



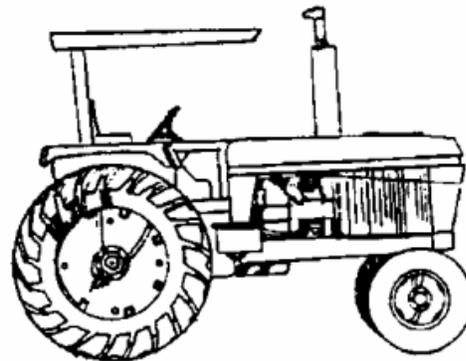
# 4-H PETROLEUM POWER PROGRAM

## Questions and Answers

for

# Tractor Operators Contest Senior Division (Supplement #2)

To be used as a supplement to whatever teaching materials are used at county level. Reproduce and distribute to all 4-H Tractor leaders and 4-H members participating in county, area and state contests.



**NOTE:** All test questions for Area and State Senior Tractor Operator Contests will be taken from this supplement *plus* Supplement #1 – Junior Division questions.

1. Thinning of oil in the crankcase is commonly caused by: B
  - A. oil breaking down.
  - B. fuel and byproducts of combustion getting into the crankcase due to cold operation.
  - C. condensation due to temperature change.
  
2. Sludge maybe formed by: B
  - A. a poor grade of oil.
  - B. products of combustion.
  
3. If the oil-pump screen is plugged, oil \_\_\_\_\_ flow to the bearings. B
  - A. will
  - B. will not
  
4. In a pressure lubrication system the pressure shown on the gauge \_\_\_\_\_ a true indication of the amount of oil that is reaching the parts to be lubricated. A
  - A. is not
  - B. is
  
5. A multi-grade oil \_\_\_\_\_ as it warms up. B
  - A. thickens
  - B. gets thinner
  
6. Paper oil-filter cartridges \_\_\_\_\_ be cleaned and reused. B
  - A. may
  - B. should never
  
7. Crankcases must be drained more often in winter than in summer because: A
  - A. water, sludge, and condensation forms faster and is a serious problem.
  - B. the tractor works harder.
  
8. A gasoline engine would use an \_\_\_\_\_ API-classification crankcase oil for severe service. B
  - A. SA
  - B. SE

9. Oil-filter bases should be drained \_\_\_\_\_ removing the filter element. A  
A. before  
B. after
10. Oil for the hydraulic system must be: A  
A. kept clean.  
B. stored where it will not freeze.
11. The throttle stop-screw adjustment on a carburetor: B  
A. changes the mixture.  
B. adjusts the throttle valve position.  
C. regulates air.
12. On a carburetored gasoline engine when the idle adjustment is made, the throttle valve should be: B  
A. open.  
B. closed.  
C. nearly closed.
13. Closing the adjustment of the high-speed, or load needle valve on a carburetor \_\_\_\_\_ the amount of fuel in the mixture. A  
A. decreases  
B. increases
14. The measure of the ignition value of diesel fuel is: B  
A. octane.  
B. cetane.  
C. flash point.
15. A common indication of an over-fueled operating mixture is \_\_\_\_\_ vapor or smoke from exhaust. C  
A. white  
B. blue  
C. black
16. An extremely lean mixture will cause: A  
A. loss of power and burned valves.  
B. greater economy of operation.
17. Four 6-volt batteries connected in series yield: C  
A. 6 volts.  
B. 12 volts.  
C. 24 volts.

18. An engine should be at \_\_\_\_\_ and under load, when making the final adjustment of the carburetor. A  
A. correct operating temperature  
B. 140 degrees Fahrenheit.
19. Diesel engines have less compression than gasoline engines. B  
A. True  
B. False
20. The gas lever changes the: B  
A. carburetor throttle.  
B. governor spring tension.
21. Fuel and air in a diesel engine are mixed: B  
A. before they enter the cylinder.  
B. in the cylinder.
22. Diesel fuel is ignited by: A  
A. the heat of compression.  
B. a spark plug
23. The amount of diesel fuel injected depends on engine: C  
A. speed.  
B. load.  
C. load and speed.
24. Injection pumps and injectors \_\_\_\_\_ be disassembled in the field. B  
A. can  
B. should not
25. The parts of a diesel engine fuel system fit together: A  
A. very closely.  
B. fairly closely.  
C. loosely.
26. A wire brush can be used to clean the \_\_\_\_\_ of spark plugs. C  
A. electrodes  
B. porcelain  
C. threads
27. In gauging the spark gap of used spark plugs \_\_\_\_\_ is more accurate. B  
A. a flat gauge  
B. a round wire gauge

28. Setting spark gaps closer than recommended can cause: A  
A. poor idling.  
B. better idling.  
C. easier starting.
29. The main difference between a HOT and a COLD spark plug is: B  
A. the gap setting.  
B. length of the insulator below the gasket shoulder.
30. A fully charged battery will deliver approximately 65% of its cranking power at: A  
A. 32 degrees Fahrenheit.  
B. 60 degrees Fahrenheit.  
C. 0 degrees Fahrenheit.
31. The electrolyte solution in a battery should be checked every: B  
A. 25 hours  
B. 50 hours  
C. 75 hours
32. If the charge in a battery is low, the battery is \_\_\_\_\_ to freeze. A  
A. more apt  
B. less apt
33. Keeping a battery fully charged all the time: A  
A. is good for it.  
B. burns it out sooner than necessary.
34. Poor or worn insulation on spark plug wires \_\_\_\_\_ affect starting. B  
A. cannot  
B. can
35. The voltage regulator controls: A  
A. the output of the generator.  
B. how much voltage the battery produces.
36. Burning fuel temperatures range between 3,000 and 4,000 degrees Fahrenheit. Approximately \_\_\_\_\_ of this heat is carried off by the cooling system. A  
A. one-third  
B. all  
C. one-tenth

37. Temperatures are highest around the: A  
A. cylinder head and exhaust valves.  
B. piston and walls of cylinder.
38. At night an SMV emblem appears as an orange hollow triangle. B  
A. True  
B. False
39. In Indiana newly manufactured self propelled equipment must have A  
turn indicators.  
A. True  
B. False
40. It is better to use \_\_\_\_\_ in your radiator. B  
A. cold well water  
B. rainwater
41. If excess grease enters the cooling system it \_\_\_\_\_ interfere A  
with cooling efficiency.  
A. will  
B. will not
42. What precautions should be taken to keep your tractor from A  
freezing?  
A. Use an anti-freeze.  
B. Put a light under the engine.
43. Tractor engines that run too cool: B  
A. are best for hot days.  
B. waste fuel.
44. Pressure cooling systems: A  
A. are sealed and have a pump to force the water through the engine.  
B. lower the boiling point of the coolant.
45. To remove all the water when draining most tractors that have A  
a water pump, drain at the:  
A. radiator and block.  
B. radiator only.
46. Today's standards require two red tail lamps visible to the front of B  
self-propelled equipment.  
A. True  
B. False

47. Extra weight carried by tractor tires to give greater pulling power is needed: A  
A. only for heavy pulling.  
B. for road operation.  
C. only when heavy equipment is mounted on tractors.
48. A 1/1 (antifreeze to water) ratio gives a freezing point of approximately: C  
A. -10 degrees Fahrenheit.  
B. -20 degrees Fahrenheit.  
C. -30 degrees Fahrenheit.
49. For more efficient field operation the rate of slippage of radial ply tires is less than bias ply tires. A  
A. True  
B. False
50. The most commonly neglected service in tractor care is: C  
A. rotation of the tires.  
B. keeping mud from caking around lug grips.  
C. proper inflation of tires.
51. Over-inflation of tires: B  
A. allows the tire to slip on the rim.  
B. reduces traction, resulting in excessive slippage.  
C. results in repeated buckling of the side wall.
52. Under-inflation of tires causes: C  
A. damage to the side wall of a tire.  
B. reduced traction.  
C. both of the above
53. The right gauge to use when checking air-inflated tractor tires accurately: C  
A. should have 3-pound graduations.  
B. should have a minimum reading of 50 lbs.  
C. should be a low-pressure gauge with 1-pound graduations.
54. All animal-drawn or motorized conveyance traveling 25 mph or less need to have an SMV. A  
A. True  
B. False

55. Tractor tire slippage can be reduced by: C  
A. increasing the air pressure.  
B. increasing the engine speed.  
C. adding weights to the tractor.
56. Front wheel bearings having no grease fittings \_\_\_\_\_ A  
need to be lubricated.  
A. do  
B. do not
57. \_\_\_\_\_ water pump bearings are sealed and do not need B  
periodic lubrication.  
A. All  
B. Most
58. Planetary gears get their name because they resemble the planets A  
of the solar system.  
A. True  
B. False
59. \_\_\_\_\_ engine lubricants should be used during cold weather. A  
A. Multigrade or lighter  
B. Heavier
60. Tractor hydraulic power-lifts \_\_\_\_\_ get their lubrication from A  
the transmission case.  
A. sometimes  
B. never  
C. always
61. A little grease \_\_\_\_\_ be left on grease fittings to seal the openings A  
against water and dirt.  
A. should  
B. should not
62. Grease fittings should be wiped off before the grease gun is applied: B  
A. so the nozzle of the gun will fit perfectly.  
B. to prevent any dirt, dust or other harmful materials from being  
forced into the bearing.
63. Contaminants \_\_\_\_\_ get into grease as they do into oil. A  
A. do  
B. do not

64. A diesel engine: B  
A. has a special spark ignition system.  
B. depends on high compression and heat for ignition.  
C. runs best when cold.
65. A magneto: A  
A. generates its own electric current.  
B. takes electricity from the air and needs no battery.  
C. stores electricity in the magnets.
66. A coil: B  
A. increases the power of a battery.  
B. increases the voltage for the spark plug.  
C. reduces the voltage so the spark will jump the plug gap.
67. A condenser is used in the ignition system to: A  
A. prevent arcing across the breaker points.  
B. change the current from direct current to alternating current.
68. If the breaker point gap is \_\_\_\_\_ the engine may miss at high speeds. A  
A. too wide  
B. too narrow
69. Ignition must be advanced on a gasoline engine when running: A  
A. to allow firing of the fuel by the time piston starts down.  
B. to allow time for a hot spark to build up.  
C. to keep engine from kicking.
70. On modern tractors the charging rate of the generator is controlled by: B  
A. the automatic spark advance.  
B. the voltage regulator.  
C. a hand switch.
71. Diesel engines \_\_\_\_\_ have to be timed. A  
A. do  
B. do not
72. If you disconnect the belt on a generator that is in good condition and hold the contact points of the cut out closed: A  
A. it will behave as a slow-running motor.  
B. sparks will fly.  
C. nothing will happen.

73. Insulated wire terminals have barrels of different colors for different size wires. A  
A. True  
B. False
74. If the engine suddenly quits, a tractor that has power steering should: B  
A. get out of control.  
B. not get out of control because you can steer it manually.
75. On most types of tractors the steering gears and bearings are: B  
A. lubricated with grease guns.  
B. enclosed in an oil-tight case containing the lubricant.  
C. oiled daily with a hand oil can.
76. SMV stands for: A  
A. Slow Moving Vehicle.  
B. Standard Motor Vehicle.
77. Turbo chargers are driven by intake air pressure. B  
A. True  
B. False
78. Tractor front-wheel bearings are generally of the \_\_\_\_\_ type. B  
A. ball bearing  
B. tapered roller bearing  
C. roller bearing
79. When packing front-wheel bearings: C  
A. use a rustproof type of grease.  
B. soak bearings in oil to remove the old grease and then rub the new grease on only the inner surface of the bearing.  
C. work the grease entirely through the bearing.
80. The most common way to tighten front-wheel bearings is: C  
A. to force the bearings into place as tightly as possible.  
B. to turn the adjusting nut counter clockwise until it drops into position and lock with a cotter pin.  
C. to turn the wheel slowly while tightening the adjusting nut until a drag is felt, then back the nut off to the first cotter key hole.

81. If the front wheels of a tractor have been operated under water: C  
A. they should be jacked up to allow water to drain.  
B. they should be tightened afterward.  
C. they should be removed, cleaned, and repacked with grease.
82. As you crank an engine and the piston comes up to top dead center, the compression is probably \_\_\_\_\_ if the cylinder rocks back as you release the crank. B  
A. faulty  
B. good
83. The best method for testing compression is: C  
A. cranking and observing piston action.  
B. putting your thumb in a spark-plug hole and feeling pressure.  
C. use of a compression gauge.
84. In using a compression gauge, you put it: C  
A. into the exhaust stack.  
B. into the no. 1 cylinder spark-plug hole.  
C. into every spark plug hole in turn.
85. If you find that compression is weak, the best thing to do is to: C  
A. use a heavier oil.  
B. pour liquid solder in the cooling system.  
C. take the tractor to a reputable service man.
86. Any time you remove such parts as spark plugs, distributor or valve covers be sure to: C  
A. write down a list of each part removed.  
B. clean parts in fuel.  
C. remove all dirt from around the parts before removing.
87. As you adjust each valve be sure: A  
A. that the piston for that cylinder is in firing position.  
B. that the ignition is turned off.  
C. that you don't get your fingers caught in the whirling fan.
88. The best method of gauging the valve clearance is: A  
A. to use two gauges, one slightly thicker than the recommended gap and one of the right measurements.  
B. to place the gauge of the correct measurement in the opening and tap it with a screwdriver to see if it will pass through.  
C. use a thin dime.

89. Lubrication of valves is provided by: B  
A. oil splashing up from crankcase.  
B. a small oil line which carries oil under pressure to the rocker arms.  
C. oil vapors rising from below.
90. Gears may be used to transmit power and reduce shaft speed, C  
\_\_\_\_\_ the torque on the shaft.  
A. not changing  
B. reducing  
C. increasing
91. Low gear is obtained by meshing \_\_\_\_\_ with a larger A  
gear on the driven shaft.  
A. a small gear  
B. a large gear  
C. a gear of the same size
92. A brake on each wheel assists in turning. When making a C  
short turn apply the brake:  
A. suddenly.  
B. lightly.  
C. gradually after reducing speed.
93. The lubricant in the final drive should: C  
A. never be drained.  
B. seldom be drained.  
C. be drained whenever the transmission is serviced as per owners manual.
94. It is important to keep the gear lubricant at the proper C  
level because the:  
A. gear lubricant is heavy and flows slowly.  
B. the gears are located below the lubricant level.  
C. the gears dip into the lubricant and carry it to the bearings.
95. In cold-weather operation with heavy loads for long periods: C  
A. part of the gear lubricant should be drained.  
B. more gear lubricant should be used.  
C. the gear lube should be as specified by the operator's manual.
96. Gears may be used to transmit power and increase shaft speed, B  
\_\_\_\_\_ the torque on the shaft.  
A. not changing  
B. reducing  
C. increasing

97. Antifreeze and summer coolant should be used all year long. A  
A. True  
B. False
98. Winterizing of engines should be done: C  
A. only on those that will stand idle for more than a month at a time.  
B. only on gasoline tractor engines.  
C. on all tractor and other farm engines.
99. V-belts need only be checked once a year. B  
A. True  
B. False
100. In following a winterizing procedure: C  
A. leave the used oil in the crankcase so that the crankshaft remains well coated all winter.  
B. drain and flush the crankcase and replace the plug immediately so that no dirt or dust can blow in.  
C. drain the crankcase and refill with new oil of the correct seasonal grade, operating the tractor long enough to circulate the oil.
101. Most fuel suppliers offer different fuel blends for different seasons. A  
A. True  
B. False
102. As the gauge number of electrical wire increases the actual size reduces. A  
A. True  
B. False
103. Self-propelled equipment operated on roadways must have a minimum of \_\_\_\_\_ headlight(s). B  
A. one  
B. two  
C. three
104. When winterizing a tractor the battery should be: B  
A. drained.  
B. fully charged and left in the tractor.
105. Moisture will condense faster in a fuel tank when it is: B  
A. full.  
B. empty.

106. Power is: B  
A. increased through gears.  
B. not changed through gears except for friction loss.
107. Speed changes may be made by means of: B  
A. gears only.  
B. belt drives, chain drives, hydrostats, etc...  
C. a clutch.
108. An idler should run on the \_\_\_\_\_ of a v-belt. B  
A. tight side  
B. loose side
109. A large drive pulley and a small driven pulley increase the speed. A  
A. True  
B. False
110. A dynamometer measures horsepower. A  
A. True  
B. False
111. Like belts, chains can have idlers also and should be on the \_\_\_\_\_ B  
side of the chain.  
A. tight  
B. loose
112. Slip clutches connect one part of a machine to another and B  
transmit power.  
A. These clutches should not slip because they will burn out.  
B. Slip clutches are made so they will slip for safety.
113. A ratchet clutch allows the shaft to turn independently on a wheel B  
or pulley that normally drives it and:  
A. is automatic and should not be lubricated.  
B. needs attention to keep it clean and working free.
114. The number measuring anti-knock properties of gasoline is: B  
A. cetane.  
B. octane.  
C. flash point.

115. The center of pull on any tractor is: C  
A. midway.  
B. slightly to the right of center.  
C. midway between the rear wheels and just ahead of the rear axle.
116. The ideal way to attach an implement is to have the center of pull \_\_\_\_\_ the center of the tractor. A  
A. directly behind  
B. slightly to right of  
C. slightly to the left of
117. Side draft means: B  
A. adding weight to one side or the other of the tractor to keep it from slipping.  
B. that there is some side pressure on the tractor wheels or the implement.
118. A chisel plow requires \_\_\_\_\_ fuel per acre than a moldboard plow. B  
A. more  
B. less  
C. about the same
119. An offset disk covers \_\_\_\_\_ surface residue than a chisel plow. A  
A. more  
B. less  
C. about the same
120. A chisel plow can be used with \_\_\_\_\_ type(s) of point(s). C  
A. one  
B. two  
C. many
121. A plowshare should be kept sharp to: B  
A. make the plow scour.  
B. make the plow go into the ground better.  
C. make the plow do a better job of covering trash.
122. A moldboard plow covers approximately \_\_\_\_\_ of the surface residue. A  
A. 100%  
B. 75%  
C. 50%

123. Forty-mesh screen has \_\_\_\_\_ holes per square inch. A  
A. 1600  
B. 40  
C. 80
124. In applying chemicals it is important to: A  
A. calibrate the applicator carefully.  
B. guess at the proper rate and get the job done quickly.
125. \_\_\_\_\_ are used for high pressure. A  
A. Piston pumps  
B. Gear pumps
126. A flat fan nozzle has a: C  
A. round pattern with a hole in the center.  
B. rectangular pattern.  
C. flat, oval-shaped pattern.
127. Strainers are used in sprayers to: B  
A. keep the spray material properly mixed.  
B. remove dirt and foreign particles.
128. A forty-mesh screen has \_\_\_\_\_ holes per linear inch. B  
A. 1,600  
B. 40  
C. 80
129. Increasing speed while spraying \_\_\_\_\_ the application rate. B  
A. increases  
B. decreases
130. Increasing pressure \_\_\_\_\_ the application rate of a sprayer. A  
A. increases  
B. decreases
131. Once you have a granular applicator adjusted for the proper rate you \_\_\_\_\_ have to change the rate setting if you move to another field. B  
A. never  
B. may

132. \_\_\_\_\_ is the most important factor once you have a granular applicator properly adjusted. A  
A. Appropriate speed  
B. Time of day  
C. Temperature
133. A careful field calibration is a good idea for: A  
A. all applicators.  
B. only sprayers.  
C. only granular applicators.
134. Rubber tires are used on drills: B  
A. so as not to pack the seed too tightly.  
B. because damp soil will not stick so readily and the rubber mounting is easier on the machine being carried.
135. A double-run feed: B  
A. drills twice as fast as a fluted-wheel feed.  
B. has two sides of different sized pockets for large or small seed.  
C. exposes more of the gear for increasing the rate of seeding.
136. An SMV emblem should be mounted with one point straight down. B  
A. True  
B. False
137. Planters should be cleaned after use: B  
A. because the valves might stick overnight and cause trouble.  
B. particularly after fertilizer has been used in them.
138. A planter seed mechanism: A  
A. should be lubricated sparingly.  
B. should be oiled and greased liberally every day.
139. It is okay to leave work lamps projecting to the rear on while traveling on a road way. B  
A. True  
B. False
140. A "knock-out" is used: B  
A. to kick the seed out of the hopper.  
B. to clear each hole in the plate and make it ready for the next seed to be selected.  
C. to make chains easy to unhook.

141. An SMV emblem should be mounted perpendicular to the direction of travel. A  
A. True  
B. False
142. A corn planter with a 40-inch row spacing drops an average of 1 kernel every 10 inches. The number of kernels planted per acre is: C  
A. 14,900.  
B. 156,800.  
C. 15,680.
143. Two red reflectors, visible from the rear, must be used on equipment extending more than 4 ft to the rear of the hitch. B  
A. True  
B. False