

**STATE FFA AGRICULTURAL ENGINEERING CAREER DEVELOPMENT EVENT**

**Written Examination – 75 Questions – Two Points each**

**SHEET #260016 Ohio Multipurpose A**

**BACK OF SHEET STARTING WITH #201**

Instructions: **Do not mark on the exam!** Please read the questions carefully and select the best answer for each of the following questions. Darken or black out the letter corresponding to the correct answer on the answer sheet provided. There are five areas of general knowledge with 15 questions each for a total of 75 questions worth 2 points each. Good Luck!

**2009 Energy Systems – 15 Questions**

**201. An electrical heater rated at 1540 W and operated at 120 V would draw much current?**

- a. 185 Kilowatts
- b. 7 Watts
- c. 7 amperes
- d. 7 Ohms

**202. A heater is rated at 2000 W and electricity costs \$0.08/kWhr, what does it cost if the heater runs continuously for 4 hours?**

- a. \$ 0.04
- b. \$ 0.40
- c. \$ 0.06
- d. \$ 0.32

**203. OHMS Law formulas State Which of the following**

- a.  $W = V \times I$
- b.  $I = V \times R$
- c.  $V = I / W$
- d. all of the above

**204. Agricultural buildings must be wired with different materials than a residence because**

- a. dust and moisture in agricultural buildings.
- b. heavier loads are present.
- c. different voltage levels are used.
- d. agricultural buildings need to be wired cheaper.

**205. The name of a switch which opens and closes depending on the temperature of the air,**

- a. thermostat.
- b. humidistat.
- c. relay.
- d. reed switch.

**206. Automotive electrical systems are generally operated on**

- a. inverter systems
- c. 12 Vac, 400 Hz
- d. 120/240 V single phase
- d. 12 Vdc

- 207. The \_\_\_\_\_ bearing is used in electric motors and allows the motor to be mounted in any position.**
- a. ball
  - b. thrust**
  - c. sleeve
  - d. friction
- 208. A GFCI will open the circuit when it senses**
- a. a leakage current greater than 5/1000 Ampere (5 mA).**
  - b. voltage on the supply circuit drops below 100 V.
  - c. more than 125% overload current.
  - d. voltage on the supply side exceeds rated voltage.
- 209. Which of the following is a common designation for an electric motor type?**
- a. 1800 rpm
  - b. Overload capacity
  - c. Capacitor-start**
  - d. Intermittent
- 210. Term used in hydraulics that describes a fluid under pressure**
- a. Reserve pressure
  - b. Cavitation
  - c. Hydrostatic**
  - d. Hydrolysis
- 211. Which is a type of hydraulic pump?**
- a. Piston**
  - b. Diaphragm
  - c. Reed
  - d. Electro-pressure
- 212. If electric motors are not cooled properly problems can occur by**
- a. an increase in the Voltage.
  - b. shorts developing in the windings.**
  - c. a decrease in amperage draw.
  - d. all of the answers offered
- 213. In an automobile or tractor battery, chemical energy is converted into electrical energy by the chemical reaction between the active materials of dissimilar plates submersed in a (an) \_\_\_\_\_ solution.**
- a. magnetic
  - b. basic
  - c. electrolyte**
  - d. water
- 214. Which of the following types of starting devices would allow the use of automated-remote or multiply starting locations?**
- a. Magnetic starter**
  - b. Manual starter
  - c. Toggle switch
  - d. all of the above

**215. If the specific gravity of a battery measures 1.257 in all cells, what should be done to determine if the battery should be replaced?**

- a. First charge battery then test further
- b. Nothing can be done, replace the battery
- c. Replace the engine alternator and battery cables
- d. Battery is in good condition, do not replace

**2009 Environmental and Natural Resource Systems – 15 Questions**

**216. Which measurement does NOT equal One Chain length?**

- a. 4 rods
- b. 66 feet
- c. 100 feet
- d. all of the answers offered

**217. A square tract of land which is 1/2 mile on each side contains \_\_\_\_\_ acres.**

- a. 40
- b. 320
- c. 640
- d. 160

**218. Water held in the soil that is Un-available for plants to use is**

- a. hygroscopic water.
- b. capillary water.
- c. surface water.
- d. gravitational water.

**219. Water which will leach the most available nutrients out of the soil is**

- a. hygroscopic water.
- b. gravitational water.
- c. capillary water.
- d. surface water.

**220. A conservation practice recommended for the establishment of waterways where a high water velocity will be incurred almost immediately is**

- a. concrete slabs laid parallel across the waterway.
- b. direct sodding.
- c. straw covering.
- d. seeding with double the nitrogen level.

**221. The inherent poisonous potency of a compound under experimental conditions is referred to as the compound's \_\_\_\_\_**

- a. toxicity.
- b. use hazard.
- c. poisoning effect.
- d. noxious effect.

**222. A pesticide label that contains the signal word DANGER in bold print and is required for all highly toxic compounds, is classified as:**

- a. Category II
- b. Category III
- c. Category IV
- d. Category I

**223. Which Signal word is on the label of a pesticide which is moderately toxic?**

- a. **WARNING**
- b. CAUTION
- c. DANGER
- d. HAZARDOUS

**224. Something that can be broken down by bacteria and fungi is called**

- a. **biodegradable.**
- b. recyclable
- c. natural
- d. in-organic

**225. Careful preservation and protection of something, especially planned management of a natural resource to prevent exploitation, destruction, or neglect is termed:**

- a. **conservation**
- b. restoration
- c. utilization
- d. development

**226. The amount of drift an application of herbicide may be attributed to:**

- a. droplet size, wind velocity, and speed of travel
- b. **droplet size, wind velocity, and spray release height**
- c. droplet size, wide velocity, and rate of application
- d. droplet size, wind velocity, and the amount of additives in the mixture

**227. Liquid chemical drift can be described as:**

- a. **when chemicals do not stay in the intended area**
- b. when the application equipment does not stay in rows of a field
- c. when the chemical is washed through the ground by rain
- d. all of the answers offered

**228. The separation of an organic substance into its' constituent elements is achieved by:**

- a. combustion
- b. decomposition
- c. oxidation- reduction reactions
- d. **all of the answers offered**

**229. The separation of an organic substance into its' constituent elements through chemical and biological change; to rot:**

- a. **decomposition**
- b. reduction
- c. combustion
- d. all of the answers offered

**230. In any ecosystem, there are 3 main groups of organisms:**

- a. predators, prey and observers
- b. plants, animals, and decomposers
- c. **producers, consumers, and decomposers**
- d. producers, constituents, consumers

## 2009 Industry and Marketing Systems – 15 Questions

**231. All of the information necessary to build a structure as it was designed and engineered can be found in the**

- a. specifications.
- b. drawing.
- c. building permit.
- d. project plans.

**232. Information lists which describe written details to clarify the types of items necessary to build a structure can be found in the**

- a. drawing.
- b. building permit.
- c. specifications.
- d. plan title page.

**233. On a materials list, the cost of material per selling unit is called**

- a. unit cost.
- b. cost extension.
- c. pricing unit.
- b. unit extension.

**234. Written authorization for a supplier to ship product at a specified place.**

- a. requisition
- b. purchase order
- c. submittal
- d. project bid

**235. The price a borrower pays for using a lending institution's money is called the**

- a. interest
- b. rate
- c. base
- d. premium

**236. An individual and his/her unincorporated business are considered a single entity.**

- a. joint venture
- b. partnership
- c. franchise
- d. proprietorship

**237. When an agricultural pesticide is swallowed, it is considered a/an \_\_\_\_\_ exposure.**

- a. oral
- b. inhalation
- c. dermal
- d. ocular

**238. The LC50 value for a compound is associated with which type of exposure**

- a. inhalation
- b. oral
- c. dermal
- d. all of the answers offered

**239.** \_\_\_\_\_ is a measure of the ability of a pesticide to cause a harmful effect.

- a. Toxicity
- b. Acute
- c. Exposure
- b. Dosage

**240. Which terms best describes the effect of a single exposure to a chemical causing an illness?**

- a. acute
- b. chronic
- c. toxic
- d. caustic

**241. The United States \_\_\_\_\_ is the federal agency that registers and regulates all pesticides.**

- a. Worker Protection Standard (WPS)
- b. Environmental Protection Agency (EPA)
- c. Department of Agriculture (USDA)
- d. Occupational Safety and Health Administration (OSHA)

**242. In production agriculture, the most common form of chemical poisoning is through:**

- a. oral contact
- b. dermal contact
- c. inhalation
- d. ocular contact

**243. Money that is paid back on a loan minus the interest and fees.**

- a. note
- b. equity
- c. rate
- d. principle

**244. Which of the following is NOT considered a commercial building:**

- a. condominium
- b. school
- c. restaurant
- d. grocery store

**245. The person responsible for estimating the cost of a engineering job is the**

- a. architect
- b. estimator
- c. project manager
- d. financial officer

### **2009 Machinery and Equipment Systems – 15 Questions**

**246. Which of the following will effectively adjust the rate of spray when calibrating a sprayer?**

- a. pressure
- b. speed of travel
- c. nozzle size
- d. all of the answers offered

**247. When calibrating a sprayer, if the gallon per acre value determined is not required, the easiest method of correction is to:**

- a. change the sprayer pressure.
- b. changing the nozzle tips.
- c. speed up or slow down the tractor.
- d. none of the answers offered

**248. When calibrating a sprayer for Band application and the pesticide rate is given for broadcast application you should:**

- a. convert the application rate (Band rate = (Band width(in) X(row spacing(in) / Broadcast rate))
- b. no need to convert the rate
- c. convert the application rate (Band rate = (Band width(in) / row spacing(in)) X Broadcast rate)
- d. always reduce the rate by 1/3

**249. The ideal location to mount the pressure gauge for the greatest accuracy in application of the chemical is:**

- a. on the boom as close to the nozzles as possible.
- b. before the pressure regulator.
- c. close to the operator.
- d. immediately after the pump.

**250. Diesel fuel used in agricultural tractors can be distinguished from fuel used in over-the-road vehicles by**

- a. lower octane number in agricultural fuels.
- b. red dye in agricultural fuel.
- c. red dye in over-the-road fuel.
- d. there is no difference.

**251. The main reason for keeping permanent antifreeze in the tractor radiator during the summer months is to**

- a. prevent accidental freezing in case of a cold snap.
- b. raise the boiling point of the coolant.
- c. lower the freezing point of the coolant.
- d. prevent the cooling system from being overloaded when using the air conditioning.

**252. When making planter adjustments, proper down pressure on this part will best close the seed trench.**

- a. packer wheel
- b. ripple coulter
- c. gauge wheels
- d. all of the answers offered

**253. Nozzle type for sprays are grouped by which following:**

- a. spray patterns.
- b. spray angles.
- c. flow rates.
- d. all of the answers offered

**254. Creeping of a hydraulic cylinder when stopped in mid-stroke is most likely caused by**

- a. excessive pressure.
- b. worn control valve
- c. incorrect hydraulic oil.
- d. misalignment of the piston rod

**255. The presence of water in a hydraulic system is indicated by**

- a. the fluid having a grayish-milky color
- b. excessive thinning of the oil.
- c. noisy relief valves.
- d. the need to add fluid more often than normal.

**256. Which of the following is not the recommended procedure to clean a clogged orifice tip?**

- a. fine bristle brush
- b. toothpick
- c. metal probe
- d. cleaning solution and water

**257. Sprayers should be calibrated:**

- a. periodically during the season and each time a new chemical is used.
- b. only when purchased new.
- c. only once a year after winter storage.
- d. only when changing from one chemical to another.

**258. Adjusting seeding rate is best done by changing**

- a. the size of the wheel.
- b. only travel speed.
- c. the ratio of seed metering mechanics to the travel speed of the planter.
- d. only the seed metering mechanism.

**259. The diesel fuel system transfer pump pushes fuel to the**

- a. injector pump.
- a. injector nozzles.
- c. combustion chamber.
- d. auxiliary tank

**260. The air intake system does which of the following?**

- a. heats, filters and slows down the air
- b. filters, heat and atomize the air
- c. compress, heat and slow down the air
- d. compress, filter and speeds up the air

### **2009 Structural Systems – 15 Questions**

**261. Term which describes the sink or settle of a sample of concrete to determine the workability of the mix.**

- a. slump
- b. stiffness
- c. aggregate
- d. float

**262. To increase the tensile strength of concrete which of the following is increase in the mix?**

- a. water
- b. fine aggregate
- c. cement
- d. coarse aggregate

**263. The horizontal members on which the trusses sit are called.**

- a. girder
- b. girts
- c. purlins
- d. none of the answers offered

**264. Round poles are classified according to**

- a. length.
- b. average diameter.

- c. weight.
- d. top circumference.

**265. Properly cured concrete will do which of the following as it ages.**

- a. become harder.
- b. become softer
- c. remain the same
- d. separate into layers

**266. When constructing a chemical storage structure, the air inlet vents should be located \_\_\_\_\_ to help remove heavier than air toxic and flammable vapors**

- a. at eye level
- b. greater than 48 inches from the floor
- c. as high as possible on the walls
- d. within 12 inches from the floor

**267. A knot in a rafter should be**

- a. placed in compression.
- b. placed in tension.
- c. knocked out.
- d. placed in parallel.

**268. Three coating put on nails to increase the holding power are cement, resin, or**

- a. brass.
- b. neoprene.
- c. zinc.
- d. chrome.

**269. To reduce splitting the ends of lumber**

- a. blunt the nail point.
- c. use a larger nail.
- b. sharpen the nail point.
- d. use a larger hammer.

**270. A chemical storage structure equipped with a mechanical ventilation system should be designed to have a minimum of \_\_\_\_\_ air changes per hour when the facility is to be occupied by a person.**

- a. 2
- b. 8
- c. 10
- d. 4

**271. Sheet metal roofing nails should be made of the same material as the roofing because,**

- a. possible chemical reaction of the metals
- b. they do not need to be the same material.
- c. the aesthetic look of the nails.
- d. they should always be steel.

**272. The three general classifications of softwoods are**

- a. log- post and structural.
- b. light framing - joist and plank.
- c. board - dimension and timbers.
- d. finish - common and select.

**273. This tool produces a rough finish for traction on fresh concrete.**

- a. broom
- b. steel trowel
- c. wood float
- d. magnesium float

**274. Excessive working of plastic concrete may result in**

- a. mixing of the aggregate.
- b. surface scaling at a later period.
- c. sinking of the water in the mix.
- d. all of the answers offered

**275. The best tool for calculating and marking the slope angle for a rafter board.**

- q. steel tape measure.
- b. framing square.
- c. combination square.
- b. T-bevel square.

**STATE FFA AGRICULTURAL ENGINEERING TECHNOLOGY CONTEST**  
**Problem Solving – 25 questions – Four Points each**

Instructions: **Do not mark on the exam!** Please read the questions carefully and select the best answer for each of the following questions. Darken or black out the letter corresponding to the correct answer on the answer sheet provided. There are five areas of general knowledge with 5 questions each for a total of 25 questions worth 4 points each. Good Luck!

**2009 Machinery and Equipment Systems – 5 Questions**

276. What is the Value of the Wheat in a circular grain bin 40 in diameter, and the wheat is 25 ft high in the bin. The value of the wheat is \$4.00 per bushel. One bushel of wheat is 60 lbs and has a volume of 1.25 cubic feet.

- a. \$100,480
- b. \$122,264
- c. \$ 3,925
- d. \$64,804

277. What is the number of acres that can be sprayed with one, 1200 gallon full tank, traveling at 25 acres /hr and applying 20 gallon/acre?

- a. 120 acres
- b. 48 acres
- c. 2.7 acres
- d. 60 acres

278. What is the pressure (psi) in a 6 in diameter cylinder that is holding a load force of 18,500 lbs.

- a. 1432 psi
- b. 982 psi
- c. 3083 psi
- d. 1964 psi

279. How much time will it take to fill a truck bed ,level to the top, that is 7 ft wide 16 feet long and 60 inch tall, If 6 in diameter auger is moving 12 bushel of corn per minute? ( one bushel of corn weighs 56 lbs and occupies a volume of 1.25 cubic ft.)

- a. 45 min
- b. 30 min
- c. 15 min
- d. 60 min

280. Given the following data for an electric motor, calculate the efficiency of motor.

Data : 1 hp= 746 W

Motor inputs - 225 V , 25 A, 7500 watts

Motor outputs – 8.0 hp , 1760 rpm

- a. 82.9%
- b. 76.5%
- c. 79.6%
- d. 95.5%

### **2009 Environmental and Natural Resources Systems – 5 Questions**

281. How many trees will be needed to replant an area that is 4 acres, when the trees are planted in rows 8 feet apart and spaced 72 inches? ( note: one acre = 43,560 square feet)

- a. 3,630 trees
- b. 303 trees
- c. 908 trees
- d. 1362 trees

282. If algae contain a carbon: nitrogen: phosphorus (C:N:P) ratio of 100:16:1 by weight, and the water in which the algae grow contains 2.00 mg/L of carbon, 0.16 mg/L of nitrogen, and 0.20 mg/L of phosphorus, which element will be limiting algae growth?

- a. Carbon
- b. Nitrogen
- c. Phosphorus
- d. none are limiting

283. How many days of storage can a rectangular manure pit that is 30 feet wide, 90 feet long and 60 inches deep when the manure produced by 360 hogs averages 4 gal per pig per day?

Note : 1 gal = .134 cubic feet

- a. 7 days
- b. 70 days
- c. 58 days
- d. 280 days

284. A rectangular field measures 520 yards long and 1900 feet wide. This field contains how many acres?

- a. 68 acres
- b. 23 acres
- c. 3460 acres
- d. 75 acres

285. An area is to be re-planted and the plant spacing is 3 feet by 3 feet. What is the population rate per acre that is being requested.

- a. 14,520 plants per acre.
- b. 1,613 plants per acre.
- c. 4,840 plants per acre.
- d. 22,000 plant per acre.

### 2009 Energy Systems – 5 Questions

286. A 1500 watt heater operates 24 hrs per day. What is the cost to operate the heater for 4 months, if electricity is \$.065 per kwh? ( each month = 30 days)

- a. \$ 280.80
- b. \$ 9,360.00
- c. \$ 124.80
- d. \$ 29.25

287. Given a farmstead with the following buildings and the corresponding maximum demand loads, determine the minimum main service capacity -- Residence - 85 A, 230 V -- Grain Handling System - 115 A, 230 V -- Farm Shop - 75 A, 230 V -- Hog House - 90 A, 230 V -- Beef Barn - 40 A, 230 V

- a. 500 A
- b. 1000 A
- c. 400 A
- d. 200 A

288. The heater in a pig nursery has a output of 45,000 BTU/hr. If the heater is burning propane at 75% efficiency, what is the cost per hour for the propane to operate the heater? Assume that the propane costs \$2.90/gal and has an energy content of 92,000 BTU/gal.

- a. \$1.42/hr
- b. \$ .67/hr
- c. \$4.45/hr
- d. \$1.89/hr

289. Given the following data for an electric motor, calculate the operating efficiency of the motor. Note: 1 hp = 746 W -- Motor Inputs – 225 V, 25 A, 4500 W, -- Motor Outputs – 4.0 hp, 1760 rpm

- a. 66.3%
- b. 95.4%
- c. 76.5%
- d. 82.9%

290. Given a 120 Volt circuit that has three 100 watt bulbs and one 1500 watt heaters. How many Amps will be pulled when the items are all running at once?

- a. 30 amps
- b. 13.3 amps
- c. 15 amps
- d. .07 amps

### 2009 Industry and Marketing Systems – 5 Questions

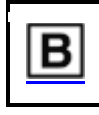
291. Calculate the total amount of money due if the tax rate to be applied to the items is 6.25%. The Items include a Mower - \$ 1324.90 and a bag of seed \$79.95. ( The customer is not tax exempt.)

- a. \$1487.65
- b. \$1404.85
- c. \$2282.85
- d. \$1492.65

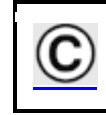
Choosing a fire extinguisher: **A** Class A fires are the most common. They involve ordinary combustibles such as wood, paper, cloth, rubber, and some plastics. -- **B** Class B fires are caused by flammable liquids, gases, and grease. Water can spread and splatter these explosive fires when sprayed into the flames. -- **C** Class C electrical fires require special attention. Water provides a path of conductivity for electricity to follow, endangering personnel.



Class A fires are the most common. They involve ordinary combustibles such as wood, paper, cloth, rubber, and some plastics.



Class B fires are caused by flammable liquids, gases, and grease. Water can spread and splatter these explosive fires when sprayed into the flames.



Class C electrical fires require special attention. Water provides a path of conductivity for electricity to follow, endangering personnel.

292. Given the above chart on fire, fire extinguisher types and symbols which type would be the best to have for a grease fire?

- a. A type extinguisher
- b. C type extinguisher
- c. bucket of water
- d. **B type extinguisher**

293. Given the above chart on fire, fire extinguisher types and symbols which type would be the best to have in a Machinery Shop?

- a. **ABC type extinguisher**
- b. B type extinguisher
- c. C type extinguisher
- d. A type extinguisher

You have been given the following chart listing performance characteristics of different types of stainless steel.

#### Stainless Steel Types Performance Characteristics

Corrosion Resistance	Machinability	Weldability
Excellent 316, A286, Nitronic 60	Excellent 303, 416	Good 301, 302, 304, 316, 321, 17-4
Good 301, 302, 304, 309, 321	Good 304, 316, 410, 430	PH Fair
Fair 303, 430	Fair 301, 302, 309, 321, 420	410 Difficult
Poor 410, 416, 420, 440C	Poor 420V, 440C, 15-5 PH, 17-4	303, 416, 440C
Not rated 420V, 15-5 PH, 17-4 PH	PH, Nitronic 60, A286	

Based on the above chart which type of stainless steel would best suited for the following applications:

294. Ease of machining or machinability

- a. 303
- b. 301
- c. 410
- d. 316

295. Best with combined characteristics of weldability, machinability and corrosion resistance.

- a. 416
- b. A286
- c. 303
- d. 316

### **2009 Structural Systems – 5 Questions**

296. A concrete drive is need that is 20 feet wide, 80 feet long and 6 inches deep. What is the cubic yards of concrete needed for this pour?

- a. 30 cubic yards
- b. 15 cubic yards
- c. 36 cubic yards
- d. 17 cubic yards

297. The sub-grade material for the concrete pad is 411 limestone, density of 100 pounds per cubic foot. What is the number of tons of stone to be ordered for an area of 30 feet wide, 120 feet long and 4 inches deep.

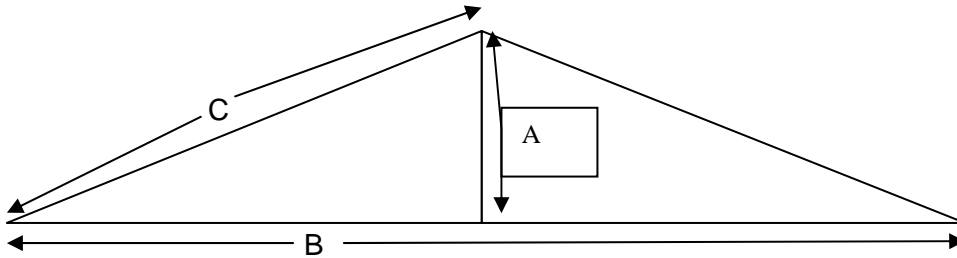
- a. 60 tons
- b. 225 tons
- c. 720 tons
- d. 180 tons

298. A new metal roof is needed for a pole building with each side of the two sloped roof measures 18 ft long and 60 feet wide. How many sheets of 3 ft x 18ft metal will be needed for this roof?

- a. 20 sheets
- b. 60 sheets
- c. 180 sheets
- d. 40 sheets

299. What is the number of sheet of 4 x 8 insulation board to cover a single sloped roof that measures 46 feet wide and 20 feet long ?

- a. 30 sheets
- b. 36 sheets
- d. 28 sheets



300. The length of the truss (B) is 24 feet wide and the height of the truss (A) is 6 feet, What is the length of the top of one side of the truss (C)?

- a. 14'
- b. 13'5"
- c. 13'
- d. 12'5"

**STATE FFA AGRICULTURAL ENGINEERING CAREER DEVELOPMENT EVENT**  
**Written Examination – 75 Questions – Two Points each**  
**May 2, 2008**

Instructions: **Do not mark on the exam!** Please read the questions carefully and select the best answer for each of the following questions. Darken or black out the letter corresponding to the correct answer on the answer sheet provided. There are five areas of general knowledge with 15 questions each for a total of 75 questions worth 2 points each. Good Luck!

**Machinery and Equipment Systems – 15 Questions**

**1. The electrolyte in a lead-acid battery is made up of**

- a. water and sulfuric acid.
- b. lead and calcium.
- c. lead and antimony.
- d. hydrochloric acid and water.

**2. Diesel fuel used in agricultural tractors can be distinguished from fuel used in over-the-road vehicles by**

- a. lower octane number in agricultural fuels.
- b. red dye in over-the-road fuel.
- c. red dye in agricultural fuel.
- d. there is no difference.

**3. The most heavy duty turbo charged diesel tractors could use an oil with an API rating of**

- a. CA.
- b. CB.
- c. CC.
- d. CD.

**4. The main reason for keeping permanent antifreeze in the tractor radiator during the summer months is to**

- a. prevent accidental freezing in case of a cold snap.
- b. raise the boiling point of the coolant.
- c. lower the freezing point of the coolant.
- d. prevent the cooling system from being overloaded when using the air conditioning.

**5. Adjusting seeding rate is best done by changing**

- a. the size of the wheel.
- b. the ratio of seed metering mechanics to the travel speed of the planter.
- c. only travel speed.
- d. the seed metering mechanism.

**6. In helping prepare the seedbed, no-till planters may use a \_\_\_\_\_ coultter.**

- a. rough
- b. smooth
- c. trash guard
- d. ripple

**7. Nozzle data supplied states that the Volume Median Diameter of a given nozzle is 810 microns at 40 psig and .5gpm. What percent of the droplets from this nozzle will be less than 810 microns?**

- a. 25
- b. 50
- c. 65
- d. 70

**8. When calibrating a sprayer, if the gallon per acre value determined is not required, the easiest method of correction is to:**

- a. change the sprayer pressure.
- b. speed up or slow down the tractor.
- c. changing the nozzle tips.
- d. none of the above.

**9. The ideal location to mount the pressure gauge for the greatest accuracy in application of the chemical is:**

- a. before the pressure regulator.
- b. immediately after the pump.
- c. close to the operator.
- d. on the boom as close to the nozzles as possible.

**10. Color coding of nozzle tips by companies makes it easy to match:**

- a. spray patterns.
- b. spray angles.
- c. nozzle heights.
- d. flow rates.

**11. A discharge line is frequently closed on a 250 psi spray system. If it is desired to reduce pump working pressure to pump inlet pressure, the best valve to install would be a/an"**

- a. unloader valve.
- b. relief valve.
- c. manual shut off valve.
- d. electric shut off valve.

**12. Strainers should always be checked before using a sprayer. If all strainers (tank, pump, and nozzle) were the same shape and size, the pump strainer could be identified as the one with \_\_\_\_\_ mesh.**

- a. 10-20
- b. 40-50
- c. 50-200
- d. 200+

**13. The air intake system of the engine includes**

- a. muffler.
- b. air cleaner.
- c. turbo charger.
- d. b and c only.

**14. The number-one cylinder on most engines is**

- a. located close to the front of the engine.
- b. the back cylinder - rear of the engine.
- c. varies with number of cylinders.
- d. varies - whether a vee or straight-line engine.

**15. The diesel fuel system transfer pump pushes fuel to the**

- a. injector nozzles.
- b. injector pump.
- c. combustion chamber.
- d. auxiliary tank.

### Energy Systems – 15 Questions

**16. Agricultural buildings must be wired with different materials than a residence because**

- a. heavier loads are present.
- b. dust and moisture in agricultural buildings.
- c. different voltage levels are used.
- d. agricultural buildings need to be wired cheaper.

**17. A switch that opens and closes depending on the moisture content of the air, is called a**

- a. humidistat.
- b. reed switch.
- c. relay.
- d. thermostat.

**18. Automotive electrical systems are generally operated on**

- a. 12 Vdc
- b. 12 Vac, 400 Hz
- c. inverter systems
- d. 120/240 V single phase

**19. The \_\_\_\_\_ bearing is used in electric motors and allows the motor to be mounted in any position.**

- a. ball
- b. sleeve
- c. thrust
- d. friction

**20. Which of these motor enclosures should be used if a motor is installed in an environment where it will be splashed or sprayed by water?**

- a. Open
- b. Dust proof
- c. Splash proof
- d. Explosion proof

**21. Term used in hydraulics that describes a fluid under pressure**

- a. Reserve pressure
- b. Hydrolysis
- c. Cavitation
- d. Hydrostatic

**22. Which is not a type of hydraulic pump?**

- a. Diaphragm
- b. Vane

- c. Gear
- d. Piston

23. Which of the following is a commonly used electric motor mount?

- a. "A" Frame
- b. Cushioned
- c. Vibrating
- d. Orbital

24. During the starting of an automobile or tractor, current for the starting system is provided by the:

- a. Transformer
- b. Alternator
- c. Generator
- d. Battery

25. If the specific gravity of a battery measures 1.200 in all cells, what should be done to determine if the battery should be replaced?

- a. Battery is in good condition, no further maintenance or testing is necessary
- b. Nothing can be done, replace the battery
- c. First charge battery then test further
- d. Replace the engine alternator and battery cables

26. In an automobile or tractor battery, chemical energy is converted into electrical energy by the chemical reaction between the active materials of dissimilar plates submersed in \_\_\_\_\_ solution.

- a. a water
- b. an electric
- c. a base
- d. an electrolyte

27. How are the input and output factors handled when checking the efficiency of an appliance as an energy converter?

- a. The output wattage is divided by the input wattage times 100
- b. The output and input wattages are multiplied and divided by 100
- c. the input wattage is divided by the output wattage times 100
- d. The output wattage is divided by 100 and multiplied by twice the input wattage

28. If electric motors are not cooled properly problems can occur by

- a. insulation breaking down in the windings.
- b. shorts developing in the windings.
- c. an increase in amperage draw resulting in a voltage drop.
- d. all of the above.

29. Ambient temperature is a standard for the

- a. temperature of the air surrounding the electric motor.
- b. temperature after operating the electric motor thirty minutes.
- c. temperature of the air inside the motor.
- d. none of the above.

30. A split phase-start motor can be reversed by

- a. changing the way it is plugged in.
- b. reversing leads of the starting windings.
- c. rotating the starting switch.
- d. changing position of the brushes.

### Industry and Marketing Systems – 15 Questions

31. All of the information necessary to build a structure as it was designed and engineered can be found in the

- a. specifications.
- b. project plans.
- c. drawing.
- d. building permit.

32. When two companies combine to work on a certain project the ownership becomes a

- a. franchise.
- b. joint venture.
- c. merger.
- d. proprietorship.

33. On a materials list, the cost of material per selling unit is called

- a. cost extension.
- b. unit extension.
- c. pricing unit.
- d. unit cost.

34. When an agricultural pesticide is spilled on your skin, it is considered a/an \_\_\_\_\_ exposure.

- a. oral
- b. inhalation
- c. dermal
- d. ocular

35. \_\_\_\_\_ is a measure of the ability of a pesticide to cause a harmful effect.

- a. Acute
- b. Dosage
- c. Exposure
- d. Toxicity

36. Least toxic chemicals would be labeled with this single word:

- a. Danger
- b. Warning
- c. Caution
- d. Hazard

37. The most commonly used form of pesticide formulation is:

- a. wettable powders.
- b. emulsifiable concentrates.
- c. baits.
- d. granules.

38. The higher the LD50 value for a compound, the:

- a. Less toxic the compound.
- b. Longer the period of time the compound remains toxic.
- c. More toxic the compound.
- d. Shorter the period of time the compound remains toxic.

39. \_\_\_\_\_ exposure is a low-level exposure to a compound or condition over a long period of time.

- a. Acute
- b. Chronic
- c. Ocular
- d. Toxicity

40. The United States \_\_\_\_\_ is the federal agency that registers and regulates all pesticides.

- a. Department of Agriculture (USDA)
- b. Environmental Protection Agency (EPA)
- c. Worker Protection Standard (WPS)
- d. Occupational Safety and Health Administration (OSHA)

41. A(n) \_\_\_\_\_ is a chemical that must be applied by a certified chemical applicator due to high toxicity or concerns about the environment.

- a. agrichemical
- b. fumigant
- c. pesticide
- d. restricted use pesticide

42. Clothing and devices that are worn to protect the human body from contact with pesticides and their residues are:

- a. respirators
- b. personal protective equipment
- c. safety shields
- d. Material Safety Data Sheets

43. Exposure to anhydrous ammonia may cause:

- a. eye irritation.
- b. freezing of the skin.
- c. damage to the respiratory tract.
- d. all of the above.

44. When a bid is advertised, it usually states

- a. the type of work.
- b. the location of the project.
- c. where to obtain plans and specifications.
- d. all of the above.

45. To gain support from taxpayers of a public project a \_\_\_\_\_ is passed around and signed.

- a. bond
- c. mortgage

b. certificate

d. petition

### Structural Systems – 15 Questions

**46. Round poles are classified according to**

a. top circumference.

b. average circumference.

c. length.

d. none of the above.

**47. Concrete hardens due to a chemical reaction called**

a. dehydration.

b. hydration.

c. electrolysis.

d. hydrolysis.

**48. When constructing a chemical storage structure, the air inlet vents should be located \_\_\_\_\_ to help remove heavier than air toxic and flammable vapors**

a. within 12 inches from the floor

b. greater than 12 inches from the floor

c. at eye level

d. as high as possible on the walls

**49. \_\_\_\_\_ refers to structures built around pesticide and fertilizer storage facilities to contain products that have escaped out to leaks, spills, fire, impacts, vandalism or ruptured tanks.**

a. Secondary containment

b. Adsorbent pillow or “pigs”

c. Primary containment

d. none of the above

**50. A well drained soil is essential when selecting sites for**

a. houses with basements.

b. septic tanks.

c. livestock feed lots.

d. all of the above.

**51. With sheet metal roofing the nails should be made of**

a. the same material as the roofing.

b. different material.

c. steel only.

d. aluminum.

**52. The three general classifications of softwoods are**

a. factory and shop-yard and structural.

b. board - dimension and timbers.

c. light framing - joist and plank.

d. finish - common and select.

**53. To reduce splitting the ends of lumber**

a. blunt the nail point.

b. sharpen the nail point.

c. use a smaller nail.

d. a and c.

**54. Three coating put on nails to increase the holding power are zinc, resin, or**

a. brass.

b. chrome.

c. neoprene.

d. cement.

**55. The best tool for transferring odd angles from one piece of lumber to another is the**

a. combination square.

b. steel tape measure.

c. sliding T-bevel square.

d. framing square.

**56. Regardless of size, the minimum recommended ventilation rate for a chemical storage facility is \_\_\_\_\_ CFM.**

a. 100

b. 150

c. 200

d. 250

**57. A chemical storage structure equipped with a mechanical ventilation system should be designed to have a minimum of \_\_\_\_\_ air changes per hour when the facility is to be occupied by a person.**

a. 2

b. 4

c. 6

d. 8

**58. Suppose the current state building codes and regulations for the construction of a pesticide storage building/rinse pad facility to be located on a new country club golf course are more stringent than the current Federal EPA and OSHA regulations. Which regulations should the contractor follow during the construction procedures?**

- a. **The more stringent state government building codes and regulations**
- b. The less stringent EPA/OSHA regulations because they are published by the federal government
- c. The regulations that will cost the least to build
- d. The owner of the golf course can decide because they both are current regulations

**59. The purpose of bull floating a flat concrete slab is to:**

- a. bring as much water to the surface as possible so the slab will cure wet.
- b. bring as much water to the surface as possible in order to evaporate water out of the concrete as this will make it stronger.
- c. **level the surface and more larger aggregate below the surface.**
- d. leave a course finish on the concrete surface for a chemical storage building.

**60. Leftover spray mixtures should be:**

- a. **Stored in the original containers.**
- b. disposed of in approved landfills.
- c. applied to land that has already received the chemical.
- d. drained on an isolated on the farm.

### **Environmental and Natural Resource Systems – 15 Questions**

**61. In chaining with a 100 ft. steel tape, pins were exchanged twice and the rear chainman has 6 pins in his/her hand. If the distance from the last pin is 40.5 feet, the total distance chained would be**

- a. 256.5 ft.
- b. 2660.5 ft.
- c. 1640.5 ft.
- d. **2640.5 ft.**

**62. Which minimum tile size is recommended for subsurface drainage?**

- a. 3"
- b. **4"**
- c. 5"
- d. 6"

**63. A surveyor's ring contains \_\_\_\_\_**

- a. **11 pins.**
- b. 10 pins.
- c. 9 pins.
- d. 5 pins.

**64. A square tract of land which is 1/4 mile on each side contains \_\_\_\_\_ acres.**

- a. 20
- b. 25
- c. 4
- d. **40**

**65. Field notes should be**

- a. taken on scratch paper in the field and recopied in the office.
- b. considered not a permanent record of the job done.
- c. **recorded in the field at the time the work is done.**
- d. recorded with an ink pen.

**66. A conservation practice recommended for the establishment of waterways where a high water velocity will be incurred almost immediately is**

- a. direct sodding.
- b. straw covering.
- c. concrete slabs laid parallel across the waterway.
- d. seeding with double the nitrogen level.

**67. The USDA has surveyed and classified land according to use into one of**

- a. 10 classes.
- b. 8 classes.
- c. 6 classes.
- d. 4 classes.

**68. The amount of water remaining in the soil after the free water has been drained by gravity is the soil's**

- a. surface water.
- b. water tolerance.
- c. water intake rate.
- d. water holding capacity.

**69. The inherent poisonous potency of a compound under experimental conditions is referred to as the compound's:**

- a. use hazard.
- b. toxicity.
- c. poisoning effect.
- d. noxious effect.

**70. The risk or danger of poisoning when a chemical is used or applied is sometimes referred to as the chemical's:**

- a. use hazard.
- b. toxicity.
- c. poisoning effect.
- d. noxious effect.

**71. A pesticide label that contains the signal word WARNING in bold print is required for all moderately toxic compounds and is classified as:**

- a. Category I
- b. Category II
- c. Category III
- d. Category IV

**72. A pesticide label that contains the signal word Caution "Keep Out of Reach of Children" is required of all compounds having unqualified claims for safety is classified as:**

- a. Category I
- b. Category II
- c. Category III
- d. Category IV

**73. The amount of drift an application of herbicide may be attributed to:**

- a. droplet size, wind velocity, and speed of travel
- b. droplet size, wide velocity, and rate of application
- c. droplet size, wind velocity, and spray release height
- d. droplet size, wind velocity, and the amount of additives in the mixture

**74. The NFPA classifies stored liquid pesticide as flammable if the liquid:**

- a. has a flash point at or above 100°F
- b. smells like gasoline
- c. has a flash point below 100°F
- d. burns when ignited.

**75. Secondary containment refers to:**

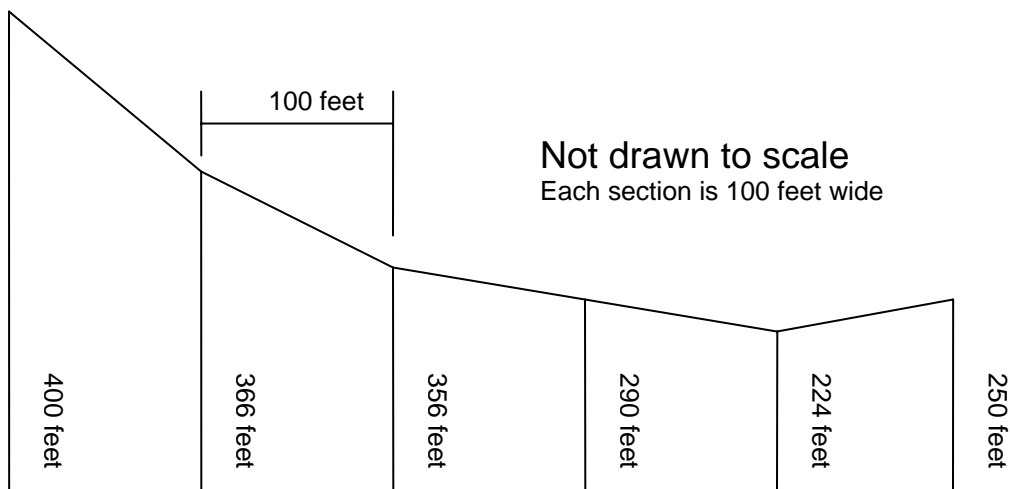
- a. structures built around storage facilities to contain products that have leaked or spilled
- b. shovels and sand used to cover over leaks and spills
- c. water tanks used to wash away leaks and spills
- d. none of the above

**STATE FFA AGRICULTURAL ENGINEERING TECHNOLOGY CONTEST**  
**Problem Solving – 25 questions – Four Points each**  
**May 2, 2008**

Instructions: **Do not mark on the exam!** Please read the questions carefully and select the best answer for each of the following questions. Darken or black out the letter corresponding to the correct answer on the answer sheet provided. There are five areas of general knowledge with 5 questions each for a total of 25 questions worth 4 points each. Good Luck!

**Environmental and Natural Resource Systems – 5 Questions**

A field with an irregular curve boundary is shown in the illustration below:



76. The above field contains:

- a) More than 3 acres
- b) About 2.75 acres
- c) About 1.75 acres
- d) Less than .75 acre

77. The Allegheny and Monongahela Rivers meet at Pittsburgh to form the Ohio River. The Allegheny River, flowing south through forests, well-tended farms, and small towns, has an average flow rate of 340 cubic feet per second (cfs) and a silt load of 250 mg/L. The Monongahela River, flowing north through old steel towns and poor farm country, has a flow rate of 460 cfs and a silt load of 1500 mg/L. What is the average flow of the Ohio River?

- a) 800 cfs
- b) 700 cfs
- c) 600 cfs
- d) 500 cfs

78. For the problem above, what is the expected silt concentration in the Ohio River?

- a) 1010 mg/L
- b) 969 mg/L
- c) 925 mg/L
- d) 890 mg/L

79. If algae contain a carbon: nitrogen: phosphorus (C:N:P) ratio of 100:16:1 by weight, and the water in which the algae grow contains 1.00 mg/L of carbon, 0.32 mg/L of nitrogen, and 0.20 mg/L of phosphorus, which element will be limiting algae growth?

- a) Nitrogen
- b) Phosphorus
- c) Carbon
- d) None of the above

80. A cylindrical manure pit used to store manure from 60 Holstein dairy cows is 30 ft in diameter and 10 ft deep. The manure production of Holstein dairy cows is 15 gal per day per cow. Estimate the number of days of storage the pit will provide.

- a) 8
- b) 10
- c) 24
- d) 58

### **Energy Systems – 5 Questions**

81. The heater in a pig nursery has a output of 45,000 BTU/hr. If the heater is burning propane at 80% efficiency, what is the cost per hour for the propane to operate the heater? Assume that the propane costs \$1.10/gal and has an energy content of 92,000 BTU/gal.

- a) \$.43/hour
- b) \$.38/hour
- c) \$.54/hour
- d) \$.67/hour

82. A 1500 watt heater operates 10 hours per day. What is the cost to operate the heater for one month (30 days) if electricity costs \$.065/kwh)?

- a) \$2.92
- b) \$29.25
- c) \$8.98
- d) \$98

83. Given a farmstead with the following buildings and the corresponding maximum demand loads, determine the minimum main service capacity

Residence	92 A, 230 V
Grain Handling System	125 A, 230 V
Farm Shop	80 A, 230 V
Hog House	100 A, 230 V
Beef Barn	60 A, 230 V

- a) 100 A
- b) 200 A
- c) 500 A
- d) 1000 A

### **Machinery and Equipment Systems – 5 Questions**

84. An elevator leg is elevating 2000 bu/hr of corn to a height of 80 ft. If the mechanical efficiency of the elevator is 80%, estimate the power (Hp) that is being developed by the electric motor powering the elevator. Assume 1 bu of corn weighs 56 lbs. (1 Hp = 33,000 ft-lb /min).

- a) 6.3
- b) 5.7
- c) 4.8
- d) 4.5

85. In checking inventory the depth of stored wheat in a 36 ft diameter circular bin is determined to be 18 ft. If wheat is \$4.40/bu, what is the value (\$) of the stored wheat? One bushel of the stored wheat weighs 60 lb and has a volume of 1.244 cubic feet.

- a) \$80,616
- b) \$64,804
- c) \$58,565
- d) \$52,500

86. A sprayer with a 1200 gallon tank is applying 18 gallon/acre at an average rate of 25 acres/hr. Estimate the time (hr) required to apply one tank full of spray mixture to the field.

- a) 48
- b) 4.8
- c) 2.7
- d) 1.8

87. The sprayer in the previous problem is refilled from a nurse tank by a 350 gal/min pump. If the pressure drop across the pump is 8 psi and the efficiency of the pump is 80%, estimate the power (Hp) required to operate the transfer pump. ( $H_p = PQ/1714$ )

- a) 1.6
- b) 2.0
- c) 2.3
- d) 5.0

88. A 6 inch diameter auger with a pitch of 7 inches is operating at 700 rpm to elevate corn into a truck. If the auger is running full, estimate the loading rate (bu/hr). One bushel of corn weighs 56 lb and occupies a volume of 1.244 ft.

- a) 1231
- b) 3867
- c) 4350
- d) 4920

89. Given the following data for an electric motor, calculate the operating efficiency of the motor.  
Hint: 1 hp = 746 W

Motor Inputs – 225 V                      25 A                      4500 W  
Motor Outputs – 5.0 hp      1760 rpm

- a) 66.3%
- b) 95.4%
- c) 76.5%
- d) 82.9%

90. What is the pressure in a 4 inch diameter cylinder that is producing 18,000 lb of force to support a load? ( $F = PA$ )

- a) 4500 psi
- b) 1432 psi
- c) 1125 psi
- d) 358 psi

### Industry and Marketing Systems – 5 Questions



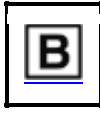
91. The National Fire Prevention Association (NFPA) uses a colored-coded, numerical diamond labeling and marking system (see above) to identify hazardous materials. The “red” 4 (top of the diamond) labeled above indicates a material that is:

- a) a severe health hazard
- b) a moderately reactive hazard
- c) a deadly flammable hazard
- d) a slight health hazard

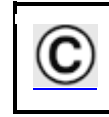
## Choosing a fire extinguisher



Class A fires are the most common. They involve ordinary combustibles such as wood, paper, cloth, rubber, and some plastics.



Class B fires are caused by flammable liquids, gases, and grease. Water can spread and splatter these explosive fires when sprayed into the flames.

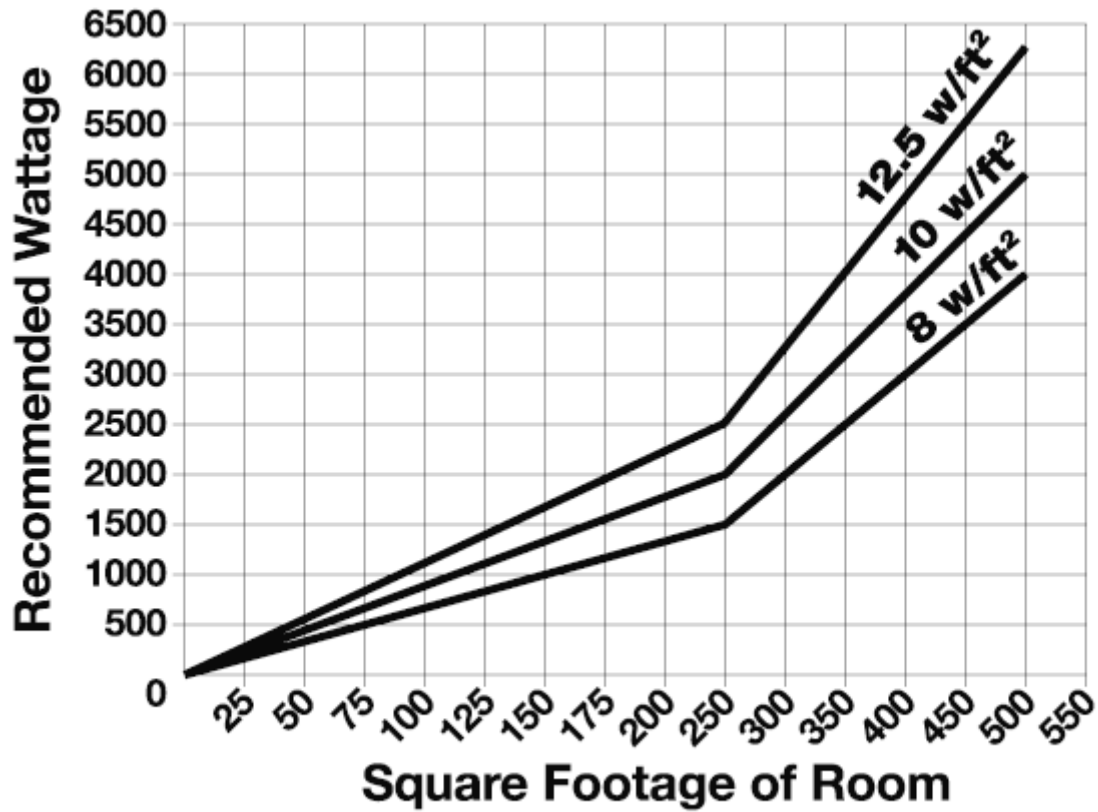


Class C electrical fires require special attention. Water provides a path of conductivity for electricity to follow, endangering personnel.

92. Given the above chart on fire, fire extinguisher types and symbols which type would be the best to have in a farm shop?

- a) A type extinguisher
- b) B type extinguisher
- c) ABC type extinguisher
- d) A bucket of water

Purchasing a heater:



---

Minimal or no insulation: 12.5 watts/sq. ft.

Average amount of insulation (R-11 in walls and R-19 in ceiling): 10 watts/sq. ft.

Fully insulated (R-19 in walls and floor, R-38 in ceiling): 8 watts/sq. ft.

93. You are planning to purchase a heater for a fully insulated farm office. The room is 250 square feet. Given the above information and using the graph what is the recommended wattage:

- a) 500
- b) 1500**
- c) 2000
- d) 2500

You have been given the following chart listing performance characteristics of different types of stainless steel.

Stainless Steel Types Performance Characteristics

Corrosion Resistance	Machinability	Weldability
Excellent 316, A286, Nitronic 60	Excellent 303, 416	Good 301, 302, 304, 316, 321, 17-4 PH
Good 301, 302, 304, 309, 321	Good 304, 316, 410, 430	Fair 410
Fair 303, 430	Fair 301, 302, 309, 321, 420	Difficult 303, 416, 440C
Poor 410, 416, 420, 440C	Poor 420V, 440C, 15-5 PH, 17-4 PH,	
Not rated 420V, 15-5 PH, 17-4 PH	Nitronic 60, A286	

Based on the above chart which type of stainless steel would best suited for the following applications:

94. Ease of welding or weldability:

- a) 301
- b) 303
- c) 410
- d) 416

95. Resistance to corrosion:

- a) 316
- b) 416
- c) 420
- d) 430

**Structural Systems – 5 Questions**

96. What depth (ft) is required to store 8000 bushels of corn in a cylindrical grain bin 30 ft in diameter?

- a) 11.1
- b) 11.3
- c) 14.1
- d) 20.2

97. A concrete curing compound is applied to fresh concrete to increase the strength of the concrete. The compound is applied at a rate of 5 gallons for every 350 square feet. The concrete to be cured measures 100 feet long by 80 feet wide and 4" thick. How many gallons of curing compound will be needed to cure the concrete?

- a) 23 gallons
- b) 115 gallons
- c) 5 gallons
- d) 1600 gallons

98. The concrete for a feed lot is to be 5 inches thick with a 6 inch compacted sub-grade. The sub-grade material is 411

limestone that has a density of 100 pounds per cubic foot. The feed lot measures 120 feet long by 75 feet wide. How many tons of stone are required for the sub-grade?

- a) 450 tons
- b) 900 tons
- c) 225 tons
- d) 500 tons

99. How many square yards of plastic are required to construct a temporary greenhouse covered with a single layer of plastic. The greenhouse is to be semicircular in shape; 100 ft long, 20 ft wide and 10 feet high in the center. Include the ends.

- a) 384 yd<sup>2</sup>
- b) 349 yd<sup>2</sup>
- c) 222 yd<sup>2</sup>
- d) 356 yd<sup>2</sup>

100. Under certain conditions the air in the greenhouse of problem 99 is to be completely changed 4.5 times every hour by a ventilation fan. What flow rate (cfm) must the fan maintain at these conditions?

- a) 524 cfm
- b) 9424 cfm
- c) 750 cfm
- d) 2356 cfm

**2007 State FFA Greenhand Quiz**  
**Career Development Event**

**Choose the best answer and good luck.**

**There are 75 questions. It is your responsibility to make sure there are 75 questions on this exam, please check! It is also your responsibility to make sure you bubble your answers in on Multi Purpose form C, #271211-1 on the front –right side- under ‘Multiple Choice Section A’**

- 1) Which of the following are the Official FFA Colors?
  - A) National Blue and Corn Gold
  - B) Maize and Blue
  - C) Yellow and Blue
  - D) National Blue and Maize
  
- 2) Who is the State FFA Advisor?
  - A) Dr. Larry Case
  - B) Dr. Ike Kershaw
  - C) Mr. Steve Gratz
  - D) Mr. C. Coleman Harris
  
- 3) Where is the National FFA Center located?
  - A) Louisville, Kentucky
  - B) Alexandria, Virginia
  - C) Columbus, Ohio
  - D) Indianapolis, Indiana
  
- 4) On the FFA Emblem, the rising sun:
  - A) Signifies progress and holds a promise that tomorrow will bring a new day glowing with opportunity.
  - B) Is recognized for its wisdom, symbolizes the knowledge required to be successful in the industry of agriculture.
  - C) Serves as a reminder of our freedom and ability to explore new horizons
  - D) None of the above
  
- 5) In what year were the Future Farmers of America formed?
  - A) 1917
  - B) 1928
  - C) 1926
  - D) 1988
  
- 6) Who is the National Treasurer for the National FFA Organization?
  - A) Dr. Isaac Kershaw
  - B) Dr. C. Coleman Harris
  - C) Mr. Marion Fletcher
  - D) Mr. Steve Gratz

- 7) In what year was the Ohio FFA Association chartered?
- A) 1971
  - B) 1928
  - C) 1929
  - D) 1950
- 8) Who was the first National FFA President?
- A) Leslie Applegate
  - B) Harold Gum
  - C) Mark Sanborn
  - D) Bobby Jones
- 9) When did the New Farmers of America merge with the Future Farmers of America?
- A) 1927
  - B) 1965
  - C) 1942
  - D) 1935
- 10) Who designed the first FFA jacket?
- A) Dr. Gus Lintner
  - B) Mr. Henry Groseclose
  - C) Mr. Carlton Patton
  - D) Dr. C.H. Lane
- 11) Which of the following is not considered one of the three Essential Components of Agriculture Education?
- A) Supervised Agriculture Experience Program
  - B) Classroom / Laboratory
  - C) FFA
  - D) Career Development Events
- 12) What is the Chapter FFA Degree pin made of?
- A) Gold
  - B) Silver
  - C) Bronze
  - D) Aluminum
- 13) What act of Congress established classes in Vocational Agriculture?
- A) National Vocational Education Act of 1917
  - B) Smith-Hughes Act of 1920
  - C) Education Reform Act of 1927
  - D) None of the above
- 14) The FFA Creed is five paragraphs in length. What phrase starts each paragraph?
- A) In the beginning
  - B) We understand
  - C) I believe
  - D) I cannot deny

- 15) Which of the following is not one of the four types of membership in the National FFA Organization?
- A) Collegiate
  - B) Alumni
  - C) Active
  - D) Public
- 16) Who is the 2006-2007 National FFA Secretary?
- A) Kacy Baugher
  - B) Coty Black
  - C) Jamie Cecil
  - D) Jennifer Himburg
- 17) Which of the following is an FFA mentoring program based on partnering FFA members with younger students to build trust and self-esteem by working together in agricultural activities?
- A) PALS
  - B) Food for America
  - C) Local Program Success
  - D) SAE
- 18) How many taps of a gavel calls an FFA meeting to order?
- A) One
  - B) Two
  - C) Three
  - D) Tap the gavel several times
- 19) In the FFA Opening Ceremony, where is the Advisor stationed?
- A) By the Rising Sun
  - B) By the Flag
  - C) By the Plow
  - D) None of the above
- 20) What is BOAC?
- A) Building Ohio's Agricultural Communities
  - B) Building Our American Communities
  - C) Boarding Ohio's Angus Cattle
  - D) None of the above.
- 21) A motion to adjourn requires a \_\_\_\_\_ vote.
- A) 2/3's
  - B) No vote is required
  - C) Majority
  - D) 3/4 vote
- 22) When announcing the result of a vote the chair taps the gavel \_\_\_\_\_ time/s.
- A) Once
  - B) Twice
  - C) Three times
  - D) No tap is required.

- 23) In what year was the National Future Farmer (now known as FFA New Horizons) magazine first published?
- A) 1952
  - B) 1989
  - C) 1927
  - D) 1961
- 24) Where is the State FFA Degree pin worn on the FFA Jacket?
- A) Below the name
  - B) Below the emblem
  - C) Above the emblem
  - D) Above the name
- 25) Which of the following offices is stationed by the door?
- A) President
  - B) Reporter
  - C) Sentinel
  - D) Advisor
- 26) Which of the following is the Ohio FFA Executive Secretary?
- A) Dr. Ike Kershaw
  - B) Mr. Craig Wiget
  - C) Mr. Jim Ogden
  - D) Dr. Steve Gratz
- 27) Who is the National FFA Executive Secretary?
- A) Ms. Jessica Scholer
  - B) Mr. Steve Gratz
  - C) Dr. C. Coleman Harris
  - D) Dr. Marion Fletcher
- 28) Which of the following people was the last National FFA President from Ohio?
- A) Mark Sanborn
  - B) Susie Barrett
  - C) Bobby Jones
  - D) Emily Buxton
- 29) When were women first allowed becoming FFA members?
- A) 1927
  - B) 1969
  - C) 1965
  - D) 1971
- 30) The event where the FFA member presents a 4-6 minute speech after a 30-minute preparation period is the \_\_\_\_\_ speaking contest.
- A) Prepared
  - B) Creed
  - C) Extemporaneous
  - D) Beginning prepared

- 31) Which of the following officers is stationed by the flag?
- A) President
  - B) Vice President
  - C) Secretary
  - D) None of the above.
- 32) Where was the first FFA Chapter established?
- A) Fredericktown, Ohio
  - B) Blacksburg, Virginia
  - C) Kansas City, Missouri
  - D) Ogden, Utah
- 33) If the President cannot attend a meeting, who presides in his/her absence?
- A) the Vice President
  - B) the Advisor
  - C) the Secretary
  - D) the Sentinel
- 34) Who is the Executive Director of the Ohio FFA Foundation?
- A) Mr. Steve Gratz
  - B) Mr. John Miley
  - C) Ms. Brenda Correll
  - D) Ms. Melissa Bell
- 35) Where is the National FFA Headquarters located?
- A) Louisville, Kentucky
  - B) Indianapolis, Indiana
  - C) Columbus, Ohio
  - D) None of the above.
- 36) Where is Ohio FFA Camp Muskingum located?
- A) Carrollton, Ohio
  - B) Columbus, Ohio
  - C) Marysville, Ohio
  - D) Toledo, Ohio
- 37) Who presides over the National FFA Foundation, Board of Trustees?
- A) Dr. Larry D. Case
  - B) Dr. C. Coleman Harris
  - C) Dr. Marion Fletcher
  - D) Mr. Steve Gratz
- 38) The Small Animal Care Proficiency Award recognizes a student's excellence in the production and care of \_\_\_\_\_.
- A) Chickens, turkeys and ducks
  - B) Dogs, cats and rabbits
  - C) Fish, ducks and mice
  - D) Sheep, dairy cattle and swine

- 39) Which of the following Career Development Events is not held on the National FFA level?
- A) Dairy Foods
  - B) General Livestock
  - C) Beginning Prepared Public Speaking
  - D) Nursery and Landscape
- 40) How many delegates attended the first National FFA Convention in 1928?
- A) 33
  - B) Over 300
  - C) 125
  - D) 50
- 41) Which of the following Presidents of the United States have spoken at the National FFA Convention?
- A) Ronald Reagan
  - B) Bill Clinton
  - C) Jimmy Carter
  - D) John F. Kennedy
- 42) What metal is the State FFA Degree pin made of?
- A) Gold
  - B) Silver
  - C) Bronze
  - D) Platinum
- 43) A motion to suspend the rules requires a 2/3 vote.
- A) True
  - B) False
- 44) What is the maximum number of voting delegates allowed at the National FFA Convention?
- A) As many members that can attend.
  - B) 475
  - C) 100
  - D) 18
- 45) When was the FFA Creed last revised?
- A) 1990
  - B) 1987
  - C) 1965
  - D) 1930
- 46) Who were the last two states to charter FFA Associations?
- A) Alaska and Hawaii
  - B) Hawaii and New Hampshire
  - C) Rhode Island and Alaska
  - D) Delaware and Rhode Island

- 47) Which of the following is a non-voting member of a chapter executive committee?  
A) President  
B) Sentinel  
C) Secretary  
D) Advisor
- 48) Which officer coordinates all committee work?  
A) President  
B) Sentinel  
C) Vice President  
D) Advisor
- 49) Which U.S. President spoke at the Silver Anniversary National Convention in 1953?  
A) Harry S. Truman  
B) Dwight D. Eisenhower  
C) John F. Kennedy  
D) Richard Nixon
- 50) Which of the following is not one of the three divisions of the Program of Activities?  
A) Student Development  
B) Alumni Coordination  
C) Chapter Development  
D) Community Development
- 51) Which of the following is not a motion classification in parliamentary procedure?  
A) Primary  
B) Unclassified  
C) Privileged  
D) Incidental
- 52) Which of the following is not required for the American FFA Degree?  
A) Must have graduated at least 12 months prior to receiving the degree.  
B) Must have a high school scholastic record of "C" or better.  
C) Must be enrolled in a collegiate agriculture program.  
D) Must hold the State FFA Degree.
- 53) Which of the following Career Development Events held in Ohio is not held at the National FFA level?  
A) Meats  
B) Agricultural Mechanics  
C) Greenhand Quiz  
D) Agronomy
- 54) Who was the author of The FFA Creed?  
A) Erwin Milton Tiffany  
B) Henry Groseclose  
C) Leslie Applegate  
D) Dr. C. H. Lane

- 55) Who is the National FFA Organization Chief Operating Officer?  
A) Larry Case  
B) C. Coleman Harris  
C) Doug Loudenslager  
D) Marion Fletcher
- 56) How many National FFA Presidents have been from Ohio?  
A) 4  
B) 1  
C) 2  
D) 5
- 57) What is the first line in the FFA Motto?  
A) "Learning to do"  
B) "Living to Serve"  
C) "I believe"  
D) "Doing to learn"
- 58) For a chapter to conduct official business more than half of the active membership must be present. This is called a \_\_\_\_\_.  
A) Membership  
B) Minority  
C) Quorum  
D) Roll
- 59) What FFA support organization got its start in 1971?  
A) National Young Farmers  
B) New Farmers of America  
C) PALS  
D) National FFA Alumni
- 60) National FFA President Beau Williamson is from \_\_\_\_\_.  
A) Ohio  
B) California  
C) Texas  
D) Missouri
- 61) National FFA Eastern Regional Vice President, Coty Black is from \_\_\_\_\_.  
A) Ohio  
B) West Virginia  
C) New Jersey  
D) Kentucky
- 62) Where does the National FFA Organization conduct its National FFA Convention?  
A) Louisville, KY  
B) Indianapolis, IN  
C) Columbus, OH  
D) Washington, DC

- 63) What is the deadline for submitting membership dues to the Ohio FFA Association?
- A) June 30
  - B) October 1
  - C) November 30
  - D) September 30
- 64) At what age is a student no longer allowed to be an active member of the Ohio FFA?
- A) 23<sup>rd</sup> birthday
  - B) 21<sup>st</sup> birthday
  - C) 25<sup>th</sup> birthday
  - D) 19<sup>th</sup> birthday
- 65) Which of the following is not a requirement for the Chapter FFA Degree?
- A) Must have received the Greenhand Degree.
  - B) Have participated in the planning and conducting of at least three official functions in the chapter Program of Activities.
  - C) Earned or invested \$500 or worked 1500 hours and have developed plans for continued growth and improvement in a supervised agricultural experience program.
  - D) Have demonstrated five procedures of parliamentary law.
- 66) Which of the following National FFA Officer positions is not elected?
- A) Secretary
  - B) Treasurer
  - C) President
  - D) Eastern Region Vice President
- 67) How many constitutional officer positions are there at the chapter level?
- A) 6
  - B) 7
  - C) 16
  - D) 8
- 68) At the state convention an official delegate assembly limited to \_\_\_\_\_ delegates per chapter will convene.
- A) 4
  - B) 5
  - C) 1
  - D) 2
- 69) Which of the following established the National FFA a federal charter?
- A) Smith – Hughes Act of 1917
  - B) Public Law 81-740
  - C) House bill 150
  - D) None of the above
- 70) Which of the following awards is given to members and non-members for recognition of promoting diversity in the FFA?
- A) Honorary FFA Degree
  - B) Proficiency Awards
  - C) H. O. Sargent Award
  - D) American FFA Degree

- 71) Who is the 2006-2007 Ohio State FFA Sentinel?  
A) Katie Croft  
B) Callie Crum  
C) Amanda Hill  
D) Abby Snyder
- 72) Who is serving as the 2006-2007 Ohio District 6 President?  
A) Lucas Shammo  
B) JD Bethel  
C) Rene Gerber  
D) Esther Mast
- 73) In what year did the first Agriculture Career Show take place at the National FFA Convention?  
A) 1928  
B) 1981  
C) 1966  
D) 1983
- 74) From the April 2007 issue of FFA New Horizons, who is Harold Brubaker?  
A) A member of the North Carolina House of Representatives.  
B) United States Senator from Ohio.  
C) Editorial Director for FFA New Horizons.  
D) State FFA Supervisor from Iowa.
- 75) Which career was highlighted in the February 2007 issue of FFA New Horizons with the cover stating "Yays and Neighs?"  
A) Parliamentary Procedure  
B) Agronomy  
C) Equine Science  
D) Horticulture

HAVE YOU BUBBLED IN 75 ANSWERS ON MULTI PURPOSE C ON THE FRONT –RIGHT SIDE UNDER MULTIPLE CHOICE SECTION A? IT IS YOUR RESPONSIBILITY TO MAKE SURE THAT THESE ARE TAKEN CARE OF!! PLEASE CHECK!

2007 Ohio State FFA Greenhand Quiz CDE Key

- 1) A
- 2) B
- 3) D
- 4) A
- 5) B
- 6) C
- 7) C
- 8) A
- 9) B
- 10) A
- 11) D
- 12) B
- 13) A
- 14) C
- 15) D
- 16) A
- 17) A
- 18) B
- 19) D
- 20) B
- 21) C
- 22) A
- 23) A
- 24) D
- 25) C
- 26) D
- 27) C
- 28) A
- 29) B
- 30) C
- 31) D
- 32) B
- 33) A
- 34) D
- 35) D
- 36) A
- 37) A
- 38) B
- 39) C
- 40) A
- 41) C
- 42) A
- 43) A
- 44) B
- 45) A
- 46) C
- 47) A
- 48) C
- 49) B

- 50) B
- 51) A
- 52) C
- 53) C
- 54) A
- 55) C
- 56) C
- 57) A
- 58) C
- 59) D
- 60) B
- 61) D
- 62) B
- 63) C
- 64) A
- 65) C
- 66) B
- 67) A
- 68) D
- 69) B
- 70) C
- 71) B
- 72) B
- 73) C
- 74) A
- 75) C

**STATE FFA AGRICULTURAL ENGINEERING CAREER DEVELOPMENT EVENT**  
**Written Examination – 75 Questions – Two Points each**  
**May 6, 2005**

Instructions: **Do not mark on the exam!** Please read the question carefully and select the **best answer** for each of the following questions. Darken or black out the letter corresponding to the correct answer on the answer sheet provided. There are five areas of general knowledge with 15 questions each for a total of 75 questions worth 2 points each. Good Luck!

**Industry and Marketing Systems – 15 Questions**

1. Worker safety equipment that should be available in a pesticide handling area should include:
  - a. an emergency shower
  - b. an eyewash
  - c. the current Material Safety Data Sheets
  - d. **all of the above**
  
2. Pesticides may enter the body by way of:
  - a. the mouth
  - b. the skin
  - c. inhalation
  - d. **all of the above**
  
3. Clothing and devices that are worn to protect the human body from contact with pesticides and their residues are:
  - a. respirators
  - b. **personal protective equipment**
  - c. safety shields
  - d. Material Safety Data Sheets
  
4. Dry fertilizer is hygroscopic, this means that it will \_\_\_\_\_.
  - a. Readily burn.
  - b. explode easily.
  - c. Have very small particles.
  - d. **Attract moisture.**
  
5. In production agriculture, the most common form of chemical poisoning is through:
  - a. oral contact.
  - b. **inhalation.**
  - c. dermal contact.
  - d. ocular contact.
  
6. The higher the LD50 value for a compound, the:
  - a. **Less toxic the compound.**
  - b. Longer the period of time the compound remains toxic.
  - c. More toxic the compound.
  - d. Shorter the period of time the compound remains toxic.
  
7. The term "MSDS" means:
  - a. Mandatory Safety Department Standards
  - b. **Material Safety Data Sheets**
  - c. Ministry of Standards
  - d. None of the above
  
8. An acute health hazard is one in which:

- a. results in symptoms of overexposure becoming quickly apparent
- b. never results in any adverse condition
- c. causes symptoms to develop slowly over a long period of time
- d. causes the victim to suddenly die three days after exposure

9. When you spill a pesticide or agrichemical, the first thing you should do is to:

- a. Control the spill and identify the source.
- b. Contain the spill.
- c. Clean up the spill.
- d. Call the authorities.

10. The United States \_\_\_\_\_ is the federal agency that registers and regulates all pesticides.

- a. Department of Agriculture (USDA)
- b. Environmental Protection Agency (EPA)
- c. Worker Protection Standard (WPS)
- d. Occupational Safety and Health Administration (OSHA)

11. Computers are used in Food, Agricultural and Biological engineering for:

- a. designing.
- b. engineering.
- c. modeling
- d. all of the above.

12. An application to form a corporation is call the:

- a. articles of incorporation
- b. application for corporation
- c. incorporation form.
- d. stock certificates.

13. Policy decisions of a corporation are made by the:

- a. board of directors.
- b. chairman of the board.
- c. chief operating officer.
- d. president.

14. When the owner and a general contractor discuss the terms of a contract they are:

- a. bidding.
- b. competing.
- c. hiring.
- d. negotiating.

15. When a bid is advertised, it usually states:

- a. the type of work.
- b. the location of the project.
- c. where to obtain plans and specifications.
- d. all of the above.

### **Energy Systems – 15 Questions**

16. A battery works on the principle of conversion of:

- a. stored chemical energy to electrical energy.
- b. stored nuclear energy to electrical energy.
- c. kinetic energy converted to electrical energy.
- d. conversion of dc energy to ac energy.

17. When connecting a booster battery to another battery of an automobile or tractor, connect the:

- a. positive terminal to the negative terminal.
- b. negative terminal to the positive terminal.
- c. positive terminal to the ground.
- d. positive terminal to the positive terminal.

18. A \_\_\_\_\_ can be used in an alternating current circuit but not in a direct current circuit:

- a. fuse
- b. transformer
- c. switch
- d. relay

19. The \_\_\_\_\_ bearing is used in electric motors and allows the motor to be mounted in any position.

- a. ball
- b. sleeve
- c. thrust
- d. friction

20. Which of these motor enclosures should be used if a motor is installed in an environment where it will be splashed or sprayed by water?

- a. Open
- b. Dust proof
- c. Splash proof
- d. Explosion proof

21. The fluid output of a hydraulic pump can be measured in:

- a. pounds per square inch.
- b. square feet of surface area.
- c. linear feet per minute.
- d. gallons per minute.

22. Term used in hydraulics that describes a fluid under pressure:

- a. Reserve pressure
- b. Hydrolysis
- c. Cavitation
- d. Hydrostatic

23. Which is not a type of hydraulic pump?

- a. Diaphragm
- b. Vane
- c. Gear
- d. Piston

24. In a hydraulic system, one method that converts fluid power into mechanical power is through the use of:

- a. Hydraulic Cylinders.
- b. Hydraulic filters.
- c. Hydraulic chains.
- d. Hydraulic reservoirs.

25. Sixty cycle AC alternates from a maximum positive value to a maximum negative value:

- a. 60 times a second.
- b. 60 times a minute.
- c. 60 times an hour.
- d. none of the above.

26. A kilowatt is equal to:

- a. 10 watts.
- b. 100 watts.
- c. 1,000 watts.
- d. 10,000 watts.

27. How are the input and output factors handled when checking the efficiency of an appliance as an energy converter?
- a. The output wattage is divided by the input wattage times 100
  - b. The output and input wattages are multiplied and divided by 100
  - c. the input wattage is divided by the output wattage times 100
  - d. The output wattage is divided by 100 and multiplied by twice the input wattage
28. OHMS law formulas state that:
- a.  $V = I \times R$ .
  - b.  $I = V / R$ .
  - c.  $R = V / I$ .
  - d. all of the above.
  - e. none of the above.
29. Removing air from the hydraulic cylinder is called:
- a. hydrolysis.
  - b. bleeding.
  - c. cylinder creeping.
  - d. misalignment.
30. Hydraulic pumps produce:
- a. fluid pressure.
  - b. fluid flow.
  - c. compressed fluid.
  - d. all of these.

### **Environmental and Natural Resource Systems – 15 Questions**

31. Through the photosynthetic process, plants use light energy from the sun, carbon dioxide, and nutrients to produce high energy molecules and:
- a. Carbon monoxide
  - b. Oxygen
  - c. Methane
  - d. Nitrogen gas
32. Something that can be broken down by bacteria and fungi is called:
- a. Recyclable
  - b. Biodegradable
  - c. Recalcitrant
  - d. Mixed waste
33. Municipal solid waste (MSW) is also called:
- a. Trash
  - b. Refuse
  - c. Garbage
  - d. All of the above
34. To separate into constituent elements through chemical and biological change; to rot:
- a. Reduction
  - b. Combustion
  - c. Decomposition
  - d. Renewal
35. Careful preservation and protection of something, especially planned management of a natural resource to prevent exploitation, destruction, or neglect:
- a. Conservation
  - b. Development
  - c. Utilization
  - d. Restoration

36. In any ecosystem, there are 3 main groups of organisms:

- a. Producers, consumers, and constituents
- b. Plants, animals, and birds
- c. Predators, prey, and observers
- d. Producers, consumers, and decomposers

37. A zero emissions waste management plan would include:

- a. Reduce, reuse, recycle
- b. Incineration of wastes
- c. Disposal in landfills
- d. River or stream discharge

38. Animal and/or plant populations within an ecosystem are constrained by:

- a. Space availability
- b. Food
- c. Predators
- d. All of the above

39. Secondary containment refers to:

- a. structures built around storage facilities to contain products that have leaked or spilled
- b. shovels and sand used to cover over leaks and spills
- c. water tanks used to wash away leaks and spills
- d. none of the above

40. The term "rinsate" refers to:

- a. water tanks used to wash away leaks and spills
- b. containers that are used once and then disposed
- c. a thin layer of granular material placed on top of a prepared subgrade
- d. water that has been used to clean pesticide

41. Liquid contact pesticides refer to:

- a. pesticides that knock insects off of plants
- b. pesticides that kill pests by coming in contact with the pest
- c. pesticides that must be applied with a garden hose
- d. none of the above

42. Liquid pesticide drift can be described as:

- a. when the application equipment does not stay in rows of a field
- b. when chemicals do not stay in the intended area
- c. when a spray nozzle is clogged
- d. none of the above

43. To reduce the risk of drift when applying liquid pesticides, one should select:

- a. a contact type of pesticide
- b. a slow moving applicator
- c. a systemic type of pesticide
- d. a nozzle that produces coarse droplets

44. The environmental assessment of a site for a containment facility should include:
- a. counting all the birds and fish in the area.
  - b. sampling soil at and around the proposed site.
  - c. determining the type of grass growing on the site.
  - d. determining if there is a local fire department.
45. Worker safety equipment that should be available in a pesticide handling area should include:
- a. an emergency shower
  - b. an eyewash
  - c. the current Material Safety Data Sheets
  - d. all of the above

### **Machinery and Equipment Systems – 15 Questions**

46. On a gasoline engine, the term “cam angle” refers to the
- a. shape of the camshaft lobe.
  - b. included the angle of the camshaft lobe.
  - c. degrees the distributor cam rotates while the points are closed.
  - d. wear found on the cam of a distributor.
47. The electrolyte in a lead-acid battery is made up of:
- a. water and sulfuric acid.
  - b. lead and calcium.
  - c. lead and antimony.
  - d. hydrochloric acid and water.
48. Diesel fuel used in agricultural tractors can be distinguished from fuel used in over-the-road vehicles by:
- a. lower cetane number in agricultural fuels.
  - b. red dye in over-the-road fuel.
  - c. red dye in agricultural fuel.
  - d. there is no difference.
49. In addition to service classification type, engine oils are selected by \_\_\_\_\_ number.
- a. cetane
  - b. viscosity
  - c. specific gravity
  - d. octane
50. The most heavy duty turbo charged diesel tractors should use an oil with an API rating of:
- a. CA.
  - b. CB.
  - c. CC.
  - d. CD.
51. The main reason for keeping permanent antifreeze in the tractor radiator during the summer months is to:
- a. prevent accidental freezing in case of a cold snap.
  - b. raise the boiling point of the coolant.
  - c. lower the freezing point of the coolant.
  - d. prevent the cooling system from being overloaded when using the air conditioning.

52. What is considered the maximum allowable tractor wheel slippage under normal heavy-load operating conditions?

- a. 0%
- b. 5%
- c. 15%
- d. 25%

53. A hydrostatic transmission uses fluids at \_\_\_\_\_ pressures, but relatively \_\_\_\_\_ flowrates.

- a. low / high
- b. high / high
- c. low / low
- d. high / low

54. Open-center hydraulic systems differ from closed center systems in that:

- a. open-center systems do not need a pressure relief valve.
- b. closed-center systems do not need a pressure relief valve.
- c. during neutral conditions, oil flows through directional control valves of open-centered systems.
- d. closed-center systems cannot have a fixed displacement pump.

55. Creeping of a hydraulic cylinder when stopped in mid-stroke may be caused by:

- a. excessive pressure.
- b. incorrect hydraulic oil.
- c. worn control valve.
- d. misalignment of the piston rod.

56. The presence of water in a hydraulic system is indicated by:

- a. excessive thinning of the oil.
- b. the need to add fluid more often than normal.
- c. the fluid having a grayish-milky color.
- d. noisy relief valves.

57. Irregular seed placement in the row should normally be blamed on the

- a. seed metering mechanism.
- b. seed placement systems.
- c. inadequate tire pressure.
- d. setting of the gauge wheels.

58. A planter travels 10 feet for each turn of a seed plate with 24 cells. If there is one seed per cell, the seed spacing would be

- a. 3 inches.
- b. 5 inches.
- c. 8 inches.
- d. 10 inches.

59. Adjusting seeding rate is best done by changing

- a. the size of the wheel.
- b. the ratio of seed metering mechanics to the travel speed of the planter.
- c. only travel speed.
- d. the seed metering mechanism.

60. In helping prepare the seedbed, no-till planters may use a \_\_\_\_\_ coulters.

- a. rough
- b. smooth
- c. trash guard
- d. ripple

## Structural Systems – 15 Questions

61. Posts and timbers are wood products of this basic dimension or greater:

- a. 1" T-W
- b. 2/4" 7-W
- c. 5" T-W
- d. none of the above

62. A project requires 7 pieces - 2"x 8"x 144" - the board feet is:

- a. 8
- b. 112
- c. 120
- d. 1205

63. A \_\_\_\_\_ is used to carry loads over doors and windows.

- a. cripple stud
- b. header
- c. fascia
- d. sill plate

64. A \_\_\_\_\_ is a trim board nailed to the vertical cut at the end of a rafter.

- a. sole plate
- b. top plate
- c. fascia
- d. soffit

65. The horizontal members that siding is attached to in pole construction are called:

- a. purlins.
- b. headers.
- c. girts.
- d. none of the above.

66. Round poles are classified according to:

- a. top circumference.
- b. average circumference.
- c. length.
- d. none of the above.

67. Concrete hardens due to a chemical reaction called:

- a. dehydration.
- b. hydration.
- c. drying.
- d. electrolysis.
- e. hydrolysis.

68. When ordering ready-mix concrete for the construction of a chemical storage or rinse pad structure, it is recommended that Type II or Type V concrete be used because they are more resistant to the damaging effects of:

- a. sulfates used in many fertilizers & pesticides.
- b. the ozone layer.
- c. evaporation.
- d. expansion and contracting due to freezing.

69. Reinforcing steel is placed in concrete to increase

- a. economy.
- b. density.
- c. durability.
- d. tensile strength.

70. Excessive working of plastic concrete may result in

- a. a change in the water cement ration to the surface.
- b. segregation of the aggregate.
- c. surface scaling at a later period.
- d. all of the above.

71. A well drained soil is essential when selecting sites for

- a. houses with basements.
- b. septic tanks.
- c. livestock feed lots.
- d. all of the above.

72. Flashing is a special construction

- a. adhesive.
- b. material used at building joints.
- c. roofing underlayment.
- d. roof decking.

73. With sheet metal roofing the nails should be made of

- a. the same material as the roofing.
- b. different material.
- c. steel only.
- d. aluminum.

74. The three general classification of softwoods are

- a. factory and shop-yard and structural.
- b. board - dimension and timbers.
- c. light framing - joist and plank.
- d. finish - common and select.

75. On a lumber grade stamp the abbreviation S-Dry refers to wood with a moisture content of

- a. 15%.
- b. 19%.
- c. less than 19%.
- d. greater than 19%.

**STATE FFA AGRICULTURAL ENGINEERING TECHNOLOGY CONTEST**  
**Problem Solving – 25 questions – Four Points each**  
**May 6, 2005**

Instructions: **Do not mark on the exam!** Please read the question carefully and select the **best answer** for each of the following questions. Darken or black out the letter corresponding to the correct answer on the answer sheet provided. There are five areas of general knowledge with 5 questions each for a total of 25 questions worth 4 points each. Good Luck!

**Machinery and Equipment Systems – 5 Questions**

76. The speedometer on Ann's tractor is not working. She thinks she is traveling at 4 MPH. She sees two trees along a fence row 176 feet apart. She drives that distance. About how fast should he cover that distance at 4 MPH?
- a) 15 seconds
  - b) 30 seconds
  - c) 60 seconds
  - d) 90 seconds
77. When plowing (under load), David observes that he has 20 wheel revolutions between two telephone poles. However when not under load he observes 18 wheel revolutions between the same two telephone poles. Determine the percent slippage Peter is experiencing between the two poles. The poles are 80 feet apart.

Percent of slippage is:

- a) 5
  - b) 10
  - c) 15
  - d) 20
78. Is the percent of slippage from problem 77 acceptable?
- a) Yes
  - b) No
  - c) depends on conditions
  - d) can't tell

You have your own welding shop. You've specialized in having a mobile welding service. You modified a Hum-Vee to have SMAW, GTAW, GMAW, OAC/OAW and PAC processes which you can take anywhere in the field.

Currently, you are working on two jobs. One job is in the shop and the other will be done in the field.

For the shop job you are required to weld with E7024 electrodes. Here is the information for the job:

A  $\frac{1}{2}$ " flat fillet weld is to be made around the base of round light poles. There are 100 poles to be welded. Each pole is 7" in diameter.

For the field job you are also required to weld with E7024 electrodes. Here is the information for this job:

A  $\frac{1}{2}$ " flat fillet weld is to be made around the base of square light poles at a new shopping mall. There are 100 poles to be welded. Each pole is 5.5" in square.

You need to determine how long each job will take to weld and how many pounds of pounds of electrodes needed to do the work. Use the follow to do the calculations:

79. Given the above information calculate the length of weld (perimeter/circumference of lamp post) needed to weld each lamp post (field job and shop job). For Pi (  $\pi$  ) use 22/7. Calculate to the length of each weld to the nearest inch.

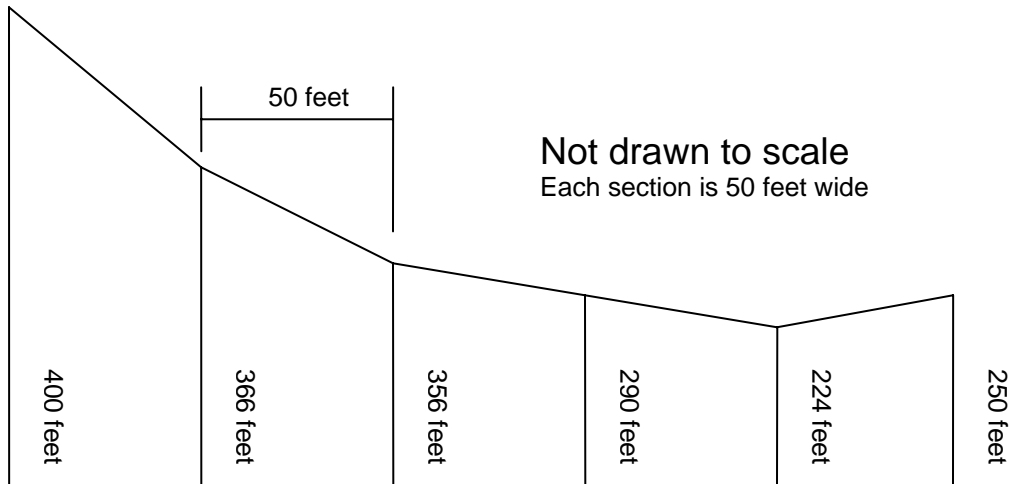
- a) 22" of weld for the shop job and 16.5" of weld for the field job.
- b) 22" of weld for both projects**
- c) 30" of weld for the shop job and 11" of weld for the field job.
- d) 30" of weld for both projects

80. Given the above information you need to order electrodes for the job. A  $\frac{1}{2}$ " flat fillet weld weights  $\frac{1}{2}$  lb per foot. Electrode efficiency is about 50% for E7024 electrodes. This means that it takes 1 lb of electrodes to make a foot of  $\frac{1}{2}$ " flat fillet weld. The combined length of weld for both jobs is 4400" of weld. How many 50 lb boxes of electrode will you need to buy? You can only buy whole boxes.

- a) 10 boxes
- b) 8 boxes
- c) 6 boxes**
- d) 2 boxes

## Environmental and Natural Resource Systems – 5 Questions

A field with an irregular curve boundary is shown in the illustration below:



81. The above field contains:
- a) More than 4 acres
  - b) About 2.75 acres
  - c) About 1.75 acres
  - d) Less than .75 acre
82. The Allegheny and Monongahela Rivers meet at Pittsburgh to form the Ohio River. The Allegheny River, flowing south through forests, well-tended farms, and small towns, has an average flow rate of 340 cubic feet per second (cfs) and a silt load of 250 mg/L. The Monongahela River, flowing north through old steel towns and poor farm country, has a flow rate of 460 cfs and a silt load of 1500 mg/L. What is the average flow of the Ohio River?
- a) 800 cfs
  - b) 700 cfs
  - c) 600 cfs
  - d) 500 cfs
83. For the problem above, what is the expected silt concentration in the Ohio River?
- a) 1010 mg/L
  - b) 969 mg/L
  - c) 925 mg/L
  - d) 890 mg/L

84. If algae contain a carbon: nitrogen: phosphorus (C:N:P) ratio of 100:16:1 by weight, and the water in which the algae grow contains 1.00 mg/L of carbon, 0.32 mg/L of nitrogen, and 0.20 mg/L of phosphorus, which element will be limiting algae growth?
- a) Carbon
  - b) Nitrogen
  - c) Phosphorus
  - d) None of the above
85. A cylindrical manure pit used to store manure from 60 Holstein dairy cows is 30 ft in diameter and 10 ft deep. The manure production of Holstein dairy cows is 15 gal per day per cow. Estimate the number of days of storage the pit will provide.
- a) 58
  - b) 24
  - c) 10
  - d) 8

### Energy Systems – 5 Questions

86. The heater in a pig nursery has a output of 45,000 BTU/hr. If the heater is burning propane at 80% efficiency, what is the cost per hour for the propane to operate the heater? Assume that the propane costs \$1.10/gal and has an energy content of 92,000 BTU/gal.
- a) \$.67/hour
  - b) \$.54/hour
  - c) \$.43/hour
  - d) \$.38/hour
87. A 1500 watt heater operates 10 hours per day. What is the cost to operate the heater for one month (30 days) if electricity costs \$.065/kwh)?
- a) \$2.92
  - b) \$29.25
  - c) \$8.98
  - d) \$.98
88. Given a farmstead with the following buildings and the corresponding maximum demand loads, determine the minimum main service capacity
- |                       |              |
|-----------------------|--------------|
| Residence             | 92 A, 230 V  |
| Grain Handling System | 125 A, 230 V |
| Farm Shop             | 80 A, 230 V  |
| Hog House             | 100 A, 230 V |
| Beef Barn             | 60 A, 230 V  |
- a) 100 A
  - b) 200 A
  - c) 500 A
  - d) 1000 A

89. Given the following data for an electric motor, calculate the operating efficiency of the motor. Hint: 1 hp = 746 W

Motor Inputs – 225 V                      25 A                      4500 W  
Motor Outputs – 5.0 hp                      1760 rpm

- a) 66.3%
- b) 95.4%
- c) 76.5%
- d) 82.9%

90. What is the pressure in a 4 inch diameter cylinder that is producing 18,000 lb of force to support a load?  
( $F = PA$ )

- a) 4500 psi
- b) 1432 psi
- c) 1125 psi
- d) 358 psi

## Industry and Marketing Systems – 5 Questions



91. The National Fire Prevention Association (NFPA) uses a colored-coded, numerical diamond labeling and marking system (see above) to identify hazardous materials. The “red” 4 (top of the diamond) labeled above indicates a material that is:
- a severe health hazard
  - a moderately reactive hazard
  - a deadly flammable hazard
  - a slight health hazard

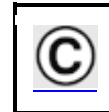
### Choosing a fire extinguisher



Class A fires are the most common. They involve ordinary combustibles such as wood, paper, cloth, rubber, and some plastics.



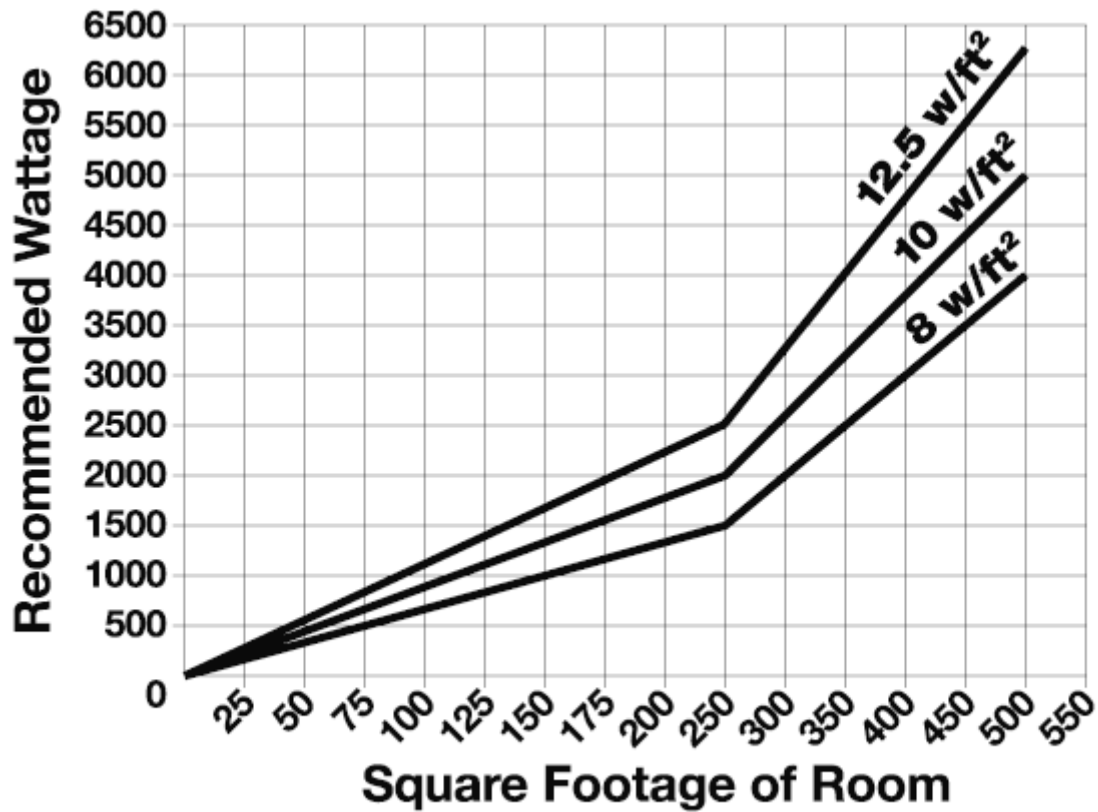
Class B fires are caused by flammable liquids, gases, and grease. Water can spread and splatter these explosive fires when sprayed into the flames.



Class C electrical fires require special attention. Water provides a path of conductivity for electricity to follow, endangering personnel.

92. Given the above chart on fire, fire extinguisher types and symbols which type would be the best to have in a farm shop?
- A type extinguisher
  - B type extinguisher
  - ABC type extinguisher
  - A bucket of water

Purchasing a heater:



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Minimal or no insulation: 12.5 watts/sq. ft.

Average amount of insulation (R-11 in walls and R-19 in ceiling): 10 watts/sq. ft.

Fully insulated (R-19 in walls and floor, R-38 in ceiling): 8 watts/sq. ft.

93. You are planning to purchase a heater for a fully insulated farm office. The room is 250 square feet. Given the above information and using the graph what is the recommended wattage:

- a) 500
- b) 1500
- c) 2000
- d) 2500

You have been given the following chart listing performance characteristics of different types of stainless steel.

#### Stainless Steel Types Performance Characteristics

Corrosion Resistance	Machinability	Weldability
Excellent 316, A286, Nitronic 60	Excellent 303, 416	Good 301, 302, 304, 316, 321, 17-4
Good 301, 302, 304, 309, 321	Good 304, 316, 410, 430	PH Fair
Fair 303, 430	Fair 301, 302, 309, 321, 420	410 Difficult
Poor 410, 416, 420, 440C	Poor 420V, 440C, 15-5 PH, 17-4	303, 416, 440C
Not rated 420V, 15-5 PH, 17-4 PH	PH, Nitronic 60, A286	

Based on the above chart which type of stainless steel would best suited for the following applications:

94. Ease of welding or weldability:

- a) 301
- b) 303
- c) 410
- d) 416

95. Resistance to corrosion:

- a) 316
- b) 416
- c) 420
- d) 430

### Structural Systems – 5 Questions

96. What depth (ft) is required to store 8000 bushels of corn in a cylindrical grain bin 30 ft in diameter?

- a) 11.1
- b) 11.3
- c) 14.1
- d) 20.2

97. A concrete curing compound is applied to fresh concrete to increase the strength of the concrete. The compound is applied at a rate of 5 gallons for every 350 square feet. The concrete to be cured measures 100 feet long by 80 feet wide and 4" thick. How many gallons of curing compound will be needed to cure the concrete?

- a) 23 gallons
- b) 115 gallons
- c) 5 gallons
- d) 1600 gallons

98. The concrete for a feed lot is to be 5 inches thick with a 6 inch compacted sub-grade. The sub-grade material is 411 limestone that has a density of 100 pounds per cubic foot. The feed lot measures 120 feet long by 75 feet wide. How many tons of stone are required for the sub-grade?

- a) 450 tons

- b) 900 tons
- c) 225 tons
- d) 500 tons

99. How many square yards of plastic are required to construct a temporary greenhouse covered with a single layer of plastic. The greenhouse is to be semicircular in shape; 100 ft long, 20 ft wide and 10 feet high in the center. Include the ends.

- a) a) 384 yd<sup>2</sup>
- b) b) 349 yd<sup>2</sup>
- c) c) 222 yd<sup>2</sup>
- d) d) 356 yd<sup>2</sup>

100. Under certain conditions the air in the greenhouse of problem 99 is to be completely changed 4.5 times every hour by a ventilation fan. What flow rate (cfm) must the fan maintain at these conditions?

- a) 524
- b) 9424
- c) 750
- d) 2356