Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

8212470188

ENVIRONMENTAL MANAGEMENT **5014/21**

Paper 2 **October/November 2016**

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

Study the appropriate source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **14** printed pages and **2** blank pages.

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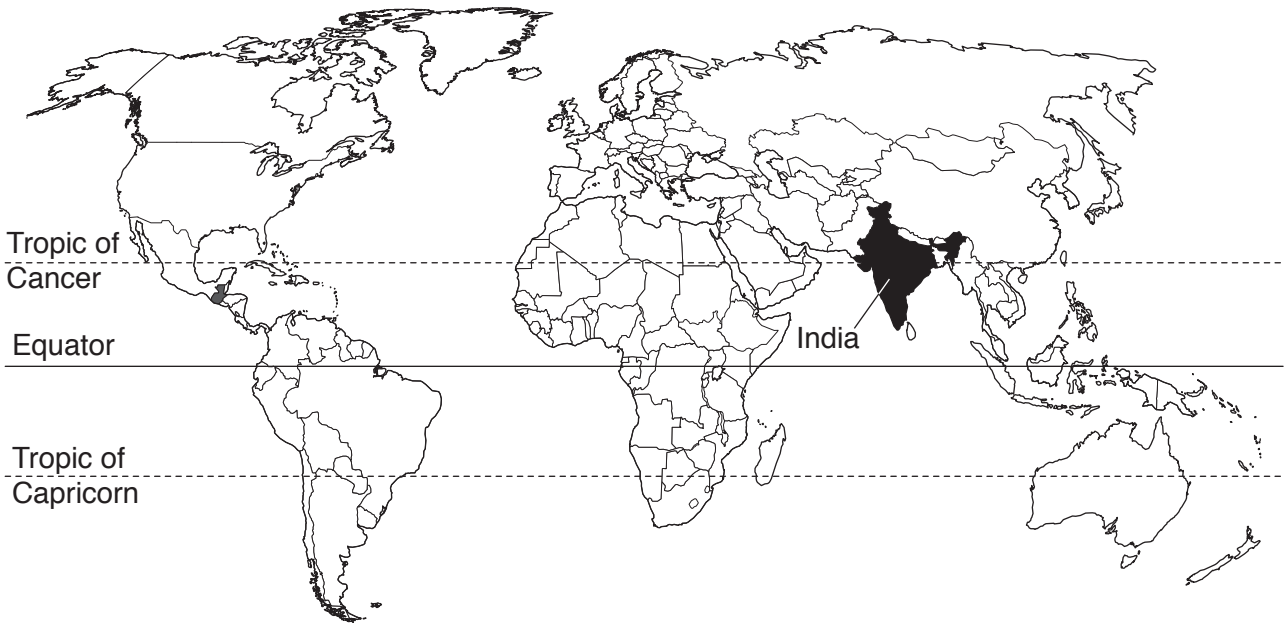
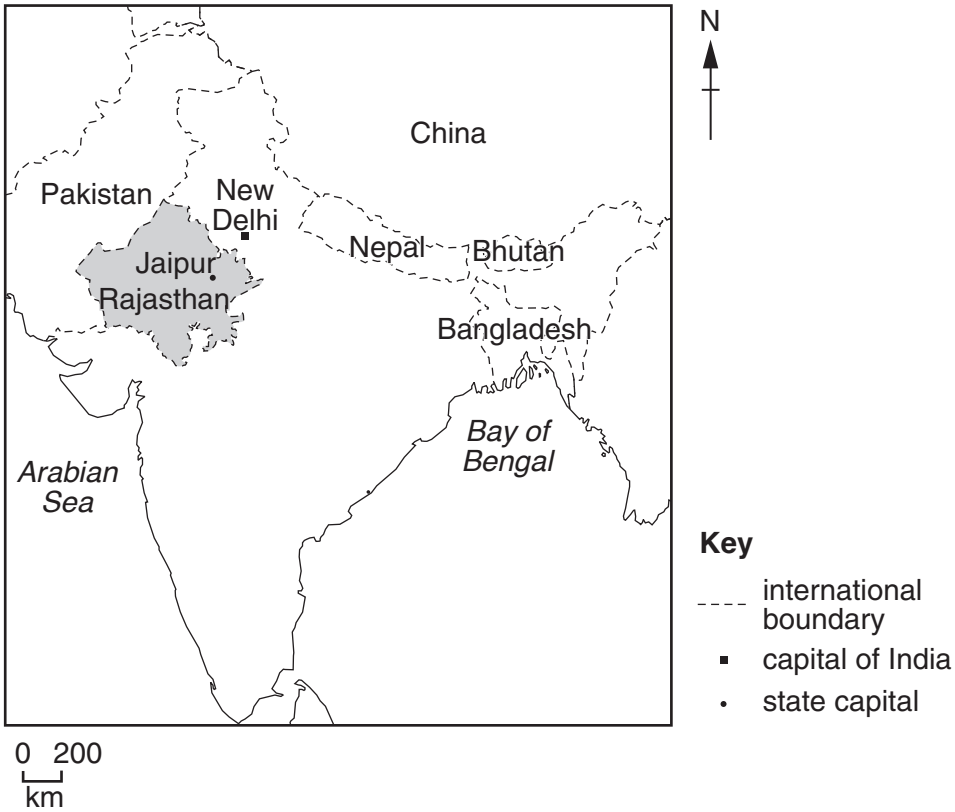
CAMBRIDGE International Examinations

map of the world



map of India



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area of India: 3.3 million km^2

population: 1252 million

children per woman: 2.48

life expectancy: 68 years

currency: Indian Rupee (60 INR = 1 USD)

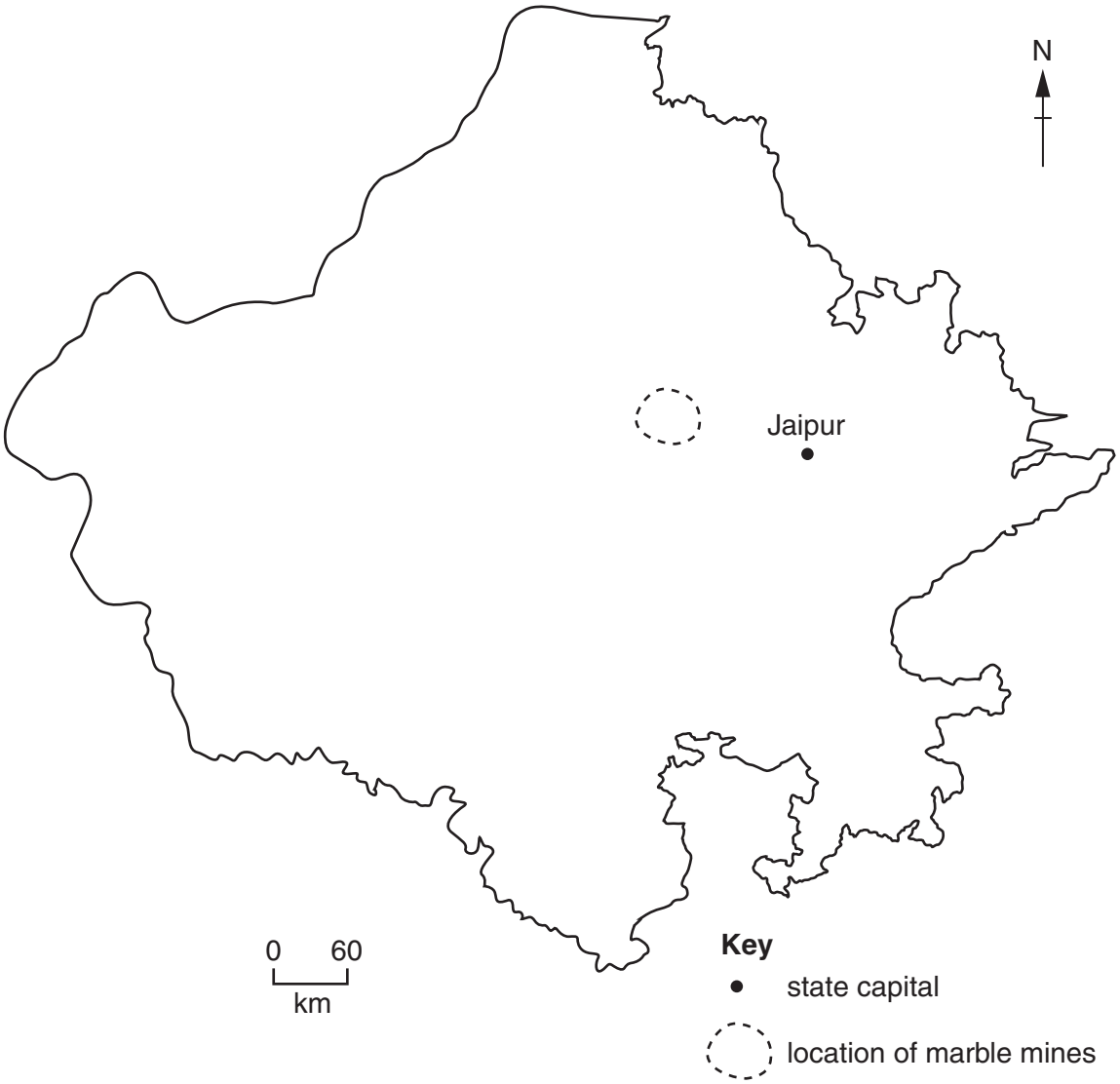
languages: Hindi, many other languages

climate: tropical monsoon, arid in north west

terrain: mountains in the north, Ganges valley, plateau in south

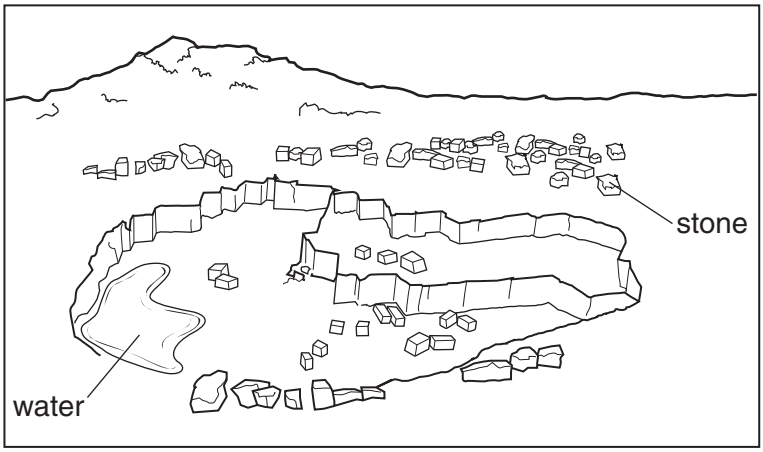
main exports: petroleum products, precious stones, machinery, iron and steel, chemicals, vehicles, clothing

map of Rajasthan



1 Rajasthan has the largest area of any state in India and a population of 85 million.

Most of the population are farmers and live in small villages. Natural resources include marble, granite, sandstone, copper, zinc and oil. There are thousands of small quarries and mines from which stone is extracted. An example is shown in the diagram below.



(a) The eight largest cities in the state are shown in the table.

city	population / millions
Jaipur	3.1
Jodhpur	1.2
Kota	1.0
Bikaner	0.7
Ajmer	0.6
Bhilwara	0.4
Alwar	0.4
Bharatpur	0.3
total	.....

(i) Complete the table. [1]

(ii) Calculate the percentage of the 85 million people of Rajasthan that live in these cities.

Space for working.

..... % [1]

(b) Some businesses in the cities trade in stone to supply other states in India and to export to other countries. White marble is a valuable form of stone. Labourers migrate from farming villages to work in the mines. Most of the work is done by hand. When the mines flood, work stops for at least three months.

Look at the rainfall data for a location near a mine.

month	J	F	M	A	M	J	J	A	S	O	N	D
average rainfall / mm	5	3	4	3	11	93	239	232	105	18	16	2

(i) State in which **three** months work is most likely to stop in the mine.

.....[1]

(ii) Suggest the impact on labourers when mining has to stop.

.....

.....[1]

(iii) People living near a mine suffer more disease when the mine is flooded than when it is not flooded.
Suggest why.

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.....[3]

(iv) This mining of marble causes noise and dust pollution.
Suggest how noise and dust pollution can affect the environment near the mine.

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.....[4]

(c) Read these quotes from two miners.

We work ten hours a day, six days a week. Our employer only gives us water to drink.

Many miners cannot continue working for more than a few years as their lungs become damaged. They are not paid compensation when they can no longer work.

(i) Suggest **three** other items employers should give to miners.

.....

.....

.....

.....[3]

(ii) Suggest why the miners are **not** paid compensation.

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.....[2]

(d) Mines are abandoned when all the marble has been removed.
Describe what can be done to restore the land when a mine reaches the end of its working life.

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.....[4]

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(e) A student carried out a visual survey of three piles of waste from a marble mine.

waste pile one
No plants on pile. Plants only seen 10 m from the edge of the pile. Dust comes from pile when wind blows.

waste pile two
No dust released when wind blows. Some plants on one side of pile. A few plants 5 m from pile.

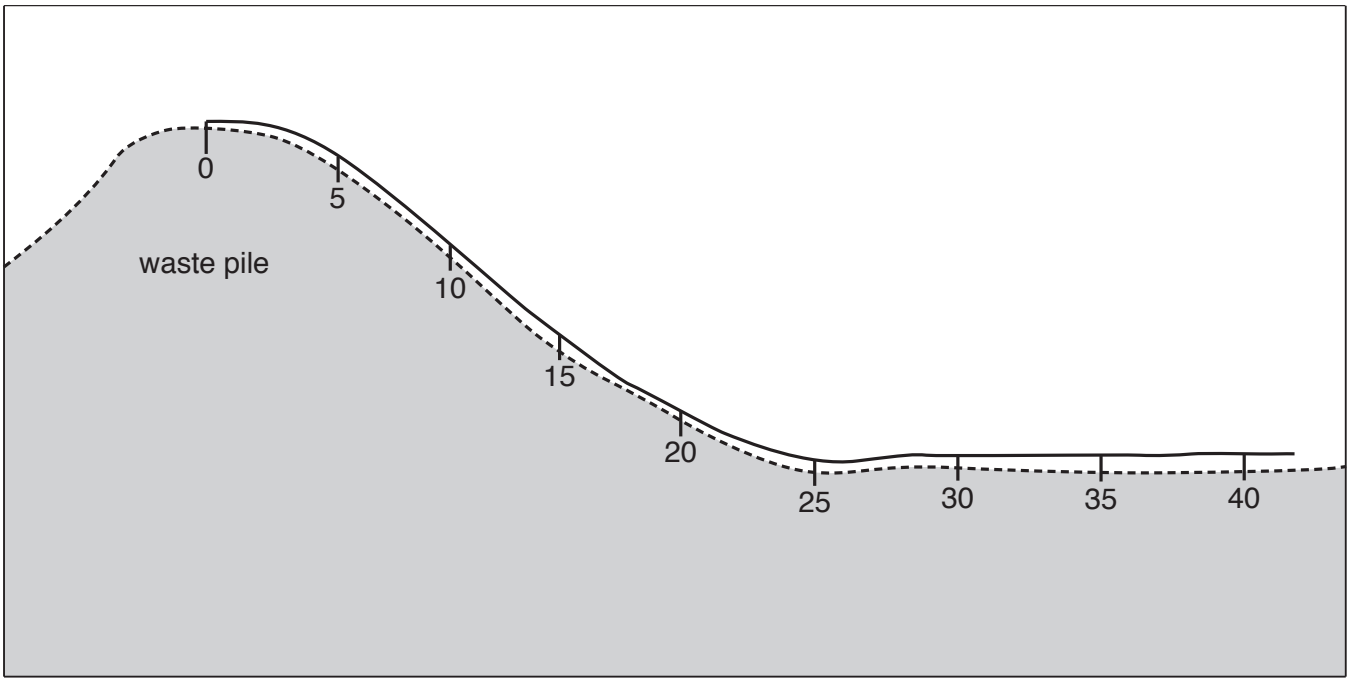
waste pile three
Some plants on all sides of the pile. No dust released when wind blows. Some plants at the base of the pile.

Using this information, state which is the newest and which is the oldest pile.

newest .....

oldest ..... [2]

(f) The student decided to carry out a more detailed survey to record the plants found along a transect starting at the top of a waste pile. They surveyed at 5 m intervals using a 0.25 m^2 quadrat. The student also measured pH and surface temperature at 5 m intervals.



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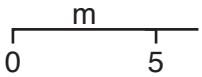

transect line

surface of waste pile

The results are shown in the table.

distance from top of waste pile / m	0	5	10	15	20	25	30	35	40
number of plants	1	2	5	8	12	13	18	17	18
number of plant species	1	1	1	2	3	3	5	4	5
pH	8.7	8.6	8.5	8.2	7.7	7.4	7.2	7.2	7.2
surface temperature / °C	25	25	26	26	25	24	23	23	24

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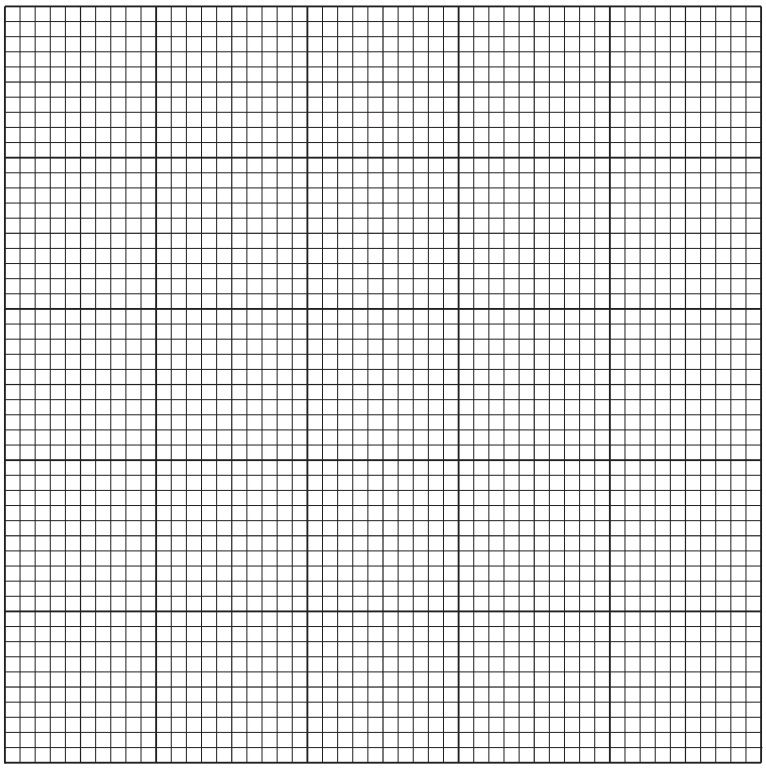
(i) Plot a graph of the **number of plants** along the transect on the grid below. [4]



(ii) Describe the trend shown by the graph.

.....

.....[1]

(iii) The student decided that waste from the mine had an effect on the plants. Using information in the table, and your own knowledge, explain the findings of this survey.

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.....[4]

(iv) Explain why these findings may **not** be representative of the problems caused by the marble mine waste in Rajasthan.

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.....[2]

(v) Describe **one** other investigation the student could carry out in a laboratory to find out how dust from these mines may affect wheat crops grown nearby.

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.....[3]

(g) About half the rock from marble mines becomes waste. When cutting and polishing machines are used, large amounts of marble powder mix with water to form slurry. This is pumped onto nearby land.
A machine has been made that can produce building blocks. The following raw materials can be used to make up to 750 000 blocks in one year.

raw material	mass / tonnes
cement	11
sand	32
slurry	272
total	315

(i) Calculate the percentage by mass of slurry in each block.

Space for working.

..... % [2]

(ii) Suggest advantages to block-makers and mine owners of using this machine.

block-makers .....

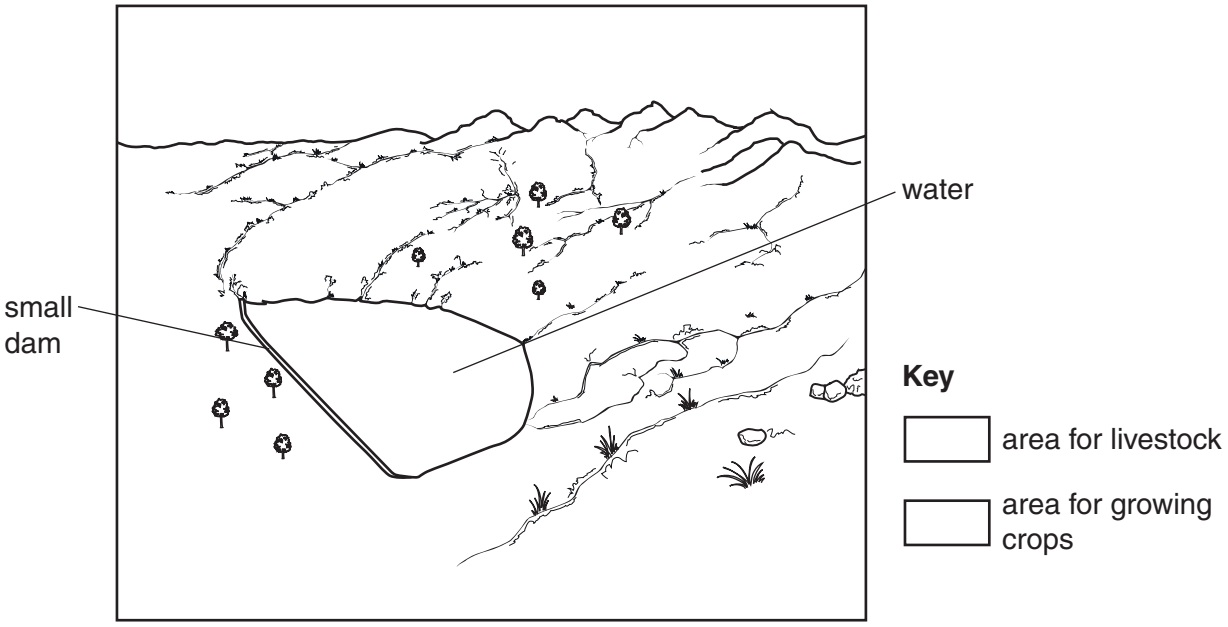
.....

mine owners .....

.....

[3]

2 **(a)** The annual rainfall across Rajasthan varies from 100 mm to 1000 mm. The average annual rainfall is 574 mm. Some parts of Rajasthan experience drought. Many villages have built a small dam to capture surface run-off. This water refills wells and aquifers.
An example is shown below.



(i) Shade in **one** area suitable for livestock and **one** area suitable for growing crops. Complete the key. [3]

(ii) Explain your choices in part **(i)**.

.....

.....

.....

.....[2]

(iii) Describe how wells below the small dam can provide water during drought.

.....

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.....[2]

(b) Read the newspaper report shown below.

This year's drought continues

The drought continues. Most villages with small dams still have enough drinking water, but livestock are now suffering. There have been many reports of less reproduction, lower milk yields, poor health and high mortality rates amongst all types of livestock.

Suggest reasons why the government is usually reluctant to declare a drought.

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.....[3]

(c) To find out how drought affects villages a survey of livestock is carried out regularly. A sample of villages in every district is surveyed.

(i) Describe how the villages could be sampled for this survey.

.....

.....[1]

(ii) A questionnaire is used to find out about the survival of village livestock and their productivity. Complete the questionnaire with **three** further questions. The first one has been done for you.

1. Which animals do you keep?

goats ☐ sheep ☐ chickens ☐ buffalo ☐

2. .....

.....

3. .....

.....

4. .....

.....

[4]

(iii) Some results for the survey of one village in a drought year are shown below.

animal	number before drought	number after drought	percentage decrease
goats	110	101	8.2
sheep	150	98	34.7
chickens	200	155	22.5
buffalo	35	32	.....

Complete the table. [1]

Space for working.

(iv) Suggest reasons why some types of livestock are less affected by drought than others.

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.....[3]

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