

## Ag Mechanics

- 1 Which of the following spray tip materials typically provides the longest wear life for pesticide applications?
  - a) Polymer
  - b) Brass
  - c) **Ceramic**
  - d) Stainless Steel
- 2 When pesticide is applied with a traditional boom sprayer, if all other variables remain constant, which of the following will result in a decreased chemical application rate?
  - a) Increase the spray pressure of the nozzle
  - b) Reduce the travel speed of the sprayer
  - c) Replace the existing nozzles with nozzles having a larger tip size
  - d) **Increase the travel speed of the sprayer**
- 3 Which of the following pesticide spray application equipment types use spinning disks or cups to break liquid into uniformly sized droplets by centrifugal force?
  - a) Ultra low volume sprayer
  - b) **Controlled droplet applicator**
  - c) Electrostatic sprayer
  - d) Airblast sprayer
- 4 Which of the following pesticide spray pumps delivers low volumes of 3 to 10 gallons per minute at low to moderate pressures, and will withstand abrasion for wetttable powders because the pump valves are the only metal components exposed to the pesticide solution?
  - a) Centrifugal
  - b) **Diaphragm**
  - c) Gear
  - d) Piston
- 5 When calibrating a traditional boom sprayer, if a small increase or decrease in the application rate is required, what modification to the sprayer is appropriate?
  - a) **Increase or decrease the nozzle operating pressure**
  - b) Install nozzles with larger or smaller flow rates
  - c) Add more pesticide or more water to the chemical mixture
  - d) Increase or decrease the height of the spray boom
- 6 When calibrating a traditional boom sprayer, if a large increase or decrease in the application rate is required, what modification to the sprayer is appropriate?
  - a) **Install nozzles with larger or smaller flow rates**
  - b) Increase or decrease the nozzle operating pressure
  - c) Add more pesticide or more water to the chemical mixture
  - d) Increase or decrease the height of the spray boom
- 7 A tractor mounted pesticide sprayer has a centrifugal pump that is typically driven or powered by what tractor component?
  - a) **Power take off (PTO)**
  - b) Submersible pump
  - c) Small gasoline engine
  - d) Electric system

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- 8 Which of the following pesticide spray equipment produces a spray that is positively charged when it exits the nozzle?
- a) Controlled droplet applicator
  - b) Ultra low volume sprayer
  - c) **Electrostatic sprayer**
  - d) Airblast sprayer
- 9 A pesticide spray nozzle has an operating range from 10 to 100 pounds per square inch (psi). When the operating nozzle pressure is increased from 10 psi to 40 psi, how is the output flow changed?
- a) **Output is doubled**
  - b) Output decreases
  - c) Output remains the same
  - d) Output is quadrupled
- 10 When spraying wettable powder pesticides, which nozzle tip is most appropriate?
- a) Polymer
  - b) Stainless steel
  - c) Brass
  - d) **Ceramic**
- 11 Flat fan spray tips with an 80 degree spray angle will typically have what percent spray overlap to ensure uniform spray application?
- a) **30 percent**
  - b) 88 percent
  - c) 100 percent
  - d) 8 percent
- 12 Pesticide spray nozzle data states that the Volume Median Diameter (DV0.5) of a given nozzle is 370 microns at 40 psig and 0.5 gpm. What percent of the droplets from this nozzle will have diameters smaller than 370 microns? (Note: gpm= gallons per minute and psig= pounds per square inch, measured with a gauge.)
- a) 40 percent
  - b) **50 percent**
  - c) 75 percent
  - d) 95 percent
- 13 Which of the following pesticide spray equipment components directly controls the pressure developed at the sprayer nozzle and the quantity of spray delivered to the nozzles?
- a) Screenshot
  - b) Nozzle body
  - c) **Pressure regulator**
  - d) Strainer
- 14 Which of the following pumps provides the highest pressure for pesticide spray applications?
- a) **Piston pump**
  - b) Roller pump
  - c) Turbine pump
  - d) Centrifugal pump

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- 15 What pump type develops high volume outputs, but rather low pressures for pesticide spray applications?
- a) Turbine pump
  - b) Centrifugal pump**
  - c) Roller pump
  - d) Piston pump
- 16 During a 30-second sprayer calibration procedure, 26 ounces of liquid are collected from a spray tip. What is this tip's approximate delivery rate in gallons per minute? (Note: 1 gal = 128 ounces, 1 minute = 60 seconds)
- a) 0.2 gallons per minute
  - b) 0.4 gallons per minute**
  - c) 0.3 gallons per minute
  - d) 0.8 gallons per minute
- 17 A pesticide spray boom, traveling at 8 miles per hour, has a 48-foot effective swath width, the spray tips are spaced on 20-inch centers, and it applied 15 gallons per acre. What is the approximate delivery rate of the spray tips in gallons per minute? Note: Gallons/Minute = [(Gallons/Acre) x (Miles/Hour) x (Nozzle Spacing in Inches)] / 5940
- a) 0.4 gallons per minute**
  - b) 0.2 gallons per minute
  - c) 0.3 gallons per minute
  - d) 0.8 gallons per minute
- 18 A self-propelled sprayer has a 90-foot effective swath width, travels at 10 miles per hour, and operates with a field efficiency of 73 percent. What is the approximate effective field capacity (EFC) of the sprayer in acres per hour? Note: EFC in acres per hour = (width of implement in feet x speed in miles per hour x efficiency) / 8.25
- a) 90 acres per hour
  - b) 73 acres per hour
  - c) 80 acres per hour**
  - d) 110 acres per hour
- 19 What is the approximate speed, in miles per hour, of a sprayer that travels 300 feet in 25.6 seconds? Note: 5,280 ft = 1 mile, 3600 seconds = 1 hour
- a) 8 miles per hour
  - b) 6 miles per hour
  - c) 5 miles per hour
  - d) 4 miles per hour

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- 20 A spray boom travels at 6 miles per hour, has a 48-foot effective swath width, has spray nozzles that are spaced on 20-inch centers, and each nozzle delivers 0.4 gallons per minute. What is the approximate application rate of the sprayer in gallons per acre? Note: Gallons per Minute =  $[(\text{Gallons/Acre}) \times (\text{Miles/Hour}) \times (\text{Nozzle Spacing in Inches})] / 5940$
- a) 40 gallons per acre
  - b) **20 gallons per acre**
  - c) 10 gallons per acre
  - d) 2 gallons per acre
- 21 What type of belt is the most common means of driving light loads using pulleys for farm machines?
- a) **V**
  - b) Round
  - c) Flat
  - d) Serrated
- 22 Which type of drive chain should be used for a grain handling application where heavy loads must be moved at low speeds?
- a) Silent
  - b) Plain
  - c) **Roller**
  - d) Detachable Link
- 23 If the gear teeth on a combine drive system are scored, what is/are the likely cause(s) for this scoring?
- a) **Excessive gear speed**
  - b) Too much backlash
  - c) Intermittent overloading
  - d) Dirt, grit, or metal particles on the gear teeth
- 24 What is the proper range of tire slippage for a farm tractor?
- a) 0 to 2 percent
  - b) **10 to 15 percent**
  - c) 20 to 25 percent
  - d) 30 to 35 percent
- 25 If a hydraulic system on an off-highway vehicle has foaming hydraulic oil, what is most likely the problem?
- a) The hydraulic pump is going bad
  - b) The oil is dirty
  - c) The oil level is too low
  - d) **Water is in the hydraulic oil**

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- 26 Which of the following is NOT one of the basic enemies that attack hydraulic systems?
- a) **Low oil levels**
  - b) Leaks
  - c) Dirt
  - d) Water
- 27 When purchasing a tractor, the salesperson describes the power as the amount of weight the unit can pull at a given speed. What kind of power is being described by the sales person?
- a) Engine power
  - b) **Drawbar power**
  - c) Power takeoff power \
  - d) Hydraulic power
- 28 If a diesel engine is producing blue-colored smoke, what is the most likely cause?
- a) **Combustion of engine oil**
  - b) Incomplete combustion
  - c) A cold engine
  - d) Restricted air intake
- 29 What electrical measurement should always be the same for exterior lighting on a farm tractor?
- a) Wattage
  - b) Amperage
  - c) **Voltage**
  - d) Power
- 30 What percentage of engine power will the average farm tractor convert to PTO power?
- a) 110 percent
  - b) **86 percent**
  - c) 50 percent
  - d) 30 percent
- 31 Why do most tractor manufacturers suggest refueling at the end of the day?
- a) **To prevent moisture accumulation in the fuel tank**
  - b) Because less fuel is required in the evening
  - c) To reduce time required for warm up
  - d) Because fuel is more dense in the morning
- 32 What should be done to correct the operation of a tractor with zero percent wheel slippage?
- a) No correction is needed, zero percent slippage is appropriate
  - b) **Reduce tractor ballast**
  - c) Increase tractor ballast
  - d) Double the tractor's speed to reduce the percentage wheel slippage

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- 33 Which one of the following would be considered specialized planting equipment?
- a) **Potato planter**
  - b) Grain drill
  - c) Row crop planter
  - d) Broadcast seeder
- 34 Which of the following is used to determine the size of a row crop planter?
- a) The size of tractor required to pull it
  - b) **Number of rows and the spacing between the rows**
  - c) The capacity of the seed hoppers
  - d) The diameter of the press wheel
- 35 Which of the following is the traditional method used to determine the size of a grain drill?
- a) The length of the grain box
  - b) The volume of the grain box
  - c) **Number of furrow openers and the spacing between openers**
  - d) The diameter of the furrow openers
- 36 What problem will occur if a grain drill is operated with an under inflated metering drive wheel?
- a) **The seeding rate will increase**
  - b) The seeding rate will decrease
  - c) The seeding rate will not be affected
  - d) Seed-soil contact will be affected
- 37 If the corn seeds are evenly spaced within 30-inch rows and the seeds are planted every seven inches, what is the approximate seeding rate (seeds per acre) of the planter? Note: 1 ft = 12 inches and 1 acre = 43,560 square feet
- a) 4,978 seeds per acre
  - b) **29,870 seeds per acre**
  - c) 2,489 seeds per acre
  - d) 207 seeds per acre
- 38 A broadcast fertilizer spreader is driven over the top of a 12-foot by 12-foot tarpaulin placed on the ground. If 5 pounds of fertilizer is collected on the tarp, what is the approximate application rate in pounds per acre? Note: 1 acre = 43,560 square feet
- a) 720 pounds per acre
  - b) 144 pounds per acre
  - c) **1500 pounds per acre**
  - d) 12 pounds per acre

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- 39 The seeding tool uses two 2-inch hydraulic rams to raise and lower its frame. If each ram receives a maximum pressure of 2,500 pounds per square inch, what is the greatest approximate force that each lift cylinder can produce? Note: Force = (Pressure) x (Area of Piston), Area of Circle =  $(\pi) \times (\text{diameter})^2 \div 4$ ,  $\pi = 3.14$
- a) **7,900 pounds**
  - b) 3,900 pounds
  - c) 15,700 pounds
  - d) 90,000 pounds
- 40 A tractor produces 105 horsepower and has a power takeoff speed of 540 revolutions per minute. Approximately how much torque, in foot-pounds, can this tractor produce? Note: Torque = (PTO Horsepower x 5252) / Rotational Speed
- a) **1000 foot-pounds**
  - b) 540 foot-pounds
  - c) 105 foot-pounds
  - d) 5 foot-pounds
- 41 What is the name of the device used to measure tractor PTO (power take-off) horsepower?
- a) Wattmeter
  - b) Load Cell
  - c) Calorimeter
  - d) **Dynamometer**
- 42 The theoretical field capacity of a machine such as a disk harrow or chisel plow is a function of what two factors?
- a) Tillage depth and working width
  - b) Tractor power output and draft load
  - c) **Travel speed and working width**
  - d) Machine rating and velocity
- 43 The average farm tractor will convert about what percentage of PTO (power take-off) power to drawbar power?
- a) 55 percent
  - b) **86 percent**
  - c) 100 percent
  - d) 40 percent
- 44 A diesel engine produces white-colored exhaust. What is the most likely cause?
- a) **Low engine temperature**
  - b) Turbocharger failure
  - c) Combustion of engine oil
  - d) Restricted air intake

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- 45 Which of the following is a benefit associated with using dual rear tires?
- a) Stress on axels, bearings, and power trains is reduced
  - b) Tractor performance is improved, especially under light drawbar loads.
  - c) **Tractor stability is improved**
  - d) Turning the tractor becomes easier
- 46 Which of the following components gives the final reduction in speed and increase in torque in a tractor power train?
- a) Differential
  - b) Transmission
  - c) Clutch
  - d) **Final drives**
- 47 Which hydraulic system component converts mechanical energy into hydraulic energy?
- a) Actuator (such as a hydraulic cylinder)
  - b) **Hydraulic pump**
  - c) Directional control valve
  - d) Relief valve
- 48 If I have a hydraulic system on an off-highway vehicle and it has foaming hydraulic fluid, what is most likely the problem?
- a) The fluid level is too low
  - b) **The hydraulic pump is going bad**
  - c) Water is in the hydraulic fluid
  - d) The fluid is dirty
- 49 Which of the following causes a knock in a diesel engine?
- a) **Fuel igniting too slowly**
  - b) Fuel igniting too rapidly
  - c) Fuel igniting properly
  - d) Incomplete combustion
- 50 Which of the following would be considered a fuel conservation technique?
- a) Operating tractor at partial load
  - b) Making unnecessary tillage trips
  - c) Shifting to a lower gear and "throttling" up under light load
  - d) **Shifting to a higher gear and "throttling" down under light load**
- 51 Which of the following items represents a machinery operating cost?
- a) Shelter
  - b) Insurance
  - c) **Maintenance**
  - d) Taxes

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- 52 Which of the following items represents a fixed machinery cost?
- a) Labor
  - b) **Depreciation**
  - c) Repairs
  - d) Fuel
- 53 A tractor pulling a scraper on firm soil requires 225 drawbar horsepower to travel at 3 miles per hour. Approximately how much drawbar pull in pounds is the tractor exerting? Note: drawbar power = (Pull x Speed) / 375
- a) 56,300 pounds
  - b) 84,400 pounds
  - c) 675 pounds
  - d) **28,100 pounds**
- 54 A tractor produces 225 PTO horsepower at a rated power take-off speed of 1000 revolutions per minute. Approximately how much torque in foot-pounds does the tractor produce at the power take-off shaft? Note: PTO Power = (Torque x Rotational Speed) / 5252
- a) 225,000 ft-lb
  - b) 225 ft-lb
  - c) **1,180 ft-lb**
  - d) 1,000 ft-lb
- 55 A skid-steer loader is used to move soil from a stockpile. The loader uses two 3-inch by 36-inch hydraulic cylinders to raise and lower the loader lift arms. If the loader's hydraulic system can generate a maximum pressure of 2,500 pounds per square inch, approximately what is the maximum lifting force (pounds) that each cylinder can produce?
- a) **17,700 lbs**
  - b) 70,700 lbs
  - c) 7,900 lbs
  - d) 2,500 lbs
- 56 A twenty foot long dump truck bed is 54 inches deep and seven feet wide. What is the approximate capacity of the truck bed in cubic yards if a load is struck level across the top?
- a) 630 yd<sup>3</sup>
  - b) **23 yd<sup>3</sup>**
  - c) 210 yd<sup>3</sup>
  - d) 70 yd<sup>3</sup>
- 57 Three equally-sized pull-type scrapers are being operated with large tractors. Each scraper pan measures four feet deep, ten feet wide, and four feet long. If all three scraper pans can be filled (struck even) in eight minutes and it requires an average of 12 additional minutes to dump and restart the filling of each scraper, what is the approximate total capacity of the three scrapers in cubic yards per hour?
- a) 17.8 yd<sup>3</sup>/hr

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- b) 160.0 yd<sup>3</sup>/hr
  - c) **53.3 yd<sup>3</sup>/hr**
  - d) 480.0 yd<sup>3</sup>/hr
- 58 Which of the following types of large round balers produces bales with a low density inner core?
- a) Variable chamber
  - b) **Fixed chamber**
  - c) Chain-type
  - d) Belt-type
- 59 Which of the following types of hay conditioners uses a row of fast spinning tines to condition hay?
- a) **Impeller**
  - b) Crusher
  - c) Dehydrator
  - d) Crimper
- 60 Which of the following implements is used to fluff up and spread out forage for faster drying?
- a) Windrower
  - b) Parallel-bar rake
  - c) **Tedder**
  - d) Finger wheel rake
- 61 Cone-shaped large round bales result from which of the following conditions?
- a) Windrows that are too far apart
  - b) **Feeding too much hay into one side of the baler**
  - c) Windrows that are too small
  - d) Too much hay going into the middle of the baler
- 62 In relation to the ground speed of the tractor, what speed should the mower-conditioner typically be set on for a standing crop?
- a) Two times the ground speed
  - b) One-half the speed of ground speed
  - c) Two and three-quarters times the ground speed
  - d) **One and one-quarter times the ground speed**
- 63 What devices do disc mowers typically use to cut the crop?
- a) Serrated scissors
  - b) Reciprocating knives
  - c) **Short blades**
  - d) Sharpened forks
- 65 In order to determine the drawbar power output of a tractor, what must be measured?
- a) **Drawbar pull & travel speed**

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- b) Engine torque and rotational speed
  - c) Hydraulic pressure and flow rate
  - d) Fuel consumption and engine temperature
- 66 What tractor power train component directs power equally to both rear wheels to prevent the loss of traction that occurs when one wheel is slipping?
- a) Final drive lock
  - b) Drawbar lock
  - c) **Differential lock**
  - d) Transmission Lock
- 67 What is the typical reaction time required for a person to receive an unexpected signal, decide what to do, and do it?
- a) 4.5 seconds
  - b) **2.8 seconds**
  - c) 0.2 seconds
  - d) 0.9 seconds
- 68 Which of the following is the best means of maintaining proper travel speed when driving down a hill with a tractor-loader?
- a) **Use a lower gear and take advantage of engine braking**
  - b) Ride the brake pedals
  - c) Back down the hill
  - d) Place the transmission in neutral and roll down the hill
- 69 Under what circumstances must a slow moving vehicle (SMV) sign be displayed on agricultural machinery?
- a) Only on machinery that will operate on interstate highways
  - b) When machinery will NOT be operated on public roads
  - c) **When machinery is operated on public roads**
  - d) Only on machinery that will be transported on a trailer
- 70 Which of the following statements about a tractor-loader's center of gravity is true?
- a) It is always in the same place
  - b) It is located ten feet behind the loader
  - c) It changes depending on the operator's hours of use
  - d) **It changes as the position of the loader changes**
- 71 If the measured tractor wheel slippage is zero, what adjustment can increase wheel slippage?
- a) Add more ballast to the tractor
  - b) **Remove the ballast from the tractor**
  - c) Drive 2 miles per hour faster
  - d) Drive 2 miles per hour slower

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72 What is the approximate density, in pounds per cubic foot, of a large round bale of hay that is 72 inches in diameter, 62 inches long, and weighs 2,200 pounds? Note: Density = Weight/Volume, Volume of a Cylinder -  $[(\pi) \times (\text{Diameter})^2 \times (\text{Length})]$

- a) 3 lb/ft<sup>3</sup>
- b) 6 lb/ft<sup>3</sup>
- c) 11 lb/ft<sup>3</sup>
- d) **15 lb/ft<sup>3</sup>**

73 A differential double-acting hydraulic cylinder on a tractor-loader has a bore of 3 inches and a stroke of 36 inches. The tractor's hydraulic system produces a maximum pressure of 2,900 pounds per square inch. What is the approximate maximum force, in pounds, that the cylinder can exert on extension? Note: Force = Pressure x Area, Area of Circle =  $(\pi) \times (\text{diameter}/2)^2$

- a) **20,500 lb**
- b) 8,700 lb
- c) 82,000 lb
- d) 2,900 lb

74 The theoretical field capacity (TFC) of a 14-foot wide self-propelled windrower is seven acres per hour. The windrower's effective field capacity (EFC) is actually 63.7 acres during 13 working hours. What is the field efficiency of the windrower? Note: EFC = (TFC) x (Efficiency)

- a) 30%
- b) 50%
- c) **70%**
- d) 90%

75 A disc mower-conditioner has a cutting width of 13 feet, operates at seven miles per hour (MPH), and has a field efficiency of 90 percent. What is the approximate effective field capacity (EFC) of the mower-conditioner in acres per hour? Note: EFC =  $[(\text{MPH}) \times (\text{Width in Feet}) \times (\text{Efficiency})] / 8.25$

- a) 7 acres per hour
- b) 9 acres per hour
- c) **10 acres per hour**
- d) 11 acres per hour

76 If hearing protection is not worn, what is the maximum acceptable sound level for a person who exposed to continuous noise for eight hours?

- a) **90 decibels**
- b) 100 decibels
- c) 120 decibels
- d) 140 decibels

77 Which of the following is an example of a fixed cost for an aerial crop spraying company that has full time workers?

- a) Overtime pay for all hired labor

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- b) **Property tax on the firm's property**
- c) Health benefits on full time workers
- d) Vacation pay for the pilots

78 To safely jump start a disabled vehicle, where should the negative terminal of the booster battery be connected?

- a) To the positive terminal of the booster battery
- b) To the positive terminal of the disabled vehicle
- c) To a metal grounded component of the booster battery
- d) **To a metal grounded component of the disabled vehicle**

79 Which of the following documents identifies a chemical or pesticide product, describes the physical characteristics of the product, and lists the health effects, exposure limits, and precautionary measures for the end user?

- a) Poison Control Center (PCC)
- b) Occupational Safety and Health Act (OSHA)
- c) **Material Safety Data Sheet (MSDS)**
- d) National Electric Code (NEC)

80 Which of the following is a typical operational (variable) cost associated with owning crop spraying machinery?

- a) Machinery insurance costs
- b) **Fuel and oil costs to run machinery**
- c) Depreciation on the equipment
- d) Taxes on the machinery

81 As an export commodity, how is corn normally classified?

- a) An oilseed crop
- b) A food grain
- c) A fiber crop
- d) **A feed grain**

82 Which of the following would be a direct cost to the employer when there is a job related accident?

- a) Lower employee morale
- b) **Property damage**
- c) Legal costs
- d) Loss of production time

83 Which depreciation method reduces the value of the depreciated item the greatest during the first year of ownership?

- a) Sum-of-the-digits method
- b) Maximum variable cost method
- c) **Declining balance method**

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- d) Straight line method
- 84 As a farm implement is used more and more hours per year, what happens to the average fixed cost per hour of use?
- a) Remains constant
  - b) Increases
  - c) Eventually becomes a variable cost
  - d) **Decreases**
- 85 When is it wisest to consider owning a piece of equipment as opposed to leasing or renting that equipment?
- a) **When the equipment will have a high annual use and the required capital for purchase is available**
  - b) When the savings can be placed in a low interest bearing account
  - c) When fixed costs of ownership are determined to be more than the leasing costs
  - d) When repair costs are determined to be more than the fixed costs of ownership
- 86 What is the proper body position for a person to safely lift and lower heavy materials?
- a) Bend at the hips, keep legs straight, and use the back muscles to lift and lower
  - b) Lean to the left or right while twisting the body and keep the legs straight to lift and lower
  - c) Bend at the hips, keeping arms straight, and use the back and arm muscles to lift and lower
  - d) **Bend at the knees, keep hips and back aligned and almost vertical, and use leg muscles to lift and lower**
- 87 Which of the following is a biologically active substance designed to interact with living organisms by either altering their makeup or killing them?
- a) Amino Acid
  - b) Fertilizer
  - c) Protein supplement
  - d) **Pesticide**
- 88 In sound decibel units, what is considered to be the threshold of pain for humans working near agricultural equipment operations?
- a) 60 decibels
  - b) 80 decibels
  - c) 100 decibels
  - d) **140 decibels**
- 89 Which of the following phrases describes the effective capacity of an agricultural machine?
- a) The maximum possible capacity obtainable, plus the gain due to inefficiency
  - b) **The maximum possible capacity obtainable, less the loss to inefficiency**
  - c) The amount of material that passes through a machine in a one hour time period

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- d) The amount of material that passes through a machine in a ten-minute time period
- 90 A 24 inch wide conveyor belt operates at 18 feet per minute and transports 144 forty-pound cartons of agricultural chemical in 1 hour and 45 minutes. What is the approximate capacity of the conveyor belt in pounds per hour? Note: 1 hour = 60 minutes, 1 ft = 12 inches
- a) 144 pounds per hour
  - b) 432 pounds her hour
  - c) 2,592 pounds per hour
  - d) **3,291.4 pounds per hour**
- 91 What is the speed, in miles per hour, of a sprayer that travels 375 feet in 65 seconds? Note: 1 miles = 5280 feet, 1 hour = 3600 seconds
- a) 1.46 miles per hour
  - b) 2.21 miles per hour
  - c) **3.93 miles per hour**
  - d) 4.43 miles per hour
- 92 Pesticide spray equipment has a 60-foot effective swath width, travels at 4.25 miles per hour, and operates with a field efficiency of 85 percent. What is the approximate effective field capacity (EFC) of the sprayer in acres per hour? Note: EFC in acres per hour = (width of swath in feet x speed in miles per hour x efficiency) / 8.25
- a) **26.27 acres per hour**
  - b) 30.09 acres per hour
  - c) 35.24 acres per hour
  - d) 41.62 acres per hour
- 93 It costs \$3.45 per acre per year to have a crop service scout for insect pests. What will be the approximate yearly charge to scout a field measuring 1199 feet wide and 2399 feet long? Note: 1 acre = 43,560 square feet.
- a) \$178.57 per year
  - b) **\$227.81 per year**
  - c) \$4,136.55
  - d) \$8275.55 per year
- 94 If sales tax is 7.15 percent, what is the approximate total cost including the sales tax, for an item marked \$36.94?
- a) **\$39.58**
  - b) \$49.63
  - c) \$156.48
  - d) \$264.12
- 95 Which of the following is an example of a variable cost for a small grain hauler that is hiring full time workers?
- a) Workman's Compensation insurance on full time workers

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- b) Depreciation on a new semi-truck with trailer
  - c) **Overtime pay for hired labor**
  - d) Property tax on the firm's property
- 96 The separation or failure of the power takeoff drive shaft is commonly caused by what operator mistake?
- a) Continuous running at idle speed
  - b) **An improper hitching position**
  - c) Using a lower grade shear bolt than is required for the application
  - d) Overriding the clutch on the equipment driving the power take off shaft
- 97 If a worker falls into a large grain storage bin with flowing grain, how quickly would a worker become buried or covered in the grain?
- a) Instantly
  - b) It takes about five minutes
  - c) **It takes less than one minute**
  - d) There is no danger of being buried in moving grain
- 98 Which of the following safety practices has proven to reduce fire hazards around grain elevators?
- a) Encourage the use of safety harnesses
  - b) **Eliminate accumulations of dust and crop residue materials**
  - c) Provide employees with safety glasses and footwear
  - d) Keep safety shields in place
- 99 Which of the following is a fixed cost associated with owning small grain machinery?
- a) Legal fees for incorporation
  - b) Opportunity cost of investment
  - c) Fuel cost
  - d) **Depreciation**
- 100 Which of the following is an indirect cost to the employer when there is a job related accident?
- a) Medical payments
  - b) **Lowered employee morale**
  - c) Property damage
  - d) Insurance payments
- 101** What is a proven accident-prevention device or technique that is used with electrical equipment to notify other workers that repairs are in progress?
- a) **Lockout or tag-out device placed on power source**
  - b) Yellow flag tied to electrical equipment
  - c) Red tape place over on-off switch, with switch in off position
  - d) Temporary out of service notice placed on all building entrance

## Ag Mechanics

1-100

- 102 What is the definition of depreciation?
- a) Those costs varying in proportion to the amount of use
  - b) Those costs depending more on how much an item is used rather than on who owns the item
  - c) The economic sacrifice of not doing something else or forgoing another opportunity
  - d) **The loss in value of an item due to time and use**
- 103 During an average year of operation, at what percent of maximum power will a farm tractor operate?
- a) 45 percent
  - b) **55 percent**
  - c) 75 percent
  - d) 85 percent
- 104 How is the cleaning air controlled in a combine?
- a) By adjusting the straw walker and opening the concave
  - b) By opening up the entrance to the tailings auger
  - c) **By adjusting the shutters, windboards, and fan speed**
  - d) By adjusting the ground travel speed
- 105 Generally, what is an acceptable crop harvesting loss for small grain?
- a) 0 to 1 percent
  - b) **3 to 5 percent**
  - c) 7 to 10 percent
  - d) 12 to 14 percent
- 106 When a grain tank extension is added to a small grain combine, what is the main safety consideration?
- a) **The additional weight raises the center of gravity and increasing the likelihood of combine overturn**
  - b) It requires additional slow moving vehicle signs when driven on public roads
  - c) It reduces the combine's traction
  - d) It blocks the view of unloading auger
- 107 If it takes 35 seconds for a spray applicator to travel 155 feet, what is the approximate travel speed of the spray applicator in miles per hour? Note: 1 mile = 5280 feet, 1 hour = 3600 seconds
- a) 1.46 mph
  - b) 2.21 mph
  - c) **3.02 mph**
  - d) 4.43 mph

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108 What is the approximate effective field capacity (in acres per hour) of a 20-foot wide grain drill, traveling at 3.75 miles per hour, and operating with a field efficiency of 82 percent? Note: effective field capacity = [(width of implement in feet) x (speed in miles per hour) x (efficiency)]/8.25

- a) 2.42 acres per hour
- b) **7.45 acres per hour**
- c) 9.09 acres per hour
- d) 16.40 acres per hour

109 If a railcar has a 60-ton maximum capacity, approximately how many sacks of seed wheat can it safely hold if wheat sacks have an average weight of 53 pounds? Note: 1 ton = 2000 pounds

- a) **2264 sacks**
- b) 3180 sacks
- c) 106,000 sacks
- d) 120,000 sacks

110 If it costs \$1.12 per bushel to clean and sack seed, what is the charge to clean 12,000 pounds of seed? Note: 1 bushel = 60 pounds

- a) \$67.30
- b) \$178.57
- c) **\$224.00**
- d) \$10,714.28

111 The average annual fixed costs for owning a grain drill is \$4,950 and operating costs are \$7.36 per acre. If the custom rate for seeding wheat is \$10.50 per acre, how many acres must be planted annually to break even on owning and operating the grain drill? Note: break even acreage = average annual fixed costs/(custom rate per acre - operating cost per acre)

- a) 77.28 acres per year
- b) 471.42 acres per year
- c) 672.55 acres per year
- d) **1,576.43 acres per year**

112 If a storage elevator charges 3.25 cents per bushel per month to store wheat, what is the total cost to store 38,400 bushels for 5 months?

- a) \$16.25
- b) \$1,248.00
- c) \$2,363.00
- d) **\$6,240.00**

113 What is the total cost of an item marked \$76.94 if the sales tax is 6.75%?

- a) \$78.19
- b) **\$82.13**
- c) \$86.69
- d) \$519.35

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- 114 Which factors influence the minimum horsepower required when selecting a tractor?
- a) **Desired implement width and operation speed**
  - b) Interest rates and fuel costs
  - c) Service life and commodity prices
  - d) Labor costs and fuel prices
- 115 Which of the following is the safest way to drive a loader up hill with a full bucket?
- a) Back straight up the hill
  - b) Drive forward diagonally across the slope of the hill
  - c) One method is not safer than another
  - d) **Drive forward straight up the hill**
- 116 Which factors are used to calculate the material capacity of a machine?
- a) Machine width and height
  - b) **Material weight and time**
  - c) Machine RPM and down time
  - d) Machine draft and width
- 117 Which of the following correctly describes the requirement for tractor ROPS?
- a) Tractors under 50 horsepower do need ROPS
  - b) Farms with fewer than 10 employees do need ROPS
  - c) **Tractors used in orchards (low profile) may need a ROPS that can be lowered**
  - d) Family farms do need ROPS
- 118 Which of the following is the cause for the majority of fatal tractor accidents?
- a) Hydraulic system failure
  - b) **Tractor overturns**
  - c) Power take off entanglements
  - d) Being run over by a tractor
- 119 Which of the following agricultural machines has been involved in the greatest number of accidents?
- a) Elevators
  - b) Wagons
  - c) Combines
  - d) **Tractors**
- 120 Which soil type normally offers the least draft for a disk harrow?
- a) Clay
  - b) **Sandy Loam**
  - c) Silt Loam
  - d) Clay Loam

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- 121 Which of the following will reduce the total operating cost per hour for a skid-steer loader?
- a) Pay cash for the loader
  - b) Decrease the annual hours of operation
  - c) Decrease the years of ownership
  - d) **Increase the annual hours of operation**
- 122 Which of the following would be considered a shear point safety hazard?
- a) PTO shafts
  - b) Disc mowers
  - c) **Grain augers**
  - d) Pulleys and belts
- 123 When pulling (towing) a heavy load behind a tractor, where should a chain be attached to the tow tractor?
- a) The top three point hitch of the tractor's draft link
  - b) The tractor's ROPS
  - c) The tractor's rear axel
  - d) **The tractor's drawbar**
- 124 Which of the following is true with regard to the interest expense associated with a machinery purchase?
- a) Interest on the cash used to purchase the machine is a direct expense
  - b) **Interest on the cash used to purchase the machine is an indirect expense**
  - c) Interest on the money borrowed to purchase the machine is an indirect expense
  - d) Interest on the dealer discount is an indirect expense
- 125 Which of the following costs are generally considered to remain unchanged when the hours of machine use varies?
- a) **Interest cost**
  - b) Lubrication costs
  - c) Fuel cost
  - d) Operating and labor costs
- 126 A John Deere utility tractor has been re-equipped with low profile tires (smaller diameter than the factory equipped tires) for orchard use. How will the smaller diameter tires change the relative ground speeds listed in the operator's manual for specific RPMs and gear settings?
- a) **Assume both tire sizes are properly inflated.**
  - b) The speeds listed in the manual will be faster than the actual tractor speed
  - c) The speeds listed in the manual will be slower than the actual tractor speed
  - d) The speeds listed in the manual will be the same as the actual tractor speed      The speeds listed in the manual will be slower for high gears (3 & 4) and faster for low (1 & 2 ) gears

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127 If the local property tax is 1%, what is the tax cost per year on a potato storage facility with a value of \$150,000?

- a) \$15.00
- b) \$150.00
- c) **\$1,500.00**
- d) \$15,000.00

128 A loader was purchased 5 years ago for \$52,000 and has an estimated 10 year life. If the accumulated depreciation is \$23,400, what is the current book value?

- a) \$23,400.00
- b) \$26,000.00
- c) **\$28,600.00**
- d) \$52,000.00

129 Concrete delivered to a farm costs \$90 per cubic yard. If the exact amount of concrete needed is purchased, what is the approximate cost for concrete to be delivered to a farm for a slab 6 inches thick, 40 feet wide, and 200 feet long? Note: 1 cubic yard = 27 cubic feet

- a) \$1,448.00
- b) **\$13,333.00**
- c) \$68,889.00
- d) \$80,000.00

130 A right-triangle shaped concrete slab that is eight inches thick will be poured. The two shorter sides of the triangular concrete slab are 30 feet and 40 feet long. What is the length of the long side (hypotenuse) of the triangular slab? Note:  $(\text{Length Side A})^2 + (\text{Length Side B})^2 = (\text{Length Side C})^2$ , C is the hypotenuse

- a) 30 feet
- b) 40 feet
- c) **50 feet**
- d) 60 feet

131 A truck tire is warranted for 50,000 miles and costs \$360. The warranty credits a prorated amount of the purchase price toward a replacement tire based on miles of service. What warranty amount is credited toward the price of a new replacement tire if the older tire fails after 40,000 miles of service?

- a) **\$72.00**
- b) \$131.00
- c) \$188.00
- d) \$240.00

132 Why do engine manufacturers recommend that fuel stabilizer be added to the fuel left in gasoline engines, such as lawnmowers and snowblowers, when the equipment will not be used from one season to the next?

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- a) To prevent the engine oil from entering the gasoline
  - b) **To prevent the gasoline from breaking down**
  - c) To prevent the cylinder liner(s) from rusting
  - d) To prevent the engine valves from rusting
- 133 When a tractor engine is operated in an enclosed building, what exhaust gas presents a hazard to people and animals?
- a) Hydrogen Sulfide
  - b) Hydrogen Peroxide
  - c) Carbon Dioxide
  - d) **Carbon Monoxide**
- 134 Which type of fuel is most efficiently converted into work by a tractor's engine?
- a) **Diesel**
  - b) Gasoline
  - c) Propane
  - d) LP-gas
- 135 If a flat field measures 1320 feet by 2640 feet and is not bordered by a fence, what direction should the field be disked for optimum field efficiency for equipment operation?
- a) Along the 1320-foot direction
  - b) **Along the 2640-foot direction**
  - c) Diagonally from opposite corners
  - d) In large arcs along the length of the field
- 136 Which of the following will improve the effective field efficiency of an eight row planting operation?
- a) Reduce the grain carrying capacity for the planter to reduce the overall weight
  - b) Overlap each planting pass across the field so that each pass is seven rows wide
  - c) **Refill the planter's hoppers in the field rather than returning to the storage barn**
  - d) Decrease the row spacing between the planter's drills by one-half
- 137 Which of the following is an example of where a tractor roll over protective structure (ROPS) is NOT recommended?
- a) When a tractor is operated on an inclined surface
  - b) **When a tractor is operated in a building and under objects with low overhead clearance**
  - c) When a tractor is operated near an irrigation ditch
  - d) When a tractor is operated under an electrical overhead transmission line
- 138 Which depreciation method and duration of life will result in the fastest decrease in the book value for agricultural machinery?
- a) Straight line depreciation for 10 years
  - b) Straight line depreciation for 5 years

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- c) Declining balance depreciation for 10 years
  - d) **Declining balance depreciation for 5 years**
- 139 When pulling or towing trailers with a tractors, what is the correct place to connect the load?
- a) The lower arms of the three-point hitch
  - b) The tractor's rear axel
  - c) **The tractor's drawbar**
  - d) The top link of the three-point hitch
- 140 When a hydraulic leak is suspected to originate from an implement hose, which of the following is the correct procedure to locate the leak?
- a) **Use a piece of cardboard to locate the origin of the leak**
  - b) Wrap duct tape around the hose to locate the origin of the leak
  - c) Use your fingers to locate the origin of the leak
  - d) Use the back of your hand to locate the origin of the leak
- 141 Which of the following costs (a variable cost) is generally considered to vary with farm machine use?
- a) Taxes
  - b) Shelter
  - c) Interest
  - d) **Fuel**
- 142 If the annual property tax rate is 2.2%, what is property tax per year on a property with a value of \$50,000?
- a) \$700
  - b) **\$1,100**
  - c) \$1,500
  - d) \$2,100
- 143 Agricultural equipment was purchased five years ago for \$52,000 and has an estimated 10 year life. If the accumulated depreciation is \$23,400 to date, what is the current book value?
- a) \$23,400
  - b) \$26,000
  - c) **\$28,600**
  - d) \$52,000
- 144 Douglass Fir costs \$0.90 per nominal board-foot. What is the approximate cost of 38 boards with nominal measurements of 2 inches by 8 inches by 16 feet? Note: 1 board-foot = 144 cubic inches of wood
- a) \$620
  - b) **\$730**
  - c) \$840
  - d) \$960

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145 A battery is warranted for 60 months. It originally cost \$89, and the warranty offers a linear prorated value for battery based on length of service. What is the prorated value of the battery if it fails after 36 months of service?

146 Which of the following professional groups provides a standardized method of testing engine output?

- a) American Society of Agricultural Educators
- b) Underwriter's Laboratories, Inc.
- c) American National Standards Institute
- d) **Society of Automotive Engineers**

147 What small engine component relieves the crankcase pressure created by the reciprocating motion of the piston during engine operation?

- a) **Crankcase Breather**
- b) Piston Ring Gap
- c) Intake Valve
- d) Exhaust Valve

148 What is the name of the disk that pivots on a shaft, regulating air and fuel flow to the carburetor?

- a) Idle plate
- b) Emulsion plate
- c) **Throttle plate**
- d) Venturi

149 What is the typical manufacturer's recommended service interval for the foam air filters on most small gasoline engines?

- a) 2 hours
- b) **25 hours**
- c) 75 hours
- d) 150 hours

150 During normal operation of a four-hour stroke gasoline engine, what is the typical manufacturer's recommended service interval for changing the engine oil?

- a) **25 hours**
- b) 200 hours
- c) 100 hours
- d) Daily

151 What material or equipment is used to measure the spacing and/or wear on the bearing located between the rod and the crankshaft of a small gasoline engine?

- a) Feeler Gage
- b) **Plastigage**
- c) Micrometer

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- d) Dial Caliper
- 152 What component in the block of a small gasoline engine aligns the valve stem?
- a) Valve Seat
  - b) Valve Spring
  - c) **Valve Guide**
  - d) Valve Lifter
- 153 After a four-stroke small gasoline engine has completed one full operating cycle, how many degrees has the crankshaft rotated? Note: 360 degrees = 1 rotation
- a) 180 degrees
  - b) 360 degrees
  - c) **720 degrees**
  - d) 1440 degrees
- 154 In four-stroke small gasoline engines, how fast does the camshaft turn with respect to the speed of the crankshaft?
- a) The camshaft turns at the same speed as the crankshaft
  - b) The camshaft turns at four times the speed of the crankshaft
  - c) The camshaft turns at twice the speed of the crankshaft
  - d) **The camshaft turns at one-half the speed of the crankshaft**
- 155 In two-stroke small gasoline engines, what opens and closes the reed valve, allowing the air and fuel mixture to enter the engine?
- a) **Change in crankcase pressure**
  - b) Valve push rod
  - c) Tappets
  - d) Flywheel
- 156 In four-stroke small gasoline engines, which of the following oil viscosities is recommended for engines operated at temperatures above 40 degrees Fahrenheit?
- a) SAE 10W-15
  - b) SAE 40W-60
  - c) **SAE 30**
  - d) SAE 60
- 157 What is inappropriate spark gap for the spark plugs in most four-stroke small gasoline engines?
- a) 0.003 inches
  - b) **0.030 inches**
  - c) 0.075 inches
  - d) 0.125 inches
- 158 Which of the following correctly lists the order of the four strokes of the piston in a four-stroke engine?

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- a) Intake, power, compression, and exhaust
- b) Exhaust, power, intake, and compression
- c) **Intake, compression, power, and exhaust**
- d) Compression, power, intake, and exhaust

159 In a four-stroke small gasoline engine, which engine components transfers the up and down or linear motion of the piston into rotary motion?

- a) **Crankshaft and connecting rod**
- b) Engine head and block
- c) Flywheel and drive belts
- d) Valve and lifter

160 In performing general maintenance on a small gasoline engine, how often should the cooling fins typically be cleaned?

- a) After every hour of engine operation
- b) After every 5 hours of engine operation
- c) **After ever 100 hours of engine operation**
- d) After every 500 hours of engine operation

161 When troubleshooting a problem with a small gasoline engine, which of these choices list the three components of the engine's operating system that should be checked?

- a) That the gas tank is full, that the oil tank is full, and that the valves are open during the compression stroke
- b) **That the cylinder is getting fuel, that the spark plug will spark, and that the cylinder will create compression**
- c) That the engine has oil, that the air cleaner is removed, and that the exhaust pipe is warm
- d) That the kill switch is operating, that the pull cord is fully retracted, and that the flywheel is free to turn

162 Why should the load-bearing pulleys and other drive members be mounted as close as possible to the crankshaft main bearing of small gasoline engines?

- a) **To decrease the radial load**
- b) To increase the radial load
- c) To increase the rear axial load
- d) To decrease the rear axial load

163 What is the approximate displacement of a single cylinder engine that has a 2.75 inch bore and a 2.5 inch stroke? Note: Displacement of Cylinder = (stroke) x ( $\pi$ ) x [(bore diameter)<sup>2</sup> / 4 ]

- a) 5.45 cubic inches
- b) 13.50 cubic inches
- c) **14.85 cubic inches**
- d) 48.49 cubic inches

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- 164 A 12 horsepower single cylinder engine is operating at 4000 feet above sea level. What approximate horsepower is produced by the engine if the engine's power is decreased 3.5 percent for each 1000 feet of elevation above sea level?
- a) 7.20 horsepower
  - b) 7.80 horsepower
  - c) **10.32 horsepower**
  - d) 10.60 horsepower
- 165 If a two-stroke small engine requires a fuel to oil mixture of 50 parts gasoline to 1 part oil, what would be the correct amount of oil to mix with one gallon of gasoline? Note: 1 gallon = 128 ounces
- a) **2.56 ounces of oil per one gallon of gasoline**
  - b) 3.64 ounces of oil per one gallon of gasoline
  - c) 4.21 ounces of oil per one gallon of gasoline
  - d) 5.12 ounces of oil per one gallon of gasoline
- 166 To turn an overhead light on and off with wall switches from four different locations, the following number and types of light switches are necessary.
- a) One 3-way switch and three 4-way switches
  - b) **Two 3-way switches and two 4-way switches**
  - c) Three 3-way switches and one 4-way switch
  - d) Four 4-way switches
- 167 What is the name of the device used in electrical power transmission to step-up or step-down voltage?
- a) Capacitor
  - b) Rectifier
  - c) **Transformer**
  - d) Diode
- 168 If three different sized (Watts) lights are connected to electrical power in such a way as to allow each light to operate at rated voltage and amperage, how should they be wired?
- a) In series
  - b) **In parallel**
  - c) In a split connection with one light in series and two in parallel
  - d) In a split connection with one light in parallel and two in series
- 169 Which of the following standard motor enclosures is appropriate, both functionally and economically, for a electrically powered feed grinder used out of doors?
- a) Open motor enclosure
  - b) Explosion proof motor enclosure
  - c) Drip proof motor enclosure
  - d) **Totally enclosed motor enclosure**
- 170 What operation causes the relay contacts of a mechanical magnetic relay to open or close?

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- a) The gravitational force acting on the weighted relay
- b) The centrifugal force caused by a motor's shaft rotation
- c) The solenoid action of a motor's drive shaft
- d) **The magnetic field produced by the electromagnetic coil**

171 If the contacts of a mechanical magnetic relay have a normally closed designation, what happens when the relay's coil is energized?

- a) The contacts close and remain closed as long as the coil is energized
- b) **The contacts open and remain opened as long as the coil is energized**
- c) The contacts open and remain opened for one or two seconds
- d) The contacts close and remain closed for one or two seconds

172 Which of the following motor types is appropriate for a single phase, hard starting load such as an air compressor?

- a) **Capacitor start, induction run motor**
- b) Shaded pole motor
- c) Split phase motor
- d) 3-phase, induction run motor

173 What motor characteristics are common to a capacitor start, capacitor run electrical motor?

- a) A horsepower rating appropriate only for two phase operation
- b) A low starting torque
- c) Capacitors to reduce the operating amperage for low voltage operation
- d) **Capacitors to assist with the starting and running of the motor**

174 A mechanical magnetic relay is used to control a 120-volt motor. A low voltage control, operating at 12 volts, controls the relay's magnetic coil. Which of the following statements is correct?

- a) The relay contacts carry the motor amperage and the motor amperage passes through the coil
- b) The relay contacts carry low voltage and low voltage passes through the coil
- c) **The relay contacts carry the motor amperage and low voltage passes through the coil**
- d) The relay contacts carry only the low voltage and the motor amperage passes through the coil

175 If an electrical relay is used to correctly control a three-phase motor, which of the following pole designations is correct for the relay?

- a) Single pole
- b) Double pole
- c) **Triple pole**
- d) Quadruple pole

176 Automatic electrical controls sensing environmental variables, changes in conditions, and changes in locations are used to operated electrical equipment. Which of the following are all automatic electrical controls?

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- a) Photo electric cell, pull chain, and thermometer
- b) **Thermostat, humidistat, and smoke detector**
- c) Fuel gauge, ammeter, and Watt-hour meter
- d) Toggle switch, radon sensor, and traffic light

177 If three light bulbs, one of 100 Watts, one of 200 Watts, and one of 300 Watts, are connected in parallel to 115 volts, which of the following is true?

- a) The 100 Watt light is brightest
- b) The 200 Watt light is brightest
- c) **The 300 Watt light is brightest**
- d) Each light operates at the same brightness

178 If three light bulbs, one of 100 Watts, one of 200 Watts, and one of 300 Watts, are connected in series to 115 volts, which of the following is true?

- a) **The 100 Watt light is brightest**
- b) The 200 Watt light is brightest
- c) The 300 Watt light is brightest
- d) Each light operates at the same brightness

179 If three light bulbs, all 75 Watts, are connected in parallel to 110 volts, which of the following is true?

- a) **Each light has the same resistance (ohms)**
- b) Each light operates at a different voltage
- c) Each light operates at a different amperage
- d) Each light operates at a different Wattage

180 If three light bulbs, 50 Watts, 100 Watts, and 200 Watts, are connected in parallel to 110 volts, which of the following is true?

- a) Each light operates at the same Wattage
- b) **Each light operates at the same voltage**
- c) Each light operates at the same amperage
- d) Each light has the same resistance (ohms)

181 If three light bulbs, 60 Watt, 75 Watt, and 100 Watt are connected in series to 110 volts, which of the following is true?

- a) ch light has the same resistance (ohms)
- b) Each light operates at the same voltage
- c) Each light operates at the same Wattage
- d) **Each light operates at the same amperage** Ea

182 What current (amperage) is required for a 3.6 kiloWatt electric water heater when it operates at 240 volts? Note: Wattage = Voltage x Amperage, 1 kiloWatt = 1000 Watts      15.00 amps      0.02 amps      864.00 amps      864,000.00 amps

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183 What is the operating resistance (ohms) of a 120-volt electrical heat lamp that requires 3 amps to operate?

- a) 40.00 ohms     0.03 ohms
- b) 140.00 ohms
- c) 360.00 ohms
- d) **Voltage = Amperage x Resistance**

184 A two horsepower, single phase, dual voltage motor is operating at 115 volts and 24 amps when fully loaded. If the motor connections are rewired to operate at 230 volts and it is connected to a 230 volt power source, what will happen to the full-load amperage (FLA) of the motor?

- a) **Full load amperage will decrease from 24 amps to 12 amps**
- b) Full load amperage will increase from 24 amps to 48 amps
- c) Full load amperage will decrease from 230 amps to 115 amps
- d) Full load amperage will increase from 115 amps to 230 amps

185 If a Wattmeter measures 5800 Watts of power being used by a five horsepower electric motor, operating at 230 volt, and 28 amps, what is the approximate power factor for the motor? Formula:

Wattage = Voltage x Amperage x Power Factor

- a) 0.123 or 12% power factor
- b) 0.252 or 25% power factor
- c) 2.072 or 207% power factor
- d) **0.091 or 90% power factor**

186 When the piston of the four stroke small engine reaches the bottom of the cylinder on the intake stroke, it starts upward on what stroke?

- a) Power
- b) Combustion
- c) **Compression**
- d) Exhaust

187 The intake valve of a 4-stroke single-cylinder small engine is opened and closed by the action of what component?

- a) Wrist pin
- b) **Camshaft**
- c) Throttle
- d) Piston

188 What is the part of the coil that is made of several thousand turns of fine gage wire?

- a) The complete circuit
- b) The main circuit
- c) The primary circuit
- d) **The secondary circuit**

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- 189 Modern small engines use a solid state ignition system to open and close the primary circuit. What part of the small engine ignition system opened and closed the primary circuit prior to the solid state system?
- a) **Breaker Points**
  - b) Transistors
  - c) Integrated chips
  - d) Coil
- 190 What does the Octane rating of gasoline indicate?
- a) The ability of the engine to prevent engine compression
  - b) **The ability of the engine to prevent engine knock**
  - c) The inability of the engine to prevent engine knock
  - d) The ability of the engine to prevent engine post ignition
- 191 Which of the following describes the correct level for engine oil in a four cycle lawn mower when it is not equipped with a dipstick?
- a) Oil should be level with the top of the crankcase
  - b) Oil should fill the crankcase to the point that it flows from the crankcase breather
  - c) **Oil should be level with the top of the filler plug opening**
  - d) Oil should be level with the top of the crankshaft
- 192 A partially sheared flywheel key can result in which of the following?
- a) An increase in engine power
  - b) **Altered engine timing**
  - c) A decrease in engine compression ratio
  - d) Altered engine head bolt torque
- 193 Which of the following tools is used to measure the outside diameter of crankshaft surfaces in a small engine?
- a) Inside micrometer
  - b) Telescoping gauge
  - c) **Micrometer**
  - d) Feeler gauge
- 194 Which of the following tools is used to measure the inside diameter of the cylinder of a small engine?
- a) Feeler Gauge
  - b) **Telescoping gauge and micrometer**
  - c) Air pressure gauge
  - d) Plastigage and ruler
- 195 What term identifies the outer edge of the head of an engine valve?
- a) The stem

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- b) The tail
- c) The face
- d) **The margin**

196 What is the name given to the tiny projections left on the bearing surface of a connecting rod from the machining process?

- a) Porosity
- b) Kerf
- c) Slag
- d) **None of these**

197 The American Petroleum Institute provides standards that indicate the performance level and quality of engine oil as indicated by the EOLCS program. What is the name of the program with the acronym EOLCS?

- a) Engine Operation Life and Casualty System
- b) Engine Overloading Lubrication and Corrosive Standards
- c) Engineering Office Lifetime Corrective Standards
- d) **Engine Oil Licensing and Certification System**

198 Which of the following is a true statement concerning the crankshaft of a multiple cylinder engine?

- a) The multiple cylinder crankshaft must be shorter than that of the crankshaft for the single cylinder engine
- b) **The multiple cylinder crankshaft must have multiple crankpin journals to accommodate multiple connecting rods**
- c) The multiple cylinder crankshaft must have multiple crankpin journals to operate the intake and exhaust valves
- d) The multiple cylinder crankshaft must have multiple magneto journals to accommodate multiple ignition systems

199 What is the name given to the printed safety information that must be kept on file for each hazardous material kept or used in a small engine shop?

- a) **Material Safety Data Sheet**
- b) Management Safety Detection Sheet
- c) Material Safety Deterrent System
- d) Management Safety Depreciation System

200 What is the pressure exerted on a piston head with a top surface area of 4.91 square inches during the combustion process that applies a total force of 2000 pounds? Note: (Pressure in Pounds per Square Inch) = (Force in Pounds) / (Area in Square Inches)

- a) 230.33 psi
- b) 367.33 psi

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- c) **407.33 psi**
- d) 511.33 psi

**201** A 10 horsepower single cylinder engine is operating at 5000 feet above sea level. What approximate horsepower is produced by the engine if the engine's power is decreased 2.5% for each 1000 feet of elevation about sea level?

- a) 6.65 horsepower
- b) 7.52 horsepower
- c) **8.75 horsepower**
- d) 9.62 horsepower

101-200

202 What is the engine horsepower required to drive a 5kW generator? Note: Required Horsepower = (kilowatts) x (1.34) / (0.70)

- a) 7.26 horsepower
- b) 8.30 horsepower
- c) **9.57 horsepower**
- d) 10.39 horsepower

203 How much torque in ft-lbs is applied to a head bolt by applying 120 pounds of force on the end of a wrench 12 inches in length? Note: Torque in ft-lbs = (Force in pounds) x (Length of lever arm in inches)

- a) **120 ft-lbs**
- b) 720 ft-lbs
- c) 1,440 ft-lbs
- d) 14,400 ft-lbs

204 Which of the following is the proper name for the electrical conductors that travel from the power company's transformer to a residence?

- a) Transmission drop
- b) Distribution drop
- c) Meter drop
- d) **Service drop**

205 What type of switches must a four-way switch be used in combination with in order to independently control lights from three different locations?

- a) Two four-way switches
- b) **Two three-way switches**
- c) Three single-pole switches
- d) Three rotary switches

206 The National Electric Code (NEC) requires that conductor insulation be color-coded. Which of the following conductor insulation colors indicates the grounded conductor?

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- a) **White**
- b) Black
- c) Green
- d) Red

207 What is the unit of measure for electrical pressure that relates to current flow through a given resistance?

- a) Wattage
- b) Ohmage
- c) Amperage
- d) **Voltage**

208 When determining the correct combination of electrical box size and appropriate number of conductors, what is the box fill volume allowance for each ungrounded 12 gauge conductor that enters or exits an electrical box?

- a) 0
- b) **1**
- c) 2
- d) 3

209 Which of the following statements about the American Wire Gauge (AWG) conductor rating system is true?

- a) The smaller the AWG number, the smaller the wire
- b) The larger the AWG number, the larger the wire
- c) **The smaller the AWG number, the larger the wire**
- d) The smaller the AWG number the longer the wire

210 What is the minimum length for a service entrance grounding rod that will be driven into the ground?

- a) 1 foot
- b) 2 feet
- c) 4 feet
- d) **8 feet**

211 Which type of electrical cable is appropriate to use in a branch circuit in a barn housing livestock?

- a) SE cable
- b) **UF cable**
- c) NM cable
- d) Triplex cable

212 What terminology correctly identifies the reduction in voltage, caused by resistance, that occurs between the power supply and the load?

- a) Short circuit

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- b) Ground fault
- c) Power factor
- d) **Voltage drop**

213 A non-metallic sheathed cable that contains two #12 insulated conductors (white and black) and one bare grounding conductor would be identified by which of the following markings?

- a) 10-2 WG
- b) 12-3 WG
- c) **12-2 WG**
- d) 14-2 WG

214 According to Article 547 of the National Electric Code, all electrical wiring cable in agricultural applications shall be secured within how many inches of exiting a box?

- a) **8 inches**
- b) 16 inches
- c) 32 inches
- d) 48 inches

215 According to the National Electric Code, in no case shall the point of attachment of service drop conductors be less than how many feet above finished grade?

- a) 4 feet
- b) 6 feet
- c) **10 feet**
- d) 16 feet

216 At least how many inches of free conductors shall be left at each outlet, junction, and switch point for splices or the connection of fixtures and devices?

- a) 2 inches
- b) **6 inches**
- c) 10 inches
- d) 25 inches

217 The continuous load supplied by a circuit should not exceed 80% of the branch circuit rating. After how many hours of continuous operation is a load considered to be a continuous load?

- a) one-half hour
- b) one hour
- c) two hours
- d) **three hours**

218 A hog finishing building is required to have one electrical outlet for each pair of pens for every 150 square feet of floor area. If the building is 30 feet wide and 200 feet long, what would be the minimum number of convenience outlets that must be installed?

- a) 10 electrical outlets
- b) 20 electrical outlets

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- c) 30 electrical outlets  
d) **40 electrical outlets**
- 219 How much power (Wattage) is used by a 120 volt circuit with a 10 ampere load?
- a) 12 Watts  
b) 120 Watts  
c) **1200 Watts**  
d) 12,000 Watts
- 220 If each outlet on an electrical circuit uses approximately 1.5 amperes, how many outlets may be safely installed on a circuit sized to carry a maximum of 20 amperes?
- a) 8 electrical outlets  
b) **13 electrical outlets**  
c) 18 electrical outlets  
d) 24 electrical outlets
- 221 The monthly charge to operate a pivot irrigation system is 8 cents per kiloWatt hour (KWH) for the first 1000 hours and 7.75 cents for each hour greater than 1000 hours. If the irrigation system uses 1785 KWHs of electricity during a single month, what is the monthly cost, in dollars, to operate the irrigation system? Note: 1 kiloWatt = 1000 Watts
- a) \$133.84  
b) **\$140.84**  
c) \$162.84  
d) \$191.84
- 222 A new structure measures 50 feet wide and 80 feet long. A minimum of one general purpose circuit is required for each 500 square feet of floor space. What is the minimum number of circuits that must be installed?
- a) 6 general purpose circuits  
b) **8 general purpose circuits**  
c) 10 general purpose circuits  
d) 12 general purpose circuits
- 223 When metal is cut, what is the name of the opening or space that is produced by the cutting process?
- a) Joint  
b) Weld  
c) **Kerf**  
d) Crater
- 224 What property must metal have for the plasma arc cutting process to work effectively?
- a) Rigidity  
b) Ductility  
c) Malleability

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### d) **Conductivity**

225 During the plasma arc cutting process, what is the molten metal called that solidifies and adheres to the bottom edge of a cut?

- a) **Dross**
- b) Slate
- c) Daze
- d) Shell

226 Which of the following lens shades is most effective at reducing the brilliancy of light and screening out the harmful infrared and ultra-violet rays produced during arc welding?

- a) #2 shade lens
- b) #4 shade lens
- c) #8 shade lens
- d) **#12 shade lens**

227 What are the stresses commonly evaluated in the design of agricultural structures?

- a) Rust and corrosion
- b) **Tension and compression**
- c) Failure and destruction
- d) Hydration and oxidation

228 What is the most common type of steel used in the construction of agricultural buildings, fences, and gates?

- a) **Mild steel**
- b) Cast iron
- c) Stainless steel
- d) Wrought iron

229 What is the scientific symbol for the element of iron?

- a) Cu
- b) Ir
- c) **Fe**
- d) Ni

230 What is the maximum hose pressure in pounds per square inch (psi) for acetylene fuel gas used in oxyacetylene cutting equipment?

- a) 5 psi
- b) 45 psi
- c) **15 psi**
- d) 90 psi

231 What colors are appropriate for the oxygen hose on oxyacetylene cutting and welding equipment?

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- a) Either a white hose or a clear hose are approved colors
  - b) Either a yellow hose or a red hose are approved colors
  - c) Either a purple hose or an orange hose are approved colors
  - d) **Either a black hose or a green hose are approved colors**
- 232 When an oxyacetylene cutting torch is operating, what does a loud squealing or hissing noise indicate?
- a) **The oxyacetylene mixture is igniting inside the torch in an unsafe manner**
  - b) The oxyacetylene equipment is properly adjusted and operating safely
  - c) The acetylene pressure is much too high for the cutting operation
  - d) The oxygen pressure is much too high for the cutting operation
- 233 What is the name of the metal joining process where two pieces of metal are heated to the point of melting and the melted metals flow together?
- a) Sweat welding
  - b) Braze welding
  - c) Solder welding
  - d) **Fusion welding**
- 234 What type of flame is used for most oxy-fuel welding procedures when welding on mild steel?
- a) Oxidizing flame
  - b) Acetylene flame
  - c) Carburizing flame
  - d) **Neutral flame**
- 235 What electrical device is a necessary component of an electrical welding machine and is used to step up or step down the voltage and amperage as needed to perform welding operations?
- a) Alternator
  - b) **Transformer**
  - c) Generator
  - d) Rheostat
- 236 Which of the following safety concerns related to welding is more likely to occur gradually over an extended period of time?
- a) Burns from the handling of or coming in contact with heated metals
  - b) Injury to eyes from flying metal or sparks
  - c) Blisters on eyes from watching a welding arc without proper eye protection
  - d) **Hearing loss caused by extended exposure to elevated sound levels**
- 237 Which of the following statements is correct with respect to safety glasses while welding?
- a) **Safety glasses should be worn continuously while working with or near metal working activities**
  - b) Safety glasses are not needed for other metal working activities as long as a face shield is worn while welding

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- c) Safety glasses should be darkly tinted to protect the eyes at all times while performing metals working activities
- d) Safety glasses are not needed when a welding helmet is worn, because the helmet protects the eyes from all welding-related hazards

238 If 380 feet of steel rod is used to construct a hay feeding rack and the rod weighs 0.685 pounds per foot of length, what is the approximate weight of the hay feeding rack?

- a) **260 pounds**
- b) 290 pounds
- c) 340 pounds
- d) 400 pounds

239 Steel angle iron is sold for \$1.45 per linear foot, steel rod is sold for \$1.13 per linear foot, and steel pipe is sold for \$2.29 per linear foot. If 8 feet of angle iron, 15 feet of rod, and 30 feet of pipe are purchased, what is the total price for the metal before taxes?

- a) \$56.75
- b) **\$97.25**
- c) \$118.25
- d) \$193.75

240 There is 180 feet of steel rod, 210 feet of steel pipe, 200 feet of steel tubing, and 190 feet of steel channel iron. If each type of steel is sold for \$1.09 per linear foot, what is the total price of all the metal before taxes?

- a) \$590.30
- b) \$655.40
- c) \$735.10
- d) **\$850.20**

241 Steel angle iron weighs 1.25 pounds per linear foot and costs \$89.45 for a 20-foot length. Steel pipe weighs 1.15 pounds per linear foot and costs \$85.65 for a 20-foot length. If 120 pounds of each type of steel is purchased, which of the following statements is correct?

- a) **120 pounds of steel pipe will cost more than 120 pounds of steel angle iron**
- b) 120 pounds of steel angle iron will cost more than 120 pounds of steel pipe
- c) 120 pounds of steel angle iron or 120 pounds of steel pipe will each be less than 20 linear feet of steel
- d) 120 pounds of steel angle iron will be exactly the same price as 120 pounds of steel pipe

242 What term describes a piece of wood or metal used to reinforce a wood joint?

- a) Girder
- b) **Gusset**
- c) Purlin
- d) Girt

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243 What are the standard dimensions (thickness x width x length) of the board measure known as a board-foot?

- a) 1 inch x 1 inch x 12 inches
- b) 1 inch x 8 inches x 12 inches
- c) 1 inch x 4 inches x 12 inches
- d) **1 inch x 12 inches x 12 inches**

244 What is the term used to designate lumber with a nominal thickness from two inches to four inches and a nominal width from two inches to sixteen inches?

- a) Board
- b) Plank
- c) **Dimension lumber**
- d) Timber

245 Wood that will be placed in contact with the ground, or subjected to high moisture conditions, should receive what type of treatment to prevent decay and insect attack?

- a) Rubberization (undercoating)
- b) **Preservative (pressure treatment)**
- c) Galvanized Coating (zinc)
- d) Laminating (glued layers)

246 Which of the following is NOT a typical fastener used on wooden truss members?

- a) Bolt
- b) **Pop rivet**
- c) Gusset plate
- d) Nail

247 Plywood is commonly stamped with an identification index (a pair of numbers separated by a forward slash). Which of the following statements is true for a plywood sheet with a 48/24 stamp?

- a) **The plywood can carry the basic floor load over a maximum support spacing of 24 inches**
- b) The plywood can carry the basic floor load over a maximum support spacing of 48 inches
- c) The plywood can carry the basic floor load over a maximum support spacing of 72 inches
- d) The plywood can carry the basic floor load over a maximum support spacing of 96 inches

248 Which of the following is NOT a common load stress placed on wooden construction members?

- a) Compression
- b) Shearing
- c) Bending
- d) **Lamination**

249 What term describes thin sheets of wood that are glued together to form a sheet of plywood?

- a) Braces

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- b) Tissues
- c) **Veneers**
- d) Plyneers

250 What term describes the expanded foundation provided for posts on a post-frame building to prevent a support post from settling?

- a) Gusset
- b) **Footing**
- c) Purlin
- d) Header

251 Which of the following letter classifications for plywood indicates that the exterior veneer has fewer imperfections (has a better appearance)?

- a) **The letter A**
- b) The letter B
- c) The letter C
- d) The letter D

252 What is the term used to describe a construction member placed between posts and girders in post frame buildings to strengthen and add rigidity to a building?

- a) Purlin
- b) Joist
- c) **Brace**
- d) Ridge Board

253 Which of the following statements is correct with respect to pressure treated lumber?

- a) **Pressure treated lumber does not hold nails as well as untreated lumber**
- b) Pressure treated lumber has greater nail holding power than untreated lumber
- c) Pressure treated lumber has the same nail holding power than untreated lumber
- d) Nails cannot be used to secure pressure treated lumber

254 What term identifies the highest point of a gable roof?

- a) Gusset
- b) Purlin
- c) **Ridge**
- d) Rafter

255 Which of the following quantities of lumber has the greatest number of board-feet?

- a) **Six boards measuring 2 inches by 12 inches by 10 feet**
- b) Eight boards measuring 1 inch by 6 inches by 10 feet
- c) Twelve boards measuring 2 inches by 4 inches by 10 feet
- d) Ten boards measuring 1 inch by 12 inches by 10 feet

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256 How many sheets of standard sized, three-quarter inch plywood are needed to completely cover a floor measuring 36 feet by 24 feet? Note: Standard size plywood is 4 feet by 8 feet

- a) 24 sheets of plywood
- b) **27 sheets of plywood**
- c) 36 sheets of plywood
- d) 40 sheets of plywood

257 The floor of a wooden structure can safely hold a maximum of 18 tons. If the average weight of wheat is 45 pounds per bushel, how many bushels of wheat can be stored on the floor of the wooden structure? Note: 1 ton = 2000 pounds

- a) 400 bushels
- b) **800 bushels**
- c) 1600 bushels
- d) 3200 bushels

258 What is the approximate surface area, in square inches, for the end of a round concrete posts with a diameter of 6 inches? Area of circle =  $(\pi) \times (\text{diameter})^2 \div 4$

- a) 18.84 square inches
- b) **28.26 square inches**
- c) 75.36 square inches
- d) 113.04 square inches

259 The weight of wheat is 26.1 pounds per cubic foot and wheat is stored to a depth of 10 feet in a wooden storage bin. If the floor supports of the bin are spaced 4 feet apart, what is the maximum pressure, in pounds per square foot, applied to the supports? Formula: Pressure in pounds per square foot = (pounds per cubic foot) x (depth of wheat in feet)

- a) 6.5 pounds per square foot
- b) 26.1 pounds per square foot
- c) 1044.0 pounds per square foot
- d) **261.0 pounds per square foot**

260 In electrical terminology, what is the meaning of the abbreviation AC?

- a) Arc Current
- b) **Alternating Current**
- c) Always Current
- d) Acetylene Current

261 Which of the following colors are correct for oxygen and acetylene hoses?

- a) Yellow for acetylene, green for oxygen
- b) Green for acetylene, red for oxygen
- c) **Red for acetylene, green for oxygen**
- d) Green for acetylene, yellow for oxygen

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262 On a basic constant current arc welding machine, what does the primary/main adjustment control?

- a) Temperature
- b) Oxygen
- c) Wattage
- d) **Amperage**

263 On a typical shielded metal arc welding E7018 electrode, the 70 indicates what value for tensile strength?

- a) 70 psi tensile strength
- b) 700 psi tensile strength
- c) 7000 psi tensile strength
- d) **70,000 psi tensile strength**

264 What welding agency or entity does the acronym AWS indentify?

- a) Associated Welding Stores
- b) Alternative Welding System
- c) **American Welding Society**
- d) Arc Welding System

265 Ductility is the ability of metal to do what before it breaks?

- a) Harden
- b) **Elongate**
- c) Resist penetration
- d) Return to its original shape after stretching

266 What is the length of the most commonly used electrode for the process of shielded metal arc welding?

- a) 4 inches
- b) 10 inches
- c) **14 inches**
- d) 18 inches

267 What is a common name for the shielded metal arc welding process?

- a) MIG welding
- b) Wire welding
- c) **Stick welding**
- d) Tungsten welding

268 What would be a negative effect of insufficient shielding gas flow in the gas metal arc welding process?

- a) Excessive molten puddle cooling
- b) Wide, flat configuration of completed welling bead

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- c) Undercutting
- d) **Porosity**

269 Which of the following terms describes the appropriate power source for the gas metal arc welding process?

- a) **Constant voltage**
- b) Constant current
- c) Straight voltage
- d) Reverse current

270 What type of power supply is used for the flux core arc welding process?

- a) Constant current
- b) Alternating current
- c) Cosmic accumulator
- d) **Constant voltage**

271 On a direct current arc welding machine, what electrical component converts the incoming alternating current into direct current for welding?

- a) **A rectifier**
- b) A transformer
- c) An adjustable primary coil
- d) A straight polarity switch

272 What is another name used to describe the gas metal arc welding process?

- a) Metal inside gas welding
- b) Metal infrared gas welding
- c) **Metal inert gas welding**
- d) Metal ion gas welding

273 What is the name of the cleansing agent used to prevent the formation of oxides, release trapped gases, and slag and cleanse the metal chemically during the welding, brazing, and/or soldering process?

- a) Lintel
- b) Striker
- c) **Flux**
- d) Pixel

274 A total of 410.5 feet of steel rod is used to construct a hay feeding rack. The rod weighs 0.685 pounds per foot of length. If the filler metal from welding adds an additional 2.8 pounds to the overall weight, what is the approximate total weight of the feeding rack?

- a) 166 pounds
- b) 191 pounds
- c) 224 pounds
- d) **273 pounds**

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275 Steel angle iron is sold for \$1.59 per linear foot, steel rod is sold for \$1.34 per linear foot, and steel pipe is sold for \$2.68 per linear foot. If 9.5 feet of angle iron, 12.75 feet of rod, and 22.25 feet of pipe are purchased, what is the total price for the metal before taxes?

- a) **\$91.82**
- b) \$96.20
- c) \$111.64
- d) \$131.46

276 There is 165 feet of steel rod, 209 feet of steel pipe, 147 feet of steel tubing, and 182 feet of steel channel iron. If each type of steel is sold for \$1.39 per linear foot, what is the total price for all the metal before taxes?

- a) \$799.27
- b) \$833.30
- c) **\$977.17**
- d) \$1,004.20

277 Steel angle iron weighs 1.32 pounds per linear foot and costs \$78.88 for a 20-foot length. Steel pipe weighs 1.19 pounds per linear foot and costs \$83.57 per linear foot. If 120 pounds of each type of steel is purchased, which of the following statements is correct?

- a) **120 pounds of steel pipe will provide more linear feet of length than 120 pounds of steel angle iron**
- b) 120 pounds of steel angle iron will be exactly the same length as 120 pounds of steel pipe
- c) 120 pounds of steel angle iron will provide more linear feet of length than 120 pounds of steel pipe
- d) 120 pounds of steel angle iron or 120 pounds of steel pipe will each be more than 100 linear feet of steel

278 What is the proper name for the stick welding process?

- a) Gas tungsten arc welding (GTAW)
- b) Gas metal arc welding (GMAW)
- c) **Shielded metal arc welding (SMAW)**
- d) Carbon arc welding (CAW)

279 The National Electric Manufacturers Association (NEMA) has classified electric arc welders primarily by duty cycle. What is the minimum duty cycle rating of a NEMA Class I machine?

- a) 30%
- b) **60%**
- c) 90%
- d) 120%

280 What is the recommended eye protection shade number for a welding helmet lens used when welding with 1/8 inch electrode?

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- a) No. 4 lens shade
- b) No. 6 lens shade
- c) No. 8 lens shade
- d) **No. 10 lens shade**

281 Which of the following shielded metal arc welding electrodes is designated as a low hydrogen electrode?

- a) **E7018 E6010 E6011 E7024**

282 Which of the following measurements is appropriate for fresh concrete in which a slump test is performed to determine the stiffness of concrete prior to placing and finishing?

- b) **2 to 4 inches of slump**
- c) 8 to 12 inches of slump
- d) 21 cubic inches of slump
- e) 27 cubic yards of slump

283 What is the name of the process during the placing and finishing of concrete that involved removing the excess concrete to bring the concrete surface even with the top of the form boards?

- a) Troweling
- b) **Screeding**
- c) Floating
- d) Brushing

284 What is the name of the automatic plumbing valve that allows fluid to flow in only one direction, but prevents the fluid from draining back when the line is not pressurized?

- a) Gate valves
- b) Compression hose faucets
- c) **Check valves**
- d) Stop-and-waste valves

285 Which of the following nail types should provide the greatest withdrawal resistance?

- a) Common nail
- b) Box nail
- c) Casing nail
- d) **Spiral shank nail**

286 What is the recommended AWS/ANSI lens shade number for cutting one inch thick metal using oxygen fuel cutting (OFC)?

- a) 2-3 AWS/ANSI lens shade
- b) 3-4 AWS/ANSI lens shade
- c) **5-6 AWS/ANSI lens shade**
- d) 9-10 AWS/ANSI lens shade

287 Which of the following materials cannot be cut using an oxy-fuel process?

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- a) Carbon steel
- b) **Stainless steel**
- c) Low-alloy steel
- d) Galvanized steel

288 What duty cycle rating is required for a welding machine that will operate at its maximum rating for six minutes continually during a ten minute period?

- a) 20%
- b) 40%
- c) **60%**
- d) 80%

289 Which of the following thread types and hose colors is correct for the oxygen hose on an oxy-acetylene regulator and hose assembly?

- a) **Right handed threads and green hose**
- b) Right handed threads and red hose
- c) Left handed threads and red hose
- d) Left handed threads and green hose

290 If 10-foot long, 2-inch by 4-inch lumber (nominal dimensions) sells for \$0.45 per board foot (nominal size), what is the cost for 144 pieces of lumber this size? Note: 1 board foot = 144 cubic inches of lumber

- a) \$198.00
- b) \$236.00
- c) \$312.00
- d) **\$432.00**

291 Approximately how many cubic yards of concrete must be ordered if the concrete must fill a wooden form measuring 30 feet wide, 50 feet long, and 4 inches deep if five percent extra concrete is ordered? Round the answer to the nearest one-half cubic yard. Note: 1 cubic yard = 27 cubic feet, 1 foot = 12 inches

- a) 18.0 yd<sup>3</sup>
- b) **19.5 yd<sup>3</sup>**
- c) 23.5 yd<sup>3</sup>
- d) 26.0 yd<sup>3</sup>

292 What is the approximate rotational speed, in revolutions per minute, that is appropriate to drill a 9/16 inch hole in mild steel? Note: Appropriate RPMs = (400 / Diameter of the Hole in Inches)

- a) 300 RPM
- b) 500 RPM
- c) **700 RPM**
- d) 900 RPM

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- 293 What hole size must be drilled for the proper tapping of a 1/2-13NC thread (1/2 inch diameter with 13 threads per inch)? Note: Approximate Hole Size for Tapping = [Diameter of the Thread - (1/Number of threads per inch)]
- a) 25/64 inch
  - b) **27/64 inch**
  - c) 29/16 inch
  - d) 31/64 inch
- 294 What terminology describes the uniform application of a pesticide over an entire field?
- a) Band spraying
  - b) Accent spraying
  - c) Spot spraying
  - d) **Broadcast spraying**
- 295 If a pesticide is splashed in the eyes, what immediate first aid response is typically correct?
- a) **Immediately wash/flush eyes with clean water for 15 minutes or more**
  - b) Contact a supervisor to determine the appropriate response
  - c) Immediately move victim to fresh air and keep eyes closed
  - d) Locate the pesticide's label to determine if it damages the eyes
- 296 What is the most common route of exposure by which pesticide enters the body of a pesticide handler?
- a) Through ocular exposure
  - b) Through oral exposure
  - c) **Through dermal exposure**
  - d) Through inhalation exposure
- 297 During what operation are pesticide handlers most often exposed to concentrated pesticides?
- a) While transporting pesticides
  - b) **While mixing or loading pesticides**
  - c) While applying pesticides to target sites
  - d) While cleaning pesticide application equipment
- 298 When a pesticide container is triple rinsed, what rinse liquid should be used?
- a) Use a phytotoxic petroleum based product distillate
  - b) Use a bactericide soap and rinse water from the spray tank
  - c) Use a toxic petroleum based product distillate
  - d) **Use the liquid listed on the label as the diluents for the pesticide**
- 299 Which of the following is a true statement with respect to groundwater and pesticide contamination?
- a) Pesticides are not transported into groundwater by leaching
  - b) Groundwater is easily cleaned after it becomes contaminated

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- c) **Shallow groundwater is more susceptible to contamination than deeper groundwater**
- d) Contamination is more likely with clay soils than with sandy soils

**300** If other variables remain constant, which of the following adjustments to spray application equipment will have the describe effect?

- a) **Doubling the travel speed will reduce the application rate by one half**
- b) Doubling the travel speed will double the spray application rate
- c) Doubling the spray pressure will double the spray application rate
- d) Doubling the spray pressure will reduce the application rate by one half

201-300

301 Which of the following conditions will reduce the likelihood of pesticide drift?

- a) **Low spray pressure, low temperature, low wind speed, and high humidity**
- b) High spray pressure, high temperature, no wind, and high humidity
- c) Low spray pressure, high temperature, high wind speed, and low humidity
- d) High spray pressure, low temperature, high wind speed, and low humidity

302 When a small quantity of concentrated pesticide formulation is to be stored, which of the following is the best container for storage?

- a) Mix with other small quantities of pesticides in a metal drum
- b) **In the original pesticide container**
- c) In a clean plastic water bottle
- d) In a disposable plastic food container

303 Which of the following pest management techniques would be the most effective method for immediate control of a large-scale insect infestation, without damaging the crop?

- a) Biological pest control
- b) Mechanical pest control
- c) **Chemical pest control**
- d) Cultural pest control

304 Which of the following titles correctly identifies the technique of combining appropriate pest control tactics into a planned strategy that reduces pests and pest damage to an acceptable level?

- a) Biological Pest Management (BPM)
- b) Unplanned Pest Control (UPC)
- c) Natural Pest Control (NPC)
- d) **Integrated Pest Management (IPM)**

305 The concrete rinse pad for a pesticide collection system should be designed to contain what quantity of pesticide material?

- a) **125% of the volume of the largest storage container stored in or on the structure**
- b) 125% of the volume of the smallest storage container stored in or on the structure

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- c) 100% of the volume of the largest storage container stored in or on the structure
  - d) 100 % of the volume of the smallest container stored in or on the structure
- 306 What is the recommended technique to dispose of leftover or extra pesticide mixture?
- a) Return it to the manufacturer
  - b) Save it for three years, then dump it into a storm drain
  - c) Flush it down a home sewer drain
  - d) **Apply it to a target site according to the pesticide label directions**
- 307 Which of the following is the correct definition of pesticide spray drift?
- a) Movement of a pesticide to off-target sites caused by erosion
  - b) Movement of a pesticide to off-target sites caused by migration
  - c) **Movement of a pesticide through air at the time of application to any site other than the intended target site**
  - d) Movement of a pesticide to off-target sites by windblown contaminated soil particles
- 308 Which of the following activities is conducted by the Environmental Protection Agency to protect people and the environment from pesticides?
- a) **Mandating certification and training programs for pesticide applicators**
  - b) Implementing the No Child Left Behind pesticide program
  - c) Insuring applicator compliance with fertilizer and irrigation applications
  - d) Charging licensing fees to assist with pesticide spill cleanup
- 309 When mixing a pesticide according to the label directors, a minimum of 2 gallons of waster are to be applied per 1000 square feet of area sprayed. Approximately what is the minimum number of gallons of water required to treat one acre? Note: 1 acre = 43,560 square feet
- a) 14 gallons per acre
  - b) 43 gallons per acre
  - c) **87 gallons per acre**
  - d) 172 gallons per acre
- 310 A label specifies that pesticide formulation be applied at the rate of 8 ounces per acre. How many acres will one gallon of this pesticide formulation treat? Note: 1 gallon = 128 ounces
- a) 4 acres per gallon
  - b) 8 acres per gallon
  - c) **16 acres per gallon**
  - d) 32 acres per gallon
- 311 A pesticide label specifies that 2.5 pints of pesticide concentration, mixed with 30 gallons of water, are to be applied per acre. How many gallons of pesticide concentration are required to treat a 160-acre field? Note: 128 ounces = 1 gallon, 16 ounces = 1 pint
- a) 32 gallons
  - b) **50 gallons**
  - c) 64 gallons

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d) 3200 gallons

312 How many acres are in a rectangular field measuring 1200 feet by 363 feet? Note: 1 acre = 43,560 square feet

- a) **10 acres**
- b) 20 acres
- c) 30 acres
- d) 4356 acres

313 Moisture content is a key factor influencing grain damage during harvest. Generally, less damage occurs during harvest if the grain has what percent moisture content?

- a) 5%
- b) 10%
- c) 15%
- d) **20%**

314 What are the two most important components of a small grain production system?

- a) **Timely planting and disease control**
- b) Variety selection and dry land acreage
- c) Applying chemicals and compost to farmland
- d) Environmental stewardship and reduced tillage

315 In addition to stand-ability and disease resistance, what other characteristic should be considered in the selection of a wheat variety for planting?

- a) Irrigation efficiency
- b) **Yield potential**
- c) Population density
- d) Germination resistance

316 What commonly causes lodging in wheat?

- a) Excessive head size
- b) Excessive pests
- c) **Excessive seeding**
- d) Excessive irrigation

317 Which of the following will occur with higher concentration of nitrogen are applied to growing wheat?

- a) Yield potential can be exceeded
- b) Phosphorous availability is limited
- c) Micronutrients become limited
- d) **The potential for lodging and disease increases**

## Ag Mechanics

318 The successful production of no-till wheat requires the proper management of a different set of inputs than for other crops because wheat must survive the winter while maintaining vigor and fighting disease organisms. What are the key factors for the successful production of no-till wheat?

- a) Environmental symptoms and conditions
- b) Proper soil compaction after plowing
- c) Uniformity of growth and staging
- d) **Residue management**

319 As a general rule of thumb, what minimum increase in air temperature will double the moisture holding capacity of air and cut the relative humidity in half?

- a) **20 degrees F**
- b) 40 degrees F
- c) 60 degrees F
- d) 80 degrees F

320 What characteristics are exhibited by grain loaded into extremely large containers (semi-trucks, railcars, barges)?

- a) **Fine particles tend to concentrate in a region near the center of the container**
- b) Grain tends to be more homogenous in distribution regardless of handling vibrations
- c) Grain tends to be more homogenous in distribution due to random harvesting activities
- d) Course particles tend to concentrate in a region near the center of the container

321 What is the effect on insect activity within stored grain when the grain is cooled to a temperature between 50 and 70 degrees F?

- a) this temperature range is optimal for insect reproduction
- b) **Insect reproduction decreases**
- c) Insect activity becomes dormant
- d) Insect feeding is eliminated and no further grain damage occurs.

322 What commonly causes death when someone is trapped in flowing grain?

- a) **Suffocation**
- b) Crushing
- c) Falling
- d) Grain dust explosion

323 When wet grain ferments, what colorless and odorless gas is produced?

- a) Carbon dioxide (CO<sub>2</sub>)
- b) **Carbon monoxide (CO)**
- c) Dihydrous oxide (H<sub>2</sub>O)
- d) Dioxide (O<sub>2</sub>)

324 Which of the following is a recommended pest management technique?

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- a) Clean the grain storage bins and transport trucks only after infestation occurs
  - b) Equally mix clean grain with infested grain
  - c) **Fumigate all grain before storage**
  - d) Fumigate grain bins only when insect infestations reach unacceptable levels
- 325 Which of the following is true with regard to augers and grain damage?
- a) **Operating augers at full capacity can reduce grain breakage**
  - b) Operating augers at 50% of full capacity can reduce grain breakage
  - c) Operating augers at 25% of full capacity can reduce grain breakage
  - d) Operating augers at 10% of full capacity can reduce grain breakage
- 326 The determination of the maximum allowable storage days for grain is based on what value?
- a) Driest grain in the bin
  - b) Average moisture content of the grain in the bin
  - c) **Wettest grain in the bin**
  - d) Sea level
- 327 To locate the moisture pockets in a grain bin where mold is present, what equipment should be used?
- a) Grain probe
  - b) Thermometer
  - c) Moisture meter
  - d) **Mold detector**
- 328 When air moves through a deep grain mass, the air temperature is gradually lowered and relative humidity is increased until the air approaches equilibrium with the grain. If the air reaches equilibrium within the grain, what will occur when it passes through the remaining grain?
- a) **It will not increase grain drying**
  - b) It will increase grain drying
  - c) It will increase grain moisture
  - d) It will decrease grain spoilage
- 329 A rectangular grain bin is 12 feet wide and 16 feet long. The grain bin is filled to a level depth of 4 feet and the grain averages 45 pounds per cubic foot.. How many pounds of grain are in the bin?
- a) 8,640 pounds
  - b) 3,456 pounds
  - c) 17,280 pounds
  - d) **34,560 pounds**
- 330 If wheat has an average weight of 60 pounds per bushel and there are 0.453 kilograms in a pound, how many kilograms are there in a bushel of wheat?
- a) 18.15 kilograms
  - b) **27.18 kilograms**
  - c) 132.45 kilograms

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d) 2,345.54 kilograms

331 In determining field loss during planting, the average count is 20 seeds per square foot of area sampled. If there are approximately 387,120 seeds in one bushel, approximately how many bushels of seed are lost per acre? Note: 1 acre = 43,560 square feet

- a) **2.25 bushels per acre**
- b) 5.50 bushels per acre
- c) 10.80 bushels per acre
- d) 20.30 bushels per acre

332 What characteristic is the most useful for evaluating a fan used to dry grain while stored in a bin?

- a) Gallons per minute (gpm)
- b) **Cubic feet per minute per bushel (cfm/bu)**
- c) Pounds per square inch (psi)
- d) Bushels per hour per kiloWatt (bph/kW)

333 Which of the following are two types of fans used to force air through grain in a grain bin?

- a) Static and dielectric
- b) Turbine and axial
- c) Tubular and elastic
- d) **Centrifugal and axial**

334 What determines the temperature to which seed grain should be dried?

- a) **For maximum seed viability the temperature is relatively low, such as 100F**
- b) Differs significantly between seed types
- c) Depends directly on the relative humidity of the ambient (outside) air
- d) For maximum seed viability the temperature is relatively high, such as 400F

335 Stress cracks in grain corn kernels can be caused when high temperature grain drying is followed by which process?

- a) Waterification of the dried grain
- b) Slow heating of the dried grain
- c) **Rapid cooling of the dried grain**
- d) Rapid heating of the dried grain

336 What is the maximum moisture content for the safe long term storage of shelled corn?

- a) **13 to 15 percent**
- b) 16 to 18 percent
- c) 19 to 21 percent
- d) 22 to 24 percent

337 What are the two most common locations where wet or spoiled grain is likely to be found in a loaded grain bin?

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- a) Top and bottom of the grain
- b) Bottom-center of the grain and next to the wall of the bin
- c) **Top-center of the grain and next to the wall of the bin**
- d) Center of the grain and bottom of grain

338 What are two problems that can occur when broken grain and foreign material (fines) are present in stored grain?

- a) Increased temperature and carbohydrates
- b) **Increased spoilage and restricted air flow**
- c) Reduced ducting and infiltration
- d) Decreased spoilage and increased aeration

339 The operation of the bale accumulator and a bale ejector in baling equipment help reduce what input during the harvest of hay?

- a) **Manual labor**
- b) In field drying requirement
- c) Average fuel costs per gallon
- d) The required power take-off horsepower

340 What two mishaps may occur when an operator stacks large round bales using a tractor-mounted front-end loader?

- a) Rear tractor rollovers and crusting
- b) Fuel contamination and frequent flat tires
- c) Bale size reduction and forage waste
- d) **Bale rollback and tractor rollover**

341 What percentage of hay is contained in the outer 4 inches of a 6 foot diameter round bale?

- a) 10%
- b) **20%**
- c) 30%
- d) 35%

342 What percent moisture content is alfalfa baled at when making large round bale silage?

- a) 10-15%
- b) 20-30%
- c) **40-60%**
- d) 80-90%

343 When storing large round bales outside, the site should have which of the following characteristics?

- a) Steep slope
- b) Poorly drained
- c) **Well drained**
- d) Located in a gully

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- 344 How should round bales be stacked when stored in a barn?
- a) **on end to reduce pressure on the barn wall**
  - b) on the round side to allow easy rolling
  - c) on the round side to allow rapid drying
  - d) on end to allow rapid drying
- 345 Until modern square bale handling equipment was available, what has been the major drawback in the production of square bales?
- a) Tractor travel speed through the field was very slow
  - b) Difficulty in securing twine knots
  - c) Uniform bale size was not possible
  - d) **Process was very labor intensive**
- 346 How many square feet are in 11.0 acres? Note: 1 acre = 43,560 square feet
- a) **479,160 ft<sup>2</sup>**
  - b) 297,850 ft<sup>2</sup>
  - c) 366,720 ft<sup>2</sup>
  - d) 524,890 ft<sup>2</sup>
- 347 What is the approximate circumference of a round hay bale that has a diameter of 5 feet 9 inches? Note: Circumference of a Circle =  $(\pi) \times (\text{diameter})$ ,  $\pi = 3.14$ . 1 foot = 12 inches
- a) 14 feet
  - b) **18 feet**
  - c) 22 feet
  - d) 26 feet
- 348 What is the volume of a 6-foot diameter round bale that is 5 feet long? Note: Volume of a Cylinder =  $(\pi) \times (r)^2 \times (\text{length})$ ,  $\pi = 3.14$ ,  $r = \text{radius}$
- a) 101 ft<sup>3</sup>
  - b) **141 ft<sup>3</sup>**
  - c) 198 ft<sup>3</sup>
  - d) 238 ft<sup>3</sup>
- 349 What is the approximate combined total weight of a trailer weighing 9,445 pounds when it is loaded with 525 bushels of shelled corn that weighs 56.4 pounds per bushel?
- a) 31,000 lbs
  - b) 34,000 lbs
  - c) **39,000 lbs**
  - d) 42,000 lbs
- 350 Approximately how much time is required to move 750 round hay bales from a field if bale transport can be completed at an average hauling rate of 11.5 bales per hour? Note: 1 hour = 60 minutes

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- a) 65 hours and 2 minutes
- b) 65 hours and 22 minutes
- c) 64 hours and 48 minutes
- d) **65 hours and 13 minutes**

351 A tractor fueled by No. 2 diesel burns 7.75 gallons per hour. When the same tractor is fueled with B20 biodiesel it burns 8.25 gallons per hour. Approximately how many more gallons of fuel will the tractor use during 8 hours of operation if it is fueled by B20 biodiesel rather than No. 2 diesel?

- a) 2.5 gallons
- b) 3.0 gallons
- c) 3.5 gallons
- d) **4.0 gallons**

352 What gas has a strong odor and is commonly emitted from livestock operations?

- a) Carbon Dioxide
- b) **Ammonia**
- c) Carbon Monoxide
- d) Methanol

353 Which of the following is a biological process where microorganisms convert organic material like manure and leave into a soil-like material?

- a) Watering
- b) Mulching
- c) Denaturing
- d) **Composting**

354 Which of the following is an important factor in the movement of odor away from animal production sites?

- a) Electrical conductivity of the atmosphere
- b) **Prevailing winds**
- c) If it is mostly a cloudy day
- d) If it is mostly a sunny day

355 Liquid manure can be converted into solid waste by reducing which of the following?

- a) Nitrogen
- b) Straw
- c) Dry matter
- d) **Water**

356 Which of the following characteristics of liquid manure increases as the percentage of solids increase?

- a) Aerial propensity
- b) **Viscosity**
- c) Temperature

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- d) Slime factor
- 357 Which of the following gasses is flammable and emitted from a livestock facility?
- a) **Methane**
  - b) Hydrogen Peroxide
  - c) Carbon Dioxide
  - d) Ethanoloxide
- 358 Because higher temperatures improve manure decomposition, anaerobic lagoons work best during what season of the year?
- a) Fall
  - b) **Summer**
  - c) Winter
  - d) Spring
- 359 What type of bacteria does not require the presence of free or dissolved oxygen for metabolism?
- a) **Anaerobic**
  - b) Aerobic
  - c) Dehydrated
  - d) Consolidated
- 360 What occurs when water infiltrates the soil and removes nutrients?
- a) Fusion
  - b) Gravitational water
  - c) Percolation
  - d) **Leaching**
- 361 What are two sources of water that increase the amount of liquid manure that must be dealt with at a livestock facility?
- a) Low humidity and irrigation water
  - b) High humidity and irrigation water
  - c) **Wash water and rain water runoff**
  - d) Underground water lines and water wells
- 362 Which of the following are major nutrients of manure?
- a) Water, soil, and straw
  - b) **Nitrogen, phosphorous, and potassium**
  - c) Hydrogen, methane, and ulraine
  - d) Phosphorus, herbicide, and phosphate
- 363 A manure slurry is more viscous than liquid manure because it contains a higher percentage of what component?
- a) Hydrogen

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- b) Water
  - c) **Solids**
  - d) Phosphorus
- 364 Which of the following describes the microbial activity during composting?
- a) Aerobic, oxygen limited
  - b) **Aerobic, oxygen requiring**
  - c) Anaerobic, carbon dioxide requiring
  - d) Aerobic, carbon dioxide requiring
- 365 Which process is best described as the cooling that occurs when heat from a compost pile is used to evaporate water?
- a) Induction of heat
  - b) Enzymatic evaporation
  - c) **Evaporative cooling**
  - d) Denitrification
- 366 How many square feet are in 5.5 acres? Note: 1 acre = 43,560 square feet
- a) 117,850 ft<sup>2</sup>
  - b) 186,720 ft<sup>2</sup>
  - c) **239,580 ft<sup>2</sup>**
  - d) 434,890 ft<sup>2</sup>
- 367 How many acre-feet of manure are in a 1.7 acre lagoon filled to a depth of 12 feet? Note: 1 acre foot = 43,560 ft<sup>2</sup> x 1 foot deep = 43,560 cubic feet
- a) **20.4 acre-feet**
  - b) 40.6 acre-feet
  - c) 60.2 acre-feet
  - d) 80.8 acre-feet
- 368 If liquid manure is evenly distributed three inches deep over 15,670 square feet of area, how many cubic feet of liquid manure was applied? Note: 1 cubic foot = (12 inches x 12 inches x 12 inches)
- a) **3,917.5 ft<sup>3</sup>**
  - b) 4,456.2 ft<sup>3</sup>
  - c) 5,509.7 ft<sup>3</sup>
  - d) 6,810.4 ft<sup>3</sup>
- 369 If a pump transfers liquid manure at a rate of 110 gallons per minute, how many gallons are pumped per hour? Note: 1 hour = 60 minutes
- a) 66 gallons/hour
  - b) 660 gallons/hour
  - c) **6,600 gallons/hour**
  - d) 66,000 gallons/hour

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370 Approximately how many hours are required to pump 47,600 gallons of liquid if the pumping rate is 420 gallons per minute? Note: 1 hour = 60 minutes

- a) **1.9 hours**
- b) 1.3 hours
- c) 0.7 hours
- d) 2.5 hours

371 If a storage container measures 300 feet wide by 1200 feet long, how deep should the container be to hold 1,500,000 cubic feet of liquid? Note: 1 cubic foot = (1 foot x 1 foot x 1 foot)

- a) 1.42 feet
- b) 2.29 feet
- c) 3.72 feet
- d) **4.17 feet**

372 Which of the following is another name for the Arc Welding process that uses flux-coated metal welding rods?

- a) **Shielded Metal Arc Welding (SMAW)**
- b) Gas Tungsten Arc Welding (GTAW)
- c) Sticker Arc Welding (SAR)
- d) Gas Metal Arc Welding (GMAW)

373 The arc from an Arc Welder has a temperature of about 9000 degrees. Which of the following variables will not affect the welding temperature?

- a) size (diameter) of the electrode
- b) amperage setting of the machine
- c) length of the arc
- d) **size (length) of the electrode**

374 Direct Current (DC) welders produce current that flows in only one direction in accordance with how the welder is set according to polarity. What is one way that the polarity can be changed on the welding machine?

- a) turn the electrode around in the electrode holder
- b) turn up the amperage above 240 amps
- c) turn down the amperage to under 40 amps
- d) **Manually reverse the welding cables**

375 Which of the following items would not be considered an essential safety item in a welding shop?

- a) fire blanket
- b) **duct tape**
- c) fire extinguisher
- d) welding curtain

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- 376 Which of the following is recommended to be worn under the welding helmet for safety protection of the eyes when accomplishing other tasks besides welding?
- a) shade 5 safety goggles
  - b) shade 10 safety glasses
  - c) tinted contact lenses
  - d) **clear safety glasses**
- 377 Generally the direction of travel for a right-handed welder when using a stick welding machine would be from:
- a) right and left simultaneously slowly across the plate
  - b) right to left slowly and evenly across the plate
  - c) **left to right slowly and evenly across the plate**
  - d) always moving left slowly and evenly across the plate
- 378 Which of the following statements about arc length when welding is false?
- a) an arc that is the correct length sounds like bacon frying
  - b) **an arc that is too long sounds like bacon frying**
  - c) an arc that is too short sounds like bacon frying
  - d) an arc that is too short makes like a boeing sound
- 379 The first two digits in the AWS electrode classification number designates the:
- a) **tensile Strength**
  - b) welding position
  - c) type of flux coating
  - d) special characteristics of the electrode
- 380 When welding, one bead or layer of filler metal is called a pass. What is the name given to the first and most important pass in the weld?
- a) overpass
  - b) forward pass
  - c) **root pass**
  - d) face pass
- 381 Which of the following are accepted welding positions?
- a) **flat, horizontal, vertical, overhead**
  - b) flat, horizon, vertigo, overboard
  - c) flat, horizontal, diagonal, underhead
  - d) flat, horizontal, diagonal, overhead
- 382 Which of the following would be classified as a destructive type weld test?
- a) ultrasonic
  - b) **guided bend**
  - c) visual inspection

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d) eddy current

383 In the Shielded Metal Arc Welding process, impurities are floated out of the molten puddle to form a deposit known as \_\_\_\_\_ that protects the weld as it cools.

- a) **slag**
- b) flux
- c) dross
- d) flack

384 Stainless steel is welded with electrodes which are classified by the:

- a) American Society for Testing Materials (ASTM)
- b) American Society of Flux Coated Engineers (ASFCE)
- c) **American Iron and Steel Institute (AISI)**
- d) American Welding Society (AWS)

385 You must know the kind of metal to be welded before you can select an electrode. Which of the following is an example of a ferrous metal?

- a) porcelain
- b) **steel**
- c) aluminum
- d) copper

386 What term is used to describe the continuous running time for which a welder was designed?

- a) ambient cycle
- b) **duty cycle**
- c) running specification
- d) duty rating

387 Which of the following would cause the brightest arc when welding?

- a) **long arc length**
- b) short arc length
- c) correct arc length
- d) zero arc length

388 \_\_\_\_\_ welding is the welding of two pieces of metal at one or more point in order to hold the pieces together temporarily while welding them.

- a) tick
- b) bead
- c) **tack**
- d) root

389 Which of the following is a type of corner joint?

- a) **full open**
- b) double fillet

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- c) square butt
  - d) single- v
- 390 When repairing small engine the work should be done:
- a) where fuels are stored
  - b) in an area with plenty of rags and paper nearby
  - c) **in a well ventilated work area**
  - d) inside of a closed shop
- 391 When servicing the small engine, the first step to insure personal safety is to:
- a) clean the air filter
  - b) drain the oil
  - c) drain the fuel
  - d) **remove the spark plug wire**
- 392 Oil viscosity grades are determined by:
- a) American Petroleum Institute (API)
  - b) Small Engine Manufacturers Association (SEMA)
  - c) **Society of Automotive Engineers (SAE)**
  - d) All of the answers listed
- 393 Valve stems are held in alignment by a:
- a) cylinder block
  - b) **valve guide**
  - c) valve spring
  - d) valve sleeve
- 394 The color at the Spark Plug gap that indicates a good spark:
- a) red
  - b) yellow
  - c) orange
  - d) **blue**
- 395 If specifications are not available, the gap of a four stroke cycle small engine spark plug should be set at
- a) .005 inch
  - b) .010 inch
  - c) .020 inch
  - d) **.030 inch**
- 396 Which of the following would not be a recommended cleaning solvent for small engines?
- a) varsol
  - b) water
  - c) kerosene

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- d) **gasoline**
- 397 Clean fuel drained from an engine should be
- a) **stored in an approved container**
  - b) discarded with other trash
  - c) discarded in a floor drain
  - d) discarded down a sink drain
- 398 Most valves in small engines are ground to:
- a) 20 degrees to 30 degrees
  - b) **30 degrees or 45 degrees**
  - c) 30 degrees to 90 degrees
  - d) 45 degrees to 65 degrees
- 399 The finish on a resized or reconditioned cylinder should have a crosshatch appearance in order to:
- a) **allow proper lubrication and ring rotation**
  - b) reduce the friction between the piston rod and the cylinder wall
  - c) prevent a build up of gum in the cylinder
  - d) increase the friction between the piston rings and the cylinder wall
- 400 A Briggs & Stratton engine Model Number 92902 has a displacement of:
- a) **9 cubic inches**
  - b) 9 cubic centimeters
  - c) 92 cubic inches
  - d) 92 inch pounds
- 401 The \_\_\_\_\_ is an engine part that converts the up and down or linear motion of the piston to circular motion.
- a) **crankshaft**
  - b) flywheel
  - c) connecting rod
  - d) camshaft
- 402 The four strokes of a four-stroke cycle engine and the order in which they occur are:
- a) compression-power-intake-exhaust
  - b) **intake-compression- power-exhaust**
  - c) power-exhaust-intake-compression
  - d) intake-power-compression-exhaust
- 403 Parts or sections of a small engine valve are:
- a) stem, head, seat
  - b) stem, margin, seat
  - c) **stem, margin, face**

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d) stem, face, toe

404 Receptacle outlets and switches for lighting, appliances, and other types of electrical equipment installed in a residence are indicated on the electrical contractors wiring plan by .

- a) the building inspector
- b) the homeowner
- c) the electrical installer
- d) **standard electrical symbols**

405 The pressure at which electricity is transmitted through a conductor is called

- a) amperage
- b) wattage
- c) **voltage**
- d) flow

406 The NEC requires small appliance circuits to be installed using a minimum of a No. size conductor.

- a) 10
- b) **12**
- c) 14
- d) 18

407 The NEC requires that wall receptacles must be spaced so that no point on a wall is more than feet from a receptacle.

- a) 3
- b) 4
- c) **6**
- d) 12

408 \_\_\_\_\_ functions by comparing the current in the “hot” wire with that of the “neutral” and opening the circuit if these currents differ by 5/1000 amp or more, thus shutting off the power and eliminating the shock hazard to personnel.

- a) fuse
- b) **GFCI**
- c) breaker
- d) switch

409 When the finished wall surface is made of a combustible material, the front edge of the device box must be mounted flush with the:

- a) **finished wall surface**
- b) front of the wall stud before the wall surface is installed
- c) inside back edge of the finished wall surface
- d) back of the wall stud before the wall surface is installed

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- 410 Another name for a jumper grounding conductor is a:
- a) grounding clamp
  - b) sheep's tongue
  - c) grounding clip
  - d) **pigtail**
- 411 The wire through which electric current travels is called a:
- a) traveler
  - b) sheath
  - c) **conductor**
  - d) transmitter
- 412 The best material for conducting electricity is
- a) stainless steel.
  - b) copper
  - c) brass bronze
  - d) **because it is durable, has excellent conducting properties, and has proven to be relatively free from problems over time**
- 413 Aluminum conductors must be \_\_\_\_\_ size(s) larger than copper conductors to carry the same electrical load.
- a) **one**
  - b) two
  - c) three
  - d) None of the answers listed
- 414 All electrical connections in a residential wiring system must be contained in approved \_\_\_\_\_ or \_\_\_\_\_ boxes.
- a) aluminum/copper
  - b) fiberglass/plastic
  - c) **device/outlet**
  - d) plastic/cardboard
- 415 Surface-mounted incandescent lighting located in a closet must be installed at least \_\_\_\_\_ inches from the storage shelving.
- a) 3
  - b) 6
  - c) **12**
  - d) 15
- 416 Kitchen countertop receptacles can be located at a maximum \_\_\_\_\_ inches above the countertop.
- a) 12

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- b) 16
- c) **18**
- d) 24

417 What is the box fill volume allowance for each ungrounded conductor that enters or exits an electrical box?

- a) **1**
- b) 2
- c) 3
- d) 4

418 The overload protection of a branch circuit is determined by the amount of \_\_\_\_\_ that the conductor will safely carry

- a) voltage
- b) **amperage**
- c) hertz
- d) cycles

419 In what units are electric motor speeds measured?

- a) **revolutions per minute**
- b) gallons per minute
- c) kilowatts per hour
- d) miles per hour

420 Which terminal of an electrical device is designated for the grounded conductor?

- a) black terminal screw
- b) brass terminal screw
- c) green terminal screw
- d) **silver terminal screw**

421 What are probable results if the welding current is too high or the arc length is too great?

- a) **A wide, splattered, irregular weld**
- b) Melts off the electrode in large globules, wobbles from side to side as the arc weaves
- c) The electrode melts too fast, molten puddle too large and irregular
- d) A narrow, deposit will pile up, irregular shape

422 The appearance and strength of a bead are influenced by

- a) travel speed when making the weld
- b) angle that the electrode is held
- c) amperage setting on welder
- d) **All of the answers listed**

423 Which of the following is not a cause of undercutting?

- a) amperage set too high

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- b) **amperage set too low**
  - c) arc too long
  - d) electrode held at a 90 degree angle
- 424 The shielding gases commonly used with GMAW and FCAW processes are
- a) **Argon or Carbon Monoxide**
  - b) Argon, Carbon Dioxide, or Helium
  - c) Oxygen and Acetylene
  - d) Oxygen and Natural Gas
- 425 Amperage (current) setting depends upon electrode type, size, position, and metal thickness and should be adjusted
- a) **when no welding is being done**
  - b) during the welding operation with an electrode half used
  - c) during the welding operation with a new electrode
  - d) using an E6011 electrode on 1/4 inch mild steel plate
- 426 Which of the following characteristics is not important in determining the type of welding electrode to select?
- a) Transformer only
  - b) Plasma arc
  - c) **Transformer/ rectifier**
  - d) Generator only
- 427 Why is a change in polarity useful in electric arc welding?
- a) . Reduces ultraviolet & infrared light rays
  - b) **Controls heat & depth of penetration**
  - c) Reduces slag deposits.
  - d) Reduces splatter.
- 428 Electrodes are identified by classification systems established by.
- a) **American Welding Society**
  - b) Society of American Iron Workers
  - c) American Welders Association
  - d) American Materials Society
- 429 The flux coating on the electrode provides a gas shield to
- a) Prevents slag from forming
  - b) By product of the electrode
  - c) Does not affect the welding process
  - d) **Protect the molten metal**
- 430 When welding with a direct current machine straight polarity, the electrode holder would be
- a) Positive

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- b) **Negative**
  - c) The current from both directions
  - d) The current flows from the electrode holder all the time
- 431 The fourth digit in the electrode number designates the \_\_\_\_\_.
- a) Welding position
  - b) Type of flux coating
  - c) Tensile Strength
  - d) **Special Characteristics of the electrode**
- 432 The output of an arc welding machine is commonly expressed in terms of
- a) wattage
  - b) **amperage**
  - c) voltage
  - d) hertz
- 433 AC welding machines house transformers to reduce input \_\_\_\_\_ and increase output \_\_\_\_\_ for safe and effective welding.
- a) amperage – voltage
  - b) amperage- wattage
  - c) **voltage- amperage**
  - d) voltage- wattage
- 434 In the GMAW welding process, the “consumable” electrode is in the form of a :
- a) **continuous wire**
  - b) tungsten electrode
  - c) 36” electrode
  - d) 12 “ electrode
- 435 Why is a long arc held at the beginning of a bead?
- a) it helps to cool the molten puddle more quickly
  - b) **it allows the molten puddle to develop quickly**
  - c) it increases the life of the electrode
  - d) it creates more light to see the molten puddle better
- 436 A lean fuel mixture means that
- a) the mixture has the correct amount of air, but too much fuel
  - b) the engine will operate more efficiently
  - c) **the mixture has less fuel and more air**
  - d) the mixture has less air and more fuel
- 437 The spark plug gap of a plug that has been used should be gapped with
- a) a flat feeler gauge
  - b) a notecard

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- c) a micrometer
  - d) **a wire feeler gauge**
- 438 Compression ratio is "the relationship between the volume of the cylinder plus combustion chamber at the beginning of
- a) **the compression stroke and the end of the compression stroke"**
  - b) "the relationship between the volume of the cylinder plus combustion chamber at the end of the compression stroke as compared to the volume at the beginning of the compression stroke"
  - c) the relationship between the volume of the cylinder at the beginning of the compression stroke and the end of the power stroke
  - d) the relationship between the volume of the combustion chamber and the cylinder
- 439 Cylinder wear is greatest at:
- a) travel parallel to the crankshaft
  - b) **the top of the ring**
  - c) the center of the ring travel
  - d) the bottom of the ring travel
- 440 When arc welding, injury to the eyes can result from
- a) welding with less than a No. 10 lens
  - b) viewing welding without a helmet or shield
  - c) chipping without eye protection
  - d) **All of the answers listed**
- 441 The appearance and strength of a bead are influenced by
- a) angle that the electrode is held
  - b) travel speed when making the weld
  - c) amperage setting on welder
  - d) **All of the answers listed**
- 442 Burning clothes on a human should be extinguished with
- a) **a fire blanket**
  - b) a fire extinguisher
  - c) sand
  - d) water
- 443 Water in a welding area is useful for
- a) cooling metal
  - b) extinguishing fires
  - c) receiving sparks from piercing
  - d) **All of the answers listed**
- 444 If only one kind of electrode for all arc welding is to be purchased, the best choice is an

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- a) E6010
  - b) **E6011**
  - c) E6013
  - d) E7018
- 445 For most welding in agricultural mechanics the best electrode size is
- a) **1/8 inch**
  - b) 1/16 inch
  - c) 3/16 inch
  - d) ¼ inch
- 446 What are the advantages of gold-coated filter lenses?
- a) **Allows the welder to see the work in natural colors and reflects 99.9 percent of the harmful rays and 99.9 percent of the heat.**
  - b) Allows the welder to see the work in natural colors and absorbs 99.9 percent of the harmful rays and 99.9 percent of the heat.
  - c) Allows the welder to see the work in black and white and reflects 75.5 percent of the harmful rays and absorbs 50 percent of the heat.
  - d) Allows the welder to see the work in gold colors and reflects 99.9 percent of the harmful rays and 99.9 percent of the heat.
- 447 At what angle should the electrode be held to realize the greatest advantage of the electromagnetic field surrounding the electrode?
- a) 45°
  - b) 75°
  - c) **90°**
  - d) 115°
- 448 When working with metals, which would not be a method for identifying metals?
- a) Spark Test
  - b) **Ductility**
  - c) Appearance
  - d) Magnetic test
- 449 Electrodes are identified by classification systems established by
- a) Society of American Iron Workers
  - b) **American Welding Society**
  - c) American Welders Association
  - d) American Materials Society
- 450 The flux coating on the electrode provides a gas shield to
- a) Does not affect the welding process
  - b) By product of the electrode
  - c) **Protect the molten metal**

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- d) Prevents slag from forming
- 451 When welding with a direct current machine straight polarity, the electrode holder would be
- a) Positive
  - b) **Negative**
  - c) The current from both directions
  - d) The current flows from the electrode holder all the time
- 452 Which of the following is not another name for Shielded Metal Arc Welding?
- a) Arc Welding Stick
  - b) welding
  - c) SMAW
  - d) **GMAW**
- 453 The output of an arc welding machine is commonly expressed in terms of
- a) wattage
  - b) **amperage**
  - c) voltage
  - d) hertz
- 454 AC welding machines house transformers to reduce input \_\_\_\_\_ and increase output \_\_\_\_\_ for safe and effective welding.
- a) amperage – voltage
  - b) amperage- wattage
  - c) **voltage- amperage**
  - d) voltage- wattage
- 455 The AC/DC welding machine is essentially an AC welder with an electronic device to convert AC to DC power. This electronic device is called a
- a) justifier
  - b) generator
  - c) amplifier
  - d) **rectifier**
- 456 The \_\_\_\_\_ is an engine part that converts the up and down or linear motion of the piston to circular motion.
- a) **crankshaft**
  - b) flywheel
  - c) connecting rod
  - d) camshaft
- 457 A lean fuel mixture means that
- a) the engine will operate more efficiently
  - b) **the mixture has less fuel and more air**

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- c) the mixture has the correct amount of air, but too much fuel
  - d) the mixture has less air and more fuel
- 458 The spark plug gap of a plug that has been used should be gapped with
- a) a flat feeler gauge
  - b) a notecard
  - c) **a wire feeler gauge**
  - d) a micrometer
- 459 Compression ratio is
- a) **the relationship between the volume of the cylinder plus combustion chamber at the beginning of the compression stroke and the end of the compression stroke**
  - b) the relationship between the volume of the combustion chamber and the cylinder
  - c) the relationship between the volume of the cylinder at the beginning of the compression stroke and the end of the power stroke
  - d) the relationship between the volume of the cylinder plus combustion chamber at the end of the compression stroke as compared to the volume
- 460 Since small engines burn a fuel mixture to generate the power to run the engine, the engine is
- a) an external compression engine
  - b) an external combustion engine
  - c) an internal compression engine
  - d) **an internal combustion engine**
- 461 \_\_\_\_\_ is the point at which the piston is farthest from the cylinder head.
- a) TDC
  - b) **BDC**
  - c) MDC
  - d) None of the answers listed
- 462 A \_\_\_\_\_ plate is a round disk that pivots on a shaft, regulating air and fuel flow inside a carburetor
- a) rod
  - b) choke
  - c) vent
  - d) **throttle**
- 463 A(n) \_\_\_\_\_ governor system is a system, which uses force from moving air produced by rotating flywheel fins to sense engine speed.
- a) flywheel
  - b) **pneumatic**
  - c) rotating
  - d) force

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464 A cylinder \_\_\_\_\_ test is a test that checks the sealing capability of compression components of a small engine using compressed air.

- a) leaking
- b) leakout
- c) **leakdown**
- d) neither A, B, nor C

465 On a four stroke cycle engine, two revolutions of the crankshaft corresponds to \_\_\_\_\_ revolution(s) of the camshaft

- a) 0
- b) **1**
- c) 2
- d) 4

466 The most common method of increasing valve clearance on a small gasoline engine is to

- a) grind the valve face
- b) grind the valve seat
- c) grind the valve tappet
- d) **grind off the end of the valve stem**

467 An internal combustion engine uses the process of rapid combustion to operate. The combustion process requires what three things?

- a) fuel-spark-carbon
- b) **fuel-oxygen-heat**
- c) fuel-compression-heat
- d) fuel-oxygen-air

468 When the piston is at its highest point (greatest distance from the crankshaft) it is said to be at

- a) BDA
- b) TDA
- c) **TDC**
- d) BDC

469 At the bottom of the intake stroke, the crankshaft moves across the bottom of its swing causing the piston to move upward squeezing the air/fuel mixture against the head. This stroke is known as the \_\_\_\_\_ stroke.

- a) power
- b) intake
- c) exhaust
- d) **compression**

470 On a four-stroke cycle engine, the crankshaft makes \_\_\_\_\_ complete revolutions or turns during a cycle.

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- a) 1
- b) **2**
- c) 3
- d) 4

471 Most small engine foam type filters should be serviced after 25 hours of operation by washing. Which of the following is not approved for safely washing the foam filter?

- a) kerosene
- b) varsol
- c) detergent & water
- d) **gasoline**

472 Which of the following is not a recommended activity when servicing spark plugs on a small engine?

- a) soaking in solvent
- b) **sandblasting**
- c) scraping off deposits with knife
- d) re-gapping

473 Type NM cable

- a) cannot be installed in masonry block walls
- b) **cannot be used as service entrance cable**
- c) cannot be used for exposed work in dry locations
- d) cannot be used in multifamily dwellings

474 Multiwire branch circuit shall

- a) supply only line to neutral loads
- b) have its conductors originate from the same panelboard
- c) have a disconnect to open both "hots" at the same time when supplying a device or equipment on the same yoke in a dwelling unit
- d) **All of the answers listed**

475 GFCI protection is required for all \_\_\_\_\_ ampere, 125 volt single-phase receptacles installed on roofs.

- a) **15 and 20**
- b) 15
- c) 20
- d) 30 ampere or less

476 The minimum size branch circuit conductor is

- a) No. 10
- b) No. 12
- c) **No. 14**
- d) None of the answers listed

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- 477 Service conductors supplying one building shall not \_\_\_\_\_ of another building.
- a) **pass through the interior**
  - b) be installed on the exterior walls
  - c) all of the answers listed
  - d) None of the answers listed
- 478 Ground rods cannot be less than \_\_\_\_\_ feet in length.
- a) 6
  - b) **8**
  - c) 10
  - d) 12
- 479 When installing electrical cable in a wet location, which of these type cables is permitted for this type installation?
- a) Type AC
  - b) Type THHN
  - c) Type NM Romex
  - d) **Type UF**
- 480 When installing electrical circuits, which of the following would not help reduce voltage drop?
- a) Decrease the load of the circuit
  - b) **Decrease the voltage of the circuit**
  - c) Increase the size of the conductor
  - d) Decrease the length of the circuit
- 481 The smallest size copper conductor that should be used for a 30 amp circuit is
- a) 8 AWG
  - b) **10 AWG**
  - c) 12 AWG
  - d) 14 AWG
- 482 The silver terminal on a receptacle is identified for the connection of the \_\_\_\_\_ conductor.
- a) Ungrounded
  - b) **Grounded**
  - c) Grounding
  - d) Either the Grounded or ungrounded
- 483 White wires used as a ungrounded conductor must be
- a) Connected to black wires
  - b) Stripped of all insulation
  - c) Connected to fixtures
  - d) **Taped or painted black**
- 484 The line from the power supplier's transformer to your electric meter is known as the

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- a) metering circuit
- b) distribution panel
- c) **service drop**
- d) feeder circuit

485 A \_\_\_\_\_ functions by comparing the current in the “hot” wire with that of the “neutral” and opening the circuit if these currents differ by 5/1000 amp or more, thus shutting off the power and eliminating the shock hazard.

- a) switch
- b) fuse
- c) breaker
- d) **GFCI**

486 A four-way switch is used with two \_\_\_\_\_ switches where lights are to be controlled from three different locations.

- a) one-way
- b) two-way
- c) **three-way**
- d) four-way

487 Service lateral conductors must be installed a minimum of \_\_\_\_\_ feet below the ground surface level.

- a) 1
- b) **2**
- c) 3
- d) 4

488 If using metallic device boxes, the NEC requires that the cable be secured within the box by an approved \_\_\_\_\_ clamp or cable connector.

- a) pigtail
- b) **cable**
- c) screw
- d) splice

489 The NEC requires that conductor insulation be color-coded. Which of the following conductor insulation colors indicates the grounded conductor?

- a) red
- b) black
- c) **white**
- d) green

490 What is the name of the tillage system that leaves about one third of the soil covered with crop residue and includes no-till, strip-till, ridge-till, and mulch-till?

- a) Deep-plow tillage

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- b) **Conservation tillage**
  - c) Conventional tillage
  - d) Aeration tillage
- 491 What essential nutrient required for plant growth do legume cover crops provide?
- a) Potassium
  - b) Phosphorus
  - c) **Nitrogen**
  - d) Gypsum
- 492 What is the name of the farming practice where the annual crop grown alternates in a planned pattern?
- a) Irrigation
  - b) **Crop rotation**
  - c) Pest mitigation
  - d) Crop dehydration
- 493 Which of the following is a list of fertilizer application techniques?
- a) **Deep banding, broadcasting, and surface banding**  
Broadcasting, fumigation, and subsoiling
  - b) Surface banding, mitigating, and saturating
  - c) Deep banding, subsoiling, and surface banding
- 494 What are the two main types of threshing systems found on combine harvesters?
- a) Centrifugal and conventional
  - b) **Rotary and conventional**
  - c) Side-hill and nonconventional
  - d) Full fingered and nonconventional
- 495 A rotary threshing system includes what mechanical component?
- a) Straw walker
  - b) **Cleaning shoe**
  - c) Shaker pan
  - d) Cylinder bar
- 496 A small utility vehicle is equipped with a carbureted gasoline engine. The carburetor utilizes a restricted air passage to enable the fuel and air to mix. What is the name of the restricted air passage?
- a) Choke valve
  - b) Throttle valve
  - c) **Venturi**
  - d) Needle valve
- 497 What is the approximate compression ratio for the pistons of a gasoline engine?
- a) 1 to 1

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- b) **8 to 1**
- c) 14 to 1
- d) 22 to 1

498 What is the maximum length of time the starter (starter motor) be operated during each attempt to start a tractor?

- a) 5 seconds
- b) 10 seconds
- c) **30 seconds**
- d) 60 seconds

499 In a conservation tillage system such as mulch tillage, approximately how much of the soil surface should remain covered by crop residues?

- a) 10 percent
- b) **30 percent**
- c) 70 percent
- d) 100 percent

500 Under ideal conditions, which of the following primary tillage implements results in the best residue burial and superior soil pulverization?

- a) Chisel plow
- b) **Moldboard plow**
- c) Subsoiler
- d) Disk harrow

501 Which of the following will cause an increase in planting rate (seeds/acre) for a row crop planter that uses a ground-driven metering system?

- a) Increase in the travel speed of the planter
- b) **Under inflation of the planter's drive wheel tires**
- c) Reduction in the travel speed of the planter
- d) Over inflation of the planter's drive wheel tires