

# Automotive Brakes: Grades 9, 10, 11, 12

Adopted 2014

## Identify and demonstrate workplace safety

### **1.1 Students will be able to identify and demonstrate safe work practices.**

1. Identify general shop safety rules and procedures. [1.1.1](#)
2. Utilize safe procedures for handling of tools and equipment. [1.1.2](#)
3. Identify and use proper placement of floor jacks and jack stands. [1.1.3](#)
4. Identify and use proper procedures for safe lift operation. [1.1.4](#)
5. Utilize proper ventilation procedures for working within the lab/shop area. [1.1.5](#)
6. Identify marked safety areas. [1.1.6](#)
7. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. [1.1.7](#)

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### **1.2 Students will be able to practice personal safety.**

1. Identify the location and use of eye wash stations. [1.2.1](#)
  2. Identify the location of the posted evacuation routes. [1.2.2](#)
  3. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. [1.2.3](#)
  4. Identify and wear appropriate clothing for lab/shop activities. [1.2.4](#)
  5. Secure hair and jewelry for lab/shop activities. [1.2.5](#)
  6. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. [1.2.6](#)
  7. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.). [1.2.7](#)
  8. Locate and demonstrate knowledge of material safety data sheets (MSDS). [1.2.8](#)
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## **Demonstrate proper usage of tools and equipment**

### **2.1 Student will demonstrate knowledge of shop tools and equipment.**

1. Identify tools and their usage in automotive applications. [2.1.1](#)
  2. Identify standard and metric designation. [2.1.2](#)
  3. Demonstrate safe handling and use of appropriate tools. [2.1.3](#)
  4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. [2.1.4](#)
  5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper). [2.1.5](#)
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## **Develop employability/leadership skills**

### **3.1 Student will demonstrate employability skills.**

1. Demonstrate a good work ethic (i.e., relations with other, dependability, attitude, and personal hygiene). [3.1.1](#)
  2. Demonstrate teamwork. [3.1.2](#)
  3. Demonstrate job-seeking techniques (i.e., write a resume, search for a job, arrange references, and apply interview techniques) [3.1.3](#)
  4. Describe legal issues of sexual harassment in the workplace. [3.1.4](#)
  5. Identify employment eligibility requirements (e.g. valid driver's license, background check etc.) [3.1.5](#)
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### **3.2 Student will demonstrate leadership skills.**

1. Perform basic parliamentary procedures in a group meeting. [3.2.1](#)
  2. Demonstrate an understanding of one's personal values, interpersonal skills, etiquette, effectiveness in oral and written communication and courtesy. Develop and maintain a code of professional ethics. [3.2.2](#)
  3. Maintain a good professional appearance. [3.2.3](#)
  4. Perform basic tasks related to securing and terminating employees. [3.2.4](#)
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## **Diagnose and repair hydraulic brake system**

### **4.1 Student will demonstrate initial diagnostic procedures.**

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. [4.1.1](#)
2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). [4.1.2](#)

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## **4.2 Student will demonstrate ability to repair hydraulic brake system.**

1. Measure brake pedal height, travel, and free play (as applicable); determine necessary action. [4.2.1](#)
2. Check master cylinder for internal and external leaks and proper operation. [4.2.2](#)
3. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action. [4.2.3](#)
4. Select, handle, store, and fill brake fluids to proper level. [4.2.4](#)
5. Identify components of brake warning light system. [4.2.5](#)
6. Bleed and/or flush brake system. [4.2.6](#)
7. Test brake fluid for contamination. [4.2.7](#)

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## **Diagnose and repair drum brake system**

### **5.1 Student will demonstrate initial diagnostic procedures.**

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. [5.1.1](#)
2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). [5.1.2](#)

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### **5.2 Student will demonstrate applicable knowledge of drum brake system.**

1. Remove, clean, inspect, and measure brake drum diameter; determine necessary action. [5.2.1](#)
2. Refinish brake drum and measure final drum diameter; compare with specifications. [5.2.2](#)
3. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. [5.2.3](#)
4. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. [5.2.4](#)
5. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments. [5.2.5](#)
6. Install wheel and torque lug nuts. [5.2.6](#)

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## **Diagnose and repair disc brake system**

### **6.1 Student will demonstrate initial diagnostic procedures.**

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. [6.1.1](#)
2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). [6.1.2](#)

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## **6.2 Student will demonstrate applicable knowledge of disc brake system.**

1. Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action. 6.2.1
2. Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. 6.2.2
3. Remove, inspect, and replace pads and retaining hardware; determine necessary action. 6.2.3
4. Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks. 6.2.4
5. Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action. 6.2.5
6. Remove and reinstall rotor. 6.2.6
7. Refinish rotor on vehicle; measure final rotor thickness and compare with specifications. 6.2.7
8. Refinish rotor off vehicle; measure final rotor thickness and compare with specifications. 6.2.8
9. Retract and re-adjust caliper piston on an integral parking brake system. 6.2.9
10. Check brake pad wear indicator; determine necessary action. 6.2.10
11. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations. 6.2.11

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## **Diagnose and repair power assist units**

### **7.1 Student will demonstrate initial diagnostic procedures.**

1. Check brake pedal travel with, and without, engine running to verify proper power booster operation. 7.1.1
2. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. 7.1.2

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## **Diagnose and repair miscellaneous (wheel bearings, parking brakes, electrical, etc.)**

### **8.1 Student will demonstrate initial diagnostic and repair procedures.**

1. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. 8.1.1
  2. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed. 8.1.2
  3. Check parking brake operation and parking brake indicator light system operation; determine necessary action. 8.1.3
  4. Check operation of brake stop light system. 8.1.4
  5. Replace wheel bearing and race. 8.1.5
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**Diagnose and repair electronic brakes, and traction and stability control systems**

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**9.1 Student will demonstrate initial diagnostic and repair procedures.**

1. Identify traction control/vehicle stability control system components. 9.1.1
  2. Describe the operation of a regenerative braking system. 9.1.2
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**Diagnose and repair manual drive train and axles**

**10.1 Student will demonstrate initial diagnostic procedures**

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 10.1.1
  2. Drain and refill manual transmission/transaxle and final drive unit. 10.1.2
  3. Check fluid condition; check for leaks. 10.1.3
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**10.2 Student will demonstrate applicable knowledge of clutch system.**

1. Check and adjust clutch master cylinder fluid level. 10.2.1
  2. Check for system leaks. 10.2.2
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**10.3 Student will demonstrate applicable knowledge of the transmission/transaxle system.**

1. Describe the operational characteristics of an electronically-controlled manual transmission/transaxle. 10.3.1
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**10.4 Student will demonstrate applicable knowledge of Drive Shaft, Half Shafts, Universal and Constant-Velocity (CV) Joints.**

1. Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals. 10.4.1
  2. Inspect, service, and replace shafts. 10.4.2
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**10.5 Student will demonstrate applicable knowledge of Differential Case Assembly.**

1. Clean and inspect differential housing; check for leaks; inspect housing vent. 10.5.1
  2. Check and adjust differential housing fluid level. 10.5.2
  3. Drain and refill differential housing. 10.5.3
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**10.6 Student will demonstrate applicable knowledge of Drive Axles.**

1. Inspect and replace drive axle wheel studs. 10.6.1
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**10.7 Student will demonstrate applicable knowledge of Four-wheel Drive/All-wheel Drive.**

1. Inspect front-wheel bearings and locking hubs. 10.7.1
  2. Check for leaks at drive assembly seals; check vents; check lube level. 10.7.2
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## Preparing vehicle

### **11.1 Student will be able to prepare vehicle for service.**

1. Identify information needed and the service requested on a repair order. [11.1.1](#)
  2. Identify purpose and demonstrate proper use of fender covers, mats. [11.1.2](#)
  3. Demonstrate use of the three C's (concern, cause, and correction). [11.1.3](#)
  4. Review vehicle service history. [11.1.4](#)
  5. Complete work order to include customer information, vehicle identifying information, customer concerns, related service history, cause, and correction. [11.1.5](#)
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### **11.2 Student will be able to prepare vehicle for customer.**

1. Ensure vehicle is prepared to return to customer per school or company policy (floor mats, steering wheel cover, etc.). [11.2.1](#)