

ANSWER KEY



Step 1 Directions: choose *one* of the counties from table 1 to be the location for your new farm and *circle it*.

Table 1. Farm locations and data: Weather data “Current” shows 30-year annual average (1971-2000) and “Future” is predicted using higher emission scenarios for the mid-century time period (2040-2070).

Circle one county:		MARICOPA CO, AZ	YOLO CO, CA	DONA ANA CO, NM	LYON CO, NV	UTAH CO, UT
TEMPERATURE	Current	84.8°F	74.4°F	76.2°F	65°F	58.4°F
	Future	90.5°F	79.4°F	82.1°F	71.1°F	65°F
PRECIPITATION	Current	9.9 in.	21.2 in.	11.0 in.	9.0 in.	21.2 in.
	Future	10.1 in.	21.9 in.	11.1 in.	9.6 in.	23.1 in.
AVG. FARM SIZE (ACRES)		329	602	359	668	127
COMMON CROPS		hay, vegetables, corn, wheat, cantaloupes	vegetables, almonds, tomatoes,	pecans, hay, cotton, vegetables	hay, onions, lettuce, corn	hay, corn, wheat, cherries

Weather data source: webapps.jornada.nmsu.edu/climate-quick-guides/

Farm data: nass.usda.gov/Publications/AgCensus/2022/

Accessed: July 2026

Step 2 Directions: customize your new farm by choosing as many, or as few, as you would like of the climate-mitigating adaptations from table 2. **Place a checkmark** under each adaptation that you choose, and **write the cost (points) in the last column** for each selected adaptation.

Table 2. Climate-mitigating adaptations

ADAPTATION	PROS	CONS	COST (POINTS)	CHOSEN COSTS
NO-TILL PLANTING ☐	-Reduces costs of labor, equipment, fuel -Reduces soil erosion from water and wind -Retains soil moisture -Increases soil organic matter -Limits soil compaction	-May require more herbicide and fungicide due to higher soil moisture -High upfront cost	15	
HEDGEROWS ☐	-Reduce soil erosion from water and wind -Create pollinator habitat -Prevent spread of some insects and fungal diseases	-Require some watering and maintenance -Possibly reduce number of crop rows	5	
WATER CISTERN COLLECTION & STORAGE UNIT ☐	-Collects rainfall and/or other water runoff for use when water is scarce	-Requires space -Can take a few years to collect enough water	10	
SOIL MOISTURE MONITORING ☐	-Decreases irrigation expenses by eliminating unnecessary watering of crops	-Requires labor to operate equipment	3	
BEEHIVES & FLOWER STRIPS ☐	-Reliable pollination of crops -Provide habitat for variety of pollinators	-Requires some maintenance -Unable to use insecticides	5	
TOTAL COST (POINTS)				

student answers will vary

STARTING OUTPUT FACTOR = 100 -

TOTAL

student answers will vary

FARMS ON THE TABLE GAME DIRECTIONS

1. Your goal is to **keep your farm in the black**. Being in the black means that you are making money, and being in the red means that you are losing money.
2. Choose **at least two** of the practices and treatments from the table for each year, and write the cost of each selected item in the Chosen Costs column of the table.
3. Add up the cost of your practices and treatments, and write the Total Cost at the bottom of the table.
4. Roll the die and assign the number rolled to your first selection; write it in the last column of the table. Roll the die again and assign that number to the second checked item, and repeat this for all of the selected items.
5. Your instructor will then reveal the weather for the year and whether each of the practices and treatments were positive or negative investments. In the table, assign a plus sign to the die roll numbers of the positive investments and a minus sign to the die roll numbers of the negative investments.
6. Add up the positive and negative die roll numbers. Be sure to **pay attention to the sign**.
7. Fill in the equation at the bottom of each page, and calculate the Starting Output Factor.

YEAR 1

Starting Output Factor (from Page 2): _____

Choose **at least two** practices and/or treatments.

PLANTING PRACTICES	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
DROUGHT RESISTANT CROP VARIETY ☒	Can produce a more reliable yield per acre during periods of prolonged drought, but seeds need to be purchased every year	2	2	-	4
FLOOD RESISTANT CROP VARIETY ☐	Can tolerate being submerged periods of time or multiple years, but seeds need to be purchased every year				
INTERPLANTING ☐					
CROP ROTATION ☒	Can increase yield and reduce risk of crop loss due to host plants and crop diseases from year to year	2	2	+	6
SPREAD SPACING OF ROWS ☐	Lower crop yield/acre, but can reduce the need for crop treatments	2			
CROP TREATMENTS	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
FERTILIZING ☐	Can increase rate of growth but depletes soil fertility causing an annual reliance	2			
HERBICIDE ☒	Can reduce loss from plant pests but becomes less effective with continual use	2	2	+	3
INSECTICIDE ☐	Can reduce loss from insect pests but will harm natural pollinators; should NOT choose if have beehives & flower strips	2			
FUNGICIDE ☒	Can reduce loss from fungal pathogens but needs to be applied before infection to be effective	2	2	+	1
TOTAL COST (POINTS)			8	OUTPUT CHANGE TOTAL	6

Weather for this year (from instructor): Historically Normal

(From blank at bottom of page 2) 8 - 8 + 6 + (Three points for each chosen on page 2) 6 = 12
 Starting Output Factor Total Cost Output Change Total Farm Adaptation Bonus New Starting Output Factor

YEAR 2

New Starting Output Factor (from the end of Year 1): _____

Choose **at least two** practices and/or treatments.

PLANTING PRACTICES	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
DROUGHT RESISTANT CROP VARIETY ☐	Can produce a more reliable yield per acre during periods of prolonged drought, but seeds need to be purchased every year	2			
FLOOD RESISTANT CROP VARIETY ☐	Can tolerate being submerged for longer periods of time or multiple times per year, but seeds need to be purchased every year	2			
INTERPLANTING ☐	Can reduce erosion, spread of pathogens, and need for crop treatments; there is less economic risk in case of a crop fail year	2			
CROP ROTATION ☐	Can improve soil health and reduce loss from pathogens due to host plants changing locations from year to year	2			
SPREAD SPACING OF ROWS ☐	Lower crop yield/acre, but can reduce the need for crop treatments	2			
CROP TREATMENTS	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
FERTILIZING ☐	Can increase rate of growth but depletes soil fertility causing an annual reliance	2			
HERBICIDE ☐	Can reduce loss from plant pests but becomes less effective with continual use	2			
INSECTICIDE ☐	Can reduce loss from insect pests but will harm natural pollinators; should NOT choose if have beehives & flower strips	2			
FUNGICIDE ☐	Can reduce loss from fungal pathogens but needs to be applied before infection to be effective	2			
TOTAL COST (POINTS)				OUTPUT CHANGE TOTAL	

Weather for this year (from instructor): Drought

Starting Output Factor - Total Cost + Farm Adaptation Bonus = New Starting Output Factor

YEAR 3

New Starting Output Factor (from the end of Year 2): _____

Choose **at least two** practices and/or treatments.

PLANTING PRACTICES	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
DROUGHT RESISTANT CROP VARIETY ☐	Can produce a more reliable yield per acre during periods of prolonged drought, but seeds need to be purchased every year	2			
FLOOD RESISTANT CROP VARIETY ☐	Can tolerate being submerged for longer periods of time or multiple times per year, but seeds need to be purchased every year	2			
INTERPLANTING ☐	Can reduce erosion, spread of pathogens, and need for crop treatments; there is less economic risk in case of a crop fail year	2			
CROP ROTATION ☐	Can improve soil health and reduce loss from pathogens due to host plants changing locations from year to year	2			
SPREAD SPACING OF ROWS ☐	Lower crop yield/acre, but can reduce the need for crop treatments	2			
CROP TREATMENTS	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
FERTILIZING ☐	Can increase rate of growth but depletes soil fertility causing an annual reliance	2			
HERBICIDE ☐	Can reduce loss from plant pests but becomes less effective with continual use	2			
INSECTICIDE ☐	Can reduce loss from insect pests but will harm natural pollinators; should NOT choose if have beehives & flower strips	2			
FUNGICIDE ☐	Can reduce loss from fungal pathogens but needs to be applied before infection to be effective	2			
TOTAL COST (POINTS)				OUTPUT CHANGE TOTAL	

Weather for this year (from instructor): Heat WaveStarting Output
Factor

- Total Cost

+

Output

Adaptation
Bonus

+

Subsidy Bonus

=

New Starting
Output Factor

YEAR 4

New Starting Output Factor (from the end of Year 3): _____

Choose **at least two** practices and/or treatments.

PLANTING PRACTICES	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
DROUGHT RESISTANT CROP VARIETY ☐	Can produce a more reliable yield per acre during periods of prolonged drought, but seeds need to be purchased every year	2			
FLOOD RESISTANT CROP VARIETY ☐	Can tolerate being submerged for longer periods of time or multiple times per year, but seeds need to be purchased every year	2			
INTERPLANTING ☐	Can reduce erosion, spread of pathogens, and need for crop treatments; there is less economic risk in case of a crop fail year	2			
CROP ROTATION ☐	Can improve soil health and reduce loss from pathogens due to host plants changing locations from year to year	2			
SPREAD SPACING OF ROWS ☐	Lower crop yield/acre, but can reduce the need for crop treatments	2			
CROP TREATMENTS	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
FERTILIZING ☐	Can increase rate of growth but depletes soil fertility causing an annual reliance	2			
HERBICIDE ☐	Can reduce loss from plant pests but becomes less effective with continual use	2			
INSECTICIDE ☐	Can reduce loss from insect pests but will harm natural pollinators; should NOT choose if have beehives & flower strips	2			
FUNGICIDE ☐	Can reduce loss from fungal pathogens but needs to be applied before infection to be effective	2			
TOTAL COST (POINTS)				OUTPUT CHANGE TOTAL	

Weather for this year (from instructor): _____ *Wind*

_____ - _____ + _____ = _____
 Starting Output Total Cost Change Farm Adaptation New Starting
 Factor Total Bonus Output Factor

YEAR 5

New Starting Output Factor (from the end of Year 4): _____

Choose **at least two** practices and/or treatments.

PLANTING PRACTICES	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
DROUGHT RESISTANT CROP VARIETY ☐	Can produce a more reliable yield per acre during periods of prolonged drought, but seeds need to be purchased every year	2			
FLOOD RESISTANT CROP VARIETY ☐	Can tolerate being submerged for longer periods of time or multiple times per year, but seeds need to be purchased every year	2			
INTERPLANTING ☐	Can reduce erosion, spread of pathogens, and need for crop treatments; there is less economic risk in case of a crop fail year	2			
CROP ROTATION ☐	Can improve soil health and reduce loss from pathogens due to host plants changing locations from year to year	2			
SPREAD SPACING OF ROWS ☐	Lower crop yield/acre, but can reduce the need for crop treatments	2			
CROP TREATMENTS	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
FERTILIZING ☐	Can increase rate of growth but depletes soil fertility causing an annual reliance	2			
HERBICIDE ☐	Can reduce loss from plant pests but becomes less effective with continual use	2			
INSECTICIDE ☐	Can reduce loss from insect pests but will harm natural pollinators; should NOT choose if have beehives & flower strips	2			
FUNGICIDE ☐	Can reduce loss from fungal pathogens but needs to be applied before infection to be effective	2			
TOTAL COST (POINTS)				OUTPUT CHANGE TOTAL	

Weather for this year (from instructor): Increased Precipitation

_____ - _____ + _____ = _____
 Starting Output Total Cost Total Change Farm Adaptation New Starting
 Factor Bonus Output Factor

YEAR 6

New Starting Output Factor (from the end of Year 5): _____

Choose **at least two** practices and/or treatments.

PLANTING PRACTICES	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
DROUGHT RESISTANT CROP VARIETY ☐	Can produce a more reliable yield per acre during periods of prolonged drought, but seeds need to be purchased every year	2			
FLOOD RESISTANT CROP VARIETY ☐	Can tolerate being submerged for longer periods of time or multiple times per year, but seeds need to be purchased every year	2			
INTERPLANTING ☐	Can reduce erosion, spread of pathogens, and need for crop treatments; there is less economic risk in case of a crop fail year	2			
CROP ROTATION ☐	Can improve soil health and reduce loss from pathogens due to host plants changing locations from year to year	2			
SPREAD SPACING OF ROWS ☐	Lower crop yield/acre, but can reduce the need for crop treatments	2			
CROP TREATMENTS	DESCRIPTION	COST (POINTS)	CHOSEN COSTS	+/-	DIE ROLL
FERTILIZING ☐	Can increase rate of growth but depletes soil fertility causing an annual reliance	2			
HERBICIDE ☐	Can reduce loss from plant pests but becomes less effective with continual use	2			
INSECTICIDE ☐	Can reduce loss from insect pests but will harm natural pollinators; should NOT choose if have beehives & flower strips	2			
FUNGICIDE ☐	Can reduce loss from fungal pathogens but needs to be applied before infection to be effective	2			
TOTAL COST (POINTS)				OUTPUT CHANGE TOTAL	

Weather for this year (from instructor): Heat Wave

_____ - _____ + _____ + _____ = _____
 Starting Output Factor Total Cost Output from Adaptation Bonus Subsidy Bonus New Starting Output Factor

RESULTS AND CONCLUSIONS

1. How many years were you able to keep your farm in the black? Did you end the game in the red or in the black?

Student answers will vary.

2. Were there certain practices or treatments that seemed to be a positive investment more than others? Were there certain practices or treatments that seemed to be a negative investment more than others? Why do you think that is the case?

Interplanting and crop rotation were a positive investment every year. Flood resistant crop varieties and fungicide resulted in a negative investment most often.

Interplanting and crop rotation promote soil health and overall plant health by protecting them from pathogens without causing additional harm to the environment. Buying flood resistant crop varieties and fungicide are usually not the best practices to use in the dry, hot climate throughout much of the Southwest. Even though some areas of the Southwest are predicted to receive more rainfall, the region is not predicted to get flooding that would require flood resistant varieties or cause fungal outbreaks.

3. If you were to play this game again, what would you do differently? Why?

Student answers will vary.