2016 Cowboy Classic – Materials Handling Systems
Environmental and Natural Resources

You are currently in your Junior year of your Environmental and Natural Resources degree at the University of Wyoming. As a part of your degree requirement, you are required to intern with a firm specializing in Natural Resources and materials handling. You have just received an intern position with Trihydro Corporation in Laramie WY. As part of the companies consulting business you are required to spend the majority of your internship working with farmers installing circle irrigation pivots. During the first week of your internship, your supervisor assigns you to a 180–acre pivot project the company has contracted. Address the following concerns of the project.

You must show all work for full credit. Please show your work on the back of the sheet.

1. If a pivot pumps 800 gallons per 1 minute, how many inches are applied over 1 acre per 1 hour? Round to the nearest .01 inch. (5 pts.)

   Answer: **1.77in./1hr.**

   $$\frac{800\ gal.}{1\ min.} \times \frac{60\ min.}{1\ hr.} \times \frac{1\ in.}{1\ acre} \times \frac{1\ acre}{27,154\ gal.} = 1.77\ in.$$

2. If you have a 180 acre pivot, how long is the pivot system? (radius of field) Round to the nearest foot. (5 pts.) $Acres = \frac{\pi\ r^2}{43,560\ ft.}$ $180\ acres = \frac{3.14 \cdot (r)^2}{43,560\ ft.}$ $180 \cdot 43,560 = 3.14 \cdot (r)^2$ $7,840,800 = 3.14 \cdot (r)^2$ $\frac{7,840,800}{3.14} = (r)^2$

   $2,497,070.06 = \sqrt{r}$ $\sqrt{2,497,070.06} = r$ 1,580.2=r   Answer: **r= 1,580 ft.**

3. What is the circumference of the field in miles? Round to the nearest .01 miles. (5 Pts.)

   Equation: $\pi \cdot d$ Diameter $= r \cdot 2$ $1,580ft \cdot 2 = 3,160\ ft.$ $3.14 \cdot 3,160\ ft. = \frac{9,922.4\ ft.}{5,280\ ft.} = 1.88\ mi.$

   Answer: **1.88 miles**

4. How many hours will it take this pivot to do a 360° rotation around the field if the pivot is moving 3 feet/1 min(S) and the pivot percent timer(%) is set at 100%? Round to the nearest .1 hours. (4 Pts.)

   $\frac{2\pi r \cdot 100\%}{S \cdot \%}$ $\frac{2 \cdot 3.14 \cdot 1.580\ ft. \cdot 100\%}{180\ ft. \cdot 100\%} = 55.2\ hours$ Answer: **55.2 hours**

5. If your pivot towers are 175 feet in length, how many towers would this pivot consist of? Round to the nearest whole number. (4 pts.)

   Answer: **9 Towers**

   $\frac{1,580\ ft.}{175\ ft.} = 9.03$

6. If you were planting corn in this field at 35,000 seeds per acre and if 1 bag contains 80,000 seeds, how many bags are needed to plant this field? Round your answer UP to the nearest whole number. (4 Pts.)

   $\frac{35,000 seeds \cdot 180\ acres}{80,000\ seeds} = 79\ bags$

   Answer: **79 bags**

Criterion	Points Possible	Points Earned
Questions	15 (5 pts. Ea.)	
Questions	12 (4 pts. Ea.)	
Safety	3	

Equations you may need:

Use 3.14 for π

$$Acres = \frac{\pi r^2}{43{,}560 \ ft.}$$

Diameter= r x 2

$$2\pi r \cdot 100\%$$

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