Minimum Learning Competencies
Grades 11 and 12

በሁለተኛ ደረጃ የሁለተኛው   ርዕስን (11ኛ   ና 12ኛ ክፍሎች)   ተማሪዎች በአፍ መፍቻ
/በአማርኛ/ ቋንቋ ትምህርት የሚጠበቅ አጥጋቢ የችሎ   ብቃት ደረጃ   (MLC)

የብቃት መስክ	አጥጋቢ የማስተማር- መማር ብቃት *(Minimum Learning Competency)*	
	11ኛ ክፍል	**12ኛ ክፍል**
ማዳመጥ	• በቅድመ ማዳመጥ፣ በማዳመጥ ሂደትና በድህረ-ማዳ መጥ ወቅት አንድ አድማጭ ሊያከናውናቸው የሚገቡ ተግባራትን መዘርዘር.0.0 • ንዲሚያዳምጡት ንንግር ይዘትና ዓላማ (መረጃ ሰጭ፣ ገላጭ፣ ተን ህሊ አግባቢ፣ አዝናኒ . . .) የማዳመጥ ስል ቸውን ቀያይረው መጠቀም • የማስ ወሻ አያያዝ ብልሀትን በመጠቀም ከሚያዳም ጡት ንንግር ጠቃሚ ሀሳቦችን ከማይጠቅሙት በመለየት በሥርዓት መፃፍ • በቃል የሚሰጧቸውን የተለያዩ ነገሮችን የአሠራር ሂደት የሂደቱን ቅደም ተከተል ሳያዛባ መልሰው ማቅረብ፣ ማብራራትና መተግበር • ያዳመጡትን ንንግር ዋና ሀሳብና ጠቃሚ ዝርዝር ሀሳቦችን ሳይስት፤ በራሳቸው አባባል አሳጥረውና አጠቃለው ማቅረብ • የሚተላለፉላቸውን የተለያዩ መልዕክቶች ሲያዳምጡ አፅንኦት የሚሰጣቸውን ቃላት፣ ሃረጋትና አገላለፆች መለየት • በተለያዩ አውዶች ውስጥ ከሚያዳምጡት ንንግር፣ ጭውውት፣ ውይይት፣ ክርክር ያገኙዋቸውን ፍሬ-ሀሳቦች ወይም ጭብጦች መለየትና መግለፅ • ማዳመጥ በዕለት ተለት ሕይወትና በማህበራዊ ኑሮ ውስጥ ስለአለው ሚና ማብራራት	• ማዳመጥን በሚጠይቁ ተግባራት ውስጥ ንደ ግለሰብና ንደ ቡድን አባልነት ለውጤ ማ ማዳመጥ ተገቢ የሆኑ መተግበሪያ መንገዶችን ንዲሚያዳምጡት ጉዳይ መገልገል (በጥሞና ማዳመጥ፣ ማስ ወሻ መያዝ፣ ከአቀራቢው ጋር መሆን፣ . . .) • በቅድመ ማዳመጥ፣ ስለሚያዳምጡት መተንበይና ካዳመጡም በኋላ ያዳመጡትን ከተነበዩት ጋር በማነፃዘብ የደረሱበትን ድምዳሜ መግለጽ • በሚሳተፉባቸው ውይይቶች፣ ክርክሮችና ጭውውቶች ሥርኣትን ጠብቀው የነቃ ተሳትፎ በማድረግ አንድ ድምዳሜ ላይ መድረስ • ባዳመጡት ንንግር ዙሪያ ካቀረረብ፣ ከሰቢነትና መልዕክት በተገቢው ሁኔ ከማስተላለፍ አንፃር በደረጃቸው አስተያየት መስጠት
መናገር	• አንድን ሃሳብ በራስ አባባል መግለጽ • በአንድ ርዕስ ጉዳይ ላይ ንንግር ከማድረግ በፊት ቅድመ ዝግጅት ማድረግ • በተለያዩ ርዕስ ጉዳዮች ላይ የሚያያርጉትን ንንግር በማጥናት የተዘጋጁበትን ንንግር ማቅረብ፡፡ • በሥርዓቱ መሠረት አንድን ንንግር አቅራቢ ማስተዋወቅ፣ ማሰናበት • መግቢያ፣ ሁተ ና መደምደሚያ ያለው ቃላዊ ዘገባ ማቅረብ • የንንግር ማቅረቢያ ስልቶችን በአግባቡ መጠቀም • በተለያዩ ውይይቶችና ክርክሮች ውስጥ በተሳትፎ ሥርኣትን መሠረት ሃሳብን ማቅረብ • በንንግር ወቅት፣ ንደ አድማጩ ማንነት፣ ንደ ርዕስ ጉዳዩ አይነትና ንደ ቦ ው የቋንቋ አጠቃቀማቸውን በመለዋወጥ መገልገል	• በአንድ ርዕስ ጉዳይ ላይ ንንግር ከማድረግ በፊት መደ ረግ የሚገባቸውን የዝግጅት፣ የአደረጃጀትና የአቀራረብ ስልቶች ከነጠቀሜ ቸው መዘርዘር • በቂ ዝግጅትና ልምምድ በማድረግና በማስ ወሻ በመደገፍ ንንግራቸው ሳቢ ሆኖ ተገቢውን መልዕክት ማስተላለፍ • ውን ና የግል አስተያየት ተጠይቃዊ በሆነ መንገድ አደራጅተው በማስረጃና በምሳሌ አስደግፈው ማቅረብ • በተለያዩ የህሳብ መለዋወጫ መድረኮች / ጭውውት፣ ውይይትና ክርክር/ ስርኣትን ጠብቆ መሳተፍ

የብቃት መስክ	አጥጋቢ የማስተማር- መማር ብቃት (Minimum Learning Competency)	
	11ኛ ክፍል	**12ኛ ክፍል**
	• የቃለ መጠይቅ ሥርአትን ጠብቆ በአካባቢ ርዕስ ጉዳዮች ዙሪያ መረጃ የሚያስገኝ ቃለ መጠይቅ ማቅረብ • ሁለት የተለያዩ ሃሣቦችን በማወዳደር አንዱን ቸውንና ልዩነ ቸውን መግለጽ • ከአንድ ገለፃ የሚያስፈልጉና የማያስፈልጉ ሃሣቦችን መለየት	
ማንበብ	• የተተረዱትን ሃሣብ ለመግለጽ አንድን ጽሑፍ በምርምራዊ ንባብ ማንበብ • ተገቢ መረጃ ለመስጠት የተለያዩ ቅንቅጾችን፣ መጠይቆችን፣ ያሞላል መመሪያዎችን መከተል • ለሚደርሱበት ድምዳሜና ለቀጣይ ሀሳቦች የሚኖራቸውን ግምት በጽሑፍ ለመግለጽ አንድን ጽሑፍ ማንበብ • በራሱ ሙሉዕ የሆነ የማጠቃለያ ጽሑፍ ለማቅረብ አንድን ጽሑፍ ማንበብ • ንደሚያነቡት ጽሑፍ ዓይነትና ይዘት የንባባቸውን ስልት የቀያየሩ ማንበብ • ከልዩ ልዩ የመረጃ ምንጮች /ከመጽሐፍት፣ ከመጠይቅ፣ ከቃለመጠይቅ፣ ከአውደ-ጥበብ /አልማናክ/ ሃሣብ ማግኘት	• የሚረዱትን ሃሣብ ለመግለጽ አጫጭር ፅሑፎችን በሂሳዊ ንባብ ስልት ማንበብ • ደረጃቸውን የጠበቀ ጽሑፎችን በትክክልና በብቃት (ኦሰሰቄሮቁቁቨ ፤ ቄበስቃቁቁቨ) ማንበብ • ከተለያዩ የመረጃ ምንጮች የሚያገኙዋቸውን መረጃዎች በሥርዓት በማደራጀት በጽሑፋቸውና በንግግራቸው መጠቀም • አንድን ጽሑፍ አንብበው ጽሑፉ የተዛፈበትን ዓላማ፣ አደራጃጁቱን፣ ይዘቱንና በጀርባ የቀረበ ሀሳቡን በተመለከተ ከጠንካራ ከደካማ ጎኑ አኳያ አስተያየት ለመስጠት ማንበብ • አንበበው የተረዱትን በተለያያ መንገድ ማቅረብ • አንድን አጭር ወይም ረዥም ልበለድ አንበበው የአጻጻፍ ስልቱን፣ ሪኩን፣ ንዑሳንና አብይ ጭብጦችን ለመግለጽ ማንበብ • ልዩ ልዩ ሥራዎችን ለማከናወን የሚያስችሉ መመሪያዎችን መከተልና ማዘጋጀት
መጻፍ	• በማስ ወሻ አያያዝ ብልሀት በመገልገል ከንግግር፣ ከ ለት ለት የሕይወት ገጠመኝ ሆነ ከጽሑፍ የሚያገኙትን መረጃ በሥርዓት ማስናዳት • ዋና ዋና ሀሳቦችንና በጣም አስፈላጊ የሆኑ ዝርዝር ሀሳቦችን ያካተተ አህጽሮት ጽሑፍ ማቅረብ • በሀሳብ አደረጃጀ ቸው፣ አገላባጣቸውና ሽንግራቸው ውጤ ማነት የሚ ይባቸውና አረፍተ ነገሮቻቸውም በስዋሰው ስምሙ የሆኑ አንቀጾችን በዋናዎቹ የአንቀጽ ማስፋፊያ ስልቶች (ተራኪ፣ ገላጭ፣ አወዳዳሪ /አነፃፃሪ/ አግባቢ መጻፍ • በአንቀጾቹ መካከል የሀሳብ ሽግግር የሚስተዋል በት፣ መግቢያው፣ ሀተ ውና መደምደሚያው የሚ ወቅ፣ በርዕሱ ላይ ያተኮረ ድርስት ጽፈው ማቅረብ • በሚጽፉበት ርዕስ ጉዳይ ላይ ያተኮሩ ሀሳቦችን በውይይት አፍልቆ፣ በሥርዓት አደራጅቶና • አርሞ ፅሁፍን ማቅረብ	• በግልና በሌላ ግለሰብ የሆይወት ሪክ አሣፋ መካከል ያለውን ልዩነትና ዝምድና ያንበቡትን ዋቢ ያደረጉ መዘርዘር • ከሀይወት ገጠመኝ፣ ከሲኒማ፣ ከቲያትር፣ ከአለምአቀፍ መገናኛ ብዙሃን ወዘተ. በማስ ወሻ መያዝ ያለውን ጠቀ ሜ በመገንዘብ ገጠመኛቸውን በአያዙ ሥርዓት መሠረት ማስ ወሻ መያዝ • የአንድን ጥና ዊ ጽሑፍ ክፍሎችንና ለዝግጅቱ አስፈላጊ የሆኑ ጉዳዮችን መዘርዘር • በመረጃዎች በመ ገዝ ችግሮችን የሚለዩና የመፍትሄ ሀሳቦችን የሚጠቁም ትምህርት ቤት ነክ ጥና ዊ ጽሑፍ ማቅረብና የመረጃ ምንጮችንም መጻፍ • ተገቢ መረጃዎችን፣ ማብራሪያዎችን፣ ገለፃዎችን ምሳሌዎችን ያካተተ ድርስት በደረጃቸው መጻፍ • በረቂቅ ደረጃ የጻፉትን ጽሑፍ ባላቸው ዕውቀት መሠረት አርመው ና ከልሰው የመጨረሻውን ቅርዕ ማስያዝ

የብቃት መስክ	አጥጋቢ የማስተማር- መማር ብቃት *(Minimum Learning Competency)*	
	11ኛ ክፍል	*12ኛ ክፍል*
	• በተለያዩ ጉዳዮች ዙሪያ ያስተዋሉትንና የተገነዘቡትን በዘገባ ማቅረብ • የመረጃ ምንጮችን አጣጣፍ ሥርአት ተከትሎ መጻፍ • የግል- ሪክና የሕይወት ሪክ አጣጣፍ ስልትን ተከትሎ መጻፍ • ሃሳብን ከአንድ ቋንቋ ወደሌላ ቋንቋ መተርጎም • የቃለ-ጉባኤ አጻጻፍ መመሪያን ተከትሎ ቃለ-ጉባኤ መጻፍ • የሥራና የጥሪ ወይም የግብዣ ደብዳቤ መጻፍ	• ሃሳቦችን በግል-ገለፃና በጭምቅ-ሃሳብ ጽፎ ማቅረብ • አንድን ጽሁፍ አሳጥሮ መጻፍ • ሃሳብን ከአንድ ቋንቋ ወደሌላ ቋንቋ መተርጎም • በርዕሰ ጉዳዩ የሚካተቱ ሃሳቦችን በሐረግና በዐ/ነገር በመደርደር አስተዋጽአ መንደፍ
ሰዋስው	• በጽሕፈትና በንግግር ቋንቋ መካከል ያለውን አንድነትና ልዩነት መዘርዘር፡ • ድምፀ-ልሳናዊና ቀለማዊ የአጣጣፍ ሥርዓቶችን በተመ ለከተ ማብራሪያ መስጠት • የምዕላድን ምንንትና ዓይነቶቹን በተመለከተ በምሳሌ አስደግፈው ማብራሪያ መስጠት፡ • በተለያዩ የ ርባ ና የምሥሪ ምዕላዶች ቃላትን መመስረት • አምስቱን የሐረግ ዓይነቶች ለይተው መዘርዘር፤ በደረጃቸው በምሳሌ ማቅረብ • በአርፍተ ነገር ውስጥ የቃል ክፍሎችን ሙያ መለየት • በአንድ ጽሑፍ ውስጥ ከሚኖራቸው አገባብ /አውድ/ በመነሳት ለቃላት፣ ለሃረጋት፣ ለፈሊጦችና ለዘይቤዎች ፍቺ መስጠት • ለቃላት መዝገበ ቃላዊ፣ ማሬያዊና ፍካሬያዊ፣ ተመሳሳይና ተቃራኒ ፍቺ መስጠት • በቃላት ውስጥ የድምጾች መጠበቅና መላላት፣ መርዘምና ማጠር የሚያመጡትን የትርጉም ልዩነት ማሳየት • የቃላት ድግግሞሽን፣ ድረ ን፣ አላስፈላጊ የቃላት ውስጥን፣ የሰለቹ ቃላትን . . . አስወግዶ መጠቀም • የተነወሩ፣ዘዬ መጥና የአራዳ ቃላትን አስወግዶ ተገቢ ቃላትን መጠቀም • ኣያያዦችንና መሽጋገሪያ ቃላትን በተገቢ ቦ መጠቀም • ሥርአተ ነጥቦችን በተለያይም ሁለት ነጥብ ከሰረዝን በተገቢው ቦ መጠቀም	• በሀገሪቱ ውስጥ ብሔር/ብሔረሰቦች የየራሳቸው ቋንቋ ያላቸው መሆኑና በራስ ቋንቋ መጠቀም የሚያስገኘውን ፋይዳ ማስረዳት • ስለ አማርኛ ቋንቋ አጀማመርና የቤተሰብ አመዳደብ ማስረጃዎችን በመጥቀስ መግለፅ • በኢትዮጵያ የሚነገሩ ቋንቋዎች የሚመደቡባቸውን የቋንቋ ቤተሰቦች ስም መዘርዘር • ቃላትን በቀለማዊና በድምፀ-ልሳናዊ አጣጣፍ መጻፍ • በተለያዩ አርፍተ-ነገሮች ውስጥ የሚገኙ ልዩ ልዩ ሐረጋትን በአይነት ለይተው ማውጣት • የዐ/ነገር አይነቶችና ስልቶችን መለየት • ከስርዐተ-ቃል ስምና ቅጽልን መመሥረት • ለቃላት /መዝገበ ቃላዊ ማሬያዊና ፍካሬያዊ፣ ተመሳሳይና ተቃራኒ ፍቺ መስጠት • በቃላት ውስጥ የድምጾች መጠበቅና መላላት፣ መርዘምና ማጠር የሚያመጡትን የትርጉም ልዩነት ማሳየት • ሥርአት ነጥቦችን መጠቀም • ሰዋስዋዊ ስሕተቶችን /የቋጥር፣ የጾ ፣ የመደብ አለመስማማትና የሃረጋት አለመመጣጠን/ አስተካክሎ መጻፍ

የብቃት መስክ	አጥጋቢ የማስተማር- መማር ብቃት *(Minimum Learning Competency)*	
	11ኛ ክፍል	**12ኛ ክፍል**
ሥነ ጽሑፍ	• የተለያየ የሥነ-ጽሑፍ ዘርፎችን (ግጥም፣ ልቦለድ፣ ድራማ) በተመለከተ ስለአንድን ቻውና ልዩነ ቻው በምሳሌ ያስደገፉ መግለፅ • የተለያየ ዘይቤያዊ አነጋገሮችን መለየትና ፍቼያቸውን መግለፅ	• ስለተለያዩ የሥነ-ጽሑፍ ዘርፎች አንድነትና ልዩነት ማብራሪያ መስጠት • የተለያዩ ዘይቤያዊ አነጋገሮችን መለየትና ፍቼያቸውን ማብራራት • ሥነ-ጽሑፍን አንብበው በውስጡ ጥቅም ላይ የዋሉ ሥነ-ጽሑፋዊ አላባውያንንና ቴክኒኮችን መለየት
	• የተለያዩ ሥነ-ጽሑፋዊ አላባውያንና ቴክኒኮችን በተመ ለከተ ስለምንን ቻው መግለፅ • የቅኔ አፈ ት ዘዴዎችን መለየት • በሰምና ወርቅ ፍቼያቸው የሚገለጹ ቅኔዎችን በህብረት ቃላቸው አማካይነት ሰምና ወርቅ ፍቼያቸውን መስ ጠት • ጭውውቶችን መጻፍ • የግጥምን ቅርፅና ባህርያት መግለጽ • የተለያዩ አካባቢያዊ ሥነቃሎችን መልዕክት ተገንዝቦ ማስረዳት • በግጥም የቀረበን ሓሣብ በዝርው መጻፍ	• አጭር ልቦለዶችን መጻፍ።። • ቅኔዎችን መፍ ት • ግጥምን አንብበው ከቅርፁና ከይዘቱ አኳያ መተንተን • በተለያዩ ርዕስ ጉዳዮች ላይ ግጥም መፃፍ • አንድን ፅሑፍ መገምገም • በሚቀርብላቸው ምሳሌ መነሻ ስለልቦለድ ትችት በሚያገኙት ግንዛቤ መሠረት ከይዘትና ከቅርጽ አኳያ መጠንና የግምገማ ጽሁፍ ማቅረብ

Biology Grades 11 and 12 Minimum Learning Competencies

Area of Competency	Grade 11	Area of Competency	Grade 12
The Science of Biology	• Define science and List the steps in scientific methodology • Demonstrate scientific methods in solving problems • Classify tools used in biology as laboratory and field equipments • Reflect on the scientific methodology in the learning process • Conduct a library research and gather information to explain the relevance and promises of biological science • Explain the role of biology as a science in the fight against HIV and AIDS • Express willingness to participate in community undertakings against HIV and AIDS • Demonstrate life skills that lead to responsible sexual behavior	**Microorganisms**	• Describe the structure, show the shape of and classify bacteria and explain their role in every ecosystem • Compare infectious disease with functional disease and state the germ theory • Explain how bacteria produce diseases and the role of reservoir hosts in disease transmission • Give examples of industrial processes that use bacteria and indicate how bacteria are used in these processes • Define cloning and illustrate its processes • Describe the structure of a virus, draw and label it, diagram its different forms, give examples of RNA and DNA viruses and compare viruses with free living cells • Compare the lytic and lysogenic cycles of viral reproduction • Draw and label the structure of HIV, explain how it affects the immune system, explain its life cycle, and state its social and economic impacts • Explain how antiretroviral drugs inhibit enzymes of the life cycle of HIV • Demonstrate life skills that lead to responsible sexual behaviour
Biochemical molecules	• Group biochemical molecules as inorganic and organic • Explain the property and importance of water for life • List and describe the organic molecules in living things • Identify biologically important compounds by conducting food tests • Appreciate the way how biological molecules are obtained from different foods	**Ecology**	• Define and describe primary and secondary successions • Appreciate the natural process by which a bare land turns out to be productive area by succession • Describe the water, carbon, nitrogen, phosphorus and sulfur cycles and explain the importance of recycling in nature • Define biomes, list the major land and marine biomes of the biosphere, mention the general features of each biome and state their characteristic fauna and flora

Area of Competency	Grade 11	*Area of Competency*	Grade 12
	• Show the structures and functions of biological molecules using chemical formulae and examples		• Demonstrate love and respect to fauna and flora and their biomes • Define biodiversity, explain its significance and the threats to it, explain its status in Ethiopia and describe the principles of conservation of biodiversity • Reflect a concern towards conservation of biodiversity and appreciate the importance of plant diversity for animal diversity and vice versa • Grow trees in a given area show willingness to participate in further tree growing activities in their locality • demonstrate the influence of natality and mortality on population size and interpret a population growth rate curve • explain the impacts of rapid population growth on development and state the measures that should be taken to control it
Enzymes	• Define enzymes and explain the properties of enzymes • Explain how enzymes are named and classified • Investigate the destruction of an enzyme by heat • Conduct an experiment to show the specificity of an enzyme • Appreciate the importance of enzymes in industries and local products • Explain how enzymes lower activation energy • Explain the mechanism of enzyme action • Discuss the action of apo- and co-enzymes • Classify enzymes according to their structure • Give examples of vitamins and minerals in food that act as co-factors • Explain factors that affect enzyme activity • Explain allosteric regulation and feedback control mechanism of enzyme activity	**Genetics**	• Work out different types of gametes from a given dihybrid organism • Use the Punnet square to determine genetic crosses • Determine genotypes and phenotypes formed in a genetic cross • Explain the different types of dominance • Appreciate the significance of artificial crossbreeding and inbreeding to obtain required varieties • Describe different stages of meiotic division and appreciate that the cells formed by meiosis are gametes • Compare the biological importance of meiosis in relation to growth and reproduction • Describe the significance of meiosis in bringing variation through crossing over and independent assortment • Explain why fruit flies are considered ideal for genetic experiments

Area of Competency	Grade 11	Area of Competency	Grade 12
	• Show how temperature, pH, substrate conc. And enzyme conc. affect enzymatic activity • Appreciate the role of enzymes in controlling our metabolic activities		• Explain Sex determination, sex linkage, sex limited and sex influenced traits • Describe inheritance of blood type and Rh factor • Describe the molecular structure of a chromosome • Describe the four types of nucleotides that build up the DNA molecule • Construct a model of DNA showing the base pair between complementary nucleotides and describe DNA replication • Explain the process and site of transcription and translation • Define mutation, describe the different types of mutations, explain the causes of induced mutations, state the spontaneity of a mutation, and explain the impact of mutations
Cell biology	• Describe the cell theory and investigate the size, structure and shape of cells • List different parts of the cell and explain their function and discuss the importance of a cell membrane • Describe the composition and the arrangement of lipids and proteins in the membrane • Compare the Daveson-Daniel and the fluid mosaic model • Construct and show the arrangement of the phospholipids and proteins in the fluid mosaic model • State and explain the mechanisms of substance transport across a cell membrane • Conduct an experiment to show movement of solvent through semi-permeable membrane • Demonstrate osmosis at a semi-permeable membrane • explain that the size of a cell changes by osmosis because of in and outflow of water	**Evolution**	• Define evolution and describe Oparin's and Stanley Miller's experiments on the origin of life • Explain Lamark's and Darwin's theories of evolution and compare these two theories • Explain how fossils are formed and how they are used for dating • Explain how Paleontology, Comparative anatomy, Embryology, Biochemistry, and Plant and animal breeding support the theory of evolution and give examples for each • Define speciation and explain how isolating mechanisms cause speciation • Distinguish between convergent and divergent evolution and give examples for each • define natural selection, state and describe its types and give examples for each type • explain the biological evolution of humans by constructing an evolutionary tree and explain the importance of Lucy *(A. afarensis)* in the study of human evolution

Area of Competency	Grade 11	Area of Competency	Grade 12
	• Explain the difference between prokaryotic and eukaryotic organisms		• discuss the controversies regarding human races
Energy transformation	• Describe the structure of ATP and its role in cellular metabolism • Understand the role of electron donors and acceptors • Draw the structure of a mitochondrion and label it • Locate where the different processes of cellular respiration occur in the cell • Explain the process of alcoholic fermentation and lactate production • Appreciate the importance of lactate production during running and other sports • Draw, label and describe a chloroplast • Locate where light dependent and independent processes occur in the chloroplast • Distinguish between C3 and C4 plants and give at least three examples for each • Explain photorespiration • Name the products of the light independent and dependent process • Appreciate the importance of C4 plants in Ethiopia • Separate photosynthetic pigments chromatographically	**Behavior**	• Define behavior and describe its types • Explain the characteristics of innate behavior with examples and list and explain types of innate behavior • Describe reflex in humans, instinct behavior in animals and biological clocks in animals as types of innate behavior • Explain the characteristics and types of learned behavior with examples and explain advantages of innate behavior over learned behavior • Explain how animals learn through habituation, classical conditioning , operant conditioning, imprinting, insight learning and latent learning • Describe patterns of behavior that include courtship, territorial and social behavior and illustrate each pattern with examples

Chemistry Grades 11 & 12 Minimum Learning Competencies

Area of Competency	Grade 11	Grade 12
1. Fundamental Concepts in Chemistry.	**The students should be able to:** • Define chemistry & describe the major fields of chemistry; • Describe the SI units & their prefixes ; & write the names & symbols of derived SI units; • Identify causes of uncertainty in measurement; • Explain systematic & random errors; • Define precision & accuracy & analyses a given data interms of precision & accuracy; • Define significant figures, determine the number of significant figures in a calculated result & use the scientific notation in writing very large or very small numbers; • Define scientific method, describe its major steps & use it in solving problems; • Demonstrate some experimental skills in chemistry & describe the procedures of writing laboratory report.	
2. Structure of substance & periodic table.	• Narrate historical development of atomic nature of substance; • State postulates of Dalton's & modern atomic theories; • Discuss the discovery of electron & describe the properties of cathode rays; • Define the terms : radioactivity, radioactive decay & radioisotope; • Describe the common types of radioactive emission; • Describe the alpha scattering experiment; • Describe makeup of the nucleus; • Explain atomic number & mass number; & define atomic mass & isotope; • Tell the number of protons, electrons & determine the number of neutrons from the given atomic number & mass number of an element; • Calculate the relative atomic mass of naturally occurring isotopic elements;	

Area of Competency	*Grade 11*	*Grade 12*
	- Characterize electromagnetic radiation in terms of wave length, frequency & calculate the wave length & frequency of the electromagnetic radiation; - Explain that light has both wave & particle nature & the emission spectra of atoms consist of series of lines; - State Bohr's assumption of energy of electron in hydrogen atom ; - Calculate the radius of electron orbit, the electron velocity & the energy of an electron using Bohr model; - Explain that atoms emit or absorb energy when they undergo transition from one stats to another; - Explain that the spectrum of hydrogen demonstrates the quantized nature of the energy of its electron; - Explain the short coming of Bohr's theory; - State Hinesburg's uncertainty principle & describe the significance of electron probability distribution; - Explain the quantum numbers n, l, m_l & m_s ; - Write all possible sets of quantum numbers of electrons in an atom; - Describe the shapes of orbital designated by s,p,and d; - Explain Aufbau principle Pauli exclusion principle & Hundi's rule; - Write ground state electron configuration of elements with the periodicity of elements; - Classify elements as representative, transition & inner-transition; - Explain the general trends in atomic radius, ionization energy,electronaffinity,electro-negativity & metallic character of elements within a period & a group of the periodic table; - Write the advantages of periodic classification of elements; - Describe the reason why atom from chemical bonds; - Define chemical bonding & describe the types of chemical bonding & the mechanisms of bonding process; - Define ionic bonding & explain the formation of ionic bonding;	

Area of Competency	*Grade 11*	*Grade 12*
	• Give examples of ionic compounds & describe their properties; • Define lattice energy; • Calculate the lattice energy of ionic crystals from a given data using the methods of Born-Haber cycle; • Discuss the limitation of Octet rule; • Describe ionic bonding using Lewis electron dot symbols; • Define Covalent bonding & explain the formation of Covalent bonding; • Give examples of covalent molecules & describe their properties; • Draw Lewis structures of some covalent molecules; • Define resonance & draw resonance structures of some covalent molecules & polyatomic ions; • Discuss the exceptions to the Octet rule in covalent bonding; • Illustrate the formation of coordinate covalent bonding using examples. • Distinguish between polar & non-polar covalent molecules; • Describe the properties of covalent molecules; • Define intermolecular force & name the different types of intermolecular forces; • Explain dipole-dipole interaction & give examples of them; • Define hydrogen bonding & explain the effects of it on the properties of substances; • Explain dispersion forces & give examples of them; • Define metallic bonding & explain the properties of metals related to the concept of bonding; • Name two chemical bond theories; • Explain the VBT & distinguish between the Lewis model & valence bond model; • Discuss the overlapping of orbital in covalent bond formation; • Explain hybridization & show its process involved in some covalent molecules;	

Area of Competency	*Grade 11*	*Grade 12*
	• Draw hybridization diagram for the formation of $sp, sp^2, sp^3, sp^3d, sp^3d^2$ hybrids; • Discuss the hybridization involved in compounds containing multiple bonds; • Explain the MOT & describe molecular orbital using atomic orbital & bonding & anti-bonding orbital; • Write the electron configuration of simple molecules using molecular orbital model; • Define bond order of some simple molecules & their stability using bond order; • Describe the Valence Shell Electron Pair Repulsion(VSEPR) theory; • Define the bonding pairs & non-bonding pairs of electron; • Describe how electron pair arrangement of molecules can be predicted from the number of electron pairs; • Explain the term dipole moment with the help of a diagram; • Predict the geometrical shapes of some simple molecules on the basis of hybridization & the nature of electron pairs; • Explain that the VSEPR theory is used to explain the molecular parameters like bond angle & polarity of the molecule; • Construct models to represent shapes of some simple molecules; • Define crystal, name four types of crystalline solids, give examples & describe their properties; • Mention the types of attractive forces that exist within each type of crystalline solids.	
3.Chemical Reaction	• Define chemical kinetics & reaction rate; • Perform an activity to measure rate of reaction; • Solve problems related to the rate of reaction; • List five factors that affect the reaction rate & explain how they affected by giving examples; • Define catalyst, positive catalyst & negative catalyst;	**The students should be able to:** • Define the terms mixture, homogenous & heterogeneous mixtures, solute , solvent, solution; • Distinguish between homogeneous & heterogeneous mixtures;

Area of Competency	*Grade 11*	*Grade 12*
	• Distinguish between homogeneous & heterogeneous catalysts, biological & non-biological catalysts & homogeneous & heterogeneous reactions • Perform an activity to show the effect of nature of reactant on surface area, concentration, temperature & catalyst on the reaction rate; • State collision theory & transition state theory, & describe how these theory can be used to explain change in reaction rate; • Define activation energy, activated complex, rate law, order of reaction rate construct & half-life; • Sketch & label the energy profiles of reactions which are exothermic & endothermic; • Determine reaction order & calculate rate constants from a given experimental data; • Explain the zero, 1st & 2nd order reaction using concentration verses time curve; • Calculate the half-lives of zero, 1st, & 2nd orders from experimental data; • Explain reaction mechanism, molecularity of a reaction, & rate determining stop & give specific examples to illustrate rate determining step; • Explain the relationship between the reaction pathway & the rate law & use rate law to suggest possible reaction mechanism for a reaction; • Explain reversible & irreversible reactions; • Define dynamic equilibrium, discuss how chemical equilibrium is established & explain its characteristics; • State the law of mass action; • Define equilibrium constant, write its expression involving concentration for chemical reactions & calculate it; • Write the equilibrium constant expression involving partial pressure for chemical reactions & calculate it; • Show relationship between K_c & K_p; • Distinguish between homogeneous & heterogeneous equilibrium reaction;	• Explain different types of solutions & give examples for each; • Define heat of solution , salvation energy & hydration energy; • Explain the solution process & how heat of solution is influenced by the interparticle interaction forces; • Explain formation of saturated & supersaturated solutions; • Define rate of dissolution & discuss the factors that affect it • Define solubility & describe the factors that affect it; • Conduct an experiment to determine solubility of table salt & sugar; • State Henry's law & use it to calculate concentration of gaseous solute in a solution; • Define concentration of a solution, mass percentage of a solute in a solution, mole fraction , molarity , molality, equivalent mass, number of equivalents & normality; • Calculate the mass percentage & mole fraction of a solute in a solution ; • Prepare molar , normal & molal solutions of different substances; • Calculate molarity, normality & molality of a solution from a given information; • Explain dilution process & calculate the volume or concentration changes during dilution of solution; • Do calculations involving solutions to determine the number of moles , masses or volumes of reactants and products in ionic reactions; • Analyze ionic reactions and write net ionic equations; • List the important properties of solvents that are affected by the formation of a solution;

Area of Competency	*Grade 11*	*Grade 12*
	• Define reaction quotient & use equilibrium quotient to predict the direction of the reaction & position of equilibrium; • Calculate the equilibrium concentrations of a given initial concentrations; • List factors that affect chemical equilibrium; • State Le-chatlier principle & use it to explain the effect of changes in temperature, pressure, concentration & presence of catalyst of a reaction.	• State Raoult's law ; • Explain the changes in the colligative properties of solvent when a certain solute is added; • Describe the Vant Hoff's factor; • Calculate the vapor pressure, the boiling point & the freezing point of a solvent after a certain amount of solute is added; • Define osmosis & osmotic pressure of a solution; • Calculate the osmotic pressure of a solution; • Compare & contrast change in colligative properties of electrolytic & nonelectrolytic solution ; • Define acid & base by Arrhenius , Bronsted-Lowry & Lewis concepts & give examples of each; • Define chemical thermodynamics, systems, state functions, path function and non-function; • Give examples of systems, classify them into open, closed and isolated systems and explain them; • Distinguish between intensive and extensive properties; • Explain internal energy, heat and work in relation to the concepts of thermodynamics; • State and explain first law of thermodynamics; • Calculate change in internal energy of a system from a given information; • Define enthalpy change , standard state, standard molar enthalpy of combustion, standard molar enthalpy of formation and standard molar enthalpy; • Carry out an activity to measure standard molar enthalpy of neutralization; • State Hess's law and apply it to solve problems on enthalpy changes of chemical reactions;

Area of Competency	Grade 11	Grade 12
		• Explain bond energy and calculate it in a given chemical reaction ; • Calculate the standard enthalpy changes of a reaction from given enthalpy changes of reactants and products; • Explain entropy and entropy changes; • Calculate the entropy change from the given standard entropies of substances; • State and explain the second law of thermodynamics; • Calculate the entropy changes from the given enthalpy change of the system and absolute temperature; • Explain free changes and standard free change; • Calculate the standard free energy change from a given standard free energies of reactants and products; • Describe the relationship between standard free change, standard enthalpy change and standard entropy change of a reaction; • Determine the spontaneity of a reaction; • Define redox reactions, oxidation and reduction; • Describe the oxidizing & reducing agents; • Identify the species that are oxidized & reduced in a given redox reaction; • Balance a given redox reaction using oxidation number method & ion-electron method; • Distinguish between molten electrolytes and aqueous electrolytic solutions; • Draw labeled diagram of an electrolytic cell; • Define preferential discharge & explain factors that affect it; • Describe the reactivity of a metal from its position in the activity series;

Area of Competency	Grade 11	Grade 12
		• Describe the effect of nature of the ions, concentration of the ions, types of the electrodes on the electrolysis of aqueous solutions of dilute sulphuric acid and sodium hydroxide , on the electrolysis of dilute and concentrated solutions of sodium chloride and on the electrolysis of dilute sulphuric acid, dilute sodium hydroxide , concentrated & dilute sodium chloride and copper sulphate solutions respectively; • State Faraday's first & second law of electrolysis and write mathematical expression of them; • Do calculations related to Faraday's first and second law of electrolysis; • Mention industrial applications of electrochemistry; • Define voltaic cell, salt bridge, electrode potential and cell potential; • Draw, label and construct Zn-Cu voltaic cell; • Measure the cell potential of Zn-Cu cell using voltmeter; • Explain how standard electrode potential is measured and calculate cell potential; • Decide whether a given redox reaction is spontaneous or not; • Explain the effect of concentration on cell potential; • Mention different types of voltaic cells and give examples of each; • Distinguish between primary and secondary cells; • Identify the cathode, anode and electrolyte of a given voltaic cell; • Compare and contrast electrolyte and voltaic cells; • Explain metallic corrosion in terms of redox

Area of Competency	*Grade 11*	*Grade 12*
		reaction , its negative effects and different methods of prevention; • Describe the forms of occurrence of metals ; • Define metallurgy & explain the major steps in metallurgical processes; • Explain the chemical properties, the manufacture and uses of sodium ; • Explain the chemical properties , the manufacture and uses of calcium; • Explain the chemical properties , the manufacture and uses of tin; • Explain the chemical properties , the manufacture and uses of lead; • Explain the chemical properties , the manufacture and uses of zinc; • Explain the chemical properties , the manufacture and uses of chromium;
4.Carboxylic acids, Esters, Fats, Oils and Polymers	• Write the general formula of saturated monocarboxylic acid; • Write the molecular formulas and names of the first six members of saturated monocarboxylic acids & give their structural formulas; • Give examples for monocarboxylic, dicarboxylic and tricarboxylic acids & name some branched carboxylic acids; • Explain the general methods of preparation of saturated monocarboxylic acids & the industrial and laboratory preparation of acetic acid; • Conduct an experiment to prepare acetic acid in the laboratory; • Explain why "Tella" or "Tej" turns sour; • Describe physical properties and chemical reactions of saturated monocarboxylic acids; • Name and write structural formulas of some fatty acids; • List common sources of esters;	• Define monomer and polymer; • Classify polymers into synthetic and natural polymers give examples for each; • Explain polymerization and mention two types of polymerizations; • Explain how addition & condensation polymerization take place; • Give examples of addition polymers and tell their monomers; • Give examples of condensation polymers and tell their monomers; • Explain the common uses of addition & condensation polymers; • Describe thermoplastics and thermo set polymers & give examples of each; • Describe natural rubber and tell its monomers; • Explain vulcanization; • Explain the use of natural rubber;

Area of Competency	*Grade 11*	*Grade 12*
	• Write the general formulas of esters and the molecular formulas & names of the first six members of esters; • Explain the method of preparation of esters; • Describe physical properties and chemical reactions of esters; • Define fats and oil; • Write the general formula of fats and oil and the structures for some common triglycerides; • Describe physical properties of fats and oil; • Explain rancidity and hardening of oil; • Define soap and detergent; • Explain saponification and the cleaning action of soap ; • Prepare soap;	• Give three examples of synthetic rubbers & explain their uses; • Compare and contrast synthetic and natural rubber; • Define carbohydrate; • Describe monosaccharide, draw its structure and give examples; • Describe disaccharide, draw its structure and give examples; • Describe polysaccharide, draw its structure and give examples; • Explain the difference between starch, glycogen and cellulose; • Define amino acid, peptide and protein; • Describe the structure of amino acids; • Explain how proteins are formed; • List types of proteins;

Minimum Learning Competencies in English Language Skills Grades 11 and 12

Competencies Grade 11	*Competencies Grade 12*
Listening *Students should be able to:* Listen to a variety of text types (such as dialogues, monologues, news reports, extended lectures on familiar topics, stories, interviews etc.) and a variety of speakers and be able to: - predict the content (of all or part) using a variety of contextual clues (such as the topic, first line, the situation, the first part) or by doing pre-listening activities - identify gist - identify main ideas - identify specific information - identify detailed information - follow the structure, logic and sequence of a text through identifying discourse markers and range of tenses - relate what they have heard to their own lives - retell what they have heard in some detail Task types will include taking notes, filling in tables/charts, ticking items, answering questions (open and true/false), ordering/ranking information, drawing and labeling a diagram, sequencing events, speaking and writing exercises. If possible texts should include the use of both native and non-native speakers and the majority of material should be authentic (or scripted from authentic texts)	**Listening** *Students should be able to:* Listen to a variety of text types (dialogues, monologues, news reports, extended lectures on familiar and unfamiliar topics, stories, interviews, speeches etc.) and a variety of speakers and be able to: - predict the content (of all or part) using a variety of contextual clues (such as the topic, first line, the situation, the first part) or by doing pre-listening activities - identify gist - identify main ideas - identify specific information - identify detailed information - identify speakers' points of view - identify speakers' feelings (including through their use of intonation) - follow the structure, logic and sequence of a text through identifying discourse markers and range of tenses - relate what they have heard to their own lives - retell what they have heard in some detail Task types will include taking notes, filling in and making tables/charts, matching information, answering questions (open and true/false), ordering/ranking information, sequencing events etc. If possible texts should include the use of both native and non-native speakers and the majority of material should be authentic (or scripted from authentic texts) Grade 12 listening texts should be longer, on more challenging topics and with more difficult tasks compared to grade 11.

Competencies Grade 11	*Competencies Grade 12*

Speaking
 Students should be able to:
 • use previous knowledge to pronounce new words and structures
 • use a range of structures to:
    - take part in a meeting
    - think about a problem
    - express preferences
    - express reservations
    - say 'no' tactfully
    - express regret
    - express hopes and fears
    - interrupt
    - give reasons
 • ask for opinions, express their own opinion and support/justify it (including through illustrating a point)
 • agree, disagree and express simple counter arguments
 • discuss advantages and disadvantages and come to a consensus
 • identify a range of suggestions and recommendations on an issue
 • give explanations (including express cause and effect)
 • recount stories and experiences in the past using a range of structures
 • talk about a hypothetical present/past
 • talk about the future using a range of structures
 • ask and respond accurately to a range of open, closed and follow-on questions (including in an interview)
 • report information/what they have heard
 • contribute to and develop conversations about the unit topic
 • use appropriate turn-taking strategies
 • research, give and initiate discussion on a short presentation on a topic
 • take part in job-related speaking activities and a job interview
 • in extended utterances which both communicate the intended message and are reasonably fluent and accurate
 	
 Activities are in pairs, group or plenary and mainly on familiar topics
	Speaking
	 Students should be able to:
	 • use previous knowledge to pronounce new words and structures
	 • use a range of structures to:
	    - ask for clarification
	    - express regret
	    - correct oneself
	    - generalise and make exceptions
	    - change and come back to the subject
	    - demand explanations
	 • ask for opinions, express their own opinion and support/justify it (including illustrating a point with examples and anecdotes and presentation of evidence)
	 • agree, disagree and express simple counter arguments
	 • discuss advantages and disadvantages and come to a consensus
	 • paraphrase sentences
	 • summarise information and suggestions
	 • recount stories and experiences in the past using a range of structures
	 • talk about a hypothetical past/present
	 • talk about the future using a range of structures
	 • ask and respond accurately to a range of open, closed and follow-on questions (including in an interview)
	 • contribute to and develop conversations about the unit topic
	 • research, deliver, initiate discussion and answer questions on a short presentation on a chosen topic
	 • take part in job-related speaking activities
	 • in extended utterances which communicate the intended message, are reasonably fluent and accurate and demonstrate knowledge of a range of structure and lexis
	
	 Activities are in pairs, groups and plenary on both familiar and unfamiliar topics.

Competencies Grade 11	*Competencies Grade 12*
Reading *Students should be able to:* Read a variety of text types (such as factual articles/leaflets, summaries, guides/manuals, instructions, job applications, poems, stories, case studies, newspaper articles, graphs, letters, paragraphs etc.) on familiar and unfamiliar topics using mostly authentic materials and be able to: • predict the content of a text from, topic, title, extracts, etc • infer meanings of new words using contextual clues and/or knowledge of word formation • scan to obtain specific information • skim to get the general ideas • identify main points • identify detailed information • identify evidence to support/justify opinions /arguments • express their view (including in writing) • distinguish between fact and opinion • explain the features of different text types Task types should include making notes, collating information to tables/charts or maps, ticking items, answering questions (open and true/false), ordering/ranking/matching information, writing/speaking exercises etc.	**Reading** *Students should be able to:* Read a variety and range of text types, (such as factual articles/leaflets, instructional manuals, job applications, poems, (auto)biographical accounts, stories, newspaper articles, letters etc.) on familiar and unfamiliar topics using almost entirely authentic materials and be able to: • predict the content of a text from, topic, title, extracts etc. • infer meanings of new words using contextual clues and/or knowledge of word formation • scan to obtain specific information • skim to get the general ideas • identify main points • identify detailed information • identify evidence to support/justify opinions/arguments • identify and explain its main purpose and effect on the reader • critically evaluate it to inform their own comments/judgments • relate what they have read to their own experience • distinguish between fact and opinion Task types should include making notes, underlining information, collating information to tables/charts, answering questions (open and true/false), ordering/ranking information, writing/speaking exercises etc. Grade 12 reading texts will be on different topics from grade 11. In addition to this, texts should be longer and tasks more challenging.
Writing Students should be able to: • independently follow the six stages of writing: think, brainstorm, plan, draft, check, rewrite, proof read • write a short formal letter (including a reply) using correct conventions • write informal letters (including replies) using correct conventions • write narratives/essays independently in 5 paragraphs (including an introduction and conclusion where appropriate)	**Writing** Students should be able to: • independently follow the six stages of writing: think, brainstorm, plan, draft, check, rewrite, proof read • elaborate/justify ideas/arguments/opinions in essays by giving examples • fill in an application form/write a letter of application for admission to a college/university course or for employment

Competencies Grade 11	*Competencies Grade 12*
- interpret simple statistics and write a report - in pairs write and present a report of 350 to 400 words including suggestions/recommendations - with support summarise a text in various forms including bullet points, charts, notes and paragraphs - write suggestions/advice in response to a written request - write 2-3 paragraphs to persuade (building on grade 10), explain and inform using language that communicates the intended message as well as being reasonably accurate and complex.	- write formal/business correspondence to a standard acceptable in the workplace - interpret simple statistics and write a report - write a report based on an interview - write and present a 500 word report on a given topic for a specific audience including suggestions/ recommendations - summarise a text in various forms including bullet points, charts, notes and paragraphs - write 5 paragraph essays to explain, inform (building on grade 11) and argue using language that communicates the intended message as well as being reasonably accurate and complex and which demonstrates a range of structure and lexis
Language items - Third conditional - I wish I was - Past modals e.g. might have done - Like and as - I'd rather/prefer - Adjectives ending in '-ing' and '-ed' - Going to for prediction based on evidence - Future passive - Comparison of adverbs - When clauses - Expressing ability in the past and future	**Language items** - All forms of I wish - Past modals including I should have done (regret) - Advanced quantifiers (including a few/a little vs., few/little) - If only - Reported speech in all tenses - Gerunds - Future perfect - Adjective order - It's time + past simple - Make and let
Vocabulary Perform with and understand a total number of 2000 words in different contexts, such as education, traditional and modern medicines, HIV and AIDS, tourism, arts and literature, climate change, disability awareness, poverty and development, science and technology. Students make a note of useful vocabulary for themselves related to their subjects and their interests.	**Vocabulary** Perform with and understand a total number of 2500 words in different contexts, such as family policy, communication, education, arts and literature, trade and globalization, jobs, human development, tradition versus progress, future threats, the film industry, newspapers and magazines. Students make a note of useful vocabulary for themselves related to their subjects and their interests.

Minimum Learning Competency of Geography for grade 11 and 12

Theme	Competencies	
	Grade 11	*Grade 12*
I. The Science of Geography & research	• Examine the various definitions, scope of geography and arrive at sound judgment. • Compare and contrast the strength and weakness of various approaches of study in geography. • Distinguish the major elements of various schools of thought in geography. • Appreciate the relationship between geography and other disciplines.	• Differentiate the definitions of research given by different scholars and reach at acceptable generalization. • Justify the significance of research. • Confirm the functional importance of the two research approaches to study geographical research. • Follow the basic research elements to examine problems by employing the step by step methods.
II. Map Interpretation & Map Work	• Acquire the technique of drawing contour lines from given spot heights through interpolation. • Display relief on a contour map by using cross-section to show features of landforms. • Indicate drainage patterns on a map. • Interpret human made features by using conventional signs and symbols. • Discuss the concept of geographical information system (GIS)	• Interpret the information depicted on topographic map based on the conventional signs & symbols used. • Compare & contrast the relationship between globe & map based on their property. • Recognize the various map projections and how longitude/latitude patterns differ. • Construct sketch map of their locality.
III. Physical features of Africa & Ethiopia	• Describe the position, size and shape of Africa & their economic, political and social implications. • Use regional divisions of Africa to show geographical characteristics of the continent. • Relate geological & relief structure of Africa in relation to the continent's land formation. • Analyze the climatic variations of different areas in Africa. • Relate drought with desertification of Africa & Global warming. • Distinguish the major rivers, lakes, swamps, and drainage systems of Africa on a map & appreciate their characteristics. • Appraise the importance of African rivers & lakes. • Identify the major natural vegetation, wild animals and soil types of Africa and relate them in accordance with their geographical distribution.	• Express the position, size, & shape of Ethiopia and their economic, political and social implications compared to its neighbors. • State the geological history of Ethiopia & the resulting landforms. • Differentiate the characteristics of major rivers, lakes, & drainage systems of Ethiopia. • Evaluate the significance of major rivers & lakes of Ethiopia and evaluate water resource conservation & management of Ethiopia.

Theme	Competencies	
	Grade 11	*Grade 12*
IV. Population-socio-economic interface of Africa & Ethiopia	• Discuss the historical background and demonstrate the population growth and distribution of Africa. • Describe the changing characteristics of African population. • Examine how and why urban areas of Africa grow and appreciate rapid rate of urbanization. • Analyze the physical and cultural impact of human migration in Africa. • Discuss the similarities and differences between the concept of economic growth and development. • Distinguish the major characteristics of African economy and analyze the potential and existing economic cooperation among African countries. • Give a clear picture of the present features of African socio economic development in various ways. • Visualize and state the many challenges African face in the effort of socio-economic development and compare with the prospects. • Formulate points why and how cooperation and conflict are triggered and the involvement of countries around resources of Africa. • Confirm richness of Africa in its mineral and other resources. • Verify the role of selected partnership program for managing conflicts in utilizing resources of Africa.	• Predict how different population theories affect the population growth trend in Ethiopia. • Justify the factors that affect spatial distribution of population and its structure. • Classify settlement patterns of Ethiopia and the Horn using various criteria (e.g. population size, economic base, shape, etc….) • Compute data of population variables and discuss the results to show socio economic and environmental implications. • State the process and level of urbanization of Ethiopia and the Horn and evaluate the effect of technology in modifying physical as well as cultural environment of the region. • Discuss economic growth and development of Ethiopia using relevant indicators. • Analyze the level and distribution of major economic activities and their specific contribution to development of Ethiopia. • Analyze challenges and prospects of socio economic development for Ethiopia and the Horn. • Present mutual economic relation of Ethiopia with other countries. • Recognize Plan for Accelerated and Sustained Development to End Poverty (PASDEP) as guiding document for development of Ethiopia.

Minimum Learning Competencies for Grades 11 History

Area of competency	Grade 11
Early human beings, the neolithic revolution and the emergence of state	• Elaborate the significance of sources in the writing of history. • Describe how historical evidences are interpreted objectively. • Compare and contrast the different modes of dating and periodization implemented in the study of history. • Interpret theories of human evolution. • Analyze changes in stages of human evolution and point out basic cultural developments during the Neolithic revolution. • Indicate the major Neolithic sites in the world in general and in Ethiopia in particular. • Compare and contrast the different explanation about the origin of state.
Ancient world civilization	• Compare and contrast the characteristic features of ancient world civilizations. • Assess the contributions of ancient world civilizations to the present world.
Peoples and states in Ethiopia and the horn up to 1855	• Evaluate the challenges and merits in the writing of Ethiopian history. • Relate the various peoples of Ethiopia and the horn of Africa based on to which family and super-family the languages they speak belong. • Identify and locate the pre-Axumite states that flourished in the Ethiopian region and the horn. • Explain the socio-economic and political condition of the Axumite state. • Enumerate the achievements of the Axumite kingdom. • Explain factors that led to the decline of Axum. • Give a comparative analysis on the distinctive features of the Zagwe dynasty and the common features it had with the Axumite kingdom. • State the factors that contributed to the downfall of Zagwe and the rise to power of the "Solomonic" dynasty. • Analyze the basic economic, political and social structure under the Christian highland kingdom. • Explain the introduction and expansion of Islam in the Ethiopian region and the horn. • Elaborate the state structure, economic and political status of the states in Ethiopia and the horn. • Evaluate the relationship among the various states existed in Ethiopia and the horn. • Identify the basic sources of conflicts among the Christian highland kingdom and the sultanate of Adal. • Analyze the deriving force behind Portuguese and the Ottoman Turkish intervention in the conflicts between the Christian kingdom and the Muslim states. • Describe the socio economic and political impacts of the conflict between the Christian highland kingdom and the sultanate of Adal. • State the causes for the population movements in the Ethiopian Region in the 16th Century.

Area of competency	Grade 11
	• Show appreciation to the characteristic features and the role of social and political institutions of the Oromo society. • Evaluate the consequences of the Oromo population movement. • Describe the historical background of the coming of the Jesuit Missionaries and the political consequence of the introduction of Catholicism to Ethiopia. • Describe the urban characteristic feature and the significance of the establishment of Gondar as a capital city. • Explain the characteristic features of the Zemene Mesafint.
Medieval period and the development of capitalism	• Analyze the political, economic and social conditions of the medieval period. • List the basic characteristic features of the Byzantine Empire. • Describe the expansion of Islam and its contribution to the Arab-Muslim civilization. • Name the basic characteristic features of the Ottoman Turks. • Evaluate the relationship between the Byzantine Empire and the Ottoman Turks. • Explain the political, economic and social conditions of Japan, China and India in the Medieval period. • Analyze the basic features of the intellectual political and economic revolution in Europe and America during the 17th to the beginning of the 19th centuries (the Enlightenment, the American War of Independence, the French Revolution, Napoleonic wars and the Industrial Revolution). • Analyze the political consequences of the Congress of Vienna.
Peoples and states of Africa upto 1880s	• Evaluate major features of states in North, Western, and Equatorial Eastern Africa before the coming of the European colonizers. • Investigate the motives of European explorers in Africa. • Describe the motives, phases and the consequences of the Trans Atlantic slave trade.

Minimum Learning Competencies for Grades 12 History

Area of competency	Grade 12
Industrial capitalism nationalism and global conflicts	• Analyze the impact of nationalism on Global political developments. • Investigate the reasons for conflict and co-operation among the Europeans in the scramble for Africa. • Describe the causes and the economic, social and political consequences of the First World War. • Identify the causes and effects of the Russian Socialist Revolution. • Analyze the economic and political conditions affecting international relations between 1920s – 1930s. • Interpret the social, economic and political roots of fascism. • Describe the causes and the economic, social and political consequences of the Second World War. • Outline the aims, principles and main organs of the UN.
Post second world war global developments	• Explain the characteristics of the cold war and the role played by non-aligned movement. • Show appreciation for the independence movement of India. • Evaluate the causes and courses of the Arab-Israeli war. • Realize the main features of the Vietnam war.
Africa from colonization to independence	• Analyze the process of colonization and the partition of Africa. • Describe the characteristic feature of African resistance to the European colonizers. • Evaluate the characteristics of African peoples struggle against colonial rule between the two world wars. • Analyze the factors that helped for the development of African national liberation movements. • Describe stages in the gradual development of Pan-African movement. • Analyze the historical development that led to the formation of the organization of African unity. • Explain the achievements and weaknesses of the OAU and trend in the transformations. • Express the economic, social and political problems of contemporary Africa.
Peoples and states in ethiopia and the horn from 1855 up to 1991	• Elaborate the factors for the revival of the long distance trade in Ethiopia in the 19th century. • Discuss the contribution of the long distance trade to the social, economic and political life and the interactions among peoples and among states. • State the basic features of the long distance trade. • Analyze the historical development that necessitated the unification of Ethiopia. • Elaborate the attempts, reforms and challenges of Tewodros II to unify the country. • Discuss domestic policy and foreign relation of Ethiopia during the reign of Yohannis IV. • Outline the modernization policy and foreign relation of Ethiopia during the period of Menelik II. • Evaluate the reasons for the foreign aggressions and the characteristic features of resistance of the Ethiopians.

Area of competency	*Grade 12*
	• Outline the historical background and the consequences of the battle of Adwa. • Analyze the socio-economic and political developments in the post-Adwa periods. • Categorize the power struggle that existed in Ethiopia between 1908 to 1930. • Explain the reforms and challenges of Lij Iyassu. • Evaluate the factors that helped for the emergence of autocratic rule of Haile Selassie I. • List the major reforms made by Emporer Haile Selassie I (1930-1935). • Evaluate the historical reasons that led to the Italo-Ethiopian War of 1935-36. • Describe the characteristic features of Italian occupation and colonial rule. • Analyze the nature of national liberation movement and the international political situations that favored Ethiopia in the fight against fascism. • Discuss the economic and political conditions that led to the consolidation of the autocratic rule. • Compare and contrast the Anglo-Ethiopian and Ethio-American relations in the post liberation period. • Evaluate the root causes of the different challenges against the autocratic rule. • Assess the main events of the 1974 revolution. • Explain the characteristic features of the Derg. • Discuss the foreign relations of the Derg regime. • Describe the factors that led to the down fall of the Derg rule.

Statement of Minimum Learning Competencies(MLCs)
in Mathematics for Grade 11 & 12

	Minimum Learning Competencies for:	
Area of Competencies	*Grade 11*	*Grade 12*
I. NUMBER SYSTEM **The set of Complex Number**	• add complex numbers correctly • subtract complex numbers correctly. • describe the closure property of both addition and subtraction. • describe the commutative and associative properties of complex numbers. • identify the additive identity element in $\mathbb{C}$. • determine the additive inverse of a given complex number. • determine the product of two complex numbers. • describe five basic properties of multiplication of complex numbers. • divide two complex numbers • give reason for each step in the process of division of complex numbers • determine the conjugate of a given complex number. • find the Modulus of any given complex number • Write the simplified form of expressions involving complex numbers • describe how to set up the Argand Plane. • Plot the point corresponding to a given complex numbers. • identify the complex number that corresponds to a given point in the Argand Plane. • represent any complex number in the polar form • determine the modulus and argument of a given complex number.	
II. ALGEBRA **Rational Expression**	• define rational expression • identify the universal set of a given rational expression • show the simplified form and the necessary steps in simplify a given rational expression	

Area of Competencies	Minimum Learning Competencies for:	
	Grade 11	Grade 12
Matrices and Determinants	• Perform the four fundamental operations on rational expression • decompose rational expressions into sums of partial fractions. • solve rational equations • solve rational inequalities by using algebraic method (by considering all possible cases) • solve rational inequality by using the sign chart method • define matrix • determine the sum and difference of two given matrices of the same order. • multiply a matrix by a scalar • describe the properties of multiplication of matrices by scalars. • determine the product of two matrices. • describe the properties of the product of two matrices. • determine the transpose of a matrix • determine the determinant of a square matrix of order 2. • determine the minor and cofactor of a given element of a matrix • calculate the determinate of a square matrix of order 3. • describe the properties of determinants.	
II. ALGEBRA (cont.) **Matrices and Determinants** (cont.) **Introduction to Linear Programming**	• determine inverse of a square matrix • find associated augmented matrix of equations • describe elementary operations on matrices • solve systems of equations in two or three variables using the elementary operations • apply Cramer's rule to solve systems of linear equations ⇒*For social science stream only* • draw graphs of linear inequalities $\qquad y \leq mx + c$ and	

Area of Competencies	Minimum Learning Competencies for:	
	Grade 11	*Grade 12*
	y ≥ mx + c and ax + by ≤ c • find maximum and minimum values of a given objective function under given constraints. • create inequalities from real life examples for linear programming and solve the problem	
II. ALGEBRA (cont.) **Mathematical Applications in Business**	⇛ *For social science stream only* (cont.) • compare quantities in terms of ratio. • calculate the rate of increase and the rate of decrease in price of commodities. • solve problems on proportional variation in business • solve problems on compound proportion • find a required percentage of certain given amount • compute problems on percentage increase or percentage decrease • calculate payment by instalment for a given simple interest arrangement. • calculate the compound interest of a certain amount invested for a given period of time. • apply the formula for compound interest to solve practical problems • compute annuity for a give arrangement in compound interest. • describe what is depreciation mean and some its causes • compute depreciation by using either of the two methods appropriately. • list five valid reasons for savings. • explain how savings become investment. • list three saving plans. • identify four kinds of financial institutions. • describe three main factors in choosing a particular institution for saving. • identify the four factor that should guide consumers in planning an investment strategy.	⇛ *For social science stream only* • find unit cost • find the most economical purchase • find total cost • apply percent increase and percent decrease to business • apply percent increase and percent decrease to business • calculate initial expenses of buying a home • calculate ongoing expenses of owing a home • calculate commissions, total hourly wages, and salaries

	Minimum Learning Competencies for:	
Area of Competencies	***Grade 11***	***Grade 12***
	• explain the differences between stocks and bond. • describe ways to invest in stock and bond	
II. ALGEBRA(cont.) **Mathematical Applications in Business**	⇛***For social science stream only*** (cont.) • describe the advantages and disadvantages of borrowing money • identify the usual sources of cash loan.. • compute the amount and time on the return of loan based on the or given agreement. • name three types of activities that government performs and give examples of each • explain why government collect taxes. • describe the basic principles of taxation • describe the various kinds of taxes. • give their opinion about "income taxes" mean for them in relation to their future first job. • calculate different types of taxes based on the "rate of tax" in Ethiopia	
III. RELATION AND FUNCTION **Further on Relation and Function**	• find out the inverse of a given relation • Sketch the graph of a relation and its inverse. • define power functions • describe the properties of powers functions in relation to their exponents • determine the domains and ranges of power functions • sketch the graphs of power functions • define Modulus Function (Absolute value Function, • determine the domain and the range of modulus function • sketch the graph of a Modulus function • define the Signum function • determine the domain and range of Signum function • sketch the graph of the Signum function • define the "Greatest Integer Function"	

Area of Competencies	Minimum Learning Competencies for:	
	Grade 11	*Grade 12*
	• determine the domain and range of the Greatest Integer function • Sketch the graph of the Greatest Integer function • define "one-to-one" function • identify functions as one-to-one • define "on to' function • identify functions as on to • identify one-to-one correspondence • define the composition of function. • determine the composite function given the component functions • determine the domain and the range of a composite function of two given functions.	
III. RELATION AND FUNCTION (cont.) **Further on Relation and Function**	• define inverse function • describe the condition for the existence of inverse function • determine inverse function for an invertible function. • determine whether two given functions are inverses of each other or not. • Sketch the graph of the inverse of a function • determine the domain and range of the inverse of a given function • define rational function. • determine the domain of a given rational function. • determine the range of a given rational function. • sketch the graph of a given rational function • determine the intercepts and symmetry of the graph of a given rational function • identify the type asymptote that the graph of a given function may have. • tell the properties of a given rational function from its graph. • use graphs of rational functions to solve rational inequalities	

	Minimum Learning Competencies for:	
Area of Competencies	*Grade 11*	*Grade 12*

III. RELATION AND FUNCTION (cont.)
 	
Further on trigonometric functions
	⇛*For Natural Science stream only*
	
	• define and describe the functions sec x, cosec x and cot x.
	• Sketch graphs of sec x, cosec x and cot x
	• define and describe the functions sec x, cosec x and cot x.
	• Sketch graphs of sec x, cosec x and cot x
	• Sketch the graphs of
	   y = a sin x,
	   y = a sin kx;
	   y = a sin (kx +b),
	   y = a sin (kx +b) + c
	• List the properties of these graphs.
	• Sketch the graphs of
	   y = a cos x,
	   y = a cos kx
	   y = a cos (kx + b)
	   y = a cos (kx + b) + c
	• List the properties of these graphs.
	• Apply trigonometric functions to solve problems from fields of science, navigation, engineering etc	

III. RELATION AND FUNCTION (cont.) **Sequences and Series**		• revise the notion of sets and functions. • explain the concepts sequence, term of a sequence, rule (formula of a sequence) • compute any term of a sequence using rule(formula). • draw graphs of finite sequences. • determine the sequence, use recurrence relations such as, $u_{n+1}= 2\ u_n + 1$,given u_1 • generate the Fibonacci sequence and investigate its uses, appearance in real life • define arithmetic progressions and geometric progressions. • Determine the terms of arithmetic and geometric sequences • use the sigma notation for sums.

	Minimum Learning Competencies for:	
Area of Competencies	*Grade 11*	*Grade 12*
		• compute partial sums of arithmetic and geometric progressions • apply partial sum formula to solve problems of science and technology • define a series • decide whether a given geometric series is divergent or convergent. • show how infinite series can be divergent or convergent • show how recurring decimals converge • discuss the applications of arithmetic and geometric progressions (sequences) and series in science and technology and daily life.
IV. LOGIC **Mathematical Reasoning**	• explain the difference between "statement" and "open statement" • determine the truth value of a statement • describe the rules for each of the five logical connectives. • use the symbols ¬ , ∧ , ∨,⇒ and ⇔ to make compound statements • determine truth values of compound statements connected by each of the logical connectives. • determine truth values of two or three statements connected by two or three connectives • describe the properties and laws of logical connectives • determine the equivalence of two statements • define "Contradiction and "Tautology" • determine that a given compound statement is either a contradiction or tautology or neither of them • find the "converse" of a given compound statement • determine the truth value of the converse of a given compound statement • find the "contra -positive" of a given statement • determine the truth value of the contra- positive of a given statement	• recall what they have studied about statements and logical connectives in the previous grade • revise open statement • understand the concept of quantifiers • determine truth values of statements with quantifiers. • define argument and validity • check the validity of a given argument • use rules of inference to demonstrate the validity of a given argument • distinguish between the nature of different types of mathematical proofs. • apply the right type of proof to solve the required problem • apply the principle of mathematical induction for proving • identify a problem and determine whether it could be proved using principle of mathematical induction or not.

	Minimum Learning Competencies for:	
Area of Competencies	***Grade 11***	***Grade 12***
	• describe the two types of quantifiers • determine the truth value of statements involving quantifiers • describe what is meant by "argument" • check the validity of a given argument • use rules of inference to demonstrate the validity of a given argument.	
V. STATISTICS AND PROBABILITY **Statistics and Probability**	• identify qualitative and quantitative data • describe the difference between discrete and continuous variables (data) • identify ungrouped and grouped data • determine class interval (class size) as required to form grouped data from a given ungrouped data • make cumulative frequency table for grouped data (for both discrete and continuous) • described terms related to grouped continuous data, i.e., class limit, class boundary, class interval and class midpoint. • determine class limit, class boundary, class interval and class midpoint for grouped continuous data. • find the mean of a given grouped data. • find median grouped discrete data • find median for grouped data (continuous variable) • determine the mode of a given grouped data. • identify data that are unimodal, bimodal and multimodal. • determine the quartiles for a given grouped data • determine the required deciles of a given frequency distribution • determine the required percentile of a given frequency distribution. • describe the dispersion of data values • find the range of a given data. • Compute variance for ungrouped data	• ⇒*For social science stream only* • describe the three methods/techniques of sampling. • explain the advantages and limitation of each techniques of sampling. • describe the different ways of representations of data. • explain the purpose of each representation of data. • Construct graphs of statistical data • identify statistical graph. • explain the significance of representing a given data in different types of graphs. • draw histogram for a given frequency distribution • Sketch frequency polygon for a given frequency distribution • sketch frequency curve for a given frequency distribution • draw bar chart • construct line graph for data related to time. • construct pie chart for a given data. • compute the three mean divations of a given data. • describe the relative significance of Mean divation as a measure of dispersion. • calculate the inter-quartile range for a given data. • describe inter-quartile range as a measure of variability in values of a given set of data. • describe the usefulness of standard deviation in interpreting the variability of a given data.

	Minimum Learning Competencies for:	
Area of Competencies	*Grade 11*	*Grade 12*
V. STATISTICS AND PROBABILITY (cont.) **Statistics and Probability** (cont.)	- calculate variance for grouped data. - solve problems on variance - Calculate standard deviation for grouped data. - determine the number of different ways of possible selections from a given sets of objects (by using the multiplication principle) - find the number of ways of selections of mutually exclusive operations (by using the addition principle) - determine the factorial of a given non-negative integer - find the possible ways of arranging objects by using the principle of permutation - compute the possible arrangement of objects around the circle (using the principle of circular permutation) - describe the difference between arrangement of objects and selection of objects. - describe what is meant by "combination of objects" - determine the number of different combinations of **n** objects, taken **r** at a time. - explain the computational relationship between permutation and combination of objects. - prove simple facts about combination. - solve practical problems on combination of objects - write up to the 6th power of a binomial expression $(x + y)^n$ (i.e. when n = 0, 1, 2, 3, 4, 5) in its expanded form by using direct multiplication - describe what they observe in the expansion of $(x + y)^n$ where n = 0, 1,2,3,4,5 - describe "Pascal's Triangle" and its use - apply the "Binomial Theorem" in expanding the nth power of binomial terms i.e. $(x + y)^n$, where n$\in$ **Z**$^+$ - determine any term in the expanded form of $(x + y)^n$ where n$\in$ **Z**$^+$ solve problems on binomial expansion	⇒*For social science stream only (cont.)* - compare two groups of similar data.. - determine the consistency of two similar group of data with equal mean but different standard deviations - describe the application of coefficient of variation inn comparing two groups of similar data. - describe the relationship among mean, median and mode for grouped data by using its frequency curve. - use cumulative frequency graphs to determine the dispersion of values of data (interms of its Mean, Median and Standard deviation) - determine the variability of value of data interms of quartiles by using cumulative frequency graph. - describe the relationship among mean, median and mode for grouped data by using its frequency curve.
V. STATISTICS AND PROBABILITY (cont.)	- determine any term in the expanded form of $(x + y)^n$,where n$\in$ **Z**$^+$ - solve problems on binomial expansion - describe what is meant by "Random Experiment" - explain what is meant by an outcome of a random	

Area of Competencies	Minimum Learning Competencies for:	
	Grade 11	Grade 12
Statistics and Probability (cont.)	experienced • describe what is meant by sample space of a given random experiment. • list some of the sample points of a sample space for a given experiment. • define "equally likely outcomes" of a given trial in his own words. • define "favorable outcomes/ cases" • determine events of a given random experiment • identify sample (elementary) events and compound events • determine the number of events of a given sample space • describe the occurrence or non occurrence of an event. • explain an event denoted by "**not E**" where "**E**" is a given event • explain events connected by "or" and "and" • describe the simplified forms of events by using the properties of operations on sets • identify exhaustive events • identify mutually exclusive events • describe events that are both exhaustive and mutually exclusive • identify independent events. • identify dependent events • describe the axiomatic approach of probability • interpret basic facts in the theory of probability.	
V. STATISTICS AND PROBABILITY (cont.) **Statistics and Probability** (cont.)	• find probabilities of events based on • find probabilities of events based on "Axiomatic" approach. • describe the odds infavour of an event or the odds against an event • Find the probability of $E_1 \cup E_2$ where E_1 and E_2 are events in a random experiment • determine the probability of mutually exclusive events. • find probability of the joint occurrence independent event (by using rule of multiplication) • describe the out comes of events using tree diagram • determine the probability of the joint occurrence of	

	Minimum Learning Competencies for:	
Area of Competencies	*Grade 11*	*Grade 12*
	dependent events (using multiplication rule) • describe the outcomes of events using tree diagram to determine their probability • identify whether a given events are independent or dependent (by comparing the equation for probability of joint occurrence of independent events).	
VI. CALCULUS **Limits of sequence of numbers**		• define upper and lower bound of number sequences. • find out the least upper (greatest lower) bound of sequences. • define limit of a number sequence • consolidate their knowledge on the concept of sequences stressing on the concept of null sequence. • apply theorems on the convergence of bounded sequences • prove theorem about the limit of the sum of two convergent sequences. • apply theorems on the limit of the difference, product, quotient of two convergent sequences • define limit of a function. • determine the limit of a given function at a point. • find out the limit of the sum, difference, product and quotient of two functions. • define continuity of a function in interval. • describe the properties of continuous functions. • use properties of continuous functions to determine the continuity of various functions. • consolidate what they have studied on limits. • solve problems on limit and continuity to stabilize what have learnt in the unit.
VI. CALCULUS		• find the rate of change of one quantity with respect to another. • sketch different straight line and curved graphs and find out slopes at different points of each graph. $n \to \infty$ • define differentiability of a function at a point x_0.

Area of Competencies	Minimum Learning Competencies for:	
	Grade 11	Grade 12
Introduction to Differential Calculus		• explain the geometrical and mechanical meaning of derivative. • set up the equation of tangent line at the point of tangency, using the concept of derivative. • find the derivative of elementary functions over an interval. • find the derivatives of power, simple trigonometric, exponential and logarithmic functions • apply the sum and difference formulae of differentiation of functions. • apply the product and quotient formulae of differentiation of functions. • apply the chain rule and differentiate composition of functions • find the 2nd and the nth derivative of a function. • consolidate and stabilize what has been studied in the unit.
Application of Differential Calculus		• consolidate the concept zero(s) of a function. • find critical numbers and maximum and minimum values of a function on a closed interval. • explain the geometric interpretations of Rolle's theorem and mean value theorem • find numbers that satisfy the conclusions of mean value theorem and Rolle's theorem. • Solve problems on application of differential calculus • Interpret and apply differential calculus on problems involving the rate of change. • consolidate what has been learnt in this unit

	Minimum Learning Competencies for:	
Area of Competencies	**Grade 11**	**Grade 12**
Introduction to Integral Calculus		- differentiate between the concepts differentiation and integration - use the properties of indefinite integrates in solving problems of integration - integrate simple trigonometric functions - use different techniques of integration for computation of integrals - Compute area under a curve. - use the concept of definite integral to calculate the area under a curve. - state fundamental theorem of calculus - apply fundamental theorem of calculus to solve integration problems. - state the properties of definite integrals. - apply the properties of definite integrals for computations of integration - apply the knowledge on integral calculus to solve problems.
VII. GEOMETRY **Coordinate Geometry and Vectors**	- write different forms of equation of a line. - determine the slope, x-intercept and y-intercept of a line from its equation - determine the angle between two intersecting lines on the coordinate plane whose equations are given. - determine the distance between a point and a line given on the coordinates plane. - name the different types of conic sections - explain how the conic sections are generated (formed) - define circle as a locus and write equation of a circle - find the radius and center of a circle from its equation. - determine whether a given line and circle have a point of intersection . - determine the coordinates for the intersection point(s) (if the given line and the given circle intersect) - write equation of a tangent line to a given circle. (where the point of tangency is given)	⇒*For social science stream only* - construct the coordinate axes in space - identify planes determined by the axes in space. - identify the octants determined by the planes and axes. - read the coordinates of a point in space. - describe how to locate a point in space. - plot a point whose coordinates are given. - give the equations for the planes determined by the axes. - show graphically how to find the distance between two points in space. - compute distance between two given points in space. - determine coordinates of the mid-point of a segment in space. - describe the equation of a sphere

Area of Competencies	Minimum Learning Competencies for:	
	Grade 11	*Grade 12*
	- Write the standard form of equation of a parabola. - draw different types of a parabolas - describe some properties of a given parabola. - define "ellipse" as a locus (set of points on the plane which satisfy a certain given condition) - write the standard form of equation of an ellipse and sketch ellipse - describe some terms related to ellipses (such as latus rectum, eccentricity, major and minor axes...) - define hyperbola as a locus - write the standard form of equation of an ellipse - describe related terms to hyperbola (foci, centre, transverse axis, asymptotes, conjugate axis...) - sketch hyperbola based on its given equation - give eccentricity of a given hyperbola solve problems on hyperbola	- derive equation of a sphere - solve problems related with sphere - add, subtract vectors and multiply by a scalar in space - use the unit vectors i, j and k while representing a vector. - describe the properties of addition to solve exercise problems.. - show the closure property on their own - find the length of a vector in space - find the scalar product of two vectors in space. - evaluate and show the angle between two vectors in space.

Minimum Learning Competencies
for Grades 11&12 Physics

Area of competency	Grade 11	Grade 12
Measurement/thermodyn amics	**1. Measurement and practical work** • Explain the importance of measurement in life. • explain about sources of errors and their types • differentiate between accepted and experimental values • add and subtract scientific notation, keeping significant figures properly • Multiply scientific figures keeping significant figures properly. • Define the term scientific method and State the steps of scientific methods • Explain the possible sources of errors and State the types of errors • Distinguish between systematic and random error	**1.Thermodynamics** • Define the scientific terms :isothermal change, adiabatic change, change of state of a gas, molar gas constant • State the first law of thermodynamics • State the second law of thermodynamics • Solve problems related to the first and second laws o f thermodynamics • Describe ways of changing the internal energy of a gas • Describe the fundamental principles of heat engine • Solve problems involving calculations of P,Vor T for a gas undergoing adiabatic changes • Use the expression for the pressure of an ideal gas in terms of its density and mean square speed of molecules to solve problems • Solve problems to determine P,V,T or r.m.s speed of gas molecules for an ideal gas, given relevant data • Show that the molar heat capacity at constant pressure is greater than the molar heat capacity at constant volume • Evaluate Cp-Cv for an ideal gas • Evaluate Cp/Cv for an ideal gas
Vectors/wave motion	**2.Vector quantities** • Distinguish between vector and scalar quantities, and give examples of each • Determine the resolved part of a vector in any given direction add vectors by graphical representation to determine a resultant • determine graphically a resultant of two vectors • add/subtract two or more vectors by the vector addition rule • determine the magnitude and direction of the resolution of two or more vectors using Pythagoras theorem and trigonometry	**2. Oscillations and waves** • Define and use the terms SHM, resonance • give simple examples of vibrating systems • explain the energy changes that occur when a body performs SHM • draw and interpret graphs to show how KE and PE of an oscillator vary with time • use expressions for the frequency and periodic time of oscillations of objects performing SHM • solve problems on SHM involving periods of vibration and energy changes • explain the effect of damping on the amplitude of a system which is vibrating • identify the properties of standing waves and, for both mechanical and

Area of competency	*Grade 11*	*Grade 12*
	• solve problems related to scalar and vector products of two vectors in a plane • explain properties of vector operations • identify vectors represent the real quantities	sound waves • explain the conditions required for standing waves to occur • explain the Doppler effect, and predict in qualitative terms the frequency change that will occur in a variety of conditions • explain the modes of vibrations of strings and solve problems involving vibrating strings • Explain the way air columns vibrate • solve problems involving vibrating air column
Kinematics/electrostatics	**3.Kinematics** • use the scientific terms: speed, velocity. distance, displacement, acceleration, instantaneous velocity and acceleration correctly and state their SI units • explain the difference between average speed(or velocity)and instantaneous speed(or velocity) • solve numerical problems involving average velocity, instantaneous velocity and acceleration • explain uniform circular motion in the horizontal and vertical planes with reference to the forces involved • explain uniform circular motion in the horizontal and vertical planes with reference to the forces involved • identify circular motion requires the application of a constant force directed toward the center of the circle • solve problems involving objects moving in two dimensions • describe the behavior of motion of a freely falling body	**3.Electrostatics** • define the terms: electric field strength, electric potential, electric dipole, electric dipole moment ,dielectric, electric flux, dielectric constant • explain coulomb's law using the ideas of vectors • map an electric field lines pattern using electric lines of force • define capacitors and capacitances • solve problems related to the capacitances of parallel plate capacitors • state Gauss law qualitatively • compare the characteristics of electric potential energy with those of gravitational potential energy • explain the electric field and the electric forces produced by a single point charge, two point charges, and two oppositely charged parallel plate • describe and explain, in qualitative terms, the electric field that exists inside and on the surface of a charged conductor • apply the formula the electric field strength at a point due to an isolated point charge • use the formula for the electric potential at a point due to an isolated point charge
Energy/electricity	**4.Work, energy and power** • define and use the terms work, energy, and power • Use the principle of conservation of energy in the solution of problems	**4.Steady electric current and circuit properties** • Explain the meaning of a coulomb ,a volt, an ohm, potential difference, resistance, emf, KWH • identify the SI units of electric current, current density, resistance, resistivity, conductivity, temperature coefficient of resistance

Area of competency	*Grade 11*	*Grade 12*
	• Distinguish between elastic and inelastic collisions and solve problems involving such collisions • identify the relationship between work and change in kinetic energy • distinguish between conservative and non conservative forces • explain the energy transformation occurring during oscillations • Solve problems involving elastic and inelastic collisions in one and two dimension by using the principles of conservation of momentum and energy.	• distinguish between electrostatic and non electrostatic fields • differentiate between emf and p.d of a source • solve electrical circuit problems involving the relationship between emf, current and résistance for a complete circuit • Distinguish between emf and p.d,ohmic (linear)and non ohmic (non linear) devices • state kirchhoff's laws • solve problems involving network resistors • solve problems in which meter resistance is involved • describe how a galvanometer can be modified to measure a wide range of currents and potential differences • calculate shunt and multiplier value for use with a meter to give different current and voltage ranges • explain the principle of Wheatstone bridge solve problems involving it • explain the principle of potentiometer and how it can be used for measurement of emf, p.d, resistance and current
Dynamics/magnetism	**5.Dynamics** • state and use Newton's laws • state Newton's 2nd law interims of momentum • apply Newton's laws of motion to explain and predict the behavior of bodies acted by external forces • use the principle of momentum conservation • explain qualitatively how frictional forces depend on the nature of surfaces and normal contact force • use free body diagram representing forces on a point mass to solve problems • solve numerical problems involving Newton's laws of motion • determine the forces needed to keep an object moving in a horizontal and vertical circles • define the centre of mass of a body and that of a system of particles	**5.Magnetism** • describe and illustrate the magnetic field produced by an electric current in a long straight conductor and in a solenoid • predict by applying the right-hand rule, the direction of the magnetic field produced when electric current flows through a long straight conductor and through a solenoid • use the expression for the force on a current carrying conductor in a magnetic field • use the expression for the force on a charged particle in a magnetic field • state Ampere's law and use it in solving problems • solve problems on the motion of charged particles in electric and magnetic fields • distinguish between the terms: dia, para, and Ferro magnetic materials • describe the causes of earth's magnetism • describe an experiment to obtain the flux pattern around a bar magnet, straight carrying wire, a solenoid carrying a current

Area of competency	*Grade 11*	*Grade 12*
Mechanics/ electromagnetism	**6.Rotational motion** • Define and use the terms: angular displacement, angular velocity, angular acceleration, moment of inertia ,angular momentum, angular impulse and torque • Use the equations for uniformly accelerated angular motion • Use the equations relating linear and angular motions • State the similarities and differences between the behavior of rotating bodies and bodies traveling with linear velocity • Identify the factors which determine the moment of inertia of a body • State and apply the law of conservation of angular momentum • determine the velocity and acceleration of a point in the rotating body • demonstrate the direction of angular velocity ,angular acceleration and angular momentum using the right –hand rule	**6.Electromagnetic induction and AC circuits** • Use the terms: induced emf, back emf, magnetic flux, flux linkage, eddy current • State the laws of electromagnetic induction • Use the laws of electromagnetic induction which predict the magnitude and direction of the induced emf • Use the expression for the force on a current carrying conductor in a magnetic field • Use the force on a charged particle in a magnetic field • Use the flux density near a long straight wire, at the centre of circular coil, inside and at the end of a long solenoid • Solve problems on the motion of charged particles in electric and magnetic fields • Describe in words ,or by sketch, the general shape and relative intensities of magnetic field strength around a long straight current carrying wire,a long solenoid • apply Lenz's law to explain, predict, and illustrate the direction of the electric current induced by a changing magnetic field, using the right-hand rule • explain Ampere's law • Use an expression for the induced emf in a conductor moving through a uniform magnetic field by considering the forces on the charges • Solve problems involving calculations of the induced emf,indued current • compare direct current (DC) and alternating current (AC) in qualitative terms • define the terms: self inductance L,mutual inductance M,and henry • Use the terms:r.m.s.current,r,m,s,potential difference, peak current, peak potential difference, half cycle average current, phase difference, phase lag, phase lead • Apply the relationship between r.m.s.and peak values for the current and potential difference for a sinusoidal waveform • Use the terms: reactance, impedance, power factor with their correct scientific meaning • Solve problems involving the magnitude and phase of current and applied p.d in an a.c circuits which include resistors, capacitors and inductors

Area of competency	*Grade 11*	*Grade 12*
		• Draw phasor diagrams for R,L and C circuits • explain what are meant by r.m.s. values • explain the behavior of a capacitor in an a.c circuit • explain the behavior of an inductor in an a.c circuit
Static/wave optics **Mechanics/atomic physics**	**7.Equilibrium** • Distinguish between coplanar and concurrent forces • Find the resultant of a number of concurrent forces acting at a point • Solve problems involving the equilibrium of coplanar forces • State the conditions for there to be no rotation of a body • State the equilibrium conditions for a body acted on by coplanar forces **8.Properties of bulk matter** • Define the scientific terms :elastic limit, stress, strain, Young modulus, Shear modulus, viscous flow, viscosity, stream line flow, turbulent flow • Use equation of continuity to solve numerical problems • Describe the application of Bernoulli's principle in everyday life situation • State and use Bernoulli's equation to solve problems • Define surface tension and surface energy • Define the angle of contact and account for the shapes of liquid surfaces • Determine the relationship for the capillary rise and use it in problems • Define the terms: calorimetery, change of phase, latent heat, heat capacity, specific heat capacity • Distinguish between the concepts: heat, temperature, internal energy, work	**7.Wave optics** • Describe an experiment to illustrate interference of waves • Draw diagrams to illustrate reflection and refraction of waves • Explain diffraction at a single slit • Explain beats • solve problems involving interference and diffraction, of waves • state the conditions necessary for the interference of light to be shown • explain the principle of Young's double slit experiment • carry out calculations involving Young's double slit experiment **8.Atomic physics** • Describe Rutherford's model of atom • State the nature ,charge, and properties of alpha, beta and gamma radiation • State the law of radioactive decay and explain the meaning of a half life • Write equations to illustrate alpha and beta decay • State how many protons and neutrons their are in a nuclide for which you are given the symbol • Interpret equations representing nuclear reactions indicating the nature of energy released • Identify the relationship between mass and energy • Explain what is meant by photo electric effect • Describe an experiment to demonstrate the emission of photo electrons • State how the rate of emissions of photo electrons and their energy depend upon the intensity and frequency of the incident radiation • Work through simple problems on half –life • Associate the release of energy in a nuclear reaction with a change in mass • Discus problems posed by radioactive waste • Represent nuclear reactions in the form of equations

Area of competency	*Grade 11*	*Grade 12*
	• Identify the units for heat, heat capacity, specific heat capacity, latent heat • Solve problems involving thermal conductivity, change of state and expansivity • Describe properties that can be used for temperature measurement • Explain the methods used for the measurement of specific heat capacities • Relate latent heat to intermolecular forces	• Distinguish between fission and fission

Minimum Learning Competencies in Physical Education for Grades 11 & 12

Area of competencies	Grade 11	Grade 12
Basic concepts of Physical Education	• List 2-3 methods of developing muscular fitness. • Explain the importance of nutrition for exercise. • Describe history and objectives of all African games. • List 3-4 objective of all African games. • Mention Ethiopian results in the participation of the games	• Identify contributions of Physical education for vocational placement. • List 3-4 importance and methods of developing flexibility. • Explain the needs evaluating personal Physical fitness. • Describe brief history, aims and symbol of Olympic games. • Mention 3-4 Ethiopian's results in the Olympic games.
Fundamental skills of Gymnastics	• list 3-4 safety procedures when performing head spring. • Explain the correct performance of head spring • Demonstrate correct head spring. • Identify the bio-mechanical principle in executing head spring. • Demonstrate the correct L-seat in hand support on parallel bars.	• Apply safety rules and regulations in hand spring • Explain movement patterns of hand spring. • Perform correct hand spring exercise • List 2-3 key techniques necessary in performing handspring • Perform basic swing in hand support and front dismount on parallel bars
Ethics and the art of self-defense	• Describe the code of ethics and acceptable social behavior. • Demonstrate the techniques of back stance. • Demonstrate the techniques of sward hand strike. • Demonstrate the techniques of X-block • Describe 2-3 body mechanics properly to perform sward hand strike and X-block. • Demonstrate the techniques of release from two hand front grabs. • Explain the techniques of release from two hand front grabs.	• Describe the techniques of walking or stance. • Demonstrate the techniques of walking stance • Describe 2-3 body mechanics properly to perform palm heel strike and sward hand block. • Demonstrate the techniques of palm heel strike and sward hand block. • Demonstrate the techniques of front kick and side kick. • Describe 2-3 body mechanics properly to perform release from back two hand grab and encircling.
Basic skills of ball games	• Demonstrate correct chest pass, bounce pass and overhead pass • List at least 3-5 body action in ball passing • Demonstrate high and low dribble	• List passes used in hand ball • Demonstrate shoulder and chest pass • Describe movement patterns necessary for passing and catching • Explain the key movement elements in correct performance of

Area of competencies	Grade 11	Grade 12
	• Describe 3-4 points necessary in dribbling • Demonstrate set shot and jump shot • Describe 4-5 body actions necessary for shooting	shooting • Demonstrate jump and under hand shooting • Apply passing, catching, dribbling and shooting while playing the game
Athletics	• Mention 2-3 basic techniques of discuss throw • Demonstrate the basic techniques of discus throw • Demonstrate relay run • Describe 3-4 body actions necessary for relay run	• Demonstrate high jump using straddle style • Describe 3-4 body action necessary in high jump • Demonstrate hurdle run • Describe 3-5 body actions necessary for hurdle run.

Technical Drawing Minimum Learning Competencies

 Subject area general objective
1. Appreciate the contribution of technical drawing to society and in the industrial arts processes;
2. Understand basic principles and conventions of technical drawing;
3. Acquire basic knowledge and skills for future studies pertinent to drawing.

Theme	Grade 11 Topic & competencies	Grade 12 Topics & competencies
Basic knowledge and skills	**1.Introduction to Basic Technical drawing** • Describe the role of drawing in human civilization, • Distinguish the two classification of drawing, • List the areas/professional disciplines of technical drawing, • Describe the educational value of Technical drawing.	**1. Free hand sketching** • Describe the purpose of free-hand sketching, • Identify free-hand sketching materials, • Sketch lines, angles, arcs, circles and areas with free-hand in sufficient skill, • Sketch multi-view drawings of an object with free hand, • Sketch pictorial drawing of an object with free-hand in sufficient skill.
	2. Basic Technical drawing Equipments • List the types of technical drawing materials & instruments, • Describe the purpose of each Technical drawing materials & instruments, • Identify the types of pencils, paper and rapidograph, • Show the proper uses of Technical drawing materials & instruments. • prepare the title block on drawing paper.	
	3. Alphabet of lines. • List the types of lines used in Technical drawing, • Explain the purpose and weight of each lines, • Apply the proper weight & thickness of lines on working drawings.	
	4. Lettering • Describe the main purpose of lettering in drawing, • Identify the types of lettering styles, • Draw the universally applicable single stroke vertical Gothic letters with free-hand, • Describe the techniques of lettering to draw free hand letters properly,	

Theme	Grade 11 Topic & competencies	Grade 12 Topics & competencies
	• Draw letter, words & sentences with proper spacing, • Select proper types of pencils for lettering. • identify types of guide line devices and lettering guides **5. Geometrical construction** • Define geometrical elements; • Draw a bisecting and trisecting straight line, • Divide a line in to any number of equal parts with out ruler, • Show the methods how to bisect & trisect an angle using compass, • Copy an angle to any other places with drawing steps, • Differentiate regular and irregular polygons, • Construct triangles and quadrilaterals using different methods, • Draw regular polygons with their specific and general method, • Construct circle through three points not on a straight line on space, • Construct tangent line and tangent curves to join circles and arcs, • Construct an ellipse using different methods.	
Shape Description	**6. Multi-view drawing** • Differentiate the method of orthographic projection; • Describe the shape of an object with 1st and 3rd angle projection; • Arrange the six principal views in 1st & 3rd angle projections; • Identify the three main projection plane and their common dimension; • Determine the orientation of objects that help to choose views most descriptive; • Laying out one view, two view and three-view drawing of objects; • Prepare multi-view drawing of an object;	**2. Auxiliary view** • Use reference or folding lines when creating auxiliary view; • Draw the projection of a point, a line and a plane on the three principal projection plane; • Construct normal and edge view of a line and a plane; • Draw normal (true shape) view of inclined and oblique surface; • Describe the purpose and types of auxiliary views; • Describe the steps to draw auxiliary projection; • Draw circular features in auxiliary projection; • Differentiate the partial and complete auxiliary view of objects; • Draw the auxiliary view of an object for full shape description.

Theme	*Grade 11 Topic & competencies*	*Grade 12 Topics & competencies*
	• Differentiate the three common surfaces and their projection; • Apply the rule of precedence of line in view drawing **7. Pictorial drawing** • Explain the types of projection system and its constituting elements; • State the types of pictorial drawing and axonometric projection; • Choose appropriate position of isometric axis to describe the shape of an object; • Identify the procedure angles are located in isometric drawing; • Draw circle, arcs and irregular curves in Isometric; • Apply offset location measurement in Isometric drawing; • Construct the isometric drawing using box method and center line layout methods; • Perform isometric drawing of an object using its principle; • State the types of oblique drawing, • Explain about axis and position of objects in oblique drawing; • Describe the methods of construction of oblique drawing; • Draw circles and arcs in oblique drawing; • Construct oblique drawing of an object with its principle; • Describe the advantage of oblique drawing from others; • Explain the terms and best location of station and vanishing point, ground and horizon line, and picture plane; • Describe the main purpose and three types of perspective drawing; • State the rules of construction of objects in perspective drawing; Perform perspective drawing of objects with its principle.	**3. Sectional view** • Describe the purpose & types of sectional views; • Describe the location of cutting plane to create sectional view; • Explain the purpose and location of cutting plane line; • use the different material representation of section lining symbols; • Compare and contrast the advantage of each type of sectional views; • Draw the sectional view of an object with preferable type of section.

Theme	Grade 11 Topic & competencies	Grade 12 Topics & competencies
Size Description		**4. Dimensioning** • Explain the use, basic symbols, forms and elements of dimensioning, • Differentiate the two way of placing dimensioning figures, • State the relationship between scale and dimension figures on drawing, • Differentiate the two types of dimensions, • Use the two basic methods of dimensioning alternately in drawing, • Apply the principle of placement of dimension on any type of features, • Explain about line weight and metric system of dimensioning, Perform working drawing with proper full size description.
Pattern development		**5. Development and Intersection** • Identify the types of surface, solids, hems and joints in sheet metal drawing, • Describe the use and types of development, • State the rules and steps in parallel-line development, • State the rules and steps in radial-line development, • perform the development of prism, cylinder, cone & pyramid, • Apply the rule of true length by triangulation, • Describe piercing point, visible and hidden line in intersection, Determine the piercing point and line of intersection between lines, planes and solids.

Minimum Learning Competency for Grades 11 and 12 Physical Education

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Athletics	• Mention 2-3 basic techniques of discuss throw • Demonstrate the basic techniques of discus throw • Demonstrate relay run • Describe 3-4 body actions necessary for relay run	• Demonstrate high jump using straddle style • Describe 3-4 body action necessary in high jump • Demonstrate hurdle run • Describe 3-5 body actions necessary for hurdle run.