TTJ3CA

Transportation Technology

Brake Line Fabrication

Abstract

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Table of Contents

Project Overview

In this activity, students will fabricate a brake line using both types of flares commonly used by domestic and foreign manufacturers. Students will also use best practices to properly bend their brake line to fit a module made by the teacher. This module based activity allows students to fabricate and fit their brake line without the need for a vehicle or lift so it is an easy fit for any lab.

Project Challenge	Connections
After students have learned the theory and components of the hydraulic brake system, they will be required to construct a brake line using the provided tools and supplies. An example will be provided as well as the module that they can use to fit and adjust their line during fabrication.	**SEF Component 2 Classroom Leadership Connections** **Indicator 2.2-** Processes and practices are designed to deepen understanding of the curriculum and refine instruction to improve student learning and achievement. At this point in their learning, students have acquired a basic understanding of vehicle component systems. Relevant tasks in this project will advance learning specific to brake systems. **<u>Differentiated Instructions</u>** Different lines can be assessed for entry level and more advanced students. Depending on skill level and available resources, an enrichment activity may include replacing a brake line on a vehicle. Also different modules may be developed to suite students skill sets. A choice board with examples may help

Project Criteria	Examples
Students will create a hydraulic brake line system with the following: • brake line must have both types of flares in the proper locations; • brake line bends must be smooth without kinks; • brake line must not touch the obstruction on the module; • brake line fittings must thread easily; • both flares must be done properly (see example); • must use proper PPE; • must follow safety procedures; • must use organizational skills in following procedures and housekeeping guidelines.	

Project Synopsis and Timelines

Act #	Activity Title/Name	Time (hrs)	Curriculum Expectations	Assessment & Evaluation	Connections?
1	Brake Components and hydraulic theory and operation	3	Overall Expectations: A3, A4, B3 Specific Expectations: A3.3, A4.1, A4.3, B3.1,	K/U	• Ontario Curriculum • Growing Success • DI • SEF • Math Literacy • Literacy • Ontario Skills Passport
2	Brake line fabrication instruction, demonstration, and practice	2	Overall Expectations: A4, D1, Specific Expectations: A4.3, D1.2, D1.3, D1.4,	K/U T C A	• Ontario Curriculum • Growing Success • DI • SEF • Math Literacy • Literacy
3	Fabrication of final brake line project and recording results in shop log	3	Overall Expectations: A4, B3, B4, D1 Specific Expectations: A4.3, B3.3, B4.1, B4.3, D1.2, D1.3, D1.4, D1.	K/U T C A	• Ontario Curriculum • Growing Success • DII • SEF • Math Literacy • Literacy

CONNECTIONS RESOURCE LIST		
1	The Ontario Curriculum, Grade 11-12, Revised 2009	http://www.edu.gov.on.ca/eng/curriculum/secondary/2009teched1112curr.pdf
2	Growing Success	http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf
3	Student Success: Differentiated Instructions Educator's Package, 2010(DI)	http://www.edugains.ca/resourcesDI/EducatorsPackages/DIEducatorsPackage2010/2010EducatorsGuide.pdf
4	School Effectiveness Framework, 2013 (SEF)	http://www.edu.gov.on.ca/eng/literacynumeracy/SEF2013.pdf
5	Think Literacy	http://www.edu.gov.on.ca/eng/studentsuccess/thinkliteracy/
6	Leading Math Success	http://www.edu.gov.on.ca/eng/document/reports/numeracy/numeracyreport.pdf
7	Ontario First Nations, Metis, and Inuit Education Policy Framework (FNMI)	http://www.edu.gov.on.ca/eng/aboriginal/fnmiFramework.pdf
8	Ontario's Equity and Inclusive Education Strategy	http://www.edu.gov.on.ca/eng/policyfunding/equity.pdf
9	Ontario Skills Passport (OSP)	http://www.skills.edu.gov.on.ca/OSP2Web/EDU/DisplayEssentialSkills.xhtml
10	OCTE Resources: SafeDocs, SafetyNet	http://www.octelab.com/

Activity 1 Brake Components and Hydraulic Theory and Operation
Activity Description: Using shop models, discussions, handouts, and videos, students learn the names and purposes of all hydraulic brake components. Cross-curricular opportunities exist in the areas of Science and Math (e.g., Pascal's Law). This activity will help students name and identify the different components of a hydraulic brake system and know the purpose of each. Successful completion of this activity will support future lessons on the complete brake system.

Activity 1 Criteria and Instructions
1. Through teacher instruction, students learn of all brake system hydraulic components including: brake fluid, master cylinder, proportioning valve, hydraulic brake lines, flex hoses, calipers, wheel cylinders. 2. Students label a chart with the previous components. If a vehicle is available, these can be pointed out or labeled by students in a group or individually for assessment. 3. Students learn of hydraulic theory. Pressure, Pascal's Law, and friction will all be explored. Links can be made to other areas using hydraulic force such as factories and various shop tools such as hoists, jacks and presses.

Minds On (Engaging Prior Knowledge)

Activity 1 Prior Knowledge	Connections
● No prior knowledge or skills are necessary for this activity as it is mostly a theory introduction. However a basic understanding of friction and pressure will be useful. ● Basic knowledge of Science and Math would be beneficial. ● General research skills would be beneficial.	

Activity 1 Planning Notes	Connections
Check all recommended resources prior to beginning lessons and activity. Be sure that all computers are in working order and that the Internet access is available. A vehicle for parts identification will be useful. Be sure to set up on the lift beforehand. Check school WiFi for accessibility. Review all activities and prepare all resources (handouts, and materials) necessary for the delivery of content. If using collaboration software, be sure that all posts are updated and ready for student interaction.	**Teacher Tips** It is recommended that all resources be posted to your board collaboration system to avoid too many handouts and to ensure full accessibility. This activity is ideal for allowing students to use their own personal devices in their research.

Action (Introduce or Extend Learning)

Activity 1 Instructional Strategies	Connections
TEACHER: ● escribe what students are expected to learn and how their learning will help with the overall project. Provide students a clear vision of where this activity will lead. ● Share learning goals: - tell students, at the outset of instruction, what the learning goals are. - refer frequently to the learning goals and design process during instruction Lesson: ● Teacher will describe each component of the hydraulic brake system. (Brake Fluid, Master Cylinder, Steel Brake Lines, Flex Hoses, Proportioning Valve, Brake Warning Lamp, Calipers, and Wheel Cylinders ● Students will break into groups of 2-3. ● Each group will be given terms to research	**The Ontario Curriculum, Grade 11-12, Revised 2009** Overall Expectations: A3, A4, B3 Specific Expectations: A3.3, A4.1, A4.3, B3.1, **SEF Component 1 Assessment for, as and of Learning Connections** Describe what students are expected to learn. Provide students a clear vision of where they are going

- Using Mind Maps, students will note key words related to these terms and expand on their results.
- Results can now be shared as a class.
- Teacher will review and further explain hydraulic theory and "Pascal's Law"
- Teacher will explain hydraulic measurement in terms of pressure in "PSI" units
- Topics will include the difference between static and kinetic friction
- Teacher will explain the purpose of brake bleeding and describe the different methods used.
- Teacher will demonstrate inspection procedures according to the Ministry of Transportation guidelines pertaining to brake hydraulic systems.
- Once research is complete, students will be given a hydraulic component worksheet (Appendix A)
- Students will be asked to label the components on the sheet as per instructions and provide feedback on the condition (if a vehicle and lift are available). This will be graded as part of the summative assessment.

STUDENT:

- Students will work in groups to research hydraulic terms.
- Students will create Mind Maps of these terms
- Students will share results with the class
- Students will view provided videos
- Using the worksheet, students will label all hydraulic components on a supplied vehicle.

SEF Component 4 Curriculum Teaching and Learning

Indicator 4.4-Students are engaged in exploring real-world situations/issues and solving authentic problems. Critical thinking skills are taught, modelled, practised and developed.

Indicator 4.5-Students are grouped and regrouped, frequently and flexibly. Learning groups are based on prior assessment of student learning, strengths and needs, interests and/or learning preferences. Choices are provided based on prior assessment of student learning, interests and/or learning preferences.

Differentiated Instructions (DI)

Flexible Learning Groups In a differentiated classroom, students are grouped and regrouped, frequently and flexibly based on their; readiness to learn a concept; interest in a concept earning preferences in working with or thinking about a concept; or environmental or social sensitivities

SEF Component 3 Student Engagement

Indicator 3.1: Learning experiences are engaging, promote collaboration, innovation and creativity (i.e. are clear, meaningful, challenging, productive and include problem solving and critical thinking on a variety of issues). Ongoing feedback between and among students and teachers enables students to refine both thinking and products.

Think Literacy

Reading (research) Strategy: Engaging in Reading

- Sorting Ideas Using a Mind Map can be used in documenting their research on themes and styles
- Graphic communication (mind maps) and 'Making Notes' strategies are applicable for this activity

	SEF Component 4 Curriculum Teaching and Learning **Indicator 4.2-**Instruction in all content areas supports clear connections among reading, writing, oral and digital communication and media literacy Sort and analyze information from a variety of sources. Summarize and synthesize in order to understand what they read, hear and see. Understand, acquire, build on and apply oral communication, reading, writing and media literacy knowledge and skills. **Ontario Skills Passport** Literacy skills in reading, writing, oral communications, document and computer use. Thinking skills in decision making, finding information, and critical thinking Numeracy skills in measurement and calculations. **Math Literacy** Establishing A Positive Classroom Climate Valuing mathematics implies being productively disposed towards the subject. It involves seeing mathematics as sensible, useful, and worthwhile, and seeing oneself as able to learn and use it. Teachers must create a climate whereby all students can make sense of the mathematics they are learning and gain confidence in their mathematical ability. Introduce most skills and concepts through problem solving. Building math literacy capacity is a strong component of this project.
Activity 1 Assessment and Evaluation	Connections
Knowledge and Understanding Upon completion of the labelling worksheet, students will be assessed using a checklist (Appendix B)	**Growing Success** Teachers assess and evaluate student work with reference to established

Learning Skills ● Through observation and conferencing, students will be assessed formally or informally. ● The teacher will document the following: - the student's skills pertaining to conflict management skills; - student's ability to work effectively as a team member; - student's initiative, leadership and participation in a group. ● Conferencing assessment can take place on a daily basis. Be sure to provide encouragement and praising effort, as tasks are complete building on a positive self-image. **Assessment Tools** ● Checklist Appendix B	criteria for four levels of achievement that are standard across the province. The development of learning skills and work habits is an integral part of student learning. **SEF Component 1 Assessment for, as and of Learning Connections** **Indicator 2.2**- Provide explicit feedback about their engagement and learning as educators and advocate for what they need as learners Assessments will include communications, observation, and conferencing.
Activity 1 Accommodations	Connections
● Teachers are to be familiar with exceptional students' Individual Education Plans (IEPs) for legislated accommodations and consult with the appropriate staff. By doing this, teachers will be aware of and can implement prescribed modifications and accommodations. ● Teaching Strategies for students with special needs may include: - using and grouping teams with varied abilities to allow for peer support. The teacher may choose or modify the teams depending on individual strengths and weaknesses; - providing a word bank for students during the parts identification activity also pairing experienced students with those who are not yet familiar with the techniques.	**SEF Connections** Accommodations are to be made so students do not lose dignity because of disability, poverty, lack of success, linguistic diversity or race. Teachers foster a positive atmosphere accepting of individual's uniqueness, values, and needs. **SEF Component 1 Assessment for, as and of Learning Connections** **Indicator 1.2 & 1.4:** Reviewing student profiles, learning portfolios, IEPs and assessment data will inform decisions regarding assessment tools and strategies. **Differentiated Instruction** Encourage students to participate in skills competition.

Consolidation & Connections (Provide Opportunities for Reflection)

Activity 1 Shop Log	Connections
Students will be asked to write a shop log at the end of this activity. The log will include a summary of the activity. The purpose of this journal submission is to allow students to practice the use of proper written language skills. It will also help students reflect on their experiences throughout this unit in preparation for the unit test. This paper should include all the key terms discussed throughout the activity.	**SEF Component 2 Classroom Leadership Connections** **Indicator 2.2-** input, through the reflection papers will help refine instruction to improve student learning **Ontario Skills Passport** Literacy skills in reading, writing, oral communications, document and computer use.

Materials, Tools and Resources

Activity 1 Websites
https://www.youtube.com/watch?v=VxLTDtaRCZk https://www.youtube.com/watch?v=nepR_3idV0I https://www.youtube.com/watch?v=zpOqb_Bw4oM https://www.youtube.com/watch?v=PIEIcEGjfd8
Activity 1 Publications
Automotive Excellence Volume 1 Glencoe, McGraw Hill. ISBN 0-07-874412-1

Activity 1 Computer Software

Internet access
YouTube access

Activity 1 Human Resources

Special Education/Resource staff
Guest Speakers: Industry contacts

Activity 1 Appendices

Appendix A,B

Activity 2 Introduction to Brake Line Fabrication

Activity Description: In this activity, students will have the opportunity to view and practice basic brake line fabrication. The teacher will revisit the previous lessons and demonstrate proper brake line flaring techniques and tool usage. Students will then practice creating their own flares and bends before advancing on to the next activity. Cross-curricular opportunities exist in Math.

Activity 2 Criteria and Instructions

1. Teacher will demonstrate proper tool usage while demonstrating how to cut brake tubing using a tube cutter. (previous knowledge of tape measures may need to be revisited)
2. Teacher will demonstrate usage of both brake line flaring tools.
3. Teacher will demonstrate how to use different line bending tools.
4. Students will practice and create their own line with one 180 degree bend and both flares.

Minds On (Engaging Prior Knowledge)

Activity 2 Prior Knowledge	Connections
• General knowledge on using tape measures (will be revisited during this activity). • Knowledge gained from Activity 1 will be required.	**Teacher Tips** Teacher may have to revisit tape measure usage and fractions of an inch. Diagnostic assessment may be appropriate. Appendix C
Activity 2 Planning Notes	**Connections**
• Check all recommended resources prior to beginning lessons and activity. (ie. Brake line and fittings, tube benders, brake line flare kits, reamers and tube cutters) • Work benches with vices will be helpful for this activity • Be sure that all computers are in working order and that the Internet access is available. • Check school WiFi for accessibility. • Review all activities and prepare all resources (handouts, and materials) necessary for the delivery of content. • If using collaboration software, be sure that all posts are updated and ready for student interaction. • Consultation with Transportation Technology and Science teachers from other schools can also be helpful in understanding best practices in lesson delivery and safety precautions. • Create and/or gather teaching aids to act as visual aids when introducing tool usage.	**SEF Component 2 Classroom Leadership Connections** Indicator 2.1 Collaboration with other teachers will inform instructional practices to meet the needs of students. A collaborative learning culture (e.g., a commitment to continuous improvement, a collective focus on student learning for all, deprivatization of practice and reflective dialogue) is evident. Evidence-based teaching practices, modelled in professional learning, are used in classrooms. ❖ Collaborative learning, inquiry, co-planning and/or co-teaching inform instructional practices to meet the needs of students. **Professional Learning Communities** Learning teams provide teachers with opportunities to work together to identify challenges and discuss classroom strategies. Actively participating in these communities can help contextualize content. As an example, discuss principles and

	elements of design teaching strategies with the Science Dept. **Teacher Tips** It is recommended that all resources be posted to your board collaboration system to avoid too many handouts and to ensure full accessibility. Collaborate with teachers within your school, Board or province to establish best practices and curriculum improvements. Become a member of the Ontario Council for Technology (OCTE) where tech teachers can network and collaborate on common challenges and resource development.

Action (Introduce or Extend Learning)

Activity 2 Instructional Strategies	Connections
Teacher: Note that this activity can be taught using a "Tiering" (DI Structure) method whereby students are provided two different types of brake line material based on their individual readiness. ● Prior to beginning of this activity, students can be asked to review hydraulic principles and theory. ● Have students complete a diagnostic assessment on proper tape measure usage (Appendix C) ● Emphasis should be made to why proper bends and prevention of kinks in their lines are crucial to proper hydraulic flow. ● Review all shop safety practices pertaining to PPE, general shop safety, etc. ● Demonstrate proper tube cutting and using a reamer to dress the end of the line. ● Demonstrate the proper use of brake line flaring tools (both types of flares will be used) ● Demonstrate the use of various tube bending tools ● Demonstrate and explain how brake line can easily be kinked when not bent properly.	**The Ontario Curriculum, Grade 11-12, Revised 2009** Overall Expectations:A4, D1, Specific Expectations:A4.3, D1.2, D1.3, D1.4, **Growing Success** The diagnostic assessment can determine where the learners are in their learning, where they need to go, and how best to get there. **Differentiated Instruction:** Tiered Assignment **OCTE SafeDocs/SafeNet/ Safety Videos** Transportation technology shop safety **Math Literacy** Establishing A Positive Classroom Climate Valuing mathematics implies being productively disposed towards the subject. It involves seeing

• Once all demonstrations are complete, place students into small groups of 2 to 3 and provide each group with the handout. (Appendix D) Student: • Cut the proper amount of brake line as shown • Using the proper tools, flare each side of the brake line that you have cut (both types of flares should be done) • Using the tube benders, bend the line as shown.	mathematics as sensible, useful, and worthwhile, and seeing oneself as able to learn and use it. Teachers must create a climate whereby all students can make sense of the mathematics they are learning and gain confidence in their mathematical ability. Introduce most skills and concepts through problem solving. Building math literacy capacity is a strong component of this project. **SEF Component 3 Student Engagement** **Indicator 3.4** Apply teamwork, advocacy, and leadership skills to daily interaction. **SEF Component 4 Curriculum, teaching and learning** **Indicator 4.2** Numeracy specific concepts are explicitly used to deepen student learning and understanding in all subjects.
Activity 2 Assessment and Evaluation	Connections
This activity provides an excellent opportunity for personal / peer assessment as it is a preparation for the next activity. **Diagnostic Assessment** • The diagnostic assessment will be helpful to determine specific prior knowledge. This could include a simple questionnaire, defining technical terms, **Communication:** • Student feedback and communication will be assessed through shop logs. **Learning Skills** • Through observation and conferencing, students can be assessed formally or informally. Checklists, anecdotal comments or the Learning Skills rubric will serve to help assess students. The teacher will document the following:	**Growing Success** • Teachers assess and evaluate student work with reference to established criteria for four levels of achievement that are standard across the province. • The development of learning skills and work habits is an integral part of student learning.

- the student's skills pertaining to conflict management skills; - student's ability to work effectively as an interdependent team member; - student's initiative, leadership and participation in a group ● Conferencing assessment can take place on a daily basis. Be sure to provide encouragement and praising effort, as tasks are complete building on a positive self-image. **Assessment Tools** ● Tape Measure Diagnostic Assessment (Appendix C) ● Brake Line Rubric (Appendix E)	
Activity 2 Accommodations	Connections
Teachers are to be familiar with exceptional students' Individual Education Plans (IEPs) for legislated accommodations and consult with the appropriate staff. By doing this, teachers will be aware of and can implement prescribed modifications and accommodations. Teaching Strategies for students with special needs may include: - Using and grouping teams with varied abilities to allow for peer support. The teacher may choose or modify the teams depending on individual strengths and weaknesses. - Using "Cupro Nickel" brake line to allow easier bending, flaring and cutting.	**SEF Connections** Accommodations are to be made so students do not lose dignity because of disability, poverty, lack of success, linguistic diversity or race. Teachers foster a positive atmosphere accepting of individual's uniqueness, values, and needs. **SEF Component 1 Assessment for, as and of Learning Connections** **Indicator 1.2 & 1.4:** Reviewing student profiles, learning portfolios, IEPs and assessment data will inform decisions regarding assessment tools and strategies. **Differentiated Instructions (DI)** Challenge students by performing brake line fabrication, replacement, and bleeding procedures on vehicles in the shop if the resources are available. Encourage students to participate in skills competition.

Consolidation & Connections (Provide Opportunities for Reflection)

Activity 2 Shop Log	Connections
Students will be asked to write a shop log at the end of this activity. The log will include a summary of the activity. The purpose of this journal submission is to allow students to practice the use of proper written language skills. It will also help students reflect on their experiences throughout this unit in preparation for the unit test. This paper should include all the key terms discussed throughout the activity.	**SEF Component 2 Classroom Leadership Connections** **Indicator 2.2-** input, through the log journals will help refine instruction to improve student learning. **Ontario Skills Passport** Literacy skills in reading, writing, oral communications, document and computer use.

Materials, Tools and Resources

Activity 2 Websites
https://www.youtube.com/watch?v=BcUGBdY1zWQ https://www.youtube.com/watch?v=sqzj2HqGLDc https://www.youtube.com/watch?v=i2YcrPJ4TQc
Activity 2 Computer Software

Internet access
YouTube access

Activity 2 Human Resources

- Special Education/Resource staff
- Guest Speakers: Industry contacts

Activity 2 Appendices

Appendix C (Tape Measure Diagnostic Assessment)
Appendix D (Instruction sheet)
Appendix E (brake line flare rubric)

Activity 2 Websites

https://www.youtube.com/watch?v=BcUGBdY1zWQ
https://www.youtube.com/watch?v=sqzj2HqGLDc
https://www.youtube.com/watch?v=i2YcrPJ4TQc

Activity 2 Computer Software

Internet access
YouTube access

Activity 2 Tools and Materials

- Tape measure
- Brake line flare kits
- 3/16 brake line
- Tube bender, 'S'
- Workbench with vise
- Brake line reamer

Activity 3 Brake Line Flaring Fabrication and Fitting
Activity Description: In this activity, students will have the opportunity to flair, fabricate, and fit, a brake line to the brake line module. The teacher will revisit activity 2 and demonstrate proper brake line flaring techniques and tool usage. Students will use prior knowledge and skills from the previous activities to create a brake line that properly fits onto the module and does not interfere with any of the obstructions. Cross-curricular opportunities exist in Math.

Activity 3 Instructions
Teacher will provide students with the necessary tools and supplies (see planning notes). Teacher will introduce the brake line module and display an example of a completed brake line. Special attention should be given to areas of difficulty such as bends and areas that should be free from contact.

Minds On (Engaging Prior Knowledge)

Activity 3 Prior Knowledge	Connections
Students will use prior knowledge from the previous activities on proper tool usage during brake line flaring, tube bending and cutting, and tape measure usage. Shop safety and proper PPE should always remain paramount in any technological facility.	**Teacher Tip**: It may be necessary to review usage of the tools required for some students.

Activity 3 Planning Notes	Connections
Check all recommended resources prior to beginning lessons and activity. (ie. Brake line and fittings, tube benders, brake line flare kits, reamers and tube cutters) Teacher will have to create a brake line module consisting of a master cylinder, a wheel cylinder or caliper, and an obstruction to be used as an exemplar. Refer to examples photos in project overview area. (page 4 above) Work benches with vices will be helpful for this activity Be sure that all computers are in working order and that the Internet access is available. Review all activities and prepare all resources (handouts, and materials) necessary for the delivery of content. If using collaboration software, be sure that all posts are updated and ready for student interaction. Consultation with Transportation Technology and Science teachers from other schools can also be helpful in understanding best practices in lesson delivery and safety precautions. Create and/or gather teaching aids to act as visual aids when introducing tool usage.	**Teacher Tips:** Teachers will have to create the brake line module that will be used for future classes. If welding equipment is not available, it may be possible to recruit manufacturing teachers for assistance with this. Further advancement could allow for a brake pedal to be mounted and applied and provide for brake bleeding and pressure testing for this activity. **SEF Component 2 Classroom Leadership Connections** Indicator 2.1 Collaboration with other teachers will inform instructional practices to meet the needs of students. A collaborative learning culture (e.g., a commitment to continuous improvement, a collective focus on student learning for all, deprivatization of practice and reflective dialogue) is evident. Evidence-based teaching practices, modelled in professional learning, are used in classrooms. Collaborative learning, inquiry, co-planning and/or co-teaching inform instructional practices to meet the needs of students. **Professional Learning Communities** Learning teams provide teachers with opportunities to work together to identify challenges and discuss classroom strategies. Actively participating in these communities can help contextualize content. As an example, discuss principles and

	elements of design teaching strategies with the Science Dept.

Action (Introduce or Extend Learning)

Activity 3 Instructional Strategies	Connections
Note that this activity can be taught using a "Tiering" (DI Structure) method whereby students are provided two different types of brake line material based on their individual readiness. At this point, students should be comfortable with the use of the necessary tools and equipment. A review may be necessary for some. **Teacher:** Teacher will provide students with an example as well as the brake line module for reference during this activity. **Students:** Students will; ● start by measuring and cutting the line needed for this activity ● then flare one side noting the proper flare required ● put in the proper bends in their line to fit the module before flaring the other side with the second type of flare ● fit their line onto the brake line module and make any last adjustments before submitting to the teacher	**The Ontario Curriculum, Grade 11-12, Revised 2009** Overall Expectations: A4, B3, B4, D1 Specific Expectations: A4.3, B3.3, B4.1, B4.3, D1.2, D1.3, D1.4, D1. **OCTE SafeDocs/SafeNet/Safety Videos** Transportation technology shop safety **Differentiated Instructions (DI)** Challenge students by performing brake line fabrication, replacement, and bleeding procedures on vehicles in the shop if the resources are available Encourage students to participate in skills competition.
Activity 3 Assessment and Evaluation	Connections
Application: Students completed brake line will be assessed using the brake line rubric (Appendix F) **Communication:** Student feedback and communication will be assessed through shop logs. **Learning Skills** ● Through observation and conferencing, students can be assessed	**Growing Success** Teachers assess and evaluate student work with reference to established criteria for four levels of achievement that are standard across the province. The development of learning skills and work habits is an integral part of student learning.

formally or informally. Checklists, anecdotal comments or the Learning Skills rubric will serve to help assess students. The teacher will document the following: - the student's skills pertaining to conflict management skills; - student's ability to work effectively as an interdependent team member; - student's initiative, leadership and participation in a group ● Conferencing assessment can take place on a daily basis. Be sure to provide encouragement and praising effort, as tasks are complete building on a positive self-image. **Assessment Tools** ● Brake Line Rubric (Appendix F) ● Student Self-Assessment (Appendix G)	
Activity 3 Accommodations	Connections
Teachers are to be familiar with exceptional students' Individual Education Plans (IEPs) for legislated accommodations, and consult with the appropriate staff. By doing this, teachers will be aware of and can implement prescribed modifications accommodations and/or alternative program goals. Teaching Strategies for students with special needs may include: - using and grouping teams with varied abilities to allow for peer support. The teacher may choose or modify the teams depending on individual strengths and weaknesses. - Using "Cupro Nickel" brake line to allow easier bending, flaring and cutting.	**SEF Connections** Accommodations are to be made so students do not lose dignity because of disability, poverty, lack of success, linguistic diversity or race. Teachers foster a positive atmosphere accepting of individual's uniqueness, values, and needs. **SEF Component 1 Assessment for, as and of Learning Connections** **Indicator 1.2 & 1.4:** Reviewing student profiles, learning portfolios, IEPs and assessment data will inform decisions regarding assessment tools and strategies.

Consolidation & Connections (Provide Opportunities for Reflection)

Activity 3 Shop Logs / Self Assessment	Connections
Students will be asked to write a shop log at the end of this activity. The log will include a summary of the activity. The purpose of this journal submission is to allow students to practice the use of proper written language skills. It will also help students reflect on their experiences throughout this unit in preparation for the unit test. This paper should include all the key terms discussed throughout the activity.	**SEF Component 2 Classroom Leadership Connections** **Indicator 2.2-** input, through the log journals will help refine instruction to improve student learning. **Ontario Skills Passport** Literacy skills in reading, writing, oral communications, document and computer use.
Learning Skills Self-Assessment Have students complete a self-assessment form **(Appendix G).** This will increase responsibility for students' own learning as a result of more opportunities for self-reflection.	**SEF Component 1 Assessment for, as and of Learning Connections** **Indicator 1.5-** Students are explicitly taught and regularly use self-assessment skills to monitor, improve, and communicate their learning.

Materials, Tools and Resources

Activity 3 Websites
https://www.youtube.com/watch?v=BcUGBdY1zWQ https://www.youtube.com/watch?v=sqzj2HqGLDc https://www.youtube.com/watch?v=i2YcrPJ4TQc

Activity 3 Computer Software

Internet access
YouTube access

Activity 3 Human Resources

- Special Education/Resource staff
- Guest Speakers: Industry contacts

Activity 3 Appendices

Appendix F (brake line rubric)
Appendix G (Self-Assessment)

Activity 3 Tools and Materials

- Tape measure
- Brake line flare kits
- 3/16 brake line
- Tube bender, ‘S’
- Workbench with vise
- Brake line reamer
- Brake line fittings
- Brake line module (to created by teacher)