

DAY:1

SESSION:2

ESTABLISHING ENTRY LEVEL BEHAVIOUR-TAKE THE TEST-5 TEST ITEMS

(PISA SCIENCE QUESTIONS–SET 2 )

---

*EDITORIAL*

# Technology creates the need for new rules

---

SCIENCE has a way of getting ahead of law and ethics. That happened dramatically in 1945 on the destructive side of life with the atomic bomb, and is now happening on life's creative side with techniques to overcome human infertility.

Most of us rejoiced with the Brown family in England when Louise, the first test-tube baby, was born. And we have marveled at other firsts — most recently the births of healthy babies that had once been embryos frozen to await the proper moment of implantation in the mother-to-be.

It is about two such frozen embryos in Australia that a storm of legal and ethical questions has arisen. The embryos were destined to be implanted in Elsa Rios, wife of Mario Rios. A previous embryo implant had been unsuccessful, and the Rioses wanted to have another chance at becoming parents. But before they had a second chance to try, the Rioses perished in an airplane crash.

What was the Australian hospital to do with the frozen embryos? Could they be implanted in someone else? There were numerous volunteers. Were the embryos somehow entitled to the Rioses' substantial estate? Or should the embryos be destroyed? The Rioses, understandably, had made no provision for the embryos' future.

The Australians set up a commission to study the matter. Last week, the commission made its report. The embryos should be thawed, the panel said, because donation of embryos to someone else would require the consent of the "producers," and no such consent had been given. The panel also held that the embryos in their present state had no life or rights and thus could be destroyed.

The commission members were conscious of treading on slippery legal and ethical grounds. Therefore, they urged that three months be allowed for public opinion to respond to the commission recommendation. Should there be an overwhelming outcry against destroying the embryos, the commission would reconsider.

Couples now enrolling in Sydney's Queen Victoria hospital for in vitro fertilization programs must specify what should be done with the embryos if something happens to them.

This assures that a situation similar to the Rioses won't recur. But what of other complex questions? In France, a woman recently had to go to court to be allowed to bear a child from her deceased husband's frozen sperm. How should such a request be handled? What should be done if a surrogate mother breaks her child-bearing contract and refuses to give up the infant she had promised to bear for someone else?

Our society has failed so far to come up with enforceable rules for curbing the destructive potential of atomic power. We are reaping the nightmarish harvest for that failure. The possibilities of misuse of scientists' ability to advance or retard procreation are manifold. Ethical and legal boundaries need to be set before we stray too far.

Use the newspaper editorial “Technology creates the need for new rules” on the previous page to answer the questions below.

**QUESTION 1.1**

Underline the sentence that explains what the Australians did to help decide how to deal with the frozen embryos belonging to a couple killed in the plane crash.

**QUESTION 1.2**

List two examples from the editorial that illustrate how modern technology, such as that used for implanting frozen embryos, creates the need for new rules.

---

---

---

**2. BEES**

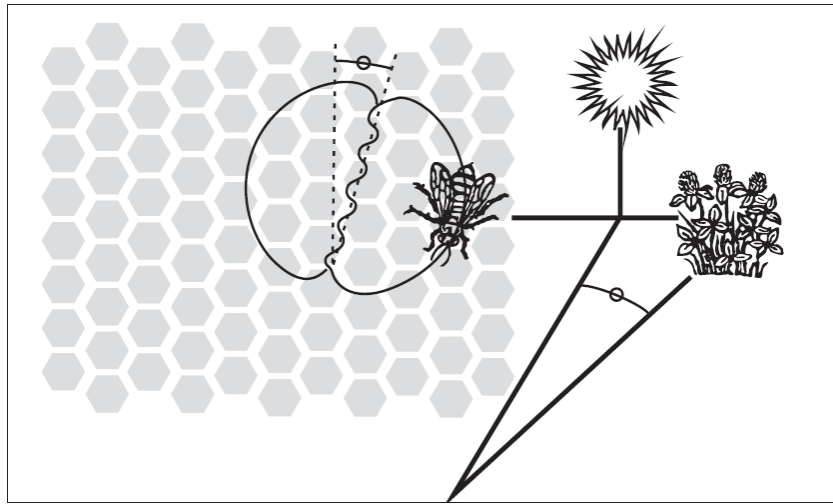
***Bees Text***

The information on this page and the next page is from a booklet about bees. Refer to the information to answer the questions which follow it.

**Collecting Nectar**

Bees make honey to survive. It is their only essential food. If there are 60,000 bees in a hive about one third of them will be involved in gathering nectar which is then made into honey by the house bees. A small number of bees work as foragers or searchers. They find a source of nectar, then return to the hive to tell the other bees where it is.

Foragers let the other bees know where the source of the nectar is by performing a dance which gives information about the direction and the distance the bees will need to fly. During this dance the bee shakes her abdomen from side to side while running in circles in the shape of a figure 8. The dance follows the pattern shown on the following diagram.



The diagram shows a bee dancing inside the hive on the vertical face of the honeycomb. If the middle part of the figure 8 points straight up it means that bees can find the food if they fly straight towards the sun. If the middle part of the figure 8 points to the right, the food is to the right of the sun.

The distance of the food from the hive is indicated by the length of time that the bee shakes her abdomen. If the food is quite near the bee shakes her abdomen for a short time. If it is a long way away she shakes her abdomen for a long time.

### **MAKING HONEY**

When the bees arrive at the hive carrying nectar they give this to the house bees. The house bees move the nectar around with their mandibles, exposing it to the warm dry air of the hive. When it is first gathered the nectar contains sugar and minerals mixed with about 80% water. After ten to twenty minutes, when much of the excess water has evaporated, the house bees put the nectar in a cell in the honeycomb where evaporation continues. After three days, the honey in the cells contains about 20% water. At this stage, the bees cover the cells with lids which they make out of beeswax. At any one time the bees in a hive usually gather nectar from the same type of blossom and from the same area. Some of the main sources of nectar are fruit trees, clover and flowering trees.

### **QUESTION 2.1**

What is the purpose of the bees' dance?

- A. To celebrate the successful production of honey.
- B. To indicate the type of plant the foragers have found.
- C. To celebrate the birth of a new Queen Bee.
- D. To indicate where the foragers have found food.

### **QUESTION 2.2**

Write down three of the main sources of nectar.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

### QUESTION 2.3

What is the main difference between nectar and honey?

- A. The proportion of water in the substance.
- B. The proportion of sugar to minerals in the substance.
- C. The type of plant from which the substance is gathered.
- D. The type of bee which processes the substance.

### QUESTION 2.4

In the dance, what does the bee do to show how far the food is from the hive?

---

---

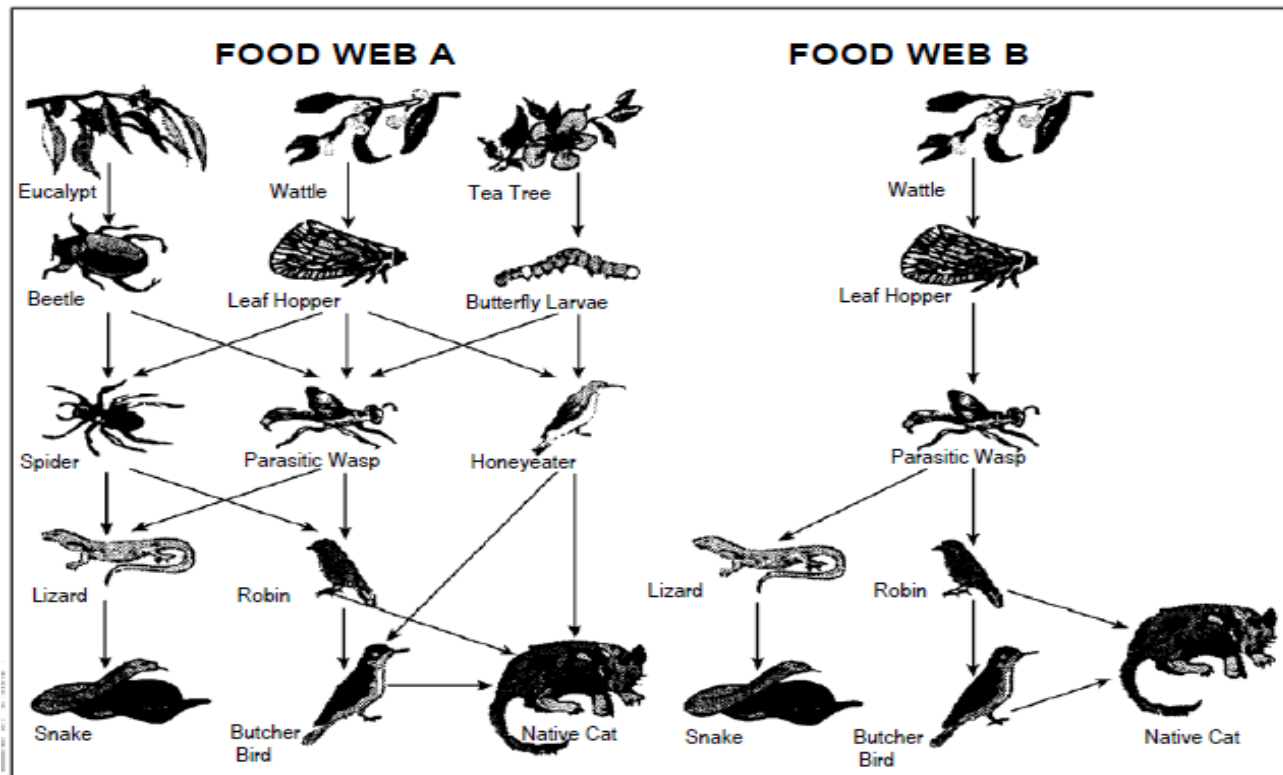
## 3. ***Biodiversity***

*Read the following newspaper article and answer the questions which follow.*

### **BIODIVERSITY IS THE KEY TO MANAGING ENVIRONMENT**

An ecosystem that retains a high biodiversity (that is, a wide variety of living things) is much more likely to adapt to human-caused environment change than is one that has little. Consider the two food webs shown in the diagram. The arrows point from the 5 organism that gets eaten to the one that eats it. These food webs are highly simplified compared with food webs in real ecosystems, but they still illustrate a key difference between more diverse and less diverse ecosystems.

Food web B represents a situation with very low biodiversity, where at some levels the food path involves only a single type of organism. Food web A represents 10 a more diverse ecosystem with, as a result, many more alternative feeding pathways. Generally, loss of biodiversity should be regarded seriously, not only because the organisms that have become extinct represent a big loss for both ethical and utilitarian (useful benefit) reasons, but also because the organisms that remain have become more vulnerable (exposed) to extinction in the future.



### Question 3.1: BIODIVERSITY

In lines 9 and 10 it is stated that “Food web A represents a more diverse ecosystem with, as a result, many more alternative feeding pathways.” Look at FOOD WEB A. Only two animals in this food web have three direct(immediate) food sources.

Which two animals are they?

- A Native Cat and Parasitic Wasp
- B Native Cat and Butcher Bird
- C Parasitic Wasp and Leaf Hopper
- D Parasitic Wasp and Spider
- E Native Cat and Honeyeater

### Question 3.2: BIODIVERSITY

Food webs A and B are in different locations. Imagine if Leaf Hoppers died out in both locations. Which one of these is the best prediction and explanation for the effect this would have on the food webs?

- A The effect would be greater in food web A because the Parasitic Wasp has only one food source in web A.
- B The effect would be greater in food web A because the Parasitic Wasp has several food sources in web A.
- C The effect would be greater in food web B because the Parasitic Wasp has only one food source in web B.
- D The effect would be greater in food web B because the Parasitic Wasp has several food sources in web B.

sources in web B.

#### 4. Corn

Consider the following newspaper report.

##### DUTCHMAN USES CORN AS FUEL

Auke Ferwerda's stove contains a few logs burning quietly with low flames. From a paper bag next to the stove he takes a handful of corn and puts it onto the flames. Immediately the fire flares up brightly. "Look here," Ferwerda says, "The window of the stove stays clean and transparent. Combustion is complete." Ferwerda talks about the fact that corn can be used as fuel as well as cattle food. As far as he is concerned, this is the future.

Ferwerda points out that corn, in the form of cattle food, is in fact a type of fuel too. Cows eat corn to get energy out of it. But, Ferwerda explains, the sale of corn for fuel instead of for cattle food might be much more profitable for farmers. Ferwerda has become convinced that, in the long run, corn will be widely used as fuel. He imagines what it will be like harvesting, storing, drying and packing the grains in bags for sale. Ferwerda is currently investigating whether the whole corn plant could be used as fuel, but this research has not been completed yet. What Ferwerda also needs to consider is the amount of attention being focused on carbon dioxide. Carbon What Ferwerda also needs to consider is the amount of attention being focused on carbon dioxide.

dioxide is regarded as the main cause of the increase of the Greenhouse effect. The increase of the Greenhouse effect is said to be the cause of the increasing average temperature of the Earth's atmosphere.

In Ferwerda's view, however, there is nothing wrong with carbon dioxide. On the contrary, he argues, plants absorb it and convert it into oxygen for human beings. However, Ferwerda's plans may clash with those of the government, which is actually trying to reduce the emission of carbon dioxide. Ferwerda says, "There are many scientists who say that carbon dioxide is not the main cause of the Greenhouse effect."

##### Question 4.2: CORN

In the article a conversion of carbon dioxide is described: "...plants absorb it and convert it into oxygen ...".

There are more substances involved in this conversion than carbon dioxide and oxygen only.

The conversion can be represented in the following way:

carbon dioxide + water → oxygen +

Write in the box the name of the missing substance.

##### Question 4.3: CORN

At the end of the article Ferwerda refers to scientists who say that carbon dioxide is not the main cause of the Greenhouse effect.

Karin finds the following table showing the relative Greenhouse effect caused by four gases:

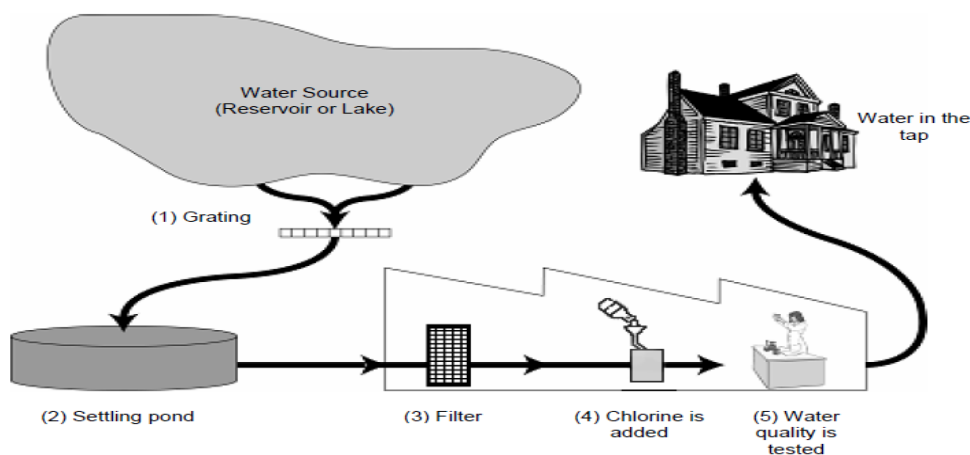
Relative Greenhouse effect per molecule of gas			
Carbon dioxide	Methane	Nitrous oxide	Chlorofluorocarbons
1	30	160	17000

From this table Karin cannot conclude which gas is the main cause of the increase of the Greenhouse effect. The data in the table need to be combined with other data for Karin to conclude which gas is the main cause of the increase of the Greenhouse effect.

Which other data does Karin need to collect?

- A. Data about the origin of the four gases.
- B. Data about the absorption of the four gases by plants.
- C. Data about the size of each of the four types of molecules.
- D. Data about the amounts of each of the four gases in the atmosphere.

## 5. Fit for Drinking



The figure above shows how water supplied to houses in cities is made fit for drinking.

### Question 5.1; FIT FOR DRINKING

It is important to have a source of good drinking water. Water found underground is referred to as **ground water**.

Give one reason why there is less bacteria and particle pollution in ground water than in water from surface sources such as lakes and rivers.

.....

.....

### Question 5.2: FIT FOR DRINKING

Suppose that the scientists involved in the testing of water at the water plant discover that there are some dangerous bacteria in the water **after** the cleaning process is completed.

What should people at home do with this water before drinking it?

.....  
.....

### **Question 5.3: FIT FOR DRINKING**

Can drinking polluted water cause the following health problems? Circle “Yes” or “No” in each case.

<b>Can drinking polluted water cause this health problem?</b>	<b>Yes or No?</b>
Diabetes	Yes / No
Diarrhea	Yes / No
HIV / AIDS	Yes / No