

Davison Community Schools
ADVISORY CURRICULUM COUNCIL
Phase I-II May 2016

<i>Automotive I</i>	
Course Essential Questions (from Phase I report):	
<ol style="list-style-type: none"> 1. How can workplace efficiency be increased? 2. How do quality standards apply to the workplace? 3. Why is industry certification important? 4. Why is preventative maintenance important? 5. How can the relationship between a technician and customer be improved? 6. How can a technician be part of a successful team? 	
Unit 1 Safety, Tools, Vehicle Lifts, Vehicle Designs	
Essential Questions: <ol style="list-style-type: none"> 1. What are the shop safety rules and procedures? 2. What are the different types of fire extinguishers? 3. What are proper lift points on a vehicle? 4. Why must you store dangerous liquids (e.g. oil, gas, battery acid) in approved containers? 	Essential Understanding: <ol style="list-style-type: none"> 1. Always wear safety glasses, wear proper clothing and shoes, and wear proper PPE depending on the job. 2. Know the five different types (A, B, C, D, and K) and what types of fire they are used for. 3. Know where to set the lift points, and when the lift points are too rusted and not safe. 4. Storing flammable or acidic liquids in an approved container in case of fire and so there are no spills.
Curriculum Standards- DOK noted where applicable with Standards	
0A1; P-1 Identify general shop rules and procedures 0A6; P-1 Identify marked safety areas 0A10; P-1 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities 0B1; P-1 Identify tools and their usage in automotive applications 0B5; P-1 Demonstrate proper use of precision measuring tools (e.g. micrometer, dial indicator, dial-caliper) 0A3; P-1 Identify and use proper placement of floor jacks and jack stands. 0A4; P-1 Identify and use proper procedures for safe lift operation.	
LEARNING TARGETS	
Knowledge/Content I Know ...	Skills/Processes I Can ...
<ul style="list-style-type: none"> • How to identify the different types of fire extinguishers. • How to safely lift and support a car on either jack stand or a lift. • How to use safety equipment properly. • How to use shop tools and shop equipment safely and properly. 	<ol style="list-style-type: none"> 1. Identify hazardous environments and apply appropriate risk prevention strategies. 2. Understand the tools and equipment in a shop. 3. Being able to understand a MSDS. 4. Understanding OSHA standards and guidelines.
Phase III Textbook/Materials	
Fundamentals Of Automotive Maintenance and Light Repair	

Phase IV Summative Assessment Evidence	
Common Summative Unit Assessments:	Agreed Upon Interim Summative Assessments: (*identifies Performance Task)
Phase V Learning Plan	

Phase II Curriculum	
Unit 2: Oils, Threads, Taps Dies, Belts and Hoses, All Data Vehicle Inspections	
Essential Questions:	Essential Understanding:
<ol style="list-style-type: none"> 1. How do you check engine oil? 2. How do you check transmission fluid? 3. What do you do if you strip a nut or a bolt on a customer's car? 4. How can you tell if a belt is worn out or leaking? 	<ol style="list-style-type: none"> 1. Find the location of the oil dipstick, pull out the dipstick with the engine off and check fluid level. 2. Have the vehicle on flat ground and start the vehicle to warm it up, shut the vehicle off and find the transmission dipstick and check the fluid level. 3. Find the right thread pitch. 4. Look for cracks, oil soaking, glazing, tears, and bottoming out of the belt.
Curriculum Standards- DOK noted where applicable with Standards	
<ol style="list-style-type: none"> 1. Engine oil <ol style="list-style-type: none"> a. The level of oil in the engine's lubrication system is critical to its operation. b. The engine oil is picked up by the oil pump, filtered through the oil filter, and sent under pressure to the crankshaft and camshaft bearings. c. If the level is too low: <ul style="list-style-type: none"> -The oil pump will starve for oil. d. If the level is too high: <ul style="list-style-type: none"> -The oil will be struck by the crankshaft, churning it into foam. e. The bearings require a steady flow of oil for lubrication, not air. They can be damaged if it is too low or too high. 2. Taps and Dies <ol style="list-style-type: none"> a. Taps cut threads inside holes or nuts and come in three different types. <ol style="list-style-type: none"> i. Taper Tap <ul style="list-style-type: none"> -Narrows at the tip to give it a good start in the hole where the thread is to be cut -Can be obtained from engineering suppliers -The diameter of the hole is determined by the tap drill chart -The chart shows what hole size has to be drilled and what tap size is needed to cut the correct thread 3. Belts and Hoses <ol style="list-style-type: none"> I. Engine drive belts <ol style="list-style-type: none"> a. Used to operate the various accessories on the engine b. Water pump, Power steering pump, Air conditioner compressor, Alternator 	

- c. V-type belt-Sits inside a deep V-shaped groove in the pulley
- d. Serpentine-type belt
- e. Has a flat profile with a number of grooves running lengthwise along the belt
- f. These grooves are the exact reverse of the grooves in the outer diameter of the pulleys.
- g. Belts should be checked for the following:
- h. Cracks
 - (a) Cracks that exceed a certain number per inch in a belt indicate that the belt may soon fail and should be replaced.
- I. Oil soaking
 - (a) A belt that has been soaked in oil will not grip properly on the pulleys and will slip.
 - (b) If the oil contamination is severe enough for this to happen, replace the belt.
- II. Glazing
 - (a) Is shininess on the surface of the belt where it comes in contact with the pulley
 - (b) If the belt is very worn, the glazing could be due to the belt bottoming out and should be replaced.
 - (c) If not old, glazing could indicate that the belt is not tight enough.
 - (d) Tightening the belt may be all that is necessary, depending on how bad the glazing is.
- III. Tears
 - (a) Torn or split belts are unserviceable and should be replaced.
- IV. Bottoming out
 - (a) Occurs when a V-type belt or serpentine belt becomes very worn
 - (b) The bottom of the V may contact the bottom of the groove in the pulley, preventing the sides of the belt from making good contact with the sides of the pulley grooves.
 - (c) This reduced friction causes slippage.
 - (d) A belt worn enough to bottom out should be replaced.
- 2. Hoses
 - a. At the radiator, there will be a large upper radiator hose and a large lower radiator hose.
 - b. The smaller heater hoses run from the engine block, manifold, or water pump to connections at the heater assembly.
 - c. The engine should be cool when inspecting the hoses.
 - d. A hot engine will have pressure in the cooling system that may make a soft hose feel stiff.
 - e. If the engine is hot, look for bulging in the hoses.
 - f. One defective hose usually means the other hose(s) may be deteriorating in the same way.
 - g. Check for any small hoses that may connect components.

LEARNING TARGETS

Knowledge/Content I Know ...	Skills/Processes I Can ...
<ul style="list-style-type: none"> • How to inspect a vehicle under the hood and on the hoist. • How to change oil, belts, transmission fluid, and air filters. • How to add oil, transmission fluid, power steering fluid, and brake fluid. • How to properly find the right tap or die to fix a stripped nut or bolt. 	<ul style="list-style-type: none"> • Complete under-the-hood check sheet. • Complete on-the-hoist check sheet • Perform a lubrication service • Check oil and fluid levels • Check belts and hoses

Phase III Textbook/Materials

Fundamentals Of Automotive Maintenance and Light Repair

Phase IV Summative Assessment Evidence	
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Phase V Learning Plan	

Phase II Curriculum	
Unit 3: Cooling Systems, Heating Systems, Engine Theory	
Essential Questions: <ol style="list-style-type: none"> 1. What is the proper mixture of coolant? 2. Where to find the radiator pressure rating and how to test the cap? 3. What is a hydrometer or refractometer used for? 4. How to test a thermostat? 5. What to look for when inspecting a drive belt? 	Essential Understanding: <ol style="list-style-type: none"> 1. The proper mixture for coolant is 50/50 but you should always check it with a hydrometer or refractometer to make sure. 2. Most the time you can find the radiator cap pressure on the cap or in the owner's manual. 3. Hydrometers and refractometers are used to test the freezing point in antifreeze. 4. Placing a thermostat in hot water (180-200 degrees) depending on what it's rated for, and you should be able to see the thermostat open. 5. Listen for belt squeal, check belt tension and pulley alignment, and look for cracks or missing grooves and look for glazed over or slick spots.
Curriculum Standards- DOK noted where applicable with Standards	
<p>A. With a vehicle, several systems are designed to maintain comfortable temperatures.</p> <ol style="list-style-type: none"> 1. Heating system 2. Ventilation system 3. Air-conditioning (HVAC) system <ol style="list-style-type: none"> a) Uses heat created by engine operation to raise temperature b) Technicians must be familiar with HVAC systems. c) Engine lubrication d) Engine cooling e) Motive power types- spark ignition engines f) Four stroke spark ignition engines g) Components of the spark ignition engine h) Cranking sound diagnosis i) Cylinder power balance test j) Cylinder leakage test k) Diagnosis engine noise and vibrations l) Types of lubrication methods 	

LEARNING TARGETS

Knowledge/Content I Know ...	Skills/Processes I Can ...
<ul style="list-style-type: none"> • Describe the principles of the air-conditioning service process • Discuss air conditioner capacity and why it is important to determine the proper charge • Explain the process of performance testing the air-conditioning system • Explain the purpose and methods of leak testing • Explain the basic principles of a modern ignition system • Explain the process involved in diagnosing ignition system issues 	<ul style="list-style-type: none"> • Identify refrigerant type • Perform the reclaim process • Recycle refrigerant • Inspect, test, and replace the compressor clutch • Remove, inspect, and reinstall the compressor • Charge an air-conditioning system • Perform a spark test • Inspect a distributor cap and rotor • Replace spark plugs and spark plug wires

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Phase II Curriculum

Unit 4: Brakes

Essential Questions:

1. What is a regenerative braking system?
2. How do cylinders effect braking?
3. What is Newton’s first law of motion
4. How does ABS help with braking?
5. How do Drum brakes work?
6. How do Disc brakes work?

Essential Understanding:

1. Brake-by-wire system uses the electric motor as a generator, which slows the vehicle by converting the vehicles kinetic energy into electrical energy.
2. By using cylinders of different sizes, hydraulic forces can be increased or reduced, allowing designers to obtain the desired braking force for each wheel.
3. An object will stay at rest or uniform speed unless it is acted upon by an outside force.
4. ABS brakes help to prevent skidding and maintain directional control of the vehicle.
5. Braking occurs by means of stationary brake shoes expanding against the inside

	<p>of the drum.</p> <p>6. Braking occurs by means of stationary pads clamping against the outside of the rotor.</p>
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Curriculum Standards- DOK noted where applicable with Standards

5B4; P-1 Select, handle, store and fill brake fluids to proper levels
 5B7; P-1 Test brake fluid for contamination
 5B6; P-1 Bleed and/or flush brake system
 5B2; P-1 Check master cylinder for external leaks and proper operation
 5D6; P-1 Remove and install pads, rotors, shoes, and drums
 5A3; P-1 Install and torque lug nuts
 5D5; P-1 Clean and inspect rotor and measure rotor thickness, thickness variation, and lateral runout

LEARNING TARGETS

Knowledge/Content I Know ...	Skills/Processes I Can ...
<ul style="list-style-type: none"> Describe the principles of braking Describe how brake design must account for heat transfer Identify the two types of brake systems on all vehicles Describe the brake systems for hybrid vehicles Describe how brake design must account for heat transfer 	<ul style="list-style-type: none"> Replace brake lines, hoses, fittings, and supports Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings and supports. Measure brake pedal height, travel, and free play Check master cylinder for external leaks and proper operation Diagnose poor stopping, noise vibration, pulling, grabbing, dragging, or pulsation concerns Remove and clean caliper assembly Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage Reassemble, lubricate, and reinstall seat pads and caliper, pads, and related hardware

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