

IMPACT OF COMPUTER GAMES ON SENIOR SECONDARY SCHOOL  
STUDENTS' ACHIEVEMENT IN MATHEMATICS. A CASE STUDY OF BOSSO  
L.G.A NIGER STATE.

BY

JOSHUA, Jeremiah Chendenka

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DEPARTMENT OF SCIENCE EDUCATION  
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FEDERAL UNIVERSITY OF TECHNOLOGY,  
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## ABSTRACT

*This research work, impact of computer games on senior secondary school student's achievements in mathematics in Bosso local government area was carried out using quasi experimental design to collect data from sampled students. 40 students (20 male and 20 female) were selected from four secondary schools that were purposively sampled based on availability of computer facilities in their schools and students and teacher's willingness to take part in the research work. Two research questions and two hypotheses were stated and tested at 0.05 level of significance respectively. Hypothesis 1 of no significant difference in the mean achievement of students taught mathematics using computer games and those taught using the conventional method was rejected as the p-value was found to be significant. Hypothesis 2 of no significant difference in the mean achievement of male and female students taught mathematics using computer games was upheld as the p-value was found not significant. The t-test was used as a method of data analysis; which helped in the findings, conclusions, summary and recommendations of this research work. The result from this study have shown that computer games learning approach has immense impact in enhancing achievement in mathematics. The researcher recommend that there should be training and retraining of mathematics teachers on the demand of the computer games learning approach. Government and school proprietors should provide computer facilities in their various schools to enable the effective use of the computer games learning approach. Parents should be encouraged to have personal computers at home for their ward.*



## CHAPTER ONE

### 1.1 Background to the Study

Mathematics as a topic offers the bedrock and basis for innovative thinking and cognitive improvement. The relevance of mathematics in the location of logical questioning, reasoning, hassle solving, human improvement cannot be over emphasized; subsequently its inclusion as a center issue in the secondary education system, in Nigeria.

Secondary schooling as mentioned in the National Policy of Education is the schooling a child gets after number one schooling and earlier than the tertiary stage. The huge dreams of secondary schooling will be to put together the person for:

- a) Useful residing with the society; and
- b) Higher schooling In unique terms,

secondary schooling shall;

- a. Provide all primary school leavers with the possibility for schooling of a better level, regardless of sex, social status, spiritual or ethnic background;
- b. Offer varied curriculum to cater for the distinction in talents, possibilities and destiny roles;
- c. Provide educated manpower in the carried out technological know-how, era and trade at sub-expert grades.
- d. Develop and sell Nigeria languages, artwork and lifestyle in the context of world's cultural heritage.
- e. Inspire college students with a preference for self development and fulfillment of excellence.
- f. Foster National team spirit with an emphasis on the ties that unite us in our diversity.

- g. Raise a era who can think for themselves, appreciate the perspectives and emotions of others, recognize the distinction of labour, respect the ones values detailed beneath our vast country wide dreams and stay as correct citizens.
- h. Provide technical information and vocational capabilities important for agricultural, industrial, business and financial improvement.

According to Ojo (2016) computer as an electromechanical tool is essential and instrumental in the teaching-learning affairs, bearing it in thoughts, its potential to just accept data, manner it into facts and to additionally keep such data in a preserved format. However, computer may be seemed as a beneficial tool that may be use in teaching student for a more fulfilment. Computer video games as an software in the computer is a sport this is performed on a computer wherein the photographs that seem at the display screen are managed via way of means of urgent keys or transferring a joystick. Examples of computer video games are zuma, real football, jewel bubbles, ludo, iron man, mind genius etc.

A game is a kind of play that follows a hard and fast of rules, ambitions at specific purpose or final results and entails opposition towards different gamers or towards limitations imposed through nature of the sport (Agwagah, 2016). Games play critical roles in Mathematics instruction. The use of video games in teaching Mathematics makes students to be actively concerned in the each day training given that they're interested by getting to know Mathematics as a recreation. Abubakar and Bawa (2016), Games remove tension, clean boredom and foster surroundings in which teaching and studying are pleasant, interesting, exciting, stimulating, motivating and on the identical time academically rewarding (Kankia, 2018). Azuka (2012) additionally opines that video games offer specific possibilities for integrating the cognitive, powerful and social factors of studying.

Computer video games consequently are recreation in of computer software program run on a non-public computer or video games are digital video games which can be interactive hardware or software program performed for entertainment, project or academic cause (Kent, 2009). Thus, computer video games are based digital sports that contain computer systems in the recreation-play manner. They integrate physical, intellectual and cognitive settlement in a gaming state of affairs to reap the gaining knowledge of content material imbedded in the recreation.

The inclination of youngsters and adolescents to video games has made the parents concerned. Most of parents state that once the kid is concerned with a computer sport, keeping him detached is difficult. Attraction, frequency and reasonably-priced rate of computer video games on one hand and in our country, the weak spot of making plans to by skip entertainment time and absence of cultural, leisure and game centers are the elements growing the inclination of kids and young people to computer video games. Despite a few worries, a few humans trust that those video games have extremely good centers for education that must be used. According to Kebritchi et all (2008), the wide variety of instructors in kindergartern and schools, universities that use video games to growth studying is accelerated. Also, video games are powerful equipment for schooling as;

- a. Practice is used as opposed to explanation.
- b. It results in private pleasure and motivation
- c. Various studying capabilities and patterns are presented
- d. Mastery is improved
- e. Drill and practice.

These distinct statements, high quality and terrible concerning the impact of computer video games on one hand and growing inclination of kids and adolescent to computer

video games however reason that a few researchers try and outline the best and horrific results of those video games. The majority of researchers are concerning the impact of video games on intellectual fitness of gamers, a few researchers recall the impact of those video games on cognitive and fulfilment overall performance of gamers. Besides all issues and exclusive perspectives concerning the impact of computer video games on mental state of humans, there are a few worries concerning the impact of computer video games on educational overall performance of students. Indeed, one of the first issues approximately computer video games primarily based totally at the extension in their use some of the kids is that such video games through developing an appealing area as in comparison to textbook assignments can cause interference in clinical and educational performances. The terrible outcomes of computer video games on educational overall performance are supported in a few research. Anderson & Karen (2012) confirmed that there has been a bad dating among the period of computer video games and educational overall performance. In every other observe carried out via way of means of Ghatrifi et al (2016), there has been no big distinction among educational overall performance of the groups (the institution now no longer the usage of computer video games, the institution the use of much less and the organization the usage of much). The outcomes of examine confirmed that there has been no correlation among the utility of computer video games and educational overall performance.

Based at the distinctive nature of particular instructional fields, a few researchers have evaluated the impact of computer video games on overall performance of customers in particular field. One of the fields is Mathematics. Mathematics is one of the powerful topics in instructional and job future of humans and has excellent utility in day by day habitual of life. There are some research concerning the consequences of computer video games on overall performance of customers in Mathematics. Wei, Sopory &

Hendrex (2019) evaluated the impact of aggressive and non aggressive instructional Mathematics computer video games of 4 to seven years antique boys and girls take into account of recreation gambling revel in. The consequences confirmed that studying of boys and girls changed into accelerated after aggressive and non aggressive video games.

Leigh (2014) confirmed that computer video games ought to enhance cognitive competencies and trouble solving. They said that if kids love computer video games, instructors must make computer Mathematics video games that scholars can do computations with computer. These video games consist of a few techniques to boom expertise of students. Computer video games have to gift on the spot comments and check abilities are developed. These video games are used as an opportunity for practice.

Based at the growing inclination of secondary students to computer video games on one hand and the inconsistent consequences alternatively, in the preceding research concerning the impact of those video games on educational overall performance of student, it's far required that researchers carry out greater have a look at on this regard. The present study is likewise completed for this aim.

## **1.2 Statement of the Problem**

Over the years, the individualized technique of teaching have been used to educate Mathematics in schools; bearing in thoughts how hectic, annoying and dull this technique may be, the overall performance of secondary students in mathematics have revel in constant lower over the years; secondary school students dropping hobby in the concern and a few walking far from technology topics as they improve in research.

These demanding situations call for the advent of various techniques in teaching mathematics; therefore the effect of computer video games have to be checked in

secondary school college students who're uncovered to non-public computer systems and clever phones. This study has a tendency to check if student's preference and exuberance in computer video games may be of benefit to their fulfilment in mathematics. And additionally attempt to see if computer video games may be used as greater than stimulant in teaching mathematics; with an try to expose weather a few idea in secondary school mathematics might be higher learnt as a recreation.

### **1.3 Purpose of the Study**

The important cause of this study is to look at the effect of computer video games on secondary school students' achievement in mathematics. In precise the examine sought to:

1. Examine if computer video games have impact on students' achievement in Mathematics.
2. Examine the effect of computer video games at the achievement of male and female students in Mathematics.

### **1.4 Research Questions**

1. What is the difference in the mean achievement of students taught mathematics using computer games and those taught using conventional method?
2. What is the difference in the mean achievement of male and female students taught mathematics using computer games?

### **1.5 Research Hypothesis**

H<sub>01</sub> There is no significant difference in the mean achievement of students taught mathematics using computer games and those taught using conventional method.

H<sub>02</sub> There is no significant difference in the mean achievement of male and female students taught mathematics using computer games.

## **1.6 Significance of the Study**

1. To decide the studying abilities of students in the computer compared with the traditional technique.
2. To help in enhancing the students' achievement in mathematics that can complements their competencies to enhance their management traits and carrier to humanity.

This study will gain the students, instructors, the researcher and the country at large.

## **1.7 Delimitation of The Study**

The project "impact of computer games on senior secondary school students' achievement in mathematics in Bosso Local Government Area". This study is limited/limited to Bosso Local Government Area of Niger State as the case study.

## **1.8 Limitation of the Study**

1. The in capacity of the researcher to prevent the sharing of facts among the experimental and control group, and this could have affected the end result of the study.

Though the test instrument have been reorganized, the students may are becoming acquainted with the items, on account that they were examined with nearly the equal item twice (pre test and post tes

## **CHAPTER TWO**

### **Literature Review**

#### **2.1 Conceptual Framework**

##### **2.1.1 Academic Achievement**

Academic success may be described as excellence in all instructional disciplines, in magnificence in addition to extracurricular sports .Academic achievement is the final results of schooling because it suggests the volume to which the scholar, instructor, curricular and certainly the instructional organization has performed the predetermined instructional dreams. Academic success is generally measured with examinations that verify critical procedural know-how including competencies, and declarative expertise which includes records which school students have learnt. Academic overall performance is consequently a backyard stick for ascertaining the talents of a scholar from which his overt, overt and inherent or unrevealed competencies may be inferred. Academic overall performance is commonly used to decide how nicely an character is capable of assimilate, retain, don't forget and talk his understanding of what has been learnt (Kpolovie et al,2014). Knowledge attained or abilties evolved in school concern is normally specific through rankings in formal check or examinations. Academic achievement talk to the located and measured thing of a scholar mastery of abilities and challenge contents as measured with legitimate and dependable take a look at (Joe,Kpolovie, Osonwa & Iderima, 2014). It advocates that educational overall performance isn't the same as the instructional potentials of a character. It is the degree of quite everlasting modifications in an character's conduct because of reports acquired. A scholar's instructional overall performance is typically measured via way of means of trainer made take a look at or standardized check (Kpolovie,2014) which in maximum instances are called outside examinations just like the senior school certificates



examination. In an attempt to perceive the reasons for low success in mathematics, a few researchers have advised that achievement in mathematics in secondary schools is motivated with the aid of using some of variables. These variables encompass learner's competencies, mindset and perceptions, own circle of relatives and socio monetary status, dad and mom and peer influences, school associated variables along with negative gaining knowledge of surroundings, mastering cultures, beyond racial discrimination and coffee expectancies with the aid of using principals and instructors.

### **2.1.2 Mathematics Learning Methods**

i. Traditional approach

ii. Modern approach

Traditional and contemporary-day are elements that motive a first-rate revolution in teaching and studying. Using laptop in teaching and gaining knowledge of is essential. The trainer can gift substances to educate the students in the shape of multi-media software program which incorporates audio, visible and pictures via way of means of the use of a laptop. Visual and auditory feel might be worried in studying via way of means of the usage of computer and multimedia software program. Empirical findings in the place of psychology confirmed that nearly seventy five percentage of mastering is done with the aid of using visible experience and thirteen percentages through auditory experience. Therefore, using laptop and multimedia software program is one of the satisfactory techniques for teaching and pupil studying. According to the research approximately the usage of laptop and multimedia software program for teaching and studying, we are able to say that the instructional software program can enhance the mastering effects while they may be followed with the conventional technique of teaching in the classroom. It may have a very good performance in the region of fixing the trouble of studying, troubles and character's variations via way of means of

providing several examples, adjusting the velocity of education and repetition of material. Another benefit of this software program is an boom of interplay amongst school students and additionally among instructor and learner (Safarian, 2010). Do mathematical computer video games make contributions to extra green and attention of tutorial dreams in any respect ranges training? Do they impact faster and higher information acquisition? Do they enhance motivation? Do they invent scholar's high quality mind-set in the direction of studying mathematics? These are the solutions in preceding studies on this discipline. Cameroon and Owyer (2005) taken into consideration the connection among gambling computer video games and figuring out academic dreams. Trying to decide how computer video games impact the belief of instructional dreams, they finished a study in a pattern of 422 students and proved that gambling computer video games is an vital mastering approach in figuring out instructional goals in mathematics. Young and Loveridge (2004) regarded into gaining knowledge of mathematical principles in early childhood. Their project became to set up how computer video games have an effect on primary mathematical abilities students. 106 kids participated in the studies. The received end result confirmed that mathematical understanding of kids who performed laptop video games turned into a higher while in comparison to the expertise of kids who did now no longer play laptop video games. Even after a yr the information of this institution changed into nevertheless statistically higher, as a count of reality the students learnt mathematics less difficult and with the aid of using gambling video games. For them the primary come upon with mathematical principles became a recreation, a amusing activity, so it could be assumed that handling mathematical standards from that point on evoked effective emotions growing their motivation for getting to know mathematics. In truth, if youngsters have a high-quality towards mathematics from an early age, which laptop

significantly make contributions to acquainting mathematical principles in mathematics. With its effectiveness, mathematics will now no longer be one of the maximum hard topics. However, even from a child's early age a computer sport has to satisfy pedagogical criteria. This concept is supported with the aid of using the studies carried out with the aid of using Din and Calao (2000) on a pattern of forty seven pre-school kids divided into groups. Every day the experimental institution performed mathematical laptop video games on sony play station for forty mins in the course of eleven days. The manipulate institution did now no longer play any laptop video games, however learned mathematics in a conventional manner. The studies end result indicated that concerning the expertise of mathematics there has been no statistically huge variations among the groups. This is one of the uncommon research have been a nice effect became now no longer detected. This can in all likelihood be defined via way of means of sony play station video games now no longer having an academic dimension. The 2d cause may be that youngsters play video games every day, constantly on the identical time in the equal shape; which could emerge as discouraging, tiring and dull for pre-school youngsters. At this age kids need new and sundry sports, new enticements i.e. a mixture of instructional laptop video games with different techniques of teaching and gaining knowledge of. The study through Keritchi and Hirumi (2008) helps the concept. Together with the sport authors they investigated pedagogical foundations of current instructional computer video games through analyzing fifty five video games created among 2000 and 2007 simplest 22 video games fulfilled pedagogical criteria, i.e have been primarily based totally on setting up studying theories and educational techniques. In 1998 Klawe carried out a study which tried to decide the affect of various factors on instructional laptop video games performance in enhancing getting to know mathematics in number one schools. The

taken into consideration elements had been: hardware and software program layout, distinctive technique of teaching with video games, gender variations. He decided that laptop video games may be extraordinarily green (higher motivation, higher information, pleasure with mathematics as a challenge). However, he additionally proved that various factors inclusive of pupil's and instructor's expectancies, the extent of integration with different instructional sports and recreation layout have an effect on the very last end result; so one have to take note of the elements whilst the usage of computer video games in teaching. If laptop video games are meant for growing motivation and making studying mathematics less complicated, he concluded that mathematical computer video games must include:

Subject depend that students are imagined to analyze.

Activities for studying.

A primary studying model.

The manner and idea of supplying the content.

Interface for manipulating with phrases and objects.

Navigation systems and order of sports.

Feedback statistics and praise systems.

Fun elements (photographs, sound, tale, characters, humor)

Rashid Far et al., (2016) in a survey beneathneath the title "position of instructional computer video games in scholar's gaining knowledge of" stated that we are able to recall computer video games as a supply of getting to know and amusement. Kids will acquire generalized techniques for getting to know. Computer video games will enhance the spatial visualization and decorate summary intellectual abilities of the gamers. Educational computer video games drew the eye of the academic gadget to itself due to the ability in getting access to to diverse programs and the capacity to reply to the want

of others. The growing recognition of laptop and video games specifically amongst kids and teens reason a few issues for his or her dangerous results. Therefore, on this examine the function of computer video games in scholar mastering is examined. The consequences confirmed that the instructional laptop video games are powerful as one of the methods for diversifying the substances and offering guides in magnificence; In addition, to its impact at the social existence of the students and their conduct out of the school. Some publications of motion had been furnished on the stop of the observe for the ideal use of tutorial computer video games.

Rahmat Bar et al (2016) in a survey with the title “the position of tutorial computer video games on mathematics studying of school students” stated that instructional computer video games as a social phenomenon along with different audio visible media in the global which can be referred to as international village choose their target market or customers from the youngsters and teens and devoted a full-size a part of their amusement time itself or even the instances that they have to do their domestic paintings. Therefore, this problem maximum be worried and reviewed extra than beyond. Thus the position of tutorial computer video games in mathematics studying of school students is examined. The end result confirmed that instructional computer video games now no longer most effective one of the strategies of diversifying are powerful in route substances particularly guides together with mathematics and technological know-how which can be referred to as hard guides, and providing academic substances in classrooms, however additionally have an impact on the social and day by day lifestyles of school students outdoor the school and their conduct with others. At the quit, a few direction of motion has been offered for the right utilization of computer video games. Ozdogan (2011) stated that youngsters are constantly interested by laptop video games. They begin gambling earlier than getting to know to stroll and talk. They have extra

attention whilst they may be gambling. Playing may be an critical device in studying for youngsters. Children stay with mathematics and develop with it and use the mathematical method while gambling.

### **Educational Computer Games and Their Characteristics**

Educational computer video games are the maximum vital computer video games. In computer video games the gamers are a producer, now no longer most effective are they readers; however additionally they're writer. In widespread, the gamers in low stage programming the sport with their acts and decisions. A right sport lets in the participant to resolve a hassle with diverse answers and their very own strategies. In a recreation, the gamers sense a experience of manage and a actual feel of possession of what they've done. Nowadays in schooling, the method of studying is hardly ever attractive. The procedure of a computer recreation may be very attractive and attractive. The mind-set of kids to laptop video games is an mind-set that we are hoping the learner has it closer to studying. Jee in 2007 believed that the compound video games accumulated all of the arousing elements that can not be visible in every other media. When the individual does now no longer sense an duty to what he's mastering, the gaining knowledge of will now no longer be executed. A right computer recreation makes the person obliged and worried with the aid of using identification. This is an identification man or woman which the participant create in recreation or sport offers it to the participant. The different element in the attractive of computer video games is their interactivity. Nothing will take place in the global of the sport until the participant determines to do something. In a very good recreation, phrases and deeds are located in a mutual courting among the participant and the international (Davaran, 2012). The time period instructional-leisure is given to the computer video games at the prevailing time. Computer video games are a subset of actual video games and typically laptop video

games have instructional intention in particular for school kids and beginners. The computer video games have the subsequent features: Low inner motivation: motivation is vital in academic video games. Most academic video games emphasize at the outside motivation (praise) as opposed to inner motivation resulting from the video games. External motivation isn't always associated with the sport. It includes non-obligatory praise including scoring for finishing a mission. On the opposite hand, inner motivation can be the sensation of capacity reason with the aid of using of of entirety of a mission. Motivation has an academic impact in order to cause robust gaining knowledge of. Providing inner motivation for computer video games is low. Non-incorporated mastering level in: it is able to be understood that studying executed via the sport enjoy remains in the mind for a protracted time. Sometimes the gamers recognition on the sport as opposed to gaining knowledge of from it. Usually the instructional video games aren't capable of combine the sport level in and getting to know.

Learning through repetition and exercise: laptop video games generally inspire the gamers to memorize responses. There isn't any want to educate the fundamental guidelines to them. Learning concepts in laptop video games are derived from repetition and exercise in preference to challenge comprehension. Easy sport play: maximum of the instructional video games have smooth recreation play. Though clean sport play is powerful specially for more youthful gamers and beginners. There is a want for extra increase video games than the economic video games to encourage the gamers. The absence of instructors: there's no want to the presence of instructors in academic video games. The newcomers can study the context and abilities on my own through those video games (Nilsen et al, 2008).

## **Brief History of Computer**

The computer as we are aware of it nowadays had its starting with a nineteenth century British mathematics professor named Charles Babbage. He designed the analytical engine and it became this layout that the primary body paintings of the computer systems of nowadays are primarily based totally on. Generally speaking, computer systems may be labeled into the generations. Each technology lasted for a sure duration of time, and every gave us both a brand new and advanced computer and an development to the prevailing computer.

**First Generation (1937-1946):** In 1937, the primary digital virtual computer systems have been constructed through Dr. John V. Atanasoff and Clifford Bery. It became known as the Atanasoff-Bery computer (ABC). In 1943, an digital computer named colossus turned into construct for the navy. Other improvement persevered till in 1946 the primary widespread cause virtual laptop, the digital numerical integrator and computer (ENIAC) turned into construct. It is stated that this computer weighed 30 tones and had 1800 vacuum tubes which became used for processing. When this laptop become became on for the primary time, mild dimmed in sections of Philadelphia. Computers of this technology should most effective carry out unmarried challenge, and that they had no working device.

**Second Generation (1947-1962):** These era of computer systems used transistors as opposed to vacuum tubes which had been extra dependable. In 1951 the primary laptop for industrial use became delivered to the public; the standard automated computer (UNIVAC). In 1953 the worldwide commercial enterprise gadget (IBM) 650 and seven hundred collection computer systems made their mark in the laptop global. During this era of computer, over one thousand computer programming languages have been



evolved, computer systems had recollections and running machine garage media together with tape and disc have been in use additionally have been printers for output.

**Third Generation (1963-1971):** It got here on board among 1963-1971. Examples of such computer systems have been ICM, IBM 360. The computer systems in which greater effective, dependable and makes use of incorporated circuit. They have the subsequent characteristics:

They have been quicker.

They have been costly.

They supported excessive degree language.

They fed on much less electricity.

They additionally create much less heat.

**Fourth Generation (1971-Present):** These are computer systems in use nowadays. They incorporate greater state-of-the-art micro-digital gadgets which include complicated included circuit. They have the subsequent characteristics:

They are greater quicker than the 0.33 era.

They are bendy to language education.

They are small in size.

They are transportable and dependable.

### **The Brief History of Computer Games**

The records of computer video games are in pans, a record of era. The laptop recreation require era able to dealing with huge quantity of statistics and of representing those facts. The dating among technological phenomenon inclusive of the computer and the much less officially primarily based totally tradition isn't always a easy one. Some theories will declare that generation determines lifestyle, a few will declare that tradition determines era. It can be affordable to peer those as a records of mutual affect,

had been era can encourage (or enable) cultural improvement, and cultural improvement can encourage new era. To quote an apparent example, the computer recreation turned into at the beginning evolved on gadget layout for navy on instructional purposes. But nowadays the laptop recreation is the using pressure in the improvement of an awful lot hardware which includes 3-d pics accelerators. About the time period computer sport, this time period is in sharp opposition with video video games, console video games, arcade video games. Video video games and console video games typically method video games related to a TV, wherein as arcade video games method video games positioned in public spaces (an man or woman carbinet). Computer video games are every now and then taken to intend video games performed on computer seeing that all of those regions had been advanced in closed parallel (and due to the fact all of those video games are performed on computer systems), I'm the use of the time period computer sport to indicate all of those regions as an entire. But it's far an vital improvement on this context that the computer sport has modified from being basically performed at an arcade; to be ordinarily performed in the domestic. This had made it feasible to expand video games of longer duration, to have video games now no longer centered at the easy purpose of getting many gamers insert cash as fast as feasible. Many traits in the records of the computer recreation aren't technologically however in simple terms conceptual. Whereas area ward and pong are video games for a couple of participant, this time from about 1977-1993 is absolutely ruled with the aid of using video games for unmarried gamers. The multi-participant video games come to be extensively famous wherein doom (ID software program 1993) lets in for connecting numerous computers, for being numerous human beings gift in the equal recreation global. Doom is at the entire and first rate influential recreation. It has been criticized for been violent, however it's far one of the maximum famous computer sport ever and

it has brought about an entire genre of video games, the three-D shooter of first individual shoot “em” up. In retrospect; there has been no technological purpose why the multi-participant recreation did not no longer turn out to be famous in the mid 1980s. it might have been flawlessly feasible to community domestic computer systems just like the Commodore 64, most effective no person did. And this ought to be defined culturally. The first computer have been large system priced at hundreds of thousands of dollars, and have been accordingly shared through many customers. In the mid seventies, the concept of the private computer emerged; a computer will become something one individual performs on a desk. In the start of the 1990s, the net takes to the air out of doors educational circles, and the laptop begins to be visible as related to different computer systems, a part of a community. The unmarried participant computer sport is dominant at some stage in the reining years of the remote private computer systems.

### **The Brief History of Mathematics**

The records of mathematics are as antique as humanity itself. Since antiquity, mathematics were essential to develop in technology, engineering and philosophy. It has advanced from easy counting, size and calculation, and the systematic observe of the shapes and movement of bodily item via the utility of summary area we recognize nowadays. From the notched bones of early man to the mathematical advances added approximately with the aid of using settled agriculture in Mesopotamia and Egypt and the innovative tendencies of historical Greece and its Hellenistic empire, the tale of mathematics is a protracted and staggering one. They carried at the baton especially China, India and medieval Islamic empire, earlier than the focal point of mathematical innovation moved again to Europe in the overdue center a while and renaissance. Then, an entire new collection of modern improvement arise in seventeenth and 18th century

Europe, placing the level for the growing complexity and abstraction of nineteenth century mathematics, and in the end the audacious are on occasion devastating discoveries of the 20 th centuries. Archaeologist, anthropologist, linguist and others reading early society have determined that wide variety thoughts developed slowly. There will generally be a exceptional phrase or image for 2 human beings, birds, or stones. Only slowly does the concept of “” end up impartial from the matters that there are of similarly, of direction for different numbers. In reality particular numbers past 3 are unknown in a few lesser advanced languages. A little bit of this utilization grasp on its personal cutting-edge English while we speak, for example a flock of ducks sold a school of fish. Mathematical files from historic a while dates again to 1900BC. The sensible want to redraw area barriers after the once a year flooding of the Nile. And the truth that there has been a small lecture elegance with time to suppose assist to create a hassle orientated sensible mathematics. A base 10 numeration device became capable of manage fantastic entire numbers and subtraction. Algebra turned into evolved most effective some distance sufficient to remedy linear equations and of direction calculate the quantity of pyramid. What we realize of the mathematics of Mesopotamia comes from cuneiform writing on clay pills which date again as some distance as 2100 BC. 60 become the wide variety device base, a device that we've got inherited and keep to at the present time in our size of time and angles some of the clay tables are observed multiplication tables, desk of reciprocals, rectangular and rectangular roots. A popular approach for fixing quadratic equation turned into to be had and some equation for better diploma might be handled. From what we will see nowadays each the Egyptians and the Mesopotamians (or Babylonians) prevent to unique sensible problems, the concept of beginning and proving popular theorems did now no longer appears to stand up in both civilization. Chinese mathematics a huge and effective frame of information

despite the fact that especially realistic and hassle orientated did incorporate standard statements and proofs. A technique just like Gaussian discount with again substitution for fixing device of linear equation become recognised 2000 years in advance in china than in the west.

### **Effects, Implications and Relevance of Computer Games Effects of Computer Games**

Sitting in the front of a computer display and gambling video games has some of results that may account for the locating of studies.

**Social Isolation:** Most laptop video games are performed on my own in place of interacting with their friends and developing social capabilities, gamers are interacting with a system and giving growing quantity of time of gaming activity.

**Physical Effects:** In one role for a extended duration posture and the muscular skeletal device, main to stated aches and pains neglecting ordinary eating regimen and hygiene so that you can provide extra time to paying computer video games also can reason pronounced bodily symptoms.

**Stress:** Playing laptop video games continuously aroused with the aid of using the simulation of hazard that many video games depend on. It is not unusual place feel to mention that it can't be wholesome to spend hours at a time gambling computer video games, however this factor of view seems to be an increasing number of with the aid of using clinical findings.

### **Implications of Computer Games**

#### **Positive Impacts**

Hand-eye aggregate gaming has visible advantages for hand-eye co-ordination in diverse sectors. Some reviews say that surgeons who play video games have come to be greater professional when they have practiced gaming over a duration of time. Other

simulation video games which includes pilot and using video games were used as a digital surroundings to teach pilots and drivers. This offers the blessings of growing hand-eye co-ordination had to manipulate excessive technical machines with out really endangering the vices of beginners or instructors. The reality that gaming software program may be used to song development additionally lets in gamers to peer a non-stop development over time.

**Brain Training:** Brain education video games had been evolved in various topics regions in order that hand-held may be used as mind education video games. It is concept that with the aid of using giving gamers mission and a laugh sports in recreation layout that they're challenged the usage of a platform that they're used to gaining knowledge of extra enjoyably.

**Thinking and Strategy Skills:** Strategy video games including conflict video games have been the participant has to consider a method to play the sport, assist gamers increase wondering capabilities. Instead of truly controlling the participant, thru a recreation time had to be taken to make the perfect choice to manual the primary sport gambling person thru the sport. Management video games consisting of soccer supervisor can run over seasons and require cautious making plans and questioning to make sure achievement over time. Strategy primarily based totally video games can assist gamers turn out to be extra adaptable and grow to be use to wondering outdoor the box. Import on mainstream software improvement: appearance to the very early computer running systems. They wherein textual content primarily based totally and tough to perform. They enquire consumer to have technical know-how and feature commonly function via way of means of kind training to manipulate how the working gadget worked. You can see these day's three-D video games consumer interface layout with computers as gadgets were especially designed with blessings for the primary

movement computing industries and allowed customers to greater effortlessly have interaction with computer systems.

### **Negative Impact**

**Cost:** Gaming is a multibillion greenback enterprise and the price to the common recreation is the usage of all of the time. While gaming may be a totally wholesome interest it can emerge as problematic. If video games participant sense the stress of getting all of the newly launched video games of their desired genre. Other elements consist of the want to buy the contemporary gaming platform.

**Separation from reality:** Some game enthusiasts end up so engrossed in video games that they truly notion they may be a part of the digital global wherein the sport takes place. **Education:** we've got already mentioned mind schooling, approach and questioning abilities and the advantages of gaming to assist training. However gaming also can have bad consequences at the improvement of each youngsters and teenagers in the society. Gamers have ignored their research because of their immersion in video games. The time spent gambling video games have affected the quantity of time spent doing homework or in a few instances real attendance at school or school. There are clearly instructional advantages of gaming however while it's far taken too some distance, gaming may have a poor effect on society.

## **2.2 Theoretical Framework**

### **2.2.1 Piaget's Theory of Learning**

#### **Jean Piaget's (2001) Cognitive Theory**

Piaget's cognitive concept of studying refers back to the level concept of cognitive improvement. According to Piaget, youngsters expand information through making an investment or building truth out of enjoy and for that reason blend the statement with their thoughts approximately how the arena works. Piaget discovered that human beings

of the identical age stage (mainly kids) have a comparable line of reasoning. For, example kids of the identical age degree have the equal line of reasoning or thinking. Children can also additionally make the identical form of mistakes. They can also additionally have the identical reasoning manner. This shows that cognition develops degree with the aid of using level. Piaget used the terms “assimilation” and “lodging” to give an explanation for his views. Assimilation method the technique of deciphering movements or activities on the subject of one’s schemas. This refers to a way of becoming truth into one’s current systems of know-how. The term “schema”, for Piaget, refers to a nicely described series of bodily and intellectual moves. Accommodation is the amendment of present schemas to suit fact. The organism is able to getting to know while it could regulate its schemas. As the organism keeps to accommodate, it maintains to analyze. Piaget believes that cognition develops from age to age and from stage to stage. According to Piaget, the riding pressure for cognitive improvement is equilibration. By equilibration, Piaget method balancing assimilation and lodging to evolve to the needs of the surroundings. Piaget believes that for humans to learn they maximum assimilate and accommodate. Piaget opines that at every level of improvement, humans use a exclusive underlining good judgment or shape of reasoning to manual their thinking. Piaget recognized four ranges of cognitive improvement:

Sensor motor, pre-operational, concrete operational and formal operational to give an explanation for cognitive improvement from infancy to formative years (Wasagu, 2011). However we must be issue with the “formal operational” degree. This degree happens in the youth level. At this level the person can begin to assume extra abstractly. This level of cognitive getting to know is characterized via way of means of the capacity to control summary in addition to concrete gadgets, thoughts and occasions. At formal operational level, the younger character acquires greater capacity to cope with



abstractions and might have interaction in hypothetical reasoning primarily based totally on common sense. At the formative years level, people can without difficulty perform realistic experiments and demonstrations. Formal operational degree gives the capacity for the character to apply summary symbols for representational purposes. For example, the man or woman, if taught, ought to recognize that H<sub>2</sub>O is water and can abstractly recognize why it's far water. Piaget's concept of highbrow improvement holds that cognitive improvement takes location from lively interplay of the kid together along with his surroundings. This method that the idea of studying is the kid's personal capacity as he interacts together along with his/her bodily and social surroundings. Piaget is of the opinion that a baby ought to act at the item in surroundings for him/her to examine. This way that he/she must be actively worried now no longer passive. The energetic involvement of the kid can be in shape of direct manipulation, visible commentary or thru intellectual or inner transportation or change. Piaget believes that intellectual interest, that is concerned in cognitive organization, is a technique of adaptation, that is divided through opposing however inseparable approaches of assimilation and lodging. Accommodation way to adjust self to suit the brand new material, even as assimilation approach to adjust the substances to in shape self. The Piagetian idea locations the kid because the most important agent in the teaching/studying state of affairs. This being the case the instructor's task is to offer the person with conditions that inspire experimentation and manipulation of items and symbols. This is why the researcher advocates the usage of computer video games; due to the fact it's far scholar centered, hobby oriented-teaching method wherein the instructor acts as a facilitator of gaining knowledge of, guiding the students through.

### **2.2.2 Robert Gagne's Condition of Learning**

This principle stipulates that there are numerous different sorts or ranges of gaining knowledge of. The importance of those classifications is that every specific kind calls for exclusive styles of practice. Gagne identifies 5 essential classes of studying: verbal facts, highbrow abilities, cognitive techniques, motor abilities and attitudes. Different inner and outside situations are vital for every form of studying. For instance, for cognitive techniques to be found out, there ought to be a risk to exercise growing new answers to troubles; to examine attitudes, the learner should be uncovered to a reputable function version or persuasive arguments. Gagne indicates that gaining knowledge of responsibilities for highbrow abilities may be prepared in a hierarchy in step with complexity: stimulus recognition, reaction generation, system following, use of terminology, discriminations, idea formation, rule utility, and hassle fixing. The number one importance of the hierarchy is to pick out conditions that must be finished to facilitate mastering at every degree. Prerequisites are recognized via way of means of doing a project evaluation of a getting to know/education mission. Learning hierarchies offer a foundation for the sequencing of guidance. In addition, the concept outlines nine educational occasions and corresponding cognitive procedures: Gaining interest (reception)

Informing newbie of the objective (expectancy)

Stimulating bear in mind of previous studying (retrieval)

Presenting the stimulus (selective perception)

Providing gaining knowledge of guidance (semantic encoding)

Eliciting overall performance (responding)

Providing feedback (reinforcement)

Assessing overall performance (retrieval)

Enhancing retention and transfer (generalization).

These activities have to fulfill or offer the important situations for mastering and function the premise for designing training and choosing suitable media (Gagne, Briggs & Wager, 1992).

### **Application**

While Gagne's theoretical framework covers all factors of mastering, the point of interest of the idea is on highbrow competencies. The principle has been implemented to the layout of training in all domains (Gagner & Driscoll, 1988). In its unique formulation (Gagne, 1962), unique interest turned into given to navy schooling settings. Gagne (1987) addresses the function of tutorial era in mastering.

### **Example**

The following instance illustrates a teaching series similar to the 9 academic activities for the objective, recognize an equilateral triangle:

Gain interest – display kind of computer generated triangles

Identify objective – pose question: “What is an equilateral triangle?”

Recall previous studying – assessment definitions of triangles

Present stimulus – deliver definition of equilateral triangle

Guide gaining knowledge of- display instance of a way to create equilateral

Elicit overall performance – ask school students to create five exceptional examples

Provide feedback – test all examples as correct/incorrect

Assess overall performance- offer ratings and remediation

Enhance retention/transfer – display pix of items and ask school students to pick out equilaterals

Gagne (1985, bankruptcy 12) gives examples of activities for every class of getting to know outcomes.

## **Principles**

Different practice is needed for distinct studying outcomes. Events of studying perform at the learner in methods that represent the situations of getting to know. The particular operations that represent academic activities are exceptional for every one of a kind sort of studying outcome. Learning hierarchies outline what highbrow abilities are to be discovered and a chain of preparation.

Gagne's principle of studying may be implemented to this work "the effect of computer video games on secondary school scholar's achievement in mathematics" as it help using interest gaining educational sports along with computer video games. And its essential attention is on highbrow talents improvement which may be completed thru the advent of computer video games to teaching and mastering in order to create allowing surroundings for scholar to expand their highbrow competencies with ease.

### **2.2.3 Jerome Bruner's Learning Theory**

Bruner (1960), added the idea of gaining knowledge of through discovery. Bruner is of the view that mastering is successfully engaged in if the mastering is giving the possibility to find out statistics with the aid of using him/herself. Bruner argue that mere presentation of data will now no longer decorate powerful strategy to of a hassle. The concept stresses cognitive effectiveness. Because of this, a few check with Bruner's principle of studying as Bruner's concept of cognitive improvement. Bruner accept as true with that gaining knowledge of with the aid of using discovery starts off evolved while the technology instructor purposefully create a hassle and gift it to the students with the aid of using introducing a few inconsistencies amongst supply of data which might be giving in the system of guidance. According to Bruner, such inconsistencies cause highbrow pain so one can stimulate the pupil to provoke person discoveries thru cognitive restructuring. The highbrow soreness created through the inconsistencies

makes the learner to try and carry order out of this confusion with the aid of using conducting intellectual method i.e. find out sports which contain statement, hypothesizing, measuring, pointing out hassle, information collection, classifying, inferring, etc. (Montoya, 2015). Through intellectual strategies, the scholar can generate information from his/her determined experiences. Experiences received for the duration of intellectual strategies allow the students to experience the disparity. According to Bruner there are sorts of discovery techniques that are:

**Assimilation:** This takes place whilst a scholar acknowledges a brand new state of affairs this is acquainted to one of the factors in the current shape of expertise (i.e. cognitive systems) and he/she without problems assimilates it.

**Accommodation:** This happens whilst a brand new state of affairs is incompatible to the present shape of information the learner first restructures his/her cognitive framework if you want to be capable of accommodate the brand new information. Bruner believes that the students ought to discover data on their personal the use of intellectual strategies. The idea locations notable emphasis on three styles of human sports for the studying i.e. the three statistics processing structures which can be:

Physical interest known as enactive representation.

Imaginary known as ionic representation.

Symbolic sports.

The 3 sports coexist with every different and for this reason; the attainment of 1 does now no longer suggest the entire abandonment of the others. At enactive level, the kid manipulates the mastering substances without delay through neuron muscular sports. At this factor the kid offers with intellectual pictures of items, however does now no longer control them without delay. At symbolic degree the kid makes use of language. The interpretation of the above is that once a infant in secondary school stage suggests

deficiencies in his/her studying capability particularly in symbolic representation, it is able to be that he/she become poor in early ranges which he/she skipped. It is consequently important to fill in the lacking hole through supplying concrete guide in order to make up for the deficiency. Skill mastering, while recommended in technology education additionally aids trouble fixing due to the fact mastering through discovery begins offevolved with hassle fixing (Enohuean, 2015). Skill studying additionally stimulates creativity in the pupil that is one of the important targets of technology teaching and mastering.

### **Application of Jerome Bruner's Theory of Learning to Mathematics Achievement in School**

The mathematics trainer must deliberately create or gift mathematics issues to school students both in shape of obvious contradiction or inconsistency amongst reassets of statistics which might be giving in the procedure of teaching. Encouraging ability getting to know in mathematics magnificence via way of means of mathematics instructors will end result into assisting trouble fixing. One of the foremost goals of mathematics teaching is pace and accuracy. Therefore, discovery studying encourages creativity. Students must be trained standards in any such manner that they have got applicability past the scenario wherein they have been taught. Retention of mathematical standards is aided through information received via ability studying. Teachers have to inspire school students to make intuitive wager extra systematically. Bruner supported an intensive reorganization of the curriculum throughout all tiers of schooling. Bruner recommended the essential shape of curriculum initially easy contents and later flow to complicated contents. This approaches that mastering need to continue from easy from easy to complicated, from concrete to summary, and from particular to general. Teachings have to be inductive.

Bruner supported the spiral nature of curriculum as we've in our gift technological know-how curriculum in any respect tiers of training. Bruner's constructivist idea asserts that getting to know is an lively manner wherein novices assemble new thoughts primarily based totally upon their modern information. Instruction may be made extra green with the aid of using presenting a cautious sequencing of substances to permit newbie to construct upon what they already realize and pass past the facts they were given to find out the important thing concepts themselves. In relation to the existing examine; the effect of computer video games to secondary school scholar's achievement in mathematics in Bosso nearby authorities in Niger state. The utility of Bruner's constructivist idea to getting to know will assist the students to have a targeted interest at the concepts they study and additionally boom and preserve scholar's mindset to getting to know surroundings.

### **2.3 Empirical Studies**

Some researchers and school students have laboured on the usage of video games as approach of teaching in different subjects in mathematics and different regions of research. All those have been efforts to discover a higher opportunity method of teaching numerous subjects. Uchegbu (2011) achieved a study at the impact of using video games on instructional overall performance in social research on the junior secondary school tiers. The cause changed into to check whether or not realistic examples will boom knowledge of social research. The layout of the look at becomes experimental studies. Two businesses had been used; the manage and experimental corporations. The observe became completed at network secondary school, Igogoro, Enugu state. Eighty out of one hundred sixty school students of junior secondary lessons have been sampled. In the look at, experimental organization executed appreciably higher than manipulate institution. This confirmed that bearing on contents

to surroundings will increase secondary students' expertise. However, the researcher focused on success (cognitive domain) as opposed to the 3 domains (cognitive, affective and psychomotor) as recommended through his topic 'overall performance in social research'. That changed into his work's weak point.

Ede (2016) researched into using video games in teaching possibility in faculties with junior secondary school as a awareness. The motive became to discover whether or not the usage of video games can assist school students obtain higher in chance than the same old expository approach of teaching. The layout turned into experimental studies. Two corporations; manage and experimental agencies had been used. The look at changed into performed at boy's excessive school Agbor, Edo state. one hundred school students out of 230 school students have been sampled in JSS3. The end result confirmed that the experimental institution executed considerably higher than the manage organization. The weak spot of the studies became that best one secondary school became sampled out of approximately 9 secondary faculties in the nearby authorities.

Ame (2017) performed studies on the usage of recreation in teaching possibility in junior secondary schools. The motive of the observe turned into to discover whether or not recreation technique could be a higher opportunity to the traditional approach of teaching mathematics. Two corporations have been used; manage and experimental organizations. Three secondary faculties had been sampled in Benin metropolis. In the end result, experimental organization performed drastically higher than the manipulate institution. The studies become true considering the fact that 3 secondary faculties have been sampled.

Etoame (2018) studied the feasibility of incorporating minimal dependent video games as an educational method into Nigeria secondary lecture rooms. The cause of the studies



became to shape one minimal sport, and attempt feasibility of incorporating those into Nigeria geography school rooms inside common time of 35minutes. Two out of 25 secondary schools in Umuahia schooling area had been sampled on these experimental studies. Two businesses; experimental and manipulate agencies had been used. The researcher found that minimal dependent recreation is appropriate to school students and instructors, and that experimental institution performed notably higher than the manage organization. The examiner become true however faculties out of 25 faculties in Umuahia instructional sector have been inadequate.

Offordo (2008) researched at the outcomes of video games on school students choice in primary mathematics ideas in elegance one. The reason become to discover whether or not video games will assist school students carry out higher than whilst taught the use of the traditional approach. The layout of the take a look at became experimental studies. Two agencies have been used; manage and check companies. Two secondary faculties had been utilized in Aba. He discovered out that students in the take a look at institution finished extensively higher than school students in the manage organization. The have a look at become accurate however he assumed overall performance to be achievement which is incorrect in Educational studies.

Nwosu (2009) researched into using video games in arousing pupil's hobby in mathematics. The cause became to decide the make bigger video games should assist in constructing hobby in school students as regards studying mathematics. The layout changed into a survey studies. Two companies have been used; manipulate and experimental companies. He sampled secondary school in port-Harcourt town. He discovered that the ones in the experimental institution indicated considerably better hobby in mathematics than school students in the manage organization. The studies

changed into true however simplest secondary faculties in port-Hacourt metropolis changed into inadequate.

Obianukor(2015) researched into using video games and simulation in teaching fundamental mathematics principles in junior secondary faculties. The motive become to shape video games and simulation, and to strive them out on junior secondary school students for you to discover the consequences on school students achievement in mathematics. The layout becomes quasi experimental studies. Two agencies have been used; manage and experimental agencies. Two secondary faculties have been sampled in Igbo-Eze North nearby authorities Area. He observed out that students in experimental organization carried out extensively higher than school students on top of things organization. The studies became desirable however the faculties sampled had been in adequate.

Ugwu (1992) researched into using ludo sport in teaching primary mathematical standards in junior secondary faculties. The cause turned into to discover whether or not ludo recreation could assist school students acquire higher in primary mathematics principles in junior secondary schools than the standard traditional technique. The layout became experimental studies. Two businesses have been used; manipulate and experimental corporations. Two secondary schools have been sampled out in Lagos mainland. She determined that students in the experimental organization done considerably higher than school students in the manage organization. The studies turned into true however secondary faculties sampled out of all of the secondary faculties in Lagos mainland became inadequate.

This present study (undertaking work) ‘impact of computer games on senior secondary school students’ achievement in mathematics’ attempted to check and notice if the students’ preference and exuberance in playing computer video games may be of benefit

to their success in mathematics. And additionally attempt to see if laptop video games may be used as extra than a stimulant in teaching mathematics; with an try to expose whether or not a few principles in secondary school mathematics could be higher learnt as a recreation

## **CHAPTER THREE**

### **3.0 Research Methodology**

This chapter specifically deals with the methods, procedures, techniques used in collection of data from the study. The methods or technique of data collection assisted the researcher to come out with the authentic information on “The impact of computer games on senior secondary school student’s achievement in Mathematics”. A case study of Bosso Local Government Area, Niger State.

### **3.1 Research Design**

The research uses the quasi experimental design to collect information from sampled students. The choice of quasi experimental design is base on students achievement in Mathematics in secondary schools; games have to be played, lesson taught and test given.

### **3.2 Population of The Study**

The targeted populations for the research work are all the senior secondary schools in Bosso Local Government and all the students. With a total population of 17,391. With 8,690 female students and 8,701 male students (source: Niger state ministry of education; planning, research and statistics unit; 2021).

### **3.3 Sample of the Study**

The sample population of the research work was 85 students composed of senior secondary school mathematics students that were randomly selected from four (4) secondary schools in Bosso Local Government Area in Niger State.

1. Niger Baptist Schools
2. Police Secondary School
3. Bahago Secondary School
4. Bosso Secondary School

### **3.4 Sampling Technique**

The sampling technique used in obtaining data was purposive sampling. Nwana (1982) stated that when the population is large, sampling is used. Purposively sampled based on the availability of computer facilities and students and teachers exposure to the use of computer in their schools. Intact classes were given to the researcher, the first containing 65 students; which was used for the control group (38 female and 27 male). The second contained 20 students; which was used for the experimental group (10 male and 10 female). Students in control group were taught Mathematics using the conventional method while students in experimental group were taught using computer games learning approach.

### **3.5 Instrument Used for Data Collection**

For the benefit of this research work, the mathematics achievement test (MAT) was used as the instrument to get data from the sampled population (a copy of which will be provided at the appendix section of the project). The study adopted computer games on mathematical concepts which served as the basis for learning. The games aim at stimulating and enhancing the student's achievement using computer games to improve their achievement in Mathematics. Example:

**NUMBER MAT:** The game consists of numbers of squares from which a number would be picked one after the other to answer a question given by the computer. Scores are given for every success and the target is to pick all the numbers within specified time limit to qualify to the next level of play.

8	1	8	1	2	5	4	3	6	7
1	3	4	6	5	2	3	4	9	2
9	8	7	4	6	8	5	7	3	8
4	3	2	1	3	5	1	6	7	2
5	6	8	2	4	6	7	4	8	3
1	2	3	6	5	2	4	6	7	8
3	8	3	4	9	7	2	8	2	1
2	1	4	8	7	1	6	5	3	7
9	3	2	4	6	7	3	2	8	1
2	1	8	1	5	4	2	3	1	9

For simple addition; click on a square to add the numbers so that they equal the value given under the word number. If the numbers are added fast enough bonus points are earned. If the numbers clicked do not add up to the target number, the game may be started all over, care pick or click or the player will get stuck. Example;  $? + ? = 22$ , given by the computer game. Possible answers include;  $7 + 6 + 8 + 1$ ;  $8 + 9 + 5$ ;  $7 + 6 + 5 + 4$ ;  $4 + 5 + 2 + 6 + 5$ ;  $9 + 9 + 4$  .....

$2x - 4 = 4$ , click the value of x on the number mat.

$$x = 4$$

Negative sign can be attached to some of the numbers to sharpen the use of signs. For example;  $-2(-3 + 2)$  click the answer on the number mat.

It will be simplified as  $6 - 4 = 2$ .

### 3.6 Validity and Reliability of the Instrument Used

The instrument was validated before been tested (used) by two (2) lecturers from Federal University of Technology Minna; two (2) experienced senior secondary school mathematics teachers and one (1) researcher from mathematics and education option.

Reliability of the instrument was conducted at Zarumai secondary school which is not among the sampled schools used for the study. The data collected was tested using test-retest method. The reliability coefficient of the instrument was 0.78 using Pearson product moment coefficient.

### **3.7 Method of Data Collection**

A pre-test was given to the students both in the control and experimental groups; it was marked and the scores were recorded. The students were then taught for a period of four (4) weeks. The control group was taught mathematics using the conventional method while the experimental group was taught mathematics using computer games learning approach. After this period, a post-test was given to the students which was marked and recorded according to the groups. The researcher was fully involved in the teaching, marking and recording test result.

### **3.8. Procedure for Data Analysis**

The T-test was used as a method of data analysis. The T-test has wide applications. It is one of the parametric statistical methods suitable for comparative investigations of two groups. The data was analyzed using the formula.

$$t = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Where  $X_1$  and  $X_2$  are the mean achievement score of group A and B respectively

$S_1^2$  and  $S_2^2$  are the variance of the two group respectively.

$n_1$  and  $n_2$  are the total number of students.

## CHAPTER FOUR

### 4.1 Introduction

This chapter presents the results of the data obtained from the study from pre-test to post-test mean scores. Answers to research questions and test of the null hypothesis using the T-test.

### 4.2 Pre-Test Mean Score

**Table 4.1:**

<b>Group</b>	<b>N</b>	<b>Mean</b>	<b>Df</b>
<b>Experimental</b>	20	12.00	
<b>Control</b>	65	12.45	0.45

As shown in Table 1 above, for experimental group, the mean in pre-test is 12.00. For control group, the mean in pre-test is 12.45. The difference in the mean scores of the two groups as shown above is 0.45 which is very small.

### 4.3 Research Question 1

What is the difference in the mean achievement of students taught mathematics using computer games and those taught using conventional method? The answer to the research question one is presented in the table below.

**Table 4.2:**

<b>Group</b>	<b>N</b>	<b>Mean</b>	<b>Df</b>
<b>Experimental</b>	20	20.70	
<b>Control</b>	65	17.40	3.3

From table two above, the mean score of the experimental group is 20.70 while the mean score for the control group is 17.40. There is a significant difference of 3.33 in there mean scores. As compared to the respective mean scores in the pre-test above: there is an increase in the mean score of both the experimental and control groups.



#### 4.4 Testing Null Hypothesis 1

There is no significant difference in the mean achievement of students taught mathematics using computer games and those taught using the conventional method.

**Table 4.3:**

<b>Group</b>	<b>N</b>	<b>Mean</b>	<b>S.D</b>	<b>D.F</b>	<b>T-Call</b>	<b>P-Value</b>	<b>Remark</b>
<b>Experimental</b>	20	20.70	3.3261	103	3.4345	0.0014	Significant
<b>Control</b>	65	17.40	2.9217				

The above table gives the number of experimental and control group students along with their mean and standard deviation at 0.05 level of significance.  $P < 0.05$  implies that there is a significant difference in the mean achievement of students taught mathematics using computer games and those taught using conventional method. This could be traced from the table 2 of mean (20.70) performance score of experimental group and mean (17.40) performance score of control group with a mean difference (3.30). Hence the result is significant.

#### 4.5 Research Question 2

What is the difference in the mean achievement of male and female students taught mathematics using computer games method?

**Table 4.4:**

<b>Group</b>	<b>N</b>	<b>Mean</b>	<b>Df</b>
<b>Male</b>	10	16.80	0.93
<b>Female</b>	10	15.87	

From the table 4 above; the mean score of the male students in the experimental group is 16.80. The mean score of the female students is 15.87. The difference in the mean scores of the two groups as shown above is 0.93.

## 4.6 Testing Null Hypothesis 2

There is no significant difference in the mean achievement of male and female students taught mathematics using computer games method.

**Table 4.5:**

<b>Group</b>	<b>N</b>	<b>Mean</b>	<b>S.D</b>	<b>D.F</b>	<b>T-Call</b>	<b>P-Value</b>	<b>Remark</b>
<b>Male</b>	10	16.80	5.88	18	0.411	0.686	Not Significant
<b>Female</b>	10	15.87	4.172				

The table 5 above gives the number of male and female students in the experimental group along with their mean and standard deviation. At 0.005 level of significance; since  $t=(0.05,18)=0.411$ ,  $p>0.05$  implies that there is no significant difference between the mean achievement score of male and female students taught mathematics using computer games learning approach. This could be traced from mean (16.80) performance score of male students and mean (15.87) performance score of female students with the difference of (0.93) not significant.

## 4.7 Discussion of Results

From the results gotten above and from the data analysis, it is clear that hypothesis (1) one of no significant difference in the mean achievement of students taught mathematics using computer games and those taught using the conventional method is rejected. The result as seen in table 2 and 3 revealed that secondary school students who use computer games in the learning process achieved significantly more in mathematics than those who were taught mathematics using conventional method. This result is in agreement with views of Kibritchi, Herumi and Bai (2010) that computer games have impact on

teaching and learning of mathematics and improve significantly achievement of students in the subject.

It is also clear that hypothesis 2 of no significant difference between male and female students taught mathematics using computer games has been upheld. The result of the study as seen in tables 4 and 5 revealed that there was no significant difference in the mean score of male and female students taught mathematics using computer games.

#### **4.8 Summary**

From the data presented and analyzed in this chapter, it is clear that students who use computer games in learning mathematics will perform better than those taught mathematics using the conventional method.

Mathematics lessons should be mixed with computer games in other to improve students' achievement in mathematics as many mathematics topics can be learned as a game.

## **CHAPTER FIVE**

### **Summary, Conclusion and Recommendations**

#### **5.1 Introduction**

The aim of this research work is to explore the impact of computer games on student's achievement in mathematics in Bosso Local Government Area, Niger State. This chapter presents the summary, conclusion and recommendation.

#### **5.2 Summary**

This study looked at the computer games learning approach and compared it with the conventional teaching method, aimed at finding out whether computer games will make students achieve higher scores in mathematics than those who were taught using conventional method. The results from the study is in agreement with the views of Kebritchi, Hirumi and Bai (2010) that computer games have impact on teaching and learning of mathematics and improve significantly achievement of students in the subject. The use of computer games in the learning of mathematics in secondary schools can assist students to be actively involved in the learning process. This agrees with the views of Yaacob (2011) that video games enhance students retentive abilities, have positive impact on student's achievement and those who played computer games demonstrated higher mathematics performance compared with those who never played. Thus, the activity-based situation offered by the computer games facilitates the student's achievement in mathematics. The study also tried to see if gender difference exist among senior secondary school students in mathematics after the use of computer games learning approach. As shown in tables 4 and 5, there is no significant difference in the mean achievement of male and female students taught mathematics using computer games.

### **5.3 Conclusion**

From the results of the study, the following conclusions were drawn:

1. The impact of computer games on student's achievement in mathematics was obvious. Hence productive.
2. In using computer games as a teaching strategy, the student's interest in mathematics improved significantly.
3. The use of computer games in teaching mathematics significantly increased the student's retentive ability.

From the results obtained in this study, computer games have the potential to overcome and removed perceived difficulties in mathematics which make the subject dreadful. The results of this study have it that the use of computer games learning approach can significantly increase student's achievement in mathematics. Poor achievement in mathematics is one of the major reasons for student's phobia in the subject. Learning environment stimulates the student's interest thereby enhancing their achievement in mathematics (Maltemp and Rosa, 2008). The game-play scenario provided by the computer games learning approach holds potential for high achievement in the subject.

### **5.4 Educational Implications of Findings**

The educational implications of the findings of this study is double faced. The teacher and the students will benefit from the findings of this study. The use of computer games as teaching strategy will help in removing boredom thereby increasing interest from students to learn the subject. Retentive abilities were increased by the use of computer games and so teachers should employ the use of games and other practical activities as means to help the retentive memory of students. Since secondary school students like

playing games, teachers should use computer games as an innovation to increase the student's interest in mathematics.

## **5.5 Recommendations**

Base on the findings of the study, the researcher recommends that:

1. Teachers should be encouraged from all angles to use computer games in teaching mathematics. This will actually compliment the conventional method.
2. Mathematics teachers should be trained and retrained on the demands of the computer games learning approach. Computer games learning approach should be included in the curriculum of mathematics teacher education programme at all level of education. Mathematics teachers should be computer literate and regular workshops and seminars should be organised for serving mathematics teachers to acquire basics skills demanded by the learning approach.
3. The government or school owners should build computer laboratories and equip them with computer accessories which will facilitate and enhance the use of computer games learning approach. One of the demands of the approach is for students to engage in game play during and after mathematics lessons. This is possible only if there are well equipped computer laboratories. Government and school proprietors should therefore ensure that secondary schools are provided with both computers and computer laboratories. Regular power supply should be ensured and provision of a stand by generator for alternative power supply.
4. Mathematics teachers should assist students in orientation of parents on needs for their wards to have a personal computers (PC) with which computer games learning approach can be practiced at home after school lesson(hours). This can

assist the teachers in schools in the course of teaching using the computer games learning approach.

5. Curriculum planners and mathematic teachers should make efforts at providing programmed texts on computer games on mathematics and other areas of education. These will simplify and pave ways for learning using computer games in the mathematics and other subject areas.

### **5.6 Suggestions for Further Studies**

Based on findings and the scope of this study, the researcher recommends further studies to be carried out because of the following reasons:

1. The study was carried out in Minna metropolis, which may affect the generalization of the findings, so similar research could be expanded throughout Nigeria.
2. The concept of mathematics used in this research is angle of elevation and depression, probability and linear equations. So, research could be conducted on the impact of computer games on other concept of mathematics like bearing, circle geometry e.t.c.
3. This research work is carried out on both private and public secondary school students in Minna metropolis. So the study could not establish a comparative analysis between public and private schools. so, other researchers may expand their purpose by looking for comparative studies between private and public secondary schools.

4. This study is limited to achievement of students in mathematics. So research should be conduct on the impact of computer games on senior secondary school students' achievement in other science subject.



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## APPENDIX A

**GROUP:** Control Group

**SUBJECT:** Mathematics

**TOPIC:** Angles of Elevation and Depression

**DURATION:** 40min

**ENTRY BEHAVIOR:** The Students have been taught Trigonometry

**INSTRUCTIONAL MATERIAL:** none

**INSTRUCTIONAL OBJECTIVES:** At the end of the lesson, the students should be able to:

- I. Define angle of Elevation
- II. Define angle of Depression
- III. Differentiate between angle of Elevation and Depression
- IV. Solve problems on angle of Elevation
- V. Solve problems on angle of Depression

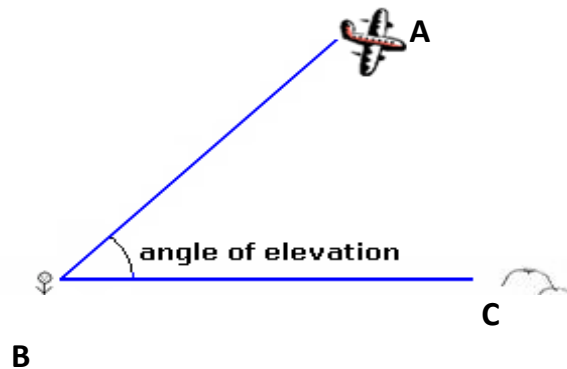
**REFERENCE:** New Concept Mathematics for Senior Secondary School, Book 2 Revised edition by A. A Arigbabu, M. O Salaam, T. D Bot, H. N Odogwu, M. O Obono

**Introduction:** The teacher introduces the lesson to the students by recall with the students that our everyday activities involve angles of Elevation and Depression. For example, looking at a flying Kite, looking at the foot of an inclined ladder.

## PRESENTATION

### STEP 1

The teacher define and give an illustration on angle of Elevation i.e Angle of Elevation is an angle between line of sight and the horizontal line. For instance, suppose a boy B is looking up towards another object A, say an Aeroplane. A is obviously at a high level than B.



### STEP 2

The teacher give and explain an example on Angle of Elevation

#### EXAMPLE:

The angle of elevation of a building from a measuring instrument placed on the ground is  $30^\circ$ . If the building is 40m high, how far is the instrument from the foot of the building?

#### SOLUTION:

Recall that

$$\tan \phi = \frac{\text{opp}}{\text{adj}}$$

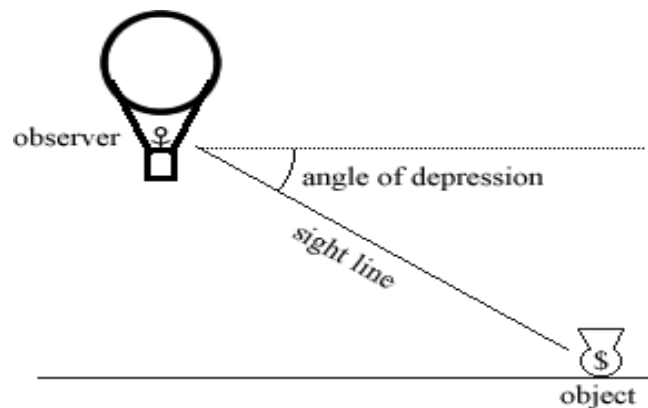
$$\tan 30 = \frac{40\text{m}}{x}$$

$$x \tan 30 = 40\text{m}$$

$$X = \frac{40}{\tan 30} = \frac{40}{0.5774} = 69.28\text{m}$$

### STEP 3

The teacher define and give an illustration on angle of Depression i.eThe angle between the line of sight and the horizontal line is called angle of depression. For Instance, Suppose an observer is at a higher level and the object is at a lower level. Consider the diagram below:



### STEP 4

The teacher give and explain an example on Angle of Elevation

#### EXAMPLE:

A cliff on the bank of a river is 300m high. If the angle of depression at a point on the opposite side of the river is  $60^\circ$ . Find the width of the river.

#### SOLUTION

Recall that

$$\tan \phi = \frac{\text{opp}}{\text{adj}}$$

$$\tan 60 = \frac{300\text{m}}{x}$$

$$x \tan 60 = 300\text{m}$$

$$X = \frac{300}{\tan 60} = \frac{300}{1.7321} = 173.21\text{m}$$

**SUMMARY:** The teacher summarizes all that he has been teaching.

**EVALUATION:** The teacher evaluates the students by ask them to:

- i. Define angle of Elevation
- ii. Define angle of Depression
- iii. Differentiate between angle of Elevation and Depression
- iv. An observer standing on top of a vertical cliff spots a house in the adjacent valley at an angle of depression of  $12^\circ$ . The cliff is 60m tall. How far is the house from the base of the cliff?
- v. The width of a river is 200m. A cliff at the bank of the river is 500m high. Find the angle of elevation.

**GROUP:** Experimental Group

**SUBJECT:** Mathematics

**TOPIC:** Angles of Elevation and Depression

**DURATION:** 40min

**ENTRY BEHAVIOR:** The Students have been taught Trigonometry

**INSTRUCTIONAL MATERIAL:** computer games

**INSTRUCTIONAL OBJECTIVES:** At the end of the lesson, the students should be able to:

- VI. Define angle of Elevation
- VII. Define angle of Depression
- VIII. Differentiate between angle of Elevation and Depression
- IX. Solve problems on angle of Elevation
- X. Solve problems on angle of Depression

**REFERENCE:** New Concept Mathematics for Senior Secondary School, Book 2 Revised edition by A. A Arigbabu, M. O Salaam, T. D Bot, H. N Odogwu, M. O Obono

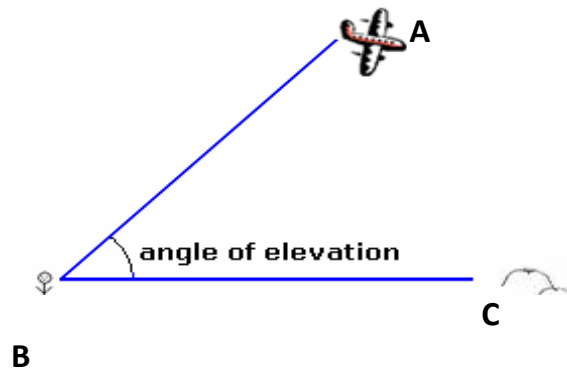
**Introduction:** The teacher introduces the lesson to the students by recall with the students that our everyday activities involve angles of Elevation and Depression. For example, looking at a flying Kite, looking at the foot of an inclined ladder.



## PRESENTATION

### STEP 1

The teacher define and give an illustration on angle of Elevation i.e Angle of Elevation is an angle between line of sight and the horizontal line. For instance, suppose a boy B is looking up towards another object A, say an Aeroplane. A is obviously at a high level than B.



### STEP 2

The teacher give and explain an example on Angle of Elevation

#### EXAMPLE:

The angle of elevation of a building from a measuring instrument placed on the ground is  $30^\circ$ . If the building is 40m high, how far is the instrument from the foot of the building?

#### SOLUTION:

Recall that

$$\tan \phi = \frac{\text{opp}}{\text{adj}}$$

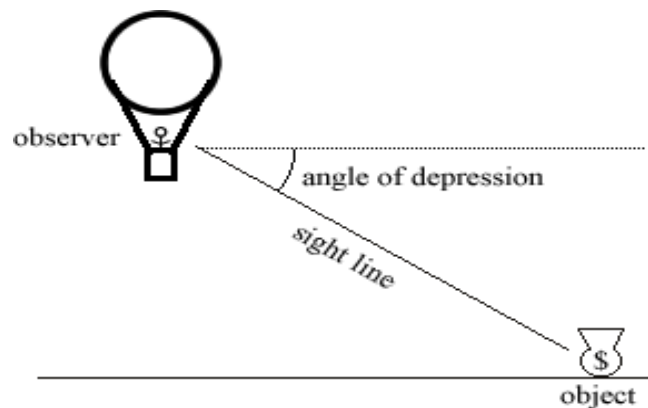
$$\tan 30 = \frac{40\text{m}}{x}$$

$$x \tan 30 = 40\text{m}$$

$$X = \frac{40}{\tan 30} = \frac{40}{0.5774} = 69.28\text{m}$$

### STEP 3

The teacher define and give an illustration on angle of Depression i.eThe angle between the line of sight and the horizontal line is called angle of depression. For Instance, Suppose an observer is at a higher level and the object is at a lower level. Consider the diagram below:



### STEP 4

The teacher give and explain an example on Angle of Elevation

#### EXAMPLE:

A cliff on the bank of a river is 300m high. If the angle of depression at a point on the opposite side of the river is  $60^\circ$ . Find the width of the river.

#### SOLUTION

Recall that

$$\tan \phi = \frac{\text{opp}}{\text{adj}}$$

$$\tan 60 = \frac{300\text{m}}{x}$$

$$x \tan 60 = 300\text{m}$$

$$X = \frac{300}{\tan 60} = \frac{300}{1.7321} = 173.21\text{m}$$

**SUMMARY:** The teacher summarizes all that he has been teaching.

**EVALUATION:** The teacher evaluates the students by ask them to:

- vi. Define angle of Elevation
- vii. Define angle of Depression
- viii. Differentiate between angle of Elevation and Depression
- ix. An observer standing on top of a vertical cliff spots a house in the adjacent valley at an angle of depression of  $12^\circ$ . The cliff is 60m tall. How far is the house from the base of the cliff?
- x. The width of a river is 200m. A cliff at the bank of the river is 500m high. Find the angle of elevation.

**GROUP:** Control Group

**SUBJECT:** Mathematics

**TOPIC:** Theoretical Probability (fair dice)

**DURATION:** 40min

**ENTRY BEHAVIOR:** The Students have been taught experimental probability

**INSTRUCTIONAL MATERIAL:** none

**INSTRUCTIONAL OBJECTIVES:** At the end of the lesson, the students should be able to:

- I. Define and explain theoretical probability.
- II. Solve problems on theoretical probability (fair dice)

**REFERENCE:** New Concept Mathematics for Senior Secondary School, Book 2 Revised edition by A. A Arigbabu, M. O Salaam, T. D Bot, H. N Odogwu, M. O Obono. Comprehensive mathematics for senior secondary schools; D.B. ADU.

**Introduction:** the teacher introduces the lesson by showing two dice to the student and explaining what they are.

## **PRESENTATION**

### **STEP 1**

The teacher defines theoretical probability: theoretical probability bases its results and occurrences on exact values that are dependent on the physical nature of the conditions or situation that are being considered.

Supposing a die is tossed, the possible outcomes will be either 1, 2, 3, 4, 5 or 6.

### **STEP 2**

The teacher solves problems on theoretical probability:

EXAMPLE: two fair dice are thrown, what is the probability of getting:

- a) The sum of 9
- b) Two odd numbers

Solution: consider the table below

	1	2	3	4	5	6
1	1	1	1	1	1	1
2	1	2	3	4	5	6
3	2	2	2	2	2	2
4	1	2	3	4	5	6
5	3	3	3	3	3	3
6	1	2	3	4	5	6
	4	4	4	4	4	4
	1	2	3	4	5	6
	5	5	5	5	5	5
	1	2	3	4	5	6
	6	6	6	6	6	6
	1	2	3	4	5	6

The total outcome is 36.

- a) The outcomes with the sum of 9 are: (3,6) (4,5) (5,4) (6,3). This is a total of four outcomes out of thirty-six outcomes.

Probability of sum of 9=  $\frac{4}{36}$

$$= \frac{1}{9}.$$

- b) The outcomes of two odd numbers are: (1,1) (1,3) (1,5) (3,1) (3,3) (3,5) (5,1) (5,3) (5,5). There are altogether nine of such combinations.

Probability of two odd numbers=  $\frac{9}{36}$

$$= \frac{1}{4}.$$

**CONCLUSION:** the teacher concludes the lesson by summarizing the main points of the lesson.

**EVALUATION:** the teacher evaluates the lesson by asking questions based on the lesson;

- I. Define theoretical probability
- II. Use the table given above to answer the following:
  - a. The probability of getting two prime numbers
  - b. The probability of getting two factors of 12.

**GROUP:** Experimental group

**SUBJECT:** Mathematics

**TOPIC:** Theoretical Probability (fair dice)

**DURATION:** 40min

**ENTRY BEHAVIOR:** The Students have been taught experimental probability

**INSTRUCTIONAL MATERIAL:** computer games

**INSTRUCTIONAL OBJECTIVES:** At the end of the lesson, the students should be able to:

- III. Define and explain theoretical probability.
- IV. Solve problems on theoretical probability (fair dice)

**REFERENCE:** New Concept Mathematics for Senior Secondary School, Book 2 Revised edition by A. A Arigbabu, M. O Salaam, T. D Bot, H. N Odogwu, M. O Obono. Comprehensive mathematics for senior secondary schools; D.B. ADU.

**Introduction:** the teacher introduces the lesson by showing two dice to the student and explaining what they are.

## **PRESENTATION**

### **STEP 1**

The teacher defines theoretical probability: theoretical probability bases its results and occurrences on exact values that are dependent on the physical nature of the conditions or situation that are being considered.

Supposing a die is tossed, the possible outcomes will be either 1, 2, 3, 4, 5 or 6.

### **STEP 2**

The teacher solves problems on theoretical probability:

EXAMPLE: two fair dice are thrown, what is the probability of getting:

- c) The sum of 9
- d) Two odd numbers

Solution: consider the table below

	1	2	3	4	5	6
1	1	1	1	1	1	1
2	1	2	3	4	5	6
3	2	2	2	2	2	2
4	1	2	3	4	5	6
5	3	3	3	3	3	3
6	1	2	3	4	5	6
	4	4	4	4	4	4
	1	2	3	4	5	6
	5	5	5	5	5	5
	1	2	3	4	5	6
	6	6	6	6	6	6
	1	2	3	4	5	6

The total outcome is 36.

- c) The outcomes with the sum of 9 are: (3,6) (4,5) (5,4) (6,3). This is a total of four outcomes out of thirty-six outcomes.

Probability of sum of 9 =  $\frac{4}{36}$

$$= \frac{1}{9}.$$

- d) The outcomes of two odd numbers are: (1,1) (1,3) (1,5) (3,1) (3,3) (3,5) (5,1) (5,3) (5,5). There are altogether nine of such combinations.

Probability of two odd numbers =  $\frac{9}{36}$

$$= \frac{1}{4}.$$



**CONCLUSION:** the teacher concludes the lesson by summarizing the main points of the lesson.

**EVALUATION:** the teacher evaluates the lesson by asking questions based on the lesson;

III. Define theoretical probability

IV. Use the table given above to answer the following:

c. The probability of getting two prime numbers

d. The probability of getting two factors of 12.

**GROUP:** Experimental and control group

**SUBJECT:** Mathematics

**TOPIC:** Linear equations

**DURATION:** 40min

**ENTRY BEHAVIOR:** the student have been taught expansion of variables.

**INSTRUCTIONAL MATERIAL:** none

**INSTRUCTIONAL OBJECTIVES:** At the end of the lesson, the students should be able to:

- I. Define and explain liner equations.
- II. Solve problems on linear equations

**REFERENCE:** New Concept Mathematics for Senior Secondary School, Book 2 Revised edition by A. A Arigbabu, M. O Salaam, T. D Bot, H. N Odogwu, M. O Obono. Comprehensive mathematics for senior secondary schools; D.B. ADU.

**Introduction:** the teacher introduces the lesson by writing out some variables on the board and asking the students to expand and collect the like terms.

**PRESENTATION:**

**STEP 1**

The teacher defines linear equation: an equation is a mathematical statement that shows equality between two expressions. A linear equation is a mathematical statement that contains only one terms in one variable and constant, and the highest power of the variable is 1. Examples of linear equations are:

a.  $2x + 6 = 16$

b.  $3x - 9 = 4x - 25$

c.  $3(y + 2) = 8y + 10$

## STEP 2

The teacher solves examples on linear equations:

### EXAMPLES:

Solve  $4x + 3 = 3x + 12$

Solution:  $4x + 3 = 3x + 12$

Collect like terms

$$4x - 3x = 12 - 3$$

$$X = 9.$$

Solve  $3(x - 2) = 4(2x - 5)$

Solution:  $3(x - 2) = 4(2x - 5)$

Expand and collect like terms

$$3x - 6 = 8x - 20$$

$$3x - 8x = -20 + 6$$

$$-5x = -14$$

$$X = -14/-5$$

$$X = 14/5.$$

**CONCLUSION:** the teacher concludes the lesson by summarizing the main points.

**EVALUATION:** the teacher evaluates by asking questions based on the lesson:

1. Define linear equation
2. Solve the following
  - a.  $2x - 1 = x + 2$

b.  $4x = 8$

c.  $4(2x - 1) - 3(3x - 1) = 12$

d.  $2x + 6 = 16.$

**APPENDIX B**

**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA**  
**DEPARTMENT OF SCIENCE EDUCATION (MATHEMATICS**  
**OPTION)**

**MATHEMATICS ACHIEVEMENT TEST**

**(For the purpose of Research only)**

Class: \_\_\_\_\_

Gender: Male [ ] Female [ ]

Two fair dice are thrown.

*Use the table below to answer question 1-4 and reduce your answer to the lowest term.*

	1	2	3	4	5	6
1	1	1	1	1	1	1
2	1	2	3	4	5	6
3	2	2	2	2	2	2
4	1	2	3	4	5	6
5	3	3	3	3	3	3
6	1	2	3	4	5	6
	4	4	4	4	4	4
	1	2	3	4	5	6
	5	5	5	5	5	5
	1	2	3	4	5	6
	6	6	6	6	6	6
	1	2	3	4	5	6

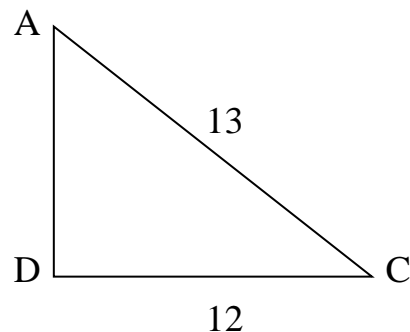
1. What is the probability of getting the sum of 9?

- (a)  $\frac{2}{4}$       (b)  $\frac{6}{3}$       (c)  $\frac{1}{9}$       (d)  $\frac{1}{7}$

2. What is the probability of getting two odd numbers?

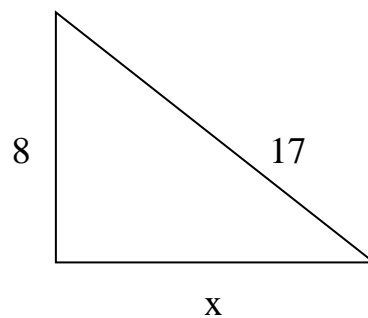
- (a)  $\frac{1}{4}$       (b)  $\frac{8}{4}$       (c)  $\frac{1}{3}$       (d)  $\frac{1}{2}$
3. What is the probability of getting two prime numbers?  
 (a)  $\frac{4}{36}$       (b)  $\frac{1}{4}$       (c)  $\frac{7}{12}$       (d)  $\frac{8}{2}$
4. What is the probability of getting two factors of 12?  
 (a)  $\frac{4}{9}$       (b)  $\frac{4}{7}$       (c)  $\frac{4}{8}$       (d)  $\frac{1}{36}$
5. What is the probability of getting a 6 when a die is tossed?  
 (a)  $\frac{6}{6}$       (b)  $\frac{8}{6}$       (c)  $\frac{1}{6}$       (d)  $\frac{3}{6}$
6. A man is at a point 18 m away from the foot of a tree. From that point the angle of elevation of the top of the tree is  $29^\circ$ . Calculate the height of the tree  
 (a) 9.98m    (b) 6.2m    (c) 8m      (d) 4m
7. The angle of depression from the top of a building of a height 30m of a stationary car is  $41^\circ$ . Find the distance between the car and the top of the building.  
 (a) 33m      (b) 60m      (c) 15m      (d) 45.7m

8. Consider  $\triangle ADC$  below. Calculate AD



- (a) 3cm      (b) 4cm      (c) 5cm      (d) 6cm

Using the figure below, answer question 9 – 11



9. What is the value of  $x$ ?  
(a) 13      (b) 14      (c) 15      (d) 16
10. What is the value of  $\cos\theta$ ?  
(a)  $\frac{8}{17}$       (b)  $\frac{15}{17}$       (c)  $\frac{15}{8}$       (d)  $\frac{17}{8}$
11. What is the value of  $\tan\theta$ ?  
(a)  $\frac{8}{15}$       (b)  $\frac{15}{17}$       (c)  $\frac{15}{8}$       (d)  $\frac{17}{8}$
12. Solve the equation  $4x + 3 = 3x + 12$   
(a) 7      (b) 8      (c) 9      (d) 10
13. What is the solution to the equation?  $3(2x - 1) = 4(x + 2)$   
(a)  $\frac{11}{12}$       (b)  $\frac{6}{2}$       (c) 3      (d) 4
14. Solve  $\frac{2x-1}{3} - \frac{3x-1}{4} = 1$   
(a) 12      (b) -13      (c) 8      (d) 7
15. Solve  $\frac{x}{3} + \frac{4x}{5} = 17$   
(a) 15      (b) 19      (c) 17      (d) 16

## **APPENDIX C**

### **MARKING SCHEME**

1. **C**
2. **A**
3. **B**
4. **A**
5. **C**
6. **A**
7. **D**
8. **C**
9. **C**
10. **B**
11. **A**
12. **C**
13. **A**
14. **B**
15. **A**