

National School Curriculum

INSTRUCTIONAL GUIDE FOR TVET (FURNITURE MAKING)

CLASSES IX & X



Department of Curriculum and Professional Development
Ministry of Education, Royal Government of Bhutan



“Your parents, relatives, and friends would be very proud of what you have achieved. At your age, to have completed your studies is your personal accomplishment. Your knowledge and capabilities are a great asset for the nation. I congratulate you for your achievements. Finally, your capabilities and predisposition towards hard work will invariably shape the future of Bhutan. You must work with integrity, you must keep learning, keep working hard, and you must have the audacity to dream big.”

- His Majesty Jigme Khesar Namgyel Wangchuck

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Foreword

COVID-19 has suddenly caused unforgiving disruptions in public education all over the world and brought about threats of fragmentation due to disparities in accessibility and connectivity in many systems. In Bhutan too, continuity of education and learning has been severely affected as a result of nationwide school closures and due to restrictions and health protocols. The disruptions have led to challenges in many existing patterns and trends in education resulting in a massive shift away from teaching and learning in traditional settings.

In the new normal education, human interaction and well-being are a priority. Digital technology that enables communication, collaboration and learning across distance, is a source of innovation and expanded potentials. As we embrace this exceptional opportunity to transform the world, and as we reimagine the organization of our educational institutions and learning environments, we need to think about where we want to go.

In the post COVID 19 era, we must prioritize the development of the whole person not just academic knowledge. Inspiration for the change can be drawn from the 1996 Delors report, *Learning the treasure within*, in its specification of four pillars of learning as “learning to know”, “to do”, “to be”, and “to live together”. Therefore, curricula must be increasingly perceived as an integrated and based on themes and problems that allows learners to learn to live in peace with our common humanity and our common planet. This has the potential in the development of a strong base of knowledge about one’s self and about the world and find purpose and be better able to participate in social and political milieu.

The National School Curriculum is, not just a mere response to the pandemic, but also a culmination of the curriculum reform work for the last four years by the then Royal Education Council. It is an attempt to transform education from the teaching of “what” to learning of “how” and “why” towards empowering learners with the transversal competencies and the 21st century skills, and preparing them to be lifelong learners. We are optimistic that this move orients our education process towards nurturing nationally rooted and globally competent citizens.

Wish all our learners and teachers a life enriching experiential teaching and learning.

Tashi Delek.

A handwritten signature in black ink, appearing to read 'Tashi Namgyel', with a horizontal line underneath it.

Tashi Namgyel

Director

Introduction

Technical and Vocational Education and Training (TVET) is aimed at providing knowledge and skills for employment. It comprises education, training and skills development related to a wide range of occupational fields, production, services and livelihood. The Department of Curriculum and Professional Development, Ministry of Education envisages that the TVET curriculum has a place in the mainstream education system, as it is the case in most of the education systems of the developed world. The formal Technical and Vocational Education and Training (TVET) began in 1965 at Don Bosco Technical School (DBTS), in Kharbandi (presently known as Rinchening) in Phuntsholing. Even after that, major curriculum reform was planned by the then Department of Curriculum Research and Development (DCRD) in an attempt to make education relevant to the Bhutanese society through diversification of Secondary Education Curriculum in the schools, which included the introduction of TVET.

As per 'National Education Framework' developed collaboratively by the Royal Education Council (REC) and the Ministry of Education (MoE), it provides a pathway on integrating technical/vocational education in the mainstream school education curriculum and as elective subjects in higher classes (NEF, 2009; page 64).

With the collaborative efforts of the Ministry of Labour and Human Resources and the erstwhile Department of Curriculum Research and Development, Vocational Curriculum has been introduced in the schools with assistance from TTIs since 2011. After the first MoU that was signed between MoE and MoLHR in 2011, the second MoU was signed again in 2014, to improve technical/vocational courses. The technical/vocational courses offered by the TTIs/IZCs are adapted and redesigned and are offered in schools aligning to the 'Bhutan Education Blue Print' 2014-2024, which recommends upscaling and diversification of TVET in schools through the provision of alternative pathways in schools and the tertiary education systems, owing to the limited access to such courses, despite the growing demand for technical skills in the country.

The resolutions of the National School Curriculum Conference 2016, also strongly emphasised the need to upscale and deepen TVET. Accordingly, the TVET framework is developed from classes PP to XII, schools equipped with necessary resources and instructors trained. Tripartite MoU among the then REC, MoE and MoLHR was also signed in 2018 to implement the programmes collaboratively.

Although the TVET curriculum is competency based with more emphasis on hands-on experience, further improvements have been made taking care of cognitive and affective domains besides psychomotor. Teaching and learning approaches have also been enriched with the recommendation to use ICT and online resources. Since the pandemic (COVID-19) has resulted in the closure of schools, it has taught us lessons to be prepared for such an untoward situation in the future. Thus, the National School Curriculum Instructional Guide is prepared not only to encourage blended learning but also to facilitate remote learning. The guide would help the schools to implement the curriculum effectively without limiting to contact teaching/learning besides using a variety of pedagogies.

Purpose of the Instructional Guide

Among the many definitions of ‘curriculum’ this Instructional Guide underscores the meaning of curriculum as a standard and competency-based sequence of planned learning experiences where learners practise and achieve the proficiency in applying the learning experiences in real life scenarios. These proficiencies, in the curriculum framework, have been stated as “competencies” and ‘objectives’ for each class. In keeping with the principle, ‘less is more’ as stated the National School Curriculum, the contents of the curriculum have been reworked, so that learners can be engaged more in activities that can lead to the acquisition of required skills rather than having them ‘cover the syllabus’.

This Instructional Guide believes that the classroom teachers, as professional individuals, can make the most authentic and reliable judgment about each learner’s learning needs and the learning experiences to be provided to propel the learners in the learning continuum. With these beliefs and principles as the background, the following are the purposes of this document.

- Facilitate learners acquire required skills and competencies.
- Strengthen blended learning, including flipped classroom with multimedia, digital pedagogies and ICT devices and websites as tools to share the responsibility of learning amongst the learners, teachers, the parents and other stakeholders.
- Facilitate the use of Continuous Formative Assessment for learning using diverse appropriate assessment techniques and tools commensurate with individual differences in learning, and gather evidence to guide planning of educational programmes and activities for learners.
- Promote inclusive learning through the blended learning which facilitates learning anywhere, any time with the learner being responsible for the learning.
- Provide suggestive means of acquiring required skills by building interrelationship among, and through, the integration of the four strands of the curriculum.
- Help teachers assume the roles of facilitator, guide, motivator and evaluator.
- Guide teachers, parents and other stakeholders in helping learners achieve their potential.
- Empower teachers to design their own ‘course of study’ or ‘class curriculum’ for their students in line with the National School Curriculum Framework.
- Enhance sharing the burden of responsibility and accountability for learning amongst the stakeholders, including the learners themselves.

In this age of advanced communication and information technology, contents are widely available from a number of sources. Therefore, the teachers can select, structure and sequence the contents as required to best suit the learners’ need while maintaining coherence and consistency. In other words, while the contents of the curriculum are negotiable, the competencies and objectives are not. While, teachers may have access to number of materials, it should be kept in mind that the teaching and learning should be focused on achieving the competencies rather than ‘covering of the syllabus’. The teaching learning materials should be used as means to create a learning environment that is competency-based where the learners need to master the skills presented to them. While designing lesson plans and teaching learning activities, teachers need to ensure that the materials are relevant and appropriate for the given task.

The assessment should be competency-based wherein the teachers should assess the learners’ mastery of the skills stated as competencies and objectives for each class. Teachers should use

appropriate assessment tools and techniques depending on the nature of the learning activities. The learners should be clearly informed about the success criteria, the areas of assessment and the tools to be used so that they know exactly what tasks are to be performed or expected of them. In the process of the performance, the teacher should continuously provide feedback and, if necessary, modify instructions. Efforts have to be made to ensure that every learner has mastered the skills.

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A. Competency/Competencies:

- ✓ Apply the principles of 5S in any place.

B. Learning objectives/Topic:

Learning objectives	Topic
1.1.1 Define 5S. 1.1.2 State the purposes of 5S. 1.1.3 Explain the principle of 5S. 1.1.4 Apply the principles of 5S.	1.1 Applying the principles of 5S Overview: The topic is about the ways of organizing and managing the workplace that enable the learners to perform their tasks effectively and efficiently.

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 1.1
- ✓ Provide handouts on 5S to the learners.
- ✓ Make learners go through the given link that explains the principles of 5S.
<https://youtu.be/n9sxq34D9HQ>.
- ✓ Make learners perform OPERATION SHEET 1.1
- ✓ Let the learners discuss in a group and do a presentation on 5S using PPT, handouts/charts, demonstration, and short video clips to explain 5S.
- ✓ Provide information on 5S, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners to perform OPERATION SHEET 1.1 through Google Classroom. (The learners may arrange available tools at home)
- ✓ Make learners discuss in a group and submit their response through Google Classroom or any other relevant social media.

D. Assessment:

- ✓ Make learners read INFORMATION SHEET 1.1 and perform OPERATION SHEET 1.1 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about 5S by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 1.1
- ✓ Make the learners do a presentation and assess as per the rubric developed.
- ✓ Make learners read INFORMATION SHEET 1.1 and perform OPERATION SHEET 1.1 and ask them to send the short video as evidence through Google Classroom or any other relevant social media platforms. Assess them using a checklist/performance guide.
- ✓ Let the student solve SAMPLE SELF CHECK 1.1 and submit answers through Google Classroom or any other relevant social media.
- ✓ Give additional relevant questions from other resources-Text book/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use the rubric to assess their answer.

E. Resources:

- ✓ Competency-based Learning Materials for classes IX
- ✓ Handouts
- ✓ <https://youtu.be/n9sxq34D9HQ> (Explanation on principles of 5S)

A. Competency/Competencies:

- ✓ Make appropriate use of PPE.

B. Learning objectives/Topic:

Learning objectives	Topic
1.2.1 Define PPE. 1.2.2 State the importance of PPE. 1.2.3 List the categories of PPE. 1.2.4 Use PPE. 1.2.5 Ensure to use appropriate PPE. 1.2.6 Ensure safe disposal of damaged PPE. 1.2.7 Ensure not to use defective and damaged PPE.	1.2 Using PPE Overview: The topic is about the proper use of various PPE and it helps the learners to maintain safety at workplace.

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 1.2
- ✓ Provide handouts to learners.
- ✓ Let learners explore PPE, through the web links <https://youtu.be/r9vp1q1L2ro>, <https://www.youtube.com/watch?v=DMBrRNV9Hrk>.
- ✓ Make learners perform OPERATION SHEET 1.2
- ✓ Let the learners discuss in a group and do a presentation on PPE using PPT, handouts/charts, demonstration, and short video clips to explain PPE.
- ✓ Instruct learners to read INFORMATION SHEET 1.2 through Google Classroom.
- ✓ Make learners go through a web link that explains PPE. <https://youtu.be/r9vp1q1L2ro>, <https://www.youtube.com/watch?v=DMBrRNV9Hr>
- ✓ Provide information on PPE, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners through Google Classroom to perform OPERATION SHEET 1.2.
- ✓ Let the learners discuss in a group and submit their responses through Google Classroom or any other relevant social media.

D. Assessment:

- ✓ Make learners read INFORMATION SHEET 1.2 and perform OPERATION SHEET 1.2 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about PPE by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 1.2
- ✓ Let the learners do a presentation and assess as per the rubric developed.

- ✓ Make learners read INFORMATION SHEET 1.2 and perform OPERATION SHEET 1.2 and ask them to send the short video as evidence through Google Classroom or any other relevant social media platforms. assess them using a checklist/performance guide.
- ✓ Let the learners solve SAMPLE SELF CHECK 1.2 and submit answers through Google Classroom or any other relevant social media.
- ✓ Give additional relevant questions from other resources-Text book/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use the rubric to assess their answers.

E. Resources:

- ✓ Competency-based Learning Materials for class IX.
- ✓ <https://www.youtube.com/watch?v=DMBrRNV9Hr> and <https://youtu.be/r9vp1q1L2ro> ([Explanation on PPE](#))

A. Competency/Competencies:

- ✓ Practise OHS procedures in any task for safety
- ✓ Make use of the standard procedure to operate the fire extinguisher.
- ✓ Make appropriate use of PPE while handling fire extinguishers.

B. Learning objectives/Topic:

Learning objectives	Topic
1.3.1 Define safety precaution. 1.3.2 List different types of safety. 1.3.3 Explain workshop and personal safety. 1.3.4 State the importance of maintaining a workplace and personal safety. 1.3.5 Explain the importance of safety signs and symbols. 1.3.6 Explain the emergency exit. 1.3.7 Describe the layout of the workshop. 1.3.8 Maintain workplace safety and personal safety 1.3.9 Ensure to follow OHS procedures. 1.3.10 Ensure to keep the workshop clean. 1.3.11 Ensure to ring the alarm bell before the accident spreads over. 1.3.12 Ensure to display safety signs and symbols. 1.3.13 Ensure to use appropriate PPE in the workplace. 1.3.14 Ensure to avoid horseplay at the workplace. 1.3.15 Ensure to avoid smoking and eating inside the workshop. 1.3.16 Ensure to avoid working under influence of alcohol.	1.3 Maintaining workplace safety and personal safety. Overview: The learners can maintain a workplace and personal safety knowing about safety signs and symbols and ways of setting conducive workshop.

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 1.5
- ✓ Provide handouts to learners.
- ✓ Make learners go through the link that explains the usage of fire extinguishers.
<https://www.youtube.com/watch?v=PQV71INDaqY>
- ✓ Make learners perform OPERATION SHEET 1.5
- ✓ Let the learners discuss in a group and do a presentation on how to use fire extinguishers using PPT, handouts, demonstration, and short video clips to explain the usage of fire extinguishers.
- ✓ Instruct learners to read INFORMATION SHEET 1.5 through Google Classroom.
- ✓ Provide the web link <https://www.youtube.com/watch?v=PQV71INDaqY> that explains about usage of fire extinguishers.
- ✓ Provide handouts, self-made tutorial video clips, and PPT through Google Classroom or any other relevant social media.
- ✓ Instruct learners to perform OPERATION SHEET 1.5 through Google Classroom. (The learners may arrange available tools and materials at home)
- ✓ Make the learners discuss in a group and submit their response through Google Classroom or any other relevant social media.

D. Assessment:

- ✓ Make learners read INFORMATION SHEET 1.5 and perform OPERATION SHEET 1.5 and assess them using a checklist/performance guide. Provide necessary intervention.
- ✓ Assess learner's knowledge about how to use fire extinguishers by asking questions.
- ✓ Conduct class tests to assess their understanding.
- ✓ Let learners carry out activities of the SAMPLE SELF CHECK 1.5
- ✓ Let the learners do a presentation on using of fire extinguisher and assess as per the rubric developed.
- ✓ Make learners read INFORMATION SHEET 1.5 and perform OPERATION SHEET 1.5 and ask them to send the short video as evidence through Google Classroom or any other relevant social media platforms. Assess them using a checklist/performance guide.
- ✓ Let the student solve SAMPLE SELF CHECK 1.5 and submit the answer through Google Classroom or any other relevant social media.
- ✓ Give additional relevant questions from other resources-Text book/Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms. Use the rubric to assess their answer.

E. Resources:

- ✓ CBLM.
- ✓ <https://www.youtube.com/watch?v=PQV71INDaqY> (Video on how to use fire extinguisher).

Chapter 2: Maintaining hand tools and portable power tools

A. Competency/Competencies:

- ✓ Sharpen plane blade to achieve smooth cutting.

B. Learning objectives/Topic:

Learning objectives	Topic
2.1.1 Define blade. 2.1.2 List the types of planes. 2.1.3 Identify the parts of the plane. 2.1.4 Identify the types of plane blades. 2.1.5 State the function of the plane and its parts. 2.1.6 Explain the purpose of soaking oil stone in water. 2.1.7 State the purpose of maintaining a sharpening angle range. 2.1.8 State the purpose of applying oil on the blade. 2.1.9 State the purpose of setting plane blade. 2.1.10 Sharpen plane/chisel blade 2.1.11 Ensure safe while checking the sharpness of the blade.	2.1 Sharpening plane/chisel blade Overview: Besides knowing about the function, types and parts of a plane, the learners can acquire the techniques of sharpening it.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 2.1
- ✓ Make the students perform OPERATION SHEET 2.1 individually after guided practice.
- ✓ Demonstrate how to sharpen the blade.
- ✓ Explain the following content:
 - Purpose of soaking oil stone in water.
 - Purpose of maintaining sharpening angle range.
 - Purpose of applying oil on the blade.
 - Purpose of setting plane blade.
- ✓ Make learners go through the notes provided on the following content through Google Classroom:
 - Purpose of soaking oil stone in water.
 - Purpose of maintaining sharpening angle range.
 - Purpose of applying oil on the blade.
 - Purpose of setting plane blade.
- ✓ Make learners go through the given link that shows the process of sharpening the blade.
<https://www.youtube.com/watch?v=GN4yr7vp4I4>

D. Assessment:

- ✓ The teacher may design the rubrics to assess their work by judging their assigned works (chisel/plane blade).
- ✓ Teacher to assess the given work through social media (Telegram, Wechat, Google Classroom, Messenger, and through emails).

E. Resources:

- ✓ CBLM of class IX
- ✓ <https://www.youtube.com/watch?v=GN4yr7vp4I4> (Process of sharpening blade)

A. Competency/Competencies:

- ✓ Sharpen saw blade to improve its efficiency.

B. Learning objectives/Topic:

Learning objectives	Topic
2.2.1 State the function of the saw. 2.2.2 List the types of saw. 2.2.3 List types of saw setting tools. 2.2.4 Explain the method of sharpening and setting saw teeth. 2.2.5 Sharpen saw blade. 2.2.6 Ensure safe handling of the saw. Ensure appropriate use of PPE.	2.2 Sharpening saw blade Overview: The technique to sharpen saw blade to achieve smooth cutting can be learnt besides related information on saw.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 2.2
- ✓ Make the students perform OPERATION SHEET 2.2
- ✓ Make learners refer notes from the given link which explains the process to sharpen saw blades using a file <https://sensibledigs.com/how-to-sharpen-saw-blades/>

D. Assessment:

- ✓ Teacher to assess learners' performance using rubrics.
- ✓ Check learner's understanding by conducting a class test.
- ✓ Teacher to assess the questions on saw given through Goggle Classroom and social media.

E. Resources:

- ✓ CBLM.
- ✓ <https://sensibledigs.com/how-to-sharpen-saw-blades/> (Process to sharpen saw)

A. Competency/Competencies:

- ✓ Grind any tool using a grinding machine.

B. Learning objectives/Topic:

Learning objectives	Topic
2.3.1 State the function of a grinding machine. 2.3.2 List the safety precaution. 2.3.3 State the function of the safety guard. 2.3.4 Explain the working principle of the grinding machine. 2.3.5 Grind hand tools 2.3.6 Ensure to follow safety precautions. 2.3.7 Use to maintain cutting edge at an angle of 25° approximately. 2.3.8 Ensure appropriate use of PPE.	2.3 Grinding hand tools Overview: The function of a grinding machine, safety precaution, and its working principles are covered and the learners can operate it safely.

C. Learning Experiences:

- ✓ Make students read INFORMATION SHEET 2.3
- ✓ Make students perform OPERATION SHEET 2.3
- ✓ Make learners volunteer to talk about safety precautions on the grinding machine.
- ✓ Teacher to show video on grinding machine.
- ✓ Make learners watch video from the given link showing the process of using a grinding machine
<https://www.youtube.com/watch?v=y|pm9jNO3JE>

D. Assessment:

- ✓ Check learner's understanding by conducting the class test.
- ✓ Assess their given task (Grind hand tools).
- ✓ The teacher assesses the given work.
- ✓ Make learners do audio records on what they understood on grinding hand tools from the video.

E. Resources:

- ✓ CBLM.
- ✓ <https://www.youtube.com/watch?v=y|pm9jNO3JE> (Operation of grinding machine).

A. Competency/Competencies:

- ✓ Make a handle of any tool.

A. Learning objectives/Topic:

Learning objectives	Topic
2.4.1 Identify the materials used for the handle. 2.4.2 State the purpose of the handle. 2.4.3 Explain the method of the fitting handle. 2.4.4 Make handle 2.4.5 Ensure proper disposal of waste. 2.4.6 Ensure safe handling of tools.	2.4 Making handle Overview: The technique to make a handle identifying different materials is covered.

C. Learning Experiences:

- ✓ Make the learners read INFORMATION SHEET 2.4
- ✓ Make learners share how they make handle at their home.
- ✓ Make learners perform OPERATION SHEET 2.4 individually.
- ✓ The teacher provides relevant material (Video link, download content, handouts, and textbook, etc) on sharpening the saw blade.
- ✓ Make learners watch video from the given link that shows the process of making hammer handle <https://www.youtube.com/watch?v=Ld499Y6WjHI>

D. Assessment:

- ✓ Check learner's understanding by conducting the class test.
- ✓ Assess their handles using a rubric.
- ✓ The teacher assesses the given work through Google Classroom and social media.

E. Resources:

- ✓ CBLM.
- ✓ <https://www.youtube.com/watch?v=Ld499Y6WjHI> (Process of making hammer handle)

A. Competency/Competencies:

- ✓ Sharpen the auger bit for better performance.

B. Learning objectives/Topic:

Learning objectives	Topic
2.5.1 Define auger bit. 2.5.2 Identify the size of the auger bit. 2.5.3 Label the parts of the auger bit. 2.5.4 State the function of the auger bit. 2.5.5 Sharpen auger bit 2.5.6 Ensure not to change the angle of the bevel from the originally sharpened bit. 2.5.7 Ensure to avoid lifting the brace end to prevent the damaging of the bevel edge. 2.5.8 Ensure safe handling of sharpening bits. 2.5.9 Ensure appropriate use of PPE.	2.5 Sharpening auger bit Overview: Informations on auger bit such as identification of its sizes, parts and its function are covered besides imparting the technique of sharpening it.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 2.5
- ✓ Make the students perform OPERATION SHEET 2.5
- ✓ The teacher provides relevant material (Video link, download content, handouts, and textbook, etc) on sharpening Auger bit.
- ✓ Make learners watch video from the given link on sharpening auger bit (<https://www.youtube.com/watch?v=MsAs5zFp-9U>)

D. Assessment:

- ✓ The teacher assesses the given task by using the rubric.
- ✓ Check learner's understanding by conducting class tests and through question-answer sessions.
- ✓ The teacher assesses the given work through Google Classroom and social media.

E. Resources:

- ✓ CBLM of class IX
- ✓ <https://www.youtube.com/watch?v=MsAs5zFp-9U> (Process of sharpening auger bit)

A. Competency/Competencies:

- ✓ Sharpen any knife for better performance.

B. Learning objectives/Topic:

Learning objectives	Topic
2.6.1 Define knife. 2.6.2 Identify the types of knives. 2.6.3 Sharpen knife. 2.6.4 Ensure safe handling of the knife.	2.6 Sharpening knife Overview: The technique to sharpen knife and information like identification of different types of knives are covered.

B. Learning Experiences:

- ✓ Make students read INFORMATION SHEET 2.6
- ✓ Make students perform OPERATION SHEET 2.6
- ✓ The teacher provides relevant material (Video link, download content, handouts, and textbook, etc) on sharpening a knife.
- ✓ Make learners make a short video on how to sharpen the knife with the help of their parents.

C. Assessment:

- ✓ Assess learners through the given task (sharpen knife) by using the rubric.
- ✓ The teacher assesses the given work through Google Classroom and social media (short video on sharpening knife).

D. Resources:

- ✓ CBLM

A. Competency/Competencies:

- ✓ Change portable planer blade as required.

B. Learning objectives/Topic:

Learning objectives	Topic
2.7.1 State the portable planer safety precaution. 2.7.2 State the function of portable planer. 2.7.3 Operate portable planer machine. 2.7.4 Change portable planer blade. 2.7.5 Ensure to follow safety precautions. 2.7.6 Ensure safe handling of power tools. 2.7.7 Ensure appropriate use of PPE. 2.7.8 Ensure the blade is aligned with the notch of the cutter block.	2.7 Changing portable planer blade Overview: The technique to change portable planer blade following safety precautions is covered. The skill to operate a planer machine is also covered as an extended activity.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 2.7
- ✓ The teacher explains the parts of the planer machine followed by letting some volunteers explain it.
- ✓ Make the students perform OPERATION SHEET 2.7
- ✓ Teacher to demonstrate on changing planer blade.
- ✓ Make learners do the individual practice.
- ✓ The teacher provides relevant material (Video link, download content, handouts, and textbook, etc) on changing circular saw blade.
- ✓ Make learners watch a video from the given link showing the process of changing planer blade.
https://www.youtube.com/watch?v=uj_6U46pnn8
- ✓ The learner watches the video and summarize.

D. Assessment:

- ✓ Make learners label the parts of circular saw machine to check learners understanding.
- ✓ Teacher assess learners by letting them change circular saw blade individually.
- ✓ Teacher to assess the given work through Google Classroom and social media.

E. Resources:

- ✓ CBLM
- ✓ https://www.youtube.com/watch?v=uj_6U46pnn8 (process to change planer blade).

A. Competency/Competencies:

- ✓ Change circular saw blade as required

B. Learning objectives/Topic:

Learning objectives	Topic
<p>2.8.1 State the function of the circular saw machine.</p> <p>2.8.2 List the parts of the circular saw machine.</p> <p>2.8.3 State the type of saw blades.</p> <p>2.8.4 Operate circular saw.</p> <p>2.8.5 Change circular saw blade.</p> <p>2.8.6 Ensure appropriate use of PPE.</p> <p>2.8.7 Ensure that the stock is well supported to prevent getting the kerf close, binding the blade, and causing a kickback.</p> <p>2.8.8 Ensure to support thin materials near the cut.</p> <p>2.8.9 Ensure to adjust the depth of cut, so that the ends of three teeth are extended to ¼" (6 mm)</p> <p>2.8.10 Ensure to check the base and angle adjustments are tightened before using a saw.</p> <p>2.8.11 Ensure to let the blade touch the workpiece only after the machine is switched on.</p>	<p>2.8 Changing the circular saw blade</p> <p>Overview: Information on function of the circular saw machine, its parts and types are covered besides the techniques to change circular saw blade and to operate it.</p>

<p>2.8.12 Ensure to hold the machine by both hands if two handles are provided.</p> <p>2.8.13 Ensure the saw blade has stopped running before resting it on the workbench.</p> <p>2.8.14 Ensure to unplug the power cable while adjusting or changing the blade.</p> <p>2.8.15 Ensure to use sharp blades and keep the blade guard functional.</p> <p>2.8.16 Ensure to avoid overextending or overreaching and losing balance while using the portable circular saw.</p>	
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C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 2.8
- ✓ Make the students perform OPERATION SHEET 2.8
- ✓ Teacher to demonstrate on changing circular saw blade.
- ✓ The teacher provides relevant material (Video link, download content, handouts, and textbook, etc) on changing circular saw blade.
- ✓ The given link shows how to change circular saw blade
<https://www.youtube.com/watch?v=NDAYE2I8AIU>
- ✓ Based on the information obtained from watching the video from the given link, make learners answer the questions uploaded in the Google Classroom.

D. Assessment:

- ✓ Teacher assess by making learners change circular saw blade individually.
- ✓ Check learner's understanding by conducting a class test.
- ✓ Ask questions to assess their understanding.
- ✓ The teacher assess the given work through Google Classroom and social media (questions).

E. Resources:

- ✓ <https://www.youtube.com/watch?v=NDAYE2I8AIU> (Changing of the circular saw blade).
- ✓ CBLM of class IX

A. Competency/Competencies:

- ✓ Replace jigsaw blade as required.

B. Learning objectives/Topic:

Learning objectives	Topic
2.9.2 State the function of the jig saw machine. 2.9.3 Label the parts of the jigsaw machine. 2.9.4 Operate jigsaw machine. 2.9.5 Replace jigsaw blade 2.9.6 Ensure to cut the workpiece at normal speed. 2.9.7 Ensure safe handling of power tools. 2.9.8 Ensure appropriate use of PPE.	2.8 Replacing jigsaw blade Overview: Information related to jigsaw machine and the technique to replace jigsaw blade are coceted. The skills to operate jigsaw machine is also covered as an extended activity.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 2.9
- ✓ Make the students perform OPERATION SHEET 2.9
- ✓ The teacher demonstrates replacing the jig saw machine.
- ✓ Make learners make notes on jigsaw (Parts of jigsaw machine) from a textbook.
- ✓ Make learners watch video from given the link showing the process of changing the jigsaw blade <https://www.youtube.com/watch?v=L68Js3FefCc>

D. Assessment:

- ✓ The teacher assesses learners by making learners change jigsaw blades individually.
- ✓ Make learners do presentations on parts of the jigsaw machine.
- ✓ Check learner's understanding by conducting the test.
- ✓ The teacher assesses the given work through Google Classroom and social media (Notes on jigsaw blade).
- ✓ Make learner answer the questions provided.

E. Resources:

- ✓ <https://www.youtube.com/watch?v=L68Js3FefCc> (Process of changing the jigsaw blade).
- ✓ CBLM

A. Competency/Competencies:

- ✓ Replace router bit as required.

B. Learning objectives/Topic:

Learning objectives	Topic
2.10.1 State the function of the router machine. 2.10.2 State the types of the router bit. 2.10.3 Use router machine. 2.10.4 Replace Router bit 2.10.5 Ensure to cut the work piece at normal speed. 2.10.6 Ensure safe handling of power tools. 2.10.7 Ensure to use PPE.	2.9 Replacing router bit Overview: The technique to replace router bit and other important information related to it are covered, besides the technique to use router machine.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 2.10
- ✓ Make the students perform OPERATION SHEET 2.10
- ✓ The teacher provides relevant material (Video link, download content, handouts, and textbook, etc) on sharpening Auger bit.
- ✓ Make learners explore on types of the router bit and make notes.
- ✓ Make learners watch the video from a given link (changing router bit)
- ✓ https://www.youtube.com/watch?v=5Xs_ukSEKQo

D. Assessment:

- ✓ Make learners change the router bit individually.
- ✓ Check learner's understanding by conducting a class test or having a quiz.
- ✓ Teacher assess work submitted through Google Classroom and any other social media (notes on types of the router bit).

E. Resources:

- ✓ CBLM
- ✓ https://www.youtube.com/watch?v=5Xs_ukSEKQo (Process of changing router bit).

Chapter 3: Carrying out basic woodworking

A. Competency/Competencies:

- ✓ Perform cross-cut techniques to produce different products.

B. Learning objectives/Topic:

Learning objectives	Topic
3.1.1 Define crosscut saw. 3.1.2 State the application of sawing. 3.1.3 State the purpose of cross-cutting. 3.1.4 Perform cross-cut 3.1.5 Ensure safe handling of tools. 3.1.6 Ensure safe use of hand saw. 3.1.7 Ensure appropriate use of PPE.	3.1 Performing cross-cut Overview: The learners can perform cross cut besides knowing the application and purpose of cross cutting.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 3.1
- ✓ Make the students perform OPERATION SHEET 3.2
- ✓ Make learners go through the link on the cross cut saw and rip cut saw
<https://www.youtube.com/watch?v=6RuhVhKIDcQ>
- ✓ Make learners summarize the content from the video and submit it through Google Classroom.

D. Assessment:

- ✓ Check learners understanding by conducting class test and quiz.
- ✓ Assess learners task (crosscut).
- ✓ Teacher assess the given work through Google Classroom and social media.
- ✓ Conduct online test on rip cut and crosscut.

E. Resources:

- ✓ CBLM
- ✓ <https://www.youtube.com/watch?v=6RuhVhKIDcQ> (Explanation on cross cut and rip cut)

A. Competency/Competencies:

- ✓ Perform rip-cut technique to produce different products.

B. Learning objectives/Topic:

Learning objectives	Topic
3.2.1 State the function of rip cut saw. 3.2.2 State the application of rip cut saw. 3.2.3 Perform rip cutting 3.2.4 Ensure safe handling of tools. 3.2.5 Ensure safe use of hand saw. 3.2.6 Ensure appropriate use of PPE.	3.2 Performing rip cutting Overview: The learners can perform rip cut besides knowing its application and purpose.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 3.2
- ✓ The teacher explains the main differences between rip cut and cross-cut.
- ✓ Make the students perform OPERATION SHEET 3.2
- ✓ The teacher provides relevant material (Video link, download content, handouts, and textbook, etc) on rip cut.
- ✓ Make learners point out the differences between cross-cut and rip-cut submit through Google Classroom.

D. Assessment:

- ✓ The teacher assesses the given task (rip cut workpiece)
- ✓ Check learner's understanding by conducting class tests and quiz.
- ✓ Teacher assess the given work through Google Classroom and social media (Differences between rip saw and crosscut saw).

E. Resources:

- ✓ CBLM

A. Competency/Competencies:

- ✓ Apply planning techniques to produce different products.
- ✓ Identify the grains of any wood.

B. Learning objectives/Topic:

Learning objectives	Topic
3.3.1 Define plane. 3.3.2 List the types of marking tools. 3.3.3 State the preventive measure for distortion of a work piece. 3.3.4 Explain the grains and textures of wood. 3.3.5 Plane workpiece 3.3.6 Ensure safe handling of planes. 3.3.7 Ensure to place the plane side-wise. 3.3.8 Ensure appropriate use of PPE.	3.3 Planing workpiece Overview: The learners can plane a work piece and make the surface smooth to a required size.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 3.3
- ✓ Make the students perform OPERATION SHEET 3.3
- ✓ Make learners go through/explore the grains of wood from the given link
<https://www.woodmagazine.com/materials-guide/lumber/understanding-wood-grain>
- ✓ Make learners take notes on marking tools and their respective functions.

D. Assessment:

- ✓ Assess learners by observing the presentation on marking tools and their applications.
- ✓ Question and answer session on the preventive measure for distortion of a work piece.
- ✓ Teachers assess learners' understanding by conducting class tests and quiz.
- ✓ Assess learners through planed workpieces using the rubric.
- ✓ Teacher to conduct the online test on grains of wood.
- ✓ The teacher assesses the given work through Google Classroom and social media submitted by learners.

E. Resources:

- ✓ CBLM
- ✓ <https://www.woodmagazine.com/materials-guide/lumber/understanding-wood-grain> (Grains of wood)

A. Competency/Competencies:

- ✓ Apply chiseling technique to produce different products.

B. Learning objectives/Topic:

Learning objectives	Topic
3.4.1 State the functions of a chisel. 3.4.2 Identify the different types of a chisel. 3.4.3 Chisel workpiece 3.4.4 Ensure safe handling of a chisel. 3.4.5 Ensure appropriate use of PPE.	3.4 Chiseling workpiece Overview: The learners can chisel hard materials as required besides knowing the function and types of it.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 3.4
- ✓ The teacher explains the concept on chiselling.
- ✓ Make the students perform OPERATION SHEET 3.4
- ✓ The teacher provides relevant material (Video link, download content, handouts, and textbook, etc) on chiseling a workpiece.
- ✓ Teacher to let learners explore types of the chisel through the textbook and other resources available.
- ✓ Make learners go through the link given about handling the chisel
<https://www.youtube.com/watch?v=MOD-IYVkAgA>

D. Assessment:

- ✓ Check learner's understanding by a question and answer session on types of chisel and their application.
- ✓ The teacher assesses the given task by using the rubric.
- ✓ The teacher assesses the given work through Google Classroom and social media (Types of chisel).

E. Resources:

- ✓ CBLM.
- ✓ <https://www.youtube.com/watch?v=MOD-IYVkAgA> (Handling of chisel).

A. Competency/Competencies:

- ✓ Operate drilling machine using different bits in different areas as per requirement.

B. Learning objectives/Topic:

Learning objectives	Topic
3.5.1 Define drilling bit. 3.5.2 List the sizes of drill bit. 3.5.3 State the purpose of drilling. 3.5.4 Explain the types of boring tools. 3.5.5 Drill holes 3.5.6 Ensure safe handling of tools and equipment. 3.5.7 Ensure appropriate use of PPE.	3.4 Drilling holes Overview: The operation of drilling machine can be learnt besides knowing about different sizes and types of boring tools.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 3.5.
- ✓ Make the students perform OPERATION SHEET 3.5.
- ✓ The teacher demonstrates using a drilling machine.
- ✓ The teacher provides relevant material (Video link, download content, handouts, and textbook, etc) on drill holes.
- ✓ The teacher gives slides on types of drilling bit and learners take notes.
- ✓ Make learners go through the given link showing the operation of cordless drilling machine <https://www.youtube.com/watch?v=r59gnrhiCw>

D. Assessment:

- ✓ Check learner's understanding by letting learners label the parts of the drilling machine.
- ✓ The teacher assesses the given task.
- ✓ Conduct online tests on types of drilling bit with its applications.
- ✓ Assess the given questions through Google Classroom and social media (the type of drilling bit and process to operate drill holes).
- ✓ Make learners do audio records on the process to drill holes.

E. Resources:

- ✓ <https://www.youtube.com/watch?v=r59gnrhiCw> (Operation of cordless drilling machine)
- ✓ CBLM

A. Competency/Competencies:

- ✓ Carry out sanding work in any product.

B. Learning objectives/Topic:

Learning objectives	Topic
3.6.1 Define sanding. 3.6.2 State the purposes of sanding. 3.6.3 Explain types of sandpaper. 3.6.4 Explain the types of sandpaper grits. 3.6.5 State the methods of sanding. 3.6.6 State the function of a portable power sanding machine. 3.6.7 Sand workpiece 3.6.8 Use a portable power sanding machine. 3.6.9 Ensure safe handling of tools. 3.6.10 Ensure to follow safety precautions. Ensure appropriate use of PPE.	3.5 Sanding workpiece Overview: The learners can sand workpiece and also know about types and methods of sanding.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 3.6
- ✓ The teacher explains the methods of sanding and the grit of sanding paper.
- ✓ Make the students perform OPERATION SHEET 3.6
- ✓ Make learners go through the following content from the textbook:
 - The process to operate a sanding machine.
 - Methods of the sanding workpiece.
- ✓ Given the link that shows detail of the sanding machine
<https://www.youtube.com/watch?v=fXFnzZg-SPo>
- ✓ Make learners go through uncovered topics on sanding workpieces.
- ✓ Make learners go through the given link on grits of sandpaper and let them take notes.
<https://www.youtube.com/watch?v=qLEVoEUeLbM>

D. Assessment:

- ✓ Making learners differentiate the grits of sandpaper by providing the sand paper.
- ✓ The teacher assesses the given task (workpiece after sanding).
- ✓ Teachers provide different scenarios and letting learners choose the accurate grit of sandpaper with the reason (Case study).
- ✓ The teacher assesses the given work through Google Classroom and social media.

E. Resources (online and offline):

- ✓ CBLM
- ✓ <https://www.youtube.com/watch?v=fXFnzZg-SPo> (Details of the portable sanding machine)
- ✓ <https://www.youtube.com/watch?v=qLEVoEUeLbM> (Explanation on the grits of sandpaper)

ENGINEERING DRAWING

Module 1: INTERPRETING ENGINEERING DRAWING

Chapter 1: Interpreting basic engineering drawing.

A. Competency/Competencies:

- ✓ Carry out basic engineering drawing
- ✓ Handle the drawing instrument properly.

B. Learning Objectives/Topic

Learning objectives	Topic
1.1.1 Define engineering drawing. 1.1.2 State the purposes of engineering drawing. 1.1.3 List the types of drawing instruments. 1.1.4 State uses of drawing instruments. 1.1.5 List types and sizes of drawing papers. 1.1.6 <i>Ensure clean and neatness of drawing.</i> 1.1.7 <i>Ensure proper handling of drawing instruments.</i>	1.1 Using drawing instruments Overview: The learners can use appropriate drawing instruments to carry out engineering drawing.

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 1.1
- ✓ Make learners perform OPERATION SHEET 1.1.
- ✓ Exhibit the real instruments to the learners which are required for the drawing.
- ✓ Make learners go through the given web link <https://youtu.be/0Q6QwvtjVm8> that explains the types of the drawing instrument) and learners take notes.
- ✓ Make learners go through the given link https://youtu.be/kLe_brmh774 that explains the types of drawing instrument and their uses)
- ✓ Share the weblink <https://youtu.be/0Q6QwvtjVm8> that explains the types of the drawing instrument)
- ✓ Share the weblink https://youtu.be/kLe_brmh774 that explains the types of drawing instrument and their uses)
- ✓ Provide handouts

D. Assessment:

- ✓ Assess the learner's conceptual understanding of different types of drawing instruments and their function by conducting a class test.
- ✓ Make learners answer the SAMPLE SELF CHECK 1.1 and given additional questions.
- ✓ Based on the information gathered from the videos and handouts, the learners develop videos that explain the functions of the different drawing instruments.

E. Resources:

- ✓ Competency-Based Learning Materials
- ✓ Handout

- ✓ <https://youtu.be/0Q6QwvtjVm8> (Explanation on the types of drawing instrument and their uses)
- ✓ https://youtu.be/kLe_brmh774 (Explanation on the types of drawing instrument and their uses)

A. Competency/Competencies:

- ✓ Layout the drawing sheet as per the required dimension.

B. Learning objectives/Broad theme/Strand/chapter/topics:

Learning Objectives	Topic
1.2.1 Define the layout of a drawing sheet. 1.2.2 Define the title block. 1.2.3 Layout drawing sheet.	1.2 Laying out drawing sheet Overview: The learners can layout drawing sheet.

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 1.2
- ✓ Share the weblink <https://youtu.be/FzMPAiW8O-s> that explains the layout of the drawing sheet).
- ✓ Make learners perform OPERATION SHEET 1.2
- ✓ Demonstrate the layout of the drawing sheet according to OPERATION SHEET1.2 and make learners do it in a group followed by individual practices.
- ✓ Provide handouts to learners through Google Classroom or any other social media platforms.
- ✓ Make learners go through the web link <https://youtu.be/FzMPAiW8O-s> that explains the layout of drawing sheet).
- ✓ The teacher makes a video of the layout of the drawing sheet and uploads it inGoogle Classroom or any other social media platform.

D. Assessment

- ✓ Make learners design layout of the drawing sheet referring to OPERATION SHEET 1.2.
- ✓ Assess the learner’s conceptual understanding by letting the learners answer the SAMPLE SELF CHECK 1.2. Based on the assessment, provide necessary intervention.
- ✓ Assess the learner’s conceptual understanding by letting the learners answer the SAMPLE SELF CHECK 1.2 and make learners submit through Google Classroom or any other social media platforms.
- ✓ Make learners perform OPERATION SHEET1.2 and submit/ upload the layout sheet through Google Classroom or any other social media platforms.

E. Resources (Online and Offline)

- ✓ Competency-Based Learning Materials
- ✓ Handout
- ✓ <https://youtu.be/FzMPAiW8O-s> (Explanation on the layout of drawing sheet)

A. Competencies

- ✓ Interpret signs and symbols as required.

B. Learning objectives/Topic:

Learning objectives	Topic
1.3.1 Define signs and symbols. 1.3.2 Define abbreviation. 1.3.3 Draw engineering signs, symbols, and abbreviations.	1.3 Interpreting engineering signs, symbols, and abbreviations Overview: The learners can interpret engineering signs, symbols, and abbreviation.

C. Learning Experiences:

- ✓ An instructor may carry out the instructional practice on interpreting Engineering signs, symbols, and abbreviation through the following order.
- ✓ Make the learners read INFORMATION SHEET 1.3
- ✓ Make the learners go through OPERATION SHEET 1.3
- ✓ Make learners go through the given web link <https://youtu.be/MfNoq0y1LLY> that explains the engineering signs and symbols)
- ✓ The learner watches the video from the weblinks and gathers information on the engineering signs, symbols, and abbreviations.
- ✓ Make learners go through the given web link <https://youtu.be/MfNoq0y1LLY> that explains the engineering signs and symbols).
- ✓ The learner watches the video or goes through the learning resource.
- ✓ Based on the information obtained from the learning resources, the learner develops notes.

D. Assessment

- ✓ Make learners perform OPERATION SHEET 1.3
- ✓ Make learners solve the SAMPLE SELF CHECK 1.3
- ✓ Give additional questions.
- ✓ Make learners solve the SAMPLE SELF CHECK 1.3
- ✓ Give additional questions from CBLM and other resources-Google/YouTube.

E. Resources:

- ✓ CBLM
- ✓ <https://youtu.be/MfNoq0y1LLY> (Explanation on the engineering signs and symbols).

A. Competencies :

- ✓ Draw different types of lines as per their application.

B. Learning objectives/Broad theme/Strand/Chapter/topics:

Learning objectives	Topic
1.4.1 Define line.	1.4 Drawing different types of lines Overview: The learners can know about different types of lines and draw them.
1.4.2 State types of line and their applications.	
1.4.3 Ensure clean and neatness of drawing.	
1.4.4 Ensure Proper handling of drawing instruments.	

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 1.4
- ✓ Make learners perform OPERATION SHEET 1.4
- ✓ The teacher asks learners to watch the following videos:
- ✓ Share the weblink <https://youtu.be/SaOoKpLBfYo> that explains the different types of lines)
- ✓ Share the weblink <https://youtu.be/E6OXZ9OHpVk> that explains the application of lines (withdrawing)
- ✓ The learner notes the different types of line, their application, and their symbols.
- ✓ Using the information from the videos, the learner develops a drawing containing all the lines.
- ✓ An instructor may ask learners to watch the following videos:
<https://youtu.be/SaOoKpLBfYo> that explains the different types of lines.
- ✓ Share the weblink <https://youtu.be/E6OXZ9OHpVk> that explains the application of lines (withdrawing)
- ✓ The learner takes note of the different types of line and their application. Based on the information, the learner draws the symbols of different types of lines using a drawing instrument.
- ✓ The learner compares the different types of lines and explains their uses.

D. Assessment

- ✓ Assess notes and drawing containing different types of lines using a rubric or a checklist. Provide necessary intervention based on the assessment
- ✓ Assess the work uploaded in the Google Classroom to assess learner's understanding of different types of lines. Provide necessary intervention following the assessment.

E. Resources (Online or offline)

- ✓ Competency-Based Learning Materials for Classes IX and X, REC
- ✓ <https://youtu.be/SaOoKpLBfYo> (Explanation on the different types of lines)
- ✓ <https://youtu.be/E6OXZ9OHpVk> (Explanation on the application of lines withdrawing)

A. Competencies

- ✓ Draw letters and numbers as per the given scale.

B. Learning objectives/Topic:

Learning objectives	Topic
1.4.5 Define lettering and numbering. 1.4.6 Classify letters style. 1.4.7 List the types of letters. 1.4.8 Define freehand lettering. 1.4.9 List the size of letters. 1.4.10 State the rules for lettering and numbering. 1.4.11 Ensure clean and neatness of drawing. 1.4.12 Ensure Proper handling of drawing instruments.	1.5 Drawing letters and numbers Overview: The learners will know about different letter styles, types, sizes and can also draw.

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 1.5
- ✓ Make the learners perform OPERATION SHEET 1.5
- ✓ Share the weblink <http://ednotebook.hostgator.co.in/basics-of-engineering-drawing> that explains the techniques of lettering and numbering)
- ✓ The learner gathers the information from the web links.
- ✓ The following web link can be shared with the learners or other learning resources (articles, online content, etc.) <http://ednotebook.hostgator.co.in/basics-of-engineering-drawing> (Explains the techniques of lettering and numbering)
- ✓ Make learners go through the given link <https://youtu.be/onJlaSAkiEs> (describe the ways to write letters and numbers)
- ✓ Based on the information obtained from the learning resources, the learner develops notes.

D. Assessment

- ✓ Make learners solve the SAMPLE SELF CHECK 1.5
- ✓ Give additional questions from CBLM and other resources-Google/YouTube.
- ✓ Assess learner's ability to transfer conceptual knowledge into developing a model using a checklist/rubric. Provide necessary intervention based on the assessment.
- ✓ Assess the learner's conceptual understanding of lettering and numbering by assessing the answers to questions of SAMPLE SELF CHECK 1.5 uploaded in the Google Classroom. Provide necessary intervention following the assessment.
- ✓ Provide additional questions from CBLM

E. Resources:

- ✓ Competency-Based Learning Material for Classes IX & X, REC
- ✓ <http://ednotebook.hostgator.co.in/basics-of-engineering-drawing> (Explanation on the techniques of lettering and numbering)
- ✓ <https://youtu.be/onJlaSAkiEs> (Description on the ways to write letters and numbers)

A. Competencies/Competencies:

- ✓ Provide dimensions as per the standard.

B. Learning objectives/Topic:

Learning objectives	Topic
i. Define dimension. ii. State the types of dimensions. iii. Explain the system of dimensions. iv. State the terminologies of dimensions. v. State the rules for dimensioning. vi. Carryout dimensioning.	1.6 Providing dimensions Overview: The learners can carry out dimensioning knowing about its types, system and rules.

C. Learning Experiences:

- ✓ An instructor may carry out the instructional practice on lettering and numbering through the following order.
- ✓ Make the learners read INFORMATION SHEET 1.6
- ✓ Make the learners go through OPERATION SHEET 1.6
- ✓ Share the weblink <https://youtu.be/XS0IJsmy-qg> that explains the types of dimensioning and systems of dimensioning).
- ✓ Make learners go through the given web link <https://youtu.be/XS0IJsmy-qg> that explains the types of dimensioning and systems of dimensioning) and take notes.

D. Assessment

- ✓ Assess learner's ability to identify types of dimensions and the learner's conceptual understanding of systems of dimensioning. Provide necessary intervention if needed.
- ✓ Make learners perform OPERATION SHEET1.6
- ✓ Assess the learner's conceptual understanding of dimensioning by assessing the answers to questions of SAMPLE SELF CHECK 1.6 uploaded in the Google Classroom. Provide necessary intervention following the assessment.
- ✓ Provide additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms

E. Resources(online and online)

- ✓ CBLM
- ✓ <https://youtu.be/XS0IJsmy-qg> (Explanation on the types of dimensioning and systems of dimensioning).

Class X

MODULE 1: Performing manual work

Chapter 3: Carrying out basic woodwork

A. Competency/Competencies:

- ✓ Cut glass as per the job requirement (desired shapes and sizes).

B. Learning objectives/Topic:

Learning objectives	Topic
3.7.1 Define glass.	3.7 Cutting glass Overview: Besides knowing the types of glasses, learners can cut glass using glass cutter.
3.7.2 State the function of a glass cutter.	
3.7.3 State the types of glasses.	
3.7.4 Cut glass.	

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 3.7
- ✓ Let students find out different types of glasses.
- ✓ Make the students perform OPERATION SHEET 3.7.
- ✓ Teacher to demonstrate cutting glass, followed by guided practice and individual practice.
- ✓ Make learners watch the video from the given link on the process of cutting glass and let them take notes. <https://www.youtube.com/watch?v=hIWfvgDJ3JE>
- ✓ Make learners take notes on different types of glasses from CBLM and any other resources available.

D. Assessment:

- ✓ The teacher assesses learners' understanding by asking questions.
- ✓ Assess their assigned task using a rubric.
- ✓ Assess learners based on work submitted in the Google Classroom.
- ✓ Learners to answer the questions after watching the video from the given link
- ✓ Share the weblink <https://www.youtube.com/watch?v=hIWfvgDJ3JE>.

E. Resources:

- ✓ CBLM
- ✓ <https://www.youtube.com/watch?v=hIWfvgDJ3JE> (Process of cutting glass)

A. Competency/Competencies:

- ✓ Perform timber seasoning for making any product.

B. Learning objectives/Topic:

Learning objectives	Topic
3.8.1 Define wood.	3.8 Perform timber seasoning Overview: The topic enable learners to perform timber seasoning after obtaining knowledge on types and methods of seasoning. Besides seasoning timber, learners will acquire knowledge on conversion of timber, preservation of timber, timber defects and moisture content in timber.
3.8.2 Classify the types of wood.	
3.8.3 State the characteristics of wood.	
3.8.4 Explain the species of trees in Bhutan.	
3.8.5 State the properties of wood.	
3.8.6 Explain the cross-section of timber.	
3.8.7 Explain the conversion of timber.	
3.8.8 Explain preservation of timber.	
3.8.9 Explain the timber defects.	
3.8.10 Define timber seasoning.	
3.8.11 Explain the purpose of seasoning.	
3.8.12 State the types of seasoning.	
3.8.13 Explain the methods of seasoning.	
3.8.14 Explain the moisture content in timber.	
3.8.15 Perform timber seasoning	

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 3.8
- ✓ Make the students perform OPERATION SHEET 3.8
- ✓ Learners to practice air seasoning guided by the teacher.
- ✓ Learners to go around their places to find at least three different species of wood.
- ✓ Learners to be in groups to do a presentation on given topics by a teacher.
- ✓ Make learners go through the outer parts of a tree in the given link <https://www.abcteach.com/documents/clip-art-tree-parts-color-i-abcteachcom-34022>
- ✓ Make learners explore the character of timber and write each to submit through Google Classroom.
- ✓ Make learners explore the importance of timber seasoning.
- ✓ Learners to go through the given links showing the cross-section of wood. Explore and write the functions of each part of wood given in the link. <https://www.pinterest.com/pin/116741815320865017/>
- ✓ Given links shows the methods of timber seasoning <https://www.youtube.com/watch?v=veD-xtLdDpU>. After watching the video, differentiate between natural and artificial seasoning.
- ✓ Make learners identify the trees (at least three different species) around their place and identify whether it is soft or hardwood.
- ✓ Make learners explore defects of timber and write notes.

D. Assessment:

- ✓ Assess their assigned task (different species of tree in and around their places)
- ✓ Assess learner's understanding by asking questions/ conducting tests.

- ✓ Assess learners through their presentation using the rubric.
- ✓ Assess the learners based on work submitted in the Google Classroom on the following content:
 - Defect of timber
 - Cross-section of wood
 - Species of wood
 - Differences between natural and artificial seasoning.

E. Resources:

- ✓ CBLM
- ✓ <https://www.youtube.com/watch?v=veD-xtLdDpU> (Methods of seasoning)
- ✓ <https://www.pinterest.com/pin/116741815320865017/> (Cross-section of wood)
- ✓ <https://www.abcteach.com/documents/clip-art-tree-parts-color-i-abcteachcom-34022> (Outer parts of trees)

Chapter 4: Performing wood joints

A. Competency/Competencies:

- ✓ Use butt joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.1.1 Define wood joints. 4.1.2 Explain the purpose of a butt joint. 4.1.3 State the application of butt joint. 4.1.4 State the requirements of a wood joint. 4.1.5 Explain the types of a butt joint. 4.1.6 Make butt joint.	4.1 Making butt joints Overview: After learning the purposes and applications of butt joint, learners can make butt joint to make any products.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 4.1
- ✓ Make the students perform OPERATION SHEET 4.1
- ✓ Make learners record a short video of making butt joints and submit it through Google Classroom or any social media.
- ✓ Make students state the application of butt joints around their place.
- ✓ Make learners solve sample self-check 4.1.

D. Assessment:

- ✓ The teacher may assess their butt joints using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess the learner based on work submitted in the Google Classroom (short videos and sample self-check 4.1)

E. Resources:

- ✓ CBLM

A. Competency/Competencies:

- ✓ Use a half-lap joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.2.1 Define half-lap joint.	4.2 Making half-lap joints Overview: After learning the purposes and applications of half-lap joint, learners can make half-lap joint to make any products.
4.2.2 State the purpose of a half-lap joint.	
4.2.3 State the types of half-lap joints.	
4.2.4 Make half lap joint	

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 4.2
- ✓ Make the students perform OPERATION SHEET 4.2
- ✓ A teacher explains the marking before making half-lap joints.
- ✓ Make learners go through the given links on making half-lap joint
<https://www.instructables.com/Easy-Half-Lap-Joints/>
- ✓ Learners make simple half-lap joints by using tools available at their place and let them explain what they learned while making half-lap joints.
- ✓ Let learners list the products where half-lap joints is being used at their place.

D. Assessment:

- ✓ Teacher to assess their half-lap joints using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess learner based on work submitted in the Google Classroom (half-lap joints made by them)
- ✓ Assess learners through their work submitted on the questions assigned.

E. Resources:

- ✓ CBLM
- ✓ <https://www.instructables.com/Easy-Half-Lap-Joints/>(Process of making half-lap joint)

A. Competency/Competencies:

- ✓ Use T joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.3.1 Define "T" joint.	4.3 Performing T joints Overview: After learning the purposes and applications of T-joint, learners can make T-joint to make any products.
4.3.2 Explain the application of the "T" joint.	
4.3.3 Explain the types of "T" joints.	
4.3.4 Perform "T" Joint	

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 4.3
- ✓ Make the students perform OPERATION SHEET 4.3
- ✓ Make learners go through the given links on making T bridle joint
<https://www.youtube.com/watch?v=PJvIr2xgBnI>
- ✓ Make learners list down the applications of T joints.
- ✓ Make learners make T joints.

D. Assessment:

- ✓ A teacher may assess their T joints using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess the learners based on responses submitted in Google.

E. Resources:

- ✓ CBLM
- ✓ <https://www.youtube.com/watch?v=PJvIr2xgBnI>(Process of making T bridle joint)

A. Competency/Competencies:

- ✓ Use mortise and tenon joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.4.1 Define mortise and tenon joint.	4.4 Performing mortise and tenon joint Overview: After learning the purposes and applications of mortise and tenon joint, learners can make mortise and tenon joint to make any products.
4.4.2 State the application of mortise and tenon joint.	
4.4.3 State the types of mortise and tenon joint.	
4.4.4 Perform mortise and tenon joint.	

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 4.4
- ✓ Make the students perform OPERATION SHEET 4.4
- ✓ The teacher explains the types of mortise and tenon joint.
- ✓ Make learners go through the given links on making mortise and tenon joint <https://www.youtube.com/watch?v=KOEYimvaQz4>
- ✓ Make learners do audio records on what they understood from mortise and tenon joint by watching video from a given link.

D. Assessment:

- ✓ The teacher assesses their mortise and tenon joint using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess the learners based on work submitted in the Google Classroom (audio record on mortise and tenon joints) using a rubric.

E. Resources:

- ✓ CBLM
- ✓ <https://www.youtube.com/watch?v=KOEYimvaQz4>(Process of making mortise and tenon joint)

A. Competency/Competencies:

- ✓ Use miter joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.5.1 Define miter joint.	4.5 Making miter joint. Overview: After learning the purposes and applications of miter joint, learners can make miter joint to make any products.
4.5.2 State the applications of the miter joint.	
4.5.3 Explain the types of the miter joint.	
4.5.4 Explain the characteristics of the miter joint.	
4.5.5 Make miter joint.	

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 4.5
- ✓ Make the students perform OPERATION SHEET 4.5
- ✓ Demonstrate marking while making miter joint
- ✓ Make learners explore the types of miter joints and submit the works in Google Classroom.
- ✓ Make learners list the applications of miter joints.
- ✓ Make learners solve SAMPLE SELF CHECK 4.5.

D. Assessment:

- ✓ Teachers assess their miter joint using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess learners based on work submitted in the Google Classroom (Application of miter joints and types of miter joints) using a rubric.

E. Resources:

- ✓ CBLM

A. Competency/Competencies:

- ✓ Use a finger joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.6.1 Define finger joint. 4.6.2 List the types of finger joints. 4.6.3 State the application of finger joint. 4.6.4 Make finger joint.	4.6 Making finger joint. Overview: After learning the purposes and applications of finger joint, learners can make finger joint to make any products.

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 4.6
- ✓ Make the students perform OPERATION SHEET 4.6
- ✓ Make learners go through the given link to learn more on finger joints, go to slide 8 of 13 in the given link <https://www.slideshare.net/rmaliberan07/types-of-wood-joint> and make notes on finger joints.
- ✓ Write applications of finger joints in and around your place.

D. Assessment:

- ✓ Teachers assess their finger joints using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess learners based on work submitted in the Google Classroom (Application of finger joints) using a rubric.

E. Resources:

- ✓ CBLM
- ✓ <https://www.slideshare.net/rmaliberan07/types-of-wood-joint> (Notes/slide on joints)

A. Competency/Competencies:

- ✓ Use a dovetail joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.7.1 Define dovetail joint.	4.7 Performing dovetail joints. Overview: After learning the purposes and applications of dovetail joint, learners can make dovetail joint to make any products.
4.7.2 Explain the characteristics of the dovetail joint.	
4.7.3 List the types of a dovetail joint.	
4.7.4 List the application of the dovetail joint.	
4.7.5 Perform dovetail joint.	

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 4.7
- ✓ Make the students perform OPERATION SHEET 4.7
- ✓ Make learners go through the given links where all the content of dovetail joints is being mentioned <https://www.dcdrawers.com/blog/what-is-a-dovetail-joint-types/#dovetail>
- ✓ Make learners go take notes on dovetail joints and let them differentiate between half-blind and through dovetail joints and submit through Google Classroom.
- ✓ Make learners list any products where dovetail joints are common.

D. Assessment:

- ✓ A teacher may assess their task (Dovetail joints) using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess learners based on work submitted in the Google Classroom (differences between half-blind and through dovetail joints) using a rubric.

E. Resources:

- ✓ CBLM
- ✓ <https://www.dcdrawers.com/blog/what-is-a-dovetail-joint-types/#dovetail> (Details on dovetail joints)

A. Competency/Competencies:

- ✓ Use sash joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.8.1 Define sash joint.	4.8 Performing sash joints. Overview: After learning the purposes and applications of sash joint, learners can make sash joint to make any products.
4.8.2 Explain the purpose of the sash joint.	
4.8.3 State the characteristics of sash joints.	
4.8.4 State the application of sash joint.	
4.8.5 Perform sash joint.	

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 4.8
- ✓ Make the students perform OPERATION SHEET 4.8
- ✓ Teacher to invite guest lecturer to explain and demonstrate sash joints.
- ✓ Learners make sash joints.
- ✓ Make learners go through the given link showing the process of making sash joint, and explore the different tools and machinery used in the video <https://woodandshop.com/the-house-jointer-make-sash-windows/>
- ✓ The teacher provides notes on applications and characteristics of sash joint to be noted by learners.

D. Assessment:

- ✓ Teachers assess their task (Sash joints) using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess the learners based on work submitted in the Google Classroom (Applications and characteristic of sash joints) using the rubric.

E. Resources:

- ✓ CBLM
- ✓ <https://woodandshop.com/the-house-jointer-make-sash-windows/> (Process of making sash joints)

A. Competency/Competencies:

- ✓ Use haunch joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.9.1 State the purpose of the haunch joint. 4.9.2 State the application of haunch joint. 4.9.3 Make a haunch joint.	4.9 Making haunch joints. Overview: After learning the purposes and applications of haunch joint, learners can make haunch joint to make any products.

C. Learning Experiences:

- ✓ Make the students read information sheet 4.9
- ✓ Make the students perform operation sheet 4.9
- ✓ The teacher explains the process of making haunch joints.
- ✓ Learners make haunch joints.
- ✓ Make learners go through the link on making haunch joints (<https://www.youtube.com/watch?v=yjPBFW3rp1k>)
- ✓ Make learners discuss on applications of haunch joints and the purpose of joints.

D. Assessment:

- ✓ Teachers assess their haunch joint using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess the learners based on work submitted in the Google Classroom or any social media in groups.

E. Resources:

- ✓ CBLM
- ✓ <https://www.youtube.com/watch?v=yjPBFW3rp1k>(Making haunch joint)

A. Competency/Competencies:

- ✓ Use dowel joint to make any product.

B. Learning objectives/Topic:

Learning objectives	Topic
4.10.1 Define dowel joint. 4.10.2 State the application of dowel joints. 4.10.3 State the purpose of the dowel plate. 4.10.4 Make dowel joint.	4.10 Making dowel joints Overview: After learning the purposes and applications of dowel joint, learners can make dowel joint to make any products.

C. Learning Experiences:

- ✓ Make the students read information sheet 4.10
- ✓ Make the students perform operation sheet 4.10
- ✓ The teacher provides a sample of dowel joints and explains on marking of the dowel joint.
- ✓ Teacher help learners with marking and making dowel.
- ✓ Learners make dowel joints.
- ✓ Make learners summarise after watching a video in the given link.
- ✓ Learner to watch the video in given link showing the usage of dowel joint in making bookshelf
<https://www.youtube.com/watch?v=Er-p2jUCyCo>

D. Assessment:

- ✓ A teacher may assess their dowel joint using rubrics.
- ✓ Assess the use of PPE and OHS while handling tools and machines.
- ✓ Assess the learners based on work submitted in Google.

E. Resources:

- ✓ CBLM
- ✓ <https://www.youtube.com/watch?v=Er-p2jUCyCo> (Dowel joints used in a bookshelf)

A. Competency/Competencies:

- ✓ Carry out estimation of the materials using BSR.

B. Learning objectives/Topic:

Learning objectives	Topic
4.11.1 Define estimation and costing.	4.11 Performing basic estimation of materials Overview: The topic enable learners to perform basic estimations after learning about the Bhutan Scheduel of Rate and methods of estimation and costing.
4.11.2 State methods of estimation and costing.	
4.11.3 Explain the purpose of estimation using the Bhutan Schedule of Rates (BSR).	
4.11.4 Estimate basic cost of wooden components product.	
4.11.5 Perform basic estimation of materials.	

C. Learning Experiences:

- ✓ Make the students read INFORMATION SHEET 4.11
- ✓ Explain the process of estimating.
- ✓ Make the students perform OPERATION SHEET 4.11
- ✓ Teacher to solve one sample question on estimation.
- ✓ Provide sample solutions for solving estimation.
- ✓ Make learners explore the purpose of estimation.
- ✓ Make learners research on how they estimate materials when they make any kind of product
- ✓ Make leaners do simple estimations on making a picture frame.
- ✓ Make learners solve **SAMPLE SELF CHECK 4.11**

D. Assessment:

- ✓ The teacher assesses learners after giving the task of estimating.
- ✓ Assess learners by conducting a test.
- ✓ Assess learners by asking questions in groups.
- ✓ Assess the learners based on work submitted in the Google Classroom (Estimation of the picture frame)

F. Resources:

- ✓ CBLM

ENGINEERING DRAWING (X)

Chapter 2: Drawing isometric projections.

A. Competency/Competencies:

- ✓ Convert the drawing scales as per the drawing ratios.

B. Learning Objectives/Topic

Learning objectives	Topic
2.1.1 Define drawing scale. 2.1.2 List the types of scale. 2.1.3 Convert scale for drawing	2.1 Converting scale for drawing Overview: The topic enable learners to convert the scale while drawing any figures. Learners will know about the types of scale and can use accordingly.

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 2.1
- ✓ Make learners perform OPERATION SHEET 2.1.
- ✓ The teacher solves one question on scaling using drawing.
- ✓ Make learners take notes on the definition of drawing a scale and types of scale from a textbook.
- ✓ Make learners go through the given link on sample solving question on scaling <https://www.youtube.com/watch?v=kP-L7NaATwE>
- ✓ The teacher gives questions to solve using types of scale.

D. Assessment:

- ✓ Assess learners by conducting the test.
- ✓ Make learners solve SAMPLE SELF CHECK 2.1 and given additional questions.
- ✓ Assess learners based on work submitted (Problem-solving on scaling).

E. Resources:

- ✓ Competency-Based Learning Materials
- ✓ <https://www.youtube.com/watch?v=kP-L7NaATwE> (Sample questions on scaling)

A. Competency/Competencies:

- ✓ Draw isometric blocks as per the given dimension in standards procedures.

B. Learning Objectives/Topic

Learning objectives	Topic
2.2.1 Define isometric drawing. 2.2.2 State the isometric terminologies. 2.2.3 Draw isometric blocks.	2.2 Draw isometric blocks Overview: Learners can draw isometric blocks after learning on terminologies of isometric.

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 2.2
- ✓ Make learners perform OPERATION SHEET 2.2.
- ✓ The teacher demonstrates drawing isometric blocks.
- ✓ Make learners explore isometric terminologies and take notes.
- ✓ Make learners go through the given link (drawing simple isometric block)
<https://www.youtube.com/watch?v=uWYI51QJ0Zw>
- ✓ Make learners watch the video on drawing complex isometric block.
<https://www.youtube.com/watch?v=nDCg8LSODnU>
- ✓ The teacher gives drawing to be converted into isometric blocks.

D. Assessment:

- ✓ Assess learners by asking questions.
- ✓ Assess learners by giving drawings to be converted into an isometric block.
- ✓ Assess learners based on learner's responses submitted through Google Classroom (Notes on isometric terminologies, drawing isometric block)

E. Resources:

- ✓ <https://www.youtube.com/watch?v=nDCg8LSODnU> (Drawing simple isometric block)
- ✓ Competency-Based Learning Materials
- ✓ <https://www.youtube.com/watch?v=uWYI51QJ0Zw>(Drawing isometric block).

A. Competency/Competencies:

- ✓ Draw orthographic projections to give an accurate overall representation of an object.

B. Learning Objectives/Topic

Learning objectives	Topic
2.3.1 Define orthographic projections 2.3.2 Draw six principle views 2.3.3 Explain the method of obtaining six principle views 2.3.4 Explain four quadrants with the help of diagrams 2.3.5 Differentiate between first and third angle projections 2.3.6 Draw orthographic projections	2.3 Drawing an orthographic projections Overview: The topic will enable learners to draw an orthographic projections after learning about first and third angle of projection, six principles of views and on four quadrants.

C. Learning Experiences:

- ✓ Make learners read INFORMATION SHEET 2.3
- ✓ Make learners perform OPERATION SHEET 2.3.
- ✓ Teacher to use ICT (video) on orthographic views and the differences between first and third angle projections.
- ✓ The teacher demonstrates orthographic projections.
- ✓ Make learners go through the given link (Six principle view)
https://www.youtube.com/watch?v=eCOuh_gXRQ
- ✓ Make learners watch the video on the given link
<https://www.youtube.com/watch?v=1sjaelzuGAK> (Information on orthographic view) and make learners write notes.
- ✓ Make learners watch videos from the given link
<https://www.youtube.com/watch?v=mcxUTNkSyp4>(Differences between first and third angle) to take notes on it.
- ✓ Make learners watch all the videos from the above link and summarize each to be submitted in Google Classroom.

D. Assessment:

- ✓ Assess learners by conducting a class test.
- ✓ Assess learners by asking questions.
- ✓ Assess learners through drawing (converting blocks into orthographic views).
- ✓ Assess learners based on work submitted through Google Classroom (Notes on Six principle views, differences between first and third angle).
- ✓ Assess the learner's understanding by going through the summarized notes on each content.

E. Resources:

- ✓ https://www.youtube.com/watch?v=eCOuh_gXRQ (Six principles view in orthographic)
- ✓ <https://www.youtube.com/watch?v=mcxUTNkSyp4>(Differences between first and third angle)
- ✓ Competency-Based Learning Materials

RESOURCES

- 1) Technical and Vocational Education and Training (TVET) New Normal Curriculum Framework (Classes: PP-XII)
- 2) Competency Based Learning Materials (Furniture Making)