

**2017 AGRONOMY KANSAS FFA CDE
AGRONOMIC QUIZ**

KEY

Contestant No. _____ Contestant Name _____ Score _____

WRITE ANSWERS ON BLANKS USING CAPITAL LETTERS – (4 points each)

- D_____ 1. Palmer amaranth and tall waterhemp are types of pigweeds that are problem weeds in soybeans in Kansas because, like soybeans, they are both classified as:
- A) perennial dicots
 - B) winter annual grasses
 - C) summer annual grasses
 - D) summer annual dicots
 - E) winter annual dicots
- C_____ 2. Which of the following is a common dry fertilizer carrier that supplies both nitrogen and phosphorus with a typical analysis of 11-52-0?
- A) triple super phosphate (TSP)
 - B) di-ammonium phosphate (DAP)
 - C) mono-ammonium phosphate (MAP)
 - D) ammonium polyphosphate (APP)
 - E) urea-ammonium nitrate (UAN)
- B_____ 3. A farmer is applying fertilizer “2 x 2” on corn. That means it is being applied:
- A) Topdressed sometime between two weeks after emergence and two weeks before tasseling
 - B) Banded as a starter with the planter two inches beside and two inches below the seed
 - C) Sidedressed during the growing season after stage V-2 but before stage R-2
 - D) Added to the irrigation water every second irrigation pass (fertigation)
 - E) Broadcast at least two weeks prior to planting to minimize the chance for salt injury, but not more than two months before planting to minimize the chance for losses due to leaching
- E_____ 4. Wheat is often grown every other year in very dry areas of the Western Plains. During the off year, the land is left idle the wheat residue left on the soil surface. This stores up soil moisture and increases the chance for success of the wheat crop the next year. This cropping system is called:
- A) cover cropping
 - B) strip cropping
 - C) intercropping
 - D) double cropping
 - E) fallowing
- D_____ 5. Much commercial soybean seed sold in the United States today is sold in bulk and priced by the “unit”. One “unit” of soybean seed is an amount equal to a standard seed count of:
- A) 40,000 seeds
 - B) 80,000 seeds
 - C) 100,000 seeds
 - D) 140,000 seeds
 - E) 200,000 seeds
- C_____ 6. Corn that develops under drought stress is more likely to produce moldy ears since the ears are not as heavy and may not turn down, allowing water to readily enter under the husks. A specific health concern with regard to moldy corn is caused by the fungus *Aspergillus flavus* which may result in the corn containing toxic levels of:
- A) vomitoxin
 - B) alkaloid
 - C) aflatoxin
 - D) nitrate
 - E) *E. coli* bacteria

- D_____ 7. One variation of conservation tillage for row crops is to just till the soil in narrow paths, then plant seeds into these narrow tilled paths (now possible with auto steer and precision planting technology). This practice is called:
- A) vertical tillage B) strip intercropping C) ridge tillage D) strip tillage E) fallowing
- D_____ 8. Which is a proper value for moisture content of chopped corn or sorghum forage to insure proper silage making?
- A) 15-20% B) 25-30% C) 45-50% D) 65-70% E) 85-90%
- B_____ 9. The corn disease Goss's wilt has been an increasing problem in corn production in Kansas. This disease is not readily controlled by spraying because it is caused by a:
- A) virus B) bacteria C) nematode D) fungus E) mycorrhizae
- D_____ 10. Corn rootworms cause damage to corn by:
- A) feeding on the roots during the larval stage
B) feeding on the roots during the adult stage
C) feeding in the roots during both the larval and adult stage
D) feeding on the roots during the larval stage and feeding in the silks during the adult stage
E) none of the above, they actually do not feed on corn at all
- C_____ 11. Which of the following tillage tools would incorporate the greatest amount of crop residue?
- A) field cultivator B) tandem disk C) moldboard plow D) rotary hoe
E) all of the above would be about equal in amount of residue incorporated
- E_____ 12. A common disease of wheat is leaf rust, which is caused by a fungus that does not survive over winter in Kansas. However, the leaf rust spores blow in from the Southern states each spring to infect our wheat crop. In this example, the wind is called the:
- A) pathogen B) parasite C) inoculum D) host E) vector
- A_____ 13. Treating alfalfa or clover seed by scratching the seed coat to break dormancy caused by hard seed is called:
- A) scarification B) inoculation C) vernalization D) emasculation E) fixation
- D_____ 14. Herbicides like "Roundup" and "Atrazine" that are taken up and translocated throughout the weed are called:
- A) selective B) non-selective C) contact D) systemic E) residual
- E_____ 15. Which of the following standard abbreviations for pesticide formulations indicate a product that would be sprayed directly without mixing and diluting with water?
- A) WP B) DF C) WDG D) EC E) RTU
- C_____ 16. The standard test weight per bushel for grain sorghum is:
- A) 48 pounds B) 52 pounds C) 56 pounds D) 60 pounds E) 100 pounds

- D____17. A new transgenic trait for soybeans has been developed by Monsanto called “Xtend”. These soybeans are fully released for 2017 and require the use of XtendiMax with VaporGrip from Monsanto (or Engenia from BASF or FeXapan plus VaporGrip from DuPont). Farmers are very excited about this technology for a new post-emergence herbicide targeting broadleaf annual weeds. The active ingredient(s) in these new herbicides is:
A) 2,4-D B) glyphosate C) atrazine D) dicamba
E) all of the above
- E____18. The cells that transport water in the vascular system of plants are called:
A) guard cells
B) parenchyma cells
C) meristematic cells
D) phloem cells
E) xylem cells
- A____19. Sprinkler irrigation systems have an advantage over furrow or flood irrigation systems for all of the following **except**:
A) less energy required to pump and distribute water with sprinkler
B) lower labor costs with sprinkler
C) more uniform application of water with sprinkler
D) less land leveling needed with sprinkler
E) less leaching losses with sprinkler
- E____20. Which of the following statements is generally true about sensitivity of crops to stress during specific developmental stages?
A) winter wheat is most subject to freeze injury during the flowering stage
B) grain sorghum is most subject to drought stress during the boot stage
C) soybeans are most subject to drought stress during the pod setting stage
D) corn is most subject to heat and drought stress during the silking and pollination stage
E) all of the above are true
- B____21. Which of the following statements related to managing soil texture is **not true**?
A) timeliness of tillage is more critical for clay soils than for sandy soils
B) soil applied herbicides must usually be applied at higher rates on sandy soils than on clay soils
C) it takes more lime to change the pH of clay soils compared to sandy soils
D) clay soils can hold more water and nutrients than sandy soils
E) split application of nitrogen fertilizer is more critical on sandy soils than on clay soils since sandy soils are more likely to have leaching loss of nitrogen
- D____22. The natural toxin in cotton that can have a negative effect on health of animals fed too much whole cotton seed or cotton seed by-products is called:
A) prussic acid B) nitrate C) cellulose D) gossypol E) aflatoxin
- B____23. The stages of the life cycle of a grasshopper or potato leaf hopper with **gradual** metamorphosis are:
A) egg, adult
B) egg, nymph, adult
C) egg, larvae, pupae, adult
D) larvae, nymph, pupae, adult
E) egg, larvae, adult

- D____24. What is an “NDVI” image commonly used in precision agriculture?
- A) a map showing variable soil nutrient levels produced by grid soil sampling
 - B) a map showing variable soil textures produced with a Veris electrical conductivity machine
 - C) a map showing variable yields produced by a yield monitor on a combine
 - D) a computer enhanced map showing differences between green healthy vegetation versus unhealthy or dead vegetation produced by infrared photos taken with a satellite or drone
 - E) a computer generated map showing the prescription for variable rates of an input (seed, fertilizer, lime, etc.) that a variable rate applicator uses to adjust rates as it moves across a field
- B____25. Areas of land maintained in permanent grass and strategically placed along streams or drainage areas to help control erosion and filter out sediment and contaminants from crop fields are called:
- A) critical zones
 - B) buffer strips
 - C) recharge areas
 - D) ecosystems
 - E) wetlands
- E____26. The terms suspension, saltation, and surface creep refer to processes involved in:
- A) leaching of nutrients into groundwater
 - B) movement of airborne spray particles away from the intended area of application
 - C) transport of disease pathogens from one plant to another
 - D) water erosion
 - E) wind erosion
- B____27. Which of the following conditions would **not likely** be a result of using a no-till system that leaves crop residue on the soil surface versus incorporating the residue with tillage?
- A) more water infiltration
 - B) warmer soil temperature
 - C) less soil moisture loss by evaporation
 - D) less wind and water erosion
 - E) more overwintering of insect and disease pests
- C____28. Phosphorus from fertilizer or manure is most likely to be lost from crop fields, and thus may harm the environment, by:
- A) leaching into groundwater (contaminating wells used for drinking water)
 - B) volatilization into the atmosphere as a “greenhouse gas” (contributing to climate change)
 - C) runoff into surface water (contributing to eutrophication of lakes and streams)
 - D) all of the above are common ways phosphorus is lost from soils
 - E) none of the above, phosphorus is very seldom lost from soils since it does not move readily
- B____29. The primary concern related to quality of ground water used for irrigation is the presence of high amounts of which of the following substances:
- A) *E. coli* bacteria
 - B) salts
 - C) pesticide residues
 - D) nitrates
 - E) phosphates
- C____30. Which of the following common acronyms refers to using a combination of multiple methods of pest control (chemical, biological, cultural, etc.)?
- A) PPE
 - B) REI
 - C) IPM
 - D) ADF
 - E) ATP

AGRONOMIC CALCULATIONS

Each box is worth 3 points. To receive full credit, place answer in the box with appropriate units.

Round to one decimal place unless otherwise indicated.

Useful conversions: 43,560 ft²/acre, 2,000 pounds/ton, 12 inches/foot, 5280 ft/mile, 3785 ml/gallon,
16 dry ounces/pound, 128 fluid ounces/gallon

31. When determining plant stands for soybeans, you count an average of 62 soybean plants in 20 foot sections of row. Row width is 15 inches.

What is the population in plants per acre?

108,028.8 plants/acre

32. UAN fertilizer with an analysis of 32-0-0 costs \$314 per ton.

What is the cost per pound of nitrogen (N)?

\$ 0.49 / # N

33. A farmer harvests a 69 bushels per acre wheat crop. Assume wheat averages 12% protein and protein averages 16% nitrogen. Use the standard weight of 60 pounds per bushel for wheat.

Calculate the pounds of nitrogen removed per acre in the wheat grain.

79.5 # N / acre

34. You are calibrating a sprayer and you collect 568 ml of water in 15 seconds from an individual nozzle. Nozzle spacing is 20 inches and the speed of travel is 12 miles per hour.

What is the sprayer application rate in gallons per acre (round to two decimal places)?
(you may use the shortcut formula)

$$\text{GPA} = \frac{5940 \times \text{GPM}}{\text{MPH} \times \text{Nozzle Spacing in Inches}}$$

14.9 gallons/acre

35. Your soil test recommends 120 pounds N per acre and 65 pounds P₂O₅ per acre for grain sorghum. Fertilizers available are urea (46-0-0) and APP (10-34-0).

How many total pounds of urea is needed per acre?

219.3 # urea/acre

How many total pounds of APP is needed per acre?
(be sure to account for the N applied with the APP)

191.2 # APP/acre

36. An alfalfa seed tag reads purity 90% and germination 90%. The recommended seeding rate for alfalfa is 15 pounds Pure Live Seed (PLS) per acre.

How many pounds of this seed is needed to plant a 40 acre field at the recommended seeding rate?

740.7 # alfalfa seed/field

37. A spray tank has a volume of 1200 gallons. The sprayer is calibrated to spray 15 gallons per acre. You are going to use a generic 2,4-D herbicide product called Weed-Out 4L which is a liquid (L) formulation. The recommended rate of 1.0 pounds 2,4-D active ingredient per acre. The label on the Weed-Out states that the concentration is 4 pounds active ingredient per gallon of product.

How many gallons of Weed-Out herbicide do you need to add to the tank?

20 gallons Weed-Out / tank

38. Prior to harvest, a farmer wants to estimate the yield for her corn crop. Random counts in the field result in an average of 40 ears per 25 feet of row on 30" rows. The ears average 16 rows around and 42 kernels long. Assume the corn has 1600 kernels per pound.

Estimate the yield in bushels per acre using the standard weight per bushel for corn.

209.1 bushels/acre

39. You wish to apply 1/2 inch of water to your field which is under a center pivot irrigation system on a quarter section in western Kansas. Your well capacity is 750 gallons per minute. There are 27,154 gallons per acre-inch.

How many hours will it take to complete a full circle and apply the 1/2 inch of water to the field? (a quarter section center pivot covers 125 acres)

37.7 hours / full circle