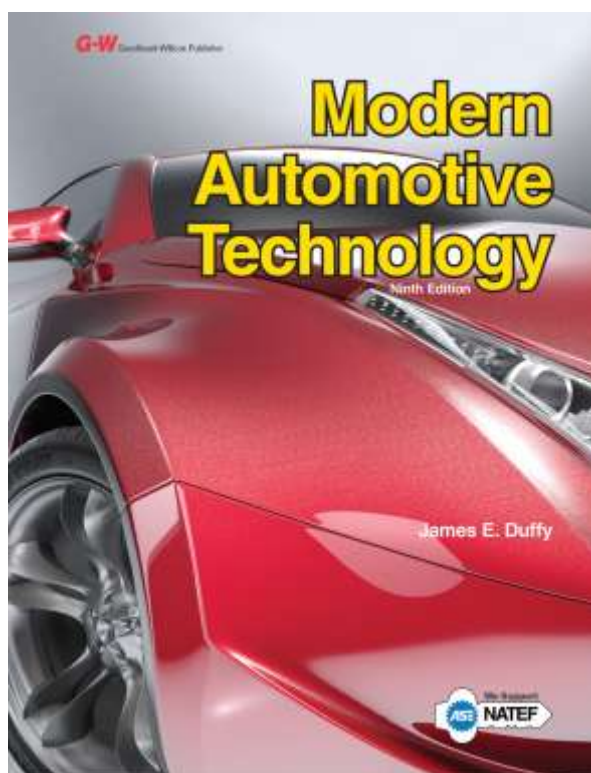


Correlation of
Modern Automotive Technology, by Duffy
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to
Precision Exams Automotive Service Standards

Goodheart-Willcox is pleased to partner with Precision Exams by correlating *Modern Automotive Technology* to their Automotive Service standards. Precision Exams standards and Career Skills Exams were created in concert with industry and subject matter experts to match real-world job skills and marketplace demands. Students who pass the exam and performance portion of the exam can earn a Career Skills Certification.

The correlation chart below lists the Standards, Objectives, and Indicators for the Automotive Service exam in the left column. Corresponding content from *Modern Automotive Technology* that can be used by a student to help achieve the standard, objective, or indicator is listed in the right column.

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Standards / Objectives / Indicators	Textbook Pages
Standard 1: Understand General Shop Safety.	
Objective 1. Learn safe working habits and procedures. Pass a safety test with 100 percent.	Chapter 3: Basic Hand Tools, 41–55; Chapter 4: Power Tools and Equipment, 59–72; Chapter 5: Auto Shop Safety, 75–85; Recycling and Disposal of Auto Shop Wastes—Other Automotive Recyclables, 152–153
Indicator 1 Personal safety.	Chapter 5: Auto Shop Safety, 75–85
Indicator 2 Tool and equipment safety.	Chapter 3: Basic Hand Tools, 41–55; Chapter 4: Power Tools and Equipment, 59–72
Indicator 3 Workplace safety.	Chapter 5: Auto Shop Safety, 75–85

Standards / Objectives / Indicators	Textbook Pages
Objective 2. Comply with safety rules for working with automotive chemicals.	Shop Safety, 78; Fires–Explosions, 79–81; Chemical Burns, 82; Right-to-Know Laws, 84; Recycling and Disposal of Auto Shop Wastes–Other Automotive Recyclables, 152–153
Indicator 1 Chemical manufacturers provide a material safety data sheet (MSDS) for each chemical they produce.	Right-to-Know Laws, 84–85
Indicator 2 Store chemicals in properly labeled containers.	Shop Safety, 78; Right-to-Know Laws, 84–85
Objective 3. Identify the gases encountered in the automotive field and the hazards they present.	Air Pollution–Sources of Vehicle Emissions, 931–933; Asphyxiation, 81–82; 2nd bullet, 84
Indicator 1 Water, oxygen, nitrogen, carbon dioxide (CO ₂), hydrocarbons (HC), oxides of nitrogen (NO _x), and carbon monoxide (CO).	Air Pollution–Sources of Vehicle Emissions, 931–933; Asphyxiation, 81–82; 2nd bullet, 84
Indicator 2 HC, NO _x , and CO can pose health and environmental problems if they are not controlled.	Air Pollution–Sources of Vehicle Emissions, 931–933; Asphyxiation, 81–82; 2nd bullet, 84
Objective 4. Identify the hazards and control of asbestos dust.	Asphyxiation, 81; 3rd bullet, 84; Warning, 1630; Warning, 1647
Indicator 1 Asbestos is a carcinogen – a substance that causes cancer.	3rd bullet, 84; Warning, 1630; Warning, 1647
Indicator 2 Never use compressed air to clean brake assemblies.	3rd bullet, 84; Warning, 1630
Indicator 3 Use a vacuum source or flush with water.	3rd bullet, 84; Warning, 1630; Warning, 1647
Indicator 4 Because some exposure might be unavoidable, wear an approved filter mask.	Asphyxiation, 81; Warning, 1630; Warning, 1647
Standard 2: Students will be able to Understand Basic Hand Tools, Fasteners, and Shop Equipment.	
Objective 1. Identify and measure metric and standard fasteners.	Fasteners–Rust Penetrant, 119–128
Indicator 1 Machine screws, sheet metal screws, bolts, studs, nuts.	Bolts and Nuts–Sheet Metal Screws, 119–123
Indicator 2 Lock washers, keys, splines, pins, snap rings, set screws, and rivets.	Washers–Adhesives, 122–124
Indicator 3 Head markings, thread series, right-hand and left-hand threads, major and minor diameters, thread pitch.	Fasteners–Bolt Description, 119–121
Objective 2. Correctly identify and use basic hand tools.	Chapter 3: Basic Hand Tools, 41–55; Chapter 4: Power Tools and Equipment, 59–72

Standards / Objectives / Indicators	Textbook Pages
Indicator 1 Screwdrivers, wrench, sockets, drive handles, extensions, pliers, hammer, chisels, punches, files, hacksaw, taps, dies, pullers, vises, drill bits, grinder.	Chapter 3: Basic Hand Tools, 41–55; Chapter 4: Power Tools and Equipment, 59–72; Thread Repairs—Removing Damaged Fasteners, 126–128
Objective 3. Identify and demonstrate use of basic measuring tools (accurate to 1/32 or 1 mm).	Measuring Systems—Hole Gauge, 89–99
Indicator 1 Micrometers, inside and outside calipers, dividers, dial indicator, dial calipers.	Measuring Tools—Hole Gauge, 90–99
Indicator 2 Electrical testers, pressure gauges, feeler gauges.	Feeler Gauges—Using a Feeler Gauge, 96; Pressure Gauge—Vacuum Gauge, 99; Electrical Test Equipment, 302–308; Using Scan Tools, 404–406
Objective 4. Use reference manuals or information systems to find service procedures and specifications	Chapter 7: Service Information and Work Orders, 109–117; Locating Engine Performance Problems—Other Sources of Service Information, 988–990; Diagnostic Laptop Computers and Tablets, 1018–1019
Indicator 1 Computer oriented.	Personal Computer, 72; Chapter 7: Service Information and Work Orders, 109–117; Other Sources of Service Information, 990; Diagnostic Laptop Computers and Tablets, 1018–1019
Indicator 2 Printed manuals.	Chapter 7: Service Information and Work Orders, 109–117; Performance Problem Troubleshooting Charts—Other Sources of Service Information, 989–990
Objective 5. Properly raise and support vehicles using jack stands and a frame contact hoist.	Floor Jack, 65–66; Transmission Jack, 66; Jack Stands, 67; Lift, 76–77; 4th bullet, 84
Indicator 1 Use a jack and jack stands to raise and support a vehicle.	Floor Jack, 65–66; Jack Stands, 67; 4th bullet, 84
Indicator 2 Use a frame hoist to raise and support a vehicle and properly use safety locks to secure the vehicle.	Lift—Alignment Rack, 76–77
Standard 3: Understand Proper Techniques in Removal and Installation of Tires and Wheels.	
Objective 1. Inspect tires for abnormal wear.	Checking Tires, 148–149; Tire, Wheel, and Wheel Bearing Diagnosis—Tire Wear Patterns, 1467–1468; Periodic Inspection, 1471
Indicator 1 Proper inflation.	Checking Tires, 148–149; Tire Inflation Problems, 1468–1470; Checking Tire Inflation Pressure, 1472
Indicator 2 Mechanical problems (no specific angles).	Checking Tires, 148–149; Tire Impact Damage, 1468; Tire Vibration Problems—Tire and Wheel Bearing Noise, 1470–1471; Periodic Inspection, 1471
Objective 2. Remove a tire from a wheel.	Mounting and Dismounting Tires, 1476–1478

Standards / Objectives / Indicators	Textbook Pages
Indicator 1 Use the proper equipment.	Mounting and Dismounting Tires, 1476–1478
Indicator 2 Use the correct techniques and safety precautions.	Mounting and Dismounting Tires, 1476–1478
Objective 3. Properly rotate tires and reinstall using proper torque procedures.	Rotating Tires, 1472–1473; Torquing Lug Nuts–Replacing Lug Studs, 1473
Indicator 1 Use either the conventional or radial tire rotation method.	Rotating Tires, 1472–1473
Indicator 2 Lug nuts should be tightened to the proper torque as indicated in the vehicle specifications and in a sequence of cross or star patterns depending on the number of lug nuts.	Torquing Lug Nuts–Replacing Lug Studs, 1473
Objective 4. Use a tire balancer to balance tires of a vehicle using proper procedures.	Wheel Balance–Wheel Balancing Machines, 1474–1476
Indicator 1 Static balance – equal distribution of weight around the wheel.	Wheel Balance–Wheel Balancing Machines, 1474–1476
Indicator 2 Dynamic balance – equal distribution of weight on each side of the wheel.	Wheel Balance–Wheel Balancing Machines, 1474–1476
Objective 5. Locate a leak. Identify proper repair procedure.	Checking Tires, 148–149; Tire, Wheel, and Wheel Bearing Diagnosis–Tire Inflation Problems, 1467–1470; Tire Maintenance–Checking Tire Inflation Pressure, 1471–1472
Indicator 1 Buff the area slightly larger than the patch.	Tire Puncture Repair, 1478
Indicator 2 Apply the cement with a brush.	Tire Puncture Repair, 1478
Indicator 3 Apply the patch and firmly roll the patch using a stitcher tool.	Tire Puncture Repair, 1478
Objective 5. Interpret tire sidewall markings: size, inflation, and load.	Tire Markings, 1451–1453
Indicator 1 Tire type.	Tires, 1449; Tire Construction, 1450–1451; Special Tires and Tire Features–Run-Flat Tires, 1454–1455
Indicator 2 Section width in millimeters.	Tire Size, 1451
Indicator 3 Aspect ratio.	Aspect Ratio, 1451–1452
Indicator 4 Speed rating.	Speed Rating, 1453
Indicator 5 Construction type.	Tire Construction, 1450–1451
Indicator 6 Rim diameter.	Wheels, 1456–1457
Standard 4: Identify and Perform Basic Services on a Vehicle.	

Standards / Objectives / Indicators	Textbook Pages
Objective 1. Locate and identify basic automotive parts.	Chapter 1: The Automobile, 3–24
Indicator 1 Identify engine parts.	Chapter 11: Engine Fundamentals, 167–181; Chapter 12: Engine Design Classifications, 185–195
<ul style="list-style-type: none"> Block, crankshaft, camshaft, piston, cylinder head, connecting rod, valve train, timing components 	Chapter 13: Engine Top End Construction, 199–211 ; Chapter 14: Engine Bottom End Construction, 215–230; Chapter 15: Engine Front End Construction, 233–238
<ul style="list-style-type: none"> Fuel systems: injector, filter, lines, pump, tank. 	Chapter 40: Fuel Tanks, Pumps, Lines, and Filters, 695–716; Chapter 41: Gasoline Injection Fundamentals, 721–739; Chapter 43: Diesel Injection Fundamentals, 773–781
<ul style="list-style-type: none"> Ignition systems: spark plugs, coil(s). 	Chapter 34: Ignition System Technology, 565–577
<ul style="list-style-type: none"> Cooling systems: radiator, pump, thermostat 	Chapter 47: Cooling System Technology, 835–855
Indicator 2 Identify drive train parts.	Chapter 61: Clutch Technology, 1227–1241; Chapter 63: Manual Transmission Technology, 1265–1282; Chapter 65: Automatic Transmission Technology, 1301–1321; Chapter 67: Drive Shaft and Transfer Case Technology, 1343–1353; Chapter 69: Differential and Rear Drive Axle Technology, 1369–1383; Chapter 71: Transaxle and Front Drive Axle Technology, 1407–1423
<ul style="list-style-type: none"> Manual Transmission 	Chapter 61: Clutch Technology, 1227–1241; Chapter 63: Manual Transmission Technology, 1265–1282
<ul style="list-style-type: none"> Automatic Transmission 	Chapter 65: Automatic Transmission Technology, 1301–1321
<ul style="list-style-type: none"> Drivelines 	Chapter 67: Drive Shaft and Transfer Case Technology, 1343–1353
<ul style="list-style-type: none"> Drive Axles 	Chapter 69: Differential and Rear Drive Axle Technology, 1369–1383; Chapter 71: Transaxle and Front Drive Axle Technology, 1407–1423
Indicator 3 Identify brake parts.	Chapter 80: Brake System Technology, 1601–1621; Chapter 82: Anti-Lock Brakes, Traction, and Stability Control, 1653–1669
<ul style="list-style-type: none"> Master cylinder, lines, caliper, rotor, drum, wheel cylinder, pads, shoes 	Chapter 80: Brake System Technology, 1601–1621
Indicator 4 Identify steering and suspension parts.	Chapter 75: Suspension System Technology, 1491–1509; Chapter 77: Steering System Technology, 1537–1556

Standards / Objectives / Indicators	Textbook Pages
<ul style="list-style-type: none"> Steering gear: worm gear vs. rack and pinion 	Steering Gear Principles—Four-Wheel Steering Systems, 1540–1556
<ul style="list-style-type: none"> Tie-rod 	Tie-Rod Assemblies, 1543; Rack-and-Pinion Tie-Rod Assemblies, 1545
<ul style="list-style-type: none"> Shocks / Struts 	Suspension System Construction—Independent Rear Suspension, 1496–1503
<ul style="list-style-type: none"> Springs: leaf, coil, torsion bar, air 	Suspension System Springs—Suspension Springs Specification, 1493–1495
Indicator 5 Identify electrical parts.	Chapter 19: Electric and Electronic Components, 277–296; Chapter 23: Computer System Fundamentals, 373–394; Chapter 28: 12-Volt and HV Battery Technology, 471–483; Chapter 30: Engine Starting Systems, 511–520, Chapter 32: Charging System Technology, 537–547
<ul style="list-style-type: none"> Battery 	Chapter 28: 12-Volt and HV Battery Technology, 471–483
<ul style="list-style-type: none"> Alternator 	Chapter 32: Charging System Technology, 537–547
<ul style="list-style-type: none"> Starter 	Chapter 30: Engine Starting Systems, 511–520
<ul style="list-style-type: none"> Circuit protection: fuse, breaker 	Chapter 19: Electric and Electronic Components, 277–296
Objective 2. Based on the manufacturer's specifications, check and adjust all vehicle fluid levels.	Chapter 9: Vehicle Maintenance, Fluid Service, and Recycling, 137–154
Indicator 1 Check belt tension and condition.	General Inspection and Problem Location, 150–151; Timing Belt Service—Installing Timing Belt Cover, 1185–1189
Indicator 2 Check condition of hoses.	General Inspection and Problem Location, 150–151; Cooling System Hose Service—Coolant Hose Replacement, 873–875
Indicator 3 Check coolant strength and leaks.	General Inspection and Problem Location, 150–151; Coolant Service—Corrosion of Aluminum, 879–881
Objective 3. Change engine oil and filter on a vehicle. Use proper disposal methods for waste oil.	Fluid Service—Changing Engine Oil and Filter, 138–141; Engine Oil and Filter Service—Changing Engine Oil and Filter, 917–919
Indicator 1 Lubricate chassis.	Chassis Lubrication—Body Lubrication, 147–148
Indicator 2 Check air filter.	Filter Service, 146–147; Air Filter Service, 715–716; Passenger Compartment Filters, 1691
Objective 4. With a voltmeter, check battery voltage with the engine running and with the engine off.	Checking 12-Volt Battery Charge—Cell Voltage Test, 491–493

Standards / Objectives / Indicators	Textbook Pages
Indicator 1 Properly jump-start a vehicle.	12-Volt Jump-Starting, 496; Hybrid Jump-Starting, 500
Objective 5. Check shocks or struts.	Shock Absorber Service—Air- and Gas-Charged Shock Service, 1514–1516; MacPherson Strut Service—Strut Installation, 1524–1527
Indicator 1 Check for leakage.	Checking Shock Absorber Condition, 1514; Air- and Gas-Charged Shock Service, 1516; MacPherson Strut Service, 1524–1525
Indicator 2 Check for proper operation.	Chapter 76: Suspension System Diagnosis and Repair, 1513–1532
Objective 5. Understand the four-stroke cycle.	Engine Operation—Four-Stroke Cycle, 167–170
Indicator 1 Intake.	Four-Stroke Cycle, 168–170
Indicator 2 Compression.	Four-Stroke Cycle, 168–170
Indicator 3 Power.	Four-Stroke Cycle, 168–170
Indicator 4 Exhaust.	Four-Stroke Cycle, 168–170
Objective 6. Check brakes.	General Inspection and Problem Location, 150; Chapter 81: Brake System Diagnosis, Service, and Repair, 1625–1649
Indicator 1 Lining thickness.	Checking Wheel Brake Assemblies, 1629–1630
Indicator 2 Fluid leaks.	Brake System Inspection—Checking Wheel Brake Assemblies, 1628–1630
Indicator 3 Park brake function.	Brake System Inspection—Checking Wheel Brake Assemblies, 1628–1630; Parking Brake Adjustment, 1649
Objective 7. Check lights.	Lightbulbs—Aiming Headlights, 604–617
Indicator 1 Replace lightbulbs as needed.	Light System Service—Aiming Headlights, 613–617
Standard 5: Students will be able to Identify Basic Emission Components.	
Objective 1. Identify common emission components.	Vehicle Emission Control Systems—Diesel Particulate Filter, 934–954
Objective 2. Run an emission test on a vehicle.	Exhaust Gas Analyzer—Evaluating Drive Trace Reports, 959–968; Emission Control Information Sticker, 980
Standard 6: Solve Basic Mathematical Equations Related to Automotive.	
Objective 1. Solve whole number problems with two- and three-digits.	Addition—Multiplication, 100–102
Indicator 1 Addition.	Addition, 100
Indicator 2 Subtraction.	Subtraction, 100–101
Indicator 3 Multiplication.	Multiplication, 101–102

Standards / Objectives / Indicators	Textbook Pages
Indicator 4 Division.	Division, 101
Objective 2. Solve fraction problems.	Fractions and Decimal Fractions—Sample problem 10—Dividing Decimal Numbers, 102–104
Indicator 1 Addition.	Addition and Subtraction of Decimals, 103
Indicator 2 Subtraction.	Addition and Subtraction of Decimals, 103
Indicator 3 Multiplication.	Multiplication and Division of Decimals, 103–104
Indicator 4 Division.	Multiplication and Division of Decimals, 103–104
Objective 3. Solve decimal problems with two- and three-digits.	Fractions and Decimal Fractions—Sample problem 10—Dividing Decimal Numbers, 102–104
Indicator 1 Addition.	Addition and Subtraction of Decimals, 103
Indicator 2 Subtraction.	Addition and Subtraction of Decimals, 103
Indicator 3 Multiplication.	Multiplication and Division of Decimals, 103–104
Indicator 4 Division.	Multiplication and Division of Decimals, 103–104
Objective 4. Solve conversion problems.	Fractions and Decimal Fractions, 102–103; Percentages—Sample Problem 12—Percentage Variation, 104–105
Indicator 1 Fraction-to-decimal.	Fractions and Decimal Fractions, 102–103
Indicator 2 Decimal-to-fraction.	Fractions and Decimal Fractions, 102–103
Indicator 3 Decimal-to-percent.	Percentages—Sample Problem 12—Percentage Variation, 104–105
Indicator 4 Percent-to-decimal.	Percentages—Sample Problem 12—Percentage Variation, 104–105
Objective 5. Solve basic ratio-to-proportion problems	Ratios, 105
Objective 6. Solve basic linear-measurement problems	Steel Rule, 90–91; Review of Shop Math, 100–105
Indicator 1 Measuring using the Imperial system.	Customary Measuring System, 90; Reading a Customary Micrometer, 94–95
Indicator 2 Measuring using the Metric system.	Metric (SI) Measuring System, 90; Reading a Metric Micrometer, 95
Standard 7: Identify and Properly Perform a Vehicle Inspection.	
Objective 1. Inspect a vehicle's ownership, glass, lights, and accessories.	Lightbulbs—Aiming Headlights, 604–617; Power Window Service, 647–649; Window Defogger Service, 650–651; Heated Windshield, 652; Windshield Wiper Service, 630–631
Indicator 1 Check for vehicle registration.	—
Indicator 2 Inspect vehicle windshield and other glass for excessive damage, breakage, inadequate movement, and unsafe alterations.	Power Window Service, 647–649; Window Defogger Service, 650–651; Heated Windshield, 652; Windshield Wiper Service, 630–631

Standards / Objectives / Indicators	Textbook Pages
Indicator 3 Inspect vehicle headlights and auxiliary lights for correct aiming; inspect headlights, auxiliary lights, taillights, brake lights, turn signals, and other lights for malfunction, damage, or other unsafe conditions.	Lightbulbs—Aiming Headlights, 604–617
Indicator 4 Inspect vehicle windshield wipers, windshield washers, windshield defrosters, horn, speedometer, odometer, and automatic transmission/starter interlock for damage or malfunction.	Dash Instrumentation—Horn Service, 618–632; Rear Window Defogger—Heated Windshield, 650–652; Neutral Safety Switch Adjustment—Backup Light Switch, 1334–1335
Objective 2. Inspect a vehicle’s brakes, steering and suspension, and tires.	Checking Tires, 148–149; General Inspection and Problem Location, 150–151; Tire, Wheel, and Wheel Bearing Diagnosis—Measuring Tire and Wheel Runout, 1467–1474; Chapter 76: Suspension System Diagnosis and Repair, 1513–1529; Chapter 78: Steering System Diagnosis and Repair, 1561–1574; Chapter 81: Brake System Diagnosis, Service, and Repair, 1625–1649
Indicator 1 Inspect vehicle tires and wheels for excessive wear, damage, mismatched sizes, and improper mounting and illegal studs.	Checking Tires, 148–149; General Inspection and Problem Location, 150–151; Tire, Wheel, and Wheel Bearing Diagnosis—Measuring Tire and Wheel Runout, 1467–1474
Indicator 2 Inspect vehicle steering and suspension assemblies for excessive wear, damage, missing parts, and improper functioning.	General Inspection and Problem Location, 150–151; Chapter 76: Suspension System Diagnosis and Repair, 1513–1529; Chapter 78: Steering System Diagnosis and Repair, 1561–1574;
Indicator 3 Inspect altered vehicles to confirm that they conform to required tolerances for raised or lowered suspension and other changes.	Suspension System Diagnosis, 1513–1514; Curb Height and Curb Weight, 1516; Computerized Suspension Diagnosis, 1527–1529
Indicator 4 Using a brake plate or visual method, inspect vehicle brake systems for excessive wear, damage, missing parts, improper functioning, and other related safety hazards.	General Inspection and Problem Location, 150–151; Chapter 81: Brake System Diagnosis, Service, and Repair, 1625–1649
Objective 3. Inspect a vehicle’s exhaust and fuel systems.	General Inspection and Problem Location, 150–151; Fuel Supply System Service—Air Filter Service, 705–716; Gasoline Injection Problem Diagnosis—Scan Tool Fuel Trim Data, 743–748; Diesel Injection Diagnosis—Injection Cleanliness, 785–787; Exhaust System Service—Stainless Steel Exhaust System Repairs, 801–805
Indicator 1 Inspect vehicle exhaust systems for excessive wear, damage, malfunction, and illegal configuration.	General Inspection and Problem Location, 150–151; Exhaust System Service—Stainless Steel Exhaust System Repairs, 801–805

Standards / Objectives / Indicators	Textbook Pages
Indicator 2 Inspect vehicle fuel systems for damage, malfunction, or leakage.	Fuel Supply System Service—Air Filter Service, 705–716; Gasoline Injection Problem Diagnosis—Scan Tool Fuel Trim Data, 743–748; Diesel Injection Diagnosis—Injection Cleanliness, 785–787
Objective 4. Inspect a vehicle's body.	Frame, Body, and Chassis—Vehicle Body Types, 4–9; General Inspection and Problem Location, 150–151; Power Seat Service, 645; Door Panel Removal, 649; Power Mirrors, 655; Engine Mount Problems, 1050–1051; Seat Belt Service—Belt Retractor Service, 1741–1743
Indicator 1 Inspect vehicle body, frame, motor mounts, fenders, bumpers, floor pan, doors, hood, seats, exterior mirrors, interior mirror, and seat belts for excessive damage, illegal configuration, missing parts, and malfunction of mechanical assemblies.	Frame, Body, and Chassis—Vehicle Body Types, 4–9; General Inspection and Problem Location, 150–151; Power Seat Service, 645; Door Panel Removal, 649; Power Mirrors, 655; Engine Mount Problems, 1050–1051; Seat Belt Service—Belt Retractor Service, 1741–1743
Indicator 2 Inspect "Sand" or "Dune" buggies to meet regular passenger car requirements.	—
Indicator 3 Inspect street rods and other modified vehicles to meet minimum equipment and safety requirements for limited use on public highways.	General Inspection and Problem Location, 150–151