SENIOR SCHOOL CURRICULUM DESIGN

GRADE 10

METAL TECHNOLOGY

KENYA INSTITUTE OF CURRICULUM DEVELOPMENT

2024

DRAFT

KENYA INSTITUTE OF CURRICULUM DEVELOPMENT
Nurturing Every Learner's Potential

SENIOR SECONDARY SCHOOL CURRICULUM DESIGN

GRADE 10

METAL TECHNOLOGY

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NATIONAL GOALS OF EDUCATION

Education in Kenya should:

1. **Foster nationalism and patriotism and promote national unity.**

   Kenya's people belong to different communities, races and religions, but these differences need not divide them. They must be able to live and interact as Kenyans. It is a paramount duty of education to help young people acquire this sense of nationhood by removing conflicts and promoting positive attitudes of mutual respect which enable them to live together in harmony and foster patriotism in order to make a positive contribution to the life of the nation.

2. **Promote the social, economic, technological and industrial needs for national development.**

   Education should prepare the youth of the country to play an effective and productive role in the life of the nation.

   a) **Social Needs**

   Education in Kenya must prepare children for changes in attitudes and relationships which are necessary for the smooth progress of a rapidly developing modern economy. There is bound to be a silent social revolution following in the wake of rapid modernization. Education should assist our youth to adapt to this change.

   b) **Economic Needs**

   Education in Kenya should produce citizens with the skills, knowledge, expertise and personal qualities that are required to support a growing economy. Kenya is building up a modern and independent economy which is in need of an adequate and relevant domestic workforce.

   c) **Technological and Industrial Needs**

   Education in Kenya should provide learners with the necessary skills and attitudes for industrial development. Kenya recognizes the rapid industrial and technological changes taking place, especially in the developed world. We can only be part of this development if our education system is deliberately focused on the knowledge, skills and attitudes that will prepare our young people for these changing global trends.

3. **Promote individual development and self-fulfilment**

   Education should provide opportunities for the fullest development of individual talents and personality. It should help children to develop their potential interests and abilities. A vital aspect of individual development is the building of character.

4. **Promote sound moral and religious values.**
   Education should provide for the development of knowledge, skills and attitudes that will enhance the acquisition of sound moral values and help children to grow up into self-disciplined, self-reliant and integrated citizens.

5. **Promote social equity and responsibility.**
   Education should promote social equality and foster a sense of social responsibility within an education system which provides equal educational opportunities for all. It should give all children varied and challenging opportunities for collective activities and corporate social service irrespective of gender, ability or geographical environment.

6. **Promote respect for and development of Kenya's rich and varied cultures.**
   Education should instill in the youth of Kenya an understanding of past and present cultures and their valid place in contemporary society. Children should be able to blend the best of traditional values with the changing requirements that must follow rapid development in order to build a stable and modern society.

7. **Promote international consciousness and foster positive attitudes towards other nations.**
   Kenya is part of the international community. It is part of the complicated and interdependent network of peoples and nations. Education should therefore lead the youth of the country to accept membership of this international community with all the obligations and responsibilities, rights and benefits that this membership entails.

8. **Promote positive attitudes towards good health and environmental protection.**
   Education should inculcate in young people the value of good health in order for them to avoid indulging in activities that will lead to physical or mental ill health. It should foster positive attitudes towards environmental development and conservation. It should lead the youth of Kenya to appreciate the need for a healthy environment.

LEARNING OUTCOMES FOR SENIOR SCHOOL

By the end of senior school, the learner should be able to:

1. Communicate effectively and utilise information and communication technology across varied contexts.
2. Apply mathematical, logical and critical thinking skills for problem solving.
3. Apply basic research and scientific skills to manipulate the environment and solve problems.
4. Exploit individual talents for leisure, self-fulfilment, career growth, further education and training.
5. Uphold national, moral and religious values and apply them in day to day life.
6. Apply and promote health care strategies in day to day life.
7. Protect, preserve and improve the environment for sustainability.
8. Demonstrate active local and global citizenship for harmonious co-existence.
9. Demonstrate appreciation of diversity in people and cultures.
10. Manage pertinent and contemporary issues responsibly.

THE SENIOR SCHOOL IN THE COMPETENCY BASED CURRICULUM (CBC)

Senior School is the forth level of Basic Education in the Competency Based Curriculum (CBC) that learners shall come to after the Pre-Primary, Primary and Junior School (JS). The essence of Senior School is to offer learners a Pre- University/ Pre- career experience where the learners have an opportunity to choose pathways where they have demonstrated interest and/or potential at the earlier levels. Senior school comprises three years of education for learners in the age bracket of **15 to 18 years** and lays the foundation for further education and training at the tertiary level and the world of work. In the CBC vision, learners exiting this level are expected to be *engaged, empowered and ethical citizens* ready to participate in the socio-economic development of the nation.

At this level, learners shall take **SEVEN (07) learning areas (LAs)** as recommended by the *Presidential Working Party on Educational Reforms* (PWPER). These shall comprise **Four Compulsory** learning areas, and Three learning areas opted for by the learner according to their choses Pathway. While English and Kiswahili are indicated as Compulsory, the learners who opt for these learning areas as their subjects of specialization shall go through a *differentiated curriculum* in terms of scope, experiences and assessment. Such learners shall; therefore, take *Advanced English* or *Kiswahili Kipevu* with additional two lessons. It is recommended that AT LEAST TWO learning areas should be from chosen Pathway. In exceptional cases, some learners may opt for ONE learning area from the chosen Pathway and a maximum of TWO learning areas from any of the three pathways; depending on the learner's career projections and with guidance by the principals at Senior School.

PROPOSED LIST OF SUBJECTS AT SENIOR SCHOOL

Compulsory Subjects	Science, Technology, Engineering & Mathematics (STEM)	Social Sciences	Arts & Sports Science
1. English 2. Kiswahili/KSL 3. Community Service Learning 4. Physical Education *NB: ICT skills will be offered to all students to facilitate learning and enjoyment*	5. Mathematics/Advanced Mathematics 6. Biology 7. Chemistry 8. Physics 9. General Science 10. Agriculture 11. Computer Studies 12. Home Science 13. Drawing and Design 14. Aviation Technology 15. Building and Construction 16. Electrical Technology 17. Metal Technology 18. Power Mechanics 19. Wood Technology 20. Media Technology* **21.** Marine and Fisheries Technology*	22. Advanced English 23. Literature in English 24. Indigenous Language 25. Kiswahili Kipevu/Kenya Sign Language 26. Fasihi ya Kiswahili 27. Sign Language 28. Arabic 29. French 30. German 31. Mandarin Chinese 32. History and Citizenship 33. Geography 34. Christian Religious Education/ Islamic Religious Education/Hindu Religious Education 35. Business Studies	36. Sports and Recreation 37. *Physical Education (C)* 38. Music and Dance 39. Theatre and Film 40. Fine Arts

LESSON DISTRIBUTION AT SENIOR SCHOOL

The number of lessons in each of the compulsory learning areas shall be 4; while the optional areas shall be 6 lessons each. A lesson shall be 40 minutes. The "free" lessons shall be used for development of ICT skills, Pastoral Instruction Programme (PPI), projects, collaborative study and further reading.

ESSENCE STATEMENT

Metal technology is one of the subjects in the technical studies track of the Science Technology Engineering Mathematics (STEM) pathway. It builds on the competencies acquired in Pre-Technical Studies, Integrated Science and other related learning areas at the Junior School. The subject equips the learner with foundational knowledge, skills, values and competencies that are prerequisite for further training and engagement in the world of work. Metal technology subject equips the learner with exploration, imagination, creativity, innovation and hands-on skills through practical activities and projects.

The subject delivery emphasizes the use of learner centred approach through varied facilitation, learning experiences and resources. This approach entails both theory and practice components, distributed equally throughout the subject. This is because the content is developed from basic science and technology concepts to more advanced concepts based on the psychological development of the learner. The content captured in the subject includes; Fundamentals of Metal Technology as a career information, Tools and Materials, Sheet Metal, Metal Joining Processes and Related Drawing.

Upon completing senior school education, the learner may join either a tertiary institution or a university to pursue further education and training in the school of engineering/technology. The learner may also join the world of work as an artisan in Mechanical Engineering.

GENERAL LEARNING OUTCOMES

By the end of senior secondary, the learner should be able to: -

1. attain a firm foundation for the study of metal technology and, further training and education
2. use knowledge and skills in drawing to design items that can be made using metals
3. use metals to fabricate items that can be used to solve problems in the society
4. correctly select and use metal working tools and equipment for given tasks
5. carry out metal joining using the various metal joining processes
6. use acquired competencies in identifying business opportunity, set up and ethically run a enterprises in metal working related field
7. prudently manage finances and create wealth using metallic materials
8. appreciate metal technology in technical and social economic development of the country
9. promote national and international consciousness fostering positive attitudes toward other people and nations

SUMMARY OF STRANDS AND SUB STRANDS

Strand	Sub Strand	Suggested Number of Lessons
Fundamentals of metal technology	Introduction to metal technology	4
	Safety at workshop	8
Tools and materials in metal technology	Hand tools and bench tools	20
	Measuring and marking out tools	20
	Ferrous and non-ferrous metals	20
	Project	18
Related drawing in metal technology	Scales and conventions	15
	Pictorial drawing	20
Metal joining and finishing processes	Methods of joining sheet metal	20
	Sheet metal processes	15
	project	20
Total Number of Lessons		**180**

Note: The suggested number of lessons per sub strand may be more or less depending on the context

STRAND 1.0: FUNDAMENTALS OF METAL TECHNOLOGY

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 Fundamentals of Metal Technology	**1.1 Introduction to metal technology** (4 lessons)	By the end of the sub strand the learner should be able to; a) define the terms used in metal technology as a learning area b) explain the importance of studying metal technology as a career c) Describe businesses related to metal technology in the community d) appreciate importance of metal technology in day to day life	The learner is guided to; • Brainstorm on the terms used in metal technology as a learning area (metal, metal technology, material, tools, machines, personal protective equipment, workshop) • Use print or digital media to search for information on the meaning of the terms used in metal technology as a learning area • Discuss the importance of studying metal technology as career • Explore on the metal technology related business in the community • Visit metal technology related businesses within the	What is the importance of studying metal technology?

			locality and share their experiences in class	

- **Core competencies to be developed:**
- Communication and collaboration: learner develops speaking, listening and teamwork skills when discussing and presenting on importance of studying metal technology.
- Learning to Learn: learner develop relationship skills as they Visit metal technology related businesses within the locality and share their experiences in class
- Digital Literacy**:** learner interacts and manipulates digital devices when using digital media to search for information on the meaning of the terms used in metal technology as a learning area

- **Values:**
- Unity**:** learners develops positive relationships as they interact and share learning aids when using print or digital media to search for information on the meaning of the terms used in metal technology
- Love**:** learner care for each other as they discuss the importance of studying metal technology
- Responsibility**:** learners care for print or digital media as they search for information on the meaning of the terms used in metal technology

Pertinent and Contemporary Issues (PCIs):
- Peer education: as learners work in groups as they discuss the importance of studying metal technology
- Social cohesion**:** learners acquire effective communication skills as they explore on the metal technology related business
- Social issues as: learners interact with each other as they visit metal technology related businesses within the locality
- Financial Literacy: as learner acquire financial literacy skills as they visit metal technology related businesses within the locality and share their experiences in class

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Fundamentals of Metal Technology	**1.2 Safety at workshop** *(8 lessons)*	By the end of the sub strand the learner should be able to: a) explain safety in a metal workshop b) explore the general workshop rules and regulations as outlined in occupational safety and health act (OSHA) c) describe the possible causes of accidents in a metal workshop d) outline the first aid procedures for accident casualties in a metal workshop. e) describe the component of a metal workshop layout f) appreciate the importance of safety in a metal workshop	The Learner is guided to; • Brainstorm on the aspects of safety in a metal workshop (personal, equipment and environment) • Use print or digital media to search for information on workshop safety rules and regulations • Discus the possible causes of accident in a metal workshop • Demonstrate first aid procedures for accident casualties in a metal technology workshop • Watch videos on different workshop layout and discuss with peers • Visit a workshop in the locality to observe safety measures in place	How does workshop layout impact on workshop safety?

• **Core competencies to be developed:** • Critical thinking and problem solving: learner interprets and makes inference when analyzing case studies on safety practices at different workplaces • Communication and collaboration: learner develops writing, reading, speaking, listening and teamwork skills when discussing and presenting on the general workshop rules and regulations • Learning to learn: learner develops self-learning skill when using print or digital media to search for information on workshop safety rules and regulations • Self-efficacy: learner develops self awareness skills as they discuss the possible causes of accident in a metal workshop
• **Values:** • Patriotism: learner exhibit rule of law as they observe safety rules and regulations in a metal workshop • Responsibility: learner develops diligence as they identify the possible causes of accident in a metal workshop • Peace: learner develops empathy as they demonstrate first aid procedures for accident casualties in a metal technology workshop •
• **Pertinent and Contemporary Issues (PCIs):** • Safety and security: as learner develop safety skills as they practice safety in a metal workshop • Social awareness: learner develop effective communication skill as they discuss the possible causes of accident in a metal workshop • Social responsibility: learner develops first aid skills as they demonstrate first aid procedures for accident casualties in a metal technology workshop

Suggested Assessment Rubric

Level Indicator	Exceeds expectation	Meets expectation	Approaches expectation	Below expectation
Ability to explain the importance of studying metalwork	Explains the importance of studying metalwork linking it to other areas	Explains the importance of studying metalwork as a learning area	Struggles to explain the importance of studying metalwork as a learning area.	With assistance, explains the importance of studying metalwork as a learning area.
Ability to define the terms used in metalwork as a learning area	Defines terms used in metalwork as a learning area with examples	Defines terms used in metalwork as a learning area.	Struggles to define terms used in metalwork as a learning area	With assistance defines the terms used in metalwork as a learning area.
Ability to describe the possible causes of accidents in a metal workshop	Describes the possible causes of accidents in a metal workshop citing examples	Describes the possible causes of accidents in a metal workshop	Inadequately describes possible causes of accidents in a metal workshop	With prompts, describes the possible causes of accidents in a metal workshop
Ability to outline the first aid procedures for casualties in a workshop	Outlines the first aid procedures for casualties with demonstrations.	Outlines the first aid procedures for casualties	Struggles to outline the first aid procedures for casualties	With prompts, outlines the first aid procedures for casualties.

STRAND 2.0: TOOLS AND MATERIALS IN METAL TECHNOLOGY

Strand	Sub-strand	Specific learning outcomes	Suggested learning experiences	Suggested Key Inquiry Question(s)
2.0 Tools and Materials in Metal Technology	2.1 Hand tools and bench tools *(20 lessons)*	By the end of the sub strand, the learner should be able to: a) select hand and bench tools for a given task in a metal workshop b) perform a given task using hand and bench tools in a metal workshop c) maintain hand and bench tools in a metal workshop d) appreciate the importance of hand and bench tools in a metal workshop	The learner is guided to: • use visual aids or realia to identify hand and bench tools used in a workshop (cutting tools, driving tools, holding tools, measuring tools and marking out tools) • discuss the use of hand and bench tools in the workshop • watch audio visual aids on the safe use of hand and bench tools in the workshop • demonstrate safe use of hand and bench tools for a given task • maintain and store hand and bench tools in the workshop	1. What are the benefits of using appropriate tools in the workshop? 2. How does care and maintenance of tools enhance to efficiency in a workshop?
Core competencies to be developed: • Communication and Collaboration: learners develops writing, reading, speaking, listening and teamwork skills as they discuss the use of hand and bench tools in the workshop				

• Digital Literacy as learners interact with digital technology as they watch audio visual aids on the safe use of hand and bench tools in • the workshop • Critical thinking and problem solving: learners develops decision making and open mindedness skills as they select hand and bench tools to perform given tasks	
• **Pertinent and contemporary issues (PCIs):** • Social awareness: learners develops effective communication skills as they discuss the of use hand and bench tools • Safety and security: learners develop safely skills as they handle hand and bench tools when performing specific tasks. • Ethnic, relations and diversities: learner develops social cohesion skills as they discuss the of use hand and bench tools	
• **Values:** • Unity:' learners develop cooperation skill as they share hand and bench tools in the workshop • Responsibility: learners develop accountability skills as they care for and maintain hand and bench tools in the workshop • **Love:** learners develops sharing skills as they use visual aids or realia to identify hand and bench tools used in a workshop	

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Tools and Materials in Metal Technology	**2.2 Measuring and marking out tools** *(20 lessons)*	By the end of the sub strand the learner should be able to; a) identify measuring and marking out tools used in a metal workshop b) Perform a given task using measuring and marking out tools in a metal workshop c) maintain measuring and marking out tools in a metal workshop d) acknowledge the importance of measuring and marking out tools in metal workshop	Learner is guided to; • use visual aids or realia to identify measuring and marking out tools used in a metal workshop (steel rule, try square, dot punch, centre punch, outside calliper, inside calliper, scriber, divider, odd leg calliper, vee-block, angle blocks, surface table, scribing block, and trammel) • discuss the use of measuring and marking tools in the workshop • watch audio visual aids on the safe use of measuring and marking tools in the workshop • demonstrate safe use of measuring and marking tools for a given task • maintain and store measuring and marking out tools in the workshop	1. What are the benefits of using appropriate measuring and marking out tools in the workshop? 2. How does care and maintenance of measuring and marking out tools enhance precision in a workshop?

Core competencies to be developed: Core competences to be developed: • Communication and Collaboration: learners develops writing, reading, speaking, listening and teamwork skills as they discuss measuring and marking out tools used in a Metal workshop • Learning to Learn: learner develops self-learning skill as they demonstrate safe use of measuring and marking tools for a given task • Digital Literacy: learners interacts and manipulates digital devices as they watch audio visual aids on the safe use of measuring and marking tools in the workshop ● Critical thinking and problem solving**:** learner develops open minded and creativity skills as he demonstrates the safe use of measuring and marking tools for a given task in the workshop
• **Values:** • Respect: learners exercise patient as they share resources during the identification of measuring and marking out tools • Responsibility: learners acquire persistence as the practice safe use of measuring and marking out tools in the metal workshop • Unity: learners exhibit fairness by respecting other people's opinion during the discussion of measuring and marking out tool ● **Social justice:** learners are united together as they work in groups when carrying out measurement marking out processes
• **Pertinent and Contemporary Issues (PCIs):** • Safety and security: learners develop safety skills as they use measuring and marking out tools in the workshop • Technology: learners enhance their technological skills as they use visual aids or realia to identify measuring and marking out tools used in a metal workshop • Self management: learners develop self esteem as they demonstrates the safe use of measuring and marking tools for a given task in the workshop

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0Tools and Materials in Metal Technology	2.3 Ferrous and Non-ferrous metals *(20 lessons)*	By the end of the sub-strand, the learner should be able to; a) distinguish between ferrous and non-ferrous metals as applied in materials b) Explain the properties of metals found in a metal workshop c) describe the process of producing iron from its ore d) Illustrate the forms of material supply in a metal workshop e) appreciate the use of ferrous and non-ferrous metals in day-to-day life	The learner is guided to: • Use print or digital media to search for information on ferrous and non-ferrous metals • sort metals into ferrous and non-ferrous metals (iron, steel,,copper, aluminium, tin, lead, zinc) • discuss the types of ferrous metals (low carbon steel, mild steel, high carbon steel) • Brainstorm on the properties of metals (physical, mechanical) • Use print or digital media to search for information production of iron from its ore • discuss the process of producing iron from its ore • Brainstorm on forms of materials supply in a metal workshop (sheets, plates, tubes, wires, bars,)	1. Why is the study of ferrous and non-ferrous metals important in metal technology? 2. What are the uses of metals in day to day life?

			• Sketch forms of material supply in a metal workshop • Acknowledged the use of ferrous and non-ferrous metals in day-to-day life	

- **Core competencies to be developed:**
- Learning to learn: learner acquires self-learning organizing skills when analyzing application of ferrous and non-ferrous metals,
- Digital literacy: learner acquires the skills of connecting and interacting with digital technology when watching and listening to video clips classification of metals,
- Critical thinking and problem solving: learner acquires interpretation and decision making skills as they sort metals into ferrous and non-ferrous metals.

Values:
- Respect: learner develops open mindedness as they brainstorm on forms of material supply
- Responsibility: learner develops self drive as they engage in assigned roles of duties during discussion of the process of producing iron.
- Peace: learner works in harmony with other members of the team as they discuss the types of ferrous and non-ferrous metals.

Pertinent and Contemporary Issues:
- Self-management: the learner acquires self esteem as learner correctly sketches forms of material supply in a metal workshop.
- Social awareness: the learner develops effective communication skills as they discuss types of ferrous and non-ferrous metals
- Safety and security: online safety as the learner uses digital devices to search on the production of iron from its ore.

Strand	Sub strand	Specific learning outcomes	Suggested learning experiences	Key Inquiry Question(s)
2.0 **Tools and Materials in Metal Technology**	**2. 4 Project** **(18 lessons)**	By the end of the sub strand the learner should be able to: a) identify a problem in the community that can be solved using the knowledge and skills acquired in study of metal technology b) suggest an item that can be made to solve the problem identified in the community using locally available materials. c) fabricate the identified item in the workshop using locally available materials d) appreciate the use of tools and equipment in fabrication.	The learners are guided to: • brainstorm on the problems in the community that can be solved using the skills acquired. • Discuss possible items that can be made to solve the identified problem in the community. • Select an item that can be made using locally available resources to solve the identified problem community • Use locally available resources fabricate the selected item • Present the fabricated the item to class	How can knowledge and skills acquired in the use of tools and materials be used to solve the problems in the community?

Core competencies to be developed:
• Creativity and imagination: learner utilizes the selection skills to choose a suitable item that can be fabricated to solve the problem identified in the community

• Critical thinking and problem solving: learner acquire evaluation and decision making skills as they identify problem that can be solved using the knowledge and skills acquired in study of tools and materials. • Digital literacy as learners use digital devices to summarize points on a project to solve the identified problem

Values:
- Love: learner shares locally available resources to fabricate the selected item.
- Unity: learner shows cooperation as they select an item that can be made using locally available resources to solve the identified problem   community
- Patriotism: learner exhibits loyalty to the country as they fabricate an item to solve the identified problem in the community.

Pertinent and Contemporary Issues:
- Good governance: the learner exercises civic responsibility by identifying a problem in the community that can be solved using the knowledge and skills acquired in study of tools and materials.
- Social awareness: learner the uses effective communication to discuss possible items that can be made using locally available resources to solve the identified problem community
- Safety and security:learner practice safety as they use tools when they are fabricating the item selected

Suggested Assessment Rubric

Level / Indicator	Exceeds expectation	Meets expectation	Approaches expectation	Below expectation
Ability to use hand and bench tools to carry out given tasks	With ease, uses hand and bench tools to carry out given tasks	Uses hand and bench tools to carry out given tasks	With difficulty, uses hand and bench tools to carry out given tasks	With assistance, uses hand and bench tools to carry out given tasks
Ability to use measuring and marking out to perform given tasks	With ease, uses measuring and marking out tools to perform given tasks	Uses measuring and marking out tools to perform given tasks	With difficulty, uses measuring and marking out tools to perform given tasks	With assistance, uses measuring and marking out tools to perform given tasks
Ability to distinguish between ferrous and nonferrous metals.	Distinguishes between ferrous and nonferrous metals citing examples	Distinguishes between ferrous and nonferrous metals	Struggles to distinguish between ferrous and nonferrous metals	With prompts, distinguishes between ferrous and nonferrous metals
Ability to illustrate forms of material supply in a metal workshop	Illustrates and explains forms of material supply in a metal workshop	illustrates forms of material supply in a metal workshop	With prompts, illustrates forms of material supply in a metal workshop	With guidance, Illustrates forms of material supply in a metal workshop
Ability to fabricate an item to solve a given problem in the community.	Fabricates an item, with aesthetics, that solves a given problem in the community.	Fabricates an item that solves a given problem in the community.	Struggles to fabricate an item that solves a given problem in the community.	With guidance, fabricates an item to solve a given problem in the community.

STRAND 3.0   RELATED DRAWING IN METAL TECHNOLOGY

Strand	Sub strand	Specific learning outcomes	Suggested learning experiences	Key Inquiry Question(s)
3.0 Related Drawing in Metal Technology	**3.1 Scales and conventions** **(15 lessons)**	By the end of the sub strand the learner should be able to: a) identify symbols, abbreviations and conventions used in drawings, b) interpret symbols, abbreviations and conventions used in drawings, c) construct scales in technical drawing d) appreciate the application of symbols, abbreviations and conventions used in drawings	The learner is guided to: • use print or digital media to search for information on symbols, abbreviations and conventions used in drawing, • discuss with peers the symbols, abbreviations and conventions used in drawing, • illustrate symbols, abbreviations and conventions used in drawings, • Practice the construction of scales (plane and diagonal) in technical drawing, • Acknowledge the application of symbols, abbreviations and conventions used in technical drawing.	Why are the symbols, abbreviations and conventions used in drawing?
Core Competencies: • Digital literacy: learner interact with technology as they use digital media to search for information on symbols, abbreviations and conventions used in drawing • Self-efficacy: learner develops effective communication skills as they illustrate symbols, abbreviations and conventions used in drawings			

• Communication and collaboration: learner acquire speaking, listening and teamwork as they discuss symbols, abbreviations and conventions used in drawings
Values: • Responsibility: learner engages in the practice of construction of plane and diagonal scales used in drawing • Respect: learner accept others opinion as they discuss the application of standard symbols, abbreviations and conventions • Integrity: learner observes honesty and discipline as they use print or digital media to search for information on symbols, abbreviations and conventions used in drawing
Pertinent and Contemporary Issues (PCIs): • Safety and security: online safety as the learner uses digital devices to search for information on symbols, abbreviations and conventions used in drawing • Social awareness: learner communicate effectively using drawing symbols, abbreviations and conventions in drawings • Self management: learner develops Self-esteem as they gains confidence when discuss the symbols, abbreviations and conventions used in drawings

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Key Inquiry Question(s)
3.0 Related Drawing in Metal Technology	**3.2 Pictorial drawing** *(20 lessons)*	By the end of the sub strand the learner should be able to: a) identify types of pictorial drawings used in metal technology b) draw three-dimensional figures used in metal technology c) Construct pictorial drawings in isometric projection d) Construct pictorial drawings in oblique projection. e) Dimension pictorial drawings used in metal technology f) appreciate the use of pictorial drawings in metal technology	The learner is guided to: • Use visual aids to identify types of pictorial drawing • discuss with peers different types of pictorial drawings in metal technology • Practice drawing of three-dimensional figures (prisms and pyramids) • Practice the drawing of three-dimensional figures in a given projection (isometric, oblique) • Practice correct dimensioning of pictorial drawings • Display the pictorial drawings in class	1. What is a pictorial drawing? 2. Why are pictorial drawings important in metal technology?

- **Core competencies to be developed:**
- Creativity and imagination: learner make connection between each other as they Practice the drawing of three-dimensional figures in a given projections (isometric, oblique)
- Self-efficacy: learner develops self awareness skills as they display the pictorial drawings done in class
- Learning to learn: learners work collaboratively as they Practice the drawing of three-dimensional figures in a given projections (isometric, oblique)

Values:
• Respect: the learner develops patience by accurately following step-by-step of construction process hence enhancing the importance of accuracy.
• Unity: learner cultivate fairness skills by sharing drawing tools and instruments with peers fostering a collaborative atmosphere during construction of pictorial drawings.
• Responsibility: learner demonstrates diligence by adherence to safety and care for tools and equipment when constructing
Pertinent and Contemporary Issues (PCIs):
• Technology: learners enhance their technological skills as they use visual aids to identify types of pictorial drawing
• Safety and security: learner demonstrates diligence by adherence to safety and care for tools and equipment when constructing
• Social skills: learner communicate effectively using drawing symbols, abbreviations and conventions in drawings

Assessment Rubric				
Level Indicator	Exceeds expectation	Meets expectation	Approaches expectation	Below expectation
Ability to identify symbols and abbreviations used in drawing	Identifies and sketches symbols and abbreviations used in Technical Drawing	Identifies symbols and abbreviations used in Technical Drawing	Struggles to identify symbols and abbreviations used in Technical Drawing	With guidance, identifies symbols and abbreviations used in Technical Drawing
Ability to construct scales used in technical drawing	Constructs and applies scales used in Technical Drawing	Constructs scales used in Technical Drawing	With prompts, constructs scales used in Technical Drawing	With assistance, constructs scales used in Technical Drawing
Ability to identify types of pictorial drawings in Technical Drawing	Identifies and sketches pictorial drawings used in Technical Drawing	Identifies pictorial drawings used in Technical Drawing	Struggles to identify pictorial drawings used in Technical Drawing	With assistance, identifies pictorial drawings used in Technical Drawing
Ability to construct a pictorial drawing in isometric projection.	Constructs and labels pictorial drawings in isometric projection	Constructs pictorial drawings in isometric projection	With prompts, constructs pictorial drawings in isometric projection	With assistance, constructs pictorial drawings in isometric projection
Ability to construct a pictorial drawing in oblique projection.	Constructs and labels pictorial drawings in oblique projection	Constructs pictorial drawings in oblique projection	With prompts, constructs pictorial drawings in oblique projection	With assistance, constructs pictorial drawings in oblique projection

STRAND 4.0   METAL JOINING AND FINISHING PROCESSES

Strand	Sub strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
4.0 Metal Joining and Finishing Processes	**4.1. Methods of joining sheet metal** (2*0 lessons)*	By the end of the sub strand the learner should be able to; a) Identify types of sheet metal joints used in metal technology. b) explain methods used in joining sheet metals in metal technology c) perform a given task using sheet metal joining methods in the workshop d) appreciate the use of sheet metal joining methods in day -to–day life	The learner is guided to: • Use print or digital media to search for information on types joints in sheet metal (butt, lap, seam) • Sketch the types of joints used in sheet metal • brainstorm on the methods used in joining sheet metals (riveting, fasteners, and screw thread) • carry out a given sheet metal joining process (riveting, seam, fastening and screw thread) • practice safety when carrying out sheet metal joining methods in the workshop • Display the sheet metal joints produced in class	What is importance of joints in sheet metal?
Core competencies to be developed:				
• Communication and Collaboration: The learner enhances speaking, listening, and teamwork skills while brainstorming on the methods used in joining sheet metals.				

• Critical Thinking and Problem Solving: The learner acquires open-mindedness and creativity by exploring different methods of joining sheet metal.   • Digital Literacy: The learner develops digital skills by using digital technology to search for information on types of joints in sheet metal.

Values:
- Respect: The learner cultivates patience by accurately following each step of methods of joining sheet metal, understanding the importance of precision and care.
- Responsibility: The learner demonstrates diligence by adhering to all safety protocols when carrying out tasks in sheet metal joining methods in the workshop, ensuring a safe working environment for themselves and others.
- Unity: The learner cultivates fairness skills by equitably sharing tools and materials with peers, fostering a collaborative atmosphere during the sheet metal joining process.

Pertinent and Contemporary Issues (PCIs):
- Safety and Security: The learner enhances safety skills by diligently practicing safety protocols when carrying out tasks in sheet metal joining methods in the workshop.
- Social Awareness: The learner improves effective communication skills through brainstorming sessions on various methods used in joining sheet metals.
- Self-Management: The learner boosts self-esteem by showcasing the sheet metal joints they have produced in class.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
4.0 Metal Joining and Finishing Processes	**4.2 Sheet metal processes** (15 lessons)	By the end of the sub strand the learner should be able to; a) Describe sheet metal processes applied in metal technology b) Select tools and equipment for a given sheet metal process in the workshop c) Carry out sheet metal processes for given task in a workshop d) Acknowledge the importance of sheet metal processes in day-to-day life.	Learner is guided to; • Use print or digital media to search for information on sheet metal processes (edge treatment, hollowing, sinking, raising) • discuss the sheet metal processes (edge treatment, hollowing, sinking, raising) • Select the appropriate tools and equipment for a given sheet metal process • Perform a given sheet metal process in the workshop • Present the work produced from sheet metal processes to class	What guides the selection of sheet process for a given task?

Core competencies to be developed:
- Communication and Collaboration: The learner enhances speaking, listening, and teamwork skills through discussions on the various types of sheet metal processes.
- Critical Thinking and Problem Solving: The learner acquires open-mindedness and creativity while selecting the appropriate tools and equipment for a given sheet metal process.
- Digital Literacy: The learner develops digital skills by using digital media to search for information on sheet metal

processes.

Values:
- Love: The learner cultivates generosity by sharing tools and equipment when carrying out a given sheet metal process in the workshop.
- Responsibility: The learner exhibits accountability for tools and equipment while performing a given sheet metal process in the workshop.
- Peace: The learner develops caring skills by practicing safety measures for themselves and others when carrying out a given sheet metal process in the workshop.

Pertinent and Contemporary Issues (PCIs):
- Safety and Security: The learner develops safety skills by practicing safety measures when carrying out sheet metal processes in the workshop.
- Social Awareness: The learner enhances effective communication skills by discussing the various sheet metal processes.
- Self-Management: The learner builds self-esteem by presenting the work produced from sheet metal processes to the class.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
4.0 Metal Joining and Finishing Processes	**4.3 Project** **(2*0 lessons*)**	By the end of the sub-strand, the learner should be able to: a) identify a problem in the community that can be solved using the knowledge and skills acquired in sheet metal processes b) Suggest an item that can be made to solve the identified problem using locally available materials c) Fabricate an item to solve the identified problem, utilizing the acquired knowledge and skills d) appreciate the importance of sheet metal processes in solving problems within the community	The learner is guided to: • brainstorm on the problems in the locality that can solved using the skills acquired in sheet metal processes • Discuss possible items that can be made to solve the identified problem. • Select an item that can be made using locally available resources to solve the identified problem • Use locally available resources fabricate the selected item • Present the fabricated item to class	1. What societal problems can be solved using knowledge and skills acquired in study of sheet metal processes? 2. How can sheet metal skills and processes be used in solving problems in the society?
Core competencies to be developed:				
• Creativity and imagination: learner utilizes the selection skills to choose a suitable item that can be fabricated to solve the problem identified in the community				

• Critical thinking and problem solving: learner acquire evaluation and decision making skills as they identify problem that can be solved using the knowledge and skills acquired in study of tools and materials. • Digital literacy as learners use digital devices to summarize points on a project to solve the identified problem
Values: • Love: learner shares locally available resources to fabricate the selected item. • Unity: learner shows cooperation as they select an item that can be made using locally available resources to solve the identified problem   community • Patriotism: learner exhibits loyalty to the country as they fabricate an item to solve the identified problem in the community
Pertinent and Contemporary Issues: • Good governance: the learner exercises civic responsibility by identifying a problem in the community that can be solved using the knowledge and skills acquired in study of tools and materials. • Social awareness: learner the uses effective communication to discuss possible items that can be made using locally available resources to solve the identified problem community • Safety and security:learner practice safety as they use tools when they are fabricating the item selected

Suggested Assessment Rubric

Indicator	Exceeds expectation	Meets expectation	Approaches expectation	Below expectation
Ability to explain methods used in joining sheet metals in a workshop	Explains, with examples, methods used in joining sheet metals in a workshop	Explains methods used in joining sheet metals in a workshop	With prompts, explains methods used in joining sheet metals in a workshop	Hardly explains methods used in joining sheet metals in a workshop
Ability to perform a given sheet metal joining process in a workshop	Performs sheet metal joining processes with precision in a workshop	Performs sheet metal joining processes in a workshop	With guidance, performs sheet metal joining processes in a workshop	Hardly performs sheet metal joining processes with in a workshop
Ability to perform a given sheet metal process in a workshop	Performs sheet metal processes with precision in a workshop	Performs sheet metal processes in a workshop	With guidance, performs sheet metal processes in a workshop	Hardly performs sheet metal processes with in a workshop
Ability to fabricate a given sheet metal item in a workshop.	Fabricates a sheet metal item, with aesthetics, in a workshop.	Fabricates a sheet metal item, in a workshop.	Struggles to fabricate a sheet metal item that solves a given problem in the community.	With guidance, fabricates a sheet metal item to solve a given problem in the community.

APPENDIX: LIST OF ASSESSMENT METHODS, LEARNING RESOURCES AND NON-FORMAL ACTIVITIES

Strand	Sub strand	Suggested assessment methods	Suggested learning resources	Suggested non-formal activities
1.0 Fundamentals of metal technology	1.1 Introduction to metal technology	• Written test • Written assignment • Observation of learning activities. • Oral assessment	• Relevant video clips and pictures on Metal Technology. • Manilla papers and marker pens to make presentations • Resource Persons	• Learners to local businesses in the community which deal with metals
	1.2 Safety at workshop	• Written assignments • Observation of learning activities • Oral assessment	• Relevant video clips and pictures on safety in a metal workshop. • First Aid Kit • Person Protection Equipment (PPE)	• Visit local workshop to observe safety
2.0 Tools and materials in metal technology	2.1 Hand tools and bench tools	• Written test • Oral assessment • Observation of practical activities	• Work bench • Cutting tools • Driving tools • Holding tools • Measuring tools • Marking out tools	• Visit local workshop to observe the use of hand and bench tools

Strand	Sub strand	Suggested assessment methods	Suggested learning resources	Suggested non-formal activities
			• Relevant video clips and pictures on hand and bench tools	
	2.2 Measuring and marking out tools	• Written test • Oral assessment • Observation of practical activities	• Work bench • Steel rule, try square, dot punch, centre punch, outside calliper, inside calliper, scriber, divider, odd leg calliper, vee-block, angle blocks, surface table, scribing block, and trammel • Relevant video clips and pictures on measuring and marking out tools	• Visit local workshop to observe the use of hand and bench tools
	2.3 Ferrous and non-ferrous metals	• Written test • Oral assessment • Observation of practical activities	• Relevant video clips and pictures on Metals & Nonmetals • Metals & Nonmetals (Iron, steel,, copper, aluminum, tin, lead, zinc, low carbon steel,	• Visit local workshop to observe metals & nonmetals

Strand	Sub strand	Suggested assessment methods	Suggested learning resources	Suggested non-formal activities
			• mild steel, high carbon steel) • Metals in different forms (sheets, plates, tubes, wires, bars)	
	2.4 Project	• Observation • Oral assessment on safety and use of tools and materials	• Hand and bench tools • Measuring and marking out tools • Locally available metals and non-metals • Print and digital devices	• Visit the community to identify problems • Visit the locality to obtain metals and non-metals (locally available)
3.0 Related drawing in metal technology	**3.1 Scales and conventions**	• Written test • Oral assessment • Observation of scale drawing activities	• Relevant video clips and pictures on symbols, abbreviations and conventions in drawing • Reference materials for drawing • Drawing instruments	• Visit a drawing room in the locality to observe symbols, abbreviations and conventions in drawing
	3.2 Pictorial drawing	• Written test • Oral assessment	• Relevant video clips and pictures on pictorial drawings	• Visit a drawing room in the locality to observe pictorial drawings

Strand	Sub strand	Suggested assessment methods	Suggested learning resources	Suggested non-formal activities
		• Observation of pictorial drawings	• Reference materials for drawing • Drawing instruments	
4.0 Metal joining and finishing processes	**4.1 Methods of joining sheet metal**	• Written test • Oral assessment • Observation of sheet metal joining activities	• Relevant video clips and pictures on types of sheet metals, joints and joining materials • Sheet metal joints (butt, lap, seam) • Sheet metal joining materials (riveting, fasteners, and screw thread) • Safety precautions reference	• Visit a sheet metal workshop in the locality to observe types of sheet metals, joints, joining materials and practice sheet metal work
	4.2 Sheet metal processes	• Written test • Observe practical activities as they carry out sheet metals processing • Oral assessment	• Print or digital media to search for information on sheet metal processes (edge treatment, hollowing, sinking, raising)	• Visit a sheet metal workshop in the locality to observe edge treatment, hollowing, sinking, raising

Strand	Sub strand	Suggested assessment methods	Suggested learning resources	Suggested non-formal activities
			• Sheet metal working Tools Equipment	and to practice sheet metal work
	4.3 Project	• Observation • Oral assessment on safety and use of tools and materials	• Sheet metal joining tools • Sheet metal processing tools and equipment • Locally available sheet metals Print and digital devices	• Visit the community to identify problems • Visit the locality to obtain sheet metals (locally available)

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KENYA INSTITUTE OF CURRICULUM DEVELOPMENT

Desai Road, off Murang'a Road.
P.O.Box 30231-00100 Nairobi, Kenya.
Telephone: +254(020)3749900-9,3748204,3747994
Fax:+254(020)3639130
Email: info@kicd.ac.ke, Website: www.kicd.ac.ke