Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education
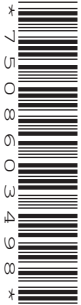
CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

ENVIRONMENTAL MANAGEMENT **0680/43**

Alternative to Coursework **October/November 2015**

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 **19** printed pages and **1** blank page.

CAMBRIDGE International Examinations

[Turn over

PAPA CAMBRIDGE

2

map of the world

N

Tropic of Cancer

Equator

Tropic of Capricorn

India

map of India

N

Hyderabad Visakhapatnam

Andhra Pradesh

Bay of Bengal

0 100
km
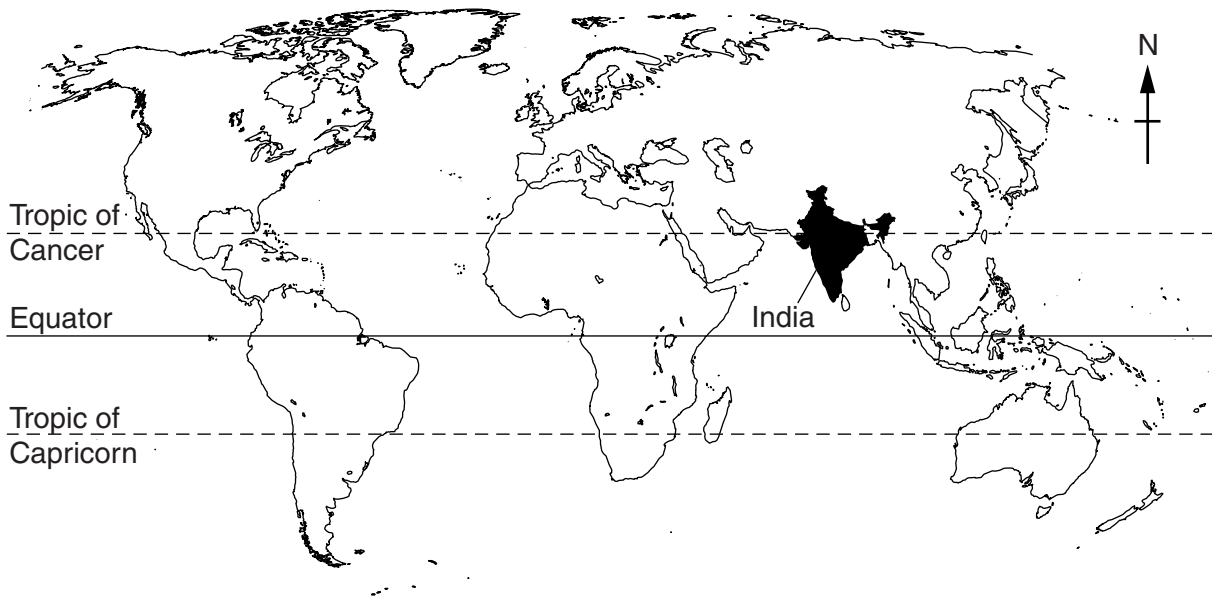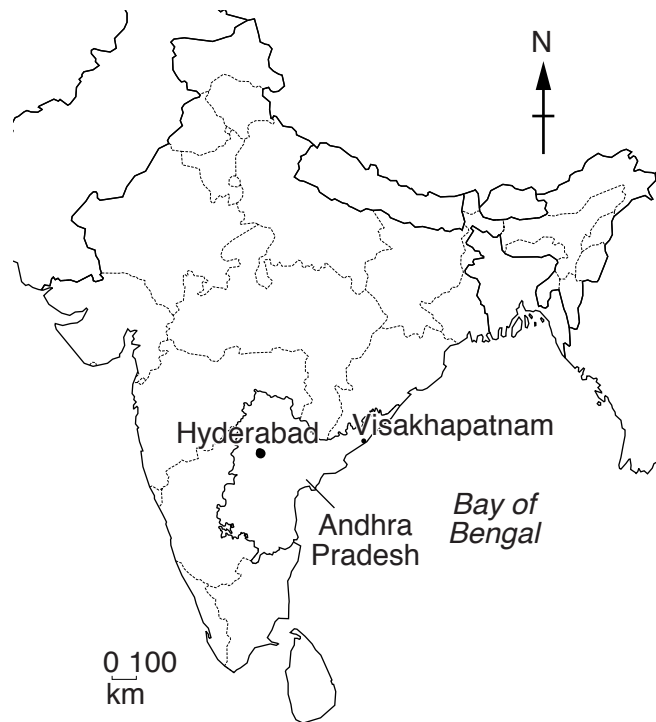
Key

• state capital

· beach location

PAPA CAMBRIDGE

Area of India: 3.3 million sq km

Population: 1210 million

Children per woman: 2.58

Life expectancy: 67 years

Currency: Rupee (45 INR = 1 US$)

Languages: Hindi, many other languages

Climate: varies from hot desert in the south, to cooler in the north

Terrain: Ganges valley, and remaining area is a plateau in the south, with deserts in the west, mountains in the north

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

Andhra Pradesh is the third largest state in India with a population of 85 million people.

It is very rich in natural resources and has a coastline of more than 900 km. The coast has many long sandy beaches. The sand contains valuable minerals. One mineral in demand in India and around the world is ilmenite. This is a magnetic ore that can be refined to produce titanium, a metal needed in a wide variety of manufacturing industries.

1 **(a)** Until recently licences have only been given for small-scale beach sand mining. All the sand is removed from the beach. The ilmenite and other valuable minerals are separated. The remaining sand is returned to the beach.

A local fisherman said,

> 'I cannot earn a living or feed my family when the beach sand mining is going on. My boat is not safe and the environment is being destroyed.'

A mining official said,

> 'The beach sand is only removed for a short time. Up to 85% of the sand is returned to the beach. The mining is helping everyone living in Andhra Pradesh.'
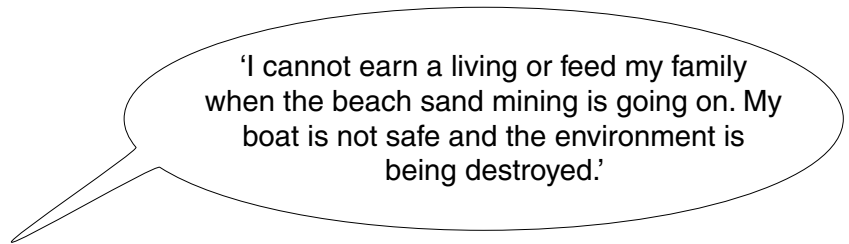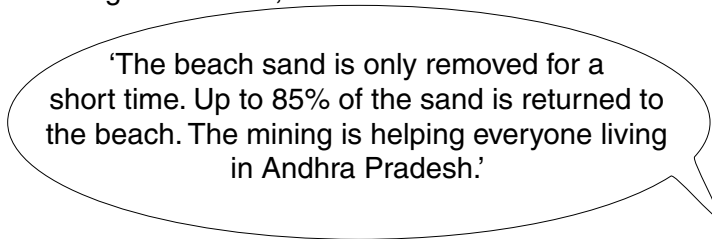
(i) Do you think the beach environment of Andhra Pradesh is being destroyed? Give a reason for your answer.

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....[1]

(ii) Suggest how beach sand mining could help everyone in Andhra Pradesh.

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....[2]

5

(b) The estimated reserves of ilmenite in beach sands in Andhra Pradesh are shown in the table below.

beach number	beach name	ilmenite reserves /million tonnes
1	Amalapuram	15
2	Bhavanapadu	10
3	Kakinada	29
4	Kalingapatnam	7
5	Narasapur	3
6	Nizampatnam	19
7	Srikurmam	14
8	Visakhapatnam	3
	total	100

(i) Calculate the percentage of total reserves located at beach 8 (Visakhapatnam).

Space for working.

....% [1]

A student visited the beach at Visakhapatnam and took 10 bags of sand from different locations. The bags were taken to a laboratory and the following method was used to extract ilmenite.
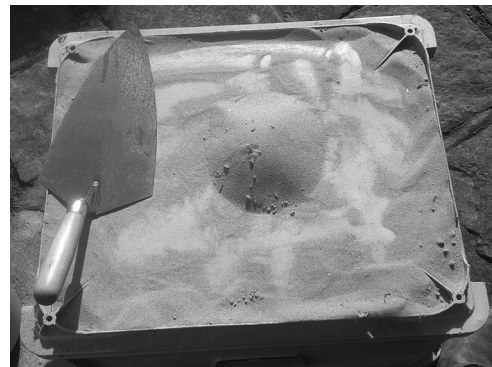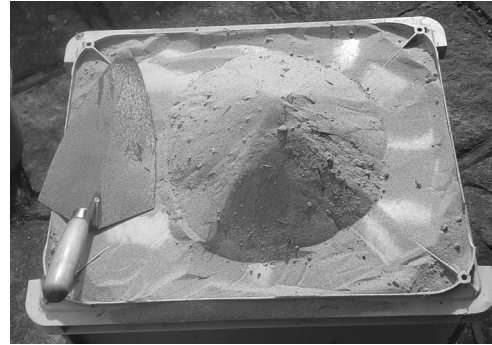
- empty a bag of sand onto a tray
- spread out the sand and leave to dry
- mix the sand with a trowel and make a cone
- divide the cone into four equal piles
- keep one pile and mix this with the trowel
- weigh a dish
- fill the dish with the sand sample and weigh again
- stir the sand with a magnet for two minutes
- remove the ilmenite from the magnet
- weigh the ilmenite

The results are shown in the table below.

sand sample	mass of sand sample/g	mass of ilmenite/g	percentage ilmenite in the sample/%
1	105	3.1	3.0
2	98	2.7	2.8
3	120	4.3	3.6
4	110	4.0	3.6
5	95	0.9	0.9
6	98	3.2	3.3
7	107	3.0	2.8
8	112	3.5	3.1
9	99	2.4	2.4
10	94	2.5	2.7
total	1038	29.6	average 2.8

(ii) State the **range** of percentage of ilmenite found by the student in the 10 sand samples.

....[1]

(iii) Identify the sample that does not fit the general pattern of results.

....[1]

(iv) Suggest **two** possible reasons why a sample from this experiment did not fit the general pattern of results.

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....[2]

(v) Another student repeated this experiment taking samples from the same locations. The student used the same method to recover ilmenite. The range for this experiment was 2.4 to 4.0%. Suggest reasons why this experiment found a different range of ilmenite than the first experiment.

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....[2]

 [Turn over

(c) After beach sand mining began in 2010, the fishermen and other local people were surveyed about their views using a questionnaire. The results persuaded the authorities to suspend the mining licence, and all mining stopped. The mining company then decided to employ fishermen and other local people to help remove the sand. Another mining licence was given to allow mining for three months each year.

One local person said,

'Now we are consulted about which sections of the beach should be mined as well as when beach sand mining should start and stop. Everybody has a chance to earn money from beach sand mining.'

The same survey was repeated after beach sand mining had started again. The results of both surveys are shown in the table.

question	percentage yes		percentage no		percentage do not know	
	when mining first began, 2010	in 2015	when mining first began, 2010	in 2015	when mining first began, 2010	in 2015
1. Is your environment being damaged?	60	25	25	65	15	10
2. Is your income being reduced?	75	15	20	81	5	4
3. Do you think this mining should be stopped?	90	24	8	68	2	8

(i) Suggest reasons for the changes in response to each question between 2010 and 2015.

question 1 ....

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question 2 ....

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question 3 ....

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[5]

(ii) Describe a method that could have been used to collect the results of these questionnaires.

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(d) The sand is taken away from the beach in trucks to a separation plant. The local people working on the beach are paid a share for each tonne of sand removed. Every truck is weighed on a weighbridge so there is no dispute and the amount of sand recorded.

sand

beach

weighbridge

25 000 kg

separation plant

beach

weighbridge

7000 kg

separation plant
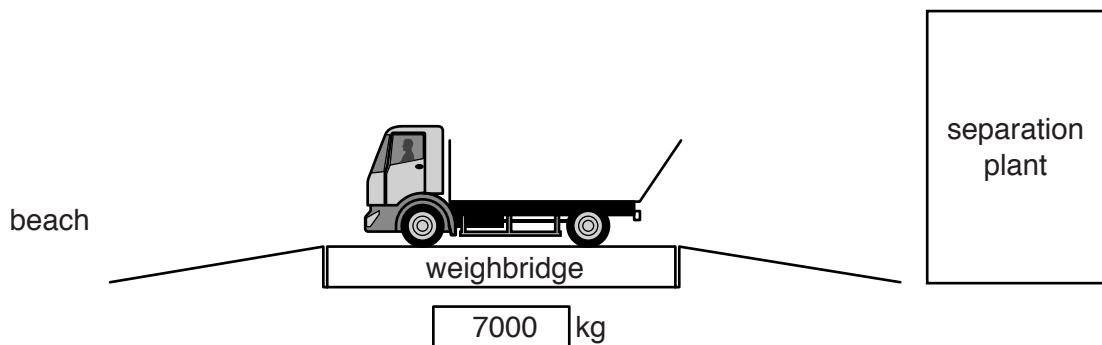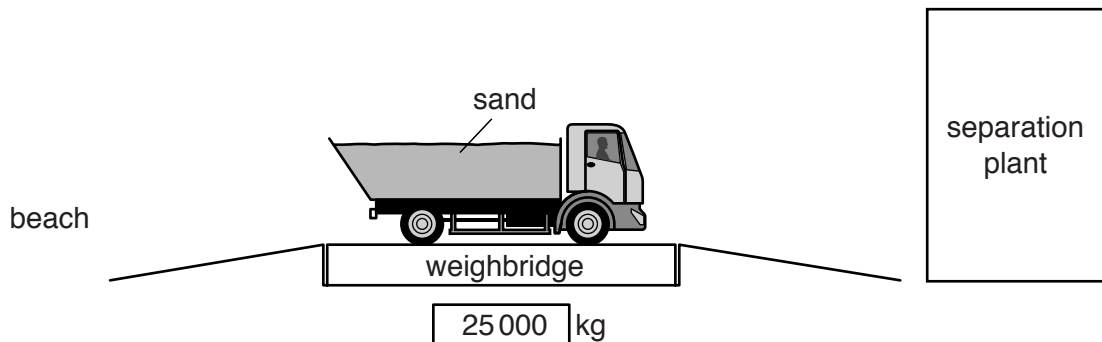
(i) Explain why the driver must stay in the truck when going onto and leaving the weighbridge.

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....[2]

(ii) The price paid to local people for each tonne of sand removed is adjusted each year using the All India Consumer Price Index. Explain why this is done.

....[1]

(e) The number of local people employed in beach sand mining at another location in Andhra Pradesh is shown in the table below.

year	number of local people employed
1	160
2	150
3	280
4	250
5	260
6	210
7	110
8	110
9	110

(i) Plot the data as a graph on the grid below.
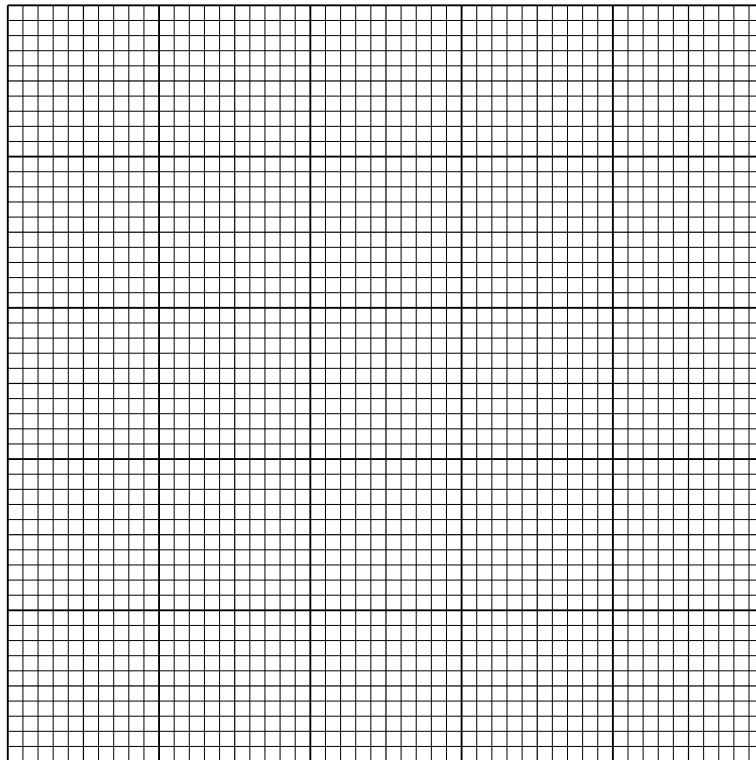
[4]

(ii) Describe the pattern shown by the graph.

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(iii) Suggest a reason for the change in the number of people employed between years 5 and 9.

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....[1]

(f) Some ilmenite deposits have been found 1 km inland. Some of these deposits have already been mined. This land has been reclaimed by planting large numbers of ironwood trees, with a few coconut trees and other trees.

Explain the advantages of reclaiming mined land in this way.

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....[3]

2 **(a)** Look at the photograph of an Olive Ridley turtle, which is an endangered species of marine reptile.

The female turtles come up a small number of beaches along the coastline of Andhra Pradesh, usually at night. They dig a nest in the sand and lay a large number of eggs. The turtles then return to the sea. Between 45 to 60 days later the hatchling turtles leave the nest at night and crawl down to the sea. Some conservationists have been surveying beaches to record the number of nests that have been dug during each nesting event. Nesting events usually take place from January to March each year.

The results of one beach survey are shown in the table.

nesting event	number of nests
A	36
B	67
C	39
D	42
E	51
average	....

(i) Complete the table.

Space for working.

[1]

The data from the table was plotted on a graph as shown below.
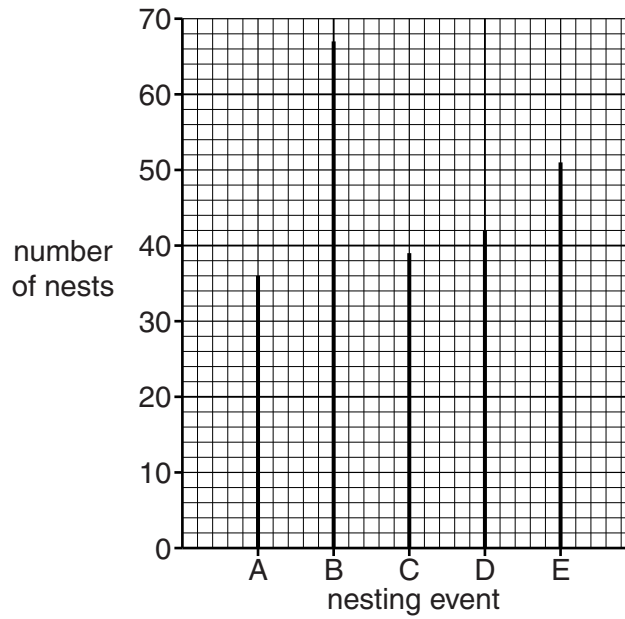
(ii) Draw a horizontal line on the graph to show the average number of nests you have calculated in part **2 (a)(i)**. [1]

(iii) The average number of eggs in a nest is 120.
Calculate the average number of eggs laid in nesting event A and nesting event E.

A   ....

E   ....   [2]

(iv) Describe what the results of this survey show.

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....[1]

(b) One conservationist said,

> 'After 45 days the eggs start to hatch. We guard the beach day and night to keep people and stray dogs away. We help as many hatchling turtles as possible to reach the sea.'

(i) Suggest why people and stray dogs can be a danger to hatchling turtles.

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....[2]

Another conservationist said,

> 'The Olive Ridley turtle is on the red list of the IUCN and is protected by CITES.'

(ii) Suggest how the red list and CITES can help to conserve this species of turtle.

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....[2]

(c) The sex of turtles is determined by the temperature of the eggs in the nest. A male to female ratio of 1:1 is produced at 30 °C. Suggest how climate change may affect the turtle population in the future.

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(d) The conservationists decided to try a new method of producing hatchling turtles so they could be returned to the sea. The eggs are removed from the nests and placed in new nests dug by the conservationists in a section of enclosed and guarded beach. This is called **ex situ** conservation. The results of a trial are shown below.

Nests dug by turtles (**in situ**)

area	number of nests	number of eggs	number of live hatchlings	number of undeveloped eggs	number of dead hatchlings
1	69	7501	5935	422	1144
2	45	5078	4101	233	744
total	114	12 579	10 036	....	....

Nests dug by conservationists (**ex situ**)

area	number of nests	number of eggs	number of live hatchlings	number of undeveloped eggs	number of dead hatchlings
1	16	1785	1429	288	68
2	38	4097	3457	565	75
total	54	5882	4886	853	143

(i) Complete the **in situ** table for nest sites dug by turtles. [2]

(ii) Use the data from the trial to complete the table below. [4]

conservation method	number of eggs per nest	number of live hatchlings per nest
nests dug by turtles (**in situ**)	....	....
nests dug by conservationists (**ex situ**)	....	....

Space for working.

(iii) Using information from the tables above, explain why you think the conservationists decided the trial was successful.

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....[4]

(iv) The conservationists carried out **ex situ** work in more nesting seasons. Explain why the conservationists should record information for each nesting season in exactly the same way as the first trial.

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(v) Suggest how long-term records of Olive Ridley turtle nesting could be used by scientists working for conservation organisations.

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....[2]

(e) Turtles are often found dead on the beaches of Andhra Pradesh. The turtles are frequently caught in the fishing nets of trawlers, trapped underwater and drown. Turtle saving devices (TSDs) have been added to the fishing nets of trawlers.
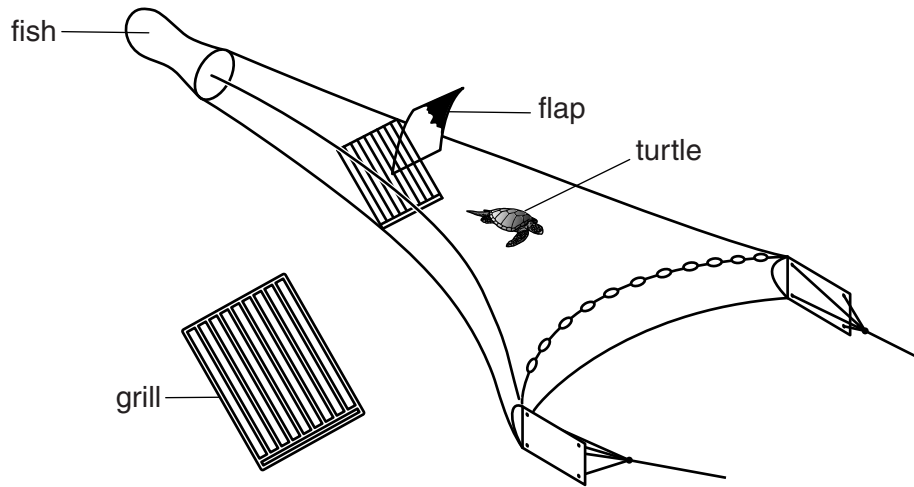
The fish go into the end of the net but the turtles are held by the bars and pushed up to a flap in the net and released. Some fishermen think that the TSDs allow some of their fish catch to escape.

(i) Suggest a way in which the fishermen might make sure they catch as many fish as possible.

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....[1]

(ii) Suggest how the use of TSDs could be enforced.

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....[2]

(f) The port at Visakhapatnam is being enlarged. The conservationists are worried that increased light pollution at night may stop the turtles finding their way to the nesting sites.
Suggest how human activity can increase around Visakhapatnam without disturbing Olive Ridley turtle populations.

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....[3]

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