

CURRICULUM MAPPING TEMPLATE

Program: Automotive Technician 47.0604

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
1	EMPLOYABILITY SKILLS, TDL, AND INDUSTRIAL SAFETY				
	<p>I. ACADEMIC FOUNDATIONS A. Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities. 6. Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences. 7. Interpret verbal and nonverbal cues/behaviors to enhance communication with co-workers and clients/participants.</p>				
	<p>II. COMMUNICATIONS B. Apply active listening skills to obtain and clarify information. 3. Model behaviors that demonstrate active listening.. C. Listen to and speak with diverse individuals to enhance communication skills. 1. Apply factors and strategies for communicating with a diverse workforce. 2. Demonstrate ability to communicate and resolve conflicts within a diverse workforce. D. Exhibit public relations skills to increase internal and external customer/client satisfaction. 1. Communicate effectively when developing positive customer/client relationships. 2. Use correct grammar to communicate verbally.</p>				
	<p>III. PROBLEM-SOLVING AND CRITICAL THINKING A. Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation. 2. Employ critical thinking and interpersonal skills to resolve conflicts with staff and/or</p>				

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	<p>customers.</p> <p>3. Identify, write and monitor workplace performance goals to guide progress in assigned areas of responsibility and accountability.</p> <p>C. Analyze and evaluate ideas, proposals, and solutions to transportation, distribution and logistics related problems in order to select the best deliverable to meet business objectives.</p> <p>5. Evaluate the data analysis techniques and data presented in support of the proposed solution.</p>				
	<p>IV. INFORMATION TECHNOLOGY APPLICATIONS</p> <p>A. Use Personal Information Management (PIM) applications to increase workplace efficiency.</p> <p>1. Manage personal schedules and contact information.</p> <p>2. Create memos and notes.</p> <p>B. Employ technological tools to expedite workflow.</p> <p>1. Use information technology tools to manage and perform work responsibilities.</p> <p>2. Use email to share files and documents.</p> <p>3. Identify the functions and purpose of email systems.</p> <p>4. Use email to communicate within and across organizations.</p> <p>8. Prepare simple documents and other business communications.</p> <p>9. Prepare reports and other business communications by integrating graphics and other non-text elements.</p> <p>10. Prepare complex multi-media publications.</p> <p>11. Prepare presentations for training, sales and information sharing.</p> <p>12. Deliver presentations with supporting materials.</p> <p>13. Create a spreadsheet.</p> <p>14. Perform calculations and analyses on data using a spreadsheet.</p> <p>15. Manipulate data elements</p> <p>16. Manage interrelated data elements.</p> <p>17. Analyze interrelated data elements.</p> <p>18. Generate reports showing interrelated data elements.</p> <p>19. Facilitate group work through management of shared schedule and contact information.</p>	<p>A.13-A.18: Engine Blue Printing</p>	<p>A.13-A.18: Operations the Real Numbers(I), Charts Tables (I), Mean (II), Creating Equations (III)</p>	<p>6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 7.EE.1; 7.EE.2; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.SP.1; 6.SP.2</p>	<p>A.APR.1; A.APR.7; N.RN.3; N.Q.1; A.REI.1; A.REI.2; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; S.ID.2</p>

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	<p>20. Facilitate group work through management of shared files and online information.</p> <p>21. Facilitate group work through instant messaging or virtual meetings.</p> <p>22. Manage computer operations.</p> <p>23. Manage file storage</p> <p>24. Compress or alter files.</p> <p>25. Operate computer driven equipment and machines.</p> <p>C. Demonstrate Digital Citizenship</p> <p>1. Identify legal and ethical issues related to the use of information and communication technologies (e.g., properly selecting and citing resources)</p> <p>2. Discuss possible long-range effects of unethical uses of technology (e.g., virus spreading, file pirating, hacking) on cultures and society</p> <p>3. Discuss and demonstrate proper netiquette in online communications</p> <p>4. Identify ways that individuals can protect their technology systems from unethical or unscrupulous users</p> <p>5. Create appropriate citations for resources when presenting research findings</p> <p>6. Discuss and adhere to fair use policies and copyright guidelines.</p>				
	<p>V. SYSTEMS</p> <p>A. Describe the nature and types of business organizations to build an understanding of the scope of organizations.</p> <p>1. Describe the types and functions of businesses.</p> <p>2. Explain the functions and interactions of common departments within a business.</p> <p>B. Implement quality control systems and practices to ensure quality products and services.</p> <p>1. Describe quality control standards and practices common to the workplace.</p> <p>2. Diagnose and make necessary corrections or improvements to a technical system in a business, industry, or simulated work place setting.</p> <p>C. Analyze and summarize the various roles and major business functions involved in a TDL organization as a way to demonstrate</p>	<p>D.1;D.2: Eliminating Customer Come Backs</p> <p>I.1: Create Budget</p>	<p>D.1:D.2: Operations with Decimals (I), comparing rates (I)</p> <p>I.1: Operations with Decimals (III), Charts and Tables (III)</p>	<p>6.NS.2; 6.NS.3; 6.NS.5; 7.NS.1; 7.NS.2; 7.NS.3; 7.EE.3; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p>	<p>S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1</p>

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	<p>understanding of the industry as a system.</p> <ol style="list-style-type: none"> 1. Summarize past and present trends related to the mission of TDL organizations. 2. Compare and contrast the various roles TDL organizations take on within the overarching industry. 3. Compare and contrast the various roles played by critical customers, suppliers, and stakeholders within a TDL organization. 4. Summarize the major competitive challenges faced by TDL organizations in the industry today and in the future. 5. Summarize the various major internal job functions and organizational structures found among TDL organizations. <p>D. Monitor, analyze and improve performance within a TDL organization using metrics common to the TDL community as a way to demonstrate understanding of how organizations manage and improve business functioning.</p> <ol style="list-style-type: none"> 1. State how metrics for financial performance such as profitability, cost reduction and asset utilization may be utilized to identify areas for improvement in improve business functioning. 2. State how metrics for market performance such as customer and sales/service growth may be used to identify areas for improvement in business functioning. 3. State how metrics for service and internal operations performance may be used to identify areas for improvement in business functioning (e.g., customer satisfaction, service quality, cycle time). 4. State how metrics for organizational health, safety and environmental compliance may be used to identify areas for improvement in business functioning. <p>E. Demonstrate understanding of important trends influencing the TDL system by assessing and summarizing the impact of various economic, social and technological changes on a TDL organization and its role in the TDL industry.</p> <ol style="list-style-type: none"> 1. State how an economic change such as economic growth/decline, income growth, consumer confidence, interest rates, and fuel and material costs may impact a hypothetical business decision. 				

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	<p>2. State how a social change as indicated by a measure of consumer attitudes, consumer preferences, demographics and/or population shifts may impact a hypothetical business decision.</p> <p>3. Summarize how various technological changes, including changes in transportation and information technology, may impact business functioning today and in the future.</p> <p>F. Implement and evaluate risk management strategies to prevent and reduce various risks and exposures within a TDL organization as a way to demonstrate understanding of risk management as a tool for improving performance.</p> <p>1. Summarize a rationale for implementing a risk management program within an organization.</p> <p>2. State the potential impact various loss exposures such as property, liability, personnel and net income may have on business functioning should there be a loss.</p> <p>3. Summarize various approaches for managing organizational risks.</p> <p>G. Demonstrate an understanding of the impact regulations have on business functioning by analyzing and summarizing the roles and functions of government in regulating and supporting TDL organizations within the industry.</p> <p>1. Summarize the role government plays in regulating domestic transportation operations.</p> <p>2. Summarize various government policies created to regulate international transportation operations.</p> <p>3. Summarize the impact of government policy on public transportation infrastructure management.</p> <p>4. Summarize the impact of government policy on health, safety and environmental management in an organization.</p> <p>H. Manage ongoing customer relationships with both internal and external TDL customer groups in order to maintain ongoing business.</p> <p>1. Generate a list of potential customer needs and requirements based upon information gathered through client interactions.</p> <p>2. Generate a list of next steps that will fulfill customer requirements and produce customer</p>				

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	<p>satisfaction.</p> <p>3. State how to appropriately respond to customer problems and complains in an effective and efficient manner.</p> <p>I. Develop and manage plans and budgets to accomplish TDL organizational goals and objectives.</p> <p>1. Develop a work plan and budget that effectively and efficiently allocates people and resources using relevant data about</p> <p>2. Develop a report that summarizes the key information about the performance and utilization of resources within an organization and/or workgroup.</p> <p>3. Based upon organization and/or workgroup data, modify a program of work and related budgets to improve alignment with a TDL organization's goals and objectives.</p> <p>J. Develop plans for improving a TDL organization's performance in the areas of customer service and operations in order to achieve acceptable levels of customer satisfaction.</p> <p>1. Compare and contrast critical performance issues associated with customer service and operations.</p> <p>2. Summarize opportunities for improvement in the areas of customer service and operations.</p> <p>3. Execute the steps involved in a structured problem-solving process while developing a plan for improving customer service and operations performance.</p> <p>K. Assess and implement measures to demonstrate compliance with organizational policies and government laws and regulations common to organizations in the TDL community.</p> <p>1. Interpret relevant organizational policies and government laws and regulations for specific functions within a TDL organization.</p> <p>2. Assess compliance with policies and regulations using data and information from relevant reports and sources within the organization.</p> <p>3. Recommend improvements for compliance in an area found to be deficient based upon information produced during an assessment of compliance.</p>				

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	<p>VI. SAFETY, HEALTH AND ENVIRONMENTAL</p> <p>A. Implement personal and jobsite safety rules and regulations to maintain safe and healthful working conditions and environments.</p> <ol style="list-style-type: none"> 1. Assess workplace conditions with regard to safety and health of employees using data collected through observations and experience. 2. Select appropriate personal protective equipment as needed for a safe workplace/jobsite. 3. Employ a safety hierarchy and communication system within the workplace/jobsite. <p>B. Assess and implement methods to reduce sources of workplace hazards common in the TDL industry in order to promote a safe and accident free working environment.</p> <ol style="list-style-type: none"> 1. Demonstrate the steps involved in preventing workplace hazards. 2. List and describe common sources of office, warehouse and worksite accidents 3. Demonstrate compliance with protocols established for maintaining a healthy workplace based on an assessment of hazards. 4. List and describe common sources of group health issues in the workplace. <p>C. Complete work tasks in accordance with employee rights and responsibilities and employers obligations to maintain workplace safety and health.</p> <ol style="list-style-type: none"> 1. Identify rules and laws designed to promote safety and health in the workplace. 2. State the rationale of rules and laws designed to promote safety and health. <p>D. Employ emergency procedures as necessary to provide aid in workplace accidents.</p> <ol style="list-style-type: none"> 1. Use knowledge of First Aid procedures as necessary. 2. Use knowledge of CPR procedures as necessary. 3. Use safety equipment as necessary. <p>E. Employ knowledge of response techniques to create a disaster and/or emergency response plan.</p>				

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	<p>1. Complete an assessment of an emergency and/or disaster situation. 2. Create an emergency and/or disaster plan.</p> <p>G. Analyze and explain major aspects and benefits promoted by implementing health, safety and environmental management systems in a TDL organization.</p> <p>1. Describe the major components of a health, safety and environmental management system. 2. State the role and summarize the benefits of each component in a health, safety and environmental management system.</p> <p>H. State the major measures and types of data utilized by government agencies to measure and monitor health, safety and environmental risks and performance.</p> <p>1. State the major measures and types of data utilized by government agencies to measure and monitor health, safety and environmental risks and performance. 2. Compare and contrast the various services through which government agencies provide assistance in ensuring compliance and improved performance in an organization.</p>				
	<p>VII. LEADERSHIP AND TEAMWORK</p> <p>A. Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.</p> <p>1. Employ leadership skills to accomplish organizational goals and objectives. 2. Employ organizational and staff development skills to foster positive working relationships and accomplish organizational goals. 3. Employ teamwork skills to achieve collective goals and use team members' talents effectively. 4. Establish and maintain effective working relationships with all levels of personnel and other departments in order to accomplish objectives and tasks. 5. Conduct and participate in meetings to accomplish work tasks. 6. Employ mentoring skills to inspire and teach others.</p>				

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	<p>VIII. ETHICS AND LEGAL RESPONSIBILITIES</p> <p>A. Know and understand the importance of professional ethics and legal responsibilities.</p> <ol style="list-style-type: none"> 1. Apply ethical reasoning to a variety of workplace situations in order to make ethical decisions. 2. Interpret and explain written organizational policies and procedures to help employees perform their jobs according to employer rules and expectations. 3. Compare and contrast the differences between ethical and legal responsibilities for different roles and functions within an organization. 4. State the relationship between the employers expectations for demonstrating ethics and personal responsibility in the workplace and the various behaviors that express compliance with expectations. 5. Compare and contrast differences in how various workplaces apply personal or professional ethics. <p>B. Evaluate and apply strategies for responding to unethical or illegal actions of individuals and organizations in the TDL industry in order to demonstrate how to respond to unethical situations.</p> <ol style="list-style-type: none"> 1. Compare and contrast the results achieved from implementing alternative strategies for responding to unethical or illegal actions. 2. Recommend procedures and rationale for applying the best strategy after thorough consideration of alternatives. 				
	<p>IX. EMPLOYABILITY AND CAREER DEVELOPMENT</p> <p>A. Know and understand the importance of employability skills.</p> <ol style="list-style-type: none"> 1. Identify and demonstrate positive work behaviors and personal qualities needed to be employable. 2. Manage resources in relation to the position (i.e. budget, supplies, computer, etc). <p>B. Explore, plan, and effectively manage careers.</p> <ol style="list-style-type: none"> 1. Develop a personal career plan to meet career goals and objectives. 2. Identify and explore career opportunities in 				

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	<p>one or more career pathways to build an understanding of the opportunities available in the cluster.</p> <ol style="list-style-type: none"> 3. Recognize and act upon requirements for career advancement to plan for continuing education and training. 4. Continue professional development to keep current on relevant trends and information within the industry. 5. Examine licensing, certification and credentialing requirements at the national, state and local levels to maintain compliance with industry requirements. 6. Examine employment opportunities in entrepreneurship to consider entrepreneurship as an option for career planning. <p>C. Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.</p> <ol style="list-style-type: none"> 1. Use multiple resources to locate job opportunities. 2. Prepare a résumé. 3. Prepare a letter of application. 4. Interview for employment. 5. Interview for employment. 6. List the standards and qualifications that must be met in order to enter a given industry. 7. Employ critical thinking and decision-making skills to exhibit qualifications to a potential employer. 8. Maintain a career portfolio to document knowledge, skills and experience in a career field. 9. Demonstrate skills in evaluating and comparing employment opportunities in order to accept employment positions that match career goals. 10. Identify and exhibit traits for retaining employment to maintain employment once secured. <p>D. Evaluate and apply written organizational policies, rules and procedures in order to function ethically and effectively within the workplace.</p> <ol style="list-style-type: none"> 1. Locate appropriate information on organizational policies in handbooks and manuals. 2. Analyze how specific organizational policies and rules, if applied, may influence specific situations in the workplace. 				

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	<p>X. TECHNICAL SKILLS</p> <p>A. Employ information management techniques and strategies in the workplace to assist in decision-making.</p> <ol style="list-style-type: none"> 1. Use information literacy skills when accessing, evaluating and disseminating information. 2. Describe the nature and scope of information management. 3. Maintain records to facilitate ongoing business operations. <p>B. Employ planning and time management skills and tools to enhance results and complete work tasks.</p> <ol style="list-style-type: none"> 1. Develop goals and objectives. 2. Prioritize tasks to be completed. 3. Develop timelines using time management knowledge and skills. 4. Use project-management skills to improve workflow and minimize costs. <p>C. Analyze and assess the various roles and functions of necessary transportation-related technological systems used in the TDL community in order to demonstrate awareness of technical skills associated with the TDL industry.</p> <ol style="list-style-type: none"> 1. Compare and contrast key features of various supply chain or transit systems that transport people and freight. 2. Compare and contrast key features of various systems for transportation information support systems. 3. Evaluate the effectiveness of different features provided by various TDL information technology applications. <p>D. Measure, analyze and manage the output of technological systems in order to enhance performance and reliability of timing, cost projecting, and forecasting within transportation operations.</p> <ol style="list-style-type: none"> 1. Summarize the concept of reliability and its usefulness in evaluating technical system performance. 2. Summarize how reliability and overall system performance is measured and monitored. 3. Summarize the importance of extracting accurate data from technological systems to improve the performance and forecasting of TDL 				

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	<p>organizations.</p> <p>4. Summarize the impact a technological system with poor reliability may have on performance within a TDL organization.</p> <p>5. Summarize methods employees can use to contribute to improved reliability and performance such as, design, selection, maintenance and operation/utilization.</p> <p>E. Summarize the potential impact technological systems may have on health, safety and environmental risks in order to demonstrate an understanding of the impact a technical system can have in managing compliance.</p> <p>1. Summarize the major health, safety and environmental risks and potential impacts associated with various technological systems.</p> <p>2. Compare and contrast various processes for managing health, safety and environmental risks and impacts within an organization.</p> <p>F. Evaluate and recommend a technological system for implementation in a TDL organization in order to demonstrate an understanding of the factors involved in selecting an appropriate system to manage risk and compliance.</p> <p>1. Summarize organizational requirements and selection criteria for technological systems.</p> <p>2. Assess alternative technological systems based upon a set of requirements and selection criteria.</p> <p>3. Recommend technological system that best fits the organization in light of the corporate and regulatory requirements identified.</p> <p>G. Participate in efforts to improve the utilization and performance of technological systems to provide the correct data needed to make informed decisions dealing with managing risk and compliance.</p> <p>1. Summarize and prioritize reliability and performance problems based upon data collected during implementation of the technological system.</p> <p>2. Synthesize opportunities for improving performance based upon a prioritized list of reliability and performance problems associated with the technological system.</p> <p>3. Execute a structured problem-solving process to develop a plan for improving</p>				

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	performance in prioritized areas.				
	<p>XI. FACILITY AND MOBILE EQUIPMENT MAINTENANCE PATHWAY</p> <p>A. Develop and manage preventative maintenance plans and systems to keep facility and mobile equipment inventory in operation.</p> <p>1. Develop preventive maintenance plans and systems to meet business and equipment manufacturer requirements.</p> <p>2. Apply strategies used to monitor and evaluate the performance of maintenance plans and systems.</p> <p>B. Assess, maintain, and improve system performance in order to keep facilities and equipment running at an optimum level of performance.</p> <p>1. Develop and execute repair plans based upon an assessment of the facility/ equipment inventory.</p> <p>2. Develop plans for improving facilities/equipment/system performance.</p> <p>3. Execute repair plans for facilities and mobile equipment.</p>				
2	ELECTRICAL-GENERAL ELECTRICAL SYSTEMS & THEORY & OPERATION				
	<p>I. ACADEMIC FOUNDATIONS</p> <p>A. Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities.</p> <p>1. Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.</p> <p>2. Demonstrate use of the concepts, strategies, and systems for obtaining and conveying ideas and information to enhance communication in the workplace.</p> <p>B. Demonstrate mathematics knowledge and skills required to pursue the full range of post-secondary education and career opportunities.</p> <p>4. Apply data and measurements to solve a problem.</p> <p>5. Analyze Mathematical problem statements</p>	Standard B	All CTE standards referenced in this document		

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	for missing and/or irrelevant data.				
	<p>II. COMMUNICATIONS</p> <p>A. Develop and interpret tables, charts, and figures to support written and oral communications.</p> <ol style="list-style-type: none"> 1. Create tables, charts, and figures to support written and oral communications. 2. Interpret tables, charts, and figures used to support written and oral communication. <p>D. Exhibit public relations skills to increase internal and external customer/client satisfaction.</p> <ol style="list-style-type: none"> 3. Listen to a presentation and record important information. Report back identifying central themes and use key points to explain how the message applies to a similar situation. 	A.1;A.2 Provide a rationale to customer. Using charts or numbers to justify diagnosis	Create charts(I)/ Reading and Interpreting Charts(I)	6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4	S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1
	<p>IV. INFORMATION TECHNOLOGY APPLICATIONS</p> <p>B. Employ technological tools to expedite workflow.</p> <ol style="list-style-type: none"> 26. Use installation and operation manuals. 				
	<p>X. TECHNICAL SKILLS</p> <p>O. ELECTRICAL/ELECTRONIC SYSTEMS - General Electrical System Diagnosis</p> <ol style="list-style-type: none"> 1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. 2. Identify and interpret electrical/electronic system concern; determine necessary action. 3. Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. 4. Locate and interpret vehicle and major component identification numbers. 5. Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law). 6. Use wiring diagrams during diagnosis of electrical circuit problems. 7. Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including: source voltage, voltage drop, current flow, and resistance. 8. Check electrical circuits with a test light; determine necessary action. 9. Check electrical/electronic circuit 	<p>O.1;O.2;O.3;O.4: Reading Charts/ Schematics. Practicing Number sense using diagnosis skills. Analyze and compare diagnostic data to Charts and Schematics. Tolerance interpretation.</p> <p>O.5;O.6; O.7: Use Ohm's law to understand current as it relates to</p>	<p>O.1;O.2;O.3;O.4: Reading and interpreting Charts(I), place value(I), general number sense(I), add and subtract decimals(I)</p> <p>O.5;O.6;O.7: Solving Linear Equations (II) Interpret Linear and Non-Linear equations (I), Substituting data into given formulas (I), Converting between units of measuring, subscript</p>	<p>6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.NS.3; 6.NS.5; 7.NS.1; 7.NS.2; 7.NS.3</p> <p>6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4; 6.EE.2</p>	<p>S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1</p> <p>A.CED.1; A.CED.2; A.CED.3; A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; S.ID.6</p>

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	<p>waveforms; interpret readings and determine needed repairs.</p> <p>10. Check electrical circuits using fused jumper wires; determine necessary action.</p> <p>11. Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.</p> <p>12. Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action.</p> <p>13. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.</p> <p>14. Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.</p> <p>15. Remove and replace terminal end from connector; replace connectors and terminal ends.</p> <p>16. Repair wiring harness (including CAN/BUS systems).</p> <p>17. Perform solder repair of electrical wiring.</p> <p>18. Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.</p>	<p>parallel, series, and parallel-series combination</p> <p>O.9; Looking for irregularities in a graph generated by oscilloscope</p> <p>O.12 Interpret meter readings and compare to charts</p> <p>O.16 Interpret Chart for current versus gage size</p>	<p>variables (II), Measurement (Digital Meter)(I), Place Value and powers of 10 (I)</p> <p>O.9 Interpret sinusoidal graphs at basic visual inspection of frequency and amplitude (II)</p> <p>O.12: Basic arithmetic and chart reading(I)</p> <p>O.16 Interpreting Charts (II)</p>	<p>6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p> <p>6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p> <p>6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p>	<p>S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1</p> <p>S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1</p> <p>S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1</p>
3	ELECTRICAL-BATTERY DIAGNOSIS & SERVICE				

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>VI. SAFETY, HEALTH & ENVIRONMENTAL</p> <p>F. Describe the regulatory areas common to the TDL industry in order to demonstrate an understanding of key protocols for protecting health, safety and the environment.</p> <ol style="list-style-type: none"> 1. Summarize the major areas addressed in health and safety laws and regulations. 2. Summarize the major areas addressed in environmental management laws and regulations. <p>I. Evaluate current practices and develop a comprehensive plan to improve health, safety, and environmental performance.</p> <ol style="list-style-type: none"> 1. Identify and describe the most critical performance problems related to health, safety and the environment. 2. Identify opportunities for improvement of performance related to the problems found in an assessment of health, safety and environmental issues. 				
	<p>X. TECHNICAL SKILLS</p> <p>P. ELECTRICAL/ELECTRONIC SYSTEMS - Battery Diagnosis and Service</p> <ol style="list-style-type: none"> 1. Perform battery state-of-charge test; determine necessary action. 2. Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action. 3. Maintain or restore electronic memory functions. 4. Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs. 5. Perform battery charge. 6. Start a vehicle using jumper cables or an auxiliary power supply. 7. Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions. 8. Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect. 9. Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures. 	<p>P1; P2: Chart Reading and Calculations</p> <p>P5: Determine charge rate based battery capacity (amps)</p>	<p>P1; P2; Reading a table and basic whole number division (I)</p> <p>P5: Substitute data into formula(I), basic math skills (I)</p>	<p>6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p> <p>6.NS.2; 6.NS.3; 7.NS.1; 6.EE.2; 7.EE.3</p>	<p>S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1</p> <p>A.APR.1; A.APR.7; N.RN.3; N.Q.1; A.CED.4</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
4	ELECTRICAL-STARTING & CHARGING SYSTEM DIAGNOSIS & REPAIR				
	<p>III. PROBLEM-SOLVING & CRITICAL THINKING</p> <p>B. Formulate ideas, proposals and solutions to transportation, distribution and/or logistics related problems in order to ensure effective and efficient delivery of products or services to targeted consumers.</p> <p>5. Synthesize alternative ideas, proposals, and solutions that would solve the problem..</p> <p>C. Analyze and evaluate ideas, proposals, and solutions to transportation, distribution and logistics related problems in order to select the best deliverable to meet business objectives.</p> <p>2. Appraise the validity of the constraints and parameters presented in the proposal.</p> <p>3. Evaluate the accuracy of the basic assumptions outlined in the proposal.</p> <p>4. Appraise the quality of information used to support solution.</p> <p>6. Evaluate the logic and reasoning used to develop the proposed solution.</p> <p>7. Assess the potential impact of the risks, costs, and benefits of testing and implementing the proposed solution.</p> <p>8. Make recommendations on supporting, changing, or not supporting the proposed solution based upon sound reasoning and data.</p>				
	<p>X. TECHNICAL SKILLS</p> <p>Q. ELECTRICAL/ELECTRONIC SYSTEMS - Starting System Diagnosis and Repair</p> <p>1. Perform starter current draw tests; determine necessary action.</p> <p>2. Perform starter circuit voltage drop tests; determine necessary action.</p> <p>3. Inspect and test starter relays and solenoids; determine necessary action.</p> <p>4. Remove and install starter in a vehicle.</p> <p>5. Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.</p> <p>6. Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.</p>	<p>Q.1;Q.2;Q3; Q6;R1;R2;R5: Interpret meter readings and compare to charts</p>	<p>Q.1;Q.2;Q3; Q6;R1;R2;R5: Measurement Interpreting Charts (I)</p>	<p>6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4</p>	<p>S.ID.5; S.IC.3</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>R. Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.</p> <ol style="list-style-type: none"> 1. Perform charging system output test; determine necessary action. 2. Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions. 3. Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment. 4. Remove, inspect, and install generator (alternator). 5. Perform charging circuit voltage drop tests; determine necessary action. 				
5	ELECTRICAL-LIGHTING SYSTEMS & HORN & WIPER/WASHER DIAGNOSIS & REPAIR				
	<p>III. PROBLEM-SOLVING & CRITICAL THINKING</p> <p>A. Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.</p> <ol style="list-style-type: none"> 4. Conduct technical research to gather information necessary for decision-making. 	A.4: Problem Solving	A.4: Problem Solving, Chart Reading, Basic Mathematical processes (I)	6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4	S.ID.5; S.IC.3; N.Q.1; N.Q.2; N.Q.3; S.ID.6
	<p>IV. INFORMATION TECHNOLOGY APPLICATIONS</p> <p>B. Employ technological tools to expedite workflow.</p> <ol style="list-style-type: none"> 5. Access and navigate Internet (e.g., use a web browser). 6. Search for information and resources. 7. Evaluate Internet resources for reliability and validity. 				
	<p>X. TECHNICAL SKILLS</p> <p>S. ELECTRICAL/ELECTRONIC SYSTEMS - Lighting Systems Diagnosis and Repair</p> <ol style="list-style-type: none"> 1. Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action. 2. Inspect, replace, and aim headlights and bulbs. 3. Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. 	<p>S1;S3;S4; U1;U2; U3; Interpret meter readings and compare to charts</p> <p>S2; Finding slope of floor, interpret</p>	<p>S1; S3; S4; U1; U2; U3 Interpreting Charts (I)</p> <p>S2; identify angle measures, interpreting chart (III)</p>	<p>6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4</p> <p>6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4;</p>	<p>S.ID.5; S.IC.3</p> <p>S.ID.5; S.IC.3; G.CO.9; G.CO.12;</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>4. Identify system voltage and safety precautions associated with high intensity discharge headlights.</p> <p>U. ELECTRICAL/ELECTRONIC SYSTEMS - Horn and Wiper/Washer Diagnosis and Repair</p> <p>1. Diagnose incorrect horn operation; perform necessary action.</p> <p>2. Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.</p> <p>3. Diagnose incorrect washer operation; perform necessary action.</p>	meter reading		7.G.5	G.CO.13
6	ELECTRICAL-GUAGES, WARNING DEVICES DIAGNOSIS & REPAIR				
	<p>I. ACADMEIC FOUNDATIONS</p> <p>A. Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities.</p> <p>4. Evaluate and use information resources to accomplish specific occupational tasks.</p> <p>B. Demonstrate mathematics knowledge and skills required to pursue the full range of post-secondary education and career opportunities.</p> <p>6. Construct charts/tables/graphs from functions and data.</p> <p>7. Analyze data when interpreting operational documents.</p>				
	<p>III. PROBLEM-SOLVING & CRITICAL THINKING</p> <p>B. Formulate ideas, proposals and solutions to transportation, distribution and/or logistics related problems in order to ensure effective and efficient delivery of products or services to targeted consumers.</p> <p>6. Evaluate possible outcomes from implementation of alternative solutions.</p>				
	<p>X. TECHNICAL SKILLS</p> <p>T. ELECTRICAL/ELECTRONIC SYSTEMS - Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair</p> <p>1. Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.</p> <p>2. Inspect and test connectors, wires, and</p>	T.1;T.2:T.3;T.4: Interpret meter readings and compare to charts	T.1;T.2:T.3;T.4: Measurement Interpreting Charts (I)	6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4	S.ID.5; S.IC.3

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>printed circuit boards of gauge circuits; determine necessary action.</p> <p>3. Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.</p> <p>4. Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.</p>				
7	ELECTRICAL-ACCESSORIES DIAGNOSIS & REPAIR				
	<p>I. ACADMEIC FOUNDATIONS</p> <p>C. Demonstrate science knowledge and skills required to pursue the full range of post-secondary and career education opportunities.</p> <p>1. Evaluate scientific constructs including conclusions, conflicting data, controls, data, inferences, limitations, questions, sources of errors, and variables.</p> <p>2. Apply scientific methods in qualitative and quantitative analysis, data gathering, direct and indirect observation, predictions, and problem identification.</p>	C.1;C.2: All technical diagnosis problems	C.1;C.2: Problem Solving (I), Chart Reading (I), Basic Mathematical processes (I)	6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3	S.ID.5; S.IC.3; A.APR.1; A.APR.7; N.RN.3; N.Q.1; N.Q.2; N.Q.3; S.ID.6;
	<p>III. PROBLEM-SOLVING & CRITICAL THINKING</p> <p>B. Formulate ideas, proposals and solutions to transportation, distribution and/or logistics related problems in order to ensure effective and efficient delivery of products or services to targeted consumers.</p> <p>4. Analyze available information and statistical data related to the problem or issue.</p>	B.4 Efficiency, Time management, Flat Rate vs Hourly, Hoist vehicle to Bay Management, Labor Guides	B.4 Calculating Mean and Rate (III), Reading Charts and tables(I)	6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3	S.ID.5; S.IC.3; A.APR.1; A.APR.7; N.RN.3; N.Q.1
	<p>IV. INFORMATION TECHNOLOGY APPLICATIONS</p> <p>B. Employ technological tools to expedite workflow.</p> <p>27. Troubleshoot computer driven equipment and machines.</p> <p>28. Access support as needed to maintain operation of computer driven equipment and machines.</p> <p>E. Utilize geographic information systems software common to the transportation, distribution and logistics industry to coordinate and facilitate business related tasks.</p> <p>1. Execute procedures involved in using</p>	B.27 Read Flow Charts		6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4	S.ID.5; S.IC.3

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	Geographic Information System/ Global Positions System (GIS/GPS) applications to perform various work functions.				
	<p>X. TECHNICAL SKILLS</p> <p>V. ELECTRICAL/ELECTRONIC SYSTEMS - Accessories Diagnosis and Repair</p> <ol style="list-style-type: none"> 1. Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. 2. Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action. 3. Diagnose incorrect electric lock operation (including remote keyless entry); determine necessary action. 4. Diagnose incorrect operation of cruise control systems; determine necessary action. 5. Diagnose supplemental restraint system (SRS) concerns; determine necessary action. 6. Disarm and enable the airbag system for vehicle service. 7. Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action. 8. Remove and reinstall door panel. 9. Diagnose body electronic system circuits using a scan tool; determine necessary action. 10. Check for module communication (including CAN/BUS systems) errors using a scan tool. 11. Diagnose the cause of false, intermittent, or no operation of anti-theft systems. 12. Describe the operation of keyless entry/remote-start systems. 13. Perform software transfers, software updates, or flash reprogramming on electronic modules. 	V.1;V.2;V.3;V.4;V.5; V.7 V.9;V.10; V11: Interpret meter readings and compare to charts,	V.1;V.2;V.3;V.4;V.5; V.7 V.9;V.10; V11: Measurement Interpreting Charts and /or graphs(I)	6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4	S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1
8	BRAKES=GENERAL BRAKE SYSTEMS DIAGNOSIS & HYDRAULIC SYSTEMS DIAGNOSIS & REPAIR				
	<p>I. ACADMEIC FOUNDATIONS</p> <p>A. Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities.</p> <ol style="list-style-type: none"> 3. Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities. 				

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	5. Use correct grammar, punctuation and terminology to write and edit documents.				
	II. COMMUNICATIONS B. Apply active listening skills to obtain and clarify information. 1. Interpret a given verbal message/information. 2. Respond with restatement and clarification techniques to clarify information.				
	III. PROBLEM-SOLVING & CRITICAL THINKING B. Formulate ideas, proposals and solutions to transportation, distribution and/or logistics related problems in order to ensure effective and efficient delivery of products or services to targeted consumers. 1. Clarify the problems or issues to be addressed. 2. Identify constraints and parameters related to the problem presented. 7. Appraise the best solution based on factors such as risk involved, cost incurred, and benefits gained. 8. Present a proposed solution to a client along with the logic and rationale for selecting the solution. C. Analyze and evaluate ideas, proposals, and solutions to transportation, distribution and logistics related problems in order to select the best deliverable to meet business objectives. 1. Confirm definition of problem and objectives for the proposed solution.	B.7;B.8: Interpret Labor and Part cost analysis	B.7;B.8: Operations with whole and decimal (I), chart reading (I)	6.NS.2; 6.NS.3; 6.NS.5; 7.NS.1; 7.NS.2; 7.NS.3; 7.EE.3; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4	A.APR.1; A.APR.7; N.RN.3; N.Q.1; S.ID.5; S.IC.3
	X. TECHNICAL SKILLS H. Brakes - General Brake Systems Diagnosis 1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. 2. Identify and interpret brake system concern; determine necessary action. 3. Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins. 4. Locate and interpret vehicle and major component identification numbers.	H.4: Read Labor and Parts Guides, Calculation Cost I.1; I.5; I.10; I.11: Measure pressure and read charts I.2; I.3:	H.4: Read charts, operations with decimals I.1; I.5;I.10; I.11: Measurement (II) Reading Chart (I) I.2; I.3: Measurement	6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 6.NS.2; 6.NS.3; 6.NS.5; 7.NS.1; 7.NS.2; 7.NS.3; 7.EE.3	S.ID.5; S.IC.3

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>I. Brakes - Hydraulic System Diagnosis and Repair</p> <ol style="list-style-type: none"> 1. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law). 2. Measure brake pedal height, travel, and free play (as applicable); determine necessary action. 3. Check master cylinder for internal/external leaks and proper operation; determine necessary action. 4. Remove, bench bleed, and reinstall master cylinder. 5. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action. 6. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. 7. Replace brake lines, hoses, fittings, and supports. 8. Fabricate brake lines using proper material and flaring procedures (double flare and ISO types). 9. Select, handle, store, and fill brake fluids to proper level. 10. Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. 11. Inspect, test, and/or replace components of brake warning light system. 12. Bleed and/or flush brake system. 13. Test brake fluid for contamination. 	<p>Measurement</p> <p>I.8: Measure Diameter, Identify Angles</p>	<p>(I)</p> <p>I.8: Measurement (I), number sense (I)</p>		
9	<p>BRAKES-DRUM & DISC BRAKE DIAGNOSIS & REPAIR</p>				
	<p>I. ACADMEIC FOUNDATIONS</p> <p>B. Demonstrate mathematics knowledge and skills required to pursue the full range of post-secondary education and career opportunities.</p> <ol style="list-style-type: none"> 1. Identify whole numbers, decimals, and fractions. 2. Demonstrate knowledge of basic arithmetic operations such as addition, subtraction, multiplication, and division. 3. Demonstrate use of relational expressions such as equal to, not equal, greater than, less than, etc. 	<p>B.1;B.2:B.3: All technical diagnosis problems</p>	<p>Kitchen Sink 😊</p>	<p>6.NS.1; 6.EE.2; 7.NS.1; 7.NS.2; 7.NS.3; 6.NS.2; 6.NS.3; 6.NS.5; 7.EE.3</p>	<p>A.APR.1; A.APR.7; N.RN.3; N.Q.1</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>X. TECHNICAL SKILLS</p> <p>J. Brakes - Drum Brake Diagnosis and Repair</p> <ol style="list-style-type: none"> 1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. 2. Remove, clean, inspect, and measure brake drums; determine necessary action. 3. Refinish brake drum; measure final drum diameter. 4. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. 5. Inspect and install wheel cylinders. 6. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings. 7. Install wheel, torque lug nuts, and make final checks and adjustments. <p>K. Brakes - Disc Brake Diagnosis and Repair</p> <ol style="list-style-type: none"> 1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action. 2. Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action. 3. Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action. 4. Remove, inspect and replace pads and retaining hardware; determine necessary action. 5. Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks. 6. Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks. 7. Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action. 8. Remove and reinstall rotor. 9. Refinish rotor on vehicle; measure final rotor thickness. 10. Refinish rotor off vehicle; measure final rotor thickness. 11. Retract caliper piston on an integrated parking brake system. 12. Install wheel, torque lug nuts, and make final checks and adjustments. 13. Check brake pad wear indicator system 	<p>J.1-J.7: Reading Micrometer Measurement, Reading charts, Basic Math</p> <p>K.1:K.4;K.7;K.9; K.10; K.12: Reading Micrometer Measurement, Dial Indicator, Reading charts, Basic Math</p> <p>K.13 Precision Measure</p>	<p>J.1-J.7: Measuring (I), Reading Charts (I), Operations with Decimals (I)</p> <p>K.1:K.4;K.7;K.9; K.10; K.12: Measuring (I), Reading Charts (I), Operations with Decimals (I)</p> <p>K.13 Measurement (I)</p>	<p>6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 6.NS.2; 6.NS.3; 6.NS.5; 7.NS.1; 7.NS.2; 7.NS.3; 7.EE.3</p>	<p>S.ID.5; S.IC.3</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	operation; determine necessary action.				
10	BRAKES-POWER ASSIST UNITS DIAGNOSIS & REPAIR				
	<p>III. PROBLEM-SOLVING & CRITICAL THINKING</p> <p>A. Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.</p> <p>1. Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate).</p> <p>B. Formulate ideas, proposals and solutions to transportation, distribution and/or logistics related problems in order to ensure effective and efficient delivery of products or services to targeted consumers.</p> <p>3. Formulate a set of objectives for the solution that address the key issues presented.</p>				
	<p>X. TECHNICAL SKILLS</p> <p>L. Brakes - Power Assist Units Diagnosis and Repair</p> <p>1. Test pedal free travel; check power assist operation.</p> <p>2. Check vacuum supply to vacuum-type power booster.</p> <p>3. Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action.</p> <p>4. Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action.</p> <p>5. Measure and adjust master cylinder pushrod length.</p>	L1;L2; L5; Measurement tools, reading gauge	L1;L2; L5; Reading ruler(l), reading gauge (l), reading charts (l)	6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4	S.ID.5; S.IC.3
11	BRAKES-MISCELLANEOUS (WHEEL BEARING, PARKING BRAKES, ELECTRICAL, ETC) DIAGNOSIS & REPAIR				
	<p>X. TECHNICAL SKILLS</p> <p>M. Brakes - Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.) Diagnosis and</p>	M1; M2 dial indicator, torque	M1; M2 measurement tools (l)	6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4	S.ID.5; S.IC.3

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>Repair</p> <ol style="list-style-type: none"> 1. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. 2. Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings. 3. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed. 4. Check parking brake and indicator light system operation; determine necessary action. 5. Check operation of brake stop light system; determine necessary action. 6. Replace wheel bearing and race. 7. Inspect and replace wheel studs. 8. Remove and reinstall sealed wheel bearing assembly. 	<p>angles</p> <p>M4; M5 Read DMM</p> <p>M7; M8 compare torque spec (reading chart)</p>	<p>M4; M5 Measurement (I), reading chart (I)</p> <p>M7; M8 reading chart (I)</p>		
12	BRAKES-ELECTRONIC BRAKE, TRACTION & STABILITY CONTROL SYSTEMS DIAGNOSIS & REPAIR				
	<p>III. PROBLEM-SOLVING & CRITICAL THINKING</p> <p>D. Develop, implement and evaluate solutions to transportation, distribution or logistics related performance problems using a structured problem-solving process in order to improve business functioning.</p> <ol style="list-style-type: none"> 1. Describe the performance problem completely and accurately using data, graphs and charts. 2. Develop and represent a comprehensive mapping of potential root and indirect causes using commonly accepted mapping methods such as the a fishbone diagram and/or flowchart. 3. Analyze the features, benefits and constraints associated with alternative solutions to the performance issue. 4. Select best solutions for further testing based upon available data and historical information. 5. Formulate an implementation strategy for one of the solutions that considers multiple variables such as time, costs, scope, and quality. 6. Monitor selected solution performance through data collection and analysis. 7. Manage implementation of the selected 	D.1-D.8: Problem Solving	D1-D8: Problem Solving (I), Chart Reading (I), Basic Mathematical processes (I)	6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3	S.ID.5; S.IC.3; N.Q.1; N.Q.2; N.Q.3; S.ID.6; A.APR.1; A.APR.7; N.RN.3

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>solution using the prescribed strategic plan.</p> <p>8. Evaluate performance of solution implemented over time based upon data collected and analyzed throughout implementation.</p>				
	<p>IV. INFORMATION TECHNOLOGY APPLICATIONS</p> <p>D. Demonstrate the effective use of computer based equipment (containing embedded computers, or processors) to control electromechanical devices commonly used in conducting work within the TDL industry.</p> <p>1. Execute the steps involved in the operation of a computer driven machine to accomplish a common work tasks.</p> <p>2. Interpret installation and operation manuals in order to install and operate a computer driven machine/equipment.</p> <p>3. Troubleshoot computer driven equipment and machines and access relevant support sources as-needed.</p>				
	<p>X. TECHNICAL SKILLS</p> <p>N. Brakes - Electronic Brake, Traction and Stability Control Systems Diagnosis and Repair</p> <p>1. Identify and inspect electronic brake control system components; determine necessary action.</p> <p>2. Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system ; determine necessary action.</p> <p>3. Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.</p> <p>4. Depressurize high-pressure components of the electronic brake control system.</p> <p>5. Bleed the electronic brake control system hydraulic circuits.</p> <p>6. Remove and install electronic brake control system electrical/electronic and hydraulic components.</p> <p>7. Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output</p>	<p>N.1;N.2;N.3;N.7;N.8:</p> <p>Measure, chart reading</p>	<p>N.1;N.2;N.3;N.7;N.8:</p> <p>Measurement (I), Chart Reading (I)</p>	<p>6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4</p>	<p>S.ID.5; S.IC.3</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>signal, resistance, shorts to voltage/ground, and frequency data).</p> <p>8. Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).</p> <p>9. Identify traction control/vehicle stability control system components.</p> <p>10. Describe the operation of a regenerative braking system.</p>				