

CANON CITY HIGH SCHOOL VOCATIONAL AUTO MECHANICS

MATRIX -- TRADES & TECHNICAL EDUCATION

COMPETENCY/SKILL	COLORADO CORE MEASURE	COLORADO CONTENT STANDARD (1313)	ASSESS- MENT METHOD	ACHIEVE- MENT LEVEL
The learner will determine the proper sequence of arithmetic operations to arrive at a solution that can be compared to other specifications when comparing system measurements to the manufacturer's specifications.	1a 1p 2t 3	IIR3.2 IIR6.1	P O W	PR 85%
The learner will add two or more whole numbers, fractions, or decimals to determine component conformance of multiple measurements with the manufacturer's specifications	1a 1d 2I	IIR1.2 IIR6.1	W P	PR 85%
The learner will subtract whole numbers, fractions, or decimals to arrive at a difference for comparison with the manufacturer's specifications.	1a 1d 2I	IIR1.2 IIR6.1	W P	PR 85%
The learner will divide decimals to determine measurement conformance with the manufacturer's specifications.	1a 1p 2t	IIR6.1	W P	PR 85%
The learner will convert variables presented orally to a mathematical form that provides for an algebraic solution.	1m 1p	IIR2.3 IIR3.3	O P	S
The learner will estimate the results of basic arithmetic operations and accurately round up or down depending on the appropriate rule for the situation.	1m 2I	IIR1.4	W O P	90%
The learner will analyze and solve problems requiring the use of fractions, decimals, ratios, or percentages by a direct or indirect variation of the numerical elements of the problem.	1m 1p 2t	IIR1.2 IIR2.2	W	75%
The learner will determine the irrelevant and/or missing data needed to solve a problem.	1rs 2I	IIR1.1 IIR3.2	O P	S
The learner will determine and interpret place value (tenths, hundredths, thousandths) when conducting precision measurements.	1m	III5.3 IIR5.5	W P	S 75%
The learner will use Centigrade or Fahrenheit measurement scales to determine the existing temperature of substances such as a coolant or lubricant.	2t 3	IIR5.5 IIR5.1	P	S

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The learner will calculate the average (mean) of several measurements to determine the variance from the manufacturer's specifications	1m 1p 2t 2I	IIR6.3 IIR6.1	W P	75%
The learner will Use English and metric angle and distance measurements and techniques to determine angle variations from the manufacturer's specifications.	1rs 2I 2t	IIR4.3 IIR4.5	W P	S 75%
The learner will convert test readings that are in decimal or fraction form to a ratio or percent for comparison with the manufacturer's specifications for the sub-system	1a 2I 1p	IIR6.1	W	75%
The learner will visually perceive the geometric relationship of systems and sub-systems that require alignment.	1m 1rs 1d 2I 2t	III4.1	P	PR
The learner will use measurement devices to determine the parallelism or perpendicularity of chassis, suspension, and other vehicle systems requiring geometric alignment.	1rs 2t 3	IIR4.1 III4.5	O P	S
The learner will use formulas to indirectly confirm systems that are outside of the manufacturer's specification	1m 1p 2I	IIR3.1	W O	S 75%
The learner will measure timed or sequenced operating parameters to determine conformance with the manufacturer's specifications.	1rs 1d 2I	IIR5.2	P	S
The learner will use English and metric scales to determine the conformance of components to the manufacturer's specific weight.	1rs 1d	IIR5.1	P	S
The learner will determine the degree of conformance to the manufacturer's specifications for length, volume, and other appropriate measurements in the English and/or metric system.	1a 1rs 2I 1d	IIR5.1	W P	S 75%
The learner will compute mentally whether the observed measurement is out-of-tolerance when comparing the observed measurement to the manufacturer's specifications.	1rs 2I 2t	IIR5.1	O P	PR
The learner will follow all oral/written directions that relate to the task or system under study.	1r 1l 1le		O P	PR
The learner will scan service manuals and databases to locate specific information for problem solving purposes.	1r 1d 2I	IR5.1	P	PR

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The learner will request, collect, comprehend, evaluate, and apply oral and written information gathered from customers, associates and supervisors regarding problem symptoms and potential solutions to problems..	1so 1p 1d 2is 2I	IR5.1	O P	S
The learner will identify for all written and oral communication and then choose the most effective strategies for listening, reading, speaking, and writing to facilitate the communication process.	1so 1rs 1w 1r 1s 1c 2r 2is	IR2.4	P	S
The learner will adapt a reading strategy for all written materials, e.g. customer's notes, service manuals, technical bulletins, etc. relevant to problem identification, diagnosis, solution, and repair.	1r 1c 1re 2is 2I	IR1.3	P	S
The learner will use study habits and techniques, i.e. previewing, scanning, skimming, taking notes, etc. when reviewing publications for problem solving, diagnosis, and repair.	1r 1c 1re 2is 2I	IR1.3 IR1.4	P	S
The learner will use prior knowledge learned from solving similar problems to diagnose and repair specific problems.	1p 1d 2I	IR1.2	O P	S
The learner will write clear, concise, complete, and grammatically accurate sentence and paragraphs.	1w	IR3.1 IR3.2 IR3.3 IR3.4	W	75%
The learner will write warranty reports and work orders to include information regarding problem resolution and the results of work performed for the customer.	1w 1p 1so 2is 2r	IR2.3	W	S 90%
The learner will use conventional symbols (E for voltage, etc.) to solve circuit parameter calculations using formulas such as Ohm's Law.	1m 1p 3	III5.2 IIII2.1	W P	S 85%
The learner will distinguish whether a measurement or tolerance is equal or not equal to the manufacturers specifications.	1r 1d 2I 2t	IIR5.2	P	PR
The learner will use the service manual to identify the manufacturer's specifications for system parameters, operation, and potential malfunctions.	1r 1s 2I	IR1.2 IR5.1	O P	PR
The learner will interpret charts, tables, or graphs to determine the manufacturer's specifications for system operation to identify out-of-tolerance systems and subsystems.	1r 1d 1c 2I	IIR3.1	O P	PR
The learner will follow all safety regulations and procedures while performing any task.	1re 1sm		P	PR

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The learner will analyze and evaluate waste products from the repair task and dispose of the parts, residue, or trash according to applicable federal, state, and local rules.	1c 1rs 1d 2r	IIR3.1 IIR5 IIR4.1	O P	PR
The learner will use the information provided in service manuals, charts, tables, or graphs to determine the manufacturer's specifications for system operation and the appropriate repair/replacement procedure.	1r 1d 2r 2I 2t 3	IIR3.1 IIR3.2	O P	S
The learner will develop a hypothesis regarding the cause of the problem and test the hypothesis to determine the solution to the problem. 1. identify the problem 2. gather information 3. develop hypothesis 4. take action 5. check results	1rs 1c 1d 1sm 1p 2I	IIR1	W O P	S 85%
The learner will convert measurements taken using the English or metric system to specifications stated in terms of either system	1m	IIR5.2	W P	PR 90%
The learner will explain and demonstrate the understanding of the chemical reaction that occurs in an automobile regarding the combustion of fuels, catalytic converters, and contamination when introduced into systems.	1s 1le 2I 2t	IIR2.1 IIR2.2	W O	S 75%
The learner will demonstrate and understanding of the kinetic and potential energy relationships that occur in valve systems, ignitions systems, and other stored energy systems, such as springs and fuels, and determine efficiency.	1rs 1le 2t	III2.2	W	75%
The learner will explain the purpose of additives in lubricants	1w 1c 2t	IIR6 IVR4.1	W O	S 75%
The learner will demonstrate an understanding of the role of balanced and unbalanced forces on linear and rotating vehicle assemblies.	1le 1rs 2I 2t	III2.3	W O	S 75%
The learner will explain the relationship of centrifugal/centripetal force to the failure of rotating systems.	1rs 2t	UUU2.3	W O	S 75%

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The learner will explain the ignition characteristics of fuels resulting from varying levels of fractional distillation.	1s 1rs 2t	III2.1	<u>W</u> <u>O</u>	S 75%
The learner will demonstrate an understanding of how fuel characteristics effect combustion in an automotive engine.	1le 1rs 2t 3	III2.1	W O	75%
The learner will demonstrate an understanding of the effect of heat on automotive systems.	1le 2I	IIR2.2	W O	S 75%
.The learner will explain the concept of heat transfer in terms of conduction, convection, and radiation in automotive systems	1le 2I	IIR2.2	W O	S 75%
The learner will demonstrate an understanding of the expansion and contraction of system parts as a result of heat generated during use and the cooling of the system when not in operation.	1rs 1c 2t	IIR2.2	W O	75%
The learner will demonstrate an understanding of the effect that adding heat will cause in a state of mater, such as solid to liquid to gas.	1le 1c 2t	IIR2.1	W O	75%
The learner will explain the role of insulation in maintaining stable temperatures.	1c 2t	IIR2.2	O	S
The learner will demonstrate an understanding of refraction in fiber optic systems.	1le 2t	III2.1	W O	S 75%
The learner will explain that dyes added to lubricants fluoresce in ultraviolet light and provide a process for determine the source of leakage.	1rs 2t	III2.1	W O P	PR 75%
The learner will demonstrate an understanding of the process of acceleration and deceleration as a function of weight and available power	1le	IIR2.3	W O	75%
The learner will demonstrate an understanding of the reaction of fluid to the motion of a valve or piston.	1le 2t	III2.3	W O	S 75%
The learner will demonstrate an understanding of the circular motion of a vehicle as it relates to such events as toe-out-on-turns and tracking.	1le 1rs 2t	IIR4.5 IIR2.2	W O P	PR 75%
The learner will explain to a customer how sound can be amplified due to resonant cavities and other physical characteristics of the vehicle.	1s 1sm 1c 2t	IIR6	O P	PR

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The learner will to explain the relationship of the frequency of the sound to a normal or abnormally operating system.	1le 1c 2t	IIR6	O	PR
The learner will demonstrate an understanding of the role of listening to sounds as part of the troubleshooting process.	1l 1p 2t	IIR6	P	PR
The learner will demonstrate an understanding of the relationship of barometric pressure to engine performance.	1rs 1p 2t	IIR4.2 VR5.1	W O	S 75%
The learner will explain the relationship of engine torque to vehicle performance	1rs 2t	III2.3	W O	S 75%
The learner will explain how levers and pulleys can be used to increase an applied force or distance.	1m 1rs 2t	II I4.5 III I2.3	W O P	S 75%
The learner will use precision measuring devices to determine if wear and adjustments are within the manufacturer's specifications and to assure that repair or replacement parts meet the specification.	1a 1d 1rs 2I 2t	IIR5.2	O P	PR
The learner will use tension gauges , such as a torque wrench, to measure the force or tension required to tighten connections to the manufacturer's specifications.	1p 2t 2I	IIR5.2 IIR2.3	P	PR
The learner will use pressure measuring tools to determine pressures in hydraulic or pneumatic systems and compare to the manufacturer's specifications.	1d 1rs 2I 2t	IIR5.2 IIR2.3	W O	S 75%
The learner will use direct and indirect methods to measure the volume of liquids in a system and compare to manufacturer's specifications.	1p 2I 2t	IIR5.2 IIR6	W O P	PR 75%
The learner will explain the role that friction plays in acceleration and deceleration of objects as illustrated by transmitting motion to a part not physically connected to the powered part.	1le 1rs 2t	IIR2.3 IIR2.2	W O	S 75%
The student will explain the necessity of knowing that the hardness of a metal determines, in part, its function and location in the automobile.	1rs 2I 2t	III I2.3	W O	75%
The student will explain the dynamic control properties of a hydraulic system.	1rs 2I 2t	III I2.3	W O	75%

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The learner will explain and demonstrate an understanding of the use of Ohm's Law in verifying circuit parameters.	1rs 1m 2I 2t	IIR5.2 IIR2.1	W O P	S 85%
The learner will demonstrate an understanding of how the deterioration in an engine's performance can be caused by a chemical reaction that occurs in a liquid that has been contaminated.	1rs 1c 2s 2t	IIR2.1	O	S
The learner will demonstrate an understanding of how cams, pulleys, and levers are used to multiply force or transfer directions of force.	1le 1rs 1c	IIR4.5 IIR2.3	W O	S 75%
The learner will explain how rotational motion is changed to linear motion and the need for balance in rotating systems.	1rs	IIR2.3	W O	S 75%
The learner will demonstrate an understanding of how variances in flow rate in air flow sensors or cooling systems can affect engine performance.	1rs 1le	II I5.2 III I2.2	W O	S 75%
The learner will explain and demonstrate an understanding of the properties of electricity that impact the lighting, engine management, and other electrical systems in the vehicle.	1c 1rs 2t	IIR2.1	O	PR
The learner will demonstrate an understanding of the characteristics of a quality electrical ground and explain the problems associated with an inadequate electrical ground.	1rs 2t	IIR2.1	O P	PR 75%
The learner will explain voltage and current flow in series and parallel circuits	1rs	IIR2.1	W O	PR 75%
The learner will demonstrate an understanding of the processes used to locate a short circuit in the electrical/electronic system.	1rs 1c 2t	IIR2.1 IIR1	O P	PR
The learner will demonstrate an understanding of the role of the alternator in maintaining battery and system voltage.	1le 2t	IIR2.1 IIR2.3	W O	PR75%
The learner will explain and demonstrate an understanding of the ignition coil's role in generating the high voltages required to fire the spark plug.	1le 2t	IIR2.1 IIR2.3	W O	PR 75%
The learner will demonstrate an understanding of the correct procedure used to measure the electrical parameters of voltage, current, resistance or power.	1a 1le 2t	II I5.2 IIR6	P	PR
The learner will explain and demonstrate an understanding of the relationship of resistance to heat, voltage drop, and circuit parameters	1a 1le 2t	IIR6	W O	S 75%

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The learner will explain the conductivity problems in a circuit when connectors corrode due to electrochemical reactions.	1rs 1c 2t	IIIR2.1 IIIR2.2	O	PR
The learner will explain the relationship between electrical current in a conductor and the magnetic field produced in a coil such as the starter solenoid.	1le 2t	IIIR2.1 IIIR2.2	W O	S 75%
The learner will explain the ability of a coil to increase battery voltage to the level required to fire a sparkplug.	1le 2t	IIIR2.1 IIIR2.2	W O	S 75%
The learner will explain the effect of magnetic fields on unshielded circuits in selected control modules.	1rs 1le 2t	IIIR2.2	W O	75%
The learner will explain the need for a specific gravity test of battery electrolyte to determine charge.	1le 2t	IIIR2.1	O	S
The learner will use precision electrical test equipment to measure current, voltage, resistance, continuity, and/or power.	1a 2t 3	II I5.2 III I2.2	P	PR
The learner will demonstrate an understanding of the role of capacitance in timer circuits, such as RC timers or MAP sensors, where the changing manifold pressure causes two metal discs to act like a capacitor by sending varying voltage to the electronic engine control system.	1le 1c 1rs 2t	II I2.2 III I2.2 IIIR6	W O	s 75%
The learner will demonstrate an understanding of the capacity of semiconductor devices to modify rapidly engine operation parameters depending on multiple inputs from engine operational sensors.	1le 1c 1rs 2t	V I2.1 III I2.2 IIIR6	W O P	S 75%
The learner will explain how the movement of a conductor in a magnetic field can generate electricity.	1le 1rs 2t	III I2.1	W O	S 75%
The learner will demonstrate an understanding of the role of mechanical transducers in sending electrical control signals to modify system operating characteristics	1RS 2T	III I2.2	W O	S 75%

Assessment method key is: IBT = industry based standard, O = oral, P = performance, PF = portfolio, W = written, and X = alternative assessment.

Achievement level key is : PR = is Proficient level which means the learner is capable of doing the task at the preset industry standard level.
S = is Satisfactory which means the learner is performing at or above the team/group norm.

80% of the completing students will complete 80% of the competencies/skills at the achievement level identified.