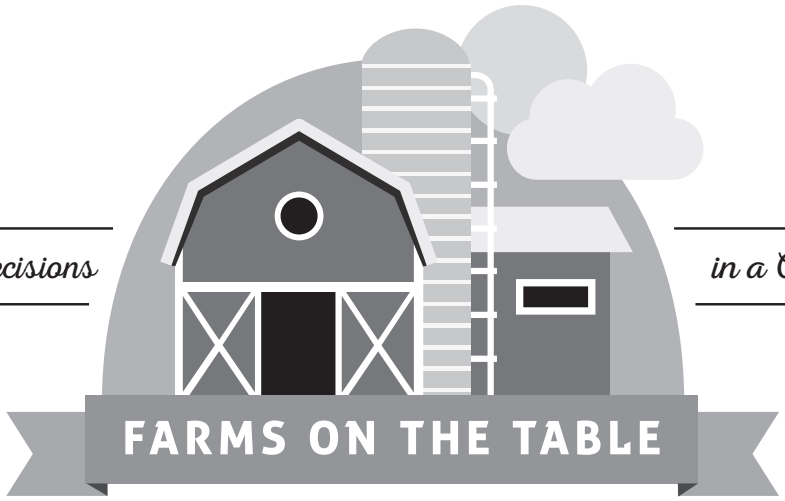
Name _____ Date _____



Making Farmland Decisions *in a Changing Climate*

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: 2015 values are averages, and 2065 values are predicted changes

Circle one county:		MARICOPA CO, AZ	YOLO CO, CA	DONA ANA CO, NM	LYON CO, NV	UTAH CO, UT
TEMPERATURE	2015 (°F)	84.8	74.4	76.2	65.0	58.4
	2065 (°F)	+5.7	+5.0	+7.9	+6.1	+6.6
PRECIPITATION	2015 (in.)	9.94	21.24	10.98	8.97	21.19
	2065 (in.)	+0.17	+0.71	+0.13	+0.64	+1.88
AVG. FARM SIZE (ACRES)		192	456	302	792	139
COMMON CROPS		cotton, alfalfa, wheat, oats, watermelon	tomato, rice, almonds, walnuts, wheat	chile, cotton, pecan, lettuce, onion	onion, potato, alfalfa, squash, wheat	alfalfa, hay, wheat, corn

Weather data source: swclimatehub.info

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)	

STARTING OUTPUT FACTOR = 100 – _____ = _____
TOTAL COST

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**			
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): _____

_____ (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): _____

_____	-	_____	+	_____	+	_____	=	_____
Starting Output Factor		Total Cost		Output Change Total		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): _____

_____	-	_____	+	_____	+	_____	+	_____	=	_____
Starting Output Factor		Total Cost		Output Change Total		Farm 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**			
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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): _____

_____	-	_____	+	_____	+	_____	=	_____
Starting Output Factor		Total Cost		Output Change Total		Farm Adaptation Bonus		New Starting 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**			
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CROP ROTATION ☐	Can improve soil health and reduce loss from pathogens due to host plants changing locations from year to year	**2**			
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CROP TREATMENTS	**DESCRIPTION**	**COST (POINTS)**	**CHOSEN COSTS**	**+/-**	**DIE ROLL**
FERTILIZING ☐	Can increase rate of growth but depletes soil fertility causing an annual reliance	**2**			
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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): _____

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

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

RESULTS AND CONCLUSIONS

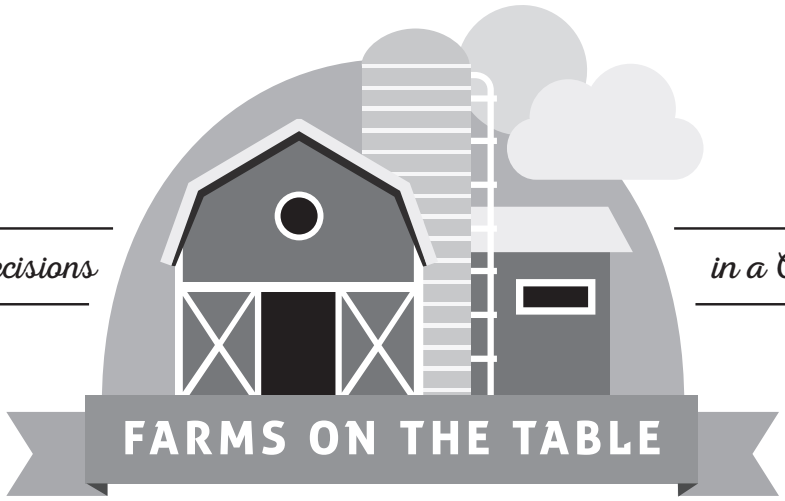
1. How many years were you able to keep your farm in the black? Did you end the game in the red or in the black?

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?

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

ANSWER KEY

Making Farmland Decisions *in a Changing Climate*



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

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Weather data source: swclimatehub.info

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

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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 C

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 submerg… periods of time or m… year, but seed… every…				
INTERPLANTING ☐		**2**			
CROP ROTATION ☑	…d reduce …s due to host plants c… …cations 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) (Starting Output Factor) - *8* (Total Cost) + *6* (Output Change Total) + *(Three points for each chosen on page 2)* (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**	

student answers will vary

Weather for this year (from instructor): *Drought*

_____ - _____ + _____ = _____

Starting Output Factor | Total Cost | Total | Farm Adaptation Bonus | New Starting Output Factor

student answers will vary

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**	*student answers will vary*		
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**	*student answers will vary*		
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 C… | …n Adaptation Bonus | Subsidy Bonus | New Starting Output Factor

student answers will vary

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**	*student answers will vary*		
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**	*student answers will vary*		
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*

_____	-	_____	+	*student answers will vary*	_____	=	_____
Starting Output Factor		Total Cost		Total	Farm Adaptation Bonus		New Starting 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**	

student answers will vary

Weather for this year (from instructor): *Increased Precipitation*

_____ - _____ + _____ = _____

Starting Output Factor | Total Cost | Total | Farm Adaptation Bonus | New Starting Output Factor

student answers will vary

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**	

student answers will vary

Weather for this year (from instructor): *Heat Wave*

_____ - _____ + _____ + _____ = _____

Starting Output Factor | Total Cost | Output [illegible] Adaptation Bonus | Subsidy Bonus | New Starting Output Factor

student answers will vary

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.