International Journal of Innovative Education Research 8(4):124-135, Oct.-Dec., 2020

© SEAHI PUBLICATIONS, 2020 www.seahipaj.org ISSN: 2354-2942

Construction and Validation of Basic Science Achievement Test for Junior Secondary Three (JS3) Students in Public Secondary Schools in Akwa Ibom State

OBILOR, Esezi Isaac, PhD[1] & AKPAN, Uduak Timothy[2]

Department of Educational Foundations
Faculty of Education
Rivers State University
Port Harcourt, Nigeria
esezirukanimgbog@gmail.com[1]

ABSTRACT

The study dealt with construction and validation of Basic Science Achievement Test for Junior Secondary Three (JS3) students in Akwa Ibom State public secondary schools. Instrumentation research design was employed in this study. Ninety-six test items were constructed and validated on a sample of 399 randomly selected students. Four research questions were posed to guide the study. The instrument for data collection was Basic Science Achievement Test (B-SAT). Testees responses were used to answer the research questions. Item analysis, reliability coefficient and standard deviation were computed. The B-SAT was administered three times. The results from the administrations showed that the minimum item difficulty indices increased from 0.36 – 0.40 and the maximum item difficulty indices decreased from 0.79 to 0.70; the minimum item discrimination indices increased from 0.22 to 0.32 while maximum discrimination indices decreased from 0.66 to 0.44; the effectiveness of distracters increased from 0.12 to 0.17 in first and second test administrations, and dropped to 0.11 in the third administration, while maximum distracter indices increased from 0.45 to 0.68. The reliability coefficient for the three administrations of the test were 0.92, 0.90 and 0.95 respectively, which were acceptable limits. The results of the study showed that these parameters: difficulty and discrimination indices, and effectiveness of distracters fell within the acceptable limit of a standardized test and the reliability coefficient of the test items were high for the three test administrations. Thus, it was recommended that this test be adopted for use by teachers and other stakeholders of education in Akwa Ibom State and beyond.

Keywords: Construction, Validation, Reliability, Basic Science, Achievement.

INTRODUCTION

Basic Science is the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence (Chi, 2005). All other science subjects such as Physics, Chemistry, Biology, Mathematics including some aspects of Technology and Agriculture stemmed from Basic Science. Consequently, Basic Science is taught in junior secondary school levels (JSS 1-3) in order to lay a solid foundation for the scientists. The subject is always handled by core professional teachers who understand the prerequisites, methods of teaching the subject and able to monitor and measure the level of achievement of learners in the subject content.

The merits of Basic Science and Science in general, cannot be overestimated in the development of science and technology in such areas as industries, health, agriculture, commerce, transportation, information, communication and the environment. Banfe (2014) stated that Basic Science does not only provide a holistic view of science, scientific education for non-specialist, but also increases potential for problem solving.

Science, according to Raymond and Ryan (2012), is practiced through the use of concepts, establishment of relationships between concepts, and deployment of acquired skills and techniques in fact-finding and problem-solving.

Basic Science is taught in standard classrooms and equipped laboratories so designed to meet the requirements of approved curriculum. Almorth (2015) observed that some schools in urban areas have well equipped laboratories for practical lessons while others in the rural areas have ill-equipped laboratories or no laboratory at all. Most laboratory works are designed to teach students the use of apparatuses and laboratory procedures in other to draw conclusions and generalize the study as found in text books and in learning and teaching process. Equipped laboratories and standard classrooms are ideal for effective teaching and learning of Basic Science. In the classrooms and laboratories, Basic Science is usually taught and assessed through tests.

Ekoh (2012) stated that testing in education is the process of administering educational test on pupils in order to obtain a quantitative representation of the cognitive or non-cognitive traits that pupils possess. This trait may be intellectual or psychological attributes. The teacher uses tests to measure the level of achievement of an individual in the learning process or as a method of private study or may be used to determine how much of the subject content is being taught. A test is used to find out the entry behaviour of the pupils to whom the subject would be taught. That is it is used to measure how much the pupils have mastered on the course already. This would help the teacher to draw the learning sequence by determining their level of achievement and adjust his lesson plans or decide on the teaching method, type of instructional materials and also helps the teacher to group the students homogenously for effective teaching and learning. Pretest, like readiness test, mental ability testing, aptitude testing and past records of achievement of the pupils are used for placement evaluation.

Sharma and Poonam (2017) clearly indicated that tests measure the nature and extend of individual differences. Ranks of students' characteristics are determined by responses of test items administered on the pupils. If one individual takes several tests we can describe his relative performance on several dimensions. When a number of tests are administered (under a diversity of circumstances) to large samples of persons, we have a means of studying the nature and range by ability and personal characteristics.

Mahmoud (2014) and Kendra (2018) were of the same opinion that well designed test serves to motivate and help students to structure in their academic effort. It can help students to understand how successful they are presenting the materials, it can reinforce learning and provide students with indications of what topic or skills they have not yet mastered and should concentrate on. Reena and Anisha (2017) opined that test gives room for educational psychologists to observe a client's work style in a relatively homogeneous setting and provides the psychologists with data about a client's ability and achievement and also provides opportunity for observations. Tests make it possible for both teachers and other stakeholders in education to discover how class, school or authority compares in the national scene. It is useful for identifying very able students and also in diagnosing special abilities and difficulties. Testing is not a highly specialized skill nor is it difficult to master. But almost everyone who has taken more than a few tests can testify from personal experience how easy it is to go astray in an examination (Ikeobi, 2005).

Teacher's responsibility is to design the instructional plan to include concepts, values and skills to be mastered by students and design achievement tests to assess the level of mastery by students. The test constructed by the teacher is called a teacher-made test. It is based on specific content areas as taught by the teacher, and is tailor-made to the teacher's purpose. Teacher-made test is used essentially to measure how well the students have mastered the units of instruction; determine the extent to which specific local objectives as emphasized by the teacher have been achieved; and provide a basis for assigning the course grades (Asuru 2015). However, there are some flaws in the teacher-made tests. A major flaw is incomparability of standards: The scores from one teacher-made test cannot be used for comparison with the scores of another group tested with a different teacher-made test. It is to curb this and other drawbacks of the teacher-made test that Mahajan (2005) recommended the use of standardized achievement tests which are carefully developed to include measurement of objectives common to many school systems. They measure knowledge of facts, concepts and principles; they are primarily used in making classroom-level, state-level, national-level and international-level decisions; and they are designed with particular reference to the course objectives and learning goals of a specific class. In a nutshell, standardized tests are valid, reliable, usable and fair. They make for objectivity, comparability and accountability (Obilor, 2017). To upgrade the teacher-made tests and make them valid, reliable, usable, and capable of objectivity, comparability and accountability, Mahajon (2005) recommended the following steps to be adopted during construction and validation of achievement tests: planning of the test, preparation of the test, administration of the test/pilot testing/test tryout, final tryout of the test, preparing final form of test and establishing reliability and validity.

Planning the test is a very important step in the construction of an achievement test. A standardized achievement test needs very careful planning. For proper planning of the test, the researcher should keep the following aspects in mind:

(i) Who is to write the test?
(ii) What use will the test scores be put?
(iii) When and where will the test be written?
(iv) How will the test be written?

Developing a standardized test therefore, includes designing the test and preparing the blue print, objectives, and contents of the test (Pooja & Baliya, 2016). Preparation of preliminary draft of achievement test includes two stages: item-writing and item editing. Item writing requires a great skill in couching the objectives, expected behaviours and designing the blue print which serve as guides to writing item for preliminary draft. The individual item should then be written to measure instructional objectives.

Following immediately is item editing. Item editing is the work of language and subject experts for checking the items framed with respect to the faulty language or inadvertent defects in wordings and also to verify whether the items measure what was intended to measure at the level of achievement. After incorporating the suggestions of the experts, the preliminary draft is reframed (Ndirika, 2012) and administered on sampled students.

The next stage in test construction is item analysis. Item analysis is the statistical procedure by which the appropriate items are selected for the final draft and poor items are rejected. It is a process of examining the responses of the students in the sample group for each of the test item. The process of determining the relative difficulty index, discriminating power, effectiveness of distracters, validity check, and determination of reliability coefficient of a test is called item analysis (Mahajan, 2015; Jayanthi, 2014).

Item analysis is the process of “testing the item” to ascertain specifically whether the item is functioning properly in measuring what the entire test is measuring (Obilor, 2019). Item analysis begins after the test has been administered and scored. According to Obilor and Obubere (2020), item analysis involves detailed and systematic examination of the testees’ responses to each item to determine the difficulty level and discriminating power of the item. The procedure for item analysis involves arranging the scores in descending order from the highest to the lowest scores. The scores of the highest 27% and lowest 27% testees are selected and used. For instance, if the test was trial tested on 300 students, the scripts will be arranged in descending order of scores. Eighty-one highest scores (27% of 300) will be selected to make up the highest scorers and 81 lowest scores (27%, of 300) to constitute lowest scorers. The rest scripts will be discarded.

Reliability refers to the degree of consistency of test scores. There are various methods of estimating reliability such as test-retest, split half, alternate forms, Kudar-Richardson and Cronbach’s Alpha. Validity refers to the ability of a test to measure what it was designed to measure. Approaches of estimating validity include face validity, content validity, construct validity, predictive validity and concurrent validity. According to Obilor and Obubere (2020), item difficulty is simply the percentage of students who answer an item correctly. In this case, it is also equal to the item mean. The item difficult index ranges from 0 to 100; the higher the value, the easier the item (question). Item discrimination refers to the ability of an item to differentiate among students on the basis of how well they know the material being tested. Ideally, more testees in the upper group should get each item correct than those in the lower group, while effectiveness of distracters is one that attracts students with misconceptions or errors in thinking and reasoning, generally those with lower overall ability. It is expected that all the distracters in each item should operate effectively. This means that every distracter must be chosen by at least one person each from the upper and lower groups.

Item selection is the step of test construction before administration, in which the number of items needed is selected. Items should first be ranked in descending order based on the magnitude of their discriminating power. Those with zero and negative values should be rejected out rightly. In the case of item difficulty, there is no specific value to be selected, but it depends on the use of the test. In most achievement tests, values of between 40% and 60% (.4 and .6) levels of difficulty are selected to cater for a wide talents or achievement range. It is on the basis of rejecting some items that the need to write more items than needed is premised.
Content coverage is concerned with relevance of the content of the items individually and as a whole. It also refers to the systematic examination of items in the entire test to determine the degree to which the test content covers a representative sample of the subject-matter (Asuru, 2015). The determination of the content coverage is based on expert judgment. Experts in the subject area should examine the test to see whether or not it covers all the vital contents of the subject and behaviours that need to be included in the test and whether there is a balance between topics and behaviours. Tests are usually constructed using the scheme of work for the subject and specific to the class. Appendix I provides the summary of Junior Secondary Three (JS3) Basic Science Scheme of Work from first term through third term. It is adapted from Akwa Ibom State (AKS) Secondary Education Board (SSEB) Uniform Syllabus (2015-2016). The construction and validation of Basic Science Achievement Test (B-SAT) for JS3 students in Akwa Ibom State was based on this scheme of work.

Statement of the Problem

It has been observed that most teachers, if not all, either pick up published past questions or simply write down their own test items without considering the psychometric properties or the quality resulting from such teacher- made tests. It is known that teacher-made tests have some flaws which affect the performance of the students such as: teacher-made tests show gross neglect in item quality which truncate educational values that the subject is expected to promote in student's personal character, teacher-made tests also neglect certain prescribed areas in curriculum content and most often, language, entry behaviour, age, sex, are not given due consideration during item construction. In a bid to overcome these problems and to improve the performance of students in Basic Science that this research seeks to construct and validate an achievement test on Basic Science for Junior Secondary (JS 3) students. It is hoped that the same will be done with all other secondary school subjects to optimise the academic performance of students.

Purpose of the Study

The purpose of this study is to develop and validate Basic Science Achievement Test for public junior secondary three students in Akwa Ibom State. The specific objectives of the study are to:

1. Construct test items in Basic Science for students in Public Junior Secondary Three (JS3) in Akwa Ibom State.
2. Determine the validity of the test items.
3. Carry out item analysis of the test (compute difficulty indices, discrimination indices and effectiveness of distracters).
4. Estimate the reliability of the test.

Research Questions

The following research questions guided the study:

1. What is the developed Basic Science Achievement Test (B-SAT)?
2. What procedures were adopted in validating B-SAT?
3. What is the reliability coefficient of the B-SAT?
4. What are the difficulty, distracter and discrimination indices of the B-SAT?

METHODOLOGY

The study engaged the instrumentation design as it involved the construction and validation of Basic Science Achievement Test (B-SAT) for Junior Secondary Basic Science Students of Akwa Ibom State Public Secondary Schools. The population consisted of 215000 Junior Secondary Three (JSS3) Students and was distributed as follows: Uyo Senatorial District 105000, Eket Senatorial Districk 71000, and Ikot Ekpene Senatorial District 39,0000 (Akwa Ibom State Secondary School Board.

The Taro Yamane's formula was used to determine the sample size for the study which was 399 JS3 students made up of 162 students - Uyo Senatorial District; 136 students - Eket Senatorial District; and 101 students - Ikot Ekpene Senatorial District. The sampling technique employed was the multistage sampling technique. First, the researcher randomly sampled five public secondary schools in each of the senatorial districts giving a total of 15 public secondary schools used for the study. Next, proportional sampling technique was used to select a sample of 399 students.

The instrument used for data collection was the researcher-developed Basic Science Achievement Test (B-SAT) and made of 96 objective test items with five options (A-E) and only one correct option per item. The instrument has a reliability coefficient of 0.86 computed using Kuder-Richardson 20 (K-R 20). The instrument was administered three consecutive times by the researcher and two research assistants at a two-week interval.

Responses to the test items were scored and difficulty, discrimination and distracter indices were computed for each item. To carry out the item analysis of computation of difficulty, discrimination and distracter indices the test papers were arranged in order of size from the highest score to the lowest score, the upper 27% of the papers selected (in this case 108 papers) and the lowest 27% of the lowest scores also selected (again 108 papers), and the rest 183 papers are discarded. Finally, the highest and lowest scores were used to compute the difficulty, discrimination, and the distracter indices (Fong, 2016, Reena and Anisha, 2017, Obilor, 2017 and Asuru, 2015).

RESULTS

Research Question 1: *What is the Constructed Basic Science Achievement Test (BSAT)?*

The constructed Basic Science Achievement Test is the multiple choice achievement test items (Appendix 1). Multiple choice test items were constructed and named Basic Science Achievement Test, see Appendix 4B. The test is made up of ninety-six (96) multiple choice items. Each item has five options (A – E) with only one correct option per item. Basic Science Junior Secondary syllabus 2015/2016 was the main source of item in the test. The syllabus consisted of twelve (12) major content areas covering from first to third term. Each content was divided into sub-units with performance objectives expected to be achieved by students. The contents were arranged and shown in Appendix 1.

Research Question 2: *What procedures were adopted in validating Basic Science Achievement Test (B-SAT)?*

The procedure adopted in validating Basic Science Achievement Test (B-SAT) was in segments. (i) Face validity and (ii) content validity

The research findings showed that the test items were 96 multiple choice objectives questions having five options (A – E) with one correct option per item. The test items were administered on the selected students for three consecutive times at a two-week interval. Basic Science Junior Secondary syllabus was the main source of item in the test.

Face and Content validation were carried out on the instrument. The validation of the test was done by experts in Educational Measurement and Evaluation of the Rivers State University. The experts indicated whether or not items were appropriately matched to the content area indicated. Any item that was inadequately matched to the test blue print was dropped or revised and 60 out of 96 test items were accepted for use. Face validity ensured that the test experts looked over the test items to ascertain whether or not the test items appeared or looked like test items in Basic Science, not History, not Physics, or any other subject. Or that it did not look like an article in the Newspaper discussing politics and finance.

Content validity required the test experts to study the list of content area in Basic Science as well as the test blueprint, along with the test items intended to be based on each content area. The experts indicated whether or not the items appropriately matched the content area indicated. Any item that was appropriately matched to the content area and test blueprint was dropped or revised. Editing the items in this way ensured the face and content validity with regards to the contents and the objectives measured.

Research Question 3: *What are the discrimination, difficulty and distracter indices of the Basic Science Achievement Test (B-SAT)?*

Table 1 shows the breakdown of the discrimination, difficulty and the distracter indices of Basic Science Achievement Test Items (B-SAT) for first, second and third test administration.

Table 1: Computed Difficulty, Discrimination, and Distracter Indices for the B-SAT

Test Administration	Discrimination Indices (D)	Difficulty Indices (P)	Distracter Indices (Do)
1st	0.22 - 0.66	0.36 - 0.79	0.12 - 0.45
2nd	0.22 - 0.52	0.38 - 0.72	0.17 - 0.68
3rd	0.32 - 0.44	0.40 - 0.70	0.11 - 0.57

The discrimination index (D) for first test administration was at the range of 0.22 to 0.66; for the second test administration, discrimination indices were between 0.22 and 0.52; while for the third test administration, discrimination indices were between 0.32 and 0.64. The item difficulty (P) indices for the first, second, and third test administration were 0.36 to 0.79, 0.38 to 0.72 and 0.40 to 0.70 respectively. However, distracter indices (Do) ranged from 0.12 to 0.45, 0.17 to 0.68 and 0.11 to 0.57 respectively for first, second, and third test administrations as shown in Table 1. The results showed that the Basic Science Achievement Test (B-SAT) had difficulty indices, dissemination indices and effectiveness of distracters within the acceptable limits.

The results also showed that minimum item difficulty increased from 0.36 to 0.38 and 0.40 in the first, second and third test administration respectively and while maximum item difficulty respectively decreased from 0.79, 0.72 and 0.70 in the three test administration.

An achievement test must include varying difficulty levels and should provide reasonable opportunity of attempt to student of different intellectual levels (Sidhu, 2007). He also opined that for a five – option multiple choice objective items, the average proportion on correct responses should be about 0.69. Asuru (2015) was of the opinion that in norm-referenced test, an acceptable item difficulty range is between 0.40 and 0.60 or optimum of 0.50. Sidhu (2007) stressed that maximum reliability coefficient will be obtained if the difficulties are between chance of success and 100 percent and then recommended a difficulty level of 0.70 for 5 – option multiple choice objective test items.

According to Sidhu (2007), the discrimination index of an item indicates whether or not the item is measuring the same ability as the test measures and shows how well an item discriminates between the able and weak students. Item discrimination in this study has minimum indices increasing from 0.22 to 0.32 and maximum indices ranged from 0.64 to 0.66 in the three test administrations. Jayanthi (2014) and Sidhu (2007) were of the view that items would be considered acceptable if the facility indices were satisfactory and discrimination index 0.25 and better in excess of 0.40. The dissemination indices in this study ranged from 0.32 to 0.64 in the final test administration and is considered to be within the acceptable limit (Table 1).

Effective distracter is a plausible wrong option of multiple choice test meant to entrap testees who do not possess the knowledge and competence being assessed (Asuru, 2015). The distracter indices for this study ranged from 0.11 to 0.68 in all three test administrations. However, all the distracters were chosen by the upper and lower group but more of the lower group than the upper group. This means that this Basic Science Achievement Test (B-SAT) is suitable to be used by teachers to access students' performance in Basic Science in junior secondary schools in Akwa Ibom State.

Research Question 4: *What is the reliability coefficient of Basic Science Achievement Test (B-SAT).*

Table 2: Estimation of Reliability Coefficient the B-SAT using K-R 20

Test Admin.	No of students	No of Items	Pq	$\bar{x}$	SD	SD^2	r
1st	399	96	23.06	55.54	16.83	283.60	0.92
2nd	399	96	22.16	56.00	15.00	225.00	0.90
3rd	399	96	18.24	55.10	18.39	338.00	0.95

The reliability coefficient (r) of Basic Science Achievement Test was computed using Kuder-Richardson-20 (K-R20) for the three test administrations and the results obtained were 0.92, 0.90 and 0.95 for first, second and third administration respectively (Table 2), yielding an average reliability coefficient of 0.92. The computed reliability coefficients for this study are within the acceptable range. These results are similar to those by Muhammad, Zeeshan and Akbar (2012) who constructed and validated an aptitude test for secondary school Mathematics.

CONCLUSION

This study has constructed and validated 60 items of Basic Science Achievement Test (B-SAT) for use in public junior secondary schools in Akwa Ibom State. The test was duly validated with reliability coefficients of 0.92 obtained. The test possesses appropriate difficulty, discrimination and distracter indices, making it very adequate for use in junior secondary schools, not only in Akwa Ibom State, but everywhere in Nigeria and beyond.

RECOMMENDATIONS

In order to construct and validate any achievement test based on this study, the following recommendations are made:

1. Teachers should make use of this test as a guide in constructing a good quality test in other subjects.
2. The test should sample the topics and sub-topics covered in the contents.
3. The writing of test items should be in appropriate language and format.
4. Procedure and principles for analysis of the test scores should strictly be followed.
5. Pool of items should be reviewed by another expert in the subject area to spot ambiguities and grammatical faults.
6. This test B-SAT should be used in Akwa Ibom State and all other schools where Basic Science is offered with appropriate updating from time to time

REFERENCES

Almorth, B.C. (2015). *Importance of laboratory exercise in Biology teaching: Case study of Exotoxicology course. Institution for Biology and Environmental Science* www.pil.gu.sell.public.erate/texler

Asuru, V.A. (2015). *Measurement and Evaluation in Education and Psychology* (2nd Ed). Port Harcourt: Pearl, Publishers International Ltd.

Banfe, M. Y. (2014). *Impact of team-teaching Strategy an academic achievement and interest in Basic Science concept among Junior Secondary school students in Potiskum, Yobe State.* Unpublished M.Ed Dissertation, Amadu Bellow University, Zaira, Nigeria.

Chi, M. T. H. (2005), Common sence conceptions of emergent process. Why some misconceptions are robust. The *Journal of the learning Sciences, 14, 161-199.*

Ekoh, I. (2012). *High stake standardized testing and erosion of a critical African worldwide.* Unpublished Master's Thesis, University of Toronto.

Fong, H. K. (2016). Preparing a Mathematics achievement test. *Teaching and Learning,* 9(1), 15-26.

Ikeobi, B. M. (2005). *Science teaching in Nigeria.* Ilorin: Atoto Press Ltd.

Jayanthi, J. (2014). Development and validation of an achievement test on Mathematics. *International Journal of Mathematics and Statistics Invention (IJMSI),* 2(4), 40-60.

Kendra, C. (2018). *How Achievement Tests Measure what people have learned*. www.verywellmind.com

Mahajan, G. (2015). Construction and validation of achievement test in economics. *International Journal of Humanities and Social Science (IJHSSS),* 1(6), 54-60.

Mahmoud, S. (2014). Achievement test development, a measure of reading comprehension strategies for Iranian learners of English. *International Journal of Linguistics,* 6(2), 67-81.

Ndirika, M. C. (2012). Achievement variation of Basic Science students taught with teacher-centred, teacher/student-centred and student-centred instructions in Kaduna State, Nigeria. *Journal of Educational and Social Research,* 2(8), 1-10.

Obilor, I. E. (2019). *Essentials of Measurement and Evaluation*. Port Harcourt: Sabcos Printers & Publishers.

Oludipe, D. I. (2011). Developing Nigeria curriculum. *Journal of Soil Science and Environmental Management,* 2(8), 134-145.

Pooja, B. & Baliya, J. N. (2016). Construction and validation of achievement test in Science *International Journal of Science and Research (IJSR),* 5(6), 1 – 4.

Raymond, A. D. & Ryan, A. B. (2012). Transfer of learning: Connecting concepts during problems: https://dol.org/10.21061/jte

Reena, R. A. (2017). Construction and standardization of Mathematics Achievement Test for IXth Grade students. *International Journal of Education and Applied Social Science 8(2), 651-655.*

Sharma, H.L & Poonam J.A. (2017). Construction and standardization of an achievement test in English grammer *International Journal of Advance Education Research.* 2(5), 230-235

Sidhu, K.S. (2007). New Approaches to Measurement and Evaluation, New Delhi, India. Sterling Publication Pvt. Ltd.

APPENDIX 1

Final Draft of Basic Science Achievement Test

(1) In man, the nervous system consists of the following EXCEPT
(a) Brain (b) Heart (c) Peripheral nerve (d) Spinal cord

(2) The following are parts of the brain EXCEPT
(a) Cerebellum (b) Cerebrum (c) Medulla oblongata (d) Oldfactory lobes (e) Spinal cord

(3) Which of these is a fluid?
(a) Spinal cord (b) Pituitary (c) Cerebellum (d) Olfactory lobes (e) Medulla oblongata

(4) The nerves that carry information from the brain and spinal cord to different parts of the body is called __________neurons. (a) Effectors (b) Intermediate (c) Receptor (d) Sensory nerves cells (e) Motor

(5) The human sensory organ for sight is __________
(a) Ear (b) Eye (c) Nose (d) Skin (e) Tongue

(6) Sensory cells are also known as ___________ (a) Sensory neurous (b) Receptor (c) Effector (d) Motor nervron (e) Medulla oblongata

(7) The centre of the body is controlled by
(a) Skeleton (b) Heat (c) Vertebra (d) Brain (e) Liver

(8) The following are involuntary action EXCEPT
(a) Writing (b) Sneezing (c) Blinking of eye (d) Coughing (e) Heart beat

(9) Which of these organs is not a special part of the nervous system?
(a) Finger (b) Nose (c) Ear (d) Eye (e) Skin

(10) When light rays fall on an object, the image of the object is formed on
(a) Fovea (b) Sclera (c) Choroid lens (e) Retina

(11) The main defects of the eye are the following EXCEPT
(a) Short sightedness (b) Long sightedness (c) myopia (d) Stereoscopic vision
(e) Astigmatism

(12) The difficulties people have in distinguishing certain colour is called?
(a) Colour blindness (b) Colour separation (c) Rain bow (d) Conjunctivitis (e) Apollo

(13) Which of the sense organs enables the body to maintain balance?
(a) Eye (b) Ear (c) Skin (d) Tongue (e) Nose

(14) The ear is divided into ___________ part(s).
(a) four (b) two (c) six (d) three (e) one

(15) Sounds reach the outer ear as
(a) air (b) light (c) vibration (d) flash (e) clap

(16) Glands in the lining of the nose produce a substance called?
(a) Mucus (b) Saliva (c) Ptyline (d) Liquid (e) Mambrane

(17) Which part of the body indentifies taste of any substance in the mouth?
(a) Tongue (b) Brain (c) Foliform (d) Foliate papillae (e) Fungiform papillae

(18) Wash your skin regularly with soap and water to remove
(a) gum (b) sand (c) bacteria (d) hair (e) scar

(19) The transmission characteristics from parnts to their offspring is called
(a) children (b) family (c) heredity (c) hormones (e) life

(20) The following, EXCEPT ______________ are regarded as scientists who discovered genetic
(a) Charles Dorwins (b) Gregor Mendel (c) Francis Galton (d) Mendel Galton (e) Vasco Da Gama

(21) The bad internal structure of the cell contains
(a) Abomasums (b) Molecules (c) Atom (d) Chromosomes (e) Biomass

(22) The genes are transmitted from parent to their offspring through the process of
(a) Hybridization (b) Reproduction (c) Generation (d) Transmission (e) Recession

(23) The method of studying transmission of trait in human beings is through
(a) Family trees (b) Pedigress (c) Photographs (d) Observations (e) Reportings

(24) A man and his wife with their children make up a family called?

(a) Separate family (b) Family tree (c) Nuclear family (d) Profamily (e) Polygamous family

(25) The useful things that we get from living things can be called?
(a) Resources (b) Vitamins (c) Proteins (d) Minerals (e) Substances

(26) The following are food crops, EXCEPT __________
(a) vegetable (b) wheat (c) jute (d) gorghum (e) radish

(27) Materials for sacks and nets are made from different kinds of plants EXCEPT ____________
(a) Sisal (b) Sorrel (c) Guinea-hemp (d) Baobab (e) Cotton

(28) One of these wood trees is not a hard wood
(a) Ebony (b) Mahogany (c) Camphor (d) Oak (e) Afara

(29) Leather goods, such as bags, shoes purse, are obtained __________ of animals.
(a) hide/skin (b) bones (c) flesh (d) tails (e) trunks

(30) Crops produced mainly for sale to people within and outside country are called? ________
(a) Food crop (b) Wood crops (c) Cash crops (d) Fruit crops (e) Root crops

(31) Which of these is the modern way of preserving food items.
(a) Salting (b) Canning (c) Smoking (d) Drying (e) Processing

(32) Refrigeration is the process of preventing ______________ from spoiling food and other items. (a) Fire (b) Flies (c) Rats (d)Ants (e) Micro-organisms

(33) Adaptation is defined as a condition which certain parts of the body of animal are suited for __________ (a) Jumping (b) Flying (c) Skipping (d) Feeding (e) Sleeping

(34) The type of teeth adapted for tearing food and biting food is?
(a) Premolar (b) Molar (c) Canine (d) Incisors (e) Milk teeth .

(35) The number and arrangement of teeth in the mouth is called? ______
(a) Set of teeth (b) Dentition (c) Types of teeth (d) Grouped teeth (e) Permanent teeth

(36) The dental formula for herbivores is ____________
(a) $i\ {}^{0}/_{3}\ c\ {}^{0}/_{1}\ p\ {}^{3}/_{3}\ m\ {}^{3}/_{3}$ (b) $i\ {}^{2}/_{2}\ c\ {}^{1}/_{1}\ p\ {}^{2}/_{2}\ m\ {}^{3}/_{3}$ (c) $i\ {}^{2}/_{2}\ c\ {}^{1}/_{1}\ p\ {}^{1}/_{1}\ m\ {}^{0}/_{0}$ (d) $i\ {}^{3}/_{3}\ c\ {}^{1}/_{1}\ p\ {}^{1}/_{2}\ m\ {}^{1}/_{1}$ (e) $i\ {}^{0}/_{3}\ c\ {}^{4}/_{3}\ p\ {}^{0}/_{0}\ m\ {}^{4}/_{4}$

(37) A Brilliant English chemist who put Sforward the atomic theory in 1803 was ________
(a) John Dalton (b) J.J. Thompson (c) Robert Millikan (d) William Crookes (e) Albert Einstein

(38) Atom is made up of ___________ particles.
(a) two (b) three (c) four (d) five (e) six

(39) The particles of which mass concentrated in a small dense central part of an atom is called?
(a) Proton (b) Electron (c) Neutron (d) Atomic number (e) Nucleus

(40) The path through which electron travels continuously and rapidly around the nucleus is called? (a) Orbit (b) Trajectory (c) Ring (d) Cosmic ray (e) Radiation

(41) The number of proton in the nucleus of an atom is known as?

(a) Atomic weight (b) Atomic mass (c) Atomic number (d) Spectral line number (e) Atomic shell

(42) Deuterium and tritium are examples of _________
(a) Hydrogen (b) Carbon (c) Oxygen (d) Halogen (e) Calcium

(43) Dalton Atomic theory explained the following EXCEPT
(a) Atom is indivisible and indestructible (b) Atom can be split into small bits (c) Atom exactly alike (d) Atom of different elements are different (e) Atom of different elements are joined by definite ratio

(44) The particles of Atom that carries neutral charge is called?
(a) Proton (b) Neutron (c) Electron (d) Protium (e) Tritium

(45) The correct symbol for the element sodium is _________
(a) Si (b) S (c) Ne (d) Na (e) Ne

(46) Which of these is the chemical symbol of methane?

(a) CH_4 (b) CH_{10} (c) Mg0 (d) 0_2 (e) H_2

(47) What is the name of this substance NH_3?
(a) Water (b) Carbon monoxide (c) Ammonia (d) Carbon-dioxide (e) Nitrogen molecule

(48) Positively charged ion is called ______
(a) Halite (b) Cation (c) Anion (d) Neutron (e) Electron

(49) Which of these compounds is not a polyatomic ions?
(a) Trioxonitrate (IV) ion (b) Tetraoxosulphate (VI) ion (c) Trioxo carbonate (IV) ion (d) Hydroxide ion (e) Sodium

(50) Which of these equations is not balanced?

(a) $Cl2 + NaBr \longrightarrow Br_2 + Na\ Cl$ (b) $Na + H_20 \longrightarrow Na0H + H_2$

(c) $H_2(g) + 0_2(g) \longrightarrow H_20$ (e) $Cu + H_2S0_4 \longrightarrow CuS04 + H20 + S0_2$

(d) $2H_2(g) + 0_2(g) \longrightarrow 2H_20$

(51) The numbers which are contained in chemical formulae are called?
(a) Manuscripts (b) Carets (c) Subscripts (d) Numbers (e) Figures

(52) What is the Latin name for silver?
(a) Atrium (b) Ferron (c) Kalum (d) Argentum (e) Plumbum

(53) Which of these substances is not a metal?
(a) Oxygen (b) Aluminium (c) Copper (d) Iron (e) Zinc

(54) The arrangement of metals and non-metals in their order of reactivity is called?
(a) Reaction table (b) Periodic table (c) Activity series (d) Compound series (e) Balancing equation

(55) Characteristics of metal include the following EXCEPT __________
(a) Metals are good conductors of heat and electricity (b) They are malleable (c) They are brittle (d) They are strong and hard (e) They are ductile

(56) Elements which burns in oxygen giving basic oxide are __________?

(a) Non-metals (b) Alloy metals (c) Salts (d) Metals (e) Gases

(57) Electropostivity is meant the ease with which atom of metals give off __________ to become stable. (a) Nucleus (b) Protons (c) Neutrons (d) Atoms (e) Electrons

(58) The greatest deposit of iron-ore in Nigeria is found in __________ State.
(a) Kwara (b) Oyo (c) Ondo (d) Cross River (e) Kaduna

(59) The action of the lime stone fed into the blast furnace is to remove ___________ during the extraction of Iron. (a) Carbon (b) Impurities (c) Salts (d) Water (e) Calcium

(60) __________ is a substance which produces hydrogen ion as the only positive ion when the acid is mixed with water. (a) Base (b) Acid (c) Hydrite (d) Hydroxide (e) Chloride