State of Iowa DEPARTMENT OF EDUCATION   CONESTENT NAME _____

Career Education Division

Grimes State Office Building   CONTESTANT SCHOOL _____

Des Moines, IA 50319

Computer Application
(15 minutes)
Note: No calculators are allowed for this activity.

Your farm sprayer is used for broadcast application of herbicides. There are 17 nozzles with a nozzle spacing of 20 inches. You will travel through the field at a speed of 6.5 miles per hour.

During a calibration check, you measured the output of each nozzle for 11 seconds and got the following results:

Nozzle #	Output (oz)
1	9.00
2	8.70
3	9.75
4	10.00
5	8.60
6	7.95
7	9.50
8	9.95
9	9.80

Nozzle #	Output (oz)
10	9.25
11	9.35
12	9.00
13	9.25
14	9.50
15	10.70
16	9.35
17	10.60

USEFUL FORMULAS & CONVERSIONS

$$GPA = \frac{(5,940) \times (GPM\ per\ nozzle)}{(MPH) \times (W)}$$

where GPA = gallons/acre
GPM = gallons/minute
MPH = speed in miles/hr
W = nozzle spacing in inches

$$Acres/hr = \frac{(MPH) \times (TW)}{(8.25)}$$

where MPH = speed in miles/hr
TW = total width of implement in feet

1 gallon = 128 oz
1 minute = 60 seconds

1. Enter your name, your school and the data into the Excel spreadsheet.

2. Enter appropriate formulas into the spreadsheet to calculate:
    a. the average nozzle output,
    b. the gallons per acre,
    c. the acres per hour,
    d. the number of acres in 8 hours.

3. Print out the data spreadsheet and graph.

4. Circle the nozzle #'s on the graph that have output greater than or less than 10% of the average output.

5. How many nozzles should be replaced, based on your calibration check?   Answer: _____

EVALUATION SCORE SHEET

ITEM	POINTS POSSIBLE	EARNED
Data entered/Print outs...	6	_____
Circled correct nozzles...	3	_____
Number GPM..	3	_____
Number GPA	3	_____
Estimated Acres per hours	3	_____
Acres - 8 hr. day..	3	_____
Number of nozzles to be replaced..	3	_____

TOTAL   25   ☐

Farm Sprayer Calibration Check - Nozzle Output
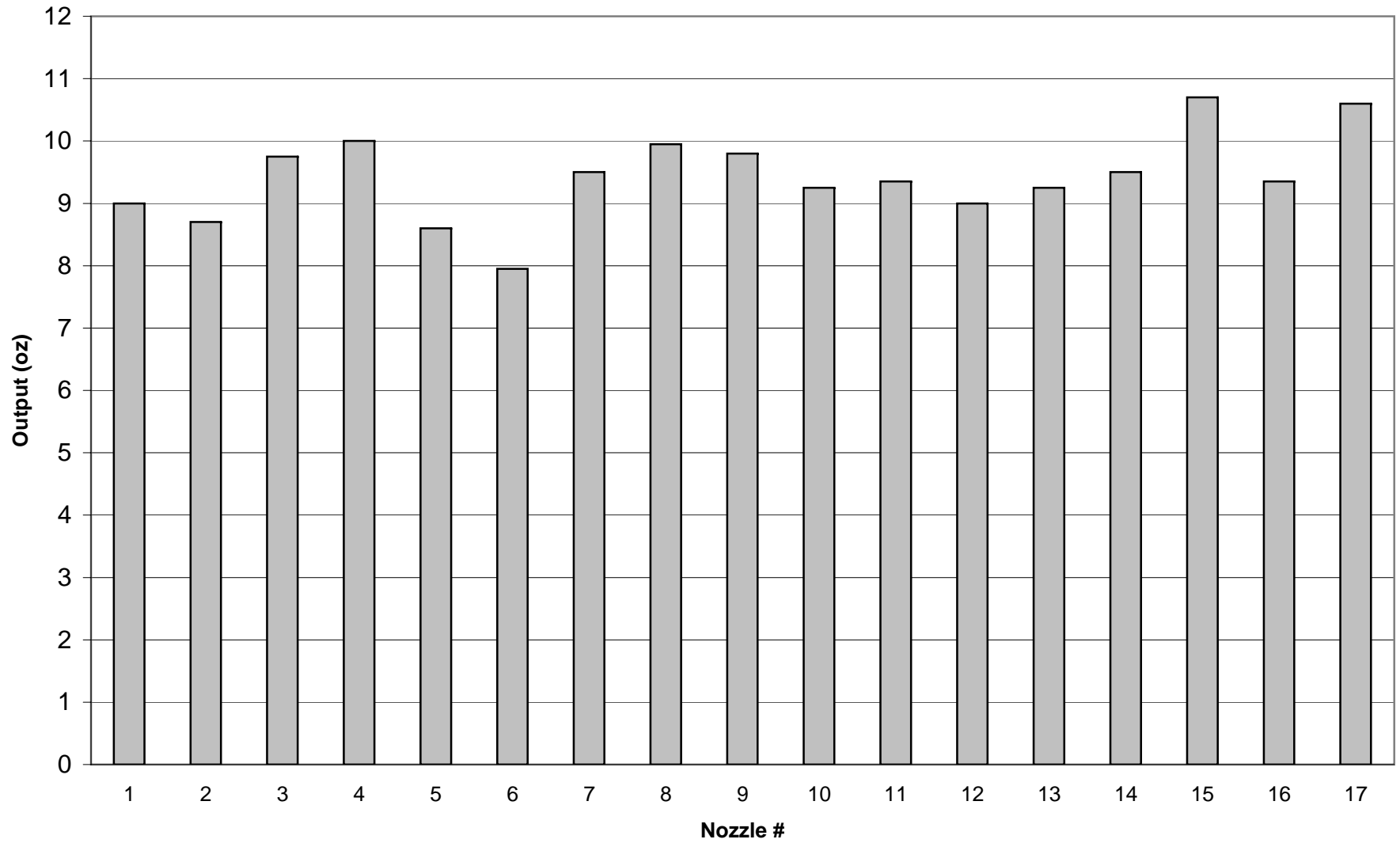
Contestant Name: Enter your name here
Contestant School: Enter your school here

Nozzle #	Output (oz)	
1		⇐ *Enter data*
2		⇐ *Enter data*
3		⇐ *Enter data*
4		⇐ *Enter data*
5		⇐ *Enter data*
6		⇐ *Enter data*
7		⇐ *Enter data*
8		⇐ *Enter data*
9		⇐ *Enter data*
10		⇐ *Enter data*
11		⇐ *Enter data*
12		⇐ *Enter data*
13		⇐ *Enter data*
14		⇐ *Enter data*
15		⇐ *Enter data*
16		⇐ *Enter data*
17		⇐ *Enter data*

Avg. Nozzle Output (oz)		⇐ *Enter formula to calculate*
Avg. Nozzle Output +10% (oz)	**0.00**	⇐ *Calculated for you based on your avg. nozzle output*
Avg. Nozzle Output -10% (oz)	**0.00**	⇐ *Calculated for you based on your avg. nozzle output*

Time of collection (sec)		⇐ *Enter data*
Speed (mph)		⇐ *Enter data*
Nozzle spacing (inches)		⇐ *Enter data*

Avg. GPM per nozzle (gallons/min)		⇐ *Enter formula to calculate*
GPA (gallons/acre)		⇐ *Enter formula to calculate*
Acres per hour		⇐ *Enter formula to calculate*
Acres in 8 hrs.		⇐ *Enter formula to calculate*

State of Iowa DEPARTMENT OF EDUCATION   CONTESTENT NAME _____KEY_____
Career Education Division
Grimes State Office Building   CONTESTANT SCHOOL _____
Des Moines, IA 50319

Computer Application
(15 minutes)
Note: No calculators are allowed for this activity.

Your farm sprayer is used for broadcast application of herbicides. There are 17 nozzles with a nozzle spacing of 20 inches. You will travel through the field at a speed of 6.5 miles per hour.

During a calibration check, you measured the output of each nozzle for 11 seconds and got the following results:

Nozzle #	Output (oz)
1	9.00
2	8.70
3	9.75
4	10.00
5	8.60
6	7.95
7	9.50
8	9.95
9	9.80

Nozzle #	Output (oz)
10	9.25
11	9.35
12	9.00
13	9.25
14	9.50
15	10.70
16	9.35
17	10.60

USEFUL FORMULAS & CONVERSIONS

$$GPA = \frac{(5,940) \times (GPM\ per\ nozzle)}{(MPH) \times (W)}$$

where GPA = gallons/acre
GPM = gallons/minute
MPH = speed in miles/hr
W = nozzle spacing in inches

$$Acres/hr = \frac{(MPH) \times (TW)}{(8.25)}$$

where MPH = speed in miles/hr
TW = total width of implement in feet

1 gallon = 128 oz
1 minute = 60 seconds

1. Enter your name, your school and the data into the Excel spreadsheet.

2. Enter appropriate formulas into the spreadsheet to calculate:
   a. the average nozzle output,
   b. the gallons per acre,
   c. the acres per hour,
   d. the number of acres in 8 hours.

3. Print out the data spreadsheet and graph.

4. Circle the nozzle #'s on the graph that have output greater than or less than 10% of the average output.

5. How many nozzles should be replaced, based on your calibration check?   Answer: _____3_____

EVALUATION SCORE SHEET

ITEM	POINTS POSSIBLE	EARNED
Data entered/Print outs...	6	_____
Circled correct nozzles..	3	_____
Number GPM..	3	_____
Number GPA	3	_____
Estimated Acres per hours	3	_____
Acres - 8 hr. day...	3	_____
Number of nozzles to be replaced...	3	_____

TOTAL   25   [   ]