



Students Will Design and Create a Table Base .



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Introduction

Course Code: TAS20 / TMJ20 / TCJ20

Broad base Technology: Manufacturing and Construction

Destination: Open

Grade Level: 10

Online Project Name: Table Base

BBT Covered in the Activity

This activity will primarily cover Manufacturing and or Construction topics. The project can be modified by the teacher to include other components from other broad based technological areas that are connected to the teacher's long term plan. One example would be to include components from Tech Design by focusing on the research and development of the drawings and procedures required to complete the table base.

Project Outline

Student Problem to Solve: A unique table needs to be built to create income to help a company grow. Only a specific amount of material can be used to ensure the table is profitable (Instructor decides the amount).

Students will work on both numeracy and literacy skills throughout the project. Students will demonstrate learning skills that include responsibility, organization, independent work, initiative and self-regulation. Students will be required to choose a design of their choice to build the base of a table. They can research ideas to help them to create a base that is creative and unique. They will be encouraged to think outside the box to come up with an idea that will be practical and artistic. There is the capability to add an extension for a table top in a separate unit or in a rotation. This project should take roughly 15-20 hours to complete depending on finishing procedures.

Student Activities

Activity #1: Introduction to Tables and Design

Activity #2: Procedure Research

Activity #3: Orthographic/Isometric Drawings

Activity #4: Table Manufacturing/Construction

Planning Notes

In a BBT specific course this activity should occur at the beginning of the course to allow the students to grow their knowledge of all the tools found in the shop while creating their table base.

This collection of activities is designed as a complete set. But you have the ability to run each one individually as stand alone lessons or a combination of any of the above. Below is a list of materials that will be required for each activity to help guide the facilitation of the activities.

Activity #1: Introduction to Tables and Design

- Access to computers with Internet
- Table Design Activity Sheet(Appendix A)

Activity #2: Procedure Research

- Access to computers with Internet
- Access to the shop for demonstrations
- Procedure List Activity Sheet (Appendix B)

Activity #3: Orthographic/Isometric Drawings

- Access to computers with Internet
- Graph Paper, Rulers and Pencils
- Orthographic/Isometric Activity Examples (Appendix C)

Activity #4: Table Base Manufacturing/Construction

- Access to all tools/machines in the shop
- Create table base (Appendix D)

Overall Expectation

These overall expectations listed here that are covered in this package assumes you are completing all four activities in this package. If you only do some of the activities, understand that you will not meet all the expectations listed.

Overall Expectations Covered

Overall TAS2O Expectations Met by the Lesson

A. Design Processes and Related Skills

A1. Initiating and Planning: Demonstrate understanding of fundamental technological concepts by planning projects.

Activity: 1 and 2

A2. Designing and Performing: Develop projects creating products/services using resources and techniques.

Activity: 2 and 3

A3. Analyzing and Refining: Evaluate and refine processes, products, and/or services.

Activity: 2 and 3

A4. Following Health and Safety Practices: Apply understanding of health and safety practices.

Activity: 4

B. Technology, the Environment, and Society

B1. Fundamentals of Technological Development: Understand how needs and social, economic, and environmental factors drive technology.

Activity: 1

B3. Careers and Pathways in Technology and the Skilled Trades: Explore and describe career opportunities and pathways.

Activity: 4

This ensures that students gain a comprehensive understanding of the integrated aspects of research, design and procedures aligned with the TAS2O curriculum expectations.

Engineering Design Process

The engineering design process will allow students to demonstrate their learning through a design process connected to the broad based technology classes.

This [engineering design process](#) has been modified from the [Ministry of Educations](#) model and as part of the expectations this step-by-step guide was developed to help the educator meet those expectations This [engineering design process](#) is to use as the basis of the activity below.

Students will go through the process of Initiating and Planning, Designing and Performing, and Analysing and Refining a project based on a real world problem.

Any engineering design process can be used. Connect with your board to implement the engineering design process that is currently being used in your district.

Universal Design for Learning

Multiple Means of Representation: provided various ways to present research processes, concepts and techniques, such as visual demonstrations, written instructions, videos, and hands-on Practices. Use of diverse materials, tools, and resources to accommodate different learning styles and preferences.

Multiple Means of Engagement: Offer options for learners to explore and engage with the table base project based on their interests and motivations. Incorporate interactive elements, creative challenges, and personalization opportunities to foster engagement and ownership of the learning process.

Multiple Means of Expression: Allow learners to demonstrate their understanding and creativity in different ways. Encourage Self-expression through diverse design choices, techniques, and styles. Provide opportunities for reflection, feedback, and revision to support continuous improvement and skill development.

Indigenous ways of knowing, doing and learning

The author has suggested an activity that honours the place from where it was written.

Please consult your school boards First Nation, Metis and Inuit curriculum and / or cultural support team to inform content or activities relevant to communities in your area.

[Indigenous Inventions and Innovations](#)

Potential for Community Partnership

Community partnerships can greatly enhance a Manufacturing project by providing support, resources, and opportunities for collaboration. There is opportunity for tables to be built for an organization or charitable foundation.

- Machine Shops
- Carpenters
- Local Small Businesses
- Lumber Yards
- Scrap Yards
- Other Secondary Schools

Innovations and Emerging Technologies

High school manufacturing shops are embracing innovations like computer numerical control (CNC) machines, enabling students to create precise and complex parts. Additionally, additive manufacturing technologies such as 3D printing are revolutionizing prototyping and customization capabilities within these educational settings. These advancements not only prepare students for future careers in manufacturing but also foster creativity and problem-solving skills through hands-on experience with cutting-edge tools.

High school wood shops are increasingly integrating advanced technologies like computer-controlled routers and 3D printers, revolutionizing traditional woodworking projects with precision and creativity. These innovations not only enhance students' technical skills but also prepare them for modern manufacturing and design careers in a rapidly evolving technological landscape.

Career Opportunities

The skills and knowledge learned by completing this project will be of great benefit to students when pursuing a career in multiple areas of the Manufacturing and Construction industry as well as other industries. Some additional examples are:

- General Machinist
- Tool and Die Maker
- Millwright
- Sheet Metal Worker
- Mould Maker
- Pattern Maker
- Carpenter
- Cabinet Maker
- Furniture Restoration

Apprenticeship and Skilled trades information was collected through skilledtradesontario.ca please ensure to check the website to ensure you are accessing the most recent updated information.

Trade Name	Trade Code	Classification	Exam	Red Seal	Trade Details
General Machinist	429A	Non-Compulsory	YES	YES	Details

Tool and Die Maker	430A	Non-Compulsory	YES	YES	Details
Industrial Mechanic Millwright	433A	Non-Compulsory	YES	YES	Details
Welder	456A	Non-Compulsory	YES	YES	Details
General Carpenter	403A	Non-Compulsory	YES	YES	Details
Cabinet Maker	438A	Non-Compulsory	YES	YES	Details

Assessment and Evaluation

Evidence of student achievement for evaluation is collected through this project from different sources using multiple sources to evaluate student learning. Student products will be in the form of assignments for evaluation. Assignments for evaluation include rich performance tasks, demonstration, research, and projects based on real world settings. Assessment will include the categories of knowledge/understanding, thinking, communication and application.

Experiential Learning

Students learn best by doing. Providing genuine, hands-on opportunities for students to engage with the world around them is a powerful way for teachers to facilitate deeper learning and allows students to make meaningful connections between themselves and the curriculum. Experiential Learning is a student-centered, inquiry-based pedagogy that promotes active learning.

Reflection of Learning

When making the table base, reflection on learning can be enhanced by documenting each step of the process, including challenges faced and solutions implemented. Take time to review the initial design concept compared to the final product, noting any improvements or adjustments made along the way. Finally, discussing the experience with peers or instructors can provide valuable insights into different approaches and techniques, fostering a deeper understanding of the manufacturing and construction process.

Health and Safety Considerations

- Personal Protective Equipment (PPE): Ensure students wear appropriate PPE such as safety glasses, gloves, and closed-toe shoes to protect against hazards like flying debris and chemical spills.
- Machine Safety: Educate students on the safe operation of machinery, including emergency shutdown procedures and proper guarding to prevent accidents involving moving parts.

- Ventilation and Air Quality: Maintain adequate ventilation to minimize exposure to fumes and dust generated during manufacturing processes, especially when using materials like metals or chemicals.
- Emergency Preparedness: Have protocols in place for responding to accidents or injuries, including access to first aid kits and clear evacuation routes in case of emergencies like fires or chemical spills.

Activity 1

Introduction to Tables and Designs

Specific Expectations: A1.3, A2.2, A2.5, B1.1, B1.3, B2.2

Activity Breakdown:

This activity will be the introduction to the project as well as the shop and its capabilities. Students will be required to research and come up with a design for a table base of their choice. While researching, shop tours and explanations should be held in small groups or as a class to help them understand the capabilities of the shop and how that relates to the design ideas that they are researching. Students will be required to come up with three design ideas by the end of the activity. They will be required to provide a rough sketch, list of tools/machines required and types of joinery/welding ect. A sheet will be provided for them to type or write their information as well as input their sketch. This is a good opportunity to start the conversations around isometric or 3D drawings which will lead into activity 3.

Key Points:

- Customize the machine/tool conversations to what is in your shop
- Sketch can be very rough, they will refine the drawing in activity 3
- Try to incorporate as many design and process ideas as possible into each base
- One of the three design ideas will be approved by the teacher to move forward with in activity 3
- Opportunity for conversations around culturally unique design and environmental impacts

Learning Goals:

- Understand various styles of designs for a table base
- Understand the shop capabilities and how they can be used

Success Criteria:

- 3 potential designs have been completed
- Various procedures have been incorporated into all 3

Resources:

Table base ideas

<https://www.pinterest.ca/rdhollenbeck/table-bases/>

Activity 2

Procedure Research

A1.2, A1.2, A1.3, A1.6, A2.1, A2.2, A2.5, A2.7, B1.1

Activity Breakdown:

In this activity the students will be researching the procedures that will potentially be used for the table base ideas. Although they will all be completing the procedures uniquely to their design, the process of each machine/tool will be the same or similar. Students will be given the procedure worksheet digitally, they will be required to research the machine/tool and give a brief description of the step by step process of how it will be used. Full class or small group demonstrations of the more complex machines/tools will help the students to understand and elaborate in the worksheet. This will prepare the students for when they are ready to start their table base and help them to start thinking about how they would like to build it. There is an option to give a minimum requirement of processes or machines used to increase the difficulty of the design.

Key Points:

- Customize the procedures to what you have in your shop
- Make it clear that they will be required to use a specific amount of procedures to build their table base
- Demonstrations, textbooks, hands out and internet research can be used
- Explain the basics of table design to help them start to think about their design while they research the processes

Learning Goals:

- Correctly explain how to use a machine/tool from start to finish
- Able to envision how they will use this machine/tool on their table base

Success Criteria:

- Detailed instruction is completed for each process
- Students are prepared to start their design

Resources:

Basic Manufacturing machines

<https://www.britannica.com/technology/machine-tool/Basic-machine-tools>

Basic Construction machines

<https://www.blacktailstudio.com/blog/essential-woodworking-tools>

Activity 3

Orthographic/Isometric Drawings

A1.1, A1.2, A1.4, A2.2, A2.6, A2.7, A3.3, A4.3, B1.1, B3.1

Activity Breakdown:

This activity is where the students will be creating a drawing for the table base they are intending to build. You will review the fundamentals of an orthographic drawing with an isometric view and lay out the specifics that you will be looking for. Revisit the procedure research to ensure they are aware of each process that is available to them and how that would be represented in the drawing. Students will be utilizing this activity to customize their design to be unique to them. They will choose the size and design based on their research. They should have an understanding of the processes in which they are intending to use and how it might be used in a workplace scenario.

Key Points:

- Understanding orthographic/isometric requirements
- Utilizing a pencil and ruler
- Incorporating proper dimensions with correct units of measurement
- Adding in all detail notes and specifics
- Incorporating various shop processes

Learning Goals:

- Correctly complete an orthographic/isometric drawing
- Create a student specific design for their table base

Success Criteria:

- Drawing is complete and meets all requirements
- Student has a personal design for their table base that incorporates various shop procedures

Resources:

Orthographic Explanation

<https://youtu.be/SdLegfoMXNA>

Isometric Explanation

<https://youtu.be/zKFAbmnUvGU?si=MIN0PQA5L-mLvSMI>

Activity 4

Table Leg Construction/Manufacturing

A2.4, A2.5, A2.6, A2.7, A4.1, A4.2, A4.3, A4.4, A4.6, B2.1 B3.1, B3.4

Activity Breakdown:

This activity is the practical component of this project. Students will use their knowledge learned from researching various table style configurations and tool/machinery to complete a personalized table base. The layout and measurement component in the preparation of their base should be closely monitored and exact. Each student's base should be unique to the design that they created. Conversations should be had daily throughout this component of the project to help students understand the practical aspect of each process and how it can relate to real world scenarios. If scrap material is available, it would be useful to have students practice certain processes on this before they use the full materials for their base. When students are complete, the base can be kept for a follow up unit project or moved along with them in a rotation to build a top.

Key Points:

- Safe and correct use of all machines and tools
- Correct measurement/layout are incorporated
- Correlation between procedures and real world scenarios
- Individual design is reflected correctly from drawing to table base

Learning Goals:

- Students should be able to correctly use all machines and tools
- Understanding layout and measurement procedures
- Connections made to real world

Success Criteria:

- All procedures are completed correctly
- Table base matches the drawing
- Students can explain when a process would be used in industry

Resources:

OCTE SafeDocs

https://octe.ca/application/files/9016/9117/4077/Construction_2022.pdf

https://legacy.octe.ca/application/files/9016/6794/4610/Manu_2022.pdf

Appendix A: Design Ideas

Use this time to check out the machines and capabilities in the shop. Research table base ideas and choose three designs you like. Use the table/worksheet to sketch your top 3 ideas. Explain which machines you would use to build your table base and why.

Base Type:	Base Type:	Base Type:
Sketch:	Sketch:	Sketch:
Machines and Procedures Required:	Machines and Procedures Required:	Machines and Procedures Required:

Appendix B: Manufacturing/Construction Procedures

Please Provide a basic setup and procedure list for the following machines and tools.

Tool/Machine	Setup/Procedure
Drill Press Example	<ul style="list-style-type: none">● Set table height and tighten to column● Secure bit into the chuck● Properly align and clamp your work● Pre drill if needed● Drill hole with smooth even feed rate● Use coolant to keep bit and material cool● Brush away chips with a brush● Debur both sides of the hole● Clean up workspace and put away all tools
Band Saw	
Mig Welder	
Lathe	
Milling Machine	
Mitre Saw	
Jointer	
Thickness Planer	
Tale Saw	
Hand tools	
Joinery Jigs	

Appendix C: Orthographic Examples

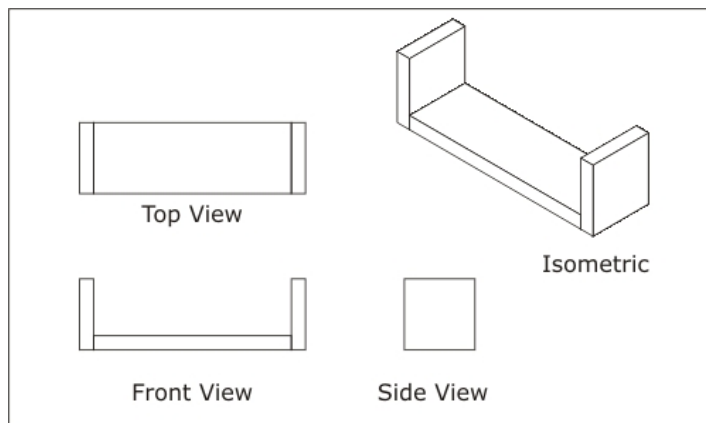
Drawing Requirements:

- Ruler and pencil
- Top/Front/Side view aligned in correct order
- 3D Isometric view
- All notes and specifications included
- All procedures Incorporated

Procedures to Incorporate:

- Joinery/Fastening procedures included
- All machine surfaces explained

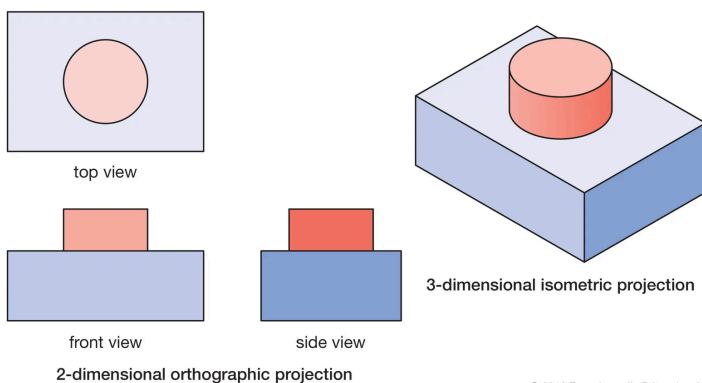
Orthographic/isometric Example :



<https://www.cdli.ca/courses/grade8control/ds2/t06/02knowledge-skills/act-01a.htm>

Orthographic/isometric Example :

Orthographic and isometric projections of an object



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<https://www.britannica.com/topic/isometric-drawing>

Appendix D - Project Instructions/Assessment Rubric

Table Base Manufacturing/Construction:

- Take time each day to explain a specific procedure and how it relates to workplace scenarios
- Give students time to practice procedures on scrap before the harder procedures
- Engage in meaningful discussions individually and as a class regarding procedures and safety
- Have students work in small groups to enable them to complete as well as observe the procedures

Utilize and customize this TAS Rubric to help you evaluate the completion of the label.

Knowledge and Understanding – Subject-specific content acquired in each course (knowledge), and the comprehension of its meaning and significance (understanding)				
Categories	50–59% (Level 1)	60–69% (Level 2)	70–79% (Level 3)	80–100% (Level 4)
	The student:			
Knowledge of content (e.g., facts; use and function of equipment and tools; technical terminology; materials; concepts, processes, safety procedures)	demonstrates limited knowledge of content	demonstrates some knowledge of content	demonstrates considerable knowledge of content	demonstrates thorough knowledge of content
Understanding of content (e.g., safety procedures, fundamental technological concepts, processes, industry standards)	demonstrates limited understanding of content	demonstrates some understanding of content	demonstrates considerable understanding of content	demonstrates thorough understanding of content
Thinking – The use of critical and creative thinking skills and/or processes				
Categories	50–59%	60–69%	70–79%	80–100%

	(Level 1)	(Level 2)	(Level 3)	(Level 4)
	The student:			
Use of planning skills (e.g., identifying a need or problem; generating and evaluating ideas; selecting strategies, tools, and resources; scheduling; budgeting)	uses planning skills with limited effectiveness	uses planning skills with some effectiveness	uses planning skills with considerable effectiveness	uses planning skills with a high degree of effectiveness
Use of processing skills (e.g., analyzing and interpreting information, forming conclusions)	uses processing skills with limited effectiveness	uses processing skills with some effectiveness	uses processing skills with considerable effectiveness	uses processing skills with a high degree of effectiveness
Use of critical/creative thinking processes (e.g., engineering design, service design, problem-solving, decision-making, diagnostic, and quality assurance processes)	uses critical/creative thinking processes with limited effectiveness	uses critical/creative thinking processes with some effectiveness	uses critical/creative thinking processes with considerable effectiveness	uses critical/creative thinking processes with a high degree of effectiveness
Communication – The conveying of meaning through various forms				
Categories	50–59% (Level 1)	60–69% (Level 2)	70–79% (Level 3)	80–100% (Level 4)
	The student:			
Expression and organization of ideas and information	expresses and organizes ideas and information	expresses and organizes ideas and information	expresses and organizes ideas and information	expresses and organizes ideas and information

<p>(e.g., clarity, logic, coherence) in oral, non-verbal, visual, and/or written forms, including digital and media forms (e.g., demonstrations, technical descriptions/instructions, presentations, reports, flowcharts)</p>	<p>with limited effectiveness</p>	<p>with some effectiveness</p>	<p>with considerable effectiveness</p>	<p>with a high degree of effectiveness</p>
<p>Communication for different audiences (e.g., peers, clients, suppliers, colleagues, supervisors, the public) and purposes (e.g., to inform, to persuade, to collaborate) in oral, non-verbal, visual, and/or written forms, including digital and media forms</p>	<p>communicates for different audiences and purposes with limited effectiveness</p>	<p>communicates for different audiences and purposes with some effectiveness</p>	<p>communicates for different audiences and purposes with considerable effectiveness</p>	<p>communicates for different audiences and purposes with a high degree of effectiveness</p>
<p>Use of conventions (e.g., standards, symbols, units of measurement, acronyms), industry-related vocabulary, and terminology of the discipline in oral, non-verbal, visual, and/or written forms,</p>	<p>uses conventions, vocabulary, and terminology with limited effectiveness</p>	<p>uses conventions, vocabulary, and terminology with some effectiveness</p>	<p>uses conventions, vocabulary, and terminology with considerable effectiveness</p>	<p>uses conventions, vocabulary, and terminology with a high degree of effectiveness</p>

including digital and media forms				
Application – The use of knowledge and skills to make connections within and between various contexts				
Categories	50–59% (Level 1)	60–69% (Level 2)	70–79% (Level 3)	80–100% (Level 4)
	The student:			
Application of knowledge and skills (e.g., manipulation of materials; application of concepts and processes; safe use of tools, equipment, technology, and techniques) in familiar contexts	applies knowledge and skills in familiar contexts with limited effectiveness	applies knowledge and skills in familiar contexts with some effectiveness	applies knowledge and skills in familiar contexts with considerable effectiveness	applies knowledge and skills in familiar contexts with a high degree of effectiveness
Transfer of knowledge and skills (e.g., manipulation of materials; application of concepts and processes; safe use of tools, equipment, technology, and techniques) to new contexts	transfers knowledge and skills to new contexts with limited effectiveness	transfers knowledge and skills to new contexts with some effectiveness	transfers knowledge and skills to new contexts with considerable effectiveness	transfers knowledge and skills to new contexts with a high degree of effectiveness
Making connections within and between various contexts (e.g., connections to everyday personal situations; connections to	makes connections within and between various contexts with limited effectiveness	makes connections within and between various contexts with some effectiveness	makes connections within and between various contexts with considerable effectiveness	makes connections within and between various contexts with a high degree of effectiveness

social, economic, environmental, ethical, and cultural issues; connections between technological education and other disciplines; connections to potential careers and related postsecondary pathways, including apprenticeship)				
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References:

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