO SECTION A

QUESTION 1

1.1

1.1.1 True √√
1.1.2 True √√
1.1.3 False √√
1.1.4 False √√
1.1.5 True √√   (5 x 2) (10)

1.2
1.2.1 SE wind√√

10 knots√√

Clockwise rotation around HP in Southern hemisphere√√

Wind is geostrophic and parallel to isobars√√

Wind is weak as PGF is small (Isobars far apart) √√   (5 x 2) (10)

1.2.2 Cold front (Mid-latitude cyclone) √√   (1 x 2) (2)

1.2.3 PE – Temperature 17ºC√
            Wind direction SW√
            Wind speed 20 knots√
        EL – Temperature 24ºC
            Wind direction WNW√
            Wind speed 20 knots√   (6 x 1) (6)

1.3
1.3.1 Line thunderstorms√√   (1 x 2) (2)
1.3.2 Summer√√   (1 x 2) (2)
1.3.3 South Indian HP feeds in warm moist air√√

South Atlantic HP feeds in cold dry air√√

The two air masses converge over the interior, where the warm air

rises causing rain to occur√√   (3 x 2) (6)

1.3.4 Moisture front / Trough line√√   (1 x 2) (2)
1.3.5 Eastern√√   (1 x 2) (2)

1.4
1.4.1 (a)   Johannesburg Central√√   (1 x 2) (2)
        (b)   Johannesburg Suburbs√√   (1 x 2) (2)

1.4.2 (a) The smoke concentration is greater in cities√as there is more pollution
            created√ here especially by cars√
        (b) The heat island will coincide √ with the area of highest√ smoke concentration√
                                                                                (3 x 2) (6)

1.4.3 In winter more energy√ is used for heating and lighting. More coal in particular
        is burnt√, but also other fuels such as wood. The HP is dominant√ in winter
        which pushes the inversion lower causing a higher concentration in pollution
        levels√   (4 x 2) (8)
                                                                                [60]

QUESTION 2

2.1

2.1.1   The entire watershed moves backward√√

2.1.2   A river that erodes into its own bed causing a canyon√√

2.1.3   Rocks that have fallen off the free face and are broken fragments of
         rock are called talus√√

2.1.4   A very slow form of mass movement caused by expansion and contraction.
         Occurs on the crest√√

2.1.5   This is the inner bank of a meander√√   (5 x 2) (10)

2.2

2.2.1   Intrusive Igneous√√ volcanic formations√√   (2 x 2) (4)

2.2.2   A = Batholith√√ B= Dome√√   C= Tor√√   (3 x 2) (6)

2.2.3   Any ONE
               Level of water table√√
               Intensity of rainfall√√
               Vegetation cover√√
               Steepness of topography√√
               Hardness of rock√√   (1 x 2) (2)

2.3

2.3.1   D – Trellis √√
         E – Angular/Rectangular √√   (2 x 2) (4)

2.3.2   Deciduous woodland √√
         Semi-permeable sandstone√√   [Any ONE]   (1 x 2) (2)

2.3.3   Dam/Reservoir √√   (1 x 2) (2)

2.3.4   Increases infiltration √√
               Groundwater content increases √√
               Increase in base flow to maintain river run-off √√
               Decrease in evaporation to increase availability of water √√
               Decreases run-off and soil erosion √√   [Any TWO]   (2 x 2) (4)

2.3.5   First rainfall infiltrates the soil and does not contribute to run-off√√
         Rainfall first forms sheet flow before it reaches a stream √√   (2 x 2) (4)

2.3.6   B√√   (1 x 2) (2)

2.3.7 Woodland will retard flow of water√√
         More water will infiltrate √√
         Will take longer for water to reach main stream at B √√
         Built up area will reduce infiltration √√
         Run-off will reach main stream at A quicker √√
         More tributaries run into stream B √√   [Any ONE]   (1 x 2) (2)

2.4

2.4.1 E – Homoclinal ridge / Cuesta √√

F – Mesa √√   (2 x 2) (4)

2.4.2 E tilted more in relation to the earth's surface √√

E has two steep slopes √√

F has one steep and one gentle slope √√   [Any ONE]   (1 x 2) (2)

2.4.3 A Of strategic importance – defensibility √√

Soft layers between ridges form fertile soil suitable for agriculture √√

If formed around basin shaped features it could trap ground water √√

Steep slopes afforested √√

[Any TWO. Accept other]   (2 x 2) (4)

[52]

QUESTION 3

3.1   Distance = 4,9cm√

4,9cm x 0,5

2,45km√   (2)

3.2   69º√√   (2)

3.3   MB = TB + MD√

TB 69º√

MD in 2002 was 22º48'W

Annual change is 12'E√

Change in years = 2011 – 2002

= 9 years√

Change in MD = 9 x 12'

= 108' (1º48') √

MD in 2011 = 22º 48' - 1º 48'

= 21º W of TN√

MB = TB + MD

= 69º + 21º√

= 90º√   (8)

3.4   Area = L x B √

12,9cm x 10,9cm√

(12,9 x 0,5) x (10.9 x 0,5) √

6,45km x 5,45km√

35,64km²√   (5)

3.5   Gradient = $\dfrac{VI}{HE}$

= $\dfrac{1757,2 – 1721m√}{6,6cm}$

= $\dfrac{36,2}{6,6 \times 500}$

= $\dfrac{36,2 ÷ 36,2}{3300 ÷ 36,2}$ √

= $\dfrac{1}{91,16}$

= 1: 91,16√   (3)

[20]

SECTION C: HOMEWORK

QUESTION 1:   **30 minutes   40 marks** *(Source: NCS grade 12 November 2010 and other previous papers)*

1.1   Choose the correct alternative. Write only the question number and letter:

1.1.1   The movement of air towards a low pressure is called:
    A   divergence
    B   adiabatic
    C   anabatic
    D   convergence

1.1.2   The atmospheric cell found on either side of the equator is the:
    A   Ferrel cell
    B   mid-latitude cell
    C   tropical cyclone
    D   Hadley cell

1.1.3   The ITCZ is the convergence of:
    A   polar easterlies
    B   westerlies
    C   tropical westerlies
    D   tropical easterlies

1.1.4   Winds that converge at the polar front are:
    A   westerlies and tropical easterlies
    B   polar easterlies and westerlies
    C   polar westerlies and easterlies
    D   polar easterlies and tropical westerlies

1.1.5   The anticlockwise change in direction of wind with the passing of a mid-latitude cyclone over Cape Town is called:
    A   backing
    B   veering
    C   converging
    D   rotating   (5 x 2) (10)

1.2   Refer to the diagram below and answer the questions that follow:
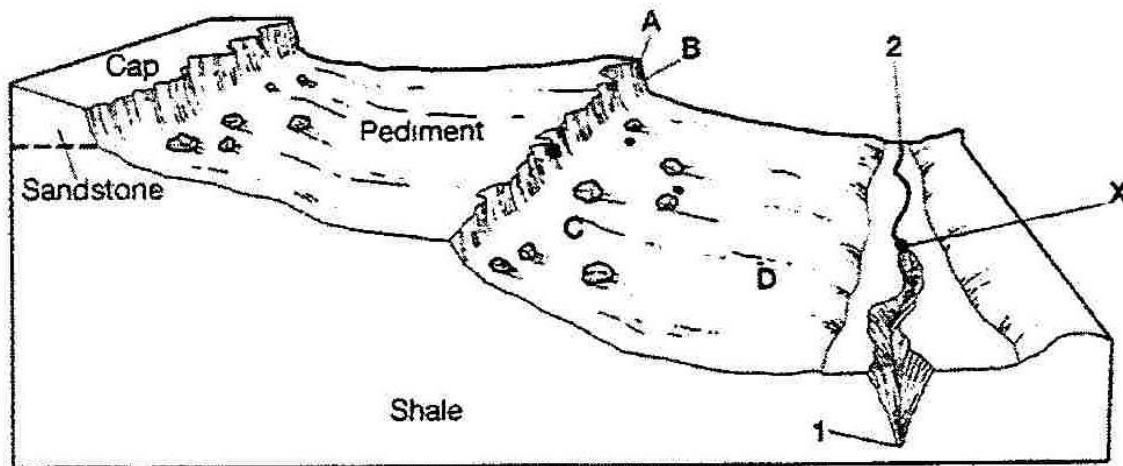
1.2.1 Name the slope forms A, B, C and D respectively.   (4 x 1) (4)

1.2.2 Give ONE characteristic of the slope form at C.   (1 x 2) (2)
1.2.3 Name the mass movement likely to occur at B.   (1 x 2) (2)
1.2.4 A knickpoint waterfall is located at X.
       (a)   Draw a long profile from 1 to 2.   (2 x 1) (2)
       (b)   Explain why a knickpoint waterfall would have formed.   (3 x 2) (6)

1.3   Write down the number of the question and the correct answer alongside.

1.3.1 Anabatic winds are
       A   Cool winds that sink down the valley sides during the night
       B   Warm winds that sink down the valley sides during the day
       C   Warm winds that rise up the valley sides during the day
       D   Cool winds that rise up the valley sides during the day

1.3.2 Urban areas generally have
       A   higher precipitation, gusty winds, higher temperatures
       B   lower precipitation, gusty winds, higher temperatures
       C   higher precipitation, gusty winds, lower temperatures
       D   higher precipitation, gentle winds, lower temperatures

1.3.3 The tropical cell of general circulation of the atmosphere occurs between
       A   60° - 90° north and south of the equator
       B   30 ° - 60 ° north and south of the equator
       C   0 ° - 30 ° north and south of the equator
       D   0 °- 40 ° north and south of the equator

1.3.4 The warmest slopes in the northern hemisphere are the
       A   north slopes
       B   south-facing slopes
       C   south slopes
       D   north-facing slopes

1.3.5 The ITCZ
    A   brings rain to southern Africa in winter
    B   is the inter-tropical convergence zone
    C   is associated with frontal rain
    D   is continuous in tropical areas

1.3.6 The instrument used to measure atmospheric temperature is:
    A   barometer
    B   thermometer
    C   hydrograph
    D   anemometer

1.3.7 The instrument used to measure wind speed is:
    A   thermometer
    B   isohyet
    C   contour
    D   anemometer   (7 x 2) (14)
                                                             [40]

QUESTION 2: 30 minutes   50 marks
(Source: NCS Gr 12 November 2010 and various other past papers)

2.1   Provide the correct terminology for:

2.1.1 The process by which the entire watershed moves backwards.
2.1.2 The angle of rock fragments that collect on the talus slope.
2.1.3 The process by which intrusive igneous rock is weakened.
2.1.4 A river that obtains its water from upstream.
2.1.5 Rock that allows water to move easily through it.   (5 x 2) (10)

2.2   Refer to FIGURE 2.2 which shows a river system and its flow hydrograph.
2.2.1   What is a *river system*?   (1 x 2) (2)
2.2.2   Explain how the following factors influence the amount of water (discharge)
       that flows in the stream:
       (a) Impermeable bedrock   (1)
       (b) Dense vegetation   (1)
2.2.3 Determine the stream order at point **X** where the stream flows out of the
       drainage basin.   (1 x 2) (2)
2.2.4 What evidence suggests that this is a superimposed stream?   (1)
2.2.5 State the lag time on the flow hydrograph.   (1)
2.2.6 The proposed development of a new urban settlement along the stream
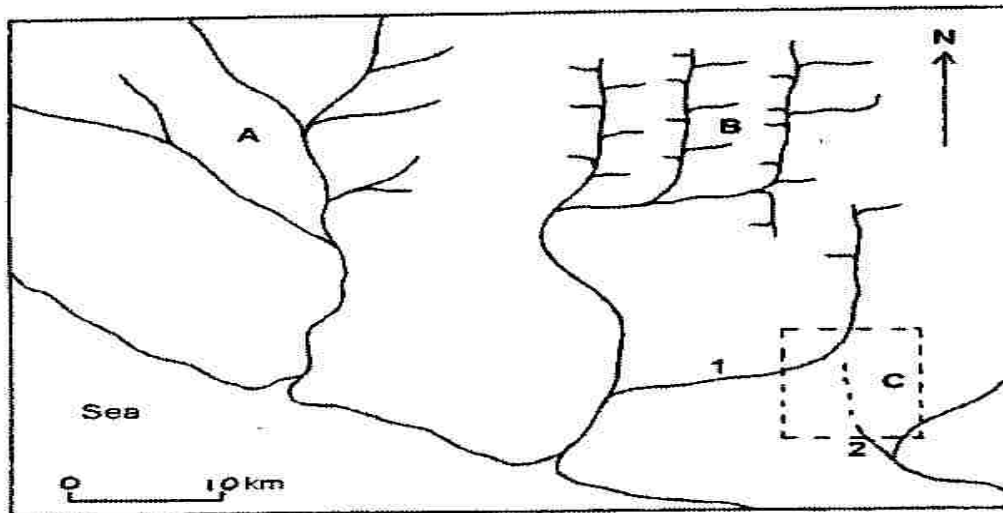   would influence the flow characteristics of the stream.

       Write a single paragraph (no longer than 12 lines) describing, with reasons,
       how the proposed urban development along the stream will change the
       lag time and the flood peak indicated on the flow hydrograph.   (6 x 2) (12)

Figure 2.2
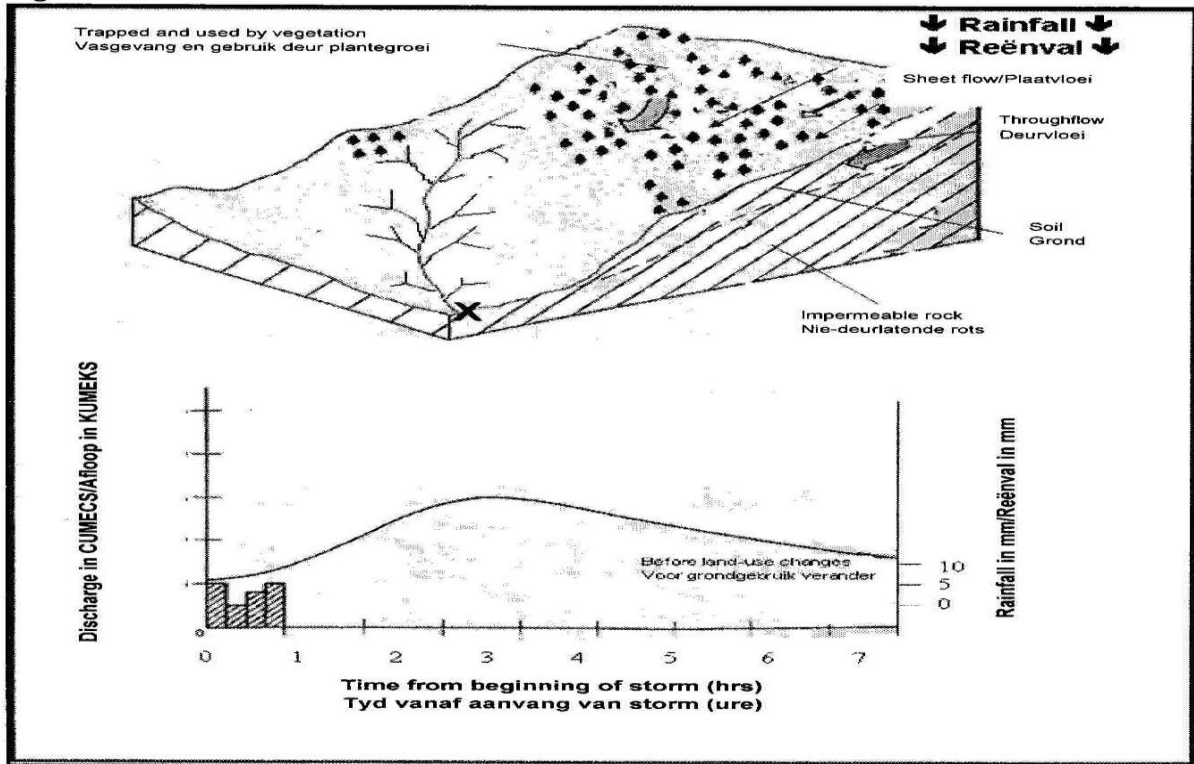
2.3 Refer to the following diagram and answer the questions that follow:

2.3.1	Identify the stream patterns at A and B.	(2 x 2) (4)
2.3.2	Suggest the underlying geology for each of the respective stream patterns.	(2 x 2) (4)
2.3.3	(a) what process is occuring in block C?	(1 x 2) (2)
	(b) re-draw block C on your answer page and label all the relevant geographical features.	(4 x 2) (8)
2.3.4	What is the highest stream order in river A?	(1 x 2) (2)
		[50]

SECTION D: SOLUTIONS TO HOMEWORK

QUESTION 1

1.1

1.1.1   D√√
1.1.2   D √√
1.1.3   D √√
1.1.4   B √√
1.1.5   A √√   (5 x 2) (10)

1.2

1.2.1 A = Crest√ B = Free face√ C= Talus√ D= Pediment√   (4 x 1) (4)
1.2.2 Any ONE
         Usually at 35º (angle of repose) √√
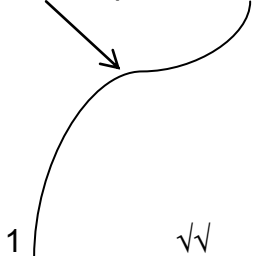   Consists of shattered rock fragments√√   (1 x 2) (2)
1.2.3 Mass wasting / rock falls√√   (1 x 2) (2)

1.2.4 (a)   x = knickpoint   2

         1 │   √√   (2 x 1) (2)
         (b) Resistant layer of rock resisted erosion√√ / or sea level dropped√√
              and level rose√√.   (3 x 2) (6)

1.3
1.3.1 C√√
1.3.2 A√√
1.3.3 C√√
1.3.4 B√√
1.3.5 B√√
1.3.6 B√√
1.3.7 D√√   (7 x 2) (14)
                                                                              [40]

QUESTION 2

2.1

2.1.1 Abstraction √√
2.1.2 Angle of repose (±34º) √√
2.1.3 Weathering √√
2.1.4 Exotic stream √√
2.1.5 Aquifer√√   (5 x 2) (10)

2.2

2.2.1   Main river and its tributaries collectively √√   [Concept]   (1 x 2) (2)

2.2.2 (a) <u>Impermeable bedrock</u>
         More water flowing/higher run-off because of less infiltration √
       (b) <u>Dense vegetation</u>
         Less water/less run-off because of more infiltration √   (2)

2.2.3 3rd order √   (1 x 2) (2)

2.2.4 The underlying rocks are inclined while the dendritic pattern is associated with
        horizontal strata √
        Stream flow not determined by underlying rock structure √
        Thinning/erosion of underlying rock structure √
        River maintained its course √
        Accept definition if evidence of superimposed stream is given √
                                        [Any ONE]   (1)

 2.2.5 About 2,5 to 3,5 hours √   (1)

 2.2.6 Lag time reduced/shorter √√
        Flood peak higher √√
        The hydrograph will change to a sharply rising limb √√
        Flood peak will be reached in a shorter space of time √√
        Removal of vegetation increases run-off √√
        More water will reach the stream much quicker thus reducing lag time √√
        Less retention therefore water reaches the stream quicker √√
        An urban settlement increases surface run-off compared to the existing
        landscape where the infiltration is higher √√
        Urban development could increase rainfall (more hygroscopic nuclei) √√
        The urban settlement has an artificial surface (tar, concrete) which does not
        retain water √√
        More water reaches the stream √√
        The flood peak will last for a shorter space of time because of the quick run-off
        rate √√
        Artificial surfaces reduce friction so water flows faster √√
                                        [Any SIX]
        [If listed and only words/phrases used **ONE** mark. If full sentences
        used **TWO** marks]   (6 x 2) (12)

2.3.
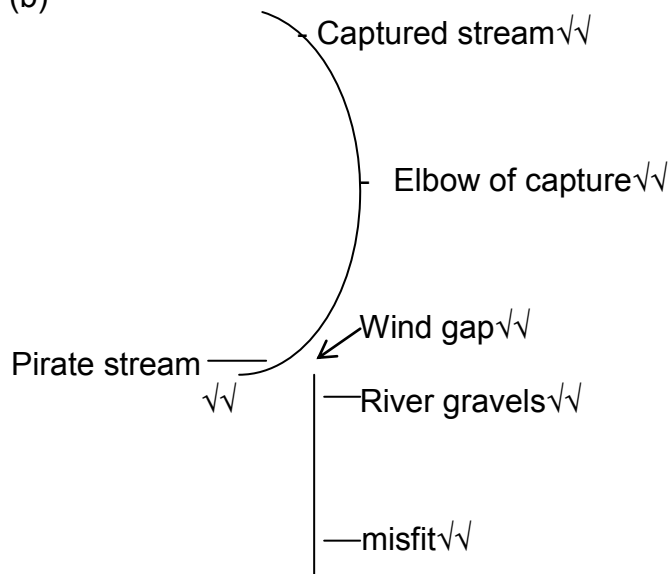2.3.1 A = dendritic √√   B = trellis√√   (2 x 2) (4)
2.3.2 A – uniform resistant rock, usually flat / horizontal sedimentary rock√√
        B – folded sedimentary rock√√   (2 x 2) (4)

2.3.3 (a) Stream piracy√√   (1 x 2) (2)

(b)

Captured stream√√

Elbow of capture√√

Wind gap√√

Pirate stream √√

River gravels√√

misfit√√

Any FOUR labels.   (4 x 2) (8)

2.3.4 3√   (1 x 2) (2)

[50]