PRACTICE EXAM 9: A9 LIGHT VEHICLE DIESEL ENGINES SIMULATION (60 QUESTIONS)

1. A diesel injector removed for testing produces a single solid stream rather than a fine cone during a pop test. This injector will MOST likely cause:

A. coolant intrusion into the engine oil supply

B. overcharging of the vehicle's starting batteries

C. poor combustion, smoke, and possible cylinder damage

D. a no-crank condition at the starter motor circuit

2. A diesel charges poorly and the water pump turns slowly, and a glazed serpentine belt is found slipping. The FIRST corrective step is to:

A. replace the alternator and the water pump together

B. replace the belt and inspect the tensioner and pulleys

C. raise the commanded rail pressure inside the ECM

D. reprogram the injector calibration codes in the ECM

3. Technician A says No. 1 diesel carries more energy per gallon than No. 2 diesel. Technician B says No. 2 diesel flows better in extreme cold than No. 1. Who is correct?

A. Technician A only

B. Technician B only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

4. Passive regeneration of a diesel particulate filter differs from active regeneration in that passive regeneration:

A. burns soot using normal exhaust heat without added fuel

B. requires the ECM to inject extra fuel for the burn

C. removes accumulated ash that soot cannot reach

D. only occurs while the vehicle is parked and idling

5. A diesel shows low oil pressure on the dash gauge, but a mechanical gauge installed at the port reads normal. The technician should suspect:

A. a worn oil pump unable to maintain pressure

B. a clogged oil cooler restricting return flow

C. fuel dilution thinning the engine oil supply

D. a faulty oil pressure sensor or its wiring

6. A turbocharger is suspected of bearing wear. The technician checks for excessive shaft play by:

A. measuring the boost pressure produced at idle speed

B. moving the shaft for radial and axial free play by hand

C. reading the exhaust back-pressure under full load

D. checking the engine oil pressure at operating temperature

7. On a cold start, a diesel with a grid (air) intake heater improves combustion by:

A. warming the intake air charge entering the cylinders

B. heating the engine coolant before the thermostat opens

C. raising the common-rail pressure during cranking

D. preheating the diesel exhaust fluid in the tank

8. Cylinder-head bolts must be tightened in the manufacturer's sequence, usually from the center outward, primarily to:

A. set the correct camshaft-to-crankshaft timing

B. establish the proper valve lash on each cylinder

C. distribute clamping load evenly and prevent warpage

D. determine the correct head-gasket thickness grade

9. Persistent small air bubbles seen in a clear fuel line on the suction side of a diesel lift pump MOST likely indicate:

A. water collecting in the fuel/water separator bowl

B. a loose fitting or crack drawing air into the system

C. excessive rail pressure venting back to the tank

D. a stuck-open exhaust gas recirculation valve

10. The primary emissions benefit of recirculating exhaust gas into a diesel's intake is a reduction in:

A. particulate soot reaching the exhaust filter

B. hydrocarbon slip past the oxidation catalyst

C. carbon monoxide formed during combustion

D. oxides of nitrogen formed at high temperatures

11. To measure connecting-rod bearing oil clearance during assembly, a technician most commonly uses:

A. a feeler gauge between the ring and its groove

B. a straightedge laid across the head deck surface

C. a plastic gauging strip crushed under the torqued cap

D. a dial indicator reading crankshaft end-thrust travel

12. A diesel emits continuous white smoke at all temperatures, loses coolant with no external leak, and the exhaust smells sweet. The MOST likely cause is a:

A. fuel injector dribbling raw fuel into a cylinder

B. turbocharger seal leaking oil into the intake tract

C. set of worn rings letting oil into the cylinders

D. head gasket leaking coolant into a combustion chamber

13. A variable-geometry turbocharger uses an actuator to move its vanes. On many late-model diesels this actuator is:

A. driven by intake manifold vacuum from the engine

B. an electric motor controlled by the engine module

C. powered by high-pressure fuel from the common rail

D. operated by coolant pressure from the water pump

14. When installing piston rings, the gaps of the compression rings should be:

A. aligned in a straight line above the piston pin

B. positioned all together on the major thrust side

C. staggered around the piston per the service manual

D. set directly over one another on each ring land

15. A severely restricted diesel fuel filter will MOST likely cause:

A. excessively high engine coolant temperature only

B. continuous overcharging of the starting batteries

C. coolant contamination of the engine oil supply

D. power loss and possible stalling under heavy load

16. The crankshaft thrust bearing in a diesel engine is designed to:

A. control the crankshaft's fore-and-aft (end) movement

B. carry the radial load from combustion pressure

C. seal engine oil at the rear of the crankshaft

D. drive the oil pump from the crankshaft snout

17. A DEF quality sensor reports that the fluid concentration is out of range. The MOST likely cause is:

A. a high-pressure fuel pump worn beyond specification

B. a thermostat that is stuck in the open position

C. DEF diluted with water or topped off with the wrong fluid

D. a fuel/water separator overdue for a routine draining

18. A diesel compression test shows one low cylinder that does NOT improve when oil is added through the glow plug port. This MOST likely indicates:

A. worn or broken rings in that cylinder

B. a leaking or burned valve in that cylinder

C. a fuel injector dribbling into that cylinder

D. a clogged air filter restricting that cylinder

19. The bypass valve built into a diesel oil filter is provided so that:

A. oil is diverted to the turbocharger on cold starts

B. system oil pressure is raised above the relief setting

C. oil flow continues to the engine if the element clogs

D. the oil is cooled before it reaches the main bearings

20. A turbo-diesel makes low boost with no boost leaks found and the VGT vanes moving freely. The technician should next check the:

A. engine coolant level in the recovery reservoir

B. air filter and intake for a restriction limiting airflow

C. diesel exhaust fluid level and quality sensor

D. cabin HVAC blower and its control resistor

21. Diesel fuel cetane number is BEST described as a measure of the fuel's:

A. total heat energy released per gallon burned

B. readiness to autoignite, which shortens ignition delay

C. resistance to autoignition, like gasoline octane

D. sulfur content measured in parts per million

22. A diesel's engine oil level has risen and the oil thins noticeably with a fuel odor. This MOST likely indicates:

A. raw fuel diluting the engine oil supply

B. coolant entering the lubrication system

C. normal soot loading from combustion

D. the wrong oil viscosity used at the last service

23. A diesel used only for very short trips repeatedly sets a high-soot DPF warning. The MOST likely reason is that:

A. the injectors are leaking excess fuel to return

B. the EGR valve is stuck in the open position

C. the turbocharger seals are leaking oil into the intake

D. the exhaust never gets hot enough to complete regeneration

24. A diesel valve spring is checked during a head overhaul. The two key measurements are the spring's free length and its:

A. concentricity with the valve guide bore

B. pressure (force) at the specified installed height

C. seat width against the valve face angle

D. clearance between the stem and the guide

25. An SCR system typically uses NOx sensors positioned:

A. only inside the diesel particulate filter housing

B. ahead of the turbocharger turbine inlet only

C. inside the intake manifold near the EGR valve

D. before and after the SCR catalyst to gauge conversion

26. In a HEUI injection system, the injection control pressure regulator (IPR) controls the:

A. amount of fuel returned to the tank from the rail

B. high-pressure oil that actuates the injectors

C. coolant flow through the engine oil cooler core

D. boost pressure delivered by the turbocharger

27. A diesel cooling system's pressure cap raises the coolant's boiling point by:

A. circulating coolant faster through the radiator core

B. increasing the pressure inside the sealed system

C. adding cavitation-protection additives to the coolant

D. lowering the thermostat's rated opening temperature

28. A diesel idles rough and one cylinder shows a much larger fuel correction value than the others on the scan tool. This points to:

A. a thermostat stuck in the wide-open position

B. a clogged radiator restricting coolant flow

C. a glow plug control module that has failed open

D. an injector flowing differently from the others

29. A wastegate stuck in the closed position on a fixed-geometry turbo-diesel will MOST likely cause:

A. continuous low boost and a loss of engine power

B. coolant contamination of the engine oil supply

C. a no-crank condition at the starter motor circuit

D. overboost that can set a code and damage the engine

30. After completing a repair, the final step in a sound diagnostic process is to:

A. verify the repair fixed the original concern under its conditions

B. immediately replace the next most commonly failed part

C. clear all codes and return the vehicle without a road test

D. recommend a full engine teardown for a final inspection

31. The EGR cooler on a diesel lowers the temperature of the recirculated exhaust gas in order to:

A. raise the fuel's cetane number before injection

B. speed up the diesel particulate filter regeneration

C. increase the boost the turbocharger can produce

D. reduce combustion temperature and control NOx more effectively

32. A connecting-rod bearing shows fine scratches and embedded particles across its surface. This wear pattern MOST likely indicates:

A. a loss of lubrication and oil-film breakdown

B. fatigue failure from high combustion loads

C. abrasive dirt contamination in the engine oil

D. a bent connecting rod causing misalignment

33. A glow plug that measures infinite resistance during testing is:

A. shorted internally to its outer metal case

B. open and unable to draw current to heat up

C. drawing excessive current and overheating fast

D. operating correctly within its normal range

34. Cooling the compressed intake air in a turbo-diesel's charge-air cooler improves power because cooler air is:

A. lower in moisture and less likely to corrode parts

B. easier for the turbocharger compressor to pump

C. denser, packing more oxygen into each cylinder

D. less likely to ignite before the injection event

35. Excess fuel returning from a common-rail system passes through a cooler before the tank mainly to:

A. raise the cetane number of the recycled fuel

B. remove water picked up in the injection system

C. lower the fuel temperature and protect components

D. add lubricity additives back into the return fuel

36. A diesel is slow to warm up, runs below normal temperature, and gives weak cabin heat. The MOST likely cause is a:

A. thermostat that is stuck in the open position

B. radiator clogged with external road debris

C. head gasket leaking combustion gas into the coolant

D. water pump leaking coolant from its weep hole

37. A diesel cylinder liner that contacts the engine coolant directly and is sealed by O-rings is classified as a:

A. dry liner pressed into the block bore

B. cast-in-place integral cylinder wall

C. wet liner exposed to the coolant jacket

D. press-fit sleeve installed during a rebore

38. A diesel cranks but will not start, and the fuel shutoff (control) solenoid does not click or open when energized. The technician should:

A. test the solenoid's power, ground, and operation

B. replace the full set of high-pressure injectors

C. raise the commanded rail pressure inside the ECM

D. command a forced diesel particulate filter regen

39. Oil jets aimed at the underside of the pistons on a diesel are provided primarily to:

A. cool the pistons and limit their operating temperature

B. lubricate the camshaft lobes and valve lifters

C. raise the common-rail fuel pressure under load

D. seal the piston rings against the cylinder walls

40. The diesel oxidation catalyst (DOC) in the exhaust stream works by:

A. physically trapping soot before the particulate filter

B. storing and releasing ammonia to reduce NOx output

C. oxidizing carbon monoxide and hydrocarbons into less harmful gases

D. metering diesel exhaust fluid into the exhaust flow

41. Diesels rely on glow plugs or intake heaters for cold starting because they ignite fuel by:

A. the heat of high compression rather than a spark

B. a spark from a plug timed to each power stroke

C. electrically heating the fuel before it is injected

D. mixing the fuel with intake air well before the valve

42. To minimize turbo lag at low engine speed, a variable-geometry turbocharger:

A. opens a wastegate to bypass exhaust around the turbine

B. cools the compressed intake air after the compressor

C. closes its vanes to accelerate exhaust onto the turbine

D. recirculates exhaust gas back into the intake manifold

43. A diesel reads abnormally high oil pressure that does not relieve even at high rpm. The MOST likely cause is a:

A. pressure relief valve stuck in the closed position

B. worn oil pump no longer building pressure

C. fuel-diluted oil with reduced viscosity

D. clogged oil cooler restricting the return flow

44. In an SCR system, the catalyst uses ammonia to convert oxides of nitrogen into:

A. carbon monoxide and unburned hydrocarbon vapor

B. soot particles captured by the particulate filter

C. sulfur dioxide and additional carbon dioxide

D. harmless nitrogen gas and water vapor

45. A diesel is hard to start after a fuel filter change, and cranking is long before it fires. The MOST likely reason is:

A. the injectors were damaged during the filter change

B. the rail pressure target was lowered in the ECM

C. the glow plug module failed during the service

D. air was left in the system and the fuel was not bled

46. After grinding a diesel valve seat, the seat must have the proper width and angle and be:

A. matched to a stiffer replacement valve spring

B. coated with a thicker head-gasket fire ring

C. concentric with the centerline of the valve guide

D. set to a wider valve-to-rocker lash clearance

47. A technician suspects worn cylinders and measures crankcase pressure or blow-by. Higher-than-normal blow-by indicates:

A. coolant leaking past the head gasket into a cylinder

B. combustion gases escaping past the rings into the crankcase

C. raw fuel diluting the engine oil in the sump

D. air being drawn into the fuel on the suction side

48. A variable-geometry turbocharger supports DPF regeneration by closing its vanes to:

A. cool the compressed intake charge air

B. prime the low-pressure fuel circuit

C. charge the batteries faster at idle

D. raise exhaust back-pressure and temperature

49. An internal leak in a diesel's oil-to-coolant oil cooler will MOST likely produce:

A. a no-crank condition at the starter circuit

B. cross-contamination of the engine oil and coolant

C. excessively high common-rail fuel pressure

D. a permanently plugged diesel particulate filter

50. Injector calibration (trim) codes entered into the ECM allow the controller to:

A. count the total injection events over the engine's life

B. measure the temperature of the fuel returning to tank

C. compensate for small flow variations between injectors

D. disable any cylinder with a completely failed injector

51. A water-in-fuel warning illuminates on a diesel. The correct response is to:

A. replace the high-pressure pump as a complete assembly

B. raise the commanded rail pressure to clear the warning

C. drain the fuel/water separator and find the water source

D. reprogram the injector calibration codes in the ECM

52. A diesel develops a cracked cylinder head between a coolant passage and a cylinder. A likely symptom is:

A. excessively high common-rail fuel pressure

B. continuous overcharging of the starting batteries

C. a no-crank condition at the starter motor

D. coolant loss and white smoke from that cylinder

53. Technician A says removing sulfur to make ULSD lowers the fuel's natural lubricity. Technician B says ULSD needs no lubricity additive at all. Who is correct?

A. Technician A only

B. Technician B only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

54. A turbocharger that is shut down immediately after hard, hot operation can suffer bearing damage because:

A. the compressor wheel keeps spinning without any load

B. residual heat can coke the oil in the bearing housing

C. boost pressure spikes during the shutdown event

D. coolant stops flowing through the charge-air cooler

55. Keeping the glow plugs energized for a short period after start-up (afterglow) helps a cold diesel by:

A. smoothing combustion and reducing cold-start smoke

B. raising the common-rail pressure during warm-up

C. recharging the batteries faster after cranking

D. speeding up particulate filter regeneration at idle

56. On many diesels, measuring piston protrusion above the block deck is required in order to:

A. select the correct head-gasket thickness grade

B. set the camshaft-to-crankshaft valve timing

C. establish the connecting-rod side clearance

D. determine the valve-spring installed height

57. An EGR valve stuck open on a diesel MOST commonly causes:

A. excessively high NOx output and lean operation

B. continuous overcharging of the starting batteries

C. a no-crank condition at the starter motor circuit

D. rough idle, low power, and black exhaust smoke

58. A diesel fuel/water separator protects the high-pressure injection system primarily by removing:

A. air drawn in on the suction side of the lift pump

B. water that would corrode the high-pressure components

C. heat carried by the fuel returning to the tank

D. ash that would otherwise plug the particulate filter

59. A vibration that changes with engine speed but not with road speed is MOST likely:

A. engine-related rather than from the driveline

B. caused by an out-of-balance tire or wheel

C. due to a worn driveshaft universal joint

D. the result of a bent axle shaft or hub

60. On a closed-loop common-rail system, the ECM maintains the target rail pressure using feedback from the:

A. rail-pressure sensor mounted on the fuel rail

B. mass airflow sensor in the intake tract

C. engine coolant temperature sensor

D. exhaust NOx sensor after the catalyst

PRACTICE EXAM 9 – ANSWER KEY (Questions 1–60)

1. C — An injector that delivers a solid stream instead of an atomized cone cannot mix fuel and air properly, producing poor combustion, smoke, and raw fuel that can erode or score the cylinder. A bad spray pattern does not affect coolant, charging, or cranking. Replacing the injector restores proper atomization and protects the cylinder.

2. B — A glazed, slipping serpentine belt cannot drive the accessories firmly, so the first step is to replace the belt and inspect the tensioner and pulleys that caused the glazing. Replacing the alternator and pump or touching fuel settings ignores the actual fault. Restoring belt grip returns normal charging and water-pump speed.

3. D — Neither technician is correct: No. 2 diesel actually carries more energy per gallon than No. 1, and No. 1 (not No. 2) flows better in extreme cold. Both statements have the fuels reversed. Knowing the true trade-off guides correct winter fuel selection.

4. A — Passive regeneration burns soot using the heat already present in normal exhaust, with no added fuel, whenever exhaust temperatures are high enough. Active regeneration is what injects extra fuel, and ash removal is a separate service. Passive regen quietly keeps soot in check during sustained driving.

5. D — When the dash gauge reads low but a mechanical gauge at the port reads normal, the actual pressure is fine and the oil pressure sensor or its wiring is at fault. A worn pump, clogged cooler, or thinned oil would lower the real pressure too. Verifying with a mechanical gauge prevents an unnecessary pump replacement.

6. B — Turbocharger bearing wear is checked by hand, feeling the shaft for excessive radial and axial free play that would let the wheels contact their housings. Boost, back-pressure, and oil pressure readings do not directly reveal shaft play. Noticeable play confirms worn bearings and the need to replace the turbo.

7. A — A grid (air) intake heater warms the incoming air charge so a cold diesel can ignite and run smoothly during start-up. It does not heat coolant, raise rail pressure, or warm DEF. The warmer intake air is what aids cold-start combustion.

8. C — Tightening head bolts in the specified sequence from the center outward spreads the clamping load evenly and prevents the head from warping or sealing unevenly. The sequence does not set timing, lash, or gasket grade. Proper sequence is essential to a leak-free head installation.

9. B — Air bubbles on the suction side of the lift pump mean the system is drawing air through a loose fitting or crack ahead of the pump. Separator water, rail venting, and EGR faults would not introduce suction-side air. Finding and sealing the leak stops the aeration and hard starting.

10. D — Recirculating exhaust gas lowers peak combustion temperature, which directly reduces the formation of oxides of nitrogen. It is not aimed at soot, hydrocarbons, or carbon monoxide. NOx control is the core purpose of the EGR system.

11. C — Connecting-rod bearing oil clearance is most commonly measured with a plastic gauging strip laid on the journal and crushed when the cap is torqued, then read against a scale. Feeler gauges, straightedges, and end-thrust indicators measure other things. Correct clearance ensures an adequate oil film and bearing life.

12. D — Continuous white smoke at all temperatures with unexplained coolant loss and a sweet exhaust odor indicates coolant is leaking into a combustion chamber through the head gasket and burning. Fuel, turbo, and ring faults produce different smoke and no coolant loss. The gasket breach must be repaired to stop the loss.

13. B — On many late-model diesels the VGT vanes are moved by an electric actuator commanded by the engine module, allowing precise position control. Vacuum, fuel, and coolant are not used to drive these actuators. The electric actuator gives the ECM fine control over boost.

14. C — Compression ring gaps should be staggered around the piston per the service manual so the gaps do not align and create a direct path for blow-by. Lining the gaps up or stacking them invites compression loss. Proper stagger maintains sealing and minimizes blow-by.

15. D — A severely restricted fuel filter starves the injection system, producing power loss and stalling that worsen under heavy load when fuel demand is highest. It does not raise coolant temperature, overcharge batteries, or contaminate oil. Replacing the filter restores full fuel flow.

16. A — The crankshaft thrust bearing limits and controls the crankshaft's fore-and-aft end movement, maintaining proper end play. Radial combustion loads are carried by the main bearings, not the thrust bearing. Correct thrust control protects against end-play damage to the crank and clutch.

17. C — A DEF concentration that reads out of range usually means the fluid has been diluted with water or topped off with the wrong fluid. Fuel pump, thermostat, and separator issues are unrelated to DEF quality. Restoring proper DEF concentration clears the fault and keeps the SCR working.

18. B — When a low cylinder does not improve after oil is added, the leak is not at the rings but at a leaking or burned valve that oil cannot seal. Ring problems would show improvement with the oil. The dry-versus-wet result directs the repair to the valve.

19. C — The oil filter bypass valve opens if the element becomes clogged so that oil flow to the engine continues, protecting against oil starvation. It does not divert oil to the turbo, raise pressure above the relief setting, or cool the oil. The bypass trades filtration for continued lubrication in an emergency.

20. B — With no boost leaks and the VGT vanes free, low boost points to an intake restriction, so the air filter and intake tract should be checked next. Coolant, DEF, and HVAC components are unrelated to boost. Clearing the restriction restores airflow and boost.

21. B — Cetane number measures how readily diesel fuel autoignites, which determines how short the ignition delay is. It is not a measure of energy content, octane-like resistance, or sulfur level. Higher cetane improves cold starting and smooths combustion.

22. A — A rising oil level with thinning oil and a fuel odor shows raw fuel is diluting the engine oil, typically from a leaking injector. Coolant intrusion makes oil milky, and soot only darkens it. Fuel dilution reduces oil film strength and must be traced to its source.

23. D — Short trips never let the exhaust reach the temperature needed to complete regeneration, so soot accumulates and triggers the high-soot warning. Injector, EGR, and turbo faults are not the cause here. Longer drives or a forced regen are needed to clear the soot.

24. B — A valve spring is judged by its free length and the pressure it produces at the specified installed height, which confirms it can still close the valve firmly. Concentricity, seat width, and stem clearance describe other components. A weak spring at installed height must be replaced.

25. D — SCR systems place NOx sensors before and after the catalyst so the ECM can compare readings and judge how well NOx is being converted. Locating them only in the DPF, before the turbine, or in the intake would not measure conversion. The two readings confirm catalyst efficiency.

26. B — In a HEUI system the injection control pressure regulator manages the high-pressure engine oil that actuates the injectors, setting injection pressure. It does not control fuel return, coolant flow, or boost. The IPR is central to how HEUI injection is controlled.

27. B — A cooling-system pressure cap raises the coolant's boiling point by holding the sealed system at higher pressure. It does not speed circulation, add additives, or change the thermostat rating. The higher boiling point helps prevent boil-over under load.

28. D — A single cylinder with a much larger fuel correction value than the others indicates that injector is flowing differently and needs service or replacement. Thermostat, radiator, and glow plug faults would not show as a per-cylinder correction. The correction value isolates the faulty injector.

29. D — A wastegate stuck closed cannot bleed off exhaust, so the turbo overspeeds and overboosts, which can set a code and damage the engine. A stuck-open wastegate would instead cause low boost. Restoring wastegate function protects the engine from overboost.

30. A — The final step of sound diagnosis is to verify the repair actually corrected the original concern under the conditions that produced it. Replacing more parts, skipping a road test, or recommending teardown are not verification. Confirming the fix prevents comebacks.

31. D — The EGR cooler lowers the temperature of the recirculated exhaust so it suppresses combustion temperature more effectively, improving NOx control. It does not raise cetane, speed regeneration, or boost airflow. Cooler EGR gas means lower combustion temperature and less NOx.

32. C — Fine scratches with embedded particles across a bearing surface are the signature of abrasive dirt contamination circulating in the oil. Lubrication loss wipes and discolors, while fatigue causes pitting. The pattern points to a contamination source that must be found.

33. B — A glow plug reading infinite resistance has an open element and cannot draw current to heat, so it will not aid cold starting. A shorted plug reads near zero and a good plug reads a low value. The open plug must be replaced.

34. C — Cooling the compressed intake air makes it denser, packing more oxygen into each cylinder for more complete combustion and power. The benefit is density, not reduced moisture, easier pumping, or ignition timing. The charge-air cooler raises power by increasing charge density.

35. C — A return fuel cooler lowers the temperature of fuel coming back from the high-pressure system before it re-enters the tank, protecting the tank, pump, and fuel from heat. It does not raise cetane, remove water, or add additives. Cooling the return preserves component life.

36. A — Slow warm-up, a below-normal running temperature, and weak heat point to a thermostat stuck open, allowing coolant to circulate before the engine warms. A clogged radiator or leaking gasket would tend to overheat. Replacing the thermostat restores proper operating temperature.

37. C — A liner that contacts the coolant directly and is sealed by O-rings is a wet liner, exposed to the coolant jacket along its length. Dry liners, integral walls, and press-fit sleeves do not directly contact coolant this way. Wet liners require careful sealing and stand-out control.

38. A — When the fuel shutoff (control) solenoid does not actuate, the technician should test its power, ground, and operation, since it controls whether fuel can flow to start the engine. Replacing injectors, raising rail pressure, or forcing a regen ignores the no-fuel cause. Verifying the solenoid circuit isolates the no-start.

39. A — Oil jets sprayed at the underside of the pistons carry away combustion heat to cool the pistons and control their temperature under load. They are not for camshaft oiling, fuel pressure, or ring sealing. Piston cooling protects against thermal damage.

40. C — The diesel oxidation catalyst oxidizes carbon monoxide and unburned hydrocarbons into less harmful carbon dioxide and water. It does not trap soot, store ammonia, or meter DEF. The DOC reduces these pollutants and supplies heat for downstream regeneration.

41. A — Diesels ignite fuel by the heat generated from high compression rather than from a spark, so glow plugs or intake heaters are needed when a cold engine cannot reach that temperature alone. There is no timed spark and the fuel is injected late. Compression ignition is the defining diesel principle.

42. C — A variable-geometry turbocharger minimizes low-speed lag by closing its vanes to narrow the exhaust path and accelerate the gas onto the turbine, building boost quickly. Wastegates, intercoolers, and EGR do not perform this. Closing the vanes is the VGT's anti-lag action.

43. A — Oil pressure that stays high and never relieves, even at high rpm, indicates the pressure relief valve is stuck closed and cannot cap the pressure. A worn pump or thinned oil would lower pressure instead. A stuck-closed relief valve risks overpressuring components.

44. D — The SCR catalyst uses ammonia from decomposed DEF to convert oxides of nitrogen into harmless nitrogen gas and water vapor. It does not produce carbon monoxide, soot, or sulfur compounds. This conversion lets the engine meet NOx standards.

45. D — Hard starting with long cranking right after a filter change means air was left in the system and the fuel was not properly bled. Injectors, rail settings, and the glow plug module are not implicated by a filter change. Priming and bleeding the air restores normal starting.

46. C — A reground valve seat must have the correct width and angle and be concentric with the valve guide so the valve seats evenly and seals. Spring choice, fire-ring thickness, and lash are separate issues. Concentricity ensures a gas-tight seat and proper valve cooling.

47. B — Higher-than-normal blow-by means combustion gases are escaping past worn rings into the crankcase, pressurizing it. It is not coolant, fuel dilution, or suction-side air. Excess blow-by confirms cylinder and ring wear.

48. D — Closing the VGT vanes raises exhaust back-pressure and temperature, which helps drive DPF regeneration. It does not cool charge air, prime fuel, or charge batteries. The vane action supplies the heat the filter needs to burn soot.

49. B — An internal leak in an oil-to-coolant cooler lets the two fluids mix, cross-contaminating the oil and coolant across the shared boundary. It does not cause no-crank, high fuel pressure, or a plugged DPF. Detecting the mix points directly to the cooler.

50. C — Injector calibration (trim) codes tell the ECM each injector's small flow differences so it can compensate and balance fueling across cylinders. They do not count events, read return temperature, or disable cylinders. Correct codes keep the engine running smoothly after injector service.

51. C — A water-in-fuel warning calls for draining the fuel/water separator and finding where the water is entering, since water corrodes high-pressure components. Replacing the pump or changing settings ignores the real problem. Removing the water protects the injection system.

52. D — A cracked head between a coolant passage and a cylinder lets coolant enter that cylinder, causing coolant loss and white smoke from the affected cylinder. It does not raise fuel pressure, overcharge batteries, or prevent cranking. The symptom points to a head crack needing repair.

53. A — Technician A is correct: removing sulfur to make ULSD reduces the fuel's natural lubricity, so additives are blended in to protect the pump and injectors. Technician B is wrong because the additive is needed. Adequate lubricity prevents premature injection-system wear.

54. B — Shutting down a hot, hard-worked turbo immediately can let residual heat coke the oil in the bearing housing, damaging the bearings. The issue is heat soak into stagnant oil, not free spinning, boost spikes, or coolant flow. A brief cool-down idle protects the turbo.

55. A — Afterglow keeps the glow plugs energized briefly after start-up to smooth combustion in a still-cold engine and reduce cold-start smoke. It does not raise rail pressure, charge batteries, or speed regeneration. The added heat steadies cold running.

56. A — Measuring piston protrusion above the deck on many diesels determines which head-gasket thickness grade is needed to set the correct clearance. It does not set timing, rod side clearance, or spring height. Correct gasket selection depends on this measurement.

57. D — An EGR valve stuck open floods the cylinders with inert exhaust, producing rough idle, low power, and black smoke from displaced oxygen. It lowers NOx rather than raising it and does not affect charging or cranking. Freeing or replacing the valve restores normal running.

58. B — A fuel/water separator protects the injection system by removing water that would corrode the high-pressure components. It is not designed to remove suction-side air, fuel heat, or exhaust ash. Draining collected water preserves injector and pump life.

59. A — A vibration that tracks engine speed but not road speed is engine-related, since it follows rpm rather than vehicle motion. Tire, driveshaft, and axle faults would change with road speed instead. Noting this relationship narrows the source to the engine.

60. A — A closed-loop common-rail system holds its target pressure using feedback from the rail-pressure sensor mounted on the fuel rail. The MAF, coolant, and NOx sensors serve other functions. The rail-pressure sensor's signal is what lets the ECM regulate pressure precisely.