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 ________________coronavirus 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

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1. (a) (i) Social entrepreneurship refers to the creation of innovative enterprises to make a positive and sustainable impact on society / environment while Sustainable development refers to the development that meets the needs of the present generation without compromising the future generation to meet their needs.

(ii) Traits of social entrepreneurs
- Personal leadership - Ethical and principle centred
- Goal-oriented and visionary - Good listeners
- Risk taker - Advocates
- Hardworking and committed - Optimistic and flexible
- Good time managers - Innovative and creative

(b) Entrepreneurial culture is a culture that encourages the whole population to take advantage of the abundant opportunities in the environment.

(i) Objectives of developing entrepreneurial culture
- To acquire formal / informal managerial knowledge and practice in business.
- To link with a wide network of independent family / business contacts.
- To embrace opportunities to practice entrepreneurial competencies.
- To be in contact with numerous familiar successful role models.
- To familiarise individuals with small business tasks during youth.
- To tap support from various technical and professional institutions that foster growth of an entrepreneurial spirit.

(ii) Benefits of drafting a mission statement:
- It provides a basis for initiating business targets and objectives.
- It defines the scope of the business.
- It brings together internal stakeholders who hold diverse views about the business.
- It provides a permanent point of reference during period of change.
- It provides a basis for initiating business targets and objectives.

(c) Strategies of coping with change:
- Training employees to cope with change.
- Giving explanation as to why change is taking place.
- Rewarding success.
- Assessing readiness of people involved before implementing change.

(d) Factors considered when evaluating business ideas:
- Through copyrights - Using trademarks
- Using patents - Preserving trade secrets

(e) Determinants of quality production in an enterprise.
- Quality of raw materials.
- Mode of packaging.
- Cleanness of the work place.
- Extent to which technical specifications regarding quality are observed.
- Nature of technology used.
- Mode of storage of the raw materials and finished goods.
- Quality of production management, process and layout.
- Mode of product distribution.
- The level of financial management.

3. (a) Reasons why newspaper advertising is preferred to radio advertising include:
- Newspapers have a wider coverage in terms of geographical area unlike radios where coverage is limited to a small geographical area.
- Errors can be corrected on proof-reading a newspaper advert unlike radio adverts where once broadcasting is done errors become hard to correct.
- Newspapers have a wider coverage in terms of geographical area unlike radios where coverage is limited to a small geographical area.

Note: questions of comparing two items require presenting both the results and showing how or why each side creates high or low quality.

5. (a) Reasons why newspaper advertising is preferred to radio advertising include:
- Newspapers advertise favours the deaf unlike radio advertising where the deaf are disfavored.
- Newspapers advertise is illustrative unlike radio where the message is theoretical.
- Detailed information can be presented using newspapers unlike radio advertising which only broadcasts brief information.
- Newspaper advertisements can be read at any convenient time to the intended people than advertising on radio where the message is timed.
- Newspapers can be kept for review than radio advertising where once a message is missed, there is no chance of review.
- Errors can be corrected on proof-reading a newspaper advert unlike radio adverts which once broadcasting is done errors become hard to correct.
- Newspapers have a wider coverage in terms of geographical area unlike radios where coverage is limited to a small geographical area.

Note: questions of comparing two items require presenting both the results and showing how or why each side creates high or low quality.
ENTREPRENEURSHIP QUESTIONs (AENT009)

SECTION A: CASE STUDY

1. Read the case study carefully and answer the questions that follow:

Brian Babeyo: Young Statistician Changing “The Face of Uganda’s Farming Business”

- A fresh graduate from Makerere University with a bachelor’s degree in Science in Quantitative Economics, Babeyo is the founder and the Chief Executive Officer (CEO) of Seed Africa. Ent. Ltd, a company he founded in 2014.
- Born in Jinja district, Babeyo says he was raised in a middle income family, with both parents earning a living from farming. However, Babeyo didn’t want to follow in his parents’ footsteps. During his senior six vacation, he took on the streets of Kampala, trying to find what to do for survival, he didn’t succeed. As he was planning to go back to Jinja, a friend showed him about a farming seminar at Nsambya Sharing Hall. He decided to attend the seminar that would later turn to be his turning point in life.
- In addition to attending seminars, he always listened to radio and TV programs on agriculture, read newspapers and got interested in the success stories of farmers within the region which changed his view on agriculture.
- He says he started with an initial capital of Shs600,000 which he raised from his friends and his uncle, Paul. In a space of about four years, his company has grown to have a net worth of over Shs50m. He adds: “I always make surprise visits to my farms to find out the weaknesses of managers and workers. I do this once a week, but I carry some goodies for them in order to inspire them.”
- Babeyo says apart from growing his company from almost scratch, he is happy to employ fellow youth, providing food to the growing population and play a part in changing people’s mindset towards farming.

“Everyone can be successful in any field he or she chooses to specialise in. I think agriculture is the only way to go and anyone can start from wherever they are,” he says. To succeed in agribusiness, he says, requires determination, self-belief and sacrifice. He insists it’s not about capital.

Questions

a) Explain the sources of business ideas Mr. Babeyo utilised to establish his business.

b) In what ways does Mr. Babeyo motivate his workers on the farm?

c) (i) What challenges does Mr. Babeyo face in running his agricultural enterprise?

d) (i) Advise Babeyo on how the above challenges can be solved.

d) What are the benefits of Babeyo’s business to the community?

SECTION B: SCHOOL BUSINESS CLUB

2. In relation to your school Business Club Project:

a) State the mission and the vision of the school business club.

b) Prepare the organisational structure for the school business club.

c) Describe the factors that affected the production decisions of the business club.

d) (i) What challenges were faced during the negotiation processes?

(ii) How were the above challenges in d (i) above solved?

SECTION C: FIELD ATTACHMENT/FIELD TRIP

3. In relation to the business you were attached to:

a) Design the plant lay out of the business you were attached to.

b) Explain the factors that influence the choice of technology in the business you were attached to.

(c) (i) What hinders effective communication in the business?

(ii) Suggest solutions to hindrances in c (i) above.

d) Describe the various ways the business fosters innovation.

4. For any field trip carried out as an individual or a group:

a) Give the general description of the business visited.

b) Describe the methods used by the business in pricing its products.

c) What are the benefits of training employees in the business visited?

d) Advise the entrepreneur on the importance of investing in collective investment schemes.

MATHEMATICS PAPER ONE QUESTIONS (AMATHS008)

THE TEACHERS

SECTION A

1. Given that \( x = 2 \log_3 y \) and \( y = 3 + e^{x+y} \), show that \( R = 8a^2 \)

Hence find the roots of the equation

\( 3 + 2 \log_3 x = \log_3 (14x - 3) \)

2. Solve the equation \( 5\cos x + 2\sin x = 3 \) for \( 0 \leq x \leq 360 \)

3. Show that the equation of the plane through point P with position vector \(-2i + 4k\) and perpendicular to the vector \( i + 3j - 2k \) is \( x + 3y - 2z = -10 \)

4. Find the equations of the tangent and normal to the curve \( y = 5x^2 - 2x + 5x - 6 \) at the point \((1, 1)\).

5. \( \int \sin x + 4 \cos x \)

6. A geometric progression and arithmetic progression have the same first term, the sums of the first, second and third terms are 6, 10.5 and 18 respectively. Calculate the sum of their sixth terms

7. Expand \((1 - 3x)^2\) in ascending powers as far as the term \(n^2\)

8. Solve the differential equation \( xy' = \frac{dy}{dx} + 3 = 0 \) given that \( y(0) = 2 \)
1. (i) 100g of naphthalene dissolved 1.67g of I
100g of naphthalene will dissolve 1.67X1000g of I
100 = 16.7 g of I.
16.7g of I in 1000g of naphthalene will cause a depression of 0.848 °C
127g of I in 1000g of naphthalene cause a depression of 127X0.848 °C

Thus the freezing point depression of Naphthalene is 6.45 °C

(ii) 100g of naphthalene dissolved 3.294g of S
100g of naphthalene will dissolve 3.294X1000g of S
100 = 32.94 g of S
0.830 °C depression was caused by 32.94 g of S
in 1000g of Naphthalene
6.45 °C depression will be caused by 6.45X32.94 g
of S in 1000g of Naphthalene

b) i) R.A.M of S = 32
ii) Structure of sulphur

2. a) i) HC=CH
2HCBr.Na in liquid NH3
CH3Cl + H2SO4(aq)

b) (CH3)3N + BF3
ii) (CH3)3N + BF3

2. Carbon is capable of catenation while other elements cannot.
3. Vanadium pentaoxide catalyst
b) i) SO3(g) + H2SO4(l) → H2SO4(l)

b) i) KHF = 3.15
2MnO4-(aq) + 10H+(aq) + 7H2O(l) → 2Mn2+(aq) + 5NO3-(aq)

6. a) i)
2NO(g) + 1/2O2(g) → 2NO2(g)

ii) 2MnO4-(aq) + 3H2O(l) + 5NO3-(aq)

iii) 271/2Al + 29Si + 37Neutron

(b) Let the original mass be N0
remaining mass Nt = NO - 32 X 100

7. a) Maximum yield of sulphur trioxide occurs at:
1. High pressure of about 9 atmospheres
2. Low pressure of about 450
3. Low pressure of about 500°C

b) i) SO3(g) + H2SO4(l) → H2SO4(l)

3. a) 1. Carbon forms oxides which are in gaseous state at room temperature, other elements form solid oxides.
2. Carbon is capable of catenation while other elements cannot.
3. Carbon can combine with almost all elements to form fairly stable compounds, other group (IV) elements cannot combine with many elements.

b) i) CO3(g) + 2H2O(l) → CO2(g) + 2OH-(aq) + 2H+(aq)

ii) Sn(s) + 2H2SO4(l) → Sn2+(aq) + 2SO42-(aq) + 4H+(aq)

4. a) Hydrogen fluoride is a weaker acid than hydrogen chloride because fluorine being more electronegative than chlorine, the hydrogen-fluoride bond is stronger than hydrogen-chlorine bond so hydrogen-chloride partially ionises in aqueous solution releasing fewer hydrogen ions in solution than hydrogen-chloride which is completely ionised.

b) KHF = 3.15 X 10^-3 n^-1, c = 0.1 mole dm^-3

5. a) i) 5CO + 13 = 0 and find the other roots.
8. (a) CH₃CH₂CH=CH₂ + Br₂ → CH₃CHBrCHBrCH₃
(b) OH⁻ + H₃PO₄ → H₂PO₄⁻ + H₂O

9. a) Melting points generally decrease from Be to Ba because the atomic radii decrease from Be to Ba causing the electron charge density to decrease hence decrease in the strength of metallic bonds consequently the amount of heat energy required to break the bond decreases.

b) The melting point of calcium is higher than that of magnesium because calcium adopts hexagonal/closed packed structure. This enhances attraction of atoms and hence strength of metallic bonds. Other members including magnesium adopts a body centred cubic structure in which the atoms are not closely packed hence weaker metallic bonds. Consequently more heat energy is required to break the stronger metallic bonds in calcium than magnesium.

SECTION B

10. a) Both ethanol and phenol react with phosphorous pentachlorid to form hydrochloride gas. Chloro ethane is formed in case of ethanol while chloro-benzene is formed in case of phenol.

   Ethanol is more reactive than phenol.

   + CH₃CH₂OH + PCl₅ → CH₃CH₂Cl + PCl₃ + HCl

b) 1. An acid-base indicator is an organic base or acid which changes colour according to change in pH of the solution.

   2. When the concentration of CH₃CO₂C₂H₅ and -OH is concurrently doubled, the initial rate of the reaction halves also. So the reaction is zero order with respect to.

   3. The empirical formula of K is MnN₂O₄

   4. A yellow precipitate with effervescence of a colourless gas.

   5. 2MnO₄⁻ + 5SO₂(g) + 3H₂O(l) → 2Mn²⁺(aq) + 5SO₄²⁻(aq) + 6H⁺(aq)

   b) A white precipitate was formed.

   c) i) R is 2-Phenylpropan-2-ol

   c) i) R is 2-Phenylpropan-2-ol

   ii) 1000 cm³ of solution contain 0.1 moles of HCl

   iii) CO₂(g) + H₂O(l) → H₂CO₃(aq)

   Volume of acid that reacted with Na₂CO₃ only = \( \frac{2(36.5 - 22.5)}{22.4} \times 10^{-3} \) cm³

   Volume of acid that reacted with NaOH only = \( \frac{2(36.5 - 22.5)}{22.4} \times 28 \) cm³

   1000 cm³ of solution contain 0.1 moles of HCl

   8.5 cm³ of solution contain \( \frac{0.1 \times 8.5}{1000} \) moles of HCl

   \( \frac{8.5 \times 10^{-5}}{1000} \) moles of HCl

   NaOH(aq) + HCl(aq) → NaCl(aq) + H₂O(l)

   Rm of NaCl = 106

   Mass of Na₂CO₃ = 106x0.056 = 5.936 g

   Na₂CO₃(aq) + 2HCl(aq) → NaCl(aq) + H₂O(l) + CO₂(g) mole ratio; carbonate to acid is 1:2

   28 cm³ of solution contain \( \frac{0.1 \times 28}{1000} \) moles of HCl

   Na₂CO₃(aq) + 2HCl(aq) → NaCl(aq) + H₂O(l) + CO₂(g)

   The empirical formula of K is MnN₂O₄

   15 a) Generally ionisation energy decreases in the order 4p > 3d > 2p > 1s, this is because after removal of the first electron or subsequent electron, the number of become greater.

   b) Element belongs to group 1 because there is a big energy change between the first and the second energy levels. This means that the electrons are removed from principle energy level.

   \( \frac{4.626 \times 10^{-34} \times 3 \times \pi^{2}}{242} = 3.25 \times 10^{-7} \)

   \( \epsilon = 0.026 \times 10^{-7} \times 3.25 \times 10^{-7} \)

   16. a) i) The cation is Mn²⁺

   ii) 2Mn²⁺(aq) + 5PhO⁻(aq) + 4H⁺(aq) → 2MnO₄⁻(aq) + 2H₂O(l) + 5Ph²⁺(aq)

   b) A white precipitate was formed.

   Mn²⁺(aq) + CO₂³⁻(aq) → MnCO₃(s)

   \( \frac{37.4}{1000} \) mol

   \( \frac{0.68}{1000} \) mol

   \( \frac{1}{1000} \) mol

   \( \frac{0.0821 \times 298 \times 0.68}{2\text{nd}} \) mol

   17. a) Reagent: dilute sulphuric acid

   \( \text{CrO}_4^{2-} \): yellow solution turns to orange

   \( \text{C}_2\text{O}_4^{2-} \): no observable change

   b) Reagent: dilute hydrochloric acid

   \( \text{SO}_4^{2-} \): Effervescence of a colourless gas

   \( \text{S}_2\text{O}_3^{2-} \): Yellow precipitate with effervescence

   c) Reagent: hot acidified potassium manganate VII solution

   \( \text{C}_2\text{O}_4^{2-} \): purple solution turns to colourless

   \( \text{CH}_3\text{COO}^- \): No observable change
Chemistry Questions (ACHEMS09)

1) (a) Define the term freezing point constant.

(b) 0.4g of K₂Fe(CN)₆ was dissolved in 10cm³ of water. (Kₗ for water = 1.86°C mol⁻¹kg⁻¹)

(i) Calculate the freezing point of the solution.

(ii) The actual observed freezing point is -0.9040°C. Explain the difference in the observed and the calculated freezing point.

(c) The vapour pressures at various temperatures for benzene and a solution containing 1.86g of an organic acid in 10g of benzene are given in the table below:

<table>
<thead>
<tr>
<th>Temp/°C</th>
<th>V.P of benzene (atm)</th>
<th>V.P of solution (atm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>72</td>
<td>0.30</td>
<td>0.10</td>
</tr>
<tr>
<td>74</td>
<td>0.42</td>
<td>0.20</td>
</tr>
<tr>
<td>76</td>
<td>0.56</td>
<td>0.31</td>
</tr>
<tr>
<td>78</td>
<td>0.75</td>
<td>0.43</td>
</tr>
<tr>
<td>80</td>
<td>1.0</td>
<td>0.56</td>
</tr>
<tr>
<td>82</td>
<td>1.2</td>
<td>0.76</td>
</tr>
</tbody>
</table>

(i) Plot a graph of vapour pressure against temperature for benzene and the solution using the same axes.

(ii) Use your graph to calculate the relative molecular mass of the organic acid. (Kₗ for benzene = 2.57 mol⁻¹kg⁻¹)

(d) (i) Explain what is meant by the term steam distillation.

(ii) When a compound Y was steam distilled at standard atmospheric pressure, the temperature of distillation was 96°C. The vapour pressure of water at this temperature was 730mmHg and the distillate contained 74% of water. Calculate the relative molecular mass of compound Y.

(2) Complete the following organic reaction mechanisms and outline the reaction mechanism;

(a) \[ \text{CH}_3 - \text{Br} + \text{Br}_2 / \text{H}_2\text{O} \rightarrow \]

(b) \[ \text{OH}^- / \text{H}^+ \rightarrow \]

(c) \[ \text{CH}_3\text{CONH}_2 + \text{H}_2\text{O} / \text{H}^+ \rightarrow \]

(d) \[ \text{CH}_3\text{CHO} + \text{H}_2\text{O}^- / \text{H}^+ \rightarrow \]

(e) \[ \text{CH}_3\text{CHO} + \text{H}_2\text{N-COCH}_2\text{NH}_2 \rightarrow \]

(i) Explain the following observations.

(a) The order of acidity of the halogens increases in order.

(b) Although ionisation energy generally increases across a period in the periodic table, the first ionization energy of boron is less than that of beryllium.

(c) A mixture of water (boiling point 100°C) and amino benzene (boiling point 184°C) boils at 98°C at 1 atmospheric pressure.

(d) An aqueous solution of chromium (III) chloride is acidic to litmus.

(e) Beryllium is in group (II) of the periodic table. But its properties resemble those of aluminium which is in group (III) of the periodic table.

(f) When propene is reacted with bromine in presence of sodium chloride bromochloropropane as well as 1,2-dibropropane are formed.

(4) (a) The elements fluorine, chlorine, bromine and iodine are in group (VII) of the Periodic table.

(i) State the physical state in which each of the above given elements exists at room temperature.

(ii) Explain your answer in (a) i above

(b) Discuss the reactions of the elements fluorine, chlorine, bromine and iodine with;

(i) Water

(ii) Sodium hydroxide

(c) How would you distinguish between potassium bromide and potassium iodide given chlorine water and tetra chloromethane.

(d) When water is added to silicon(IV)chloride a white solid and white fumes are formed however no observable change occurs when water is added to carbon tetrachloride. Explain.

(5) (a) Describe the reaction of methyl benzene with chlorine.

(b) Outline reaction mechanism for one of the reactions involved in (a) above.

(c) Explain briefly each of the following observations.

(i) Methylchlorobenzene forms a white precipitate when reacted with hot sodium hydroxide solution, dilute nitric acid and silver nitrate solution whereas no observable change occurs with chlorobenzene.

(ii) Both cyclohexene and benzene react with bromine however only cyclohexene reacts with potassium permanganate solution

(iii) Aqueous solution of phenol has a pH less than 7.

(6) (a) State the two possible oxidation states of group(IV) elements.

(ii) State and explain how the above two mentioned oxidation states vary within the group.

(b) Compare the reactions of beryllium and lead with;

(c) State the conditions and write equation for the reaction to show how the following compounds can be prepared.

(i) Tin(IV)chloride

(ii) Tin(IV)iodide

(d) When water is added to silicon(IV)chloride a white solid and white fumes are formed however no observable change occurs when water is added to carbon tetrachloride. Explain.

(7) (a) (i) Explain what is meant by the term conductivity.

(ii) State any two factors that influence magnitude of conductivity of an electrolyte.

(b) Explain what is meant by each of the following terms;

(i) weak electrolyte

(ii) strong electrolyte

(c) On the same graph draw sketch curves that show the variation in conductivity against concentration for;

(i) Hydrochloric acid

(ii) Hypochlorous acid

(d) Explain the shapes of the graphs in (c) above.

(e) (i) State Kohlraush’s law of independent migration of ions and state its application.

(ii) Calculate the molar conductivity at infinite dilution of 25°C of ethanoic acid, given that the molar conductivities at infinite dilution of hydrochloric acid , sodium chloride and sodium ethanoate are 4.26 x 10⁻³, 1.26 x 10⁻² and 9.1 x 10⁻² ohm⁻¹cm⁻¹mol⁻¹ respectively.

(8) During the extraction of aluminium from bauxite, the ore is first heated, powdered and then the powdered material is heated with sodium hydroxide solution and finally filtered.

(a) State why the;

(i) Ore is first heated before changing it to the powder.

(ii) Powdered ore is heated with sodium hydroxide solution and then filtered.

(b) Write equation for the reaction between the powdered ore and sodium hydroxide solution.

(c) Briefly describe how pure aluminium can be obtained from the products from the reaction in (b) above. (Your answer should include equations)

(d) Write equations for the reaction between aluminium and;

(i) Fe₂O₃(s)

(ii) Mn₃O₄(s)

(iii) Cr₂O₃(s)

(e) Use equations to show how anhydrous aluminium chloride can be prepared.

(f) When magnesium powder is added to aqueous solution of aluminium chloride a white precipitate and bubbles of colourless gas is given off. Explain this observation.

Answers and more questions next Tuesday