Federal Democratic Republic of Ethiopia
Ministry of Education

Physics Syllabus, Grades 7 and 8

2009

Table of Contents

Introduction

Physics is given as a linear course from grade 7 to 12. This is in line with the new curriculum framework.

The learning of physics enables students / learners to understand the physical world, to carryout observations and experiments related with physical events and phenomena, enhance interest in nature. In learning physics students acquire scientific knowledge, skills and attitudes which enable them realize that problems can be solved.

Physics should be taught by doing or practicing activities rather than telling facts to students. A major goal is to help students think of physics not as an established body of knowledge, but rather as an active process of inquiry in which they can participate. The learning and teaching process should be as much as possible learner –centered, interactive, and participatory and the teacher should relate the learning experiences to the students' day to day life. Student –centered approach activity involves students in the teaching process. It makes physics not only accessible for the students but also easier to teach.

This syllabus is prepared based on the new curriculum framework which adopts an outcome based approach to education. The outcomes define the competencies students should acquire. Competencies describe the genuine abilities of the students to demonstrate that they have understood the concepts and have acquires clearly measurable skills.

The new curriculum framework for Ethiopian school has allotted 2 periods per week for physics in grade 7 and 8. Though the academic calendar is made up of 40 weeks, the syllabus is prepared for 35 weeks. (70 periods). The distribution of periods for each unit of each grade level is indicated in the table.

In these syllabus grade 7 physics encompasses: physics and measurement, motion in a straight line, force and Newton's lows of motion, work, energy and power, simple machines, Temperature and heat, and electricity and magnets.

Grade 8 Physics includes: Physics and measurement, motion in one dimension, pressure, Heat energy, electricity and magnetism and light.

Problems such as incompatibility between physics and mathematics for the grade levels are also minimized based on the feedbacks obtained from the fields.

This document of grade 7 and 8 physics syllabus was reviewed, discussed and finalized by a national workshop (Tir 1 – Miazia 30, 2000) held at the general framework development department of the MOE and at which 10 federal, regional, and international curriculum experts participated. It was finalized by the following team of experts.

I. International consultant Dr. George Collison
II. Curriculum experts from the Ministry of Education.
    - Eshetu Asfaw
    - Girma Lemma
    - Yosef Mehret
III. Curriculum Experts from Regional Education Bureaus
    - Abdurhman Hassen (Somalie)
    - Adem Gobena (Oromiya)
    - Adane Bekele (SNNPR)
    - Kemal(Hareri)
    - Mohammed Seid (Afar)
    - Simeneh Badmon (Benshangul Gumuz)
    - Tegegn Worku (A.A)
    - Wubshet Debele (Gambela)

Aim of Grades 7 and 8 physics curriculum

The aim of the Grades 7 and 8 physics curriculum is to help students to have well-built foundation which their future learning of physics will be built by introducing the basic ideas and principles of physics.

General objectives of Grades 7 and 8 physics curriculum.

By actively participating in grades7-8 physics lessons, a student will be enabled to:

- understand the **nature of physics;**
- Understand and apply appropriate physics **concepts**, principles, laws and theories in interacting with society and the environment;
- Develop basic manipulative **skills** associated with physics.
- develop a unique view of technology, society and the environment as a result of physics education, and continue to extend this **interest and attitude** throughout life;
- Demonstrate an enjoyment of learning about physics

Area of competency	Minimum learning competency	
	Grade 7	**Grade 8**
	1. Physics and measurement • Define physics and Identify major branches of physics • Relate physics with their daily activities and state its importance • Give an examples of a career in physics • Define physical quantities and distinguish between fundamental and derived physical quantities. • State the SI units of basic physical quantities. • Define vectors and scalars and give examples for each • Perform measurement of length, mass and time using appropriate measuring devices. • Use conversion factor of length, mass and time to convert from SI units to their non-SI units. • Demonstrate the scientific enquiry/skills such as: Observing, classifying, measuring, comparing and contrast, communicating, asking question. 2. Motion • Define motion and describe types of motions • Define distance, displacement, speed, velocity, acceleration and state their SI units • Distinguish between distance and displacement, speed and velocity, uniform motion and accelerated motion. • Apply $V_{av}=S_T/t_T$ and $V_{av}=\Delta V/\Delta t$ to solve problems involving linear motion with uniform acceleration. • Identify that any freely falling bodies fall with constant acceleration due to gravity. i.e $g=9.8m/s^2$ • Demonstrate the scientific in equerry such as: observing, classifying, problem solving, asking question, inferring, applying the concept. 3. Force and Newton's Law of motion • Define force and state the SI unit of force • Describe and explain the effects of force and methods of measuring force • State the three Newton's laws of motion to predict the motion of body acted by an external force. • Solve numerical problems involving Newton's laws of motion.	1. physics and measurement • Measure and calculate the area of plane surfaces. • Measure and calculate volume of regular shaped bodies. • Measure the volume of liquids. • Measure volume of irregular bodies • Describe an experiment to verify the volume of irregular shaped bodies. • Define density and apply the formula to solve related problems. • Express the dimension of speed, force, acceleration, density, work, power. • State the significance of scientific notation. • Use scientific notation to write very large or very small numbers. • Name and use the prefixes to verify very large or very small numbers. • Demonstrate scientific enquiry skills such as: observation, inferring, predicting, communicating, measuring, asking questions, problem solving, designing an experiment. 2. motion in one dimension • Differentiate uniform motion from uniform accelerated motion and give examples for each. • Solve further problems on average speed, average velocity and acceleration. • Draw graphs to show the variation with time of distance, velocity and acceleration. • Find and interpret the slope of **S**v_s**t**, **V** v_s**t** and **a**v_s**t** and area of **V** v_s**t** • Demonstrate scientific enquiry skills such as: observation, interprets, classify, draw conclusion, asking questions, problem solving.

Area of competency	Minimum learning competency	
	Grade 7	**Grade 8**
	• Relate some physical phenomenon in their daily life activities with Newton's laws of motion • Distinguish between mass and weight of an object. • Describe and explain how friction is generated, advantage and disadvantage of friction, methods of reducing friction. • State in words and mathematical symbols how friction depends on the nature of surface and the normal contact force. • Demonstrate the scientific inquiry such as observing, inferring, predicting, classifying, solving problems, asking questions, experimenting, comparing and contrast, measuring communication, relating cause and effect, applying concept. 4. Work, energy and power • Define work, energy and power and state their dimension and SI units. • Use the mathematical formulas to solve numerical problems relate to work, energy and power. • State in words the laws of conservation of energy. • Distinguish between potential energy and kinetic energy. • Explain the energy changes when body falls. • Demonstrate the scientific inquiry such as: observing, classifying, solve problems, asking questions, predicting. 5. Simple Machines. • Define simple machines and describe its purposes. • Define M.A, V.R and efficiency (η). • Mention and describe the types of simple machines. • Discuss the significance of simple machines in their daily life. • Calculate the M.A, V.R, and η of simple machine • Construct and demonstrate some simple machines from locally available materials. • Demonstrate the scientific inquiry such as: observing, making models, asking questions, problem solving, measuring.	3. Pressure • Define pressure and state dimension and SI unit. • Use the formula P=F/A to solve numerical problems. • Describe factors that affect liquid pressure. • Demonstrate how liquid pressure varies with depth. • Apply P=ρgh. to solve the pressure exerted by liquids. • State the pascal's principle and demonstrate the existence of atmospheric pressure using crushing cane experiment. • Explain how siphons, pumps function and demonstrate to transfer liquids from one container to another. • Demonstrate scientific enquiry skills such as: observation, communicating, measuring, asking questions, problem solving, experimenting, relating cause and effect. 4. Heat energy • Identify heat as a form of energy • Describe mechanisms of heat transfer. • Classify materials as good conductors of heat and poor conductors of heat(insulators) • Describe methods of controlling heat lost in cooking devices. • Describe factors affecting the amount of heat energy of a body. • Define the specific heat capacity of substances and use Q=mcΔT. To solve numerical problems. • State the dimension and SI units of specific heat capacity. • Demonstrate scientific enquiry skills such as: observation, predicting, communicating, asking questions, problem solving. 5. Electricity and magnetism • Measure current and potential difference using an ammeter and voltmeter respectively. • State the relationship between current and voltage in words and mathematical symbols.

Area of competency	Minimum learning competency	
	Grade 7	**Grade 8**
	6. Temperature and Heat • Define temperature and express the SI unit of temperature • Name different thermometer scales and show their relation ship. • Apply the mathematical relation between temperature scales to convert on e scale to another. • List some sources of heat and describe effects of heating • Differentiate between heat and temperature. • Demonstrate the change of state of ICE ("Jelati"). • Scientific inquiry such as: observing, predict, experimenting, communicating, solving problems, asking questions, measuring, applying concept predicting. 7. Sound • Define sound as a form of energy, produced by vibration of bodies and cause sensation of hearing. • Identify that sound needs material medium for its propagation. • Describe and explain an experiment to determine the speed of sound in air. • Explain the factors affecting the speed of sound in air. • Define echo an discuss its application • Calculate the distance of sound source using the echo sounding method. • Give examples of sound reflectors and absorber materials. • Demonstrate the scientific inquiry such as: observing, classifying, solve problems, asking questions, predicting. 8. Electricity and magnetism. • Describe magnet and its properties • State and demonstrate laws of magnetism • Categorize substances as magnetic and non magnetic substance. • Make their own magnet from an iron nail by stroking it against a permanent magnet. • Sketch magnetic lines of force between magnets. • Describe some important application of magnet in modern technology.	• Define resistance and state its dimension and its SI units. • State ohm's law and apply it to solve numerical problems. • Explain the factors that affect the resistance of a conductor. • Distinguish between series and parallel connection of resistors and calculate current, voltage and resistance across each circuit. • Discuss the advantages of connecting resistors in series and parallel. • Identify resistors using color codes • Sketch magnetic lines of force around a bar magnet and horse shoe magnet. • Demonstrate magnetic field lines around a bar magnet and horse shoe magnet by using iron filling and compass needle. • Describe magnetic effect of current carrying conductor. • Demonstrate magnetic lines of force (field lines) around straight current carrying conductor and solenoid by using compass needle. • Show the direction of magnetic field, current and magnetic force by applying right hand rule. • Construct simple electromagnet and identify its polarity. • Explain the function and the principle used in electric motor. • Construct simple electric motor. • Explain alternating current and distinguish between alternating current and direct current. • Define electromagnetic induction and describe the Faraday's experiment. • Describe the working principle of Generator. • Show the difference between AC Generator and DC Generators. And list their main components. • Explain the use and describe the types of transformers. • List the main power plants in Ethiopia. • Discuss the transmission and conversion of electric energy.

Area of competency	Minimum learning competency	
	Grade 7	**Grade 8**
	• Describe and demonstrate the charging process: charging by rubbing and charging by sharing. • Name the types of charges in nature and state the basic laws of electrostatics. • Explain the uses of electroscope • Construct simple electroscope and use it to identify the types of charges • Define electric current, • State its dimension and SI unit (use I=Q/t to solve problems) • Distinguish b/n conventional and electric current • List elements of simple circuit and construct and sketch diagram of simple electric circuit using circuit elements: conductors switch, dry cell, bulb. • Define conductors and insulators and classify materials in to conductors and insulators. • Perform an experiment to check whether materials are conductors or insulators. • State the effects of electric current • Demonstrate the scientific inquiry skills: observing classifying, predicting, solving problems, asking questions, communicating, experimenting, and constructing models.	• State the electrical safety rules. • Demonstrate scientific enquiry skills such as: observation, inferring, predicting, interpreting illustration, measuring, designing model, experimenting, asking question, problem solving, communicating, comparing and contrasting. 6. Light • Classify materials as transparent, translucent and opaque. • Construct a pinhole camera and demonstrate the propagation of light in straight line. • Define reflection of light and state the laws of reflections in words. • Apply the law of reflection to solve numerical problems. • Define incident ray, reflected ray, normal line, angle of incident and angle of reflection. • Define principal axis, focal point, focal length, radius of curvature, vertex (pole) of mirror. • Describe the nature of image formed by plane and curved mirrors by using ray diagrams. • Describe the importance of periscope and construct it by using locally available materials. • Define refraction of light. • Draw and describe ray diagram to illustrate how light travel from one medium to another. • Relate the formation of mirage to refraction of light. • Distinguish between concave and convex lenses. • Define the optical center, focal length, focal point, radius of curvature and principal axis of lenses. • Describe the nature of image formed by concave and convex lenses by using ray diagrams. • Explain the importance of lenses in technology. • Define dispersion of light and name the spectrum of light(color) • Demonstrate scientific enquiry skills such as: observation, predicting, interpreting illustration, measuring, solving problems, asking questions, communicating,