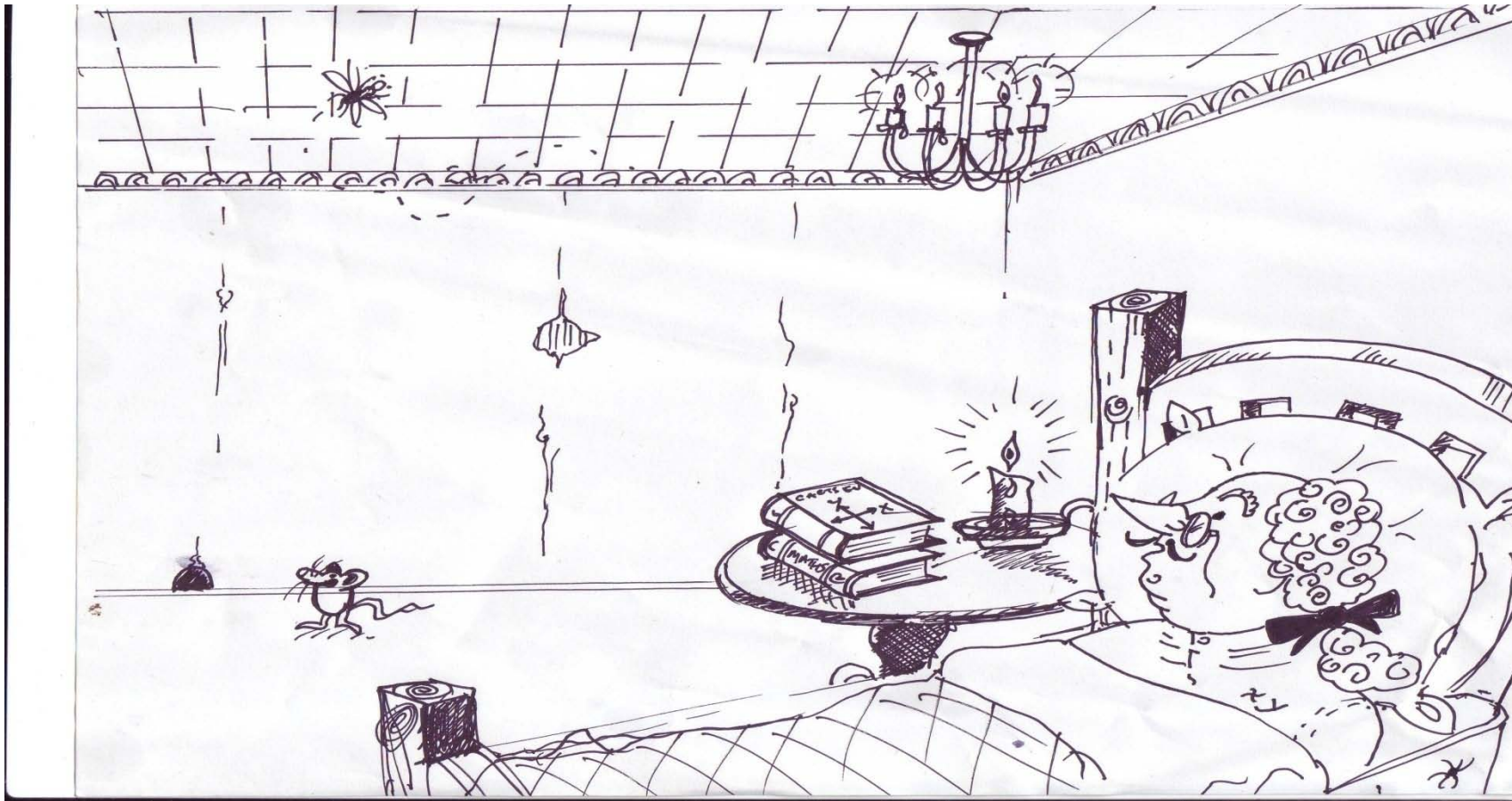


# Coordinate Geometry: Get to the point!

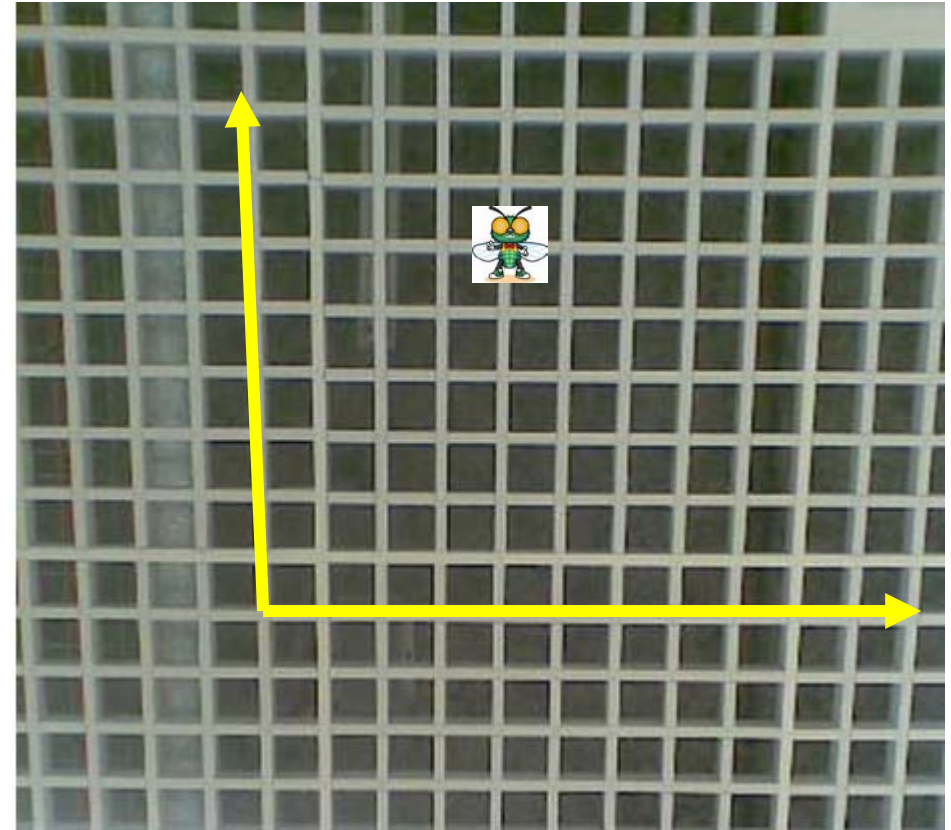


A very famous mathematician called **Rene Descartes** lay in bed one night. As he lay there, he looked up at the ceiling in his bedroom. He noticed a fly was asleep on the ceiling. Descartes, being a mathematician wondered if he could figure out a way of stating where exactly the fly was on the ceiling. Obviously it has to be a precise description he thought. I can't really say, "To the left" or "Near the right" or "In the middle".

# What Descartes saw...



When Descartes looked up at his ceiling, this is what he saw. A fly resting there. He began to think about how he might be able to describe the exact position of the fly.



Descartes decided that if he drew two lines at right angles to each other, then he might be able to come up with a way of describing the exact position of the fly.

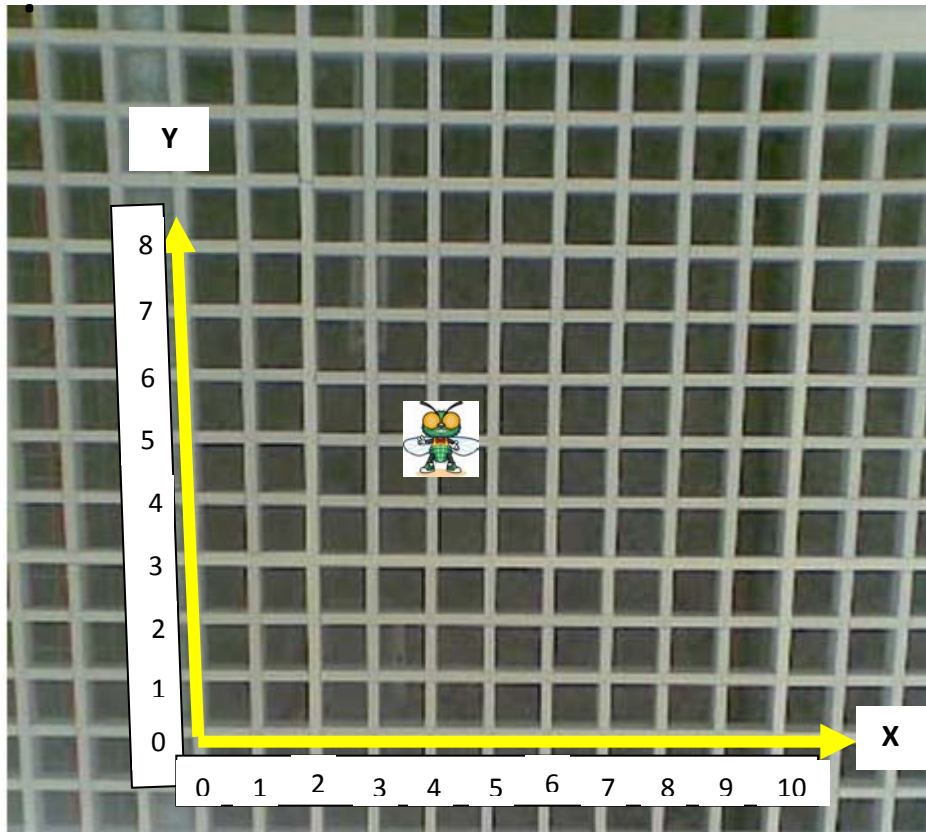
How do you think this would have helped him?

---

---

---

# What Descartes decided to do...



Descartes decided to place numbers on the bottom (horizontal) row and on the side (vertical) row. He could now state accurately where exactly the fly was on the ceiling.

But there was a problem, should he give the vertical number of tiles followed by horizontal? i.e. go up 5 squares and move across 4 squares, or should he give the horizontal number first, then the vertical? i.e. go across 4 squares then move up 5?

He decided to give the HORIZONTAL NUMBER **FIRST** and THE VERTICAL NUMBER **SECOND**. To help people remember this he called the horizontal line X and the vertical line Y (Because X comes before Y in the alphabet)

So, in this diagram, the position of the fly can be found by moving 4 units across, then 5 units up.

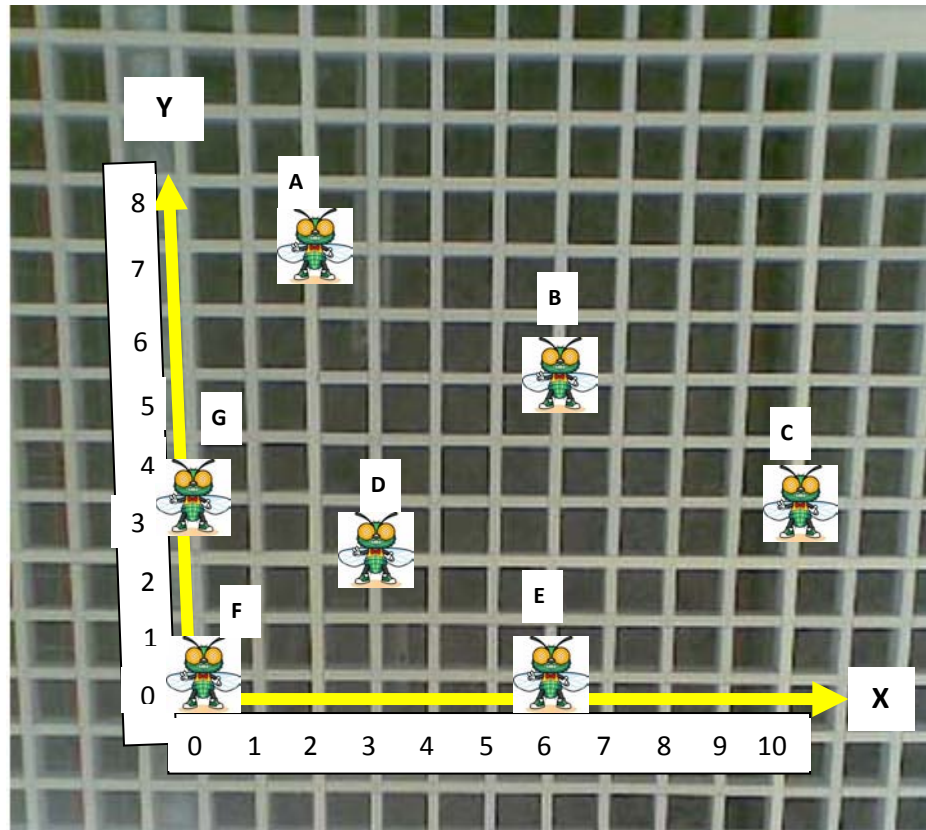
These are known as X, Y values and are written like this

Position of fly = (4, 5)

X value (First)      Y value (Second)

In honour of Rene Descartes, the graph showing the coordinates of the fly is known as the **Cartesian Plane** (or X Y Plane).

# Student Activity 1



Look at where each fly is on the coordinate plane. Can you state where each one is, using Descartes coordinates.

Remember, we write the X coordinate first, then the Y coordinate.

Be careful when dealing with questions **E**, **F**, and **G**. You will need to think a little about these before writing your answer

Answers:

The coordinates of each fly are listed below,

$$A = \left( \underline{\quad}, \underline{\quad} \right)$$

X      Y

$$B = \left( \underline{\quad}, \underline{\quad} \right)$$

X      Y

$$C = \left( \underline{\quad}, \underline{\quad} \right)$$

X      Y

$$D = \left( \underline{\quad}, \underline{\quad} \right)$$

X      Y

$$E = \left( \underline{\quad}, \underline{\quad} \right)$$

X      Y

$$F = \left( \underline{\quad}, \underline{\quad} \right)$$

X      Y

$$G = \left( \underline{\quad}, \underline{\quad} \right)$$

X      Y

Which of the above coordinates did you find most difficult to describe? Why?

---



---



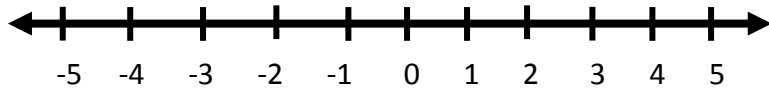
---

# Negative coordinates

## Student Activity 2

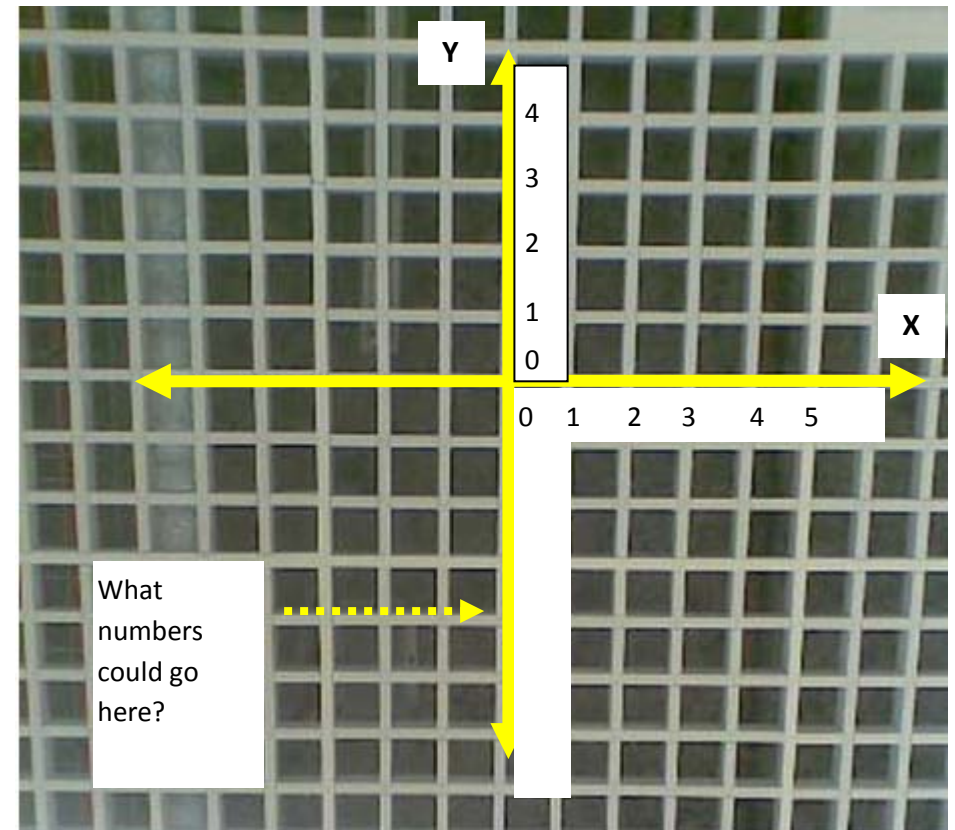
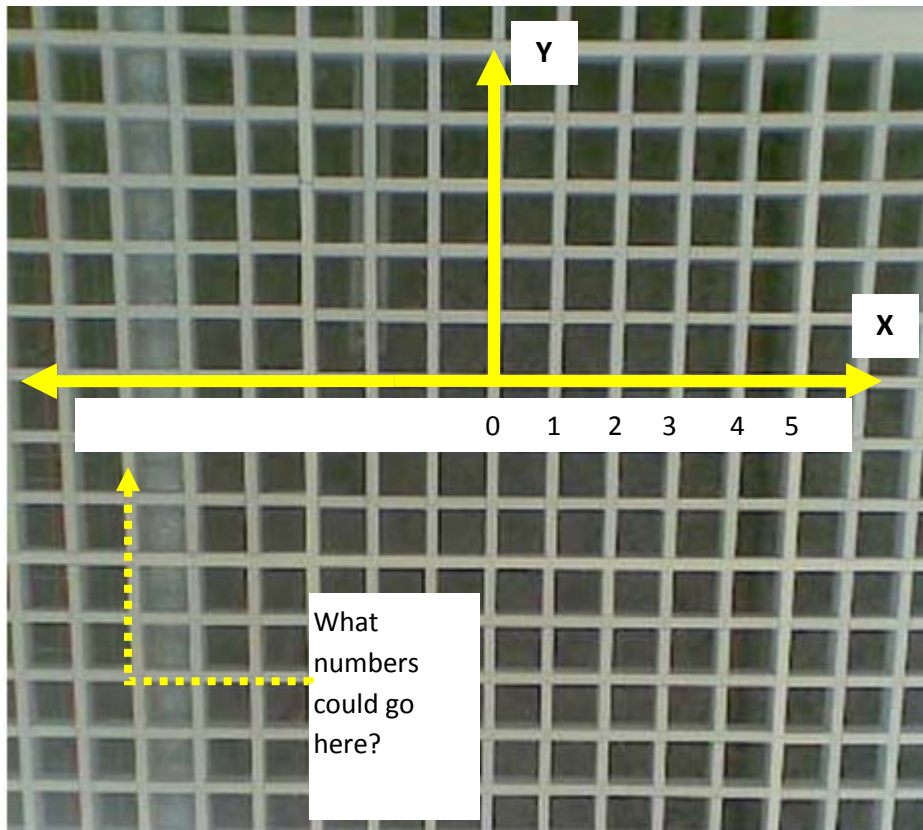
For the next part we need to think back to when we did the “Number Line”

**Recall** what the Number Line looks like



Keeping this in mind, what numbers do you think could go in the “missing parts”

of the coordinate plane. Fill them in on the diagram below.

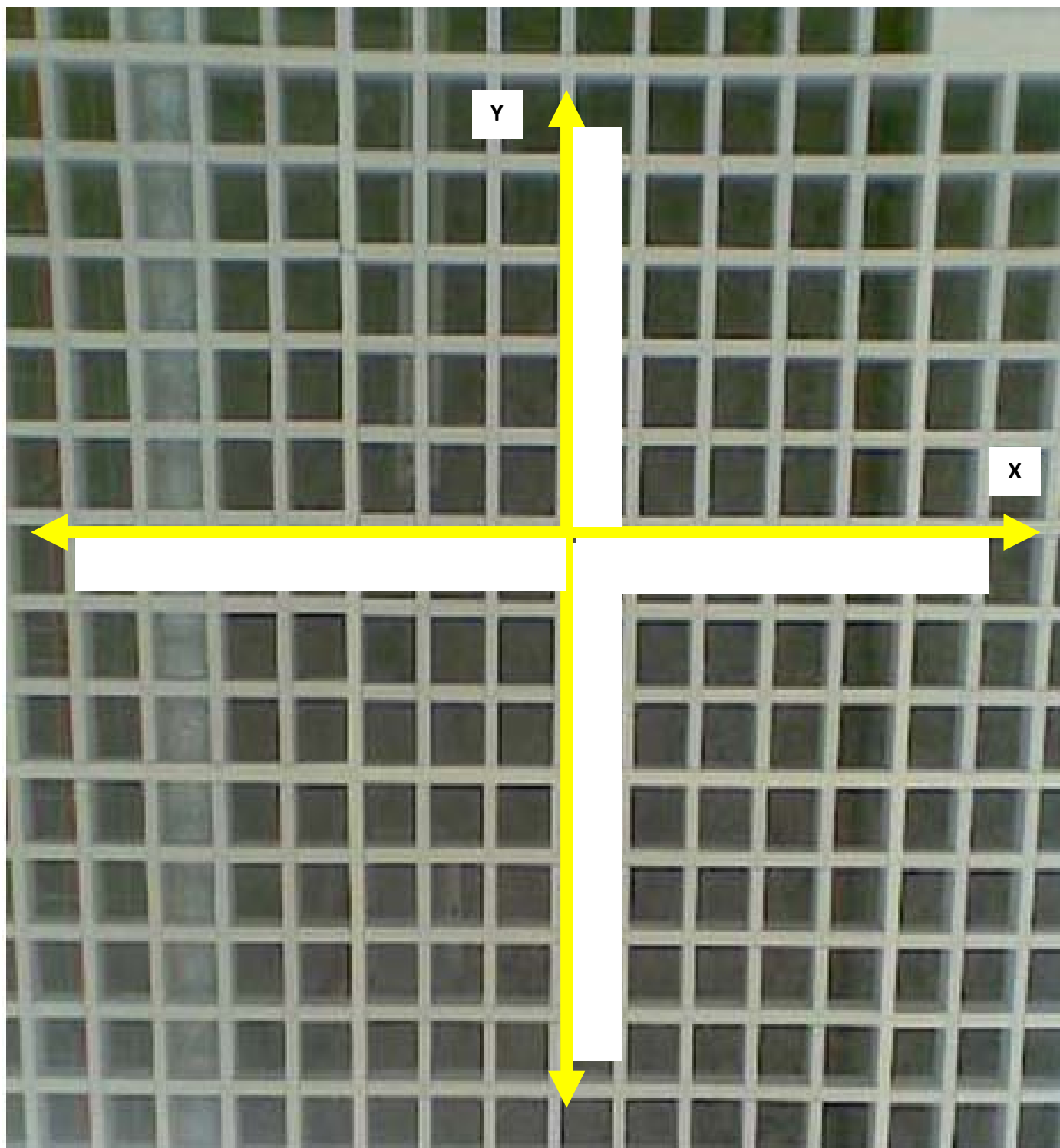




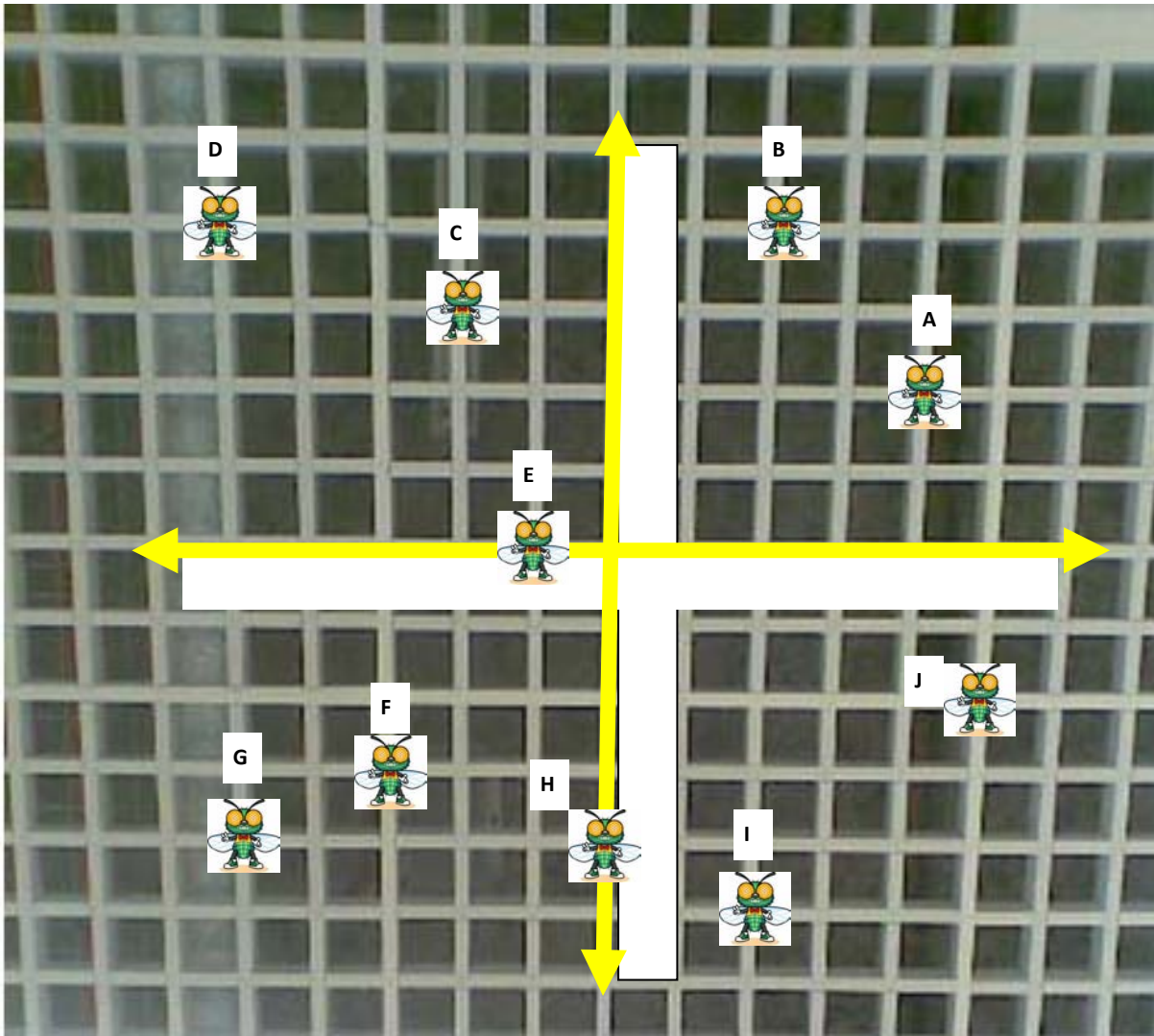
# Student Activity 3

## The completed Cartesian Plane

Fill in the numbers that should go on each axis



# Student Activity 4



Fill in the missing numbers on each of the X and Y axes.  
Then write the coordinates of each fly.

$$A = \left( \underline{\quad}, \underline{\quad} \right)$$

X                  Y

$$B = \left( \underline{\quad}, \underline{\quad} \right)$$

X                  Y

$$C = \left( \underline{\quad}, \underline{\quad} \right)$$

X                  Y

$$D = \left( \underline{\quad}, \underline{\quad} \right)$$

X                  Y

$$E = \left( \underline{\quad}, \underline{\quad} \right)$$

X                  Y

$$F = \left( \underline{\quad}, \underline{\quad} \right)$$

X                  Y

$$G = \left( \underline{\quad}, \underline{\quad} \right)$$

X                  Y

$$H = \left( \underline{\quad}, \underline{\quad} \right)$$

X                  Y

$$I = \left( \underline{\quad}, \underline{\quad} \right)$$

X                  Y

$$J = \left( \underline{\quad}, \underline{\quad} \right)$$

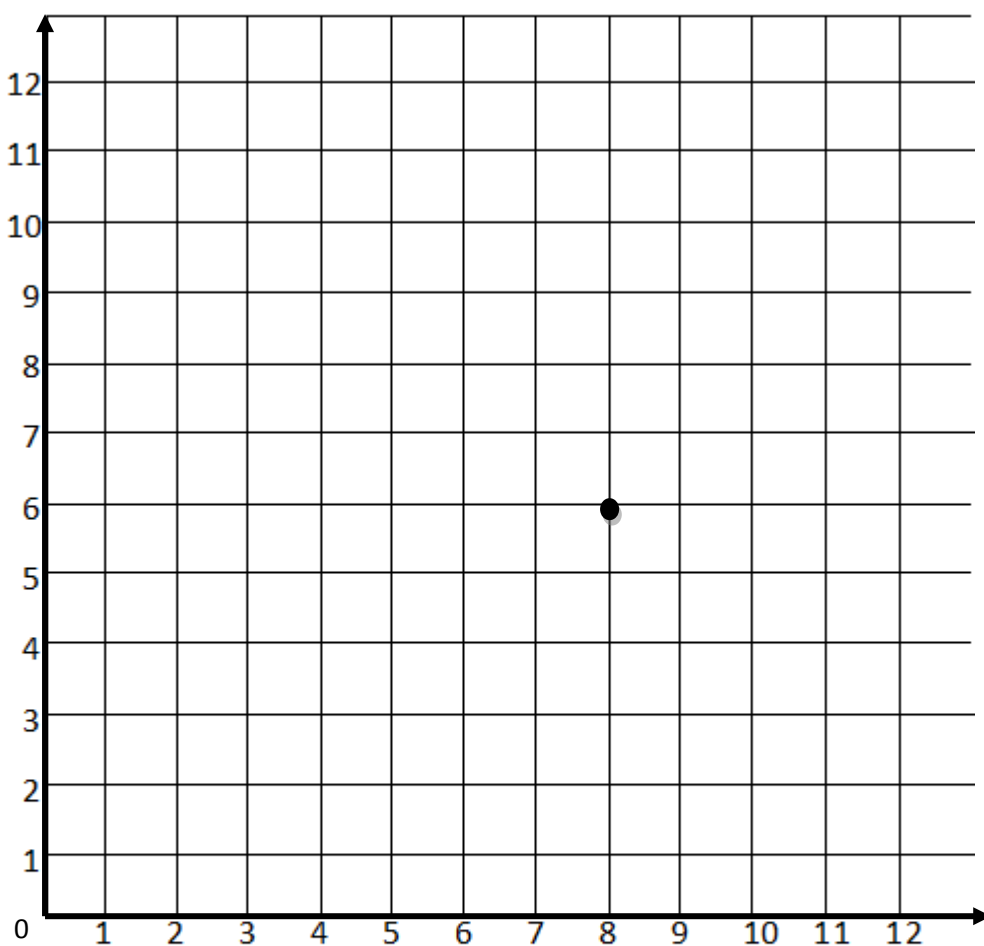
X                  Y



# Student Activity 5

Drawing a point is similar to reading a point. You start by moving across the X axes, then move up the Y axis until you get where you need to be.

## What Am I?



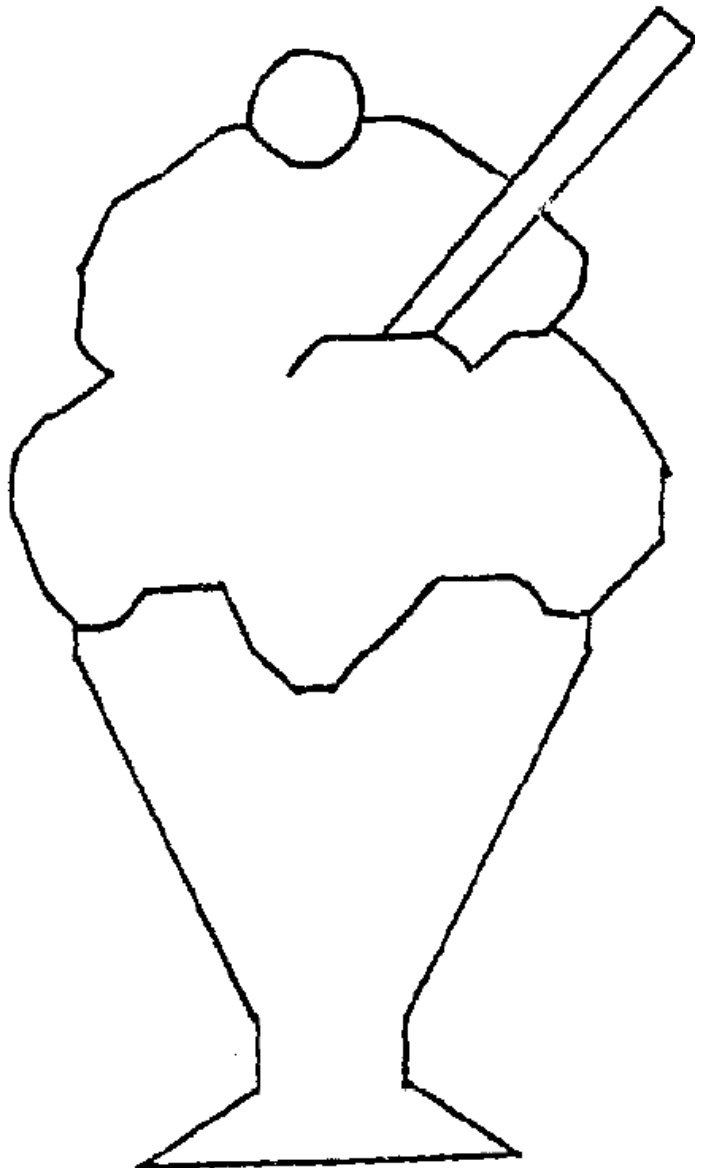
Directions: Plot the following points on the grid. Then, draw a straight line to connect from one to the next.

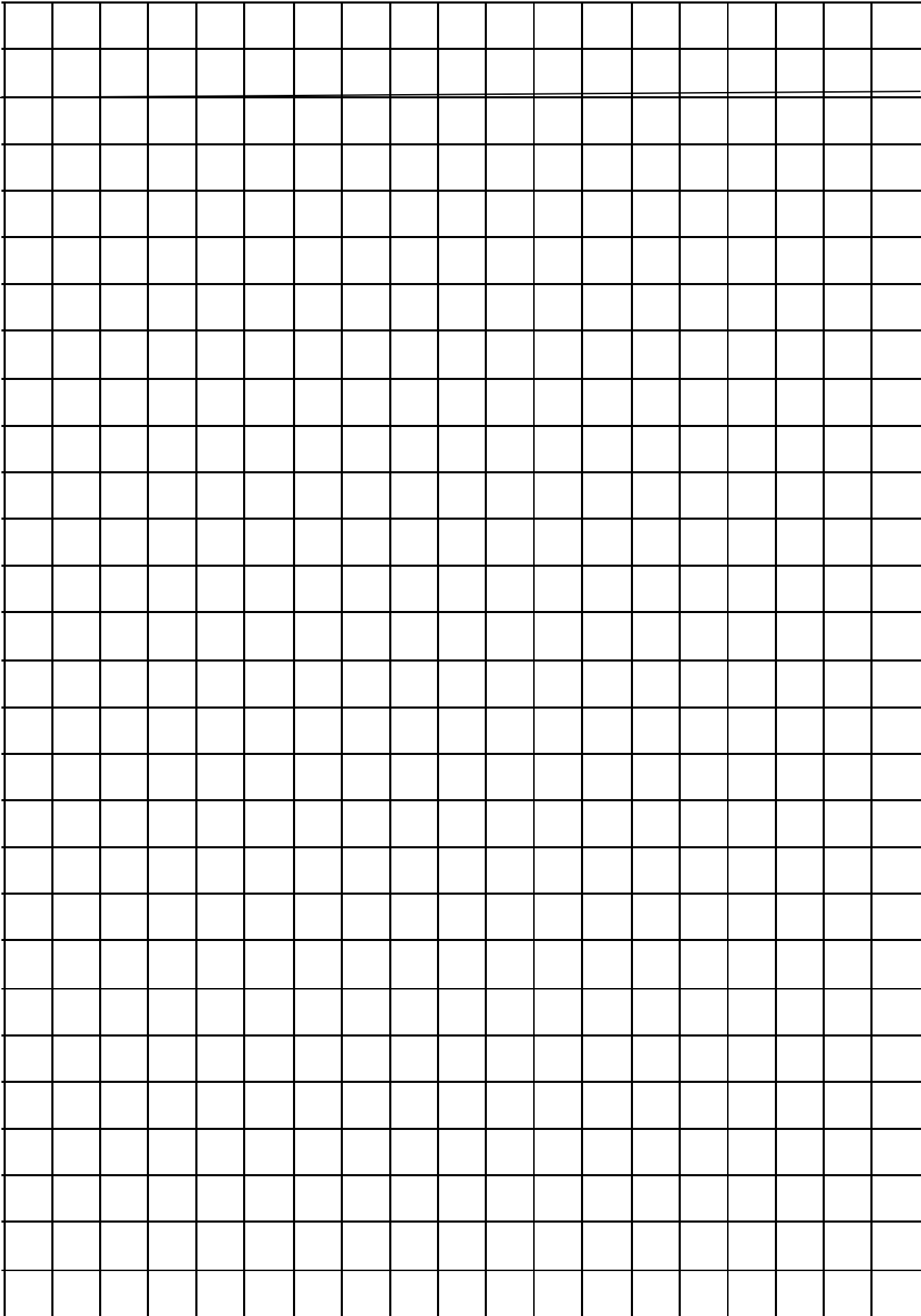
1. (8,6) to (4,10)
2. (4,2) to (8,2)
3. (4,4) to (10,4)
4. (2,4) to (4,4)
5. (4,6) to (4,10)
6. (8,6) to (4,6)
7. (4,2) to (2,4)
8. (8,2) to (10,4)
9. (4,4) to (4,6)



# Ice Cream Sundae

Dish	Ice Cream	Spoon & Finish Ice Cream	Cherry
(-7,-1)	(-1,6)	(1.5,7)	(-2,13)
(-7,-2)	(0,7)	(9, 14.5)	(-2,14)
(-2,-12)	(3,7)	(10,14)	(-1,15)
(-2,-14)	(4,6)	(6,10)	(0,15)
(-5,-16)	(5,7)	(7,9)	(1, 14)
(5,-16)	(6,7)	(7,8)	(1, 13)
(2,-14)	(7,8)	(6,7)	
(2,-12)	(7,9)	(5,7)	
(7, -2)	(6,7)	(4,6)	
(7, -1)	(8,5)	(3,7)	
	(9,3)	(6,10)	
	(9,1)		
	(7,-1)		
	(6,-1)		
	(5,0)		
	(3,0)		
	(0,-3)		
	(-1,-3)		
	(-2,-2)		
	(-3,0)		
	(-5,0)		
	(-6,-1)		
	(-7,-1)		
	(-8,0)		
	(-9,2)		
	(-9,4)		
	(-8,5)		
	(-6,6)		
	(-7,7)		
	(-7,9)		
	(-6,11)		
	(-4,12)		
	(-3,13)		
	(-2,13)		
	(-1,12)		
	(0,12)		
	(1,13)		
	(2,13)		
	(3,12)		
	(5,11)		





# Student Activity 6: Break the Code

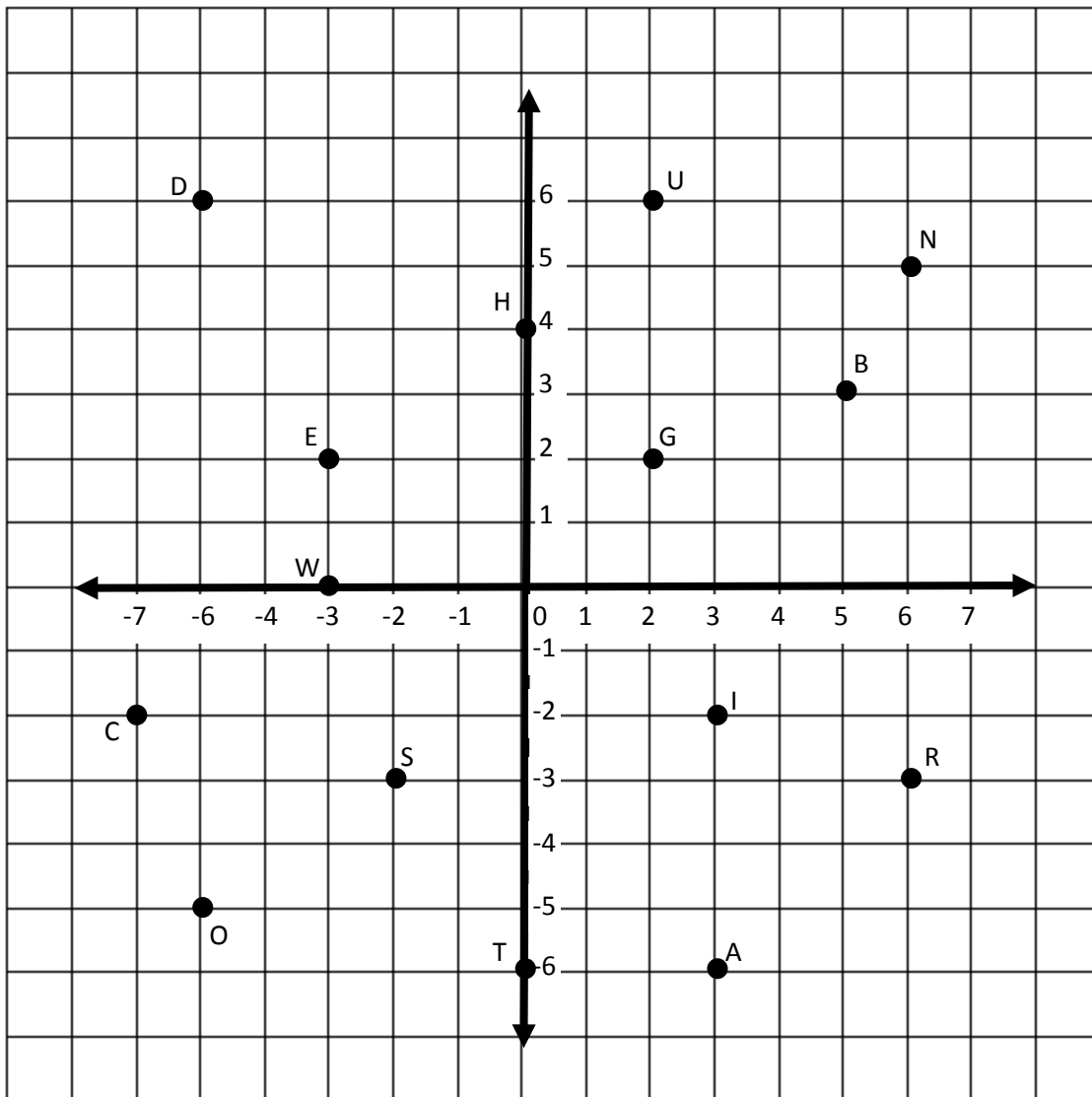


Break the code:

**Question: Why did the teacher always wear sun glasses in her classroom?**

To find the answer, you must use the Cartesian plane below. Each coordinate on the grid represents a letter. You must use the activity sheet below which will give you a list of the coordinates. As you find each coordinate, you must write the corresponding letter above it.

When you have completed this, you will have cracked the code



Answer:

\_\_\_\_\_

(5,3) (-3,2) (-7,-2) (3,-6) (2,6) (-2,-3) (-3,2) | (0,4) (-3,2) (6,-3) | (-2,-3) (0,-6) (2,6) (-6,6) (-3,2) (6,5) (0,-6) (-2,-3) |

\_\_\_\_\_

(-3,0) (-3,2) (6,-3) (-3,2) | (-2,-3) (-6,-5) | (5,3) (6,-3) (3,-2) (2,2) (0,4) (0,-6)

# Student Activity 7: Make your own Code

Make your own coded message:

Instructions:

1. Decide on a phrase or sentence you would like to encode. Don't make it too long (20 to 25 characters should be enough)
2. Draw your Cartesian plane on the graph paper below.
3. Decide where each letter is going to go, draw in the point on the plane and assign it the appropriate letter. (For example in the previous student activity, B = (5,3) )
4. Make a table below your Cartesian plane which lists the coordinates of each letter in your coded phrase.
5. Swap with your friend, you decode their message and they can decode yours!!

