PRIMARY SIX
SELF STUDY MATERIALS
ENGLISH LANGUAGE

LESSON 1: Use of Adverbs

Learning Outcomes
By the end of this lesson, you should be able to:

i) identify ways of doing things.

ii) use of adverbs in your daily life activities.

You will need:
• a pen
• a book

Introduction
An adverb is a word that tells more about a verb, an adjective and another adverb. Adverbs tell us how an action is done: when? why? how? and where?

Examples

i) The cyclist is riding slowly.

ii) Children should cross the road carefully.

Activity 1
Use the correct form of the word in the brackets to complete the sentences below. Examples have been given to guide you.

1. Tino cleverly avoided the punishment. (clever)

2. Uganda's population is steadily rising. (steady)

3. St Thomas choir sang the second compulsory song _____________. (beauty)

4. The host welcomed us __________________. (cheer)

5. We ________________________ waited for his return from Ojipaku market. (patience)

6. Italians have seen the __________________ corona virus attacked. (worse)

7. They answered the question __________________. (wise)

8. A machete is ___________________________ bigger than a knife. (usual)

9. The hungry boy ate the mango __________________. (greed)

10. The hunter _____________ attacked the lion in its den. (brave)

Activity 2
Order of Adverbs
When more than one adverb is used in a sentence, they usually follow in this order: manner (how?), place (where?) and time (when?).

Example
The pedestrian crossed the road carefully (how?) at the zebra crossing (where?) yesterday (when?).

From the sentences below, underline the adverbs of manner, place and time.

1. The traffic officer called the driver loudly at the junction in the morning.

2. Many cyclists ride carelessly at the traffic lights every day.

3. The bus driver spoke politely to the passenger on the bus on Tuesday.

4. My mother nicely made cakes from the kitchen last weekend.

5. It rained heavily in our area last year.

LESSON 2: Informal Letter Writing

Learning Outcomes
By the end of this lesson, you should be able to:

i) express your views on safety on the road.

ii) write a letter about safety on the road.

Introduction
Letter writing is one way of sending a message between or among people. You can write a letter to a friend, parents, relatives and many others.

Activity 1

1. (a) Write a letter to your father appreciating him for his effort to keep everybody well in this period of COVID-19 pandemic. Wish him a longer stay in this life. Use your school address.

(b) The letter below has some words missing. Using the words in the box, complete it by filling in the gaps correctly.

reap advise purpose academic not arua discussions hear dear examinations
SECTION A

18. (a) To
• obtain food and water.
• obtain shelter.
• find mates.
• escape from predators and enemies.
(b)(i) The difference in concentrations of two adjacent
solutions separated by a single barrier.
(b)(ii) The rate of diffusion.
(c) Wings during passive flight
Are spread at an angle from the body
Are not moved
Wings during active flight
Are not spread at a fixed angle
Are moved or flapped
(d) The pectoral major (depressor) muscles contract while
the pectoral minor (elevator) muscles relax pulling the
wings downwards. With the wing feathers spread out and
overlapping they do not permit air from passing through.
The resistance of air to wing provides an up thrust force.
This force is transmitted through the coracoids bones thereby
lifting the whole body as it moves forward.

19. (a) Movement of materials in and out of cells enables the cells
to obtain from their external environment, substances required
for its activities and to release waste products and secretions.
(b)(i) The difference in concentrations of two adjacent
solutions separated by a single barrier.
(ii) Movement of materials from where they are in a low
concentration to where they are in a high concentration.
(c) Title: An experiment to investigate the effect of different sizes on
the rate of diffusion.
Materials and apparatus: Fresh irish potato, knife, ruler,
potassium permanganate solution, razor blade, three boiling
tubes, blotting paper and stop clock.
Procedure:
• Peel the fresh irish potato.
• Cut three cubes from the fresh potato measuring A (2cm X
2cm X 2cm), B (1cm X 1cm X 1cm) and C (0.5cm X
0.5cm X 0.5cm).
• Pour 5cm³ of potassium permanganate solution in each of
the three boiling tubes.
• Put the potato cubes in each of the boiling tubes of the
potassium permanganate solution.
• After 1 hour, remove the cubes and dry their surfaces
using blotting papers.
• Cut through each of the cubes and measure the length
penetrated by potassium permanganate in each of the
potato cubes.

20. (a)(i) Autosomes are chromosomes that carry genes which
determine nonsexual characteristics, while sex chromosomes
are chromosomes that carry genes which determine sexual characteristics.
(ii) Testis: Sperms. Ovary: Ova or eggs.
(b) Because all ova produce only X sex chromosome while a
sperm contains either X or Y sex chromosome and each has
equal chance of fertilising the ovum.
(c) (i) Environmental variation. The variation in height was
not passed on to offspring and was reversed by when grown
in the other soil sample.
(ii) Let T represent allele for tallness in plants. Let t represent
allele for shortness in plants.

21. (a) The clay soil particles are small. This results into small
sized air spaces between soil particles providing little space for air
hence low aeration and few soil microorganisms, little space for
water to pass hence low drainage but highwater retention capacity
and narrow diameter hence high capillarity.
(b) Title: An experiment to compare the rates of soil drainage between clay
and loam soils.
Materials and apparatus:
Clay soil, loam soil, water, two funnels, two measuring cylinder,
filter paper, beaker.
Procedure:
• Place the funnel on top of each measuring cylinder.
• Pour clay soil inside a one funnel and loam soil inside the
other funnel.
• Pour water of equal amount in each soil sample.
• After 30 minutes, remove the funnels containing soil samples.
Observation
More water collected in the measuring cylinder whose funnel
had loam soil and little water collected in the measuring cylinder
whose funnel had clay soil.
Conclusion
Loam soil has higher water drainage capacity than clay soil.
1. Which of the following parts of the mammalian digestive system do not form part of the alimentary canal?  
A. Stomach and ileum.  
B. Pancreas and liver.  
C. Colon and duodenum.  
D. Liver and oesophagus.  

2. Which class of phylum arthropoda does the organism represented in figure 1 below belong to?  

![Figure 1](image1.png)

3. Figure 2 below shows the relationship between population size of a predator and its prey over time.  

![Figure 2](image2.png)

<table>
<thead>
<tr>
<th>Time</th>
<th>Number of organisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Y</td>
</tr>
</tbody>
</table>
Which of the curves present the population size of the prey?  
A. Y because it starts below curve X.  
B. X because its peak is always higher than for curve Y.  
C. Y because it increases after increase in curve X.  
D. X because it has the lower minimum points than curve Y.  

4. The function of the ligament is to connect bone to;  
A. bone.  
B. joint.  
C. tissue.  
D. muscle.  

5. Figure 3 below shows leaf arrangement on the stem of a plant.  

![Figure 3](image3.png)

Which type of leaf arrangement is represented in the figure?  
A. Spiral arrangement  
B. Alternate arrangement  
C. Opposite arrangement  
D. Whorled arrangement  

6. Which of the following carbohydrates is found in high concentration in sugar cane making used in production of table sugar?  
A. Starch  
B. Sucrose  
C. Maltose  
D. All of the above  

7. Which of the following is a type of dry fruits represented in figure 4 below?  

![Figure 4](image4.png)

A. Follicle  
B. Schizocarp  
C. Capsule  
D. Legume  

8. The results of an experiment to determine percentage of humus in a soil sample are shown below:  
Mass of crucible + wet soil = 50g  
Mass of crucible + soil after heating to red hot = 30g  
Mass of crucible + soil after drying = 40g  
What is the percentage of humus in the soil sample?  
A. 25%  
B. 20%  
C. 15%  
D. 30%  

9. Which of the following is the main reason for requirement of oxygen in germination?  
A. To allow production of energy.  
B. For activation of enzymes involved in germination.  
C. For aerobic respiration to occur.  
D. To allow reactions to occur.  

10. Which of the mammalian teeth illustrated below is used for tearing food?  

![Figure 5](image5.png)

A.  
B.  
C.  
D.  

11. The allele whose phenotypic effect is expressed in the heterozygous condition is;  
A. Homozygous.  
B. Genotype.  
C. Recessive.  
D. Dominant.  

12. Which of the following is the disease that has affected one of the legs shown in figure 5 below?  

A. Elephantiasis.  
B. Malaria.  
C. Trypanosomiasis.  
D. Schistosomiasis.  

13. High levels of Antidiuretic hormone in blood results in production of:  
A. Much and dilute urine.  
B. Much and concentrated urine.  
C. Little and dilute urine.  
D. Little and concentrated urine.  

14. A homozygous red flowered plant was crossed with a homozygous white flowered plant and the offspring had pink coloured flowers? Which of the following is true of the inheritance of flower colours in plants?  
A. It is a co-dominance inheritance.  
B. It is an incomplete dominance inheritance.  
C. All the pink flowered plants are in homozygous condition.  
D. Inheritance of flower colour varies discontinuously.  

15. Which of the following is the disadvantage of exoskeleton in insects?  
A. Restricts growth in insects.  
B. Does not protect all parts of insect’s body.  
C. Too flexible limiting fast movement.  
D. Does not allow effective camouflage.  

16. Which of the following is the best description of puberty?  
A. Onset of adolescent changes.  
B. Stage of growth and development after adolescent stage.  
C. Period of changes after which an individual is sexually mature.  
D. Stage of growth before adolescent stage.  

17. Which of the following blood vessels transport deoxygenated blood?  
A. Aorta.  
B. Pulmonary artery.  
C. Renal artery.  
D. Hepatic artery.  

18. Which of the following is a product of anaerobic respiration in animals?  
A. Ethanol.  
B. Pyruvate.  
C. Pyruvic acid.  
D. Lactic acid.  

19. The main reason for sweating while performing physical activities is to lose;  
A. excess heat.  
B. excess water.  
C. excess mineral salts.  
D. Urea.  

20. Which type of response is shown in figure 6 below?  

A. Voluntary response.  
B. Learned response.  
C. Conditioned response.  
D. Involuntary response.  

21. What is the gland whose position is shown in figure 8 below?  

![Figure 6](image6.png)

A. Adrenal gland.  
B. Gonad gland.  
C. Thyroid gland.  
D. Pituitary gland.  

22. Which of the following methods cannot be used to prevent infestation by tapeworms?  
A. Eating well cooked meat.  
B. Proper disposal of faecal wastes.  
C. Wearing shoes to avoid stepping on faeces.  
D. Boiling all drinking water.  

23. Which of the following terms best describes development in organisms?  
A. Permanent increase in dry mass of the organism.  
B. Specialisation of structures to perform specific functions.  
C. Irreversible increase in the size of an organism.  
D. Elongation of cells of organisms.  

24. Which of the following best describes changes in plant cover during succession?  
A. Mosses → Lichens → Ferns → Grasses.  
B. Lichens → Mosses → Ferns → Grasses.  
C. Ferns → Grasses → Trees → Mosses.  
D. Mosses → Ferns → Grasses → Shrubs.  

25. Which type of asexual reproduction is undergone by amoeba?  
A. Binary fission.  
B. Multiple fission.  
C. Fragmentation.  
D. Conjugation.  

26. Which of the following is a part of the gynoecium of a flower?  
A. Filament.  
B. Style.  
C. Petal.  
D. Sepal.  

27. Chemotaxis is movement of;  
A. part of an organism in response to chemicals substances.  
B. the whole organisms in response to chemical substances.  
C. part of an organism towards chemical substances.  
D. the whole organism toward chemical substances.  

28. Which of the following is the response of an organism to increase in temperature?  
A. Presence of thick layer of fats beneath the skin.  
B. Hairs on the skin lie flat on the skin surface.  
C. Vasodilation of skin blood vessels occurs.  
D. All of the above.
D. Rapid contraction and relaxation of skeletal muscles.

29. Figure 8 shows experimental setup used to investigate whether carbon dioxide gas is produced during aerobic respiration.

Which of the following is correct explanation for the observation made from the lime water in flask B? It:
A. turned milky due to carbon dioxide that entered the setup through flask A.
B. remained colourless as no carbon dioxide entered.
C. turned milky due to carbon dioxide produced during respiration by the toad.
D. turned milky due to carbon dioxide produced by toad as it died due to lack of oxygen.

30. B. remained colourless as no carbon dioxide was produced by toad as it died due to lack of oxygen.

31. Figure 9 below shows results obtained during an experiment to investigate the effect of weather on the rate of photosynthesis using a pond weed. The number of bubbles produced were counted everyday at 10:00am for five days.

<table>
<thead>
<tr>
<th>Day</th>
<th>Weather</th>
<th>Number of bubbles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very cloudy</td>
<td>04</td>
</tr>
<tr>
<td>2</td>
<td>Moderate cloudy</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Little sunny</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Very sunny</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Little cloudy</td>
<td>07</td>
</tr>
</tbody>
</table>

Figure 9

a) Plot a graph of relationship between weather and the number of bubbles that were produced.
b) Explain the source of bubbles during the experiment.
c) With a reason from your graph, identify the weather during the rate of photosynthesis was:
   i) Highest.
   ii) Lowest.

32. The table below shows the habitat, thickness of medulla and concentration of urine produced in three mammals who live in different habitats.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Habitat</th>
<th>Relative thickness of medulla in arbitrary units</th>
<th>Urine concentration in arbitrary units</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Lake</td>
<td></td>
<td>9.8</td>
<td>520</td>
</tr>
<tr>
<td>B Moist land</td>
<td></td>
<td>1.0</td>
<td>140</td>
</tr>
<tr>
<td>C Desert</td>
<td></td>
<td>2.6</td>
<td>2880</td>
</tr>
</tbody>
</table>

a) State relationship between thickness of medulla and the concentration of urine.
b) habitat.
c) Explain response in (a) i) above.
d) (ii) above.
e) Suggest the problem that would be faced by organism i) A if transferred to land.
f) ii) C transferred to a lake.

d) Explain the different weather conditions on the rate of photosynthesis.
   i) Sunny conditions.
   ii) Cloudy conditions.

33. Figure 10 below shows relationship between glands and hormones secreted within the first 14 days of a menstrual cycle.

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Name</th>
<th>Stimulus that stimulate secretion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Which of the hormones is secreted into blood during the period of the cycle when there is blood discharge through the vagina?

34. (a) Suggest the role of microorganisms in:
   i) formation of compost.
   ii) root nodules.
   iii) determining properties of soil.

b) Describe different activities that enrich the soil with nitrogen and its components for plants to absorb.

c) Describe how improper disposal of polythene bags affects the properties of soil.

35. (a) State the difference between a population and a community.

(b) Describe the different factors that affect the population growth.

(c) Describe how you would use the capture-recapture method to estimate the population size of rabbits in a bush.

36. (a) Describe the following processes in mammals;
   i) Inhalation.
   ii) Gaseous exchange.
   iii) State two differences between inhaled and exhaled air in mammals.

(c) Suggest why an insect cannot be drowned by inserting its head in water.

37. (a) State two stimuli and the receptor in mammals that detect them.

(b) Describe the adjustments that occur in the eye when seeing a;
   i) nearby object.
   ii) distant object.

c) Draw and label the parts of the tongue responsible for sensing sour, bitter, salty and sweet tastes.

A eulogy is a type of speech given at a burial ceremony in honour of someone that has passed on. It is usually in praise of the deceased for their achievements and showing what society will miss about them. Generally, it is to bid farewell to the deceased. It should have the following:

1. FORMAT
   (a) Title: Key words – eulogy and deceased or their name.
   (2 marks)
   (b) Protocol (2 marks)
      - Religious leaders
      - the bereaved family
      - fellow mourners.
   Note: The highest in rank at a funeral are the religious leaders regardless of whether the president or ministers or MPs etc are in attendance. All those are fellow mourners.
   (2 marks)
   ii) There is no need of signing off.
   (1 mark)
   (c) Self-introduction (1 mark)
   (d) Purpose of the speech (1 mark)
   (e) At least 2 or 3 paragraphs (1 mark)
   (f) Conclusion (1 mark)
   - May his soul rest in eternal peace
   - We shall greatly miss you etc. 
   Total 08 marks

2. CONTENT
   (a) How you came to know the deceased (2 marks)
   (b) Good things about the deceased e.g achievements/contributions to society and the Wildlife Club/what shall be missed about him (2 marks)
   (c) Cause of death (2 marks)
   Total 6 marks

3. LANGUAGE
   5-6: Very Good
   4: Good
   3: Fair
   0: I Poor

ENGLISH PAPER ONE SOLUTIONS (OE003)

SAMPLE OF A EULOGY

A EULOGY GIVEN BY THE PRESIDENT OF THE WILDLIFE CLUB IN HONOUR OF THE DECEASED.

The religious leaders, the bereaved family and fellow mourners.
My name is Namulindwa Sharon, a student at St. Christine's High School. My is with so much grief that I stand here today on behalf of the Wildlife Club of St. Christine’s High School to say farewell to our leader, friend and mentor, Sukiyuga Ibrahim, who departed from us yesterday.

As we played football in the evening, Ibrahim collapsed and became unconscious. We rushed to give him first aid and later carried him to the sickbay, where the school nurse attended to him. Since his condition was worsening, he was rushed to the hospital, where he breathed his last, leaving us in immeasurable pain and shock! At only 17 years, Ibrahim has really gone too soon! I came to know Ibrahim way back in 2017 when we joined Senior One at St. Christine’s High School. He was friendly and easy to get along with, so we became friends. Besides, he showed traits of a leader when he comforted fellow Senior One students who were crying when their parents left them in boarding school for the first time. He hated to see anybody suffer. Due to his brilliant ideas, hard work and trustworthiness, we did not hesitate to elect him the treasurer and mobiliser of the Wildlife Club. I want to assure you that each coin served its purpose and the club was booming. His ambition was to become a pilot but sadly, his dream has been cut short.

To the bereaved family, it is the Lord who gives and it is He who takes away. Only God can fill the vacuum Ibrahim has left behind and only He can strengthen you in this trying moment. Ibrahim, we shall greatly miss you. May your soul rest in eternal peace!

SECTION B SAMPLE COMPOSITION

Question: Describe a situation when you had given up hope, but something unexpected happened.

AT THE END OF THE TUNNEL

I absolutely agree with the music diva who in her own wisdom observed that God has the final say in our lives. Disillusioned and pessimistic as mortal man may be, certain occurrences may not be in anyone’s wildest dreams but alas! At the eleventh hour, something inexplicable can take place by happenstance.

Saturday 21st June, 2018 was a day like any other for...
SUMMARY WRITING

ROUGH COPY

CHALLENGES ASSOCIATED WITH THE GREEN REVOLUTION.

The Green Revolution is challenged in a way that many farmers who switched to the new varieties but have not been able to increase their output much, because they were unable to access the supporting technology like fertilizers, insecticides and water. The new varieties require tonnes of fertilizers which are not available. There is increasing dependence on pesticides. The poor farmer cannot afford the added costs without credit. These varieties demand much more care in cultivation and in labour requirements than ordinary crops. Marketing, storage and transport of the surplus produce are all new problems. Some of high-yielding cereal varieties are already proving susceptible to diseases and any resistance may lessen with time. The Green Revolution will increase water pollution. Water pollution will increase due to heavy use of fertilizers. It has widened the gap between the rich and the poor.

FAIR COPY

THE CHALLENGES ASSOCIATED WITH THE GREEN REVOLUTION.

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1 Read the following passage and answer the question that follows.

The department of Forestry Bio-diversity and Tourism, Makerere University carried out a study which aimed at establishing the prevalence of food insecurity and the impact of commercial sugarcane growing in Busoga region in Eastern Uganda. The study indicated that commercial sugarcane growing, although contributing to increased household income, does not necessarily increase food adequacy among households. Researchers said there are few varieties of food crops cultivated by sugarcane growing households and the households are also short of money to supplement what they grow. More people have taken to growing sugarcane on a commercial basis, resulting in the conversion of different land-use types to monoculture sugarcane plantations.

"Many households in the region, especially around Kakira Sugar factory, rent out most of their land to rich out-growers and remain with a little patch which they also use for growing cane," said Dr. Edward Mwavu. However, the researcher was sure to note that most men used the income acquired from commercial sugarcane growing to marry more women.

"This might compromise the sustainable management of their agro-diversity as well as food production, consequently exposing them to food insecurity and malnutrition. According to the study, 87% of the households in sugarcane growing areas reported not having adequate and nutritious foods to meet their family needs. Households also reported employing various coping mechanisms that included offering labour in exchange for food, borrowing food, rationing of food and at times stealing from their neighbours. It also emerged that male-headed households were most insecure due to disregard for food in favour of other assets, such as houses, bicycles and clothes. Those who owned land were most food insecure since they rented it out for four harvest seasons in a bid to make quick money, subsequently remaining with little for food.

Food insecurity in the region was also worsened by increasing trends in crop failures, family sizes, trade in food items in the villages and declining food availability, land available for crop cultivation and livestock numbers. The work involved 208 households in two commercial sugarcane growing districts of Jinja and Mayuge. The study recommends policy-makers to establish poverty alleviation and food security initiatives that will focus on providing alternative sources of income for the sugarcane growing households. Affected households were also urged to allocate more land for growing food crops as opposed to cash crops as a remedy to food insecurity.

(Source: New Vision, May 29, 2019)

Question: In about 120 words, summarise the impact of commercial sugarcane growing on households in Busoga region.

2A. Read the passage and answer the question that follows.

EXPORTS: TRUCK DRIVERS PUT PROTOCOLS TO TEST.

The messengers of regional trade in the East African Community (EAC) are agreement on Uganda’s imports and exports are channelled through these unsung heroes. However, of late, they are at the forefront in importing the highly infectious coronavirus into Uganda.

EAC heads of state are caught between a rock and a hard place — a catch 22 position. Like the European Union, the EAC is a single territory, a common market, a single market to accelerate economic growth and development. It is for this reason that producers with a Uganda National Bureau of Standards (UNBS) quality Q-mark are recognised in Kenya. Similarly, products with the Kenya Bureau of Standards (KEBS) mark are recognised in Uganda without need for repeat testing. Since we are one market, professional trust should grow and develop across borders.
There are discussions on harmonisation of standards to mitigate variations in technical regulations within the region. For commodities, the East African Business Council (EABC) has called for harmonisation of standards of the most traded products to reduce transit time and cost of doing business across regional borders.

Fast forward to truck drivers and testing for COVID-19, standards come into play in the medical industry. In the health care sector, testing standards and vigilance are clearly not identical among the six East African countries — Uganda, Kenya, Tanzania, Rwanda, Burundi and South Sudan. Tanzania’s COVID-19 cases have skyrocketed over the past weeks, sending a cold chill down the spine of the region.

How do we balance the freedom and rights of the integration pillars and lockdown standard operating procedures without compromising harmful trade and health? The EAC common market protocols adhere to freedom of movement of goods, persons, labour and workers. This includes truck drivers who are the messengers of trade in the region.

Regional heads of state need to either agree on standard operating procedures for testing in the EAC or assign joint testing teams in each territory as some experts have insinuated. The former is similar to standards for goods tested in each region with the assumption that each country is carrying out tests with the right kits and health standards.

The latter raises issues of trust and can spark disagreements among health professionals. Who makes the final call at testing centres comprising different EAC nationalities? The compromise which Present Yoweri Museveni brings forward is testing done in a neighbouring country’s territory closer to the border, for example Naivasha, on the same day of entry into Uganda’s territory. It must be noted that an hour’s difference in travel involving interaction before entry through a border is enough time for new infections.

In the same way, that a seal on a container should not be broken until destination, truck drivers carrying cargo after testing should stay put in their trucks with controlled interaction. However, one cannot stop drivers from disembarking to refuel or allow testing on the go. It is important to note that the testing should stay put in their trucks with controlled interaction.

Question:

3.15 If there is any word you don’t understand in the book, look……….the dictionary.

A. it up from
B. it up in
C. it up using
D. it up with

3.16 I gave you two thousand shillings. Please give me your…

A. change
B. balance
C. remainder
D. left over

3.17 I needn’t have laughed………?

A. did I?
B. didn’t I?
C. needn’t I?
D. need I?

3.18 The new shop will sell only………….

A. stationery
B. stationery
C. stationery
D. stationery

3.19 Peter bought a…………………coat.

A. blue new beautiful woolen
B. beautiful woolen new blue
C. new blue woolen beautiful
D. beautiful new blue woolen

3.20 Anfunde Felix Kaweesi was……….. a few years ago.

A. killed
B. murdered
C. finished
D. assassinated

Questions:

1. When a wave (ripple) moves from one medium to another of different depth, its direction changes. This is referred to as refraction and is caused by the change of wave length and velocity of the wave.

When a wave moves from shallow water to deep water, its;  
• Wave length increases  
• Velocity increases  
• Frequency and period remain the same.

Read about what happens when the ripple is from a deep to shallow boundary.

2. Power points or electrical appliances are usually connected in parallel with the mains supply so that;

(i) They receive the same full voltage from the mains supply or source.  
(ii) If they were in series, they would share the mains voltage which might be lower than what they require to operate.  
(iii) When one circuit is faulty or switched off, the other circuits remain working.

3.3 When white light strikes the soap film, its split into the seven different colours. This is as a result of refraction.  

Read about Dispersion of white light.

4. D  

Quantity of Charge = current x time  
Both current and time must be in S.I units.  
Quantity of change = 5 x (2 x60) = 600C

5. A  

Where white light strikes the soap film, its split into the seven different colours. This is as a result of refraction.

Read about Dispersion of white light.

6. B  

E = IR + r, where E = EMF of the cell, I = current, R = external resistance and r = internal resistance.

Note: EMF of a cell is the pd across the cell when open circuit, i.e. when not supplying current. It is when the switch is open. E = 4.5V from the table.

4.5 = 1r
4.5 = 5.0 + 3.0r = 4.5 + 3.0 = 0.5Ω
3.0

7. D  

A dynamo or sometimes simply referred to as a generator transforms mechanical energy into electrical energy. Kinetic energy is a form of mechanical energy possessed by a body in motion.  

Read about the mode of operation of a DC and AC generator and a DC motor.

8. D  

Power x time = mass x S.H.C. x change in temperature

\( IV = 0\text{mho} \)

10 x 240 x t = 5 x 4200 x 80

t = 700s

Turn to page Vi
23. B
Pitch of a note is the loudness or softness of sound. It depends on the frequency of sound produced, the higher the frequency the higher the pitch.

24. C
Power = \( IV = \left( \frac{144}{10} \right) = 14.4 \text{ W} \)

25. D

26. D

27. A
A four-stroke engine is an internal combustion engine in which the piston completes four separate strokes while turning the crankshaft.

28. C

29. C

30. A
A simple cell is made up of two electrodes and an electrolyte.

31. D
When you touch a metal on a cool day, your body is at a higher temperature compared to the metal, so heat moves away from your hand to the metal.

32. D
Pressure exerted on a surface depends on the surface area in contact.

33. B
Radioactivity is the spontaneous disintegration of heavy, unstable nuclei to form stable nuclei accompanied by release of energy.

34. C
When a balloon filled with hydrogen is released into the air on a calm day, it rises up. As it rises, the pressure exerted on the gas particles reduces, but the volume of the balloon increases until when the balloon bursts. (Boyle’s law).

35. B
When a metal sphere is dropped in a viscous fluid, it first accelerates because its downward force (weight) is greater than the total upward force (up thrust + viscous force).

As the particle accelerates downwards, its upward force increases until a point when the total upward force is equal to the downward force. At this point, the net force acting on the body is zero and therefore its acceleration is zero. The body then moves with a constant velocity called terminal velocity.

A nuclide is written as \( _{A}^{Z}X \) where \( A \) is mass number and \( Z \) proton number. \( A = N + Z \) where \( N \) is number of neutrons. If number of protons = 29, then; \( 63 + 29 = 92 \) neutrons \( \Rightarrow \) neutrons = 63 — 29 = 34.

For a neutral atom, number of protons = number of electrons.

So the number of electrons = 29
42. (a) The statement that "An electrical appliance is rated 240 V, 60 W" means that when this appliance is connected to a 240 V mains supply, it gives out energy at a rate of 60 joules per second.

(b) We mainly have three mathematical relations that help us to determine the electrical power dissipated by an electrical appliance:

\[ P = IV, \ P = I^2 R, \ P = V^2 / R \]

Since we have been given Power and Voltage, then we employ the first relation:

\[ P = 60 \text{ W}, V = 240 \text{ V}, I = ? \]

\[ P = VI \]

\[ 60 = 240 \times I \Rightarrow I = \frac{60}{240} = 0.25 \text{ A} \]

Also read about:

• The difference between potential difference and Electromotive force and their S.I units
• The series and parallel connection of resistors
• The relationship between Voltage, current and resistance
• Relationship between e.m.f and internal resistance
• Ohm’s law and its applications, the factors that affect the resistance of a conductor (Ohmic and non-Ohmic conductors)
• The formulae for electrical heat energy dissipated in an electrical appliance
• The unit Kilowatt-hour and electrical billing

43. Sketch of velocity-time graph for a body—thrown vertically upwards

• A body moving with uniform/ steady constant acceleration/ deceleration
• A body moving with non-uniform acceleration
• The Newton’s laws of motion, inertia, equation of linear motion, motion of a ticker timer, motion in a lift (when we feel weightless in a lift)
• Application of the laws of motion (Flexing on the knees by jumpers, delay to bring a fast moving ball to rest by a goal keeper, why when an inflated balloon is opened at the mouth and released, the it loses the air as it moves in the opposite direction)
• The working of a rocket/ jet engine etc.

44. A transverse wave is the one which is propagated by vibrations perpendicular to the direction of travel of the wave.

(i) \( P \) is a trough. \( Q \) is a crest.

(ii) If the frequency of the wave is 20 Hz, then using \( v = f \lambda \), the velocity of the wave can be determined;

\[ I = 20 \text{ Hz}, \lambda = 16 \text{ m}, v = ? \]

\[ v = f \lambda = 20 \times 16 = 320 \text{ m s}^{-1} \]

Read and understand the terms: Frequency, period, wave amplitude, wave front, crest, trough, rear faction etc.

Difference between electromagnetic and mechanical waves

Why is it not possible to communicate to a friend on the moon without use of devices?

The transverse and longitudinal waves and their examples Harmonics and overtones as applied in waves

Explain why echoes cannot be heard in small sized room

45. (a) Define focal length of a converging lens.

This is the distance from the optical centre to the principal focus of the lens.

(b) The focal length of a converging lens is 20.0 cm. What is its power?

Note: Recall that power of a lens is the reciprocal of the focal length of the lens expressed in metres. We first covert the focal length to metres and then obtain its reciprocal. The result obtained is the power of the lens. It is measured in dioptres (D).

\[ f = 20.0 \text{ cm} = 0.20\text{ m} \]

power \[ P = \frac{1}{f} = 5 \text{ D} \]

(c) State any two properties of an image of a real object formed by a diverging lens.

The image is erect, diminished, and virtual.

Read more about:

• Differences between real and virtual images
• The rules followed to draw the graphical representations of the images formed at various positions of the object from the lens (beyond C, at C, between C and F, at F and between F and the optical centre)
• Lenses and their applications
• Terms used and related to lenses
• The methods/experiments to determine the focal length of lenses
• The determination of the nature of the images formed by lenses using the graphical method
• The devices like the lens camera which use the lenses
• The human eye, operation, defects and how they can be fixed

46. (a) State Ohm’s law.

The current passing through a conductor at constant temperature is proportional to the potential difference across its ends.

Note: For definitions, laws, principles, theories and hypotheses, much care must be taken as if you do not change the meaning in them. Changing their meaning renders your work wrong and so you do not score the marks. On this ground, you are encouraged to read hard and understand them.

(b)

\[ \frac{\text{4 V}}{3 \Omega} \quad \frac{3 \Omega}{6 \Omega} \]

Two resistors of resistances 5 \( \Omega \) and 6 \( \Omega \) are connected across a battery of 4 V of negligible internal resistance as shown above. Find the

(i) Combined resistance.

Let combined resistance be \( R \)

\[ R = \frac{1}{\frac{1}{5} + \frac{1}{6}} = \frac{6+5}{30} = \frac{11}{3} \]

\[ R = 2 \Omega \]

(ii) Current supplied by the battery.

\[ R = 2 \Omega, e.m.f. = 4 \text{ V}, I = ? \]

Using Ohm’s law: \( V = IR \)

\[ 4 = 1 \times 2 \Rightarrow I = \frac{4}{2} = 2\text{ A} \]

Also read about:

• The formulae, Verification of Ohm’s law/Ohmic and non-Ohmic conductors, factors determining the resistance of a material
• Sketch of IV graphs of different Ohmic and non-Ohmic conductors
• Whether the parallel or the series arrangement of resistors allows higher current or potential difference.
• The use of the voltmeter and ammeters to measure and record voltage and current.

47. (a) When two insulators of different materials are rubbed together, some of the surface electrons acquire enough energy to break off the material with less affinity for electrons and clung to the material with a higher affinity for electrons. The material to which the electrons stick becomes negative ion, while the material that lost some of its electrons becomes a positive ion.

(b) Note: more charge collects at the sharp ends of the conductor than at the larger ends. So the charge distribution all over the conductor will be like the one in the figure below;

Note that a lightning conductor has sharp spikes because a lot of charge concentrates on these sharp spikes before it is transmitted to the Earth. Read more about the working of a lighting conductor.

Sketch the electric field pattern due to the two charges \( P \) and \( Q \) placed near each other as shown above.

Note: The lines of force always run from the positive charge to the negative charge, they are curved and never cross each other.

Also read about:

• The field between two similar charges, charged plates
• Charging a body by contact, induction, friction
• The gold leaf electroscope, its parts and their uses.
• The different uses of a gold leaf electroscope
• Comparing magnitude of charge on different bodies, comparing conductors and insulators, determining sign of charge on a body

48. (a) The electromotive force of a battery is the total work done in joules per coulomb of charge conveyed in the circuit in which the battery is connected.

(b) Dry cell, dynamo, thermocouple, photo cell, lead-acid

Turn to page VIII
PASS O’LEVEL

From page VII

1. (a) What is meant by:
   i) Velocity ratio of a machine?
   ii) Pitch of a screw?

(b) A screw jack with a lever arm of 40cm and a pitch 2.0cm is used to raise a heavy load
   i) Find the velocity ratio of the screw jack.
   ii) State two practical applications of a block and tackle pulley system

(c) State the principle of conservation of linear momentum.
   i) A dog of mass 8kg chases a bicycle rider at a speed of 20ms⁻¹. The mass of the rider and the bicycle is 48kg and is moving at a speed of 5ms⁻¹. If the dog runs and sticks into the spokes of the bicycle, find their common velocity after collision, and the type of the collision.
   ii) A balloon is blown full of air and its neck tied with a thread. Explain briefly what happens when the balloon is simultaneously untied and released.
   iii) State Archimedes’ principle.

(c) A uniform beam is pivoted at its centre as shown below:

4. (a) Define the following terms as applied to waves:
   i) Wave front
   ii) Wave length.

(b) (i) State three differences between light and sound waves.
   (ii) A turning fork of frequency 525 Hz causes an air column in a closed pipe to resonate with its fundamental note. Calculate the length of the tube.
   (c) (i) Describe an experiment to demonstrate resonance in sound.
   (ii) If the fundamental frequency of a note is 600 Hz, find the frequency of a note two octaves lower.
   (iii) State two ways in which the frequency of vibration of a stretched wire can be increased.

5. (a) (i) What is meant by centre of gravity?

(b) State one way of increasing;
   (i) The intensity of the X-rays produced
   (ii) The strength of the X-rays produced

(c) Define the following terms:
   (i) Activity.
   (ii) Half-life
   (iii) A radioactive nucleus of lithium disintegrated according to the equation.

6. (a) Explain what happens when two insulators of different materials are rubbed together.

(b) Describe how a lightning conductor guards a building from lightning
   (c) State Ohm’s law

(c) A uniform beam is pivoted at its centre as shown above. Find the:

   • The terms isotope, radioactivity, the effect of emission of alpha particles, beta particles, half-life and how it is determined, the different applications of the radiations in (medical, industrial etc.)
   • Deterioration of such radiations to our health and the precautionary measures.
   • The behaviour of such radiations in the electric and magnetic fields (to which pole or electric plate each radiation is deflected)
   • Comparison of the penetrating power of the radiations using an ordinary piece of paper, aluminium and lead and other related areas.

50. (a) (i) Height, h = 550 – 50 = 500 m, mass in one second, m = 2000 kg, g = 10 m s⁻²
   Potential energy per second, Q = mgh
   Q = 2000 x 10 x 500
   Q = 10,000,000 W

(ii) the maximum electrical power output of the station if the whole system is 80% efficient.

Electrical power output, P = \( \frac{80}{100} \times 10,000,000 \)
P = 8,000,000 W

(b) Potential energy per second = kinetic energy per second

\[ mg \times h = \frac{1}{2} m v^2 \]

Hence \( v = \sqrt{100000} = 1000 \text{m/s} \)

Read about:
   • The different types of machines, the terms efficiency, velocity ratio mechanical advantage, work input and work output
   • Reasons why it is not practical to have a machine that is 100% efficient
   • How to improve the efficiency of a machine
   • The relationship between work, power and energy etc.

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**PHYSICS PAPER TWO QUESTIONS (0PHY004)**

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