

**IOWA FFA AGRICULTURAL MECHANICS CAREER DEVELOPMENT EVENT  
WRITTEN EXAMINATION  
IOWA STATE UNIVERSITY  
AMES, IOWA  
JUNE 5, 2008**

**I. MACHINERY AND EQUIPMENT SYSTEMS: Round balers**

1. When setting up the tractor to attach the John Deere 556 round baler, the tractor drawbar must be \_\_\_\_\_ inches from the ground.
  - a. 6-12
  - b. 13-20
  - c. 24
  - d. 540

2. This symbol, found in the Operator's Manual, is a \_\_\_\_\_ safety symbol.
  - a. stay clear of rotating drivelines
  - b. rotating PTO shaft
  - c. machine in motion
  - d. driveshaft rotates clockwise



3. The maximum bale weight for the JD 556 Round Baler is \_\_\_\_\_ pounds in dry hay.
  - a. 900
  - b. 4310
  - c. 1450
  - d. 1750
4. Minimum horsepower requirement for a tractor, pulling the JD 556 Round Baler, is \_\_\_\_\_ HP.
  - a. 35
  - b. 45
  - c. 55
  - d. 100
5. If a large round bale starts to roll downhill, you should:
  - a. call 911
  - b. try to stop the bale with the rear tractor wheel
  - c. stay clear, until the bale stops rolling
  - d. turn the bale with the loader
6. \_\_\_\_\_ is the best tractor to use to transport large round bales.
  - a. 2010 John Deere
  - b. New Holland "Boomer"
  - c. 4450 John Deere
  - d. CA Allis-Chalmers

7. The windrow should be \_\_\_\_\_ in order to make an ideal shaped large round bale.
- twice as wide as the baler pickup
  - nearly the same width as the baler pickup
  - one-half the width of the baler pickup
  - one-third the width of the baler pickup

8. This is the safety symbol for:
- recognize safety information
  - engage gate lock
  - protect bystanders before unloading bale
  - understand signal words



9. If the windrow is not full-width of the baler pickup, the operator can \_\_\_\_\_ to make a uniform bale.
- drive faster
  - drive slower
  - keep the windrow centered
  - “weave” the baler back and forth across the windrow

10. You should do all of the following, except \_\_\_\_\_ when you see this symbol in the operator’s manual or on the machine.
- be alert to the potential for personal injury
  - follow safety instructions
  - you can ignore this warning
  - be alert to dangers where you see this sign on the machine

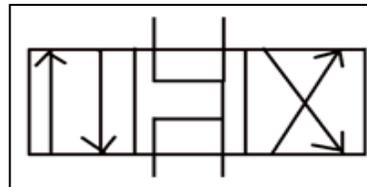


11. You should \_\_\_\_\_ if your little brother wants to ride on the tractor when you are going to operate the large round baler.
- make sure that he is at a safe distance from the baler
  - let him ride, if he is over 10 years old
  - make sure that he holds on tight
  - let him ride, if he sits in your lap
12. Large round balers can be operated safely on a moderately sloping field. Do all of the following, except \_\_\_\_\_ when you are operating the baler in this field.
- make sure you are headed up-hill when you discharge the bale
  - drive at a safe speed on moderate slopes
  - discharge bales crossways on slopes, so that the bales do not role down-hill
  - stay away from ditch banks or gullies

## II. INDUSTRY AND MARKETING SYSTEMS: Hydraulics

13. Fluid power includes \_\_\_\_\_ and \_\_\_\_\_.
- solids and liquids
  - liquids and gases
  - solids and gases
  - none of the above
14. Flow through an orifice causes a(an) \_\_\_\_\_ in pressure.
- decrease
  - increase
  - no change
  - flow
15. Hydraulics provide \_\_\_\_\_ in work force.
- great increases
  - great decreases
  - increased pressure (PSI)
  - no change
16. Hydraulic pressure and velocity vary \_\_\_\_\_.
- directly
  - smoothly
  - inversely
  - continuously
17. The PSI is \_\_\_\_\_ at the base end of a hydraulic cylinder compared to the PSI at the rod end.
- less
  - more
  - equal
  - none of the above
18. The force is \_\_\_\_\_ at the base end of a hydraulic cylinder compared to the force at the rod end.
- less
  - more
  - equal
  - none of the above
19. The lifting force required to lift a particular field finisher is 17,500 pounds. A \_\_\_\_\_ diameter cylinder would be the smallest sized cylinder that could lift the machine if the tractor hydraulic system developed 2200 PSI.
- 3 inch
  - 3.5 inch
  - 4 inch
  - 5 inch

20. Most farm hydraulic cylinders have all of the following specifications, except:
- single acting
  - double acting
  - standard pressure
  - chromed piston rod
21. A hydraulic ram, as found on some 3-point lift cylinders and some high-pressure applications, have a:
- cylinder bore diameter larger than the piston rod
  - cylinder bore diameter and rod diameter that are the same
  - cylinder bore diameter smaller than the rod diameter
  - none of the above
22. \_\_\_\_\_ would not be a good choice for oil to add to a tractor hydraulic system.
- John Deere Hy-Gard
  - Case-IH Hy-Tran
  - Cenex TCH
  - Chevron 5W30 motor oil
23. If you are checking for a pin-hole sized leak in a remote cylinder hose, you should do all of the following, except:
- replace all of the hoses on the equipment
  - use a large piece of paper, held the opposite end and moved along the hose to locate the leak
  - when there is NO pressure on the hose, you can feel of the hose to find the wet, oily spot
  - observe the hose from a safe distance, when it is under pressure, to look for the leak
24. In this diagram, the control valve is shown in the \_\_\_\_\_ position.
- Raise
  - lower
  - neutral
  - none of the above



**III. ENERGY SYSTEMS: Wiring an electric motor to a circuit**

25. This electric motor, using the data plate shown, has \_\_\_\_\_ horsepower.
- 40 c
  - 116
  - 1 ¼
  - 1
26. This is a \_\_\_\_\_ phase electric motor.
- 1 ¼
  - 1.25
  - 60
  - 1

ELECTRIC MOTOR NAMEPLATE						
MODEL 500						
FRAME		TYPE	INS. CLASS	IDENTIFICATION NO.		
66		KC	J	25380		
HP	RPM	VOLTS		AMP	CYC	S.F.
1 ¼	1725	120/240		15/7.5	60	1.25
DESIGN		CODE	PHASE	DUTY CONT.		
DRIVE END BEARING		BBD 116				
OPP. END BEARING		BOB 117				
AMB		40 C				

27. The electric motor data plate indicates that this motor operates on \_\_\_\_\_ hertz.
- 60
  - 120/240
  - 1725
  - 116
28. This electric motor can draw up to \_\_\_\_\_ amps when operated at full load.
- 120/240
  - 60
  - 7.5
  - 1725
29. In wiring an AC electric motor, \_\_\_\_\_ is the correct designation of the wire colors in the line wiring.
- black-power, white-neutral, bare-ground
  - black-neutral, white-power, bare-ground
  - black-ground, white- power, bare-ground
  - black-power, white-ground, bare-neutral
30. To reverse a single voltage, reversible, AC electric motor, you would \_\_\_\_\_ wires.
- switch #5 (black) and #1 (blue)
  - switch #5 (black) and #8 (red)
  - switch #1 (blue) and #5 (black)
  - connect #5 (black) and #1 (blue)
31. A limit switch, used to stop an electric motor driven grain auger, when the bin is full, would use a \_\_\_\_\_ switch.
- NC
  - NO
  - either of the above
  - none of the above
32. If you are wiring an exhaust fan for Farmers Coop, in a grain storage building, you should select a(n) \_\_\_\_\_ switch.
- ordinary light
  - rotary light dimmer
  - knife
  - explosion-proof
33. A fractional electric motor has \_\_\_\_\_ horsepower.
- 1.25
  - 0.75
  - 2.50
  - 12

34. A \_\_\_\_\_ type electric motor, used on an air compressor, will reach constant speed very quickly.
- capacitor start
  - split-phase
  - dual-voltage
  - open frame
35. Starting current may be \_\_\_\_\_ the running current required in an electric motor.
- the same as
  - one hundred times
  - six times
  - one-half
36. The “can” looking object found on some electric motors, is a \_\_\_\_\_.
- split-phase controller
  - little starting motor
  - Lukenheimer flapper valve
  - capacitor

#### **IV. STRUCTURAL SYSTEMS: Carpentry**

37. The 2 X 4, or 2 X 6 placed on the top of a stud wall, is called a:
- stud
  - header
  - bottom plate
  - top plate
38. The 2 X 6's placed above a window opening in a wall, called:
- cripples
  - headers
  - studs
  - sills
39. A \_\_\_\_\_ is a 2 X 4 or 2 X 6, placed horizontally between studs in a stud wall.
- fire stop
  - header
  - sill
  - short stick
40. The \_\_\_\_\_ is the outer vertical 2 X 4, or 2 X 6, in a framed window opening.
- trimmer stud
  - king stud
  - header board
  - plate support

41. Wall studs are generally placed \_\_\_\_\_ inches on center.
- 12
  - 21
  - 16
  - 36
42. The 2 X 12 placed at the ends of floor joists, and perpendicular to the floor joists and fastened to them is called the \_\_\_\_\_ joist.
- cross
  - plate
  - header
  - stop
43. The \_\_\_\_\_ \_\_\_\_\_ is the part of the rafter that extends out past the stud wall.
- rooster tail
  - loose end
  - shadow panel
  - rafter tail
44. The notch cut in the rafter which sits on the top plate is called the:
- bird's beak
  - bird's mouth
  - bird's tail
  - rafter tail
45. In a two-story house, with \_\_\_\_\_ \_\_\_\_\_, the stud wall sits on top of floor sheathing, rather than extending from the ground floor to the eaves with each stud.
- balloon framing
  - anchor framing
  - platform construction
  - stick framing
46. Roof pitch is the measurement of a roof's slope or incline. A roof with 4/12 pitch would have \_\_\_\_\_ inches of rise for each foot of horizontal distance from the edge of the roof towards the center.
- 4
  - 12
  - 1
  - 2
47. The nominal size of a plank is 2 X 12. The actual size of the 2 X 12 would be:
- 2" X 12"
  - 1 1/4" X 11"
  - 1 1/2" X 11 3/4"
  - 1 1/2" X 11 1/4"

48. A 6d nail is commonly referred to as a 6 penny nail. Long ago, this meant:
- the number of nails that could be made out of a penny
  - the number of nails that could be bought for a penny
  - the price of 100 hand forged nails of that size
  - no one knows for sure

### V. ENV / NATURAL RESOURCE SYSTEMS: Surveying

49. A total station has 3 components. All of the following, except \_\_\_\_\_ are parts of the total station.
- a theodolite or transit
  - a Philadelphia rod
  - an electronic distance measuring device
  - a microprocessor
50. A \_\_\_\_\_ is read directly through the telescope of the person using the instrument.
- level rod
  - hand level
  - Tripod
  - Double pentagon prism
51. Laser levels are precise up to \_\_\_\_\_ feet.
- 100
  - 1000
  - 250
  - 5280
52. A Philadelphia rod is graduated in \_\_\_\_\_ of a foot.
- 10ths
  - 100ths
  - 1000ths
  - 16ths
53. A plumb bob measures, or determines:
- a vertical line from the tripod to a point on the ground
  - distance from the ground to the tripod
  - elevation to the top of a hill
  - distance to the closest tree
54. Surveying measures 3 different dimensions, which include:
- distance, soil type and elevation
  - distance, angles and temperature of the day
  - distance, angles and elevation
  - distance, angles and mileage

55. A Cadastral survey has to do with determining and defining:
- soil type
  - land ownership and boundaries
  - location of a building on your farm
  - elevation of Davidson Hall at ISU
56. A \_\_\_\_\_ is a permanent point of known elevation.
- Back Sight (BS)
  - Fore Sight (FS)
  - Height of Instrument (HI)
  - Benchmark (BM)
57. Elevation of an unknown point can be determined by subtracting the rod reading (FS) from the known:
- Front Sight
  - Back Sight
  - Height of Instrument
  - Turning Point
58. \_\_\_\_\_ are the initials used to describe a point of unknown elevation.
- UKE
  - KE
  - UNK
  - ULE
59. \_\_\_\_\_ is a process of determining the relative elevations of various points, without being concerned with absolute elevations. You would probably use this method for laying out a drain line:
- Cadastral surveying
  - differential leveling
  - Height of Instrument (HI)
  - differential calculus
60. The elevation above sea level of Ames, IA is \_\_\_\_\_ feet.
- 100
  - 5280
  - 955
  - 6

## 2008 Ag Mechanics Exam Key

1. B	21. B	41. C
2. A	22. D	42. C
3. C	23. A	43. D
4. C	24. C	44. B
5. C	25. B	45. C
6. C	26. D	46. A
7. B	27. A	47. D
8. C	28. C	48. C
9. D	29. A	49. B
10. C	30. B	50. A
11. A	31. A	51. C
12. A	32. D	52. B
13. B	33. B	53. A
14. A	34. A	54. C
15. A	35. C	55. B
16. C	36. D	56. D
17. C	37. D	57. C
18. B	38. B	58. A
19. A	39. A	59. B
20. A	40. B	60. C