Problem Statement.

A Farmer in United States has the land enhanced with minerals, agriculturist can plant up to 18 sections of land with wheat and grain. He can acquire $15,000 for each section of land he plants with wheat and $13,000 for each section of land he plants with grain. His utilization of an important pesticide which is restricted by government controls to 10 gallons for his whole 18 sections of land. Wheat requires 2 gallons of pesticide for each section of land planted and grain requires only 1 gallon for every section of land.

What is the maximum profit he can make?

Linear Programming Problem in Standard Form.

let x = the number of acres of wheat.
let y = the number of acres of grain.

Since the farmer earnings from the wheat and grains are 15000 and 13000 respectively.

Considering the P as the maximum profit that has been earned.

So, the Equation will be like: -

P = 15000x + 13000y

This is our objective function. That's what we need to maximize

the constraints are:

number of acres must be greater than or equal to 0.
number of acres should be less than or equal to 18.
amount of pesticide should be less than or equal to 10.

As we have defined the constraints we are defining the constraints in the equational format.

constraint equations are:
x >= 0
y >= 0
x + y <= 18
2x + y <= 10

As all the equation been setup we can move forward to next section of solving the equation.

Solution

As the Solution indicates that taking the different values for x and y and checking the constraint regarding the problem statement and determine the maximum solution according to the problem statement.

Taking some random values of x and y.

Checking the condition based on the defined constraint. In the below example highlighted in orange are failed the constraints, hence these values been discarded.

Values in the green are determine the best values for x and y and after passing all the condition having the maximum profit.

Values		Constrains				Profit
x	y	x >= 0	y >= 0	x + y <= 18	2x + y <= 10	P = 15000x + 13000y
2	3	TRUE	TRUE	TRUE	TRUE	69000
4	2	TRUE	TRUE	TRUE	TRUE	86000
1	1	TRUE	TRUE	TRUE	TRUE	28000
2	4	TRUE	TRUE	TRUE	TRUE	82000
3	5	TRUE	TRUE	TRUE	FALSE	110000
4	2	TRUE	TRUE	TRUE	TRUE	86000
1	-1	TRUE	FALSE	TRUE	TRUE	2000
2	1	TRUE	TRUE	TRUE	TRUE	43000
4	2	TRUE	TRUE	TRUE	TRUE	86000
0	10	TRUE	TRUE	TRUE	TRUE	130000
3	3	TRUE	TRUE	TRUE	TRUE	84000

Conclusion

As we have developed a model which will tell about the general recommendation about the plantation of wheat and grains on the 18acres of land with the limited amount of pesticides which been controlled by the government. In the above solution, we have taken different values of wheat and grains and with the government restrictions on the pesticides we have developed some conditions in the above table. Based on the different quantities of wheat and grains if we farm on the land the maximum profit can be get from the condition where wheat can be farm on 3 acres of land and grain on 4 acres of land. If we use the proportion as given we will get the maximum profit and farmer can have maximum value based on the limitations.

Optimal maximum profit is 130000

References

https://www.algebra.com/algebra/homework/coordinate/word/THEO-2011-08-28-03.lesson