

SkillsUSA

2015 Contest Projects

Diesel Equipment Technology

Click the “Print this Section” button above to automatically print the specifications for this contest. Make sure your printer is turned on before pressing the button.

Station # 2 Live Engines
2015
THIS IS A LIVE ENGINE STATION.

You will be performing maintenance task and inspections as well as accessing fault codes with the computer and following diagnostic procedures.

Complete the task in the order given below under Contestant Task.

The equipment in this station is in the shop for repairs due to an aftertreatment and performance problem.

Contestant Task:

1. Record the engine serial number_____
2. Record the complete engine model name_____
3. Ensure the engine is ready to start, report any problems.
4. Name the Aftertreatment components point out by your judge
5. Check for active faults.
Record any active codes_____
6. Locate Guided troubleshooting tree for any active codes, follow the tree.
7. Locate circuit on wiring diagram of active fault component.
8. Describe to the Judge the failure mode.
9. Make required repairs.
10. Describe how OBD panel light must be extinguished
11. Clear all fault codes
12. Complete SCR DEF Leak test task with INSITE

4. Technician A says that the Primary Brake Shoe in a Cam Brake assembly is the Brake Shoe that engages first when looking at the Wheel Rotation.
Technician B says that the Primary Shoe could be located on the Top or Bottom. It depends on Cam Location at the Wheel assembly and the Wheel Rotation.

Who's Correct?

- A) Technician A only
- B) Technician B only
- C) Both Techs A and B
- D) Neither Tech A or B

5. Technician A says that Cam Brake performance is affected by the heat expansion of the Brake Drum and can create Brake Fade.
Technician B says that a Disc Brake is unaffected by heat as the Disc Rotor expansion as it gets hot does not create a Brake Fade condition.

Who's Correct?

- A) Technician A only
- B) Technician B only
- C) Both Techs A and B
- D) Neither Tech A or B

6. A Brake Spider that is used on a Cam Brake can be _____ to the axle.

- A) Bolted
- B) Welded
- C) Either Bolted or Welded
- D) None of the Above

7. What is the A/L Factor for a Wheel-End Brake with a Type 30 Brake Chamber and a 6.00" ASA?

- A) 36
- B) 5.0
- C) 50
- D) 180

8. Air Brake Chambers are specified by _____ for a particular Brake and Axle load.

- A) Chamber size
- B) Weight
- C) Length
- D) Deceleration Ratios

9. During a PM inspection a Technician has to ensure the foundation brakes are applying properly. To check that he/she must_____.

- A) Measure applied brake stroke
- B) Measure free travel
- C) Make sure the park brake chamber has air pressure
- D) All of the above

10. To check adjustment of any S-Cam brake the Technician must first _____.
- A) Raise the vehicle
 - B) Secure the wheels with chocks if a parking brake chamber is on that brake being checked.
 - C) Build up the air system pressure
 - D) Release the parking brakes
11. A Technician is performing a brake stroke check on a truck with S-Cam Brakes and a Type 30 Standard Stroke Air Brake Chamber. What is the maximum allowable applied stroke for that Brake Chamber?
- A) 1.5"
 - B) 2.5"
 - C) 2.0"
 - D) 3.0"
12. Automatic Slack Adjusters (ASA's) if properly setup will maintain a specific Brake Lining to Brake Drum clearance. If the ASA is not properly setup at installation it can cause _____.
- A) Excessive brake lining wear
 - B) Excessive brake applied stroke
 - C) Vehicle to pull when that brake is applied
 - D) Reduced or excessive brake free stroke
 - E) All of the above
13. If brake linings have been contaminated with oil, grease, or hydraulic fluids, they must be replaced. The frictional characteristics of the brake lining have been altered and cannot be returned to their original designed condition. This statement is:
- A) True
 - B) False
 - C) False-Brake linings can be used if properly cleaned
 - D) False-Brake linings can be used if baked clean and still have 50% brake lining left.
14. Technician A says that as long as a Brake Drum meets a minimum inside diameter it is acceptable to reuse during a brake reline.
Technician B says that a Disc Brake Rotor should be replaced after it has worn out two sets of Disc Brake pads.
Who's Correct?
- A) Both Technicians A and B
 - B) Neither Technician A or B
 - C) Technician A only
 - D) Technician B only
15. Brake Linings _____
- A) Are spec'd for the application of the Axle Load
 - B) Are worn out when the lining gets to a minimum thickness
 - C) Are attached to the brake shoe table with rivets
 - D) All of the above are correct
 - E) None of the above are correct

16. The Anti lock Brake System modulates air pressure in the service Air Brake Chamber to prevent Wheel lockup and prevent over-braking.

- A) True
- B) False

17. What component of the Anti Lock Brake System must be reset when the Wheel Hub is removed from the Axle?

- A) Tooth wheel
- B) ECU
- C) Sensor
- D) Modulator Valve

18. The ABS _____ Valve has two electrical Solenoids and two Check Valves.

- A) Relay
- B) Check
- C) Modulator
- D) Quick release

19. The ABS _____ is a press fit on to the Wheel Hub.

- A) Sensor
- B) Tooth wheel
- C) Spring Clip
- D) Sensor block

20. The ABS Sensor must be located within a very close distance to a Wheel Hub component to function. When it is operating the Sensor produces a _____ voltage.

- A) DC
- B) AC

Total Correct Answers x 2.5 points each = _____

Judges Initials _____

2015
Score Sheet Live Diesel Engine Diagnostic - Test Station 2
Total Number of Possible Points = 100

Contestant # _____

Time _____

| Points Possible | | Required Steps to Get Points | Points Awarded |
|-----------------|---|---|----------------|
| Task | | | |
| 1 | 2 | Recorded engine serial number correctly | |
| 2 | 2 | Recorded Engine Service Model | |
| 3 | 2 | Checked oil level | |
| | 2 | Checked coolant level | |
| 4 | 6 | Contestant correctly ID the aftertreatment components DPFean, DOCEan, SCRean, SCR Dosing Valve, SCR DEF Pump, Outlet NOx Sensor | |
| 5 | 4 | Connect Laptop to the Engine ECM | |
| | 4 | Navigated laptop to active diagnostic codes | |
| | 4 | Recorded active fault DPF differential pressure sensor 3134 | |
| 6 | 4 | Located troubleshooting procedures - right clicked on fault code | |
| | 2 | Selected correct Service Model ISX15 CM2350 101 | |
| | 4 | Located troubleshooting steps | |
| 7 | 4 | Located circuit on wiring diagram | |
| | 4 | ID correct terminals to perform voltage test | |
| | 4 | ID correct terminals to perform state change to fault 3133 | |
| | 4 | Used proper test leads where required | |
| 8 | 8 | Followed troubleshooting tree, Each step and test was correctly done | |
| | 2 | Contestant described failure mode properly, low voltage | |
| | 6 | Proper use of Multimeter and settings | |
| | 4 | Removed and install connector correctly | |
| 9 | 4 | Contestant Properly replaced component focus on lines | |
| 10 | 4 | Contestant described Mil lamp and requirements to extinguish from Insite | |
| 11 | 4 | Contestant cleared codes | |
| 12 | 4 | Navigated to engine test screen selected leak test for SCR DEF | |
| | 4 | Completed SCR DEF leak test | |
| | 4 | Student worked safely | |
| | 4 | Contestant demonstrated a professional attitude | |

100 Total Possible Points

Total Points Scored _____



**2015 DIESEL SKILLS
JUDGES INSTRUCTIONS
Station # 3**

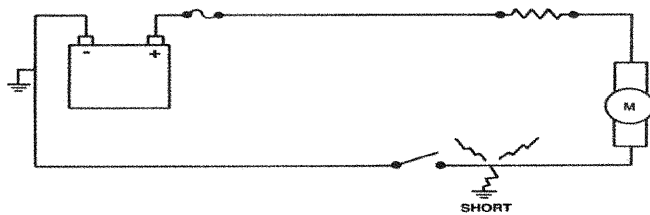
- 1) THIS IS A BASIC ELECTRICAL TEST CONSISTING OF MARKER LIGHTS, TURN SIGNAL, BRAKE LIGHT AND STARTER SYSTEMS.**
- 2) THE SCHEMATIC LOCATED ON EACH TEST BOARD IS FOR THE LIGHT SYSTEM ONLY (STOP, TAIL, TURN AND MARKER LIGHTS). THE SCHEMATIC DOES NOT INCLUDE THE STARTER SYSTEM.**
- 3) YOU WILL NEED TO DEMONSTRATE YOUR ABILITY TO USE THE "DVOM" WHILE DIAGNOSING THE PROBLEMS LISTED.**
- 4) THERE IS A JUMPER WIRE PROVIDED FOR YOU TO USE, YOU DO NOT NEED TO USE IT TO DIAGNOSE THE PROBLEMS ON THE BOARD. PLEASE USE CAUTION IF YOU USE A JUMPER WIRE. THE JUDGE MAY STOP YOU IF YOU WILL CAUSE A SHORT CIRCUIT AND POINTS MAY BE DEDUCTED FROM YOUR SCORE IF YOU CAUSE A SHORT.**
- 5) YOU ARE NOT REQUIRED TO REPAIR ANY PROBLEM YOU HAVE DIAGNOSED.**
- 6) YOU HAVE 30MINUTES TO COMPLETE THIS TEST. SOMEONE WILL GIVE YOU A 5-MINUTE WARNING NEAR THE END OF THE SESSION.**
- 7) NO TALKING DURING OR AFTER THE TEST. AFTER YOU ARE FINISHED, GIVE YOUR CLIPBOARD WITH THE TEST TO THE JUDGE AND RETURN TO YOUR CHAIR.**
- 8) FOLLOW ALL SAFETY PRECAUTIONS AT ALL TIMES.**

2015 DIESEL SKILLS STATION #3

Contestant Number _____

Score _____

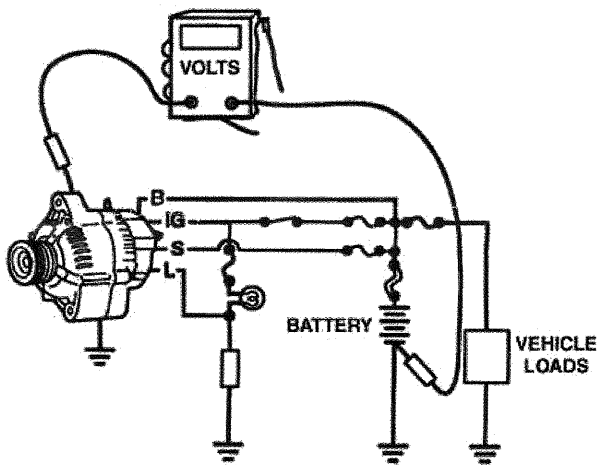
1. Diagnose failed ICC lamps on the park light circuit. Describe problem found.
2. Diagnose turn signals. Describe problem found.
3. Diagnose brake lights. Describe problem found.
4. Diagnose starter system. Describe problem found.
5. Measure and record the resistance between test point A and test point B.
6. If a short occurs at the location shown in below diagram,
 - A. the fuse will usually blow
 - B. the current will stop flowing
 - C. the load will not shut off
 - D. the wire will not be able to carry the current



Circuit component schematic symbols for use with questions # 7 through # 9.

A.  B.  C.  D.  E.  F. 

7. What is the schematic symbol for a normally open switch?
8. What is the schematic symbol for a resistor?
9. What is the schematic symbol for a diode?
10. In the voltage drop test being performed in the illustration below. What is the maximum specification allowed?



- A. .1 Volts
- B. .2 Volts
- C. .5 Volts
- D. 1.0 Volts

Louisville 2015
Heavy Equipment Technician
Station #4

Contestant #:

Note: Safety glasses must be worn at all times.

TOTAL

GAS WELD—(34 POINTS POSSIBLE)

| | POINTS |
|--|--------|
| Procedure to open tanks | 3 |
| Correctly adjust gauges | 3 |
| Light torch and adjust flame | 4 |
| Proper handling of torch: | |
| A) Connection of heat | 3 |
| B) Feeding of filler rod | 3 |
| Quality of braze and weld | 8 |
| Procedure of shutting down tanks and gauges | 4 |
| Coiling of hoses and putting equipment back in place | 3 |
| Ability to work safely | 3 |

SCORE

SHOP TOOLS---(33 POINTS POSSIBLE)

| | |
|--|----|
| Attention to instructions & ability to follow orders | 10 |
| Ability to complete task | 10 |
| Ability to work safely | 3 |
| Assemble to standard | 10 |
| Improper assembly of components - 1 point each | |
| Improper assembly of (bolts, washers, nuts) - 1 point each | |

SCORE

ARC WELD—(33 POINTS POSSIBLE)

| | POINTS |
|---|--------|
| Ability to turn on and set proper heat range for size of welding rod and work | 5 |
| Proper use of protection equipment (welding helmet, gloves, long sleeves, shielding others from ray of arc) | 5 |
| Ability to use and protect equipment properly: | |
| A) Ground - disconnect/connect | 4 |
| B) Strike and hold arc | 2 |
| C) Angle of welding rod | 2 |
| D) Speed and direction of rod travel | 2 |
| Quality of welds | 5 |
| Shutdown equipment and put away tools | 3 |
| Ability to work safely | 5 |

SCORE

Contestant #:

Score:

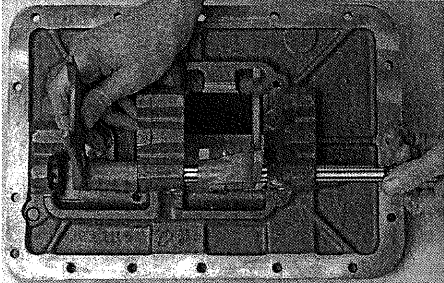
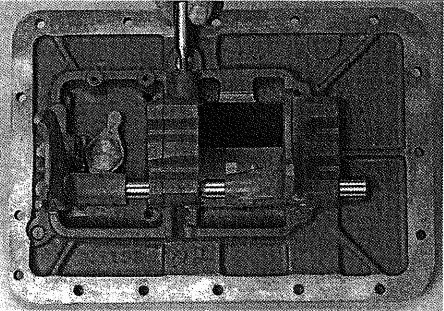
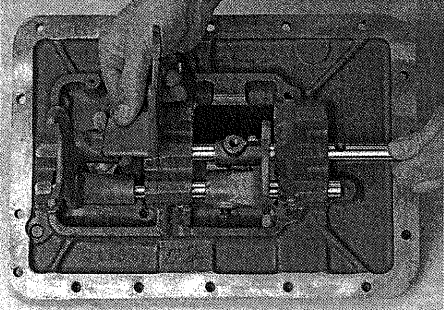
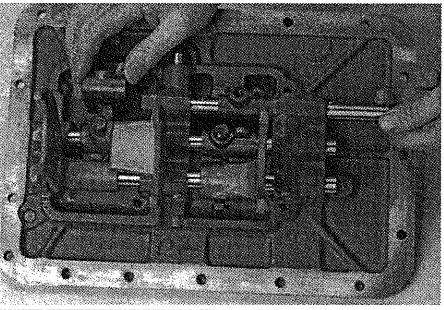
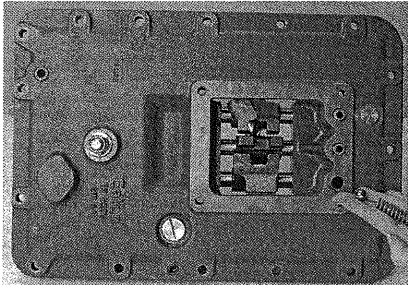
Station #: 6

Judge:

- 1) Using the Service Manual provided at this station, completely assemble the RTLO-16718 Shift Bar Housing.

Using the Service Manual provided, circle the correct answer

- 2) In the following nomenclature, what does the '9' represent?
'RTLO-20913A'
 - A. Design Level – Improved Seal System
 - B. Ratio Set
 - C. Number of Forward Speeds
 - D. Nominal Torque Capacity
- 3) What is the correct torque value for the shift yoke lockscrews?
 - A. 20-25 lb/ft
 - B. 8-12 lb/ft
 - C. 35-45 lb/ft
 - D. 18-22 lb/ft
- 4) The filter/regulator assembly regulates the air pressure to:
 - A. 38-43 PSI
 - B. 58-63 PSI
 - C. 48-53 PSI
 - D. 68-73 PSI
- 5) After installing the shift bar housing on the main case, the retaining capscrews should be torqued to the following value:
 - A. 25-35 lb/ft
 - B. 35-45 lb/ft
 - C. 45-55 lb/ft
 - D. 55-65 lb/ft
- 6) Referring to the power flow section for a 13-speed transmission, how many gearsets are being used while in 2nd gear? (Note: One gearset equals three mating gears)
 - A. None – Straight through the box
 - B. 2
 - C. 3
 - D. 4

| Judge Initials: _____ | Contestant #: _____ | Notes/Points |
|---|---|--------------|
|  | 15 Points Reverse/Low & Overdrive/Direct shift forks & rail 5 - Install the correct rail 5 - Install Reverse/Low fork 5 - Install OD/Direct fork | |
|  | 15 Points 5 - Slave valve actuating plunger 5 - 3/4" interlock balls (steps 7 & 12) 5 - Center rail interlock pin (step 10) | |
|  | 15 Points Center shift rail, shift block & 1-2 yoke 5 - Correct rail 5 - Install center shift block 5 - Install 2-3 yoke | |
|  | 15 Points Direct/Overdrive shift rail & shift blocks 5 - Install correct rail 5 - Install OD/Direct shift block 5 - Install "X" shift block | |
|  | 10 Points Detent balls and springs Note: All or nothing ** You can tell them not to install the oil trough. | |

| # | Answer | Page | Points |
|---|-------------------------|------|--------|
| 2 | A. Improved Seal System | 5 | 6 |
| 3 | C. 35-45 lb/ft | 149 | 6 |
| 4 | B. 58-63 PSI | 40 | 6 |
| 5 | B. 35-45 lb/ft | 105 | 6 |
| 6 | D. 4 | 28 | 6 |



SkillsUSA Diesel Equipment Technology Competition-2015

Drive Axle

Station 7

Contestant's Number _____

Written Axle Test Station Number _____

Total Score for Written Test _____

Written Test – Drive Axle Station All Correct Answers 1-12 = 4 Points

Question 13 = 2 Points

Possible 50 Points

*****Use the Supplied Information at the Written Axle Station you are assigned to answer the below questions *****

Circle your Answer after the Question

- 1. Technician A says that a Standard Single Drive Axle has equal traction to both Wheels and both Wheels will pull provided both Wheels have the same available traction to the pavement.**

Technician B says that if one Wheel loses available traction to the pavement the vehicle will cease to pull itself.

Who is Correct? (circle the correct answer)

- A) Technician A Only**
- B) Technician B Only**
- C) Both Technicians A & B**
- D) Neither Technicians A or B**

- 2. To mathematically calculate a Gear Ratio of _____, the Gear Set would have 7 Drive Gear Teeth and 45 Driven Gear Teeth.**

(circle the correct answer)

- 1) 6.14**
- 2) 3.15**
- 3) 6.43**
- 4) 1.55**

3. What component of a Tandem Rear Drive Axle allows the Axles to Pull the Vehicle and still allows for Speed Differences between both Axles?
(circle the correct answer)

- 5) Ring and Pinion Assembly**
- 6) Main Differential Assembly**
- 7) Inter Axle Differential Assembly**
- 8) No Spin Assembly**

4. Technician A says that a Tandem Drive Axle Vehicle with Standard Drive Axles and No Supplemental Traction Devices Engaged has equal traction to All Wheels.

Technician B says that a Tandem Drive Axle Vehicle with Standard Drive Axles and No Supplemental Traction Devices Engaged has Traction to the Rear Drive Axle Only?

Who is Correct? (circle the correct answer)

- A) Technician A Only**
- B) Technician B Only**
- C) Both Technicians A & B**
- D) Neither Technician A or B**

5. A Meritor Model MS2114X5DBBNQ Drive Axle :

(circle the correct answer)

- A) Has a GAWR of 21K pounds**
- B) Is a Single Rear Drive Axle**
- C) Has a .500/.510" Axle Wall Housing Thickness**
- D) All of the above**

6. Technician A says that the Drive Axle Carrier provides the Final Gear Ratio Reduction in a Truck Drive Train.

Technician B says that the Final Gear Reduction in a Truck can be two different Ratio's if the Drive Axle is equipped with a Two Speed Axle.

Who is Correct? (circle the correct answer)

- A) Technician A Only**
- B) Technician B Only**
- C) Both Technician A & B**
- D) Neither Technician A or B**

7. One component is necessary in a Tandem or Tridem Drive Axle configuration that is not needed in a Single Drive Axle.

What is that component? (circle the correct answer)

- A) Lube Pump**
- B) Inter Axle Differential Assembly**
- C) Driver Controlled Differential Lock Assembly**
- D) Thru Shaft Assembly**

8. The Lube Pump carries lube from the Axle Housing to what component? (circle the correct answer)

- A) Differential Case Bearings**
- B) Inter Axle Differential Assembly**
- C) Thru Shaft Assembly**
- D) None of the above**

9. The Lube Pump on a Forward Drive Axle is installed to Help Prevent? (circle the correct answer)

- A) Main Differential Spinout**
- B) Inter Axle Differential Spinout**
- C) Make the Carrier operate cooler**
- D) Pump oil through the external Oil Filter**

10. The PRINCIPAL purpose of the Inter Axle Differential (IAD) is? (circle the correct answer)

- E) Provide equal traction to both drive axles**
- F) Provide differentiation in wheel speeds between axles**
- G) Power the Forward Differential Carrier**
- H) All of the above**

11. Technician A says the Inter Axle Differential is normally locked in or engaged by a dash mounted pneumatic switch.

Technician B says that when the Inter Axle Differential is engaged that both the Forward and Rear Drive Axles are rotating at the same speed and no speed differentiation is permitted between the two Axles.

Who is correct? (circle the correct answer)

- A) Technician A only**
- B) Technician B only**
- C) Both Technician A & B**
- D) Neither Technician A & B**

12. A Truck is equipped with a Drive Axle with DCDL.

Technician A says that one of the two Axle Shafts in the Axle has two sets of Splines and one is longer than the other.

Technician B says that when the DCDL is engaged that neither wheel on that axle should be slipping or damage to the DCDL Collar and Axle Shaft can occur.

Who is Correct? (circle the correct answer)

- A) Technician A**
- B) Technician B**
- C) Neither Technician A or B**
- D) Both Technicians A & B**

13. A truck is being driven straight down the road with all wheels having equal speed. At this time, if the IAD (Inter Axle Differential) is engaged will damage occur?

Yes _____ No _____

Correct Answers 1-12 x 4 Points each = _____

Correct Answer 13 x2 points = _____

Total Written Test Score = _____

Judges Initials _____

WRITTEN JOB INTERVIEW SKILLS

Students have 15 minutes to fill-out a mock- job application. This activity is designed to prepare students for when they are applying for a job in the diesel technician industry.

This allows students the opportunity to:

- Demonstrate the ability to follow written instructions.
- Demonstrate the ability to express personal background and interests.
- Demonstrate the ability to express work experience.
- Demonstrate the ability to express job expectations.
- Demonstrate the ability to express proper working conditions.
- Demonstrate the ability to express interpersonal relationships/self confidence.
- Demonstrate the ability of time management and dealing with conflict.
- Demonstrate the ability to write legibly.

VERBAL INTERVIEW SKILLS

Students have 10 minutes to complete a mock-interview conducted by two diesel industry professionals. This activity is designed to prepare students for when they interview for a job in the diesel technician industry. This verbal interview opportunity gives students the opportunity to:

- Demonstrate ability to express personal background and interests.
- Demonstrate ability to express work experience.
- Demonstrate ability to express job expectations.
- Demonstrate ability to express proper working conditions.
- Demonstrate ability to express interpersonal relationships / self confidence.
- Demonstrate ability of time management and dealing with conflict.
- Demonstrate personal presentation skills (voice tone, eye contact, speaks clearly, appropriate language/grammar, and politeness).

Orientation Judge(s)

Note: There should be at least one orientation judge.

- Give orientation speech at the beginning of each station rotation
- Collect applications and resume - staple together
- Collect Job the ratings sheets from the interview booth judges and match it with the resume/ application.
- Review clarity of the resume – write score on the rating sheet
- Average scores from the 2 interview judges ratings sheet
- Enter score in spreadsheet / On SkillsUSA final form
- Judge clarity of applications
- Keep track of time - Contestant interview lasts no longer than 10 minutes

Interview Booth Judge (s)

Note: There should be two interview booth judges per interview booth. There should be two interview booths requiring a total of 4 judges.

- Interview one student at a time using the Job Interview Station Interview Questions.
- Fill-out the Job Interview Station Ratings Sheet
- Give ratings sheet to Orientation judge

2015 Job Interview Station - Orientation



Interview Orientation – Someone must say this before each round begins.

For Starters, all six contestants sit at tables, pens down.

“The interview station is based on a scenario where you are applying for an apprentice technician job at a John Deere construction dealership.

You will have two tasks.

The first is to fill out an application. You will be judged on the clarity of your application.

Proctors will be present to answer any questions you may have about the application itself.

The second task is to go through a mock interview.

In this, you will be judged on your self presentation and on the depth and maturity of your answers.

Two interviews will be conducted at a time, the remaining contestants will fill out their application.

Do not worry if you haven’t completed your application when you are called for your interview.

You will have 20 minutes total in this rotation to complete the application.

Are there any questions?”

Send two contestants to the interview areas.

Remaining four contestants remain at tables to fill out application.

APPLICATION FOR EMPLOYMENT
(An Equal Opportunity Employer)

DATE

PLEASE PRINT AND COMPLETE ALL SECTIONS (USE BALLPOINT PEN)

| PERSONAL INFORMATION | | | | |
|--|--|------------------------------------|--------|--------------------------------|
| NAME LAST | | FIRST | MIDDLE | CONTESTANT NUMBER |
| PRESENT ADDRESS NUMBER & STREET | | CITY | | STATE ZIP CODE |
| E-MAIL ADDRESS | | CELLULAR TELEPHONE NUMBER () - | | HOME TELEPHONE NUMBER () - |
| HAVE YOU EVER USED ANOTHER NAME? <input type="checkbox"/> YES <input type="checkbox"/> NO | | | | |
| IF YES, PLEASE PROVIDE OTHER NAMES USED | | | | |
| HAVE YOU EVER PLED GUILTY OR "NO CONTEST" TO, OR BEEN CONVICTED OF, A MISDEMEANOR OR FELONY? <input type="checkbox"/> YES <input type="checkbox"/> NO | | | | |
| IF YES, PLEASE GIVE DATE AND DETAILS | | | | |
| (Answering yes to this question does not constitute an automatic bar to employment. Factors such as age and time of the offense, seriousness and nature of the violation, and rehabilitation will be taken into account. Do not include minor traffic citations and arrests or convictions which have been sealed or expunged in answering this question.) | | | | |

| EMPLOYMENT DESIRED | | |
|--------------------|--------------------|----------------|
| POSITION DESIRED | DATE YOU CAN START | SALARY DESIRED |

| EDUCATION | | | |
|---|---|-----------|------------------------|
| SCHOOL LEVEL | NAME & LOCATION (CITY, STATE) OF SCHOOL | GRADUATE? | SUBJECTS STUDIED/MAJOR |
| HIGH SCHOOL | | | |
| COLLEGE | | | |
| TRADE, BUSINESS CORRESPONDENCE SCHOOL | | | |
| SUBJECTS OF SPECIAL STUDY OR RESEARCH WORK | | | |
| SPECIAL TRAINING | | | |
| | | | |
| SPECIAL SKILLS | | | |
| | | | |



| | | | |
|---------------------------|---|---|--------------|
| EMPLOYMENT HISTORY | | List your most recent employment first. Resumes will not be accepted in place of a completed application form. Respond completely to all information in this section. | |
| 1 | NAME & ADDRESS OF PRESENT OR MOST RECENT EMPLOYER | | |
| | | | |
| | STARTING DATE | | LEAVING DATE |
| | JOB TITLE | | |
| | NAME & TITLE OF SUPERVISOR | | |
| | DESCRIPTION OF WORK | | |
| | | | |
| | REASON FOR LEAVING | | |

| | |
|--|--|
| GENERAL EMPLOYMENT INFORMATION | |
| HAVE YOU EVER BEEN TERMINATED OR ASKED TO RESIGN FROM ANY JOB? <input type="checkbox"/> YES <input type="checkbox"/> NO | |
| IF YES, PLEASE EXPLAIN THE CIRCUMSTANCES | |
| | |
| | |
| | |
| ARE THERE ANY GAPS IN YOUR EMPLOYMENT HISTORY? <input type="checkbox"/> YES <input type="checkbox"/> NO | |
| IF YES, PLEASE EXPLAIN | |
| | |
| IF YES, PLEASE EXPLAIN | |
| | |
| ARE YOU LEGALLY AUTHORIZED TO WORK IN THE U.S.? <input type="checkbox"/> YES <input type="checkbox"/> NO (PROOF SUFFICIENT TO SATISFY U.S. IMMIGRATION LAWS IS A REQUIREMENT OF EMPLOYMENT) | |
| IF HIRED, CAN YOU FURNISH PROOF THAT YOU ARE OVER 16 YEARS OF AGE? <input type="checkbox"/> YES <input type="checkbox"/> NO | |
| ARE YOU CAPABLE OF SATISFACTORILY PERFORMING THE ESSENTIAL JOB DUTIES REQUIRED OF THE POSITION FOR WHICH YOU ARE APPLYING? <input type="checkbox"/> YES <input type="checkbox"/> NO | |

| | | |
|---|--------------|-------------|
| REFERENCES Include only individuals familiar with your work ability. DO NOT include relatives. | | |
| NAME | RELATIONSHIP | YEARS KNOWN |
| 1. | | |
| 2. | | |
| SIGNATURE OF APPLICANT | | DATE |

Contestant Number:_____

1. Tell me about yourself.
2. What made you decide to pursue the diesel industry for your career?
3. What have been some of your major accomplishments at school or work?
4. What are you looking for in a company?
5. If you could create the perfect job, what would it involve?
6. Tell me about a time when you had difficulty maintaining composure at school or work. How did you handle the situation?
7. What motivates you to succeed in a job?
8. Tell me about an area (work skill or personality trait) where you could use improvement.
9. What separates you from the other students here?
10. What questions do you have for me?

Job Interview Station - Rating Sheet



Contestant Number: _____

Score: _____

| Evaluation Items | Maximum Points Possible | Points Awarded |
|--|-------------------------|----------------|
| Greeting and Introduction | 5 | |
| Appearance: Grooming and Posture | 15 | |
| Completeness and clarity of resume* Completeness and clarity of application* <small>Maximum of 5 points for resume and 5 points for the application for a total of 10 possible points.</small> | 10 | |
| Maturity: Answers to questions | 35 | |
| Presentation: Self confidence and persuasiveness | 20 | |
| Preparation: Knowledge of position applied for and personal history | 15 | |
| | Final Score | |
| Comments | | |

**2015 Skills USA National Competition – Diesel Equipment
Station #9 – Hydraulic Systems
Test Instructions**

Welcome to Station #9 – Hydraulic Systems

On the table you will find a clipboard with the test attached to it, a machine hydraulic schematic, a disassembled hydraulic cylinder, and tools.

The test is comprised of 4 sections:

1. A hydraulic cylinder assembly exercise
2. An on-machine component identification exercise
3. A schematic component identification exercise
4. A written test

During the “on-machine component identification exercise” you will find numbered tags attached to the components on the machine. There are more tags attached to the machine than the total number of components you will be required to identify on your test. Do not move the tags on the machine. This table uses this machine, this table uses this machine, and this table uses this machine.

Be careful when climbing on to, off of, and walking around the machine as the rear access door is open. Always use three points of contact when climbing on and off of the machines.

In the “schematic component identification exercise” you are to use the machine schematic at your table to find the 7 digit CAT part number on the schematic for the component listed in the test.

The hydraulic cylinder is to be assembled using the provided tooling and supplies. The fasteners do not need to be torqued, but should be snug.

Be sure to write your contestant number on the first page of your test. Turn the clipboard over or hand your test to a judge when completed or if the horn sounds, indicating the end of the test period.

You must start with the hydraulic cylinder assembly procedure first. Please read the instructions carefully.

The judges can answer only those questions that relate to the competition procedures, the instructions I am giving you, or the instructions as they appear in your test packet.

Do you have any questions?

When the horn sounds, you may begin. Good Luck!

Scoring the Hydraulic Cylinder Assembly Procedure

There are 12 assembly steps worth 3 points each, for a total of 36 points and 4 points for safety, each step will be graded on the following criteria:

- 1) Contestant must inspect each part, prior to installation.
- 2) Each part must be properly assembled in the correct orientation.
- 3) Each part must have sufficient lubrication necessary for proper assembly and be free of damage (only if contestant damages a part, deduct a point).

**note: some parts may have and/or gain slight damage during the duration of the contest, please try to reuse damaged parts, due to limited parts availability*

Station 9
Skills USA Hydraulics
2015 National Competition

I.D. are worth 2 pts. each for possible 30 pts, -2 pts. if no contestant number, -4 pts. for safety

| Tag Number | 7 Digit CAT Part Number | Component |
|------------|-------------------------|------------------------------------|
| 12 | 375-7845 | Lift Cylinder |
| 8 | 373-8423 | Travel Motor |
| 3 | XXX | Loader Control (Joy Stick) |
| 7 | 149-0686 | Pilot Accumulator |
| 5 | 293-5711 OR 293-5712 | *Tilt Cylinder* |
| 4 | 423-0086 | Implement Pump |
| 13 | 345-4581 | Hydraulic Oil Reservoir |
| 1 | 373-6959 | Implement Control Valve |
| 14 | XXX | Hydraulic Pump Suction Hose |
| 10 | 346-5576 | Hydraulic Oil Filter |
| 11 | XXX | Work Tool Coupler |
| 17 | 345-3473 | Hydraulic Oil Cooler |
| 16 | 388-7970 | Auxiliary Hydraulic Quick Couplers |
| 20 | 341-7625 | Hydrostatic Pump |
| 18 | 258-2577 | Hydraulic Cooling Fan |

30

* These items have two (2) possible correct answers, only one is needed.

Multiple Choice are worth 2 pts. each for possible 30 pts, -2 pts. if no contestant number

Multiple Choice

- 1 - B
- 2 - B
- 3 - B
- 4 - C
- 5 - C
- 6 - B
- 7 - A
- 8 - D
- 9 - D
- 10 - C
- 11 - A
- 12 - C
- 13 - D
- 14 - C
- 15 - A

30

Cylinder As. Procedure 12 step process are worth 3 pts. per step for possible 36 pts. and 4 pts. for safety, -2 pts. if no contestant number
* test to be scored by judge

Skills USA
2015 National Skills Competition

Contestant Number _____

Directions: Circle the correct response for each item.

1. What occurs in a hydraulic system if fluid flow is restricted?
 - a. Fluid flow rate and pressure decrease.
 - b. Fluid flow rate decreases and pressure increases.
 - c. Fluid flow rate and pressure increase.
 - d. Fluid flow rate increases and fluid pressure decreases.
 - e. None of the above.
2. A charge pump supplies flow to the outlet of a larger pump to prevent cavitation.
 - a. True
 - b. False
3. An orifice in an oil passage causes:
 - a. A lower oil pressure on the downstream side of the orifice when there is no oil flow.
 - b. A lower oil pressure on the downstream side of the orifice when there is oil flow.
 - c. A lower oil pressure on the downstream side of the orifice at all times.
 - d. None of the above
4. What is the most reliable indication of an excessively worn variable displacement hydraulic pump?
 - a. Low system pressure
 - b. Low oil temperature
 - c. Excessive case drain flow
 - d. A steady high-pitched whining sound
5. How much pressure is necessary within a hydraulic system to support a 1,000 pound load if the area of the piston supporting the load is 5 square inches?
 - a. 0.05 pounds per square inch.
 - b. 20 pounds per square inch.
 - c. 200 pounds per square inch.
 - d. 2,000 pounds per square inch.
 - e. None of the above.
6. To increase the flow rate of a fixed displacement pump, which of the following must be done?
 - a. Increase pressure relief valve settings.
 - b. Increase the drive speed or RPM of the pump.
 - c. a and b.
 - d. None of the above.

14. What type gas should normally be used to charge an accumulator?

- a. Oxygen
- b. Compressed air
- c. Nitrogen
- d. Acetylene

15. A purpose of the crossover relief valve in a hydraulic motor circuit is to:

- a. absorb shock when a hydraulic motor is started, stopped, or stalled
- b. heat up the hydraulic oil
- c. limit the maximum flow to the motor
- d. to serve as a back-up in case the pump compensator fails

Station 9

Skills USA Hydraulics

2015 National Competition

Contestant Number _____

Component Identification: On the machine, match the tag number attached to the component using the list below. There are more tags on the machine than components listed. Write the tag number next to the component name. Using the schematic for the 279D XPS, write the 7 digit CAT part number for each component. *These items have two (2) possible correct answers, only one is needed.*

| Tag Number | 7 Digit CAT Part Number | Component |
|------------|-------------------------|------------------------------------|
| | | Lift Cylinder |
| | | Travel Motor |
| | XXX | Loader Control (Joy Stick) |
| | | Pilot Accumulator |
| | | *Tilt Cylinder* |
| | | Implement Pump |
| | | Hydraulic Oil Reservoir |
| | | Implement Control Valve |
| | XXX | Hydraulic Pump Suction Hose |
| | | Hydraulic Oil Filter |
| | XXX | Work Tool Coupler |
| | | Hydraulic Oil Cooler |
| | | Auxiliary Hydraulic Quick Couplers |
| | | Hydrostatic Pump |
| | | Hydraulic Cooling Fan |

* These items have two (2) possible correct answers, only one is needed.

Skills USA
2015 National Skills Competition

Contestant Number _____

Directions: Circle the correct response for each item.

1. What occurs in a hydraulic system if fluid flow is restricted?
 - a. Fluid flow rate and pressure decrease.
 - b. Fluid flow rate decreases and pressure increases.
 - c. Fluid flow rate and pressure increase.
 - d. Fluid flow rate increases and fluid pressure decreases.
 - e. None of the above.
2. A charge pump supplies flow to the outlet of a larger pump to prevent cavitation.
 - a. True
 - b. False
3. An orifice in an oil passage causes:
 - a. A lower oil pressure on the downstream side of the orifice when there is no oil flow.
 - b. A lower oil pressure on the downstream side of the orifice when there is oil flow.
 - c. A lower oil pressure on the downstream side of the orifice at all times.
 - d. None of the above
4. What is the most reliable indication of an excessively worn variable displacement hydraulic pump?
 - a. Low system pressure
 - b. Low oil temperature
 - c. Excessive case drain flow
 - d. A steady high-pitched whining sound
5. How much pressure is necessary within a hydraulic system to support a 1,000 pound load if the area of the piston supporting the load is 5 square inches?
 - a. 0.05 pounds per square inch.
 - b. 20 pounds per square inch.
 - c. 200 pounds per square inch.
 - d. 2,000 pounds per square inch.
 - e. None of the above.
6. To increase the flow rate of a fixed displacement pump, which of the following must be done?
 - a. Increase pressure relief valve settings.
 - b. Increase the drive speed or RPM of the pump.
 - c. a and b.
 - d. None of the above.

7. In a variable displacement piston pump, when the swash plate angle is increased, _____ is increased.
- Displacement.
 - RPM.
 - Pressure.
 - a and c.
 - None of the above.
8. The upstream pressure of a main system relief valve is regulated by:
- The upstream pressure only.
 - The downstream pressure only.
 - The spring force only
 - Both a and c
9. Accumulators are used in hydraulic systems to:
- Permit the use of smaller pumps.
 - Provide emergency steering and brakes.
 - Maintain constant pressure.
 - All of the above.
10. What two factors affect the amount of fluid pressure required to lift a load?
- Input force and the area on which the input force is applied.
 - Input force and the resulting fluid pressure.
 - Resisting force of the load and the area on which fluid exerts pressure to support the load.
 - Maximum fluid pressure and the area on which that pressure is exerted.
11. A single acting hydraulic cylinder has a 6" bore, 3" diameter rod, and 48" stroke, and the system relief valve set at 2500 psi. What is the maximum lifting capacity (in pounds), if pressure is applied to the head end of the cylinder?
- 70,650 lbs.
 - 52,975 lbs.
 - 68,525 lbs.
12. Pressure in a hydraulic system is generated by _____ to flow.
- Acceptance
 - Immunity
 - Resistance
 - Compliance
13. Force = _____ x _____
- flow x distance
 - work x time
 - pressure x flow
 - pressure x area

14. What type gas should normally be used to charge an accumulator?

- a. Oxygen
- b. Compressed air
- c. Nitrogen
- d. Acetylene

15. A purpose of the crossover relief valve in a hydraulic motor circuit is to:

- a. absorb shock when a hydraulic motor is started, stopped, or stalled
- b. heat up the hydraulic oil
- c. limit the maximum flow to the motor
- d. to serve as a back-up in case the pump compensator fails

Contestant Number

Judge Name

Total Score

(1) Record Contestant Number, (2) Double check your math, (3) Put total score in space ABOVE, and (4) Sign your name in space provided.

| Scoring | Value / All or Nothing | Score |
|---|------------------------|-------|
| Front chambers are type 24 | 5 points | |
| Front chambers are long stroke | 5 points | |
| Rear turbo clamp loose | 10 points | |
| Alternator power wire loose | 10 points | |
| Belt alignment bad | 10 points | |
| Radiator support arm loose | 10 points | |
| Governor airline loose / disconnected | 10 points | |
| Loose bolt from top of air bag | 10 points | |
| 5 th Wheel slide hose disconnected | 10 points | |
| Air line loose on brake chamber A2 | 10 points | |
| Axle breather loose A3 | 5 points | |
| Axle breather hose missing A3 | 5 points | |
| | Subtotal | |

SkillsUSA 2015 – Failure Analysis Station #11

You are at the Failure Analysis Station. You will find a total of **three groups** of questions. One of the three groups is “**Parts**” and you are required to identify the cause of the failure on each part. The second group is “**Oil Analysis**” questions that are related to various failure modes. The third group is “**General Knowledge**” questions.

Parts - Group One

- Use supplied parts to answer the following multiple choice questions.
- Inspect each part and determine the type or cause of the failure.
- Circle the answer that best describes the type or cause of the failure.

1. Item “1” is Coolant Test Equipment.-

Which of the tools displayed is the best tool for on sight testing of coolant.

- A. Four floating ball tester.
 - B. Coolant test strips.
 - C. Refractometer.
 - D. Float type bulb tester.
 - E. None of the above
-

2. Item “2” is Tooth Fracture of Idler Gear.

- A. Serviceable part. No defect. Return to service.
 - B. Foreign material damage.
 - C. Overloading of gear teeth.
 - D. Oil starvation due to lack of lubricating oil.
-

3. Item “3” is an Upper & Lower Main Bearing Set.

- A. Aerated lube oil.
 - B. Oil starvation / lack of lube.
 - C. Antifreeze / coolant in lube oil.
 - D. Insufficient crankshaft end thrust clearance.
-

4. Item “4” is a Ring Set. What is the Primary Cause of Failure?

- A. No lube oil for cooling.
 - B. Over fueling of cylinder
 - C. Normal wear
 - D. Air supply contamination
-

SkillsUSA 2015 – Failure Analysis Station #11

Parts - Group One - Continued

- Use supplied parts to answer the following multiple choice questions.
- Inspect each part and determine the type or cause of the failure.
- Circle the answer that best describes the type or cause of the failure.

5. Item “5” is a Connecting Rod and Piston Assembly

- A. Serviceable part. No defect. Return to service.
 - B. Defective Connecting Rod.
 - C. Defective Piston.
 - D. Both B & C.
-

6. Item “6” is a Turbo Charger Oil Feed Line

- A. Serviceable part. No defect. Return to service.
 - B. Defective fitting.
 - C. Cracked flare / seat.
 - D. Crushed braided line.
-

7. Item “7” Turbo Compression and Exhaust Wheels.

Determine Cause of Failure

- A. Engine overspeed
 - B. Hot engine shutdown
 - C. Internal engine parts passing through exhaust
 - D. Air source contaminated
-

8. Item “8” is a Piston

- A. Serviceable part. No defect. Return to service.
 - B. Impact damage to piston skirt
 - C. Piston pin bushing damage.
 - D. Dropped valve damage on piston dome.
-

Parts - Group One - Continued

- Use supplied parts to answer the following multiple choice questions.
- Inspect each part and determine the type or cause of the failure.
- Circle the answer that best describes the type or cause of the failure.

9. Item “3” is a Thermostat & Seal.

- A. Serviceable part. No defect. Return to service.
 - B. Damaged thermostat seal. Do not reuse.
 - C. Worn thermostat housing. OK to reuse.
 - D. Both “B” and “C”
-

10.Item “10” is Push Tubes (Push Rods)

- A. Serviceable part. No defect. Return to service.
 - B. Bent push tube. Do not reuse.
 - C. Damaged ball end. Do not reuse.
 - D. Damaged cup end. Do not reuse.
-

11.Item “11” is a Water Pump

- A. Serviceable part. No defect. Return to service.
 - B. Excessive wear to bearing. Do not reuse.
 - C. Cracked housing. Do not reuse.
 - D. Defective seal / impeller. Do not reuse.
-

12.Item “12” is Bent Connecting Rod

- A. Engine overspeed
 - B. Piston pin seizure.
 - C. Hydrostatic lock.
 - D. Manufacturing defect
-

OIL ANALYSIS QUESTIONS

- Circle the answer that best describes the type or cause or the failure.

13. Technician A says that in oil analysis excessive cylinder/valve train wear will show up as high iron levels. Technician B says that excessive piston/ring wear on older engines can show up as high aluminum/chromium levels. Who is correct?

- A. Technician A only
 - B. Technician B only
 - C. Both are correct
 - D. Neither is correct
-

14. The best method for obtaining an oil sample is?

- A. Drain plug method
 - B. Oil gallery (pressure valve) method
 - C. Siphon (vacuum) method
 - D. None of the above
-

15. The four major solid contaminants found in used engine oil are soot, silicon (dirt), fuel, and coolant?

- A. True
 - B. False
-

16. Technician “A” says that a high silicon reading can be caused by dirt entering the engine and contaminating the oil due to a faulty air intake system. Technician “B” says that a high silicon reading can be caused by using too much sealant during engine assembling. Who is correct?

- A. Technician A only
 - B. Technician B only
 - C. Both are correct
 - D. Neither is correct
-

SkillsUSA 2015 – Failure Analysis Station #11

GENERAL KNOWLEDGE QUESTIONS

- Circle the answer that best answers the general knowledge questions.

17. If an engine has a sudden loss of oil and the operator does not shut off the engine and continues to operate it what will be the first major component to fail?
- A. Piston / Liner
 - B. Flywheel
 - C. Crankshaft / bearings
 - D. Oil pump
18. If an engine has a sudden loss of coolant and the operator does not shut off the engine and continues to operate it what will be the first major component to fail?
- A. Piston / Liner
 - B. Camshaft / Rollers
 - C. Water Pump
 - D. Unit Injector
19. A quart can of engine oil has a marking on the lid of SAE 10w30. Technician “A” says the SAE stands for “*Society Automotive Engineers*” and this oil is a 10 weight viscosity cold and 30 weight viscosity hot. Technician “B” says the SAE stands for “*Special Additive Enabled*” and the 10w30 stands for the types of additives used. Who is right?
- A. Technician A only
 - B. Technician B only
 - C. Both Technicians A & B
 - D. Neither Technician A or B
20. Technician “A” says that orange colored diesel fuel should be used in US07 emission and newer on-highway engines. Technician “B” says that blue/green colored diesel fuel should be used in US07 emission and newer on-highway engines. Who is correct?
- A. Technician A only
 - B. Technician B only
 - C. Both Technicians A & B
 - D. Neither Technician A or B

| |
|--|
| <p>SKILLS USA 2015 – FAILURE ANALYSIS STATION # 11 - ANSWERS</p> |
|--|

PARTS:

1. B
2. C
3. D
4. D
5. D
6. B
7. D
8. B
9. ~~B~~ D
10. A
11. D
12. C

OIL ANALYSIS:

13. A
14. B
15. B
16. C

GENERAL KNOWLEDGE:

17. C
18. A
19. D
20. B

| |
|---|
| <p>SKILLS USA 2015 – FAILURE ANALYSIS</p> <p>STATION # 11 - SCORING</p> |
|---|

| No. Correct | Score |
|-------------|-------|
| 20 | 100 |
| 19 | 95 |
| 18 | 90 |
| 17 | 85 |
| 16 | 80 |
| 15 | 75 |
| 14 | 70 |
| 13 | 65 |
| 12 | 60 |
| 11 | 55 |
| 10 | 50 |
| 9 | 45 |
| 8 | 40 |
| 7 | 35 |
| 6 | 30 |
| 5 | 25 |
| 4 | 20 |
| 3 | 15 |
| 2 | 10 |
| 1 | 5 |
| 0 | 0 |



SkillsUSA Diesel Equipment Technology Competition 2015
Written Test-Braking Systems
Station 12

Contestant's Number _____

Written Brake Test Station Number _____

Written Test-All Correct Answers= 2.5 Points
Possible 50 Points

*****Use the supplied information at the Written Brake Station you are assigned to answer the below questions***

Circle your Answer after the Question

1. A Spring Brake Chamber can be automatically actuated by a low air condition.

A) This is a True statement.
B) This is a False statement.
C) This statement is False for the Service/Spring Brake Chamber Assembly.
D) None of the above is correct.

2. Technician A says that the Recommended Work Practices for Servicing Brakes for any Fiber type Brake is to have Respiratory Protection.
Technician B says that Never should a Technician use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA Filter when cleaning brake parts or assemblies.

Who's Correct?

- A) Technician A Only
B) Technician B Only
C) Both Technicians A and B
D) Neither Technicians A or B

3. The purpose of an Automatic Slack Adjuster (ASA) is:

Circle below all that apply:

A) Maintain a Preset Clearance between the Brake Shoe Lining and the Brake Drum Surface.
B) Provide a means to manually release the Brake Shoes away from the Brake Drum for Service.
C) Automatically Adjust the Brake Shoes closer to the Brake Drum Surface as the Brake Lining Wears.
D) All The Above.
E) None of the Above.

4. Technician A says that the Primary Brake Shoe in a Cam Brake assembly is the Brake Shoe that engages first when looking at the Wheel Rotation.
Technician B says that the Primary Shoe could be located on the Top or Bottom. It depends on Cam Location at the Wheel assembly and the Wheel Rotation.

Who's Correct?

- A) Technician A only
 - B) Technician B only
 - C) Both Techs A and B
 - D) Neither Tech A or B
5. Technician A says that Cam Brake performance is affected by the heat expansion of the Brake Drum and can create Brake Fade.
Technician B says that a Disc Brake is unaffected by heat as the Disc Rotor expansion as it gets hot does not create a Brake Fade condition.

Who's Correct?

- A) Technician A only
 - B) Technician B only
 - C) Both Techs A and B
 - D) Neither Tech A or B
6. A Brake Spider that is used on a Cam Brake can be _____ to the axle.
- A) Bolted
 - B) Welded
 - C) Either Bolted or Welded
 - D) None of the Above
7. What is the A/L Factor for a Wheel-End Brake with a Type 30 Brake Chamber and a 6.00" ASA?
- A) 36
 - B) 5.0
 - C) 50
 - D) 180
8. Air Brake Chambers are specified by _____ for a particular Brake and Axle load.
- A) Chamber size
 - B) Weight
 - C) Length
 - D) Deceleration Ratios
9. During a PM inspection a Technician has to ensure the foundation brakes are applying properly. To check that he/she must _____.
- A) Measure applied brake stroke
 - B) Measure free travel
 - C) Make sure the park brake chamber has air pressure
 - D) All of the above