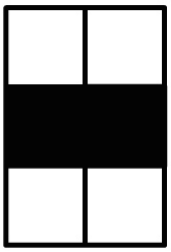
Looking into *Linear* Gardens

Name_____ Class_____ Date_____

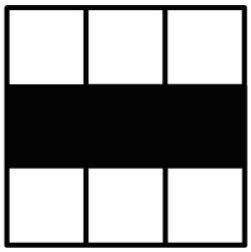
Part 1. Exploring Gardens

Using black and white pattern-block pieces, assemble the gardens below. Black tiles represent gardens and white tiles are placed above and below them.

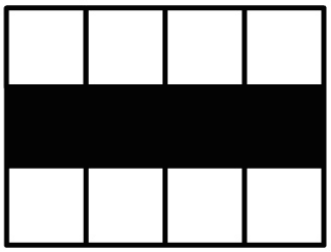
Garden 1



Garden 2



Garden 3



Garden 4

1. Find out how many white tiles are required to complete each garden. _____

_____

_____

Organize your information in some way.

2. Give an explanation of what garden 5 would look like. _____

_____

_____

_____

Create a sketch of this garden.

3. Predict the total number of white squares you will need to build garden 15._____

Explain your reasoning. _____

_____

_____

4. Write a rule that gives the total number of white squares to build any garden in this sequence.

_____

_____

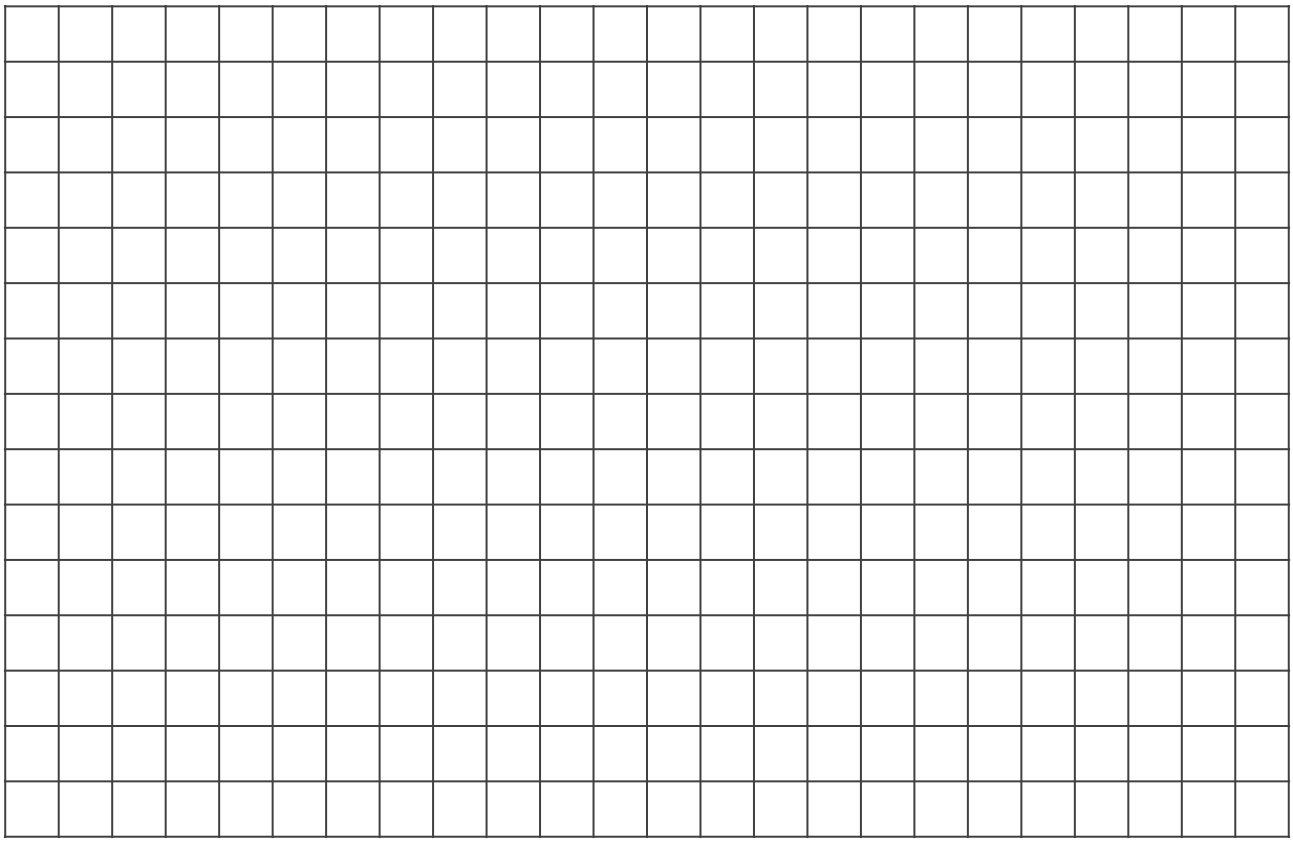
Part 2. Linear Functions

Name_____ Class_____ Date_____

5. Create a table that relates the garden number (input data value) to the number of white squares (output data value), and write their associated coordinates.

Garden	White Squares	Coordinates
1		
2		
3		
4		
5		

6. Using the above table data values, draw the Cartesian axes on grid paper and make a graph.



7. Does joining the points on the graph with a straight line make sense? Explain your reasoning.

8. According to the growing pattern shown, how many white tiles would garden #0 have? Is your result consistent with the one predicted by the graph?

9. Given a garden, how many white tiles are needed to build the next one? Can you explain how your answer is related to the graph and to the table?

10. If the points on the graph were connected by a straight line, what would its slope be? And what would its y-intercept be? Why?

11. Can you relate the slope and the rule obtained in question 4?

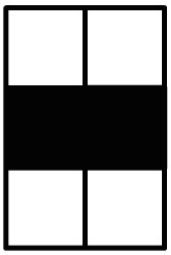
Looking into *Linear* Gardens

Name_____ Class_____ Date_____

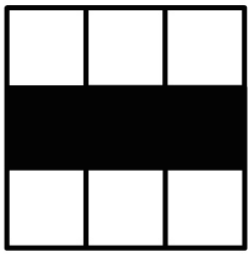
Part 1. Exploring Gardens

Using black and white pieces, build the gardens. Black tiles are gardens.

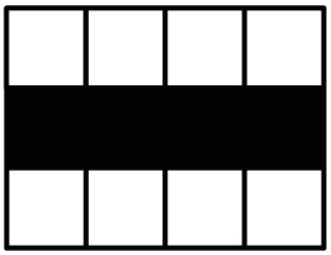
Garden 1



Garden 2



Garden 3



Garden 4

1. What is the number of white tiles needed for each garden? _____

_____

_____

Organize your information.

2. Explain what garden 5 would look like? _____

_____

_____

_____

Draw a picture of this garden.

3. How many tiles do you think garden 15 will need? _____

How did you get that answer? _____

_____

_____

4. Create a formula that can show how many white tiles we need to build any of the gardens above. _____

_____

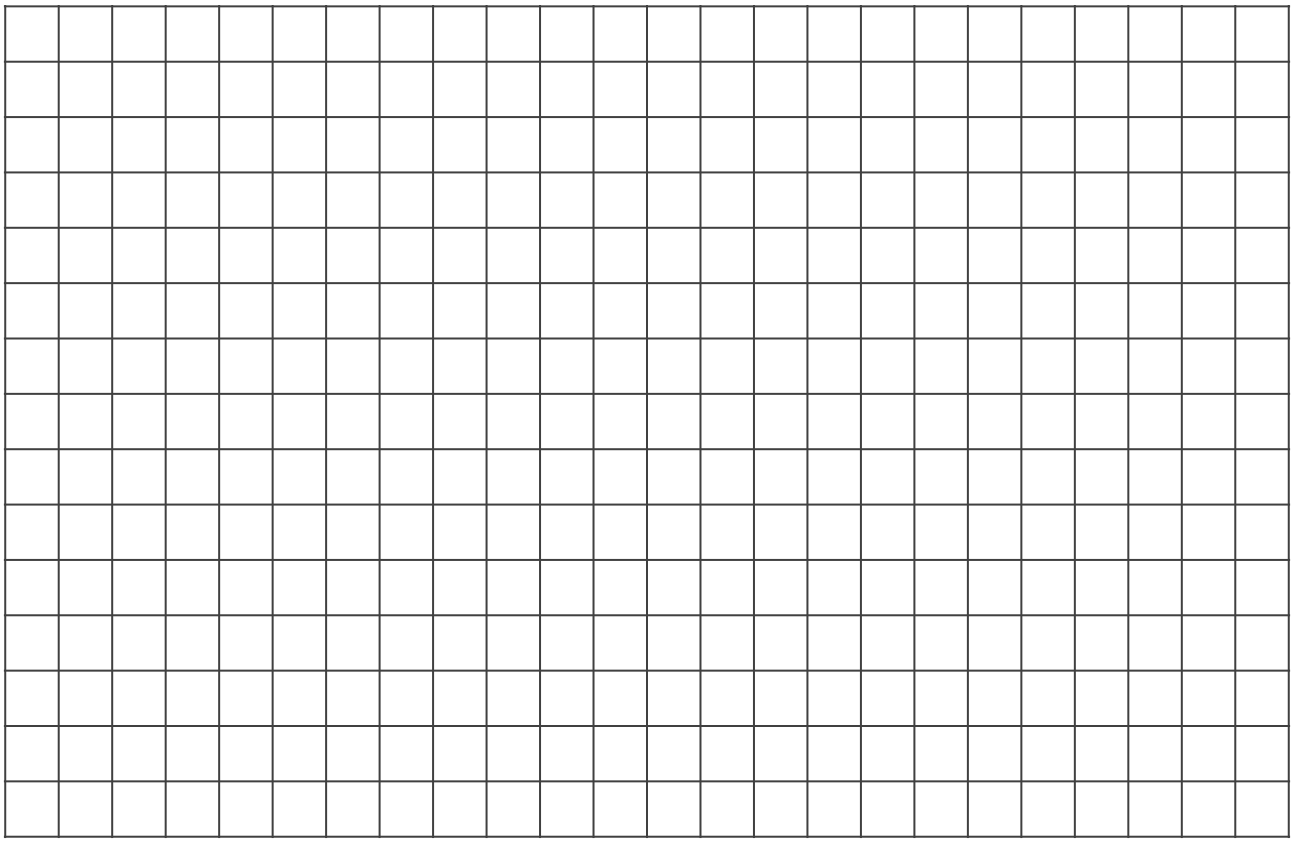
Part 2. Linear Functions

Name_____ Class_____ Date_____

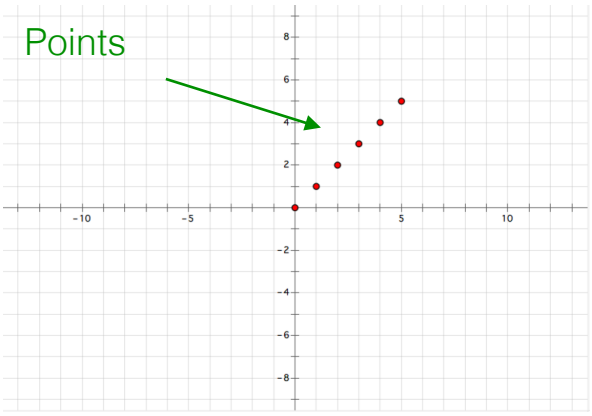
5. Make a table that displays the garden number and how many white squares each garden has. Coordinates = (Garden number, Number of white squares)

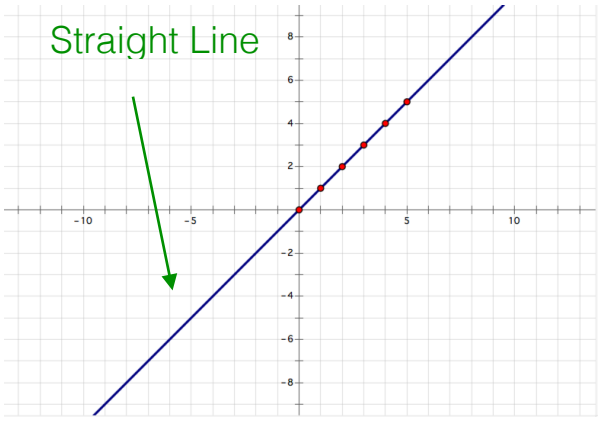
Garden	White Squares	Coordinates
1		
2		
3		
4		
5		

6. Use the table above to create a coordinate plane on grid paper and make a graph.



7. Is it possible to join the points on the graph with a straight line? Why?



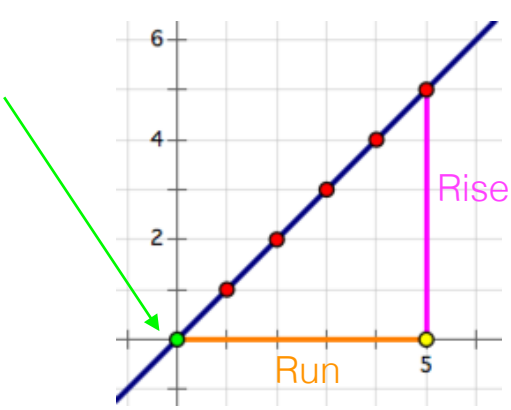


8. Use the growing pattern shown above to decide how many white tiles garden #0 would have. Does your answer match the graph?

9. Use any garden and decide how many white tiles are needed to build the next garden. Did you use the table and graph to get your answer? How?

10. If the points on the graph were connected by a straight line, what would its slope be? And what would its y-intercept be? Why?

$$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$$



11. Can you relate the slope and the rule obtained in question 4?

Looking into *Linear* Gardens

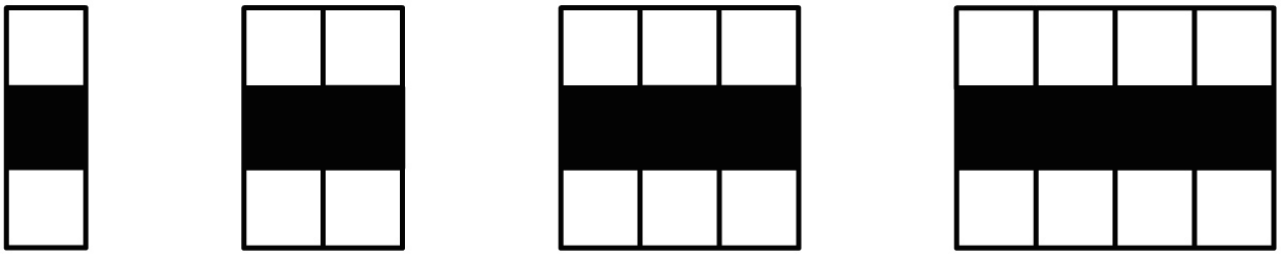
Name_____ Class_____ Date_____

Part 1. Exploring Gardens

Join the tiles.

Garden (Black Tile)

White Tile



Garden 1 **Garden 2** **Garden 3** **Garden 4**

1. What is the number of white tiles needed for each garden? _____

_____

_____

Organize your information.

2. What would garden 5 look like? _____

_____

_____

_____

Draw garden 5.

3. How many tiles does garden 15 need? _____

Why? _____

_____

_____

4. Make a formula to show how many white tiles a garden needs. _____

_____

_____

Part 2. Linear Functions

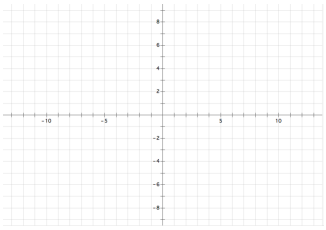
Name_____ Class_____ Date_____

5. Make a table. Show garden number and number of white squares in the table.
Coordinates = (Garden number, Number of white squares)

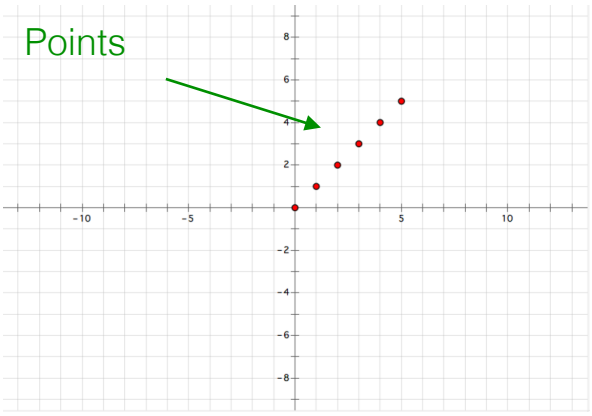
Garden	White Squares	Coordinates
1		
2		
3		
4		
5		

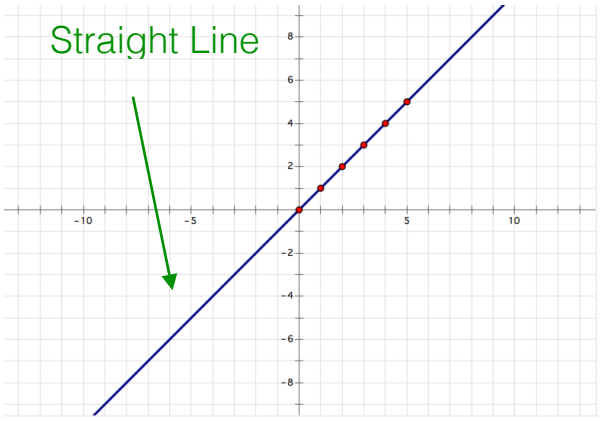
6. Use the table above to make a coordinate plane on grid paper. Make a graph.

Coordinate plane:



7. Can you connect the points on the graph with a straight line? Why?



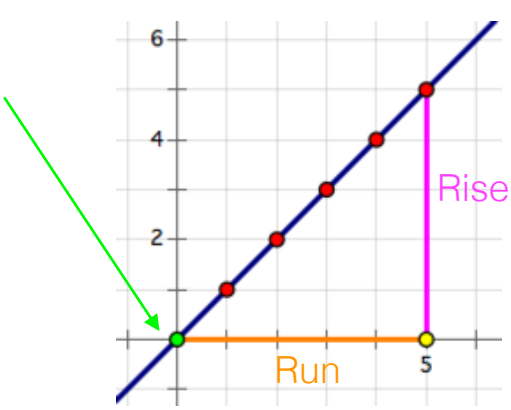


8. Look at the growing pattern shown above. What is the number of white tiles garden #0 would have? Does this number match the graph?

9. Look at a garden. How many white tiles do you need to build the next garden? Did you use the table and graph to get your answer? How?

10. If the points on the graph were connected by a straight line, what would its slope be? And what would its y-intercept be? Why?

$$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$$



11. Can you relate the slope and the rule obtained in question 4?