Reading
and
Thinking
in English

Exploring
functions
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Part 1
Presentation

Study the following table and identify:
a the characteristics which the eye and the camera have in common.
b the characteristics which make them different.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Eye</th>
<th>Camera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needs light rays to function</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Has a lens</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Has a sensitive surface</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Lens moves backwards and forwards</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Curvature of the lens changes</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>A device regulates the amount of light</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 1 ✓ = yes      X = no

Next, read these statements which compare the eye and the camera and complete Table 2 with ✓ or X as in Table 1.

The camera and the eye are similar in many respects. They both need light rays in order to function. Both have a sensitive surface on which the image is formed. In the eye the image is formed on the retina. In the camera the image is formed on the film. As in a camera, the image on the retina is inverted.

Both the eye and the camera have a lens. The lens focuses the image on the sensitive surface. In the
camera, the lens moves backwards and forwards. In the eye the curvature of the lens is changed. In this respect the eye differs from the camera.

Both the camera and the eye have a device to regulate the amount of light that passes through the lens. In the camera there is a shutter of variable speed and a diaphragm of variable aperture. In the eye the iris automatically adjusts the size of the pupil according to the intensity of light.

Both the eye and the camera are sensitive to light, shade and colour. The film records light, shade and colour. The eye perceives them but does not record them. The two eyes together produce a three-dimensional image. The camera lens produces a two-dimensional image.

The eye is more flexible than the camera. It can adapt more quickly to a wider range of light conditions. Both the camera and the eye can register small objects and distant objects. The camera performs these functions better than the eye.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Eye</th>
<th>Camera</th>
</tr>
</thead>
<tbody>
<tr>
<td>The image is inverted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The lens focuses the image</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitive to light, shade and colour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Records light, shade and colour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Produces three-dimensional image</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Now answer the following questions:

a. What is the eye’s sensitive surface called?
b. What devices in the eye and the camera regulate the amount of light that enters?
c. What advantages do the eyes have over the camera?
d. What advantages does the camera have over the eye?
Complete the following statements showing similarities and differences between the eye and the camera.

**SIMILARITIES**

<table>
<thead>
<tr>
<th>How they work</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>They have a... to form the...</td>
<td>Without...</td>
</tr>
<tr>
<td>Both can...</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What they are able to do</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>How they work</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the eye the image is formed on the...</td>
<td>In the... the image is formed on a...</td>
</tr>
<tr>
<td>The eye... light, shade and colour.</td>
<td>The... cannot record...</td>
</tr>
<tr>
<td>The... is able to...</td>
<td></td>
</tr>
</tbody>
</table>

**DIFFERENCES**

Complete this table about the eye and the camera to show differences of degree.

<table>
<thead>
<tr>
<th>What they are able to do</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to see small objects</td>
<td>The... is better than the...</td>
</tr>
<tr>
<td>Ability to see distant objects</td>
<td>The... is more flexible than the...</td>
</tr>
<tr>
<td>Ability to adjust for focus</td>
<td>The camera’s range is... the...</td>
</tr>
</tbody>
</table>
**Part 2  EXPRESSING SIMILARITIES**

**SUMMARY**

We can make comparisons between things on the basis of their characteristics. We can compare a and b with respect to such characteristics as:

![Diagram](image)

Comparisons therefore refer to:

<table>
<thead>
<tr>
<th>Characteristics which things have in common. (similarities)</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>characteristics which things have in common. (similarities)</td>
<td>both the eye and the camera have a lens.</td>
</tr>
<tr>
<td>characteristics which things do not have in common. (differences)</td>
<td>Basis of comparison: they have a lens.</td>
</tr>
<tr>
<td>characteristics which things do not have in common. (differences)</td>
<td>the camera records light, shade and colour on film. The eye does not.</td>
</tr>
<tr>
<td>characteristics which things do not have in common. (differences)</td>
<td>a ≠ b</td>
</tr>
<tr>
<td>characteristics which things do not have in common. (differences)</td>
<td>Basis of comparison: ability to record light, shade and colour on film.</td>
</tr>
</tbody>
</table>

**Part 2  Expressing similarities**

The following statements are about insect and human communities. Match the statements which express similar characteristics. One pair of statements is matched for you.

<table>
<thead>
<tr>
<th>INSECT SOCIETIES</th>
<th>HUMAN SOCIETIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>i Groups have specialized functions.</td>
<td>a Cities are complex.</td>
</tr>
<tr>
<td>ii Individuals co-ordinate their efforts.</td>
<td>b Countries maintain armies.</td>
</tr>
<tr>
<td>iii Insects build nests.</td>
<td>c Individuals work together.</td>
</tr>
<tr>
<td>iv There are soldiers to defend the colony.</td>
<td>d Human houses are functional.</td>
</tr>
<tr>
<td>v Insects' nests are complex.</td>
<td>e There is division of labour.</td>
</tr>
<tr>
<td>vi Nests are built to perform specific functions.</td>
<td>f Men build cities.</td>
</tr>
</tbody>
</table>
Now read the passage and answer this question:

*In what ways are human and insect societies different?*

Social insects live in integrated communities which in some ways are similar to human communities. In both types of community there is division of labour. In insect societies certain insects are responsible for reproduction; the workers collect food while the soldiers defend the colony. In the same way human groups such as farmers and shopkeepers have specialized functions in producing goods and providing services to the community.

Insect and human societies are also alike in that individual members of the community work together. Termite workers co-ordinate their efforts to build nests. Similarly, in human societies engineers, architects, town planners and construction workers unite to build cities.

The nests of social insects are as complex as a man-made city. In some insect nests special accommodation is provided for the young and for food storage. Many nests also have devices for regulating the temperature. So insect nests are as functional as human houses.

It is not surprising, therefore, that many analogies have been made between social insects and human societies. It must not be forgotten, however, that insect social behaviour is determined by innate instinctive mechanisms. Insects show no capacity for learning or for developing a social tradition based on learning.

Complete this table to show the relationships mentioned in the passage.

<table>
<thead>
<tr>
<th>Respect</th>
<th>society</th>
<th>society</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialization</td>
<td>shopkeepers and farmers</td>
<td>=</td>
</tr>
<tr>
<td>Co-ordination</td>
<td>=</td>
<td>termite workers</td>
</tr>
<tr>
<td>Complexity</td>
<td>=</td>
<td>nests</td>
</tr>
<tr>
<td>Functional design</td>
<td>=</td>
<td></td>
</tr>
</tbody>
</table>

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Complete the following statements to show the specific similarities mentioned in the passage.

1. Termite and human societies are alike in that there is division of labour in both. In termite societies the three functions of ......... and ......... are performed by different groups.
2. In both societies there is social co-ordination. Just as in human societies ......... have to work together in order to ......... so in termite societies ......... unite in order to .........
3. Social insects build constructions for living in. Some have special accommodation for ......... and ......... Insect constructions are therefore as ......... as human ones.

**SUMMARY**

1. **Expressing similarity**

   | Insect nests | ARE SIMILAR TO | human cities. |
   |             | ARE LIKE      |               |
   |             | ARE THE SAME AS |               |
   |             | ARE AS COMPLEX AS |             |

   | Insect nests and human cities | ARE ALIKE. | ARE SIMILAR. | ARE EQUALLY COMPLEX. |

2. **Specifying the basis of comparison**

   **Basis**

   | Insect nests | ARE SIMILAR TO | human cities | in that there is special accommodation for different purposes. |
   |             | ARE AS COMPLEX AS |             |

3. **Connecting two similar statements**

   | There is division of labour in insect societies. | Different groups have specialized functions in human societies. |
   | Insect societies there is a division of labour. | in human societies different groups have specialized purposes. |
   | Similarly, in the same way, |
Activity 1

Complete the following statements to show the similarity between two professions. Choose an appropriate profession and characteristic from the lists given. For example,

A salesman is similar to a diplomat in that both must have the power of persuasion.

PROFESSIONS
Diplomat
Dentist
Secret agent
Air stewardess
TV announcer

CHARACTERISTICS
an ability to mix with people
the power of persuasion
manual dexterity
good judgement
a pleasant personality

1. A surgeon and a ... are alike in that both need ...
2. A beauty queen and a ... are similar in that they must have ...
3. A social worker is similar to a ... in that both need ...
4. A teacher is like a ... in one respect; both must possess ...
5. An airline pilot and ... have one thing in common; they both need ...

Part 3

Expressing differences

The following statements are about plants and animals. Match the statements which express contrasting characteristics. One pair of statements is matched for you.

PLANTS
i. Plants manufacture their own food.
ii. Plants do not have the power of locomotion.
iii. Plants only grow at their extremities.
iv. Plants do not appear to be sensitive to their environment.
v. Plants grow throughout their lives.

ANIMALS
a. Animals cells are enclosed in a membrane.
b. Animals obtain food from plants or other animals.
c. Growth is limited to a definite time period.
d. Animals can move.
e. Animals are sensitive to their environments.
f. All parts of an animal grow.
Now read the passage and answer this question: What is the most fundamental difference between plants and animals?

PLANTS AND ANIMALS
There are several characteristics which distinguish plants from animals.
1. Green plants are able to manufacture their own food. They use substances in the environment. This process is known as photosynthesis. In contrast, all animals, including man, get their food either directly from plants or indirectly by eating animals which have eaten plants. Animals, therefore, take in a wider range of foods than plants.

2. Plants are generally stationary. They do not have the power of locomotion. Animals, on the other hand, can usually move about. Consequently, plants appear to be less sensitive than animals although they respond in some ways to light, heat, physical contact and other stimuli.

3. In external appearance plants are usually green. They grow in a branching fashion at their extremities. Their growth continues throughout their lives. Animals, however, are very diverse in their external appearance. Their growth pattern is not limited to their extremities but is evenly distributed. Growth occurs in a definite time period.

4. The most basic difference between plants and animals is in the unit of structure and function; that is, the cell. Plant cells have a wall which is non-living in chemical nature whereas animal cells do not have this characteristic.

Complete the following diagrams to show how plants and animals obtain food.

PLANTS

<table>
<thead>
<tr>
<th>Substances from the</th>
<th>food capture process known as</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How does the range of foods of animals compare with that of plants?

Complete the following statements to show another difference between plants and animals.

Plants cannot . . . . .

Animals have the ability to . . . . . .

Therefore animals appear to be . . . . . . than . . . . . .

Complete the following table to show differences in growth.

<table>
<thead>
<tr>
<th>Plants</th>
<th>Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td></td>
</tr>
<tr>
<td>Where growth takes place</td>
<td></td>
</tr>
<tr>
<td>When growth takes place</td>
<td></td>
</tr>
</tbody>
</table>

SUMMARY

1 Expressing differences

Animal cells can be distinguished from animal cells and plant cells are different from plant cells.

Animal cells and plant cells are different and are dissimilar.
2 Degrees of comparison

a range of food
animals
plants

The range of food of animals is wider than the range of food of plants.
The range of food of plants is not as wide as the range of food of animals.

b range of food
man
animals
plants

Man has the most varied range of food.
The widest
Plants have the least varied range of food.
The narrowest

3 Connecting two contrasting statements

Animals move. Plants do not move.

Animals move, but whereas plants do not move.

Unlike animals, plants do not move.

Animals move, in contrast, plants do not move.

Animals move. Plants, however, on the other hand, do not move.
Activity 2

Study the following table. It gives information about five types of pocket calculators to help people who want to buy one.

Pocket calculators

<table>
<thead>
<tr>
<th>Price (in dollars)</th>
<th>Guarantee</th>
<th>Size (in cubic centimetres)</th>
<th>Conveniences of controls</th>
<th>How easy to read</th>
<th>Reliability</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxford</td>
<td>1 year</td>
<td>540 cc</td>
<td>C.M %</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Rapidman</td>
<td>6 months</td>
<td>200 cc</td>
<td>% √</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Florida</td>
<td>2 years</td>
<td>180 cc</td>
<td>C.M % √</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Super-mind</td>
<td>5 months</td>
<td>550 cc</td>
<td>% √</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Magnus</td>
<td>3 months</td>
<td>220 cc</td>
<td>%</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

C = constant
M = Memory
√ = square root
% = per cent
1 = poor
5 = excellent

1. Write the name of the calculator that is:
a. the cheapest
c. the most reliable
d. the most expensive
e. the lightest
f. the least reliable.

Which calculator has:
g. most facilities
h. least convenient controls
i. fewest facilities
j. the longest guarantee
k. the shortest guarantee?
Part 3  EXPRESSING DIFFERENCES

2 Compare the following pairs of calculators with respect to the characteristics given. For example,

Oxford v. Florida (price)
The Oxford is cheaper than the Florida.

a Oxford  Rapidman (price)
b Florida  Oxford (size)
c Super-mind Magnus (weight)
d Oxford  Florida (reliability)
e Oxford  Rapidman (facilities)
f Florida  Super-mind (length of guarantee)

3 Which calculator would you choose in the following circumstances? Why?

a You need a small cheap calculator to carry in your pocket.
b You want to keep one on your desk and do complex calculations.
c You do not want to spend money repairing the calculator.
d You want to give one as a present to a friend.

Activity 3

Fill in the blanks with appropriate expressions of difference or similarity, and choose one of the words in parentheses to make the statements logical.

1 In primitive societies finding food is a basic need........, in developed societies the supply of food is (important/not important).
2 Some primitive peoples are mainly hunters and fishers........ other types of societies depend on (agriculture/hunting) for food.
3 The production of food has been raised by nutritional technology........, the distribution of food has been (improved/decreased) by scientific methods.
4 Some nutritional deficiencies have been remedied by the contact of primitive societies
Unit 7 MAKING COMPARISONS

with the modern world. Many (problems/resources), 
... ... ... have been created.
5 For animals, food is just an individual re-
sponse to biological needs. ... ... ... , for man it 
has the capacity to satisfy (social needs/hunger) as 
well.
6 The physical environment plays an important 
part in regulating food supply. ... ... ... , social 
factors are of (great/little) significance.

Part 4 Development

TEACHING MACHINES AND PROGRAMMED LEARNING
Study this part in the same way as you studied 
Part 4 of Unit 6.

Introductory questions:
The following information summarizes the con-
tent of the passage.

These students are learning 
with a teacher in a conventional 
classroom.

This student is using a 
teaching machine.

Teaching machines present the learner with a 
teaching programme. The student operates the 
machine in order to follow the programme. Some 
programmes are in the form of a text. Some pro-
grammes are audio-visual.
Now study these statements about the two machines above. Some statements are only true for Machine A. Mark them A. Some statements are only true for machine B. Mark them B. Some statements are true for both machines. Mark them AB.

1. The machine uses knobs.
2. The machine uses buttons.
3. The machine presents a teaching programme.
4. The programme is audio-visual.
5. The programme is in the form of a text.
6. The programme presents questions.
7. The programme tells the student the correct answer.

Use the information in the statements to complete the following paragraph.

Machine A: ....... Machine B: ....... However, ....... present a ....... In Machine A the programme is ....... The programmes are ....... in that ....... In addition, they .......

Purpose question

The passage contains comparisons between:

different types of teaching machines
different types of programmes
teaching machines and conventional classrooms.

Find out whether it gives the advantages or disadvantages of teaching machines in comparison with conventional classrooms.
There are different types of teaching machines. They range from simple boxes with one knob which the pupil turns, to complex computers. One of the first teaching machines was Pressey's machine of 1927. For each question four possible answers were presented; the learner had to choose the correct one by pressing a button. Other machines are similar to Pressey's but have more possible answers. In one, a pupil who gives the correct answer receives a piece of chewing-gum.

1. What two extreme types of teaching machines are mentioned?

2. The paragraph describes two types of teaching machines. What are the similarities and differences between them?

Some teaching machines are designed to present text material. Others are designed to present an audio-visual programme. In audio-visual machines the pupil is shown a picture and at the same time he hears a tape with corresponding words or sounds. Machines have to be designed so that they are easy to manipulate. This means that the designer has to consider the operations the learner has to perform. Two machines which are similar in principle are shown in A and B on page 103. In one, however, the student presses a button to advance the programme while the other is worked by a knob which the learner rotates. For machines which present text material, the knob suits senso-motoric requirements. On the other hand, push buttons are more convenient for audio-visual machines.

3. What differences are mentioned between audio-visual and text machines?

The value of these teaching machines depends very much on the value of the programmes they contain. There are two main types of programmes—linear and branching. A linear programme consists of a series of small steps. When the learner has mastered one step, he goes to the next. All students therefore work through the same
sequence. In a branching programme, however, different students may be exposed to different material. A student who answers correctly moves to the next step. A student who gives an incorrect answer receives an exclamation of his mistake. The two types of programmed learning differ fundamentally in their attitude to errors. Linear programmes avoid error, while branching programmes use errors to help the student learn.

4 Complete the following diagram to show the differences in the method used by the programmes described.

5 In what other way are the two types of programme different?

Teaching machines have been successful in many areas of education — in some cases they have replaced teachers and conventional courses. The advantage of a teaching machine (and its programme) lies in the skillful breakdown and organization of a course into a series of steps. With a teaching machine the individual student is responsible for his own learning while in a class the learning is controlled by the teacher. A machine forces him to be more active than he is in an ordinary classroom, where a pupil has for most of the time a passive listening role. Machines also free the teacher from routine work and enable him to spend time on more creative work. And unlike an ordinary teacher, teaching machines do not get tired or impatient.
6. Complete this summary:

**Advantages of teaching machines**

<table>
<thead>
<tr>
<th>With reference to the course</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>With reference to the role of the</td>
<td></td>
</tr>
<tr>
<td>In comparison with</td>
<td>but the teacher does.</td>
</tr>
<tr>
<td></td>
<td>but the machine does not.</td>
</tr>
</tbody>
</table>