

Name: \_\_\_\_\_ University: \_\_\_\_\_

Identifier: \_\_\_\_\_

Time: \_\_\_\_\_

Score: \_\_\_\_\_/50 points

- You have **one hour** to complete the test.
- Please fill in your answers on the Scantron form provided. **Make sure to include your name and identifier on both the test booklet AND the Scantron form!**
- Use only the calculators provided.
- The entire written test is worth **50 points**. All questions have the same point value.
- Please turn in the exam booklet and Scantron form when finished (your coach will receive all tests back after the completion of the contest).
- Ties will be broken by the time taken to complete the test. The proctor will determine your completion time.
- Useful conversions/formulas are provided on the next page.
- **Good luck!**

**\*\*\*\*\*Open booklet and begin test only when instructed\*\*\*\*\***

## Conversions/Formula Sheet

1 mL = 0.034 fl oz

1 gallon = 3.785344 liters

1 hectare = 2.471 acres

1 fl oz = 29.573 mL

1 pint = 16 oz

1 ft = 30.48 cm

1 mph = 88 ft/mim

1 mile = 5280 ft

1 pound = 454 grams

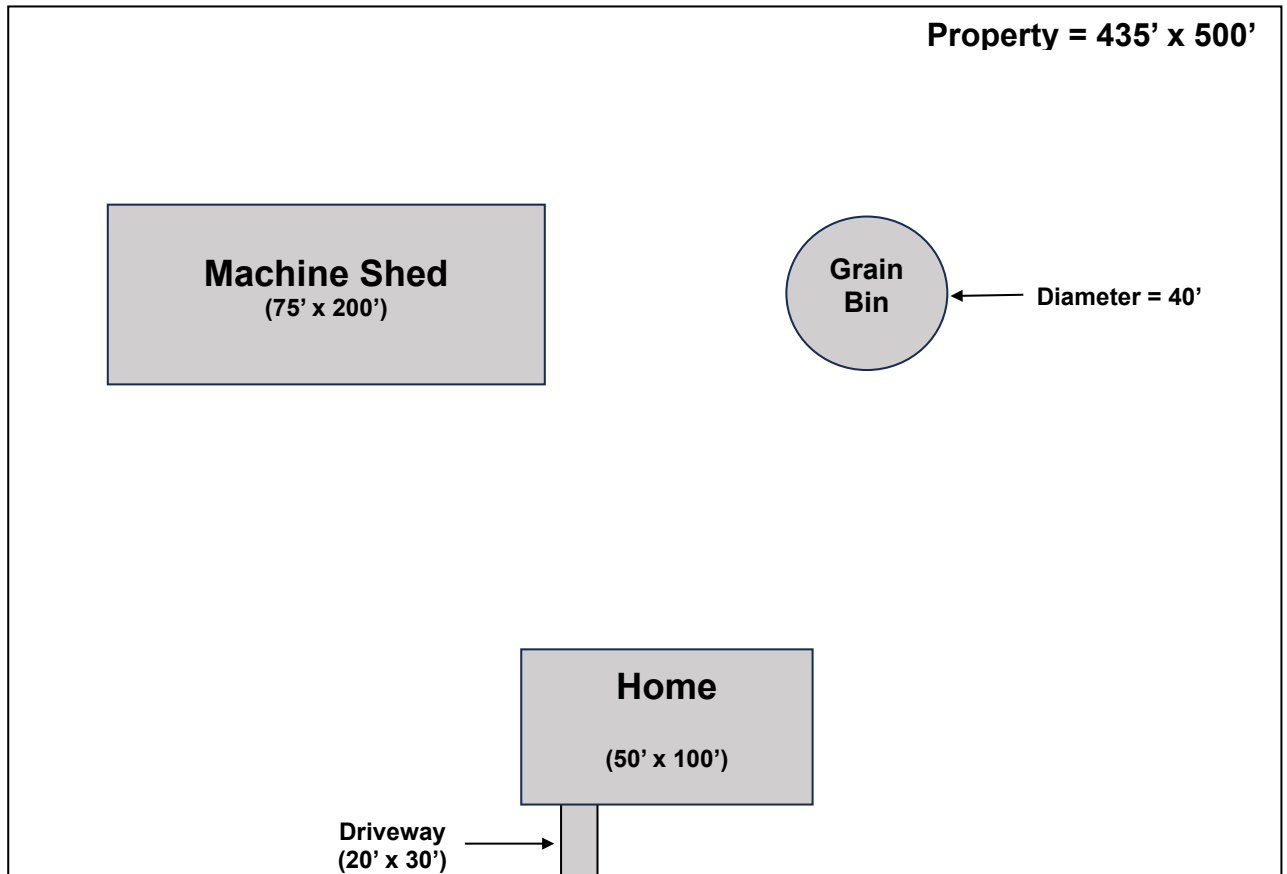
1 acre-inch = 27,154 gallons

1 acre = 43,560 ft<sup>2</sup>

1 kg = 2.205 lbs

$A = (\pi)r^2$

$\pi = 3.14$



A homeowner wants to make a spring pre-emergence application of pendimethalin (Pendulum 2G) at 2.0 lbs a.i./A to the Kentucky bluegrass lawn covering their entire property (excluding the home, driveway, and outbuildings). Using the map above determine the following:

- 1) How many acres will the homeowner apply Pendulum 2G to?
  - a) 3.5 A
  - b) 4.0 A
  - c) 4.5 A**
  - d) 5.0 A
  
- 2) How many pounds of Pendulum 2G will be required for this application?
  - a) 9 lbs
  - b) 45 lbs
  - c) 450 lbs**
  - d) 900 lbs

**SUGGESTED SPREADER SETTINGS FOR TURF**

To provide proper distribution, calibrate your spreader before application.  
25 lbs treats 11,000 sq ft (1/4 acre) at the 100 lbs product per acre rate.

Spreader		Ground or PTO Speed (mph)	Width of Coverage (ft)	Rate Range (lbs of product per acre)		
				75	100	150
Lesco Rotary				C	D	F
Scott Rotaries	R-7, R-7X	3	8	B 1/2	D	E 1/2
	R-8, R-8A, SR-1 (cone 9)	3	9	H 1/2	I	J 1/2
Lely Models	(see below)	4.5	18	3 1/4 III	3 1/2 III	4 1/2 III
Vicon	(Model 02)	4.5	18	12	16	20
	(Model 03)	4.5	10	9	10	13
Lely models WTR, WFR, HR and 1250. PTO at 450 rpm.						

3) Assuming a walking speed of 3mph and a spreader width of 8 ft, which setting should the homeowner use to apply the correct rate of Pendulum 2G using a Scott R-7 spreader?

- a) **D**
- b) E 1/2
- c) I
- d) J 1/2

Later in the summer, the homeowner would like to make a broadcast application of Drive XLR8 at 1.45 fl. oz. per 1000 ft<sup>2</sup> to control crabgrass across the property using an ATV sprayer calibrated to deliver 0.46 gal/1000 ft<sup>2</sup>.

4) How many gallons of Drive XLR8 are required for this application?

- a) 1.8 gal
- b) **2.2 gal**
- c) 2.5 gal
- d) 3.0 gal

5) How many gallons of water will be needed to make the application?

- a) 91 gal
- b) **88 gal**
- c) 85 gal
- d) 80 gal

A farmer wants to apply a PRE herbicide impregnated on diammonium phosphate (DAP, 18-46-0) prior to corn planting. They will use Dual II Magnum (7.64 lb S-metolachlor/gallon) and want to apply 90 lb of nitrogen in the preplant application. The Dual II Magnum-impregnated fertilizer will be applied to a total of 560 acres of corn.

- 6) How many lb/acre of DAP are needed to supply his desired nitrogen rate?
- a) 18 lbs/A
  - b) 90 lbs/A
  - c) 500 lbs/A
  - d) 560 lbs/A
- 7) How many tons of DAP are needed for the 560 acres?
- a) 5
  - b) 140
  - c) 157
  - d) 200
- 8) For a Dual II Magnum rate of 2.5 pts/acre, how many liters of Dual II Magnum are needed to treat this farm?
- a) 662 L
  - b) 331 L
  - c) 150 L
  - d) 175 L
- 9) How many grams of S-metolachlor active ingredient would be in 30 lb of the fertilizer after impregnation?
- a) 65 g
  - b) 550 g
  - c) 650 g
  - d) 1100 g

A field scientist wants to apply Sonic herbicide (0.62 lb ai of sulfentrazone and 0.08 lb of ai of cloransulam-methyl per lb of product) at 8 oz. per acre to 5 research trials, then irrigate to the trials to simulate an activating rainfall. Each trial is 250ft x 250ft in size and the scientist's lateral-move irrigation system is 500 ft long. When set to irrigate at 0.5 inches of water, the lateral moves at a speed of 50 meters per hour.

- 10) How many minutes does it take for the lateral to move across one trial while irrigating at 0.5 inches of water?
- a) 47 min
  - b) 60 min
  - c) 92 min
  - d) 123 min
- 11) How many gallons of water will be applied to each trial after an irrigation of 0.5 inches?
- a) 13,600 gal
  - b) 19,500 gal
  - c) 27,100 gal
  - d) 39,000 gal
- 12) How many kg of Sonic herbicide will be required to spray all 5 trials (assume you are spraying the whole trial area)?
- a) 1.63 kg
  - b) 3.59 kg
  - c) 35.9 kg
  - d) 57.4 kg

On the day of the application, the field scientist realizes that there is enough Sonic herbicide to spray only 3 trials. However, the field scientist has FirstRate (Contains 0.84 lb of cloransulam-methyl per pound of product) and Spartan 4F (Contains 4 pounds of sulfentrazone per gallon) available.

- 13) How many grams of FirstRate will be required to spray the other 2 trials (assuming the field scientist wants to maintain the same load of active ingredients present in 8 oz of Sonic per acre)?
- a) 0.1 g
  - b) 12 g
  - c) 21 g
  - d) 62 g

- 14) How many fluid ounces of Spartan 4F will be required to spray the other 2 trials (assuming the field scientist wants to maintain the same load of active ingredients present in 8 oz of Sonic per acre)?
- a) 0.3 fl. oz.
  - b) 2.2 fl. oz.
  - c) 22 fl. oz.
  - d) 28 fl. oz.

The same field scientist from has received a protocol aimed at evaluating efficacy of an experimental, non-selective, herbicide (Compound X) for use in soybeans. Since they don't yet have soybeans with a tolerance trait to Compound X, they are asked to use a hooded interrow sprayer to make a post-directed application, simulating efficacy in a traited cropping system. The sprayer the field scientist will use is capable of spraying three interrow areas per plot. Each hood is 25 inches wide and contains 3 nozzles. Each plot is 10 feet wide and 25 feet long, and the protocol requests 3 replications. Calculate the following if the protocol also indicates a spray volume of 15GPA and a ground speed of 3mph.

- 15) What should be the individual nozzle output (GPM)?
- a) 0.063
  - b) 0.189
  - c) 0.200
  - d) 0.252
- 16) What is the total treated area in the trial for each treatment (sq. ft.)?
- a) 250 sq. ft.
  - b) 390 sq. ft.
  - c) 470 sq. ft.
  - d) 750 sq. ft.
- 17) What is the total application volume required for each treatment (mL)?
- a) 161 mL
  - b) 322 mL
  - c) 500mL
  - d) 611mL
- 18) If Compound X has a use rate of 24 fl. oz./A, what is the total product amount needed to apply each treatment (mL)?
- a) 7.6 mL
  - b) 5.6 mL
  - c) 3.6 mL
  - d) 2.6mL

You are a local co-op hired to apply Enlist One plus Liberty 280 SL to 5000 acres of soybean to control tall waterhemp. Your sprayer has a 120 ft boom with 15-inch nozzle spacing. During a calibration run you start with a full tank (1,600 gallons) and after a 1000-foot run you have 1,545 gallons left in the tank. Use this information, and the label provided, to answer the following questions.

- 19) What is the spray volume in GPA?
- a) 15
  - b) 20**
  - c) 40
  - d) 55
- 20) What was the average output (ml/nozzle) over the course of the calibration run?
- a) 789 ml/nozzle
  - b) 987 ml/nozzle
  - c) 1987 ml/nozzle
  - d) 2169 ml/nozzle**
- 21) If the calibration run took 45 seconds, what was the sprayer speed in km/h?
- a) 15.1 km/h
  - b) 18.5 km/h
  - c) 21.8 km/h
  - d) 24.3 km/h**
- 22) You will spray Enlist One at 2 pts/acre plus Liberty 280 SL at 32 oz/acre. How many 265-gal totes will you need to spray all 5000 acres?
- a) 9.4 totes Enlist One and 4.7 totes Liberty 280 SL
  - b) 4.7 totes Enlist One and 4.7 totes Liberty 280 SL**
  - c) 6.5 totes Enlist One and 6.5 totes Liberty 280 SL
  - d) 7.3 totes Enlist One and 7.3 totes Liberty 280 SL
- 23) How many sprayer tanks will you need to cover all acres?
- a) 60
  - b) 61
  - c) 62
  - d) 63**
- 24) What is the maximum label rate of Enlist One you can apply per postemergence application to these acres, assuming they were all planted with Enlist soybeans?
- a) 3.0 pts
  - b) 2.0 pts**
  - c) 1.5 pts
  - d) 1.0 pts

25) How many applications of Enlist One at 2 pints could you do per acre per year?

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

26) What is the cut-off growth stage for Enlist One application in Enlist soybeans?

- a) 6"
- b) V3
- c) V6
- d) R1**

27) What PPE is not required when handling this product?

- a) Waterproof gloves
- b) Respirator**
- c) Shoes and socks
- d) Long-sleeved shirt and pants

After finishing spraying herbicides for the season, the same local co-op has been contracted to make fungicide applications to a square, 400-acre field using their Air Tractor 802. Delaro Complete will be applied at 10 fl. oz./A at a volume of 2 GPA.

28) If the Air Tractor 802's nozzles are spaced at 24 inches and its typical air speed is 130 mph, what should the output be from an individual nozzle (gpm)?

- a) 0.53
- b) 1.05**
- c) 1.18
- d) 1.35

29) The airplane is equipped with CPA203 adjustable nozzles with multiple selectable outputs (0.58, 0.97, 1.33, and 4.50 gpm) at 40 PSI, which nozzle is the closest to the appropriate output required for the application?

- a) 0.58
- b) 0.97**
- c) 1.33
- d) 4.50

30) If the airplane operator plans to maintain a pressure of 40 PSI, what should their actual air speed (mph) be to apply correctly at 2 GPA? (round to nearest whole number).

- a) 72 mph
- b) 120 mph**
- c) 165 mph

d) 557 mph

- 31) Based on the pilot's speed calculated in Part C, and a spray swath of 60 ft, how long will it take to spray the full field without accounting for turnaround time?
- a) 3 min
  - b) 15 min
  - c) 28 min
  - d) 56min

You are an industry field scientist who just received a request to implement a herbicide protocol evaluating weed control of several new experimental compounds. The protocol has 15 treatments (including one non-treated check) and 4 replications. Each plot is 10 x 30 ft in size. The target spray volume is 15 and 20 gallons per acre for preemergence and postemergence applications, respectively.

- 32) Your preemergence application is intended to cover the entire trial area, including the non-treated checks. The protocol asks for an application of Zidua SC at 3 fl. oz./acre. How many mL of Zidua SC will be required to make this application?
- a) 2.44 mL
  - b) 24.0 mL
  - c) 36.7 mL
  - d) 42.4 mL
- 33) How many gallons of water will be required to make this application?
- a) 6.2 gal
  - b) 7.0 gal
  - c) 7.8 gal
  - d) 8.3 gal
- 34) How many gallons of water will you need to irrigate the entire trial with 0.75 inches of water and incorporate your preemergence herbicide?
- a) 8,400 gal
  - b) 18,400 gal
  - c) 20, 400 gal
  - d) 27,154 gal

- 35) The protocol manager requested check strips on both sides of each plot to facilitate weed control ratings. Therefore, for the postemergence application you decided to use your 6.67 ft boom. If all treatments require the addition of MSO at 1% V/V and AMS at 2.5% V/V, how many ml of MSO and AMS will be required to complete this postemergence application? (1 decimal place)
- a) 257 mL MSO and 642 mL AMS
  - b) 209 mL MSO and 522 mL AMS
  - c) 195 mL MSO and 487 mL AMS
  - d) 105 mL MSO and 263 mL AMS
- 36) One of the postemergence treatments requires Enlist One (32 oz/acre), MSO (1% V/V), and liquid AMS (2.5% V/V). How many mL of Enlist One are needed to add to a bottle to spray this treatment?
- a) 32.0 mL
  - b) 29.2 mL
  - c) 17.4 mL
  - d) 12.0 mL
- 37) How many mL of MSO will you need to add to the mix bottle?
- a) 13.9 mL
  - b) 12.4 mL
  - c) 9.30 mL
  - d) 6.84 mL
- 38) How many mL of AMS will you need to add to the mix bottle?
- a) 34.8 mL
  - b) 31.0 mL
  - c) 23.3 mL
  - d) 17.1 mL
- 39) How many mL of water are needed if you want to spray the plots with no overage (exact amount needed in the bottle)?
- a) 1490 mL
  - b) 1390 mL
  - c) 1324 mL
  - d) 1193 mL

\*\*\*\*\*END\*\*\*\*\*