CITYTUTOR

Fifth Grade Math Lesson Materials

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A physical or electronic signature of a person authorized to act on behalf of the copyright owner of the work that allegedly has been infringed;

Identification of the copyrighted work claimed to have been infringed, or, if multiple copyrighted works allegedly have been infringed, then a representative list of such copyrighted works;

Identification of the material that is claimed to be infringing and that is to be removed or access to which is to be disabled, and information reasonably sufficient to permit us to locate the allegedly infringing material, e.g., the specific web page address on the Platform;

Information reasonably sufficient to permit us to contact the party alleging infringement, including an email address;

A statement that the party alleging infringement has a good-faith belief that use of the copyrighted work in the manner complained of is not authorized by the copyright owner or its agent, or is not otherwise permitted under the law; and

A statement that the information in the notification is accurate, and under penalty of perjury, that the party alleging infringement is authorized to act on behalf of the copyright owner of the work that allegedly has been infringed.

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CITYTUTOR DC

G5 Unit 6:

The Coordinate Plane

G5 U6 Lesson 1

Find and write coordinate pairs

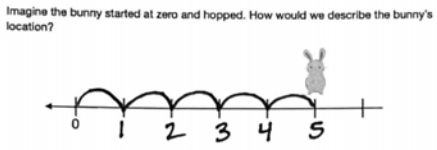
G1 U1 Lesson 1 - Today we will find and write coordinate pairs.

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Today we are going to learn something that is used in tons of jobs like being a pilot or an architect or anyone who needs to specify a location. We are going to take number lines and see how putting two together helps us specify a location in any area. And the locations are going to be marked using something called "coordinate pairs."

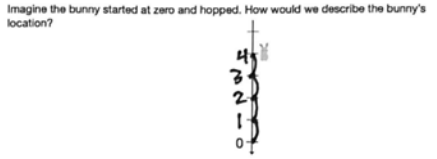
Let's Review (Slide 3): Let's start with just one number line on its own. Imagine the bunny started at zero and hopped. How would we describe the bunny's location? Possible Student Answers, Key Points:

- The bunny made 5 hops.
- If we put numbers, the bunny would be at the 5.



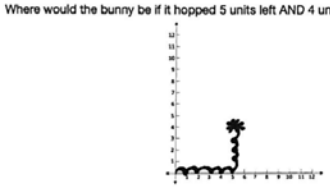
One of the things that's tricky about number lines is that we pay a lot of attention to these tick marks along the line. But really, the line itself shows the distance from zero and the tick marks are just showing stopping points along the way. So, it is helpful to show the bunnies jumps and then we can put numbers at the tick marks to show where each jump stops. But we are always counting the spaces not the tick marks. I will draw it. The bunny is 5 spaces from zero or 5 units from zero.

Let's Review (Slide 4): Let's look at a number line going this way. It's the same idea. We don't want to count the tick marks. We count the space between the tick marks and then the tick marks just mark where each space or jump ends.



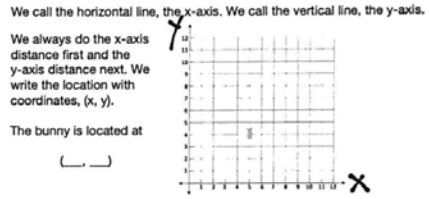
Let's count the spaces together. Watch me mark them. Notice that the numbers go right next to the tick marks. If I put the number in the space then it is between the tick marks and we can't tell what it's referring to. So we put the numbers next to the tick mark. The bunny jumped 4 spaces up or 4 units up.

Let's Talk (Slide 5): Now here's the cool part. If we put those two numbers line together then we can measure distances from left to right and distances up and down, which means we can find any location in the area between.

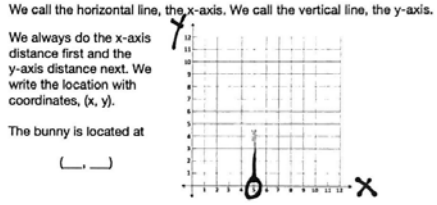


Imagine if the bunny jumped 5 units left AND 4 units up. It would be somewhere around here. But it would be much easier if we had some lines to guide us, right? That is what we are going to see on the next slide.

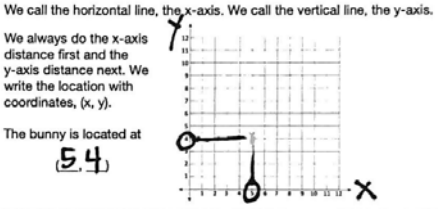
Let's Talk (Slide 6): Now we have lines! Hooray! This is called the coordinate plane.



We call the horizontal line, the x-axis. We call the vertical line, the y-axis. *Write x beside the x-axis and y beside the y-axis.*

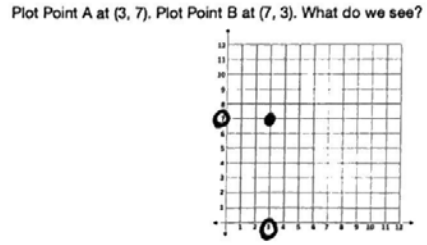


We don't want to have to always say left and right or up and down. So mathematicians made an agreement and we have to stick to that agreement too. The agreement is that we always do left and right first. Then we will do up and down. That means we always do the x-axis distance first and the y-axis distance next. One trick I use to remember this is to think of a baby. The baby learns to call first so x-axis first. Then it learns to walk so y-axis is second. *Use your fingers to crawl along the x-axis and then move your hand up and down as you explain.* Let's practice finding locations using the x-axis then the y-axis. First, we look at the x-axis. The bunny is above the 5 on the x-axis because it jumped 5 hops right.

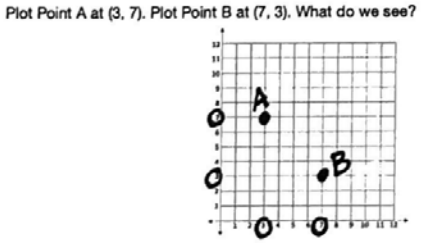


The bunny is next to the 4 on the y-axis because it jumped 4 hops up. Now we can write where the bunny is located with just two numbers called coordinates. We write (5, 4). The 5 stands for the place on the x-axis and the 4 stands for the place on the y-axis.

Let's Think (Slides 7): Let's practice finding locations using the x-axis then the y-axis.



This says, "plot Point A at (3, 7)." I am going to start with the 3 on the x-axis. That's the line going side to side like a baby crawling. Here is the 3. Now we look for the 7 on the y-axis. That's the line going up and down like when the baby learns to stand. Here is the 7. My location is where these come together. *Drag your fingers up from the 3 and sideways from the 7 at the same time. Stop where they meet and draw the point.* Here! I am going to label it A.



Now we need to plot Point B at (7, 3). It's the same numbers but in a different order. Do you think that this point will be at the same point as (3, 7)? No! The go with different axes! We need to find 7 on the x-axis. Here. Now we find the 3 on the y-axis. Here. This is where the numbers meet up and so this is where Point B is.

Let's Try it (Slides 8): Let's work on graphing more coordinates together. I will help you practice before you do it on your own.

WARM WELCOME

Today we will find and write coordinate pairs.

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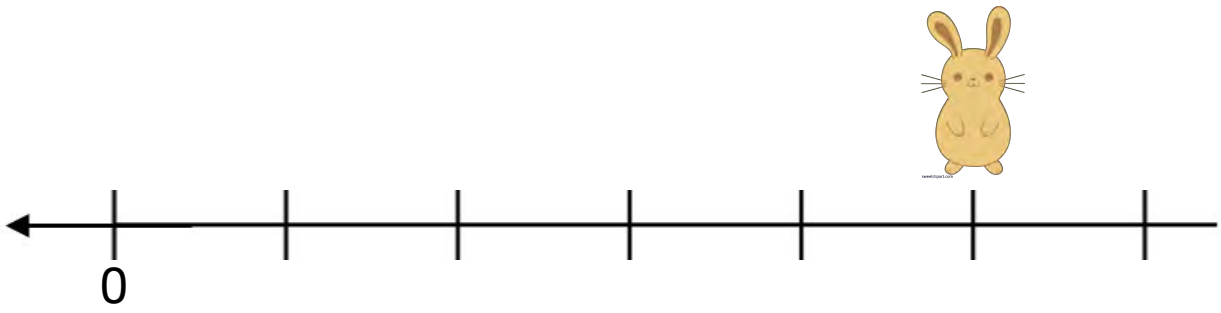
Let's Review:

Today we are going to use numbers lines to describe location.

Imagine the bunny started at zero and hopped. How would we describe the bunny's location?



Let's Review:

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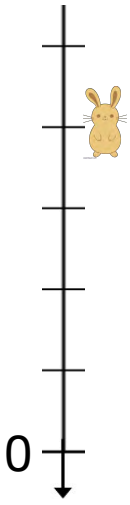
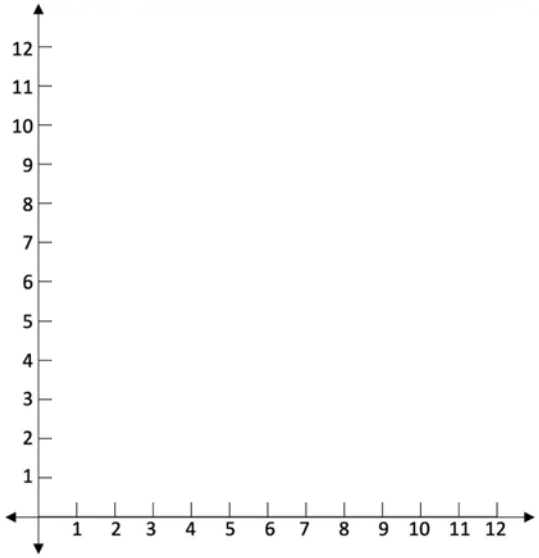
Imagine the bunny started at zero and hopped. How would we describe the bunny's location?



Let's Talk:

Let's put both lines together so we can map more locations.

Where would the bunny be if it hopped 5 units left AND 4 units up?



Let's Talk:

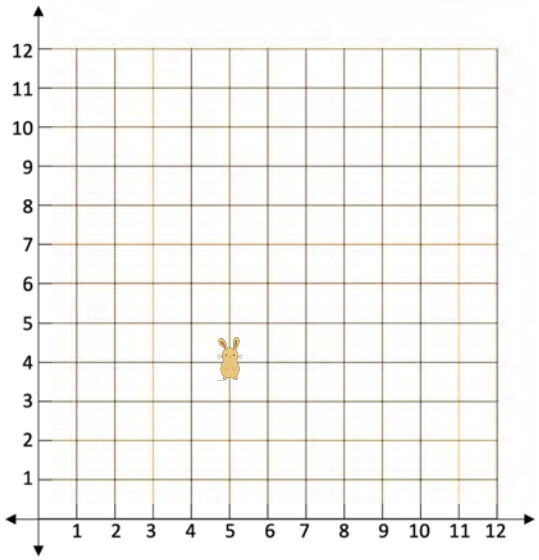
When we put a horizontal and vertical line together, we create the coordinate plane.

We call the horizontal line, the x-axis. We call the vertical line, the y-axis.

We always do the x-axis distance first and the y-axis distance next. We write the location with coordinates, (x, y).

The bunny is located at

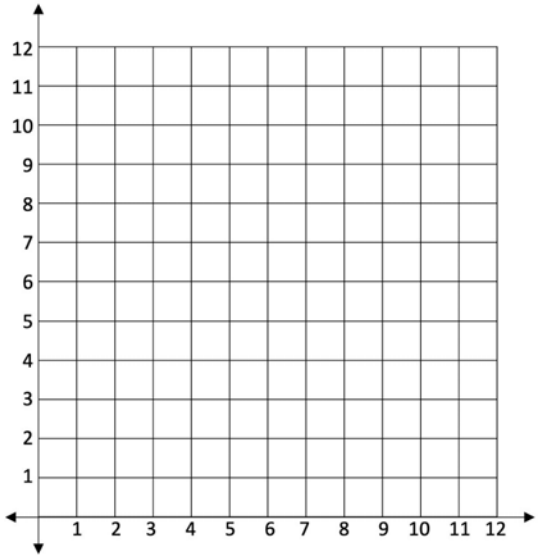
(___, ___)



Let's Think:

Let's practice finding locations using the x-axis then the y-axis.

Plot Point A at (3, 7). Plot Point B at (7, 3). What do we see?



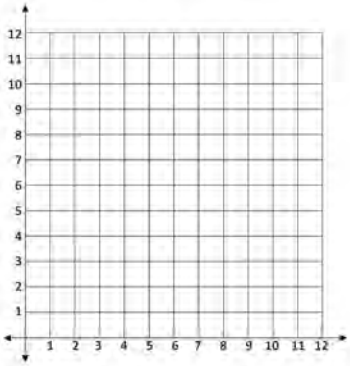
Let's Try It:

Let's practice plotting points together.

Name: _____ G5 U6 Lesson 1 - Let's Try It

Imagine an ant is standing at the origin of the graph (0, 0). The ant walks 3 units to the right. Then the ant walks 2 units to the up. Mark a point to show the ant's final location.

Now imagine another ant, standing at the origin of the graph (0, 0). This ant walks 2 units to the right. Then the ant walks 3 units to the up. Mark a point to show the ant's final location.



What is the same about the two ants' paths?

On your Own:

Now it's time for you to plot points and write their coordinates.

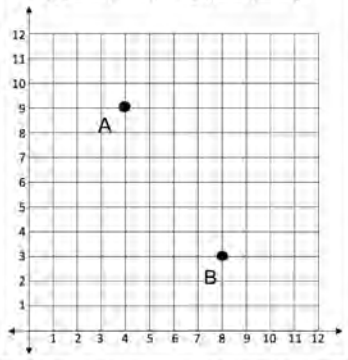
Name: _____ G5 U6 Lesson 1 - Independent Work

Remember: We find our coordinates on the horizontal axis first then the vertical axis.

Make sure to circle the numbers on each axis.

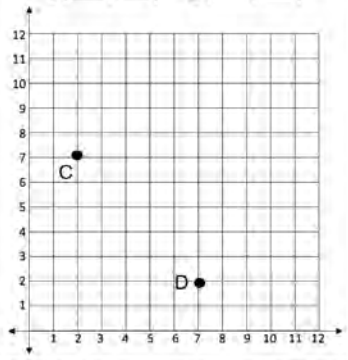
1. What are the coordinates of the point shown?

A (___, ___) B (___, ___)



2. What are the coordinates of the point shown?

C (___, ___) D (___, ___)



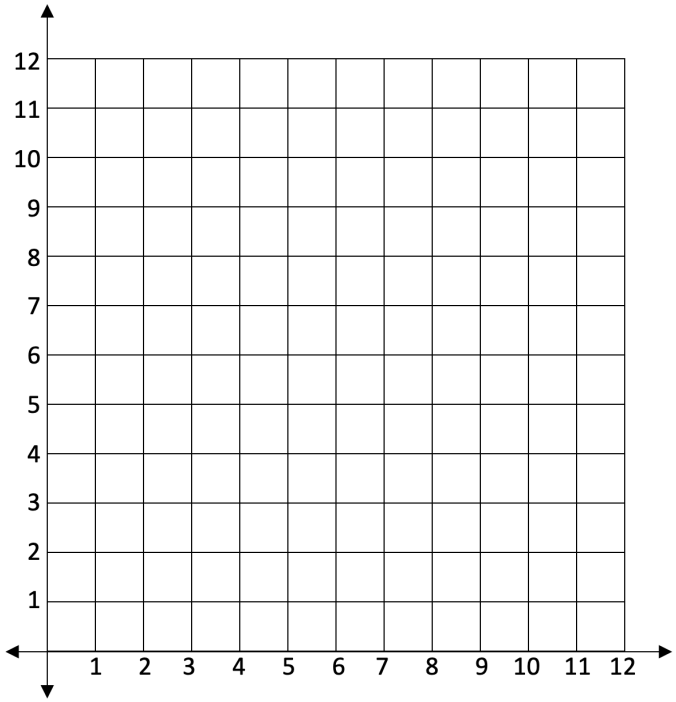
3. What are the coordinates of the point shown?

4. What are the coordinates of the point shown?

Name: _____ G5 U6 Lesson 1 - Let's Try It

Imagine an ant is standing at the origin of the graph (0, 0). The ant walks 3 units to the right. Then the ant walks 2 units to the up. Mark a point to show the ant's final location.

Now imagine another ant, standing at the origin of the graph (0, 0). This ant walks 2 units to the right. Then the ant walks 3 units to the up. Mark a point to show the ant's final location.



What is the same about the two ants' paths?

_____
_____

_____
_____

What are the coordinates of the first ant's location? (____, ____)

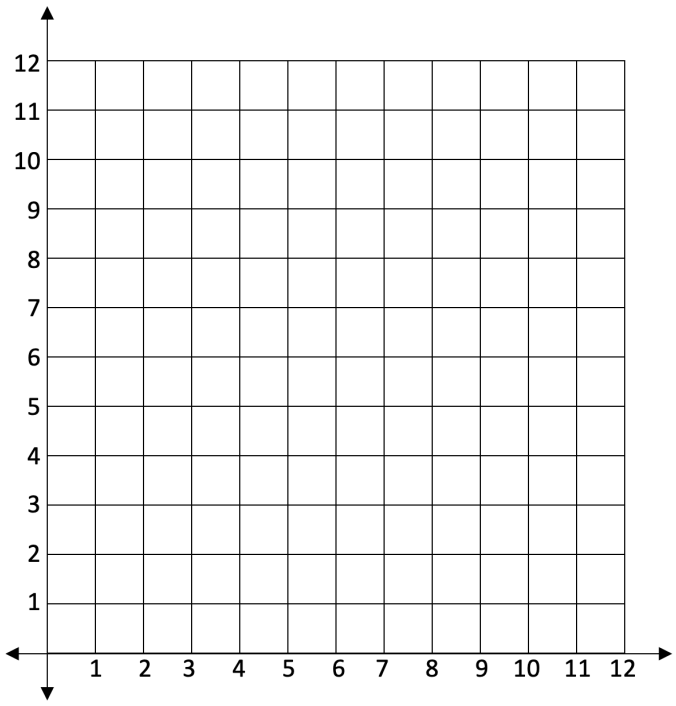
What are the coordinates of the second ant's location? (____, ____)

Why aren't the ants at the same location as each other?

_____
_____

_____
_____

Plot point A at (3, 5). Plot point B at (5, 3).



The coordinates have the same numbers. Why aren't they at the same location as each other?

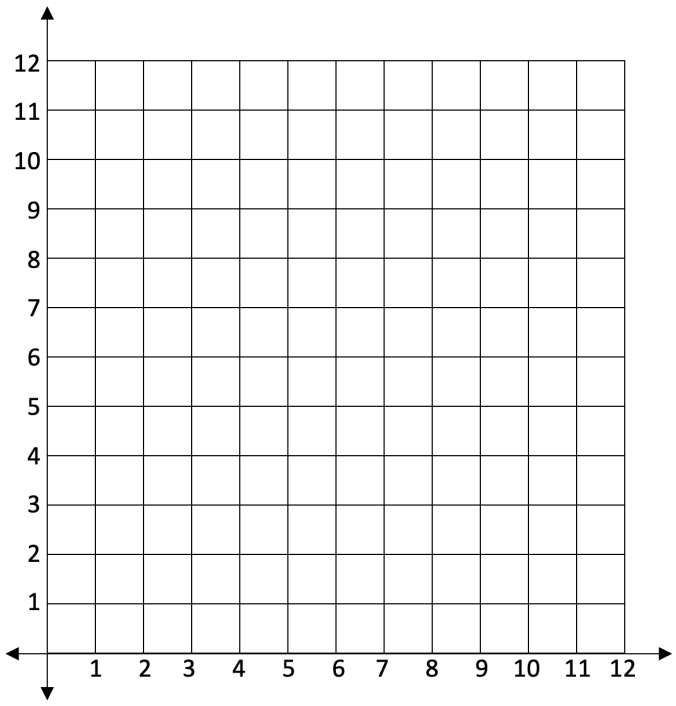
_____

_____

_____

_____

Plot point A at (0, 2). Plot point B at (2, 0).



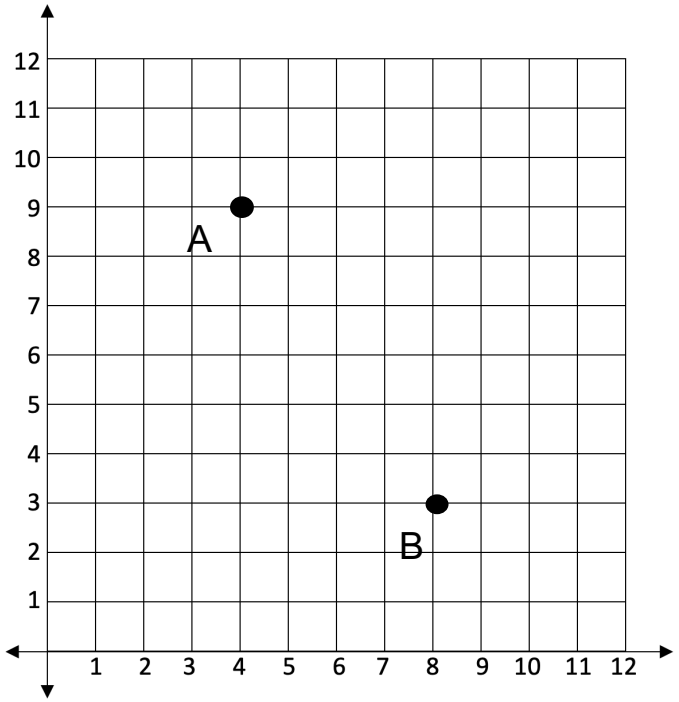
Name: _____ G5 U6 Lesson 1 - Independent Work

Remember: We find our coordinates on the horizontal axis first then the vertical axis.

Make sure to circle the numbers on each axis.

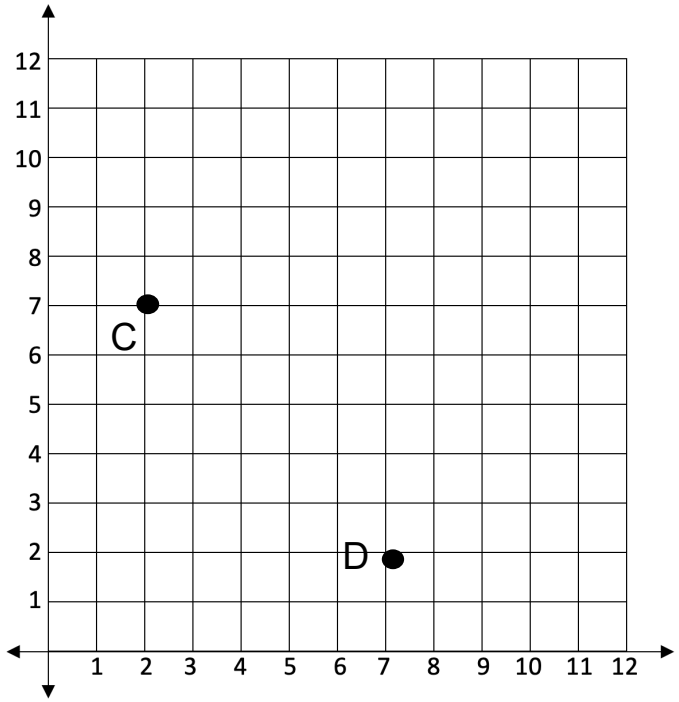
1. What are the coordinates of the point shown?

A (____ , ____) B (____ , ____)



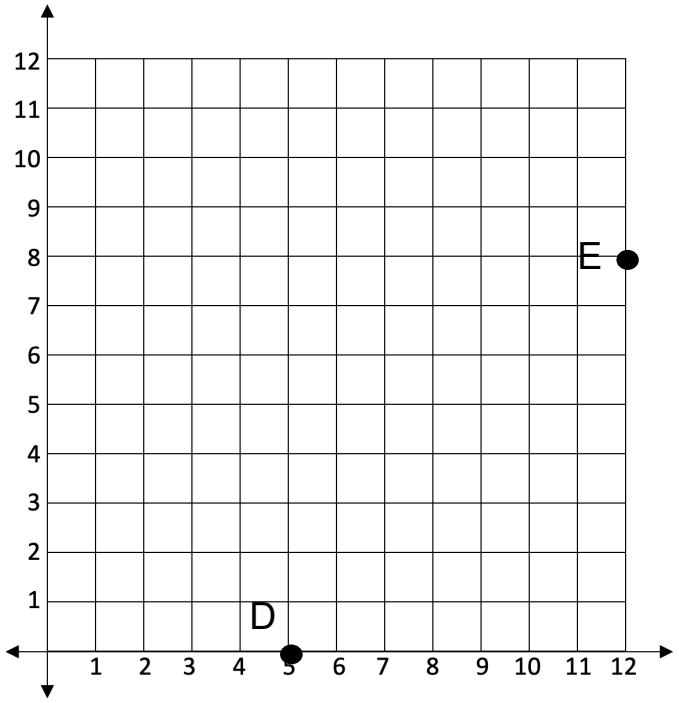
2. What are the coordinates of the point shown?

C (____ , ____) D (____ , ____)



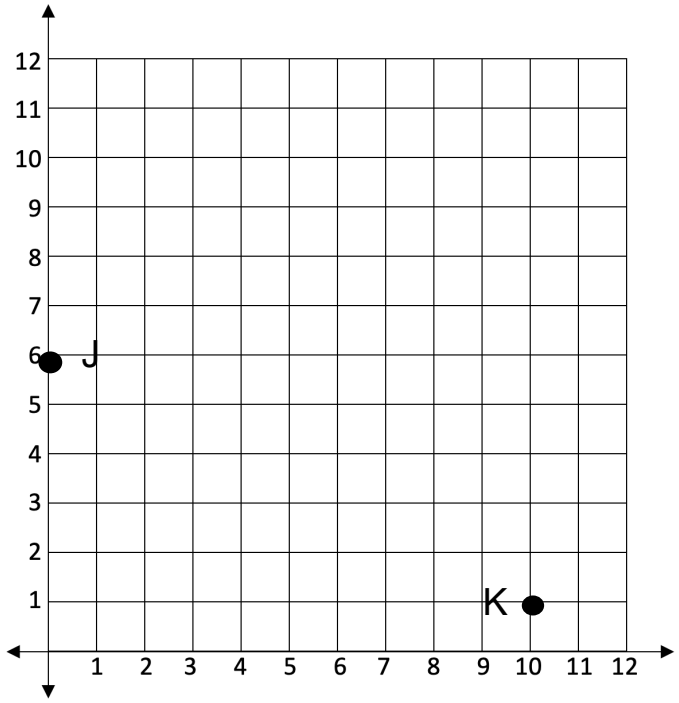
3. What are the coordinates of the point shown?

F (____ , ____) G (____ , ____)



4. What are the coordinates of the point shown?

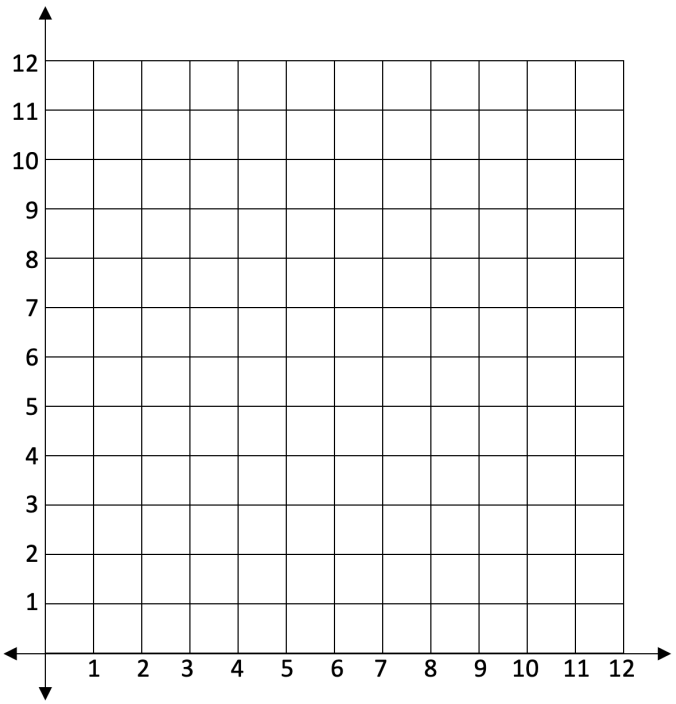
J (____ , ____) K (____ , ____)



Make sure to circle the coordinates on each axis.

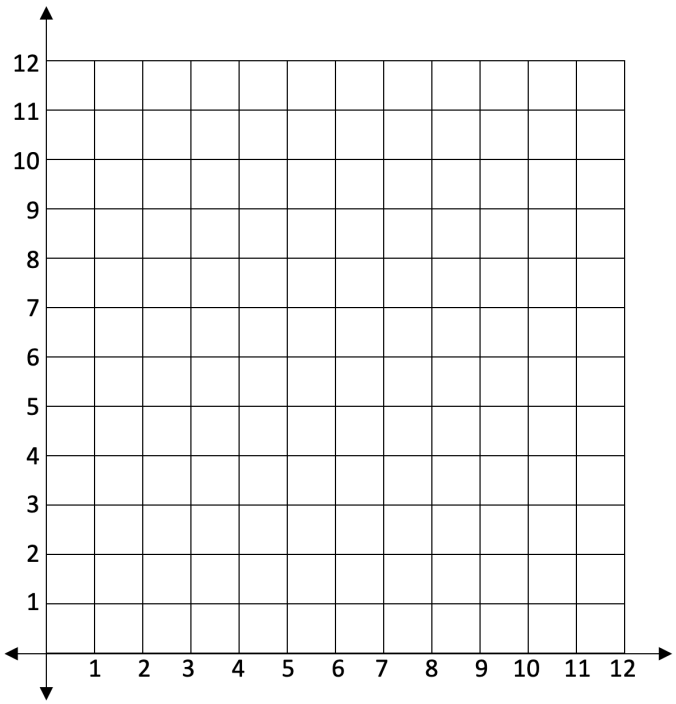
1. Plot each point and label it with a letter.

A (8, 7) B (1, 5)



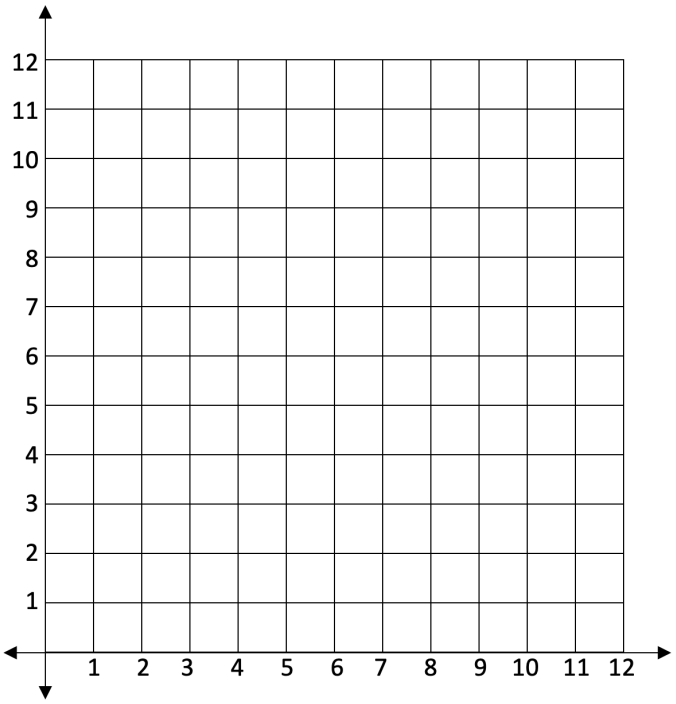
2. Plot each point and label it with a letter.

C (6, 3) D (3, 6)



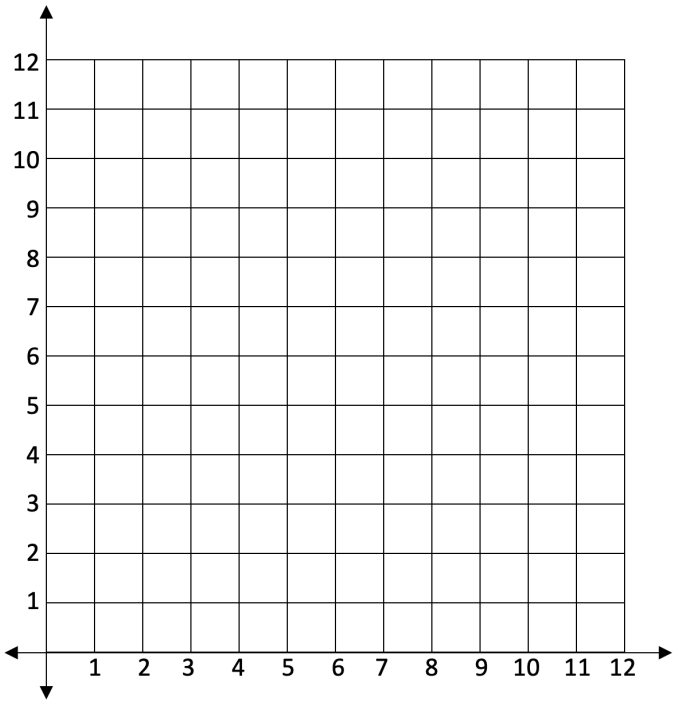
3. Plot each point and label it with a letter.

F (0, 9) G (9, 0)



4. Plot each point and label it with a letter.

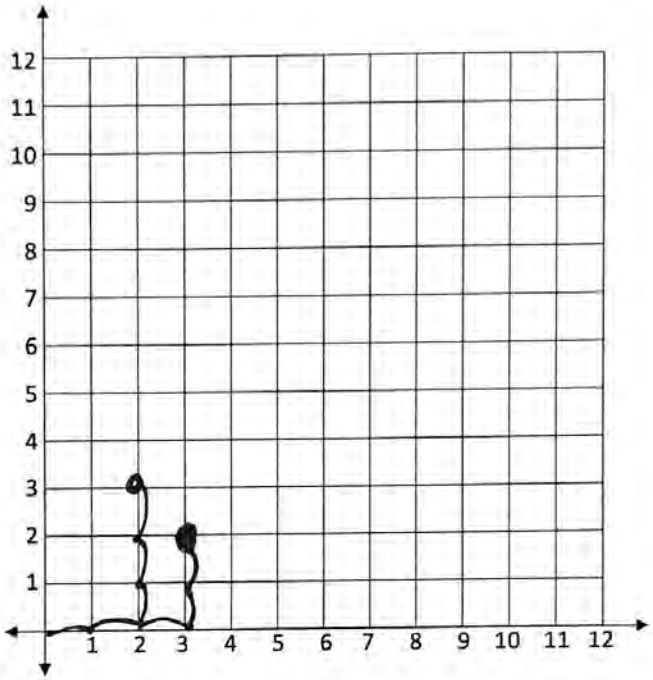
J (7, 0) K (0, 4)



Name: ANSWER KEY

Imagine an ant is standing at the origin of the graph (0, 0). The ant walks 3 units to the right. Then the ant walks 2 units to the up. Mark a point to show the ant's final location.

Now imagine another ant, standing at the origin of the graph (0, 0). This ant walks 2 units to the right. Then the ant walks 3 units to the up. Mark a point to show the ant's final location.



What is the same about the two ants' paths?

Both ants had the same numbers: 2 and 3.
They both walked left and up.

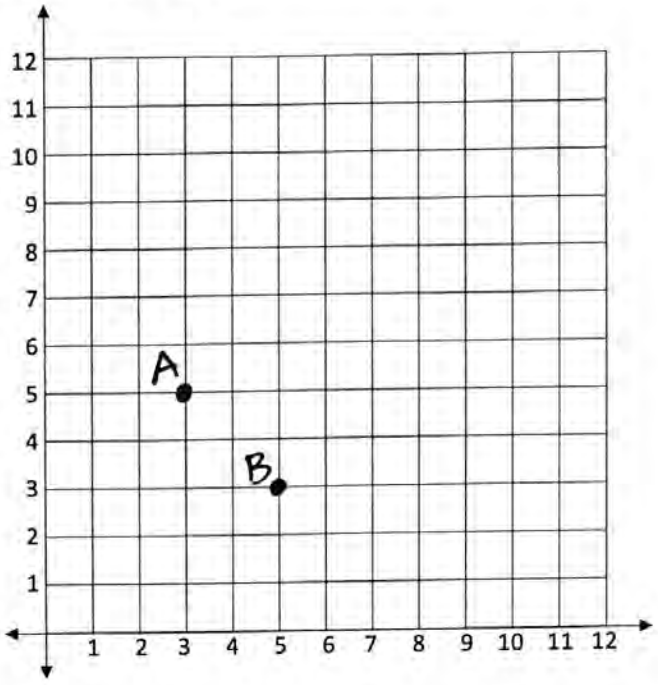
What are the coordinates of the first ant's location? (3, 2)

What are the coordinates of the second ant's location? (2, 3)

Why aren't the ants at the same location as each other?

The 2 and 3 units weren't in the same directions.
They were switched.

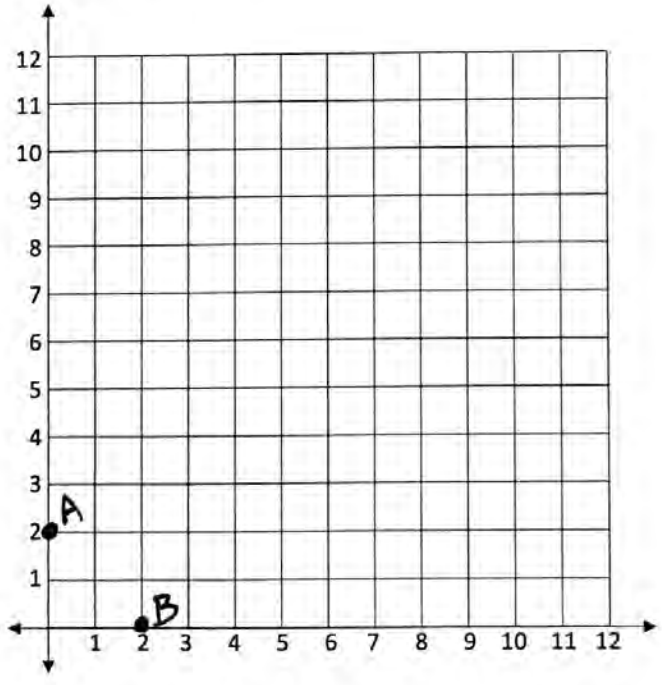
Plot point A at (3, 5). Plot point B at (5, 3).



The coordinates have the same numbers. Why aren't they at the same location as each other?

The order of the numbers is switched so the direction of the numbers is switched.

Plot point A at (0, 2). Plot point B at (2, 0).



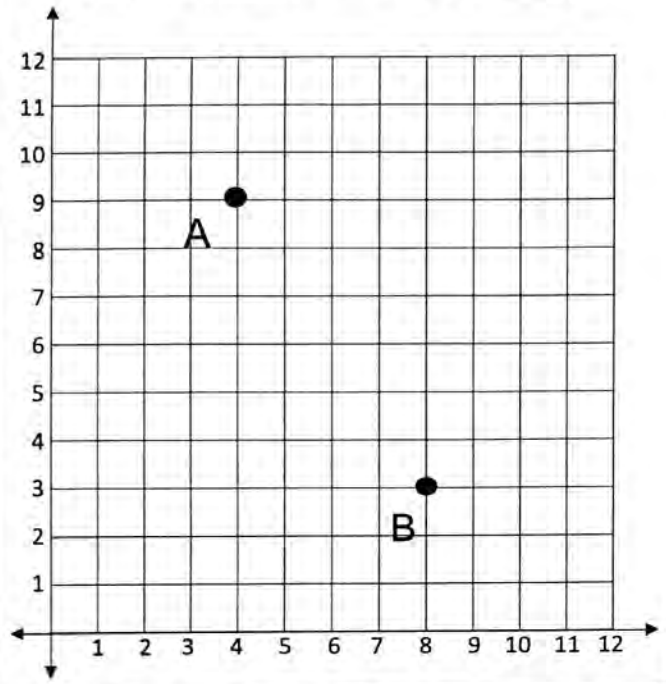
Name: ANSWER KEY

Remember: We find our coordinates on the horizontal axis first then the vertical axis.

Make sure to circle the numbers on each axis.

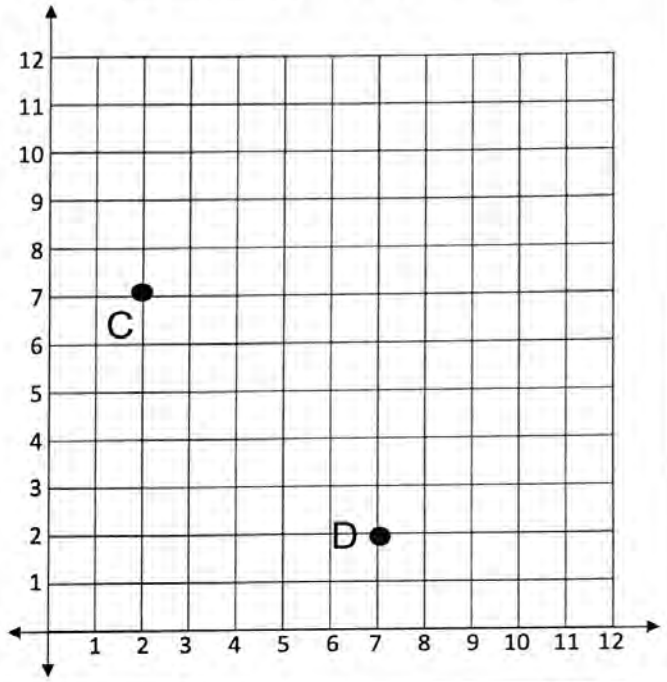
1. What are the coordinates of the point shown?

A(4 , 9) B(8 , 3)



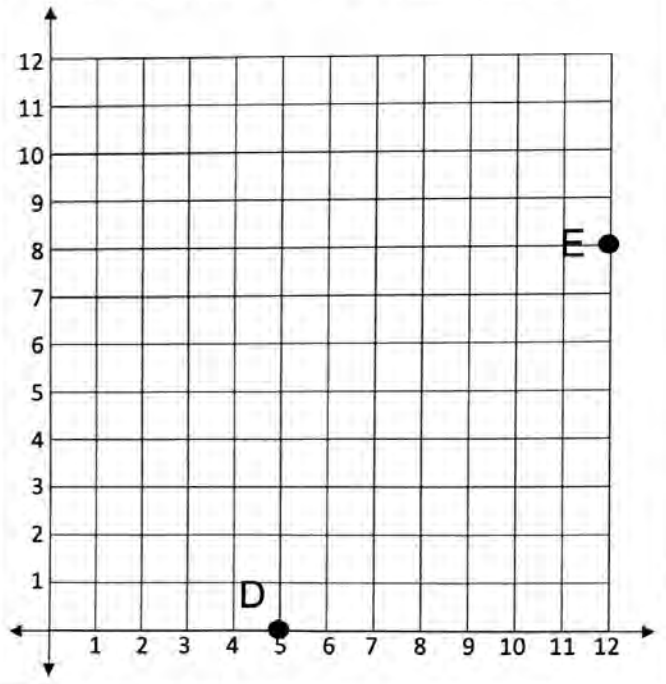
2. What are the coordinates of the point shown?

C(2 , 7) D(7 , 2)



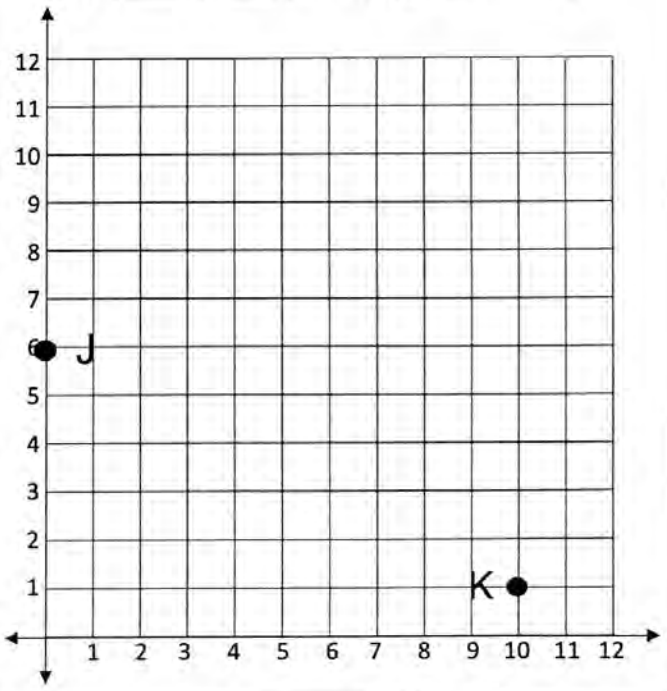
3. What are the coordinates of the point shown?

F(5 , 0) G(12 , 8)



4. What are the coordinates of the point shown?

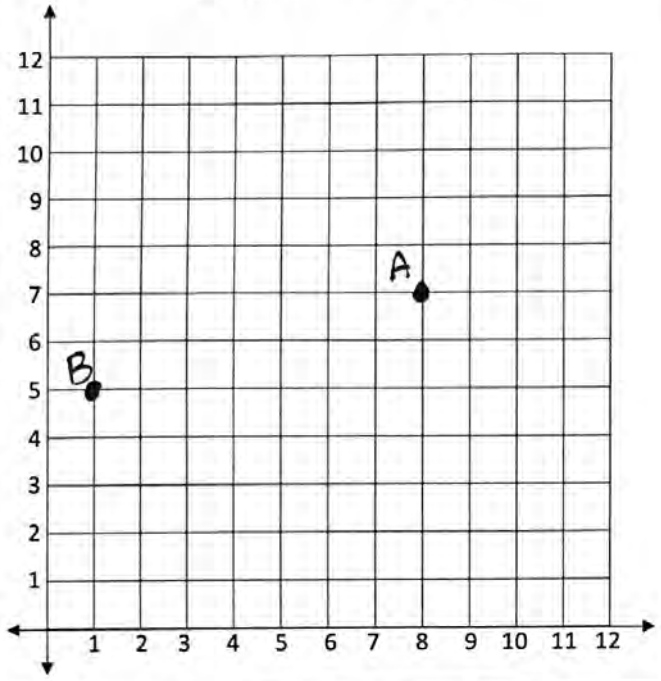
J(0 , 6) K(10 , 1)



Make sure to circle the coordinates on each axis.

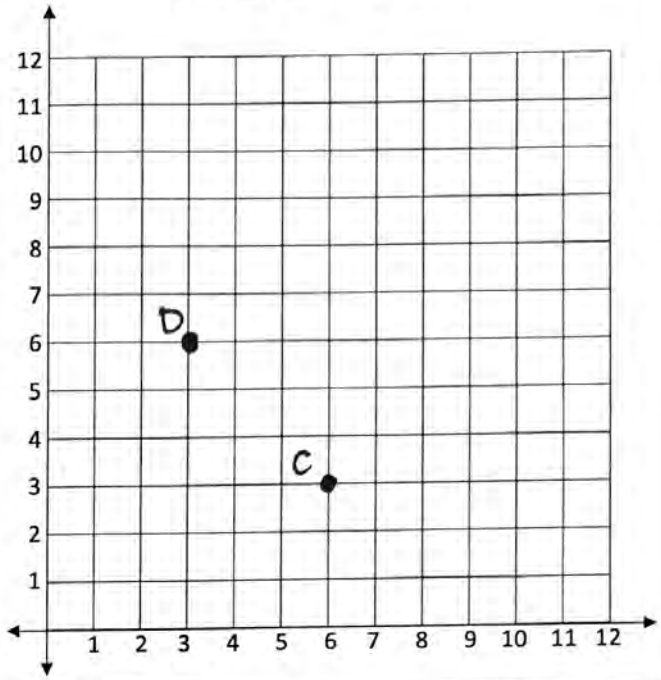
1. Plot each point and label it with a letter.

A (8, 7) B (1, 5)



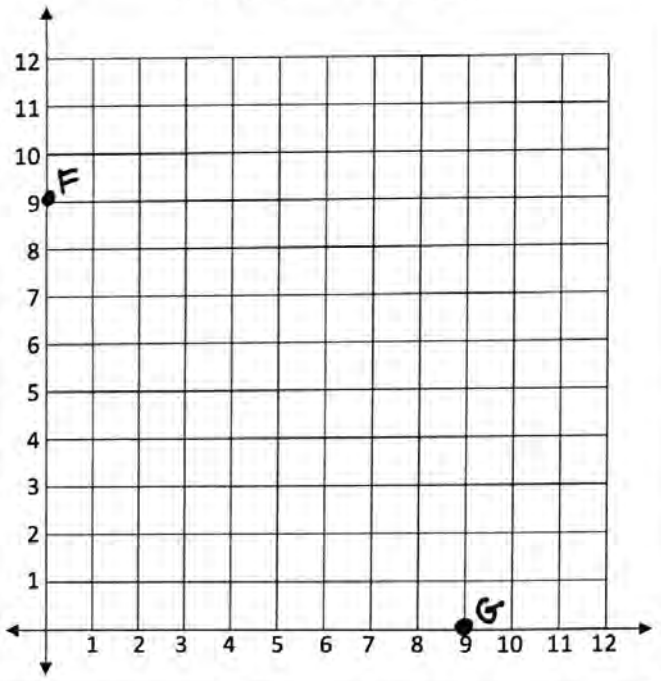
2. Plot each point and label it with a letter.

C (6, 3) D (3, 6)



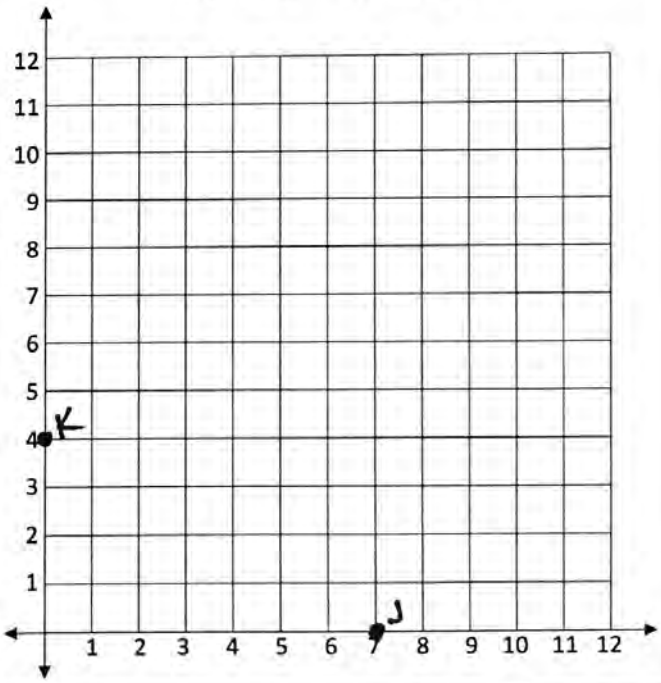
3. Plot each point and label it with a letter.

F (0, 9) G (9, 0)



4. Plot each point and label it with a letter.

J (7, 0) K (0, 4)



G5 U6 Lesson 2

Find patterns for points on a line

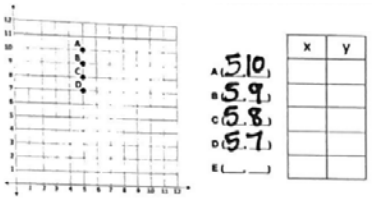
G1 U1 Lesson 2 - Today we will find patterns for points on a line.

Warm Welcome (Slide 1): Tutor choice

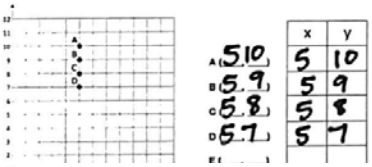
Frame the Learning/Connect to Prior Learning (Slide 2): Today we will keep graphing coordinate pairs and we are going to make lines.

Let's Review (Slide 3): How do we find locations on the coordinate plane? Possible Student Answers, Key Points:

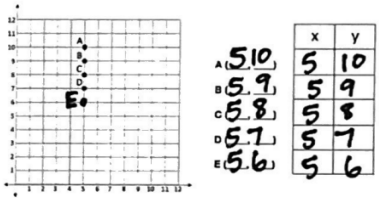
- The baby crawls before it learns to stand.
- We go left to right then up and down.
- We do the x-axis first and then the y-axis.



Let's start with Point A. I look at the x-axis and see it is above the 5. I look at the y-axis and see it is beside the 10. The point is (5, 10). What are the coordinates of Point B? *Seek student input on the rest of the answers. Point to the point and drag your finger to its location on the x-axis. Then point to the point and drag your finger to its location on the y-axis.* What are the coordinates of Point C? What are the coordinates of Point D?



Just like we keep the x-axis number and the y-axis number together with parentheses, we can keep the numbers together on a table. This is really useful when we have a set of points.

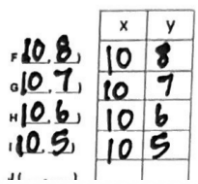


Now we can really start to see a pattern and I bet you can guess where Point E would be. *Seek student input.* It goes here! And I see that is above the 5 on the x-axis and beside the 6 on the y-axis. I will put that on my table too. What pattern do we notice with these coordinates? Possible Student Answers, Key Points:

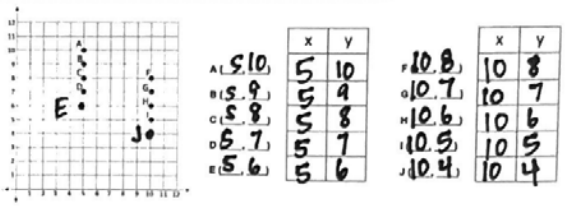
- The left hand column is always 5.
- The x-coordinate is always 5.

You don't need to know this yet but we can show this with an equation. The x-axis is always 5 so we can write $x = 5$.

Let's Talk (Slide 4): Let's see if we see a similar pattern with another line.



What are the coordinates of Point F? *Seek student input on the rest of the answers. Point to the point and drag your finger to its location on the x-axis. Then point to the point and drag your finger to its location on the y-axis.* What are the coordinates of Point G? What are the coordinates of Point H? What are the coordinates of Point I? We can put all of these points on our table and they mean the same thing.



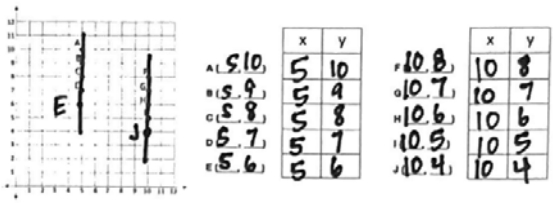
Now we can really start to see a pattern and I bet you can guess where Point J would be. *Seek student input.* It goes here! And I see that is above the 10 on the x-axis and beside the 4 on the y-axis. I will put that on my table too. What pattern do we notice with these coordinates? Possible Student Answers, Key Points:

- The left hand column is always 10.
- The x-coordinate is always 10.

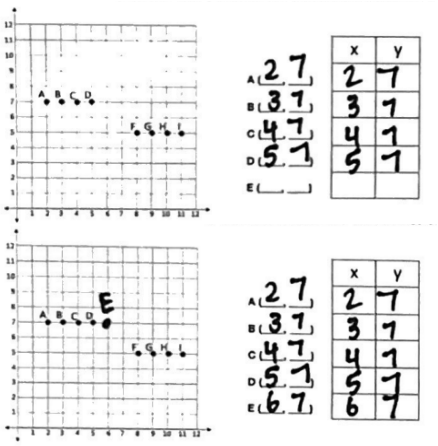
You don't need to know this yet but we can show this with an equation. The x-axis is always 10 so we can write $x = 10$.

Both of these lines were vertical lines. That means they go up and down. And we noticed something special about the coordinates for both of these lines. What do you think we will see on the table of any vertical line? Possible Student Answers, Key Points:

- The left hand column is always the same number.
- The x-coordinate is always the same number.
- One number stays the same for all the coordinates.



Let's Think (Slide 5): Let's see if we can find a pattern with horizontal lines as well. Horizontal lines are lines that go side to side.

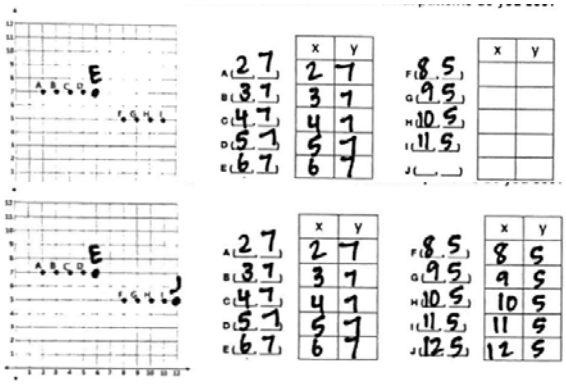


What are the coordinates of Point A? *Seek student input on the rest of the answers. Point to the point and drag your finger to its location on the x-axis. Then point to the point and drag your finger to its location on the y-axis.* What are the coordinates of Point B? What are the coordinates of Point C? What are the coordinates of Point D? We can put all of these coordinates on the table.

Now we can really start to see a pattern and I bet you can guess where Point E would be. *Seek student input.* It goes here! It is (6, 7). I will put that on my table too. What pattern do we notice with these coordinates? Possible Student Answers, Key Points:

- The right hand column is always 7.
- The y-coordinate is always 7.

You don't need to know this yet but we can show this with an equation. The y-axis is always 7 so we can write y = 7.



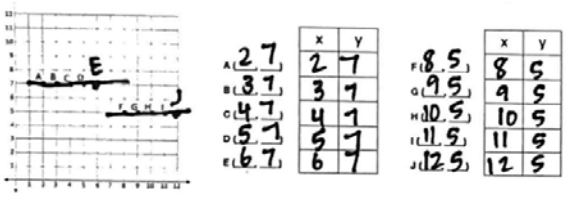
What are the coordinates of Point F? *Seek student input on the rest of the answers. Point to the point and drag your finger to its location on the x-axis. Then point to the point and drag your finger to its location on the y-axis.* What are the coordinates of Point G? What are the coordinates of Point H? What are the coordinates of Point I? We can put all of these coordinates on the table.

Now we can really start to see a pattern and I bet you can guess where Point J would be. *Seek student input.* It goes here! It is (12, 5). I will put that on my table too. What pattern do we notice with these coordinates? Possible Student Answers, Key Points:

- The right hand column is always 5.
- The y-coordinate is always 5.

You don't need to know this yet but we can show this with an equation. The y-axis is always 5 so we can write y = 5.

What do we notice about the coordinates for both of these lines? Possible Student Answers, Key Points:



- The right hand column is always the same number.
- The y-coordinate is always the same number.
- One number stays the same for all the coordinates.

Any time we have a horizontal or vertical line, we will have the same number for one of the coordinates. For vertical lines, x will always be the same. For vertical lines, y will always be the same.

Let's Try it (Slides 6): Let's work on graphing lines together. We will see these same patterns. I will help you practice before you do it on your own.

WARM WELCOME

Today we will find patterns for points on a line.

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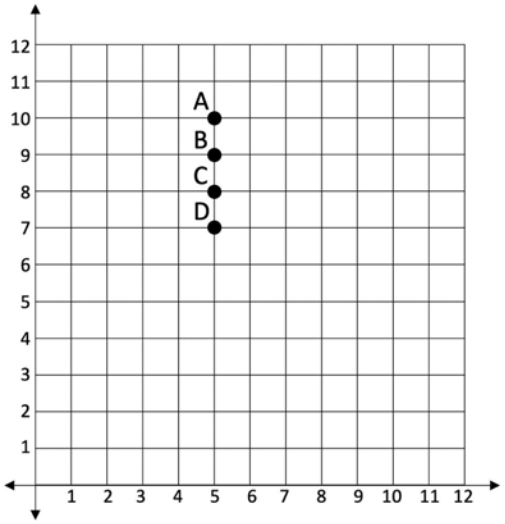
Let's Review:

How do we find locations on the coordinate plane?

Write the coordinates for the points below. Where do we think Point E would go?

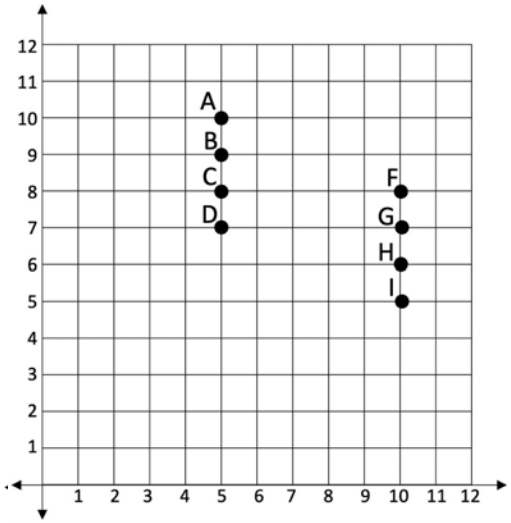


	x	y
A (___, ___)		
B (___, ___)		
C (___, ___)		
D (___, ___)		
E (___, ___)		

Let's Talk:

Let's map out another line and see if we can notice a pattern.

What do you notice about each set of coordinates?



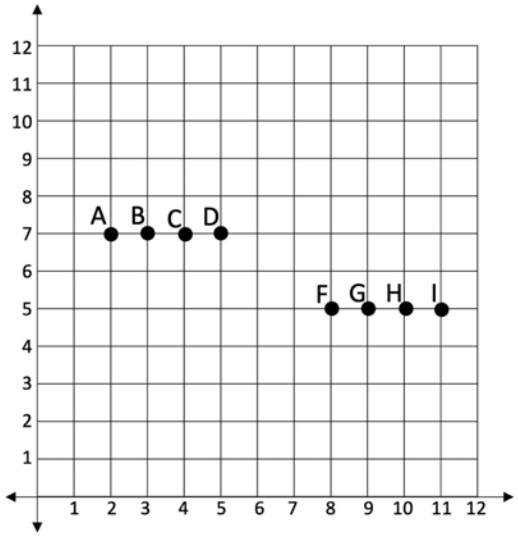
	x	y
A (___, ___)		
B (___, ___)		
C (___, ___)		
D (___, ___)		
E (___, ___)		

	x	y
F (___, ___)		
G (___, ___)		
H (___, ___)		
I (___, ___)		
J (___, ___)		

Let's Think:

There are patterns for horizontal lines as well.

Write the coordinates for the points and find the next one. What patterns do you see?

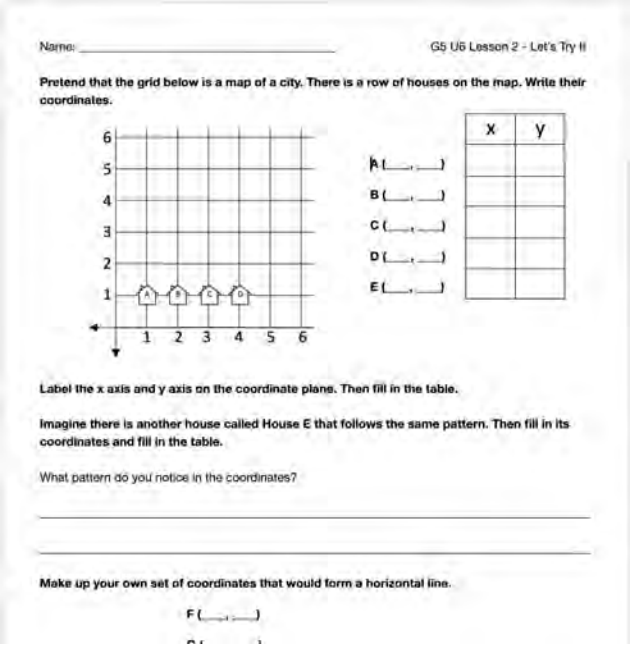


	x	y
A (___, ___)		
B (___, ___)		
C (___, ___)		
D (___, ___)		
E (___, ___)		

	x	y
F (___, ___)		
G (___, ___)		
H (___, ___)		
I (___, ___)		
J (___, ___)		

Let's Try It:

Let's practice plotting coordinates that make lines.



Name: _____ G5 U6 Lesson 2 - Let's Try It

Pretend that the grid below is a map of a city. There is a row of houses on the map. Write their coordinates.

	x	y
A (___, ___)		
B (___, ___)		
C (___, ___)		
D (___, ___)		
E (___, ___)		

Label the x axis and y axis on the coordinate plane. Then fill in the table.

Imagine there is another house called House E that follows the same pattern. Then fill in its coordinates and fill in the table.

What pattern do you notice in the coordinates?

_____

_____

Make up your own set of coordinates that would form a horizontal line.

F (___, ___)

On your Own:

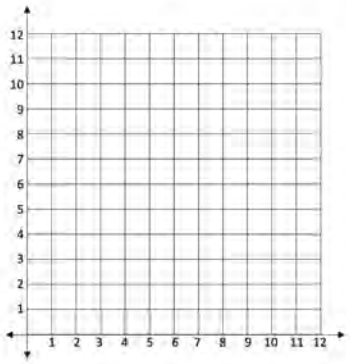
Now it's time for you to plot coordinates that make lines.

Name: _____ G5 U6 Lesson 2 - Independent Work

Remember: We find our coordinates on the horizontal axis (x) first then the vertical axis (y).

1. Plot the points on the table. Then add more points to continue the pattern.

x	y
1	4
1	6
1	8



What pattern do you see on the table?

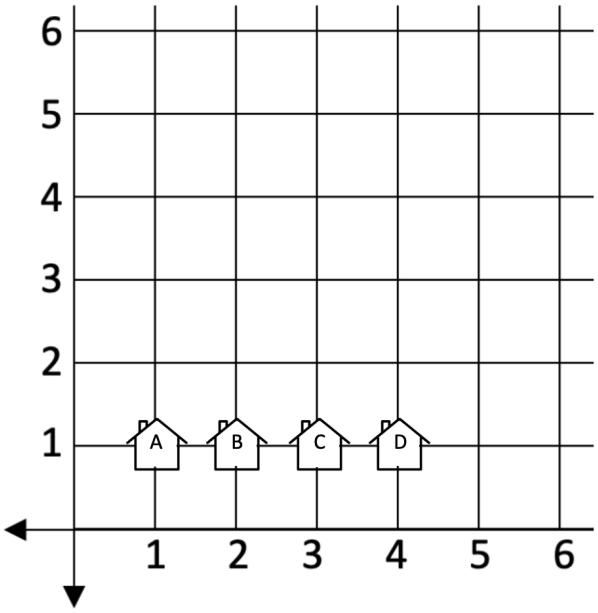
What shape did the pattern make on the graph?

2. Plot the points on the table. Then add more points to continue the pattern.

x	y
3	9

Name: _____ G5 U6 Lesson 2 - Let's Try It

Pretend that the grid below is a map of a city. There is a row of houses on the map. Write their coordinates.



A (____, ____)

B (____, ____)

C (____, ____)

D (____, ____)

E (____, ____)

x	y

Label the x axis and y axis on the coordinate plane. Then fill in the table.

Imagine there is another house called House E that follows the same pattern. Then fill in its coordinates and fill in the table.

What pattern do you notice in the coordinates?

_____

_____

_____

_____

Make up your own set of coordinates that would form a horizontal line.

F (____, ____)

G (____, ____)

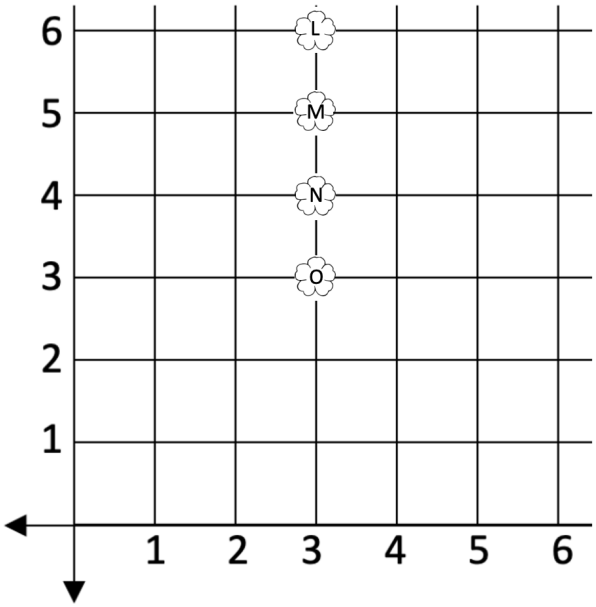
H (____, ____)

I (____, ____)

J (____, ____)

Pretend that the grid below is a map of a garden. There is a row of flowers on the map. Write their coordinates.

x	y



L (____, ____)

M (____, ____)

N (____, ____)

O (____, ____)

P (____, ____)

Label the x axis and y axis on the coordinate plane. Then fill in the table.

Imagine there is another flower called Flower P that follows the same pattern. Then fill in its coordinates and fill in the table.

What pattern do you notice in the coordinates?

_____

_____

_____

_____

Make up your own set of coordinates that would form a vertical line.

Q (____, ____)

R (____, ____)

S (____, ____)

T (____, ____)

U (____, ____)

Name: _____ G5 U6 Lesson 2 - Independent Work

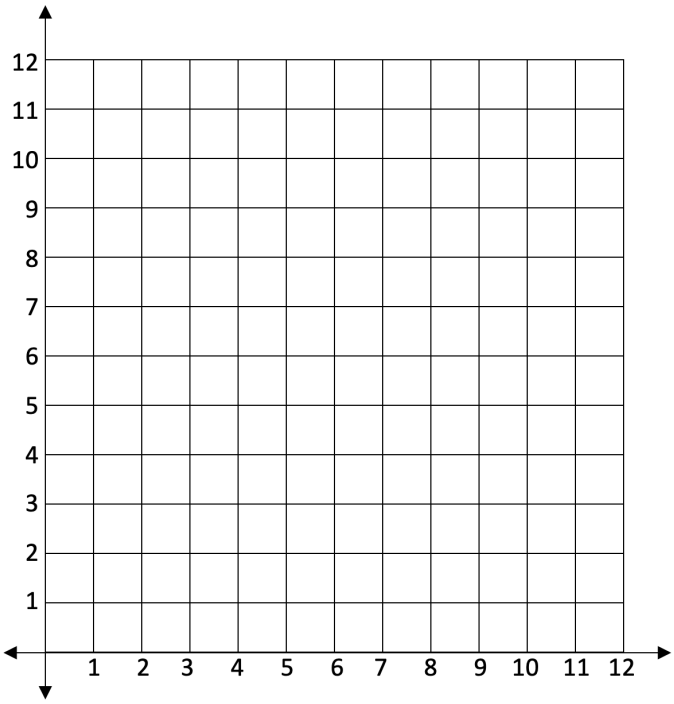
Remember: We find our coordinates on the horizontal axis (x) first then the vertical axis (y).

1. Plot the points on the table. Then add more points to continue the pattern.

x	y
1	4
1	6
1	8

What pattern do you se

What shape did the pattern make on the graph?

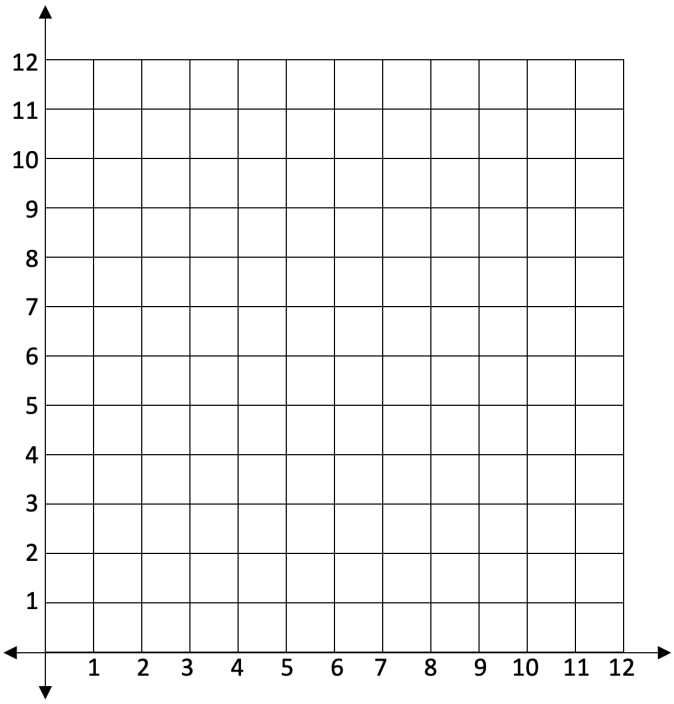


2. Plot the points on the table. Then add more points to continue the pattern.

x	y
3	9
4	9
5	9

What pattern do you s

What shape did the pattern make on the graph?



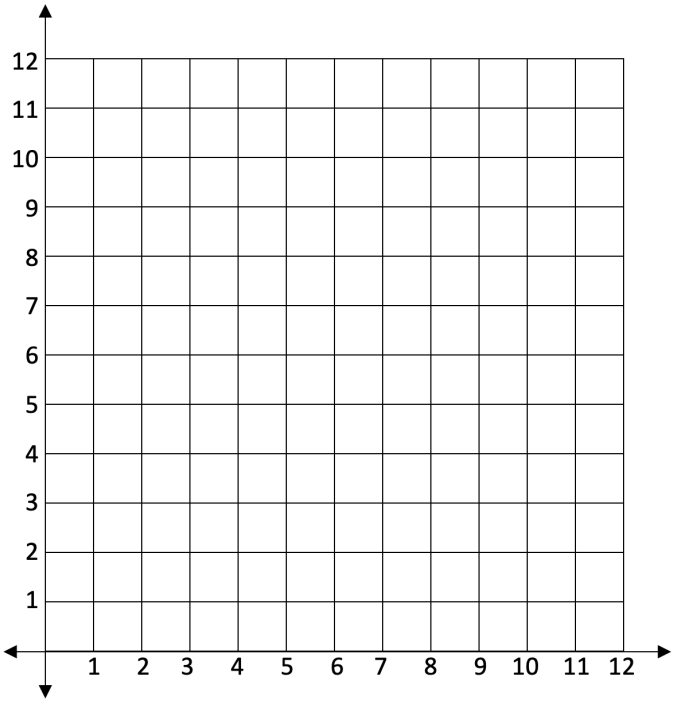
Remember: We find our coordinates on the horizontal axis first then the vertical axis.

3. Plot the points on the table. Then add more points to continue the pattern.

x	y
4	1
4	3
4	5

What pattern do you s

What shape did the pattern make on the graph?

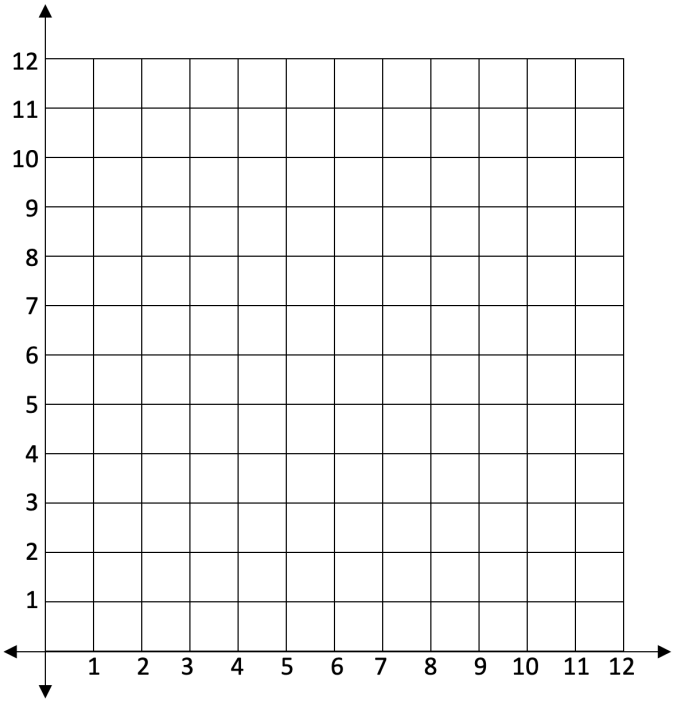


4. Plot the points on the table. Then add more points to continue the pattern.

x	y
4	6
5	6
6	6

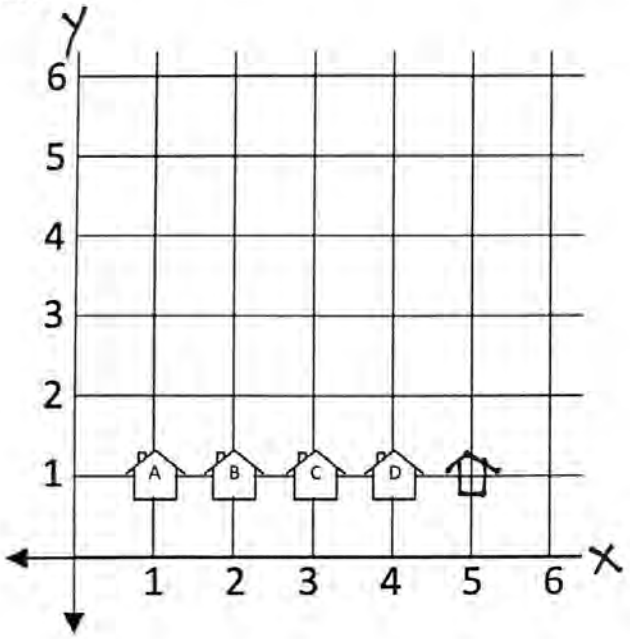
What pattern do you s

What shape did the pattern make on the graph?



Name: ANSWER KEY

Pretend that the grid below is a map of a city. There is a row of houses on the map. Write their coordinates.



A(1 , 1)
B(2 , 1)
C(3 , 1)
D(4 , 1)
E(5 , 1)

x	y
1	1
2	1
3	1
4	1
5	1

Label the x axis and y axis on the coordinate plane. Then fill in the table.

Imagine there is another house called House E that follows the same pattern. Then fill in its coordinates and fill in the table.

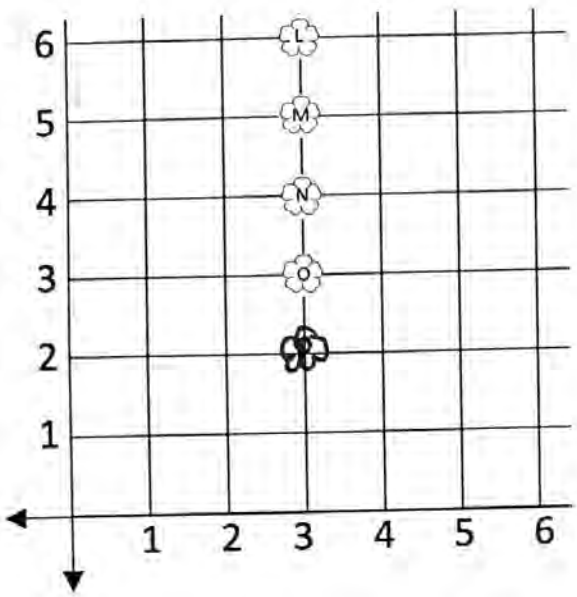
What pattern do you notice in the coordinates?

The x is going up by 1.
The y is staying 1. We can write y=1.

Make up your own set of coordinates that would form a horizontal line.

F(1 , 4) ← There are lots of different correct answers. The y just needs to stay the same number for y.
G(2 , 4)
H(3 , 4)
I(4 , 4)
J(5 , 4)

Pretend that the grid below is a map of a garden. There is a row of flowers on the map. Write their coordinates.



L(3 , 6)

M(3 , 5)

N(3 , 4)

O(3 , 3)

P(3 , 2)

x	y
3	6
3	5
3	4
3	3
3	2

Label the x axis and y axis on the coordinate plane. Then fill in the table.

Imagine there is another flower called Flower P that follows the same pattern. Then fill in its coordinates and fill in the table.

What pattern do you notice in the coordinates?

The x stays at 3. We can write x = 3.

The y is going down by 1.

Make up your own set of coordinates that would form a vertical line.

Q(1 , 5)

R(1 , 4)

S(1 , 3)

T(1 , 2)

U(1 , 1)

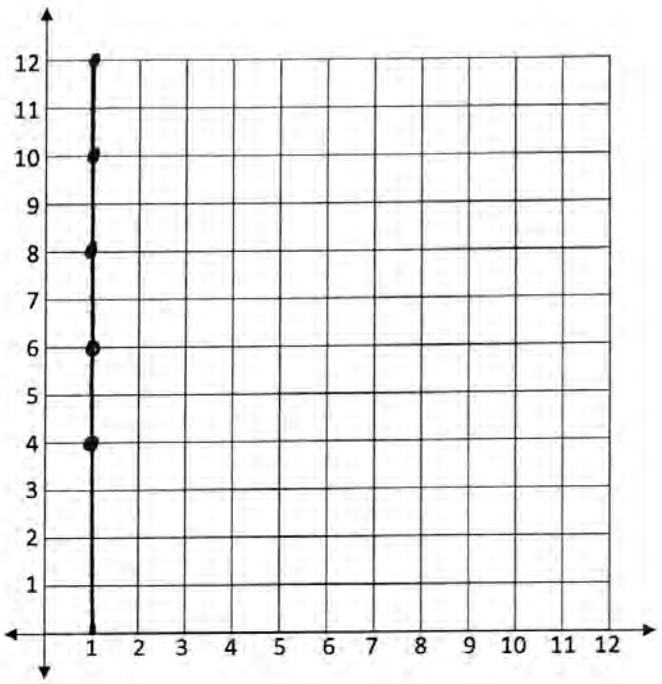
← There are lots of different correct answers The x just needs to stay the same number.

Name: ANSWER KEY

Remember: We find our coordinates on the horizontal axis (x) first then the vertical axis (y).

1. Plot the points on the table. Then add more points to continue the pattern.

x	y
1	4
1	6
1	8
1	10
1	12



What pattern do you see on the table?

The x is staying 1.

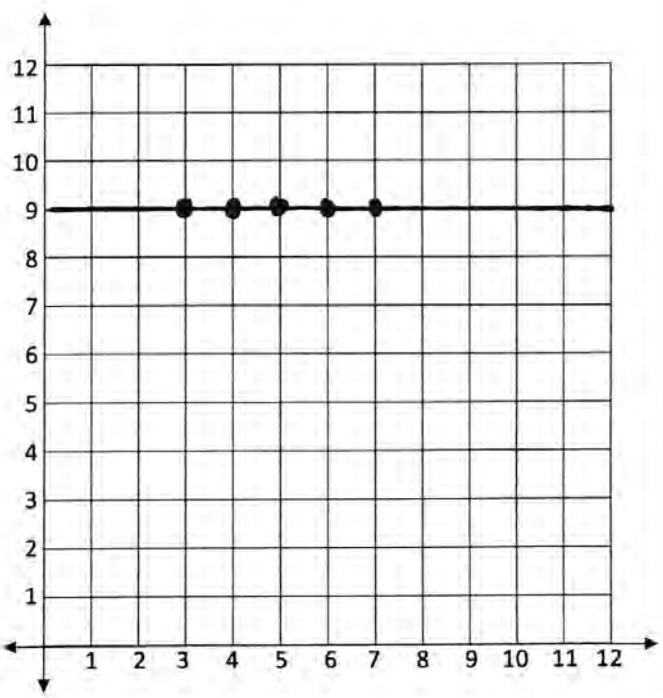
The y is going up by 2.

What shape did the pattern make on the graph?

a straight vertical line.

2. Plot the points on the table. Then add more points to continue the pattern.

x	y
3	9
4	9
5	9
6	9
7	9



What pattern do you see on the table?

The x is going up by 1.

The y is staying 9.

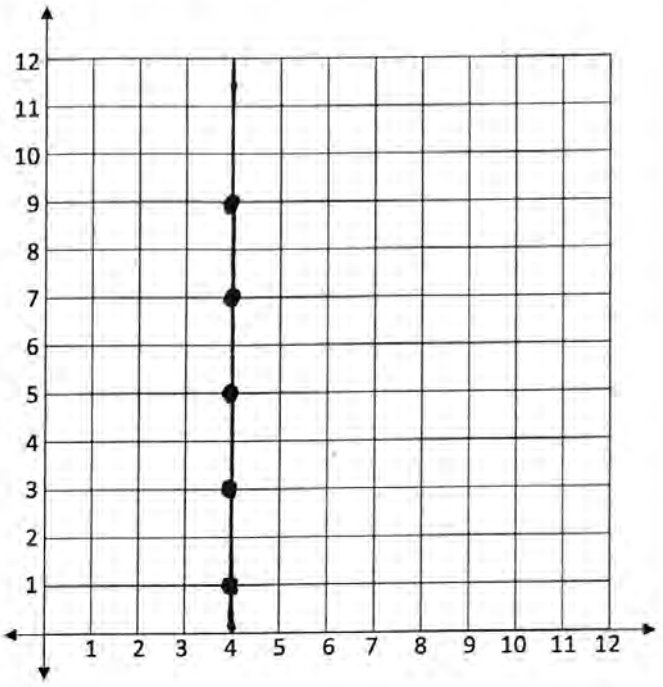
What shape did the pattern make on the graph?

a straight horizontal line

Remember: We find our coordinates on the horizontal axis first then the vertical axis.

3. Plot the points on the table. Then add more points to continue the pattern.

x	y
4	1
4	3
4	5
4	7
4	9



What pattern do you see on the table?

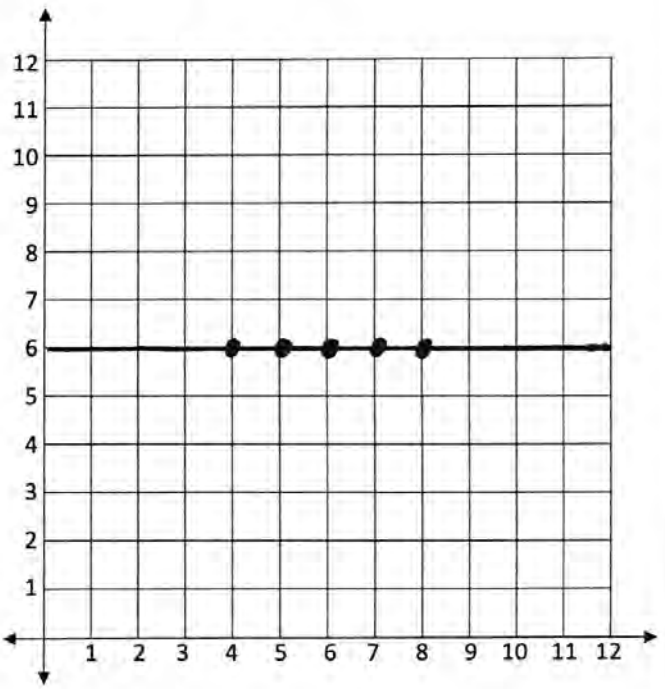
The x is staying 4.
The y is going up by 2.

What shape did the pattern make on the graph?

a straight vertical line

4. Plot the points on the table. Then add more points to continue the pattern.

x	y
4	6
5	6
6	6
7	6
8	6



What pattern do you see on the table?

The x is going up by 1.
The y is staying 6.

What shape did the pattern make on the graph?

a straight horizontal line

G5 U6 Lesson 3

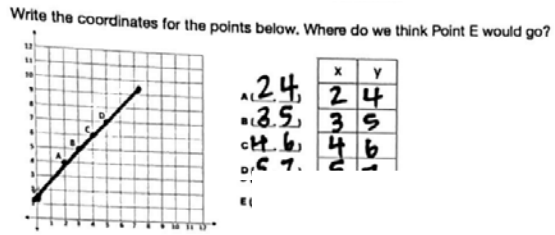
Plot and generate points that follow a rule

G1 U1 Lesson 3 - Today we will plot and generate points that follow a rule.

Warm Welcome (Slide 1): Tutor choice

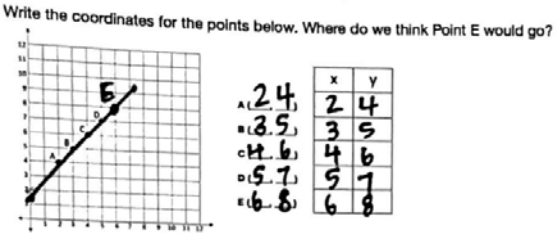
Frame the Learning/Connect to Prior Learning (Slide 2): Today we are going to learn how to describe rules that coordinate pairs sometimes follow. We're going to use equations to show the rules and we will see that equations, tables and graphs can all be used to show the same set of coordinate pairs.

Let's Review (Slide 3): Let's start with review.



We can see that these points make a diagonal line.

Now, I want you to tell me the coordinates for the points we can see. *Collect correct answers from the students and record the coordinates.* Remember that we can write this in a table as well.

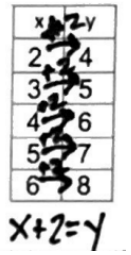


Based on this pattern, what do you think the coordinates of Point E would be? And how do you know? Possible Student Answers, Key Points:

- It's (6, 8) because that's 1 more in the x column and 1 more in the y column.
- It's (6, 8) because that's the next counting number for each side.
- It's (6, 8) because that's the next point that's up and over.
- It's (6, 8) because I can imagine where the dot is.

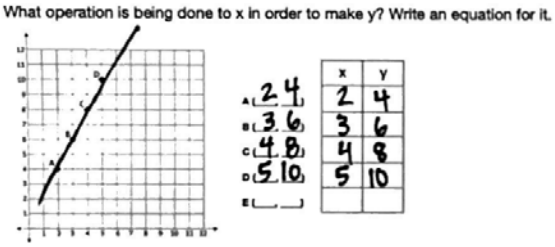
This is important. We kind of notice a pattern but it's not the same as the patterns we saw in the last lesson.

Let's Talk (Slide 4): When points make a straight line, we can write a rule for x and y using an equation. We will need to look for more patterns. You might have noticed that the x column is going up by 1 like "2, 3, 4, 5, 6." The y column is going up by 1 too. It is good to notice those patterns. But in order to write the rule or the equation, we have to notice the pattern going across the table. We need to know what is happening to x in order to make y.

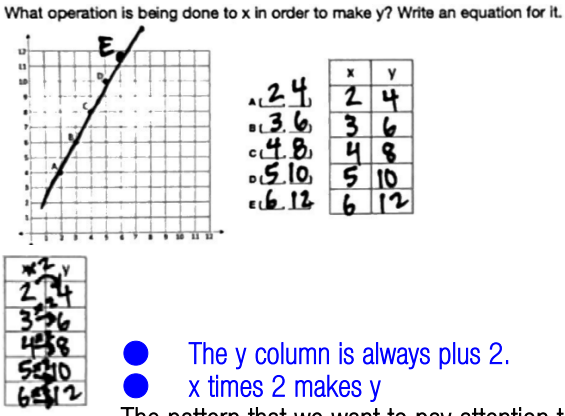


The same operation - plus, minus, multiply or divide - is happening to x. In other words, x plus something or x times something or x minus something or x divided by something makes y. We can see that it has to be plus or times because the numbers are going up. I know that 2 x 2 makes 4. But if I try 3 x 2 in the next row, I get 6 not 5. Let's try addition. I know that 2 + 2 = 4. Let's try it for the next row. 3 + 2 = 5. Then 4 + 2 = 6, 5 + 2 = 7, 6 + 2 = 8. The rule is "add 2." We can write it as x + 2 = y because every x coordinate plus 2 makes the corresponding y coordinate. This equation and this table and this line are all ways to represent the same set of coordinates.

Let's Talk (Slide 5): Let's try a rule with a different operation! We can do it because we have another diagonal line.



We start by finding the coordinates of the points. What are they? *Collect correct answers from the students and record the coordinates.* Remember that we can write this in a table as well.



Based on this pattern, what do you think the coordinates of Point E would be? And how do you know? Possible Student Answers, Key Points:

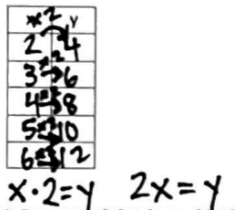
- It's (6, 12) because that's 1 more in the x column and 2 more in the y column.
- It's (6, 12) because you can count by ones for x and count by twos for y.
- It's (6, 12) because that's the next point that's up 2 and over 1.
- It's (6, 12) because I can imagine where the dot is.
- It's (6, 12) because it is always x times 2.

This is great. We can see so many patterns and one of those patterns will be our rule. What patterns do we see? Possible Student Answers, Key Points:

- The x column is always plus 1.

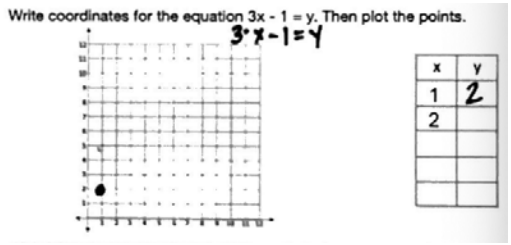
- The y column is always plus 2.
- x times 2 makes y

The pattern that we want to pay attention to is turning x into y. At first I thought it might be plus 2 like on our last slide because 2 + 2 = 4. But then I have to try it for the rest of the rows and 3 + 2 doesn't make 6. So then I try multiplication. 2 x 2 = 4. But then I have to try it for the rest of the rows and 3 x 2 = 6, 4 x 2 = 6, 5 x 2 = 10 and 6 x 2 = 12.



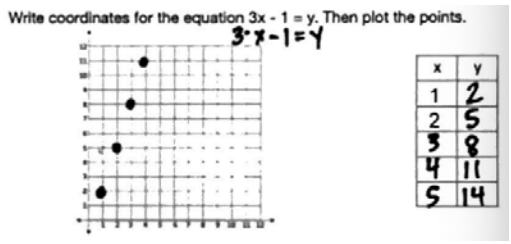
Our equation is x times 2 equals y. Since we have an x, it isn't a great idea to use x for times in our equation. You can show multiplication just by putting the number next to the letter. We write 2x = y. That is just a secret way of writing 2 times x equals y.

Let's Think (Slide 6): Sometimes we are told the rule and we just have to follow it. If we are given an equation, we can plug in numbers to get coordinates.



This equation is 3x - 1 = y. That means 3 times x minus 1 to get y.

Let's start with 1. 3 times 1 is 6 minus 1 is 5. So y is 5. I can plot it the same way I always do like (1, 5)



Let's keep going. You can help me. What is the math for the next row? What should I plot? *Let the kids talk you through the rest of the answers.*

Let's Try it (Slides 7): Now it's time to plot more points together using equations to tell us the rules. I will help you practice before you do it on your own.

WARM WELCOME

Today we will plot and generate points that follow a rule.

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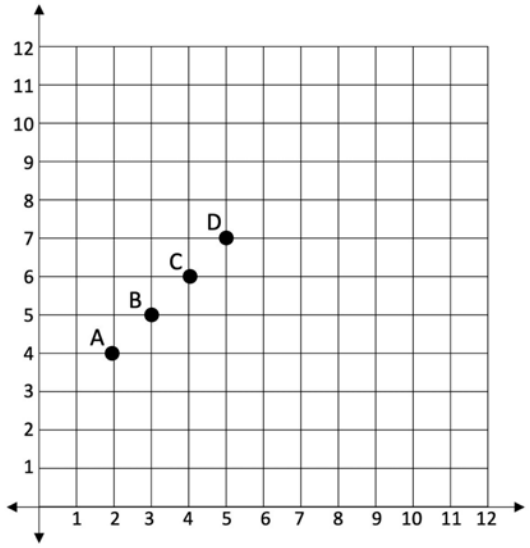
Let's Review:

How do we find locations on the coordinate plane?

Write the coordinates for the points below. Where do we think Point E would go?



A (___, ___)

B (___, ___)

C (___, ___)

D (___, ___)

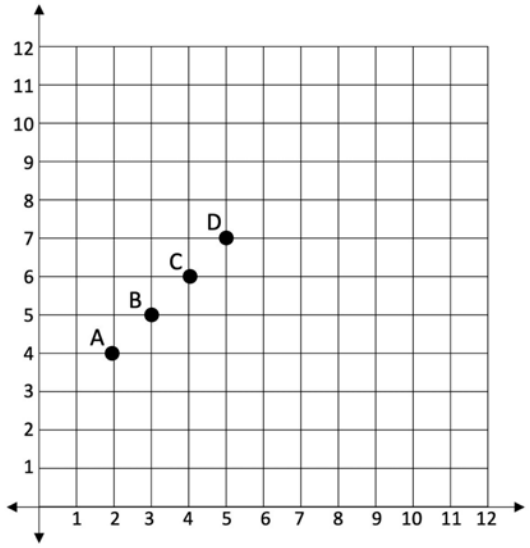
E (___, ___)

x	y

Let's Talk:

When points make a straight line, we can write a rule for x and y using an equation.

What operation is being done to x in order to make y? Write an equation for it.



A (2, 4)

B (3, 5)

C (4, 6)

D (5, 7)

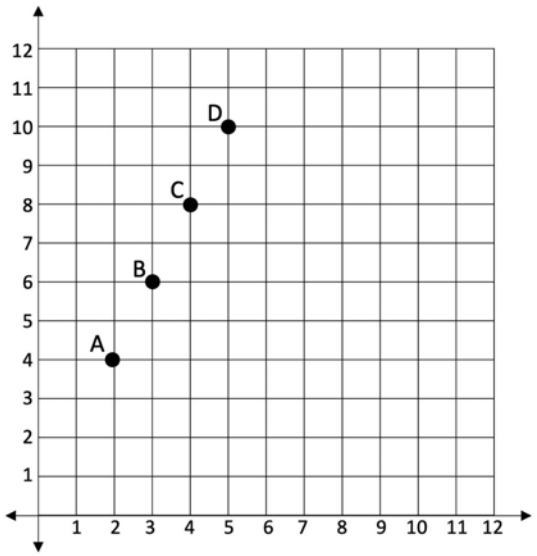
E (6, 8)

x	y
2	4
3	5
4	6
5	7
6	8

Let's Talk:

Let's try a rule with a different operation!

What operation is being done to x in order to make y? Write an equation for it.



A (____, ____)

B (____, ____)

C (____, ____)

D (____, ____)

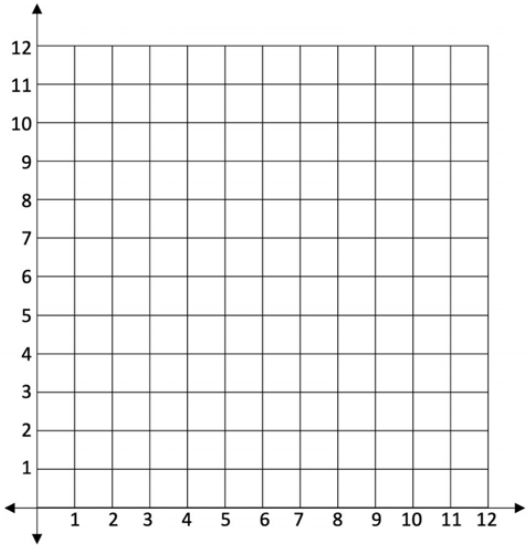
E (____, ____)

x	y

Let's Think:

If we are given an equation, we can plug in numbers to get coordinates.

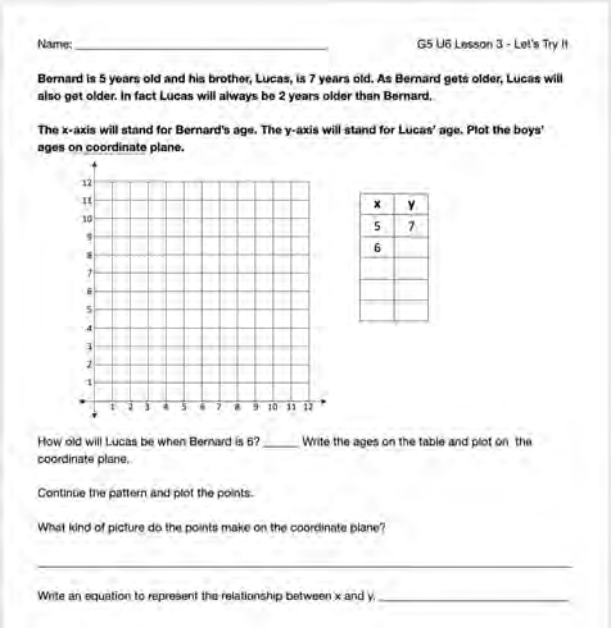
Write coordinates for the equation 3x - 1 = y. Then plot the points.



x	y
1	
2	

Let's Try It:

Let's practice plotting points for rules written as equations.



Name: _____ G5 U6 Lesson 3 - Let's Try It

Bernard is 5 years old and his brother, Lucas, is 7 years old. As Bernard gets older, Lucas will also get older. In fact Lucas will always be 2 years older than Bernard.

The x-axis will stand for Bernard's age. The y-axis will stand for Lucas' age. Plot the boys' ages on coordinate plane.

x	y
5	7
6	

How old will Lucas be when Bernard is 6? _____ Write the ages on the table and plot on the coordinate plane.

Continue the pattern and plot the points.

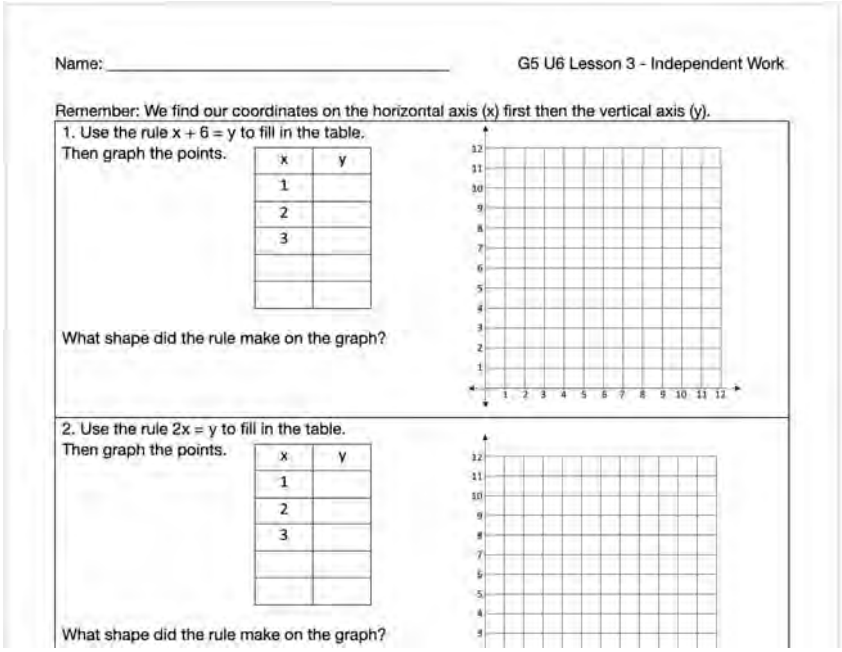
What kind of picture do the points make on the coordinate plane?

_____

Write an equation to represent the relationship between x and y. _____

On your Own:

Now it's time for you to plot coordinates that follow rules written as equations.



Name: _____ G5 U6 Lesson 3 - Independent Work

Remember: We find our coordinates on the horizontal axis (x) first then the vertical axis (y).

1. Use the rule x + 6 = y to fill in the table. Then graph the points.

x	y
1	
2	
3	

What shape did the rule make on the graph?

2. Use the rule 2x = y to fill in the table. Then graph the points.

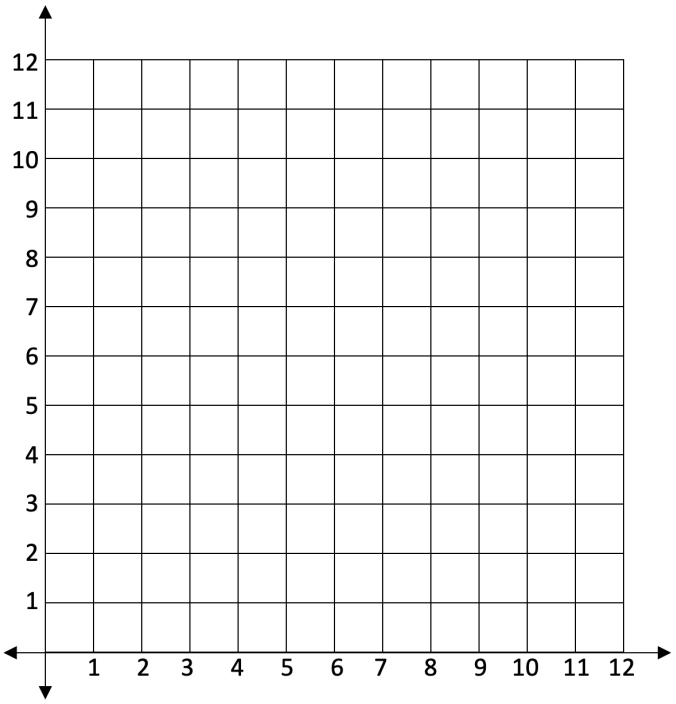
x	y
1	
2	
3	

What shape did the rule make on the graph?

Name: _____ G5 U6 Lesson 3 - Let's Try It

Bernard is 5 years old and his brother, Lucas, is 7 years old. As Bernard gets older, Lucas will also get older. In fact Lucas will always be 2 years older than Bernard.

The x-axis will stand for Bernard's age. The y-axis will stand for Lucas' age. Plot the boys' ages on coordinate plane.



x	y
5	7
6	

How old will Lucas be when Bernard is 6? _____ Write the ages on the table and plot on the coordinate plane.

Continue the pattern and plot the points.

What kind of picture do the points make on the coordinate plane?

_____

_____

Write an equation to represent the relationship between x and y. _____

Which of the coordinates below also fit your rule?

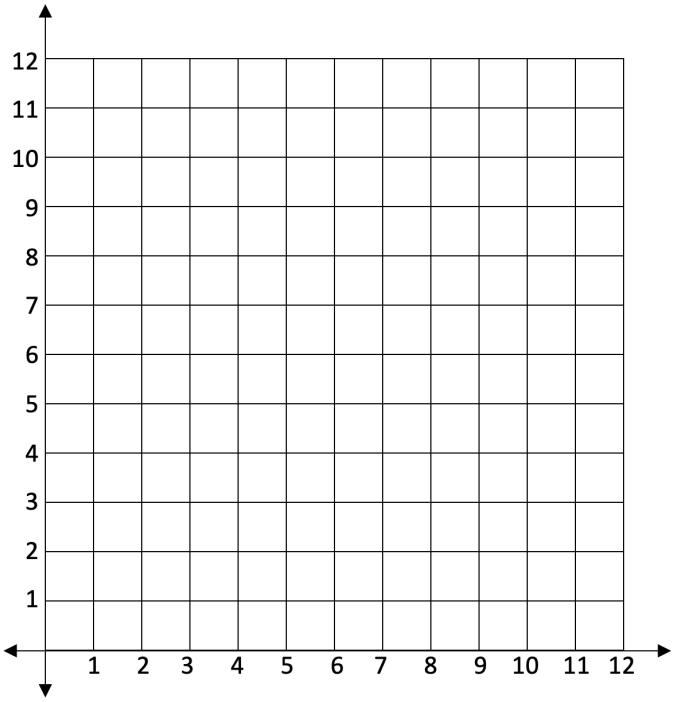
(a) (2, 3) (b) (3, 5) (c) (4, 2) (d) (0, 4)

How do you know?

_____

_____

Complete the table with coordinates that fit the equation: $2x + 1 = y$. Graph the coordinates.



x	y
1	
2	

What kind of picture do the points make on the coordinate plane?

_____

_____

Which of the coordinates below also fit your rule?

(b) (2, 4) (b) (7, 3) (c) (4, 9) (d) (0, 2)

How do you know?

_____

_____

_____

_____

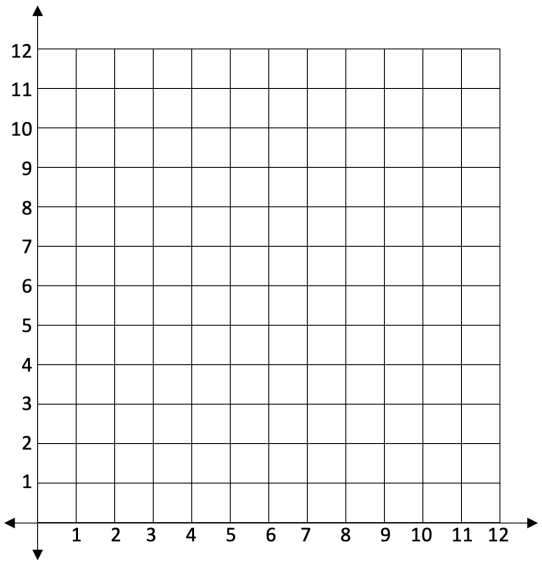
Name: _____ G5 U6 Lesson 3 - Independent Work

Remember: We find our coordinates on the horizontal axis (x) first then the vertical axis (y).

1. Use the rule x + 6 = y to fill in the table.
Then graph the points.

x	y
1	
2	
3	

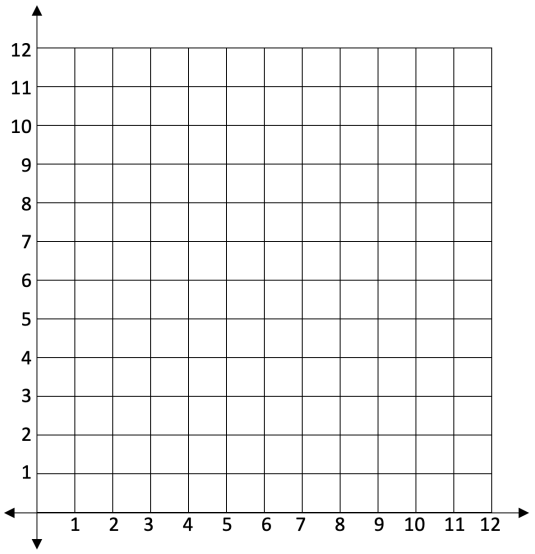
What shape did the rule make on the graph?



2. Use the rule 2x = y to fill in the table.
Then graph the points.

x	y
1	
2	
3	

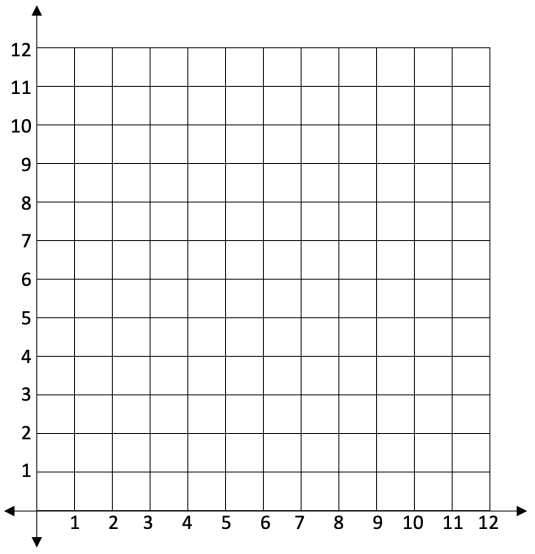
What shape did the rule make on the graph?



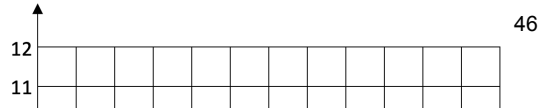
3. Use the rule 3x - 1 = y to fill in the table.
Then graph the points.

x	y
1	
2	
3	

What shape did the rule make on the graph?



Remember: We find our coordinates on the horizontal axis (x) first then the vertical axis (y).



4. Use the rule 3x = y to fill in the table.
Then graph the points.

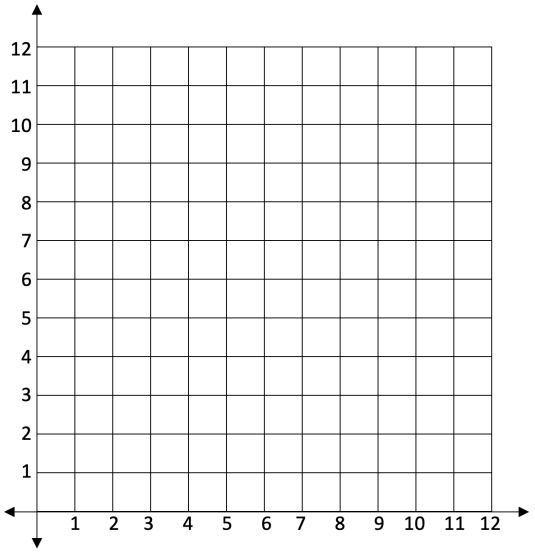
x	y
0	
1	
2	

What shape did the rule make on the graph?

5. Use the rule x - 2 = y to fill in the table.
Then graph the points.

x	y
3	
4	
5	

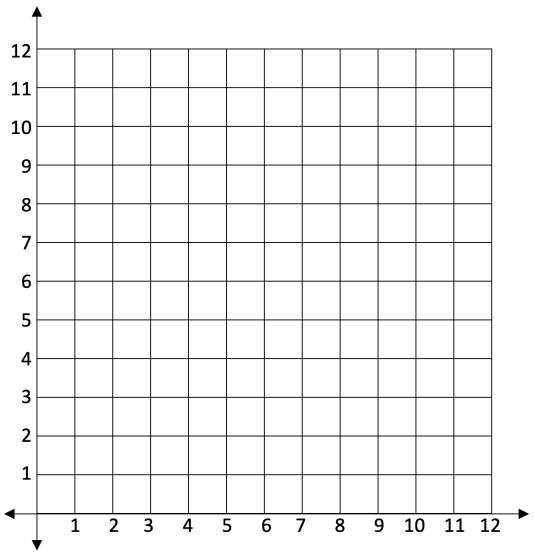
What shape did the rule make



6. Use the rule 2x + 1 = y to fill in the table.
Then graph the points.

x	y
1	
2	
3	

What shape did the rule make on the graph?

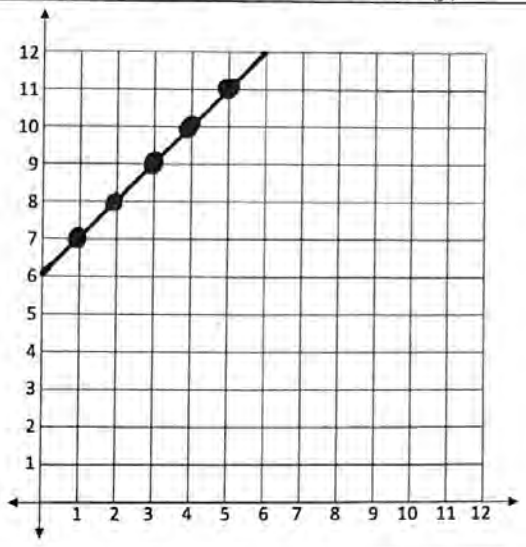


Name: ANSWER KEY

Remember: We find our coordinates on the horizontal axis (x) first then the vertical axis (y).

1. Use the rule x + 6 = y to fill in the table.
Then graph the points.

x	y
1	7
2	8
3	9
4	10
5	11

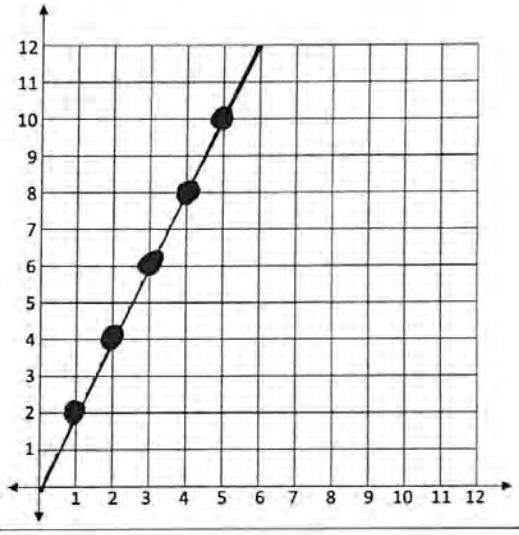


What shape did the rule make on the graph?

a straight line

2. Use the rule 2x = y to fill in the table.
Then graph the points.

x	y
1	2
2	4
3	6
4	8
5	10

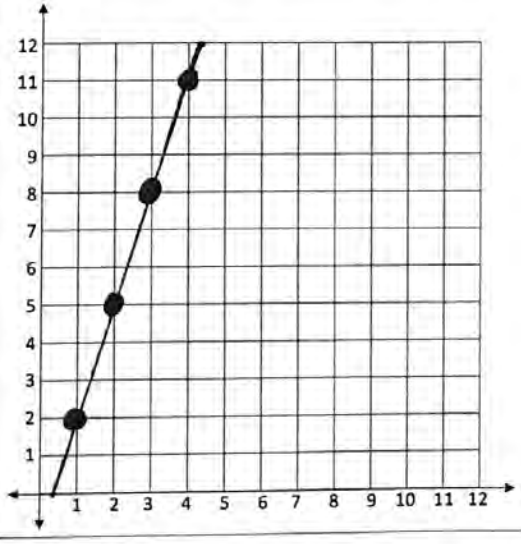


What shape did the rule make on the graph?

a straight line

3. Use the rule 3x - 1 = y to fill in the table.
Then graph the points.

x	y
1	2
2	5
3	8
4	11



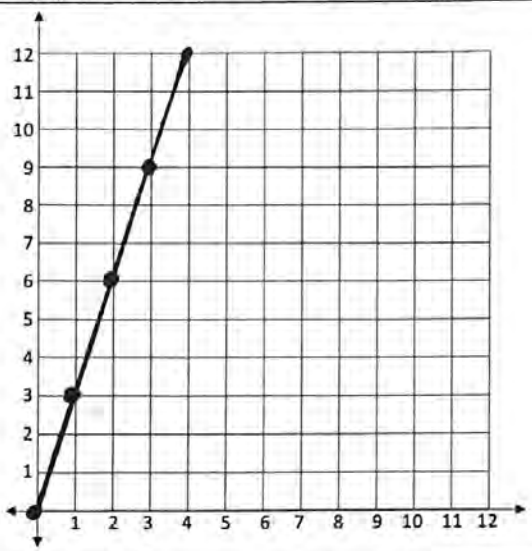
What shape did the rule make on the graph?

a straight line

Remember: We find our coordinates on the horizontal axis (x) first then the vertical axis (y).

4. Use the rule 3x = y to fill in the table.
Then graph the points.

x	y
0	0
1	3
2	6
4	12

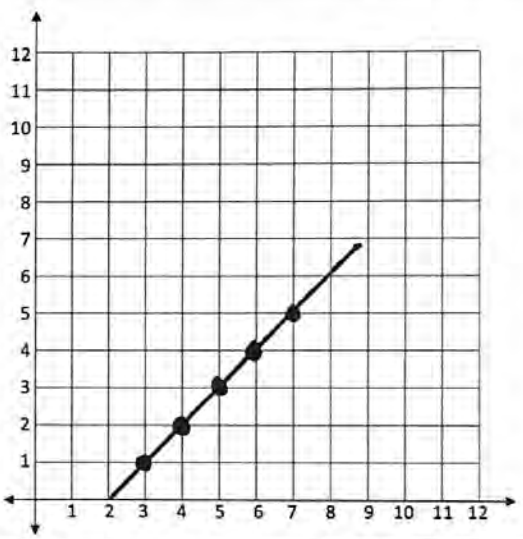


What shape did the rule make on the graph?

a straight line

5. Use the rule x - 2 = y to fill in the table.
Then graph the points.

x	y
3	1
4	2
5	3
6	4
7	5

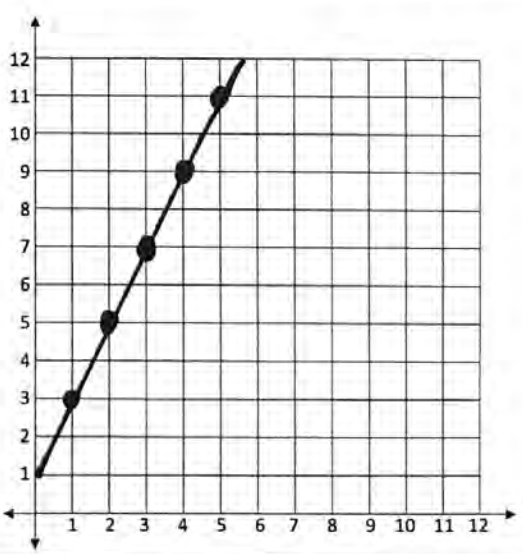


What shape did the rule make on the graph?

a straight line

6. Use the rule 2x + 1 = y to fill in the table.
Then graph the points.

x	y
1	3
2	5
3	7
4	9
5	11



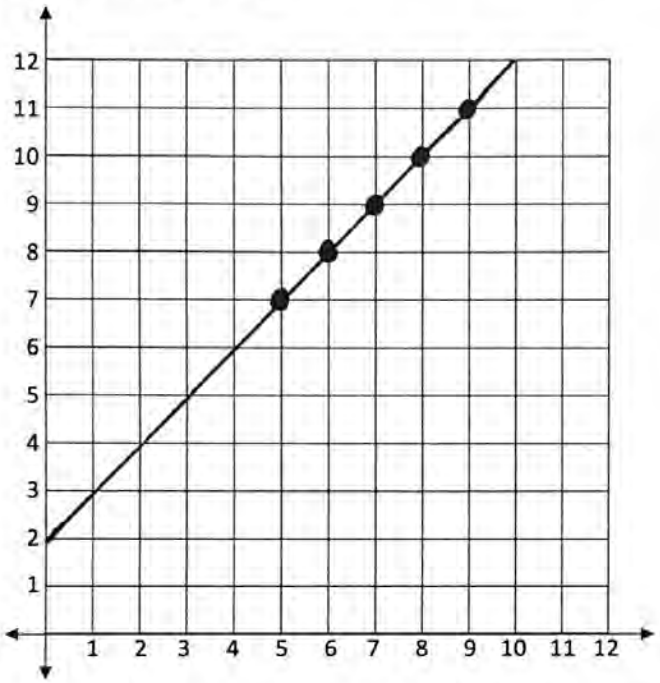
What shape did the rule make on the graph?

a straight line

Name: ANSWER KEY

Bernard is 5 years old and his brother, Lucas, is 7 years old. As Bernard gets older, Lucas will also get older. In fact Lucas will always be 2 years older than Bernard.

The x-axis will stand for Bernard's age. The y-axis will stand for Lucas' age. Plot the boys' ages on coordinate plane.



x	y
5	7
6	8
7	9
8	10
9	11

How old will Lucas be when Bernard is 6? 8 Write the ages on the table and plot on the coordinate plane.

Continue the pattern and plot the points.

What kind of picture do the points make on the coordinate plane?

They make a straight diagonal line.

Write an equation to represent the relationship between x and y. $x + 2 = y$

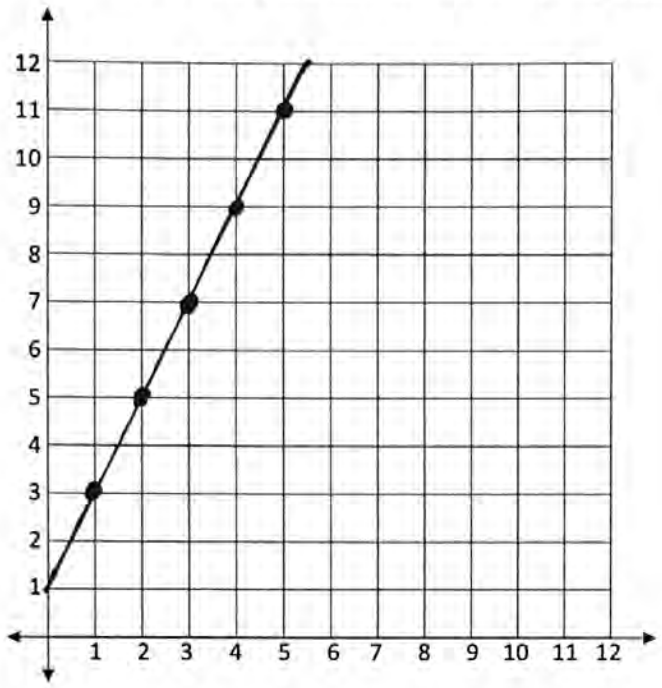
Which of the coordinates below also fit your rule?

(a) (2, 3) (b) (3, 5) (c) (4, 2) (d) (0, 4)

How do you know?

I know because x is 3 and y is 5 and $3 + 2 = 5$.

Complete the table with coordinates that fit the equation: 2x + 1 = y. Graph the coordinates.



x	y
1	3
2	5
3	7
4	9
5	11

What kind of picture do the points make on the coordinate plane?

They make a straight diagonal line.

Which of the coordinates below also fit your rule?

(b) (2, 4) (b) (7, 3) (c) (4, 9) (d) (0, 2)

How do you know?

I know because x is 4 and y is 9. 2 times 4 is 8 plus 1 is 9.

G5 U6 Lesson 4

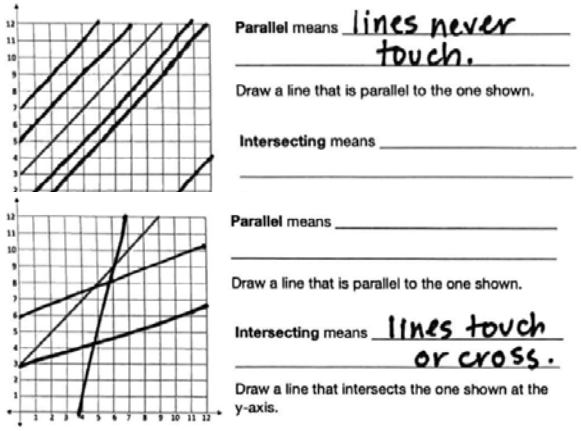
Compare the graphs of addition equations and multiplication equations

G1 U1 Lesson 4 - Today we will compare the graphs of addition equations and multiplication equations.

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Today we are going to compare the equations and graphs of different lines using everything that we've been working on.

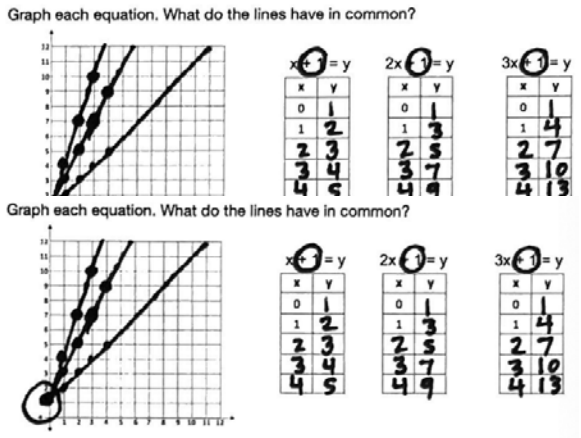
Let's Review (Slide 3): Before we can start, we need to review the meaning of two key words: parallel and intersecting.



Parallel means the lines never touch. They run side by side like train tracks. *Show parallel lines with your arms.* Parallel lines point the same direction and they increase the same way. Here are some examples of lines that are parallel to this one. *Draw a few examples then erase the board so you can go to the next vocabulary word.*

Intersecting means the lines touch. That means they might kind of look like they are going in the same direction but not exactly. *Show lines that are not parallel with your arms.* Intersecting lines eventually crash or cross. Here are some examples of lines that intersect this one. *Draw a few examples.*

Let's Talk (Slide 4): We have been noticing patterns in certain types of lines. Let's explore whether there are similarities between the lines when they all have the same addition in their equations.



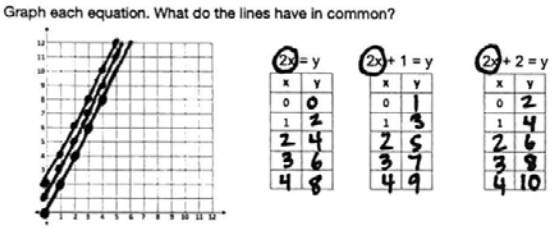
All of these equations have +1. *Circle the +1 in each equation.* Let's use each equation to complete the table and graph the points. Who can do the first point with x as zero? *Collect answers from the class. Record them in the table and graph them. As the kids talk, the teacher should write. So that this doesn't take too long, do not have kids come up to the board one at a time.*

We know how to do all of that and we are great at it! Now, we know that the equations all have a +1. That is what is the same about the equations. What is the same about the graphs of the lines? What do the lines have in common? Possible Student Answers, Key Points:

- They all touch at the beginning.
- They intersect at the y-axis.

The fancy word for this is the y-intercept. You don't need to know this yet but it doesn't hurt to hear it. The main point is when the equations have the same addition then they intersect the same point right here. *Point to the intersection and circle it.*

Let's Talk (Slide 5): Let's explore a different similarity. Let's explore whether there are similarities between the lines when they all have the same multiplication in their equations.



All of these equations have 2x. *Circle the 2x in each equation.* Let's use each equation to complete the table and graph the points. Who can do the first point with x as zero? *Collect answers from the class. Record them in the table and graph them. As the kids talk, the teacher should write. So that this doesn't take too long, do not have kids come up to the board one at a time.*

We know how to do all of that and we are great at it! Now, we know that the equations all have 2x. That is what is the same about the equations. What is the same about the graphs of the lines? What do the lines have in common? Possible Student Answers, Key Points:

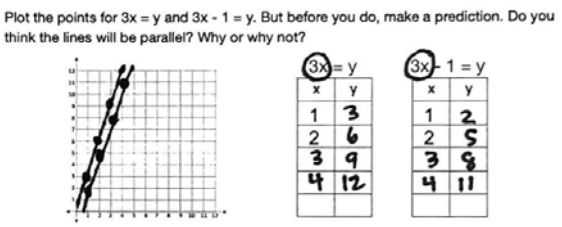
- They go the same direction.
- They are side by side.

- They are parallel.

They are parallel! This is the big idea of the lesson - when the equations have the same multiplication times x then they will be parallel. In fancy math talk, we say they have the same slope. You don't need to know that word yet but it helps to start hearing it.

Let's Think (Slide 6): Now that you know that special thing about multiplying times x, you can predict if lines will be parallel or not. Because when lines have the same multiplication times x, they will be parallel. Let's make a prediction about these two lines. *Read the directions on the slide.* What do you think? Possible Student Answers, Key Points:

- Yes because they have the same 3x.
- They will be parallel because they have the same number multiplied times x.



We see 3x in each equation. *Circle the 3x in each equation.* Since that is the same we expect the lines to be parallel. Let's use each equation to complete the table and graph the points. Who can do the first point with x as zero? *Collect answers from the class. Record them in the table and graph them. As the kids talk, the teacher should write. So that this doesn't take too long, do not have kids come up to the board one at a time.* Look! We were right! The lines are parallel!

Let's Try it (Slides 7): Now it's time to plot equations together, and we will do the same predicting about whether they will be parallel. I will guide you step by step.

WARM WELCOME

Today we will compare the graphs of addition equations and multiplication equations.

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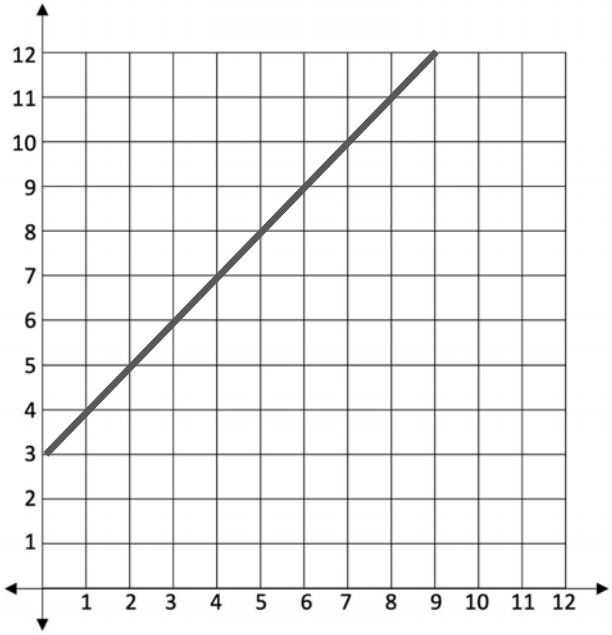
Let's Review:

Let's review the meaning of parallel and intersecting.



Parallel means _____

_____

Draw a line that is parallel to the one shown.

Intersecting means _____

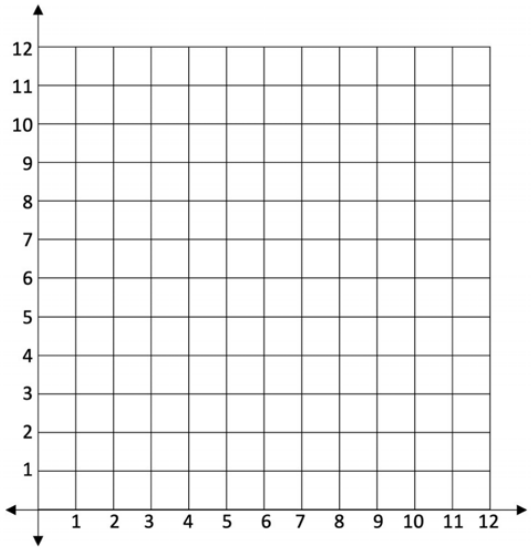
_____

Draw a line that intersects the one shown at the y-axis.

Let's Talk:

Let's look at graphs that have the same addition in their equations.

Graph each equation. What do the lines have in common?



x + 1 = y

x	y
0	
1	

2x + 1 = y

x	y
0	
1	

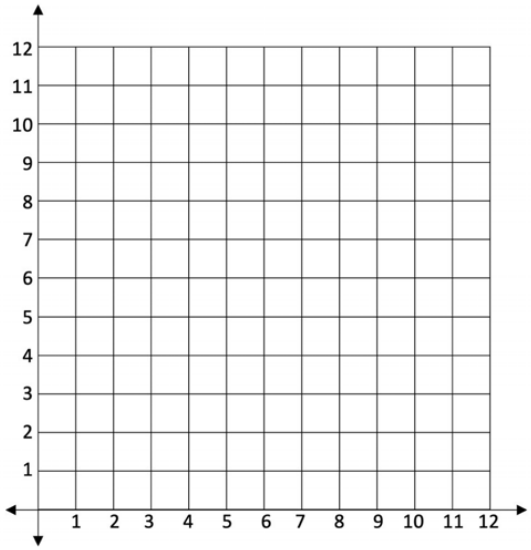
3x + 1 = y

x	y
0	
1	

Let's Talk:

Let's look at graphs that have the same multiplication in their equations.

Graph each equation. What do the lines have in common?



2x = y

x	y
0	
1	

2x + 1 = y

x	y
0	
1	

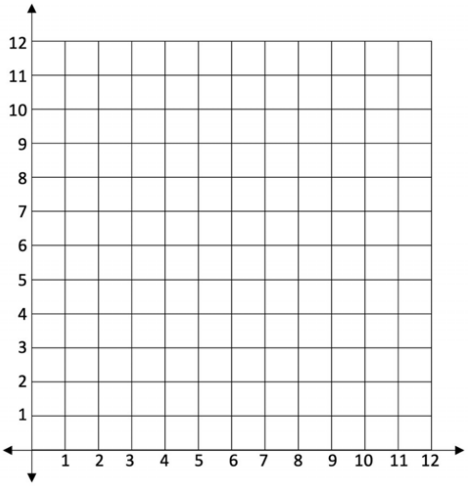
2x + 2 = y

x	y
0	
1	

Let's Think:

When lines have the same multiplication times x, they will be parallel.

Plot the points for 3x = y and 3x - 1 = y. But before you do, make a prediction. Do you think these lines will be parallel? Why or why not?



3x = y

x	y
1	
2	

3x - 1 = y

x	y
1	
2	

Let's Try It:

Let's practice plotting two equations and we will notice patterns in their graphs.

Name: _____ G5 U6 Lesson 4 - Let's Try It

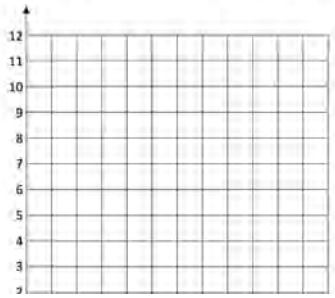
Jennifer had $1 then she got a job that paid $2 per hour. If x is the number of hours she works then y is the number of dollars she will have.

The equation to show the relationship for Jennifer is 2x + 1 = y.

Elijah had $2 then he got a job that paid $2 per hour. If x is the number of hours he works then y is the number of dollars he will have.

The equation to show the relationship for Elijah is 2x + 2 = y.

Fill in the table for each equation and graph the coordinates.



Jennifer

x	y
0	
1	

Elijah

x	y
0	
1	

On your Own:

Now it's time for you to plot two equations and you can make a prediction about them!

Name: _____ G5 U6 Lesson 4 - Independent Work

Follow the directions. Then fill in each table using the equations and graph the points.

1. What similarities do you see in the equations?

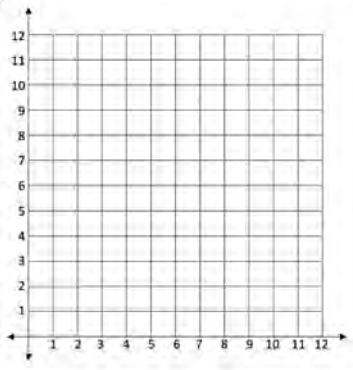
Do you expect the lines to be parallel?

$2x = y$

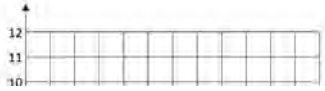
x	y
1	
2	
3	

$2x + 2 = y$

x	y
1	
2	
3	



2. What similarities do you see in the equations?



Name: _____ G5 U6 Lesson 4 - Let's Try It

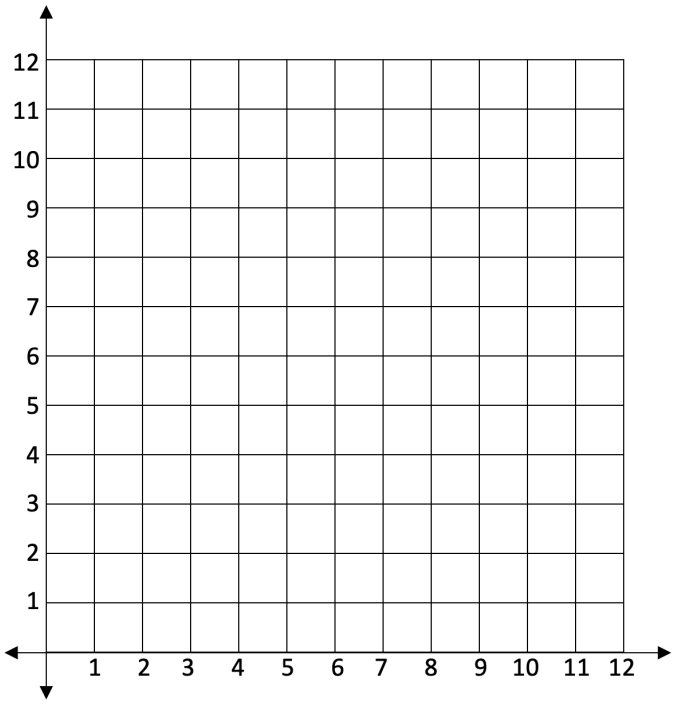
Jennifer had $1 then she got a job that paid $2 per hour. If x is the number of hours she works then y is the number of dollars she will have.

The equation to show the relationship for Jennifer is 2x + 1 = y.

Elijah had $2 then he got a job that paid $2 per hour. If x is the number of hours he works then y is the number of dollars he will have.

The equation to show the relationship for Elijah is 2x + 2 = y.

Fill in the table for each equation and graph the coordinates.



Jennifer

x	y
0	
1	

Elijah

x	y
0	
1	

How much money will Jennifer have after working 4 hours? _____

How much money will Elijah have after working 4 hours? _____

What do you notice about the lines you made? _____

_____

_____

In the equations, what part is the same? _____

Whenever equations have the same _____, they will _____.

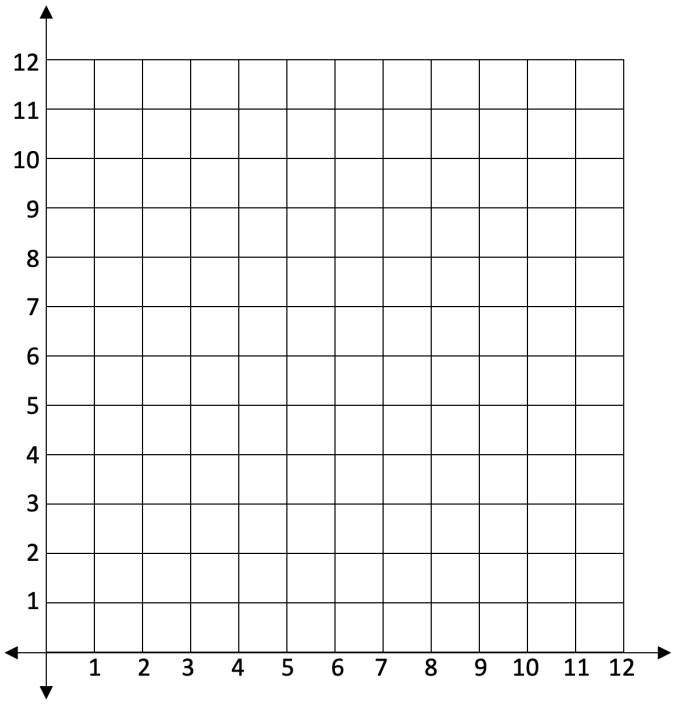
Miles had $3 then he got a job that paid $1 per hour. If x is the number of hours he works then y is the number of dollars he will have.

The equation to show the relationship for Miles is 1x + 3 = y.

Nathaniel had $3 then he got a job that paid $2 per hour. If x is the number of hours he works then y is the number of dollars he will have.

The equation to show the relationship for Nathaniel is $2x + 3 = y$.

Fill in the table for each equation and graph the coordinates.



Miles

x	y
0	
1	

Nathaniel

x	y
0	
1	

How much money will Miles have after working 4 hours? _____

How much money will Nathaniel have after working 4 hours? _____

What do you notice about the lines you made? _____

_____

In the equations, what part is the same? _____

Whenever equations have the same _____, they will _____.

Name: _____ G5 U6 Lesson 4 - Independent Work

Follow the directions. Then fill in each table using the equations and graph the points.

1. What similarities do you see in the equations?

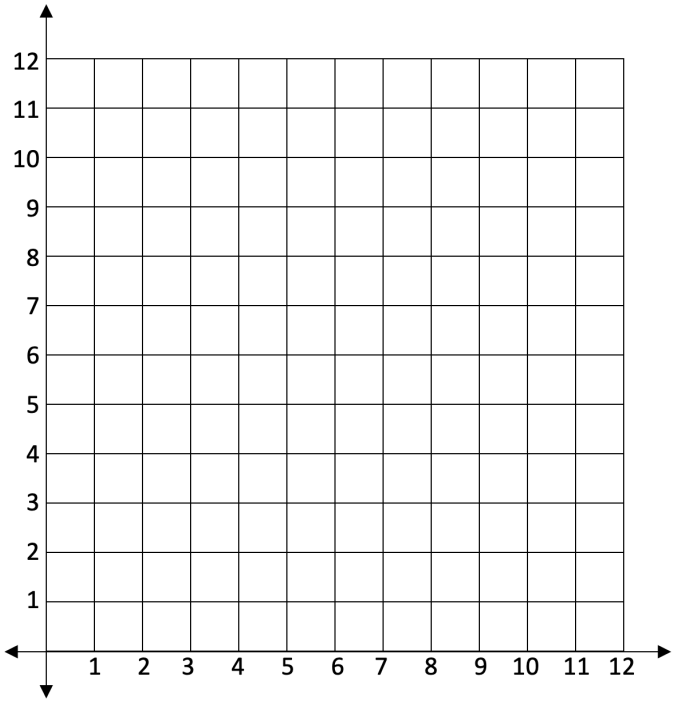
Do you expect the lines to be parallel?

$2x = y$

x	y
1	
2	
3	

$2x + 2 = y$

x	y
1	
2	
3	



2. What similarities do you see in the equations?

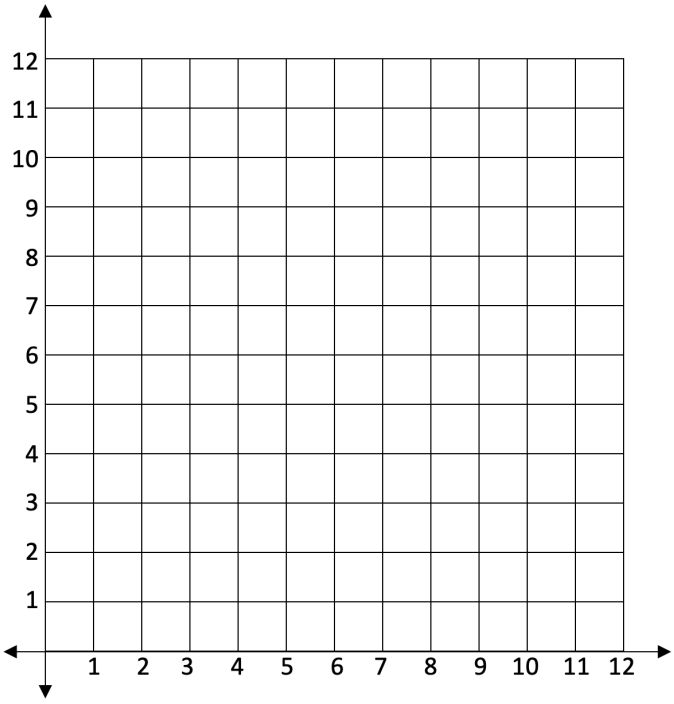
Do you expect the lines to be parallel?

$x + 1 = y$

x	y
1	
2	
3	

$2x + 1 = y$

x	y
1	
2	
3	



3. What similarities do you see in the equations?

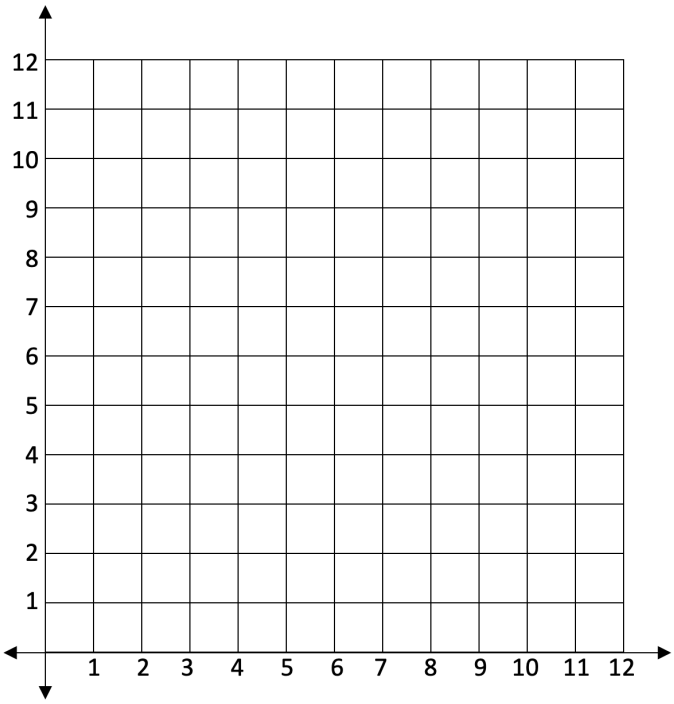
Do you expect the lines to be parallel?

$2x = y$

x	y
0	
1	
2	

$3x = y$

x	y
0	
1	
2	



4. What similarities do you see in the equations?

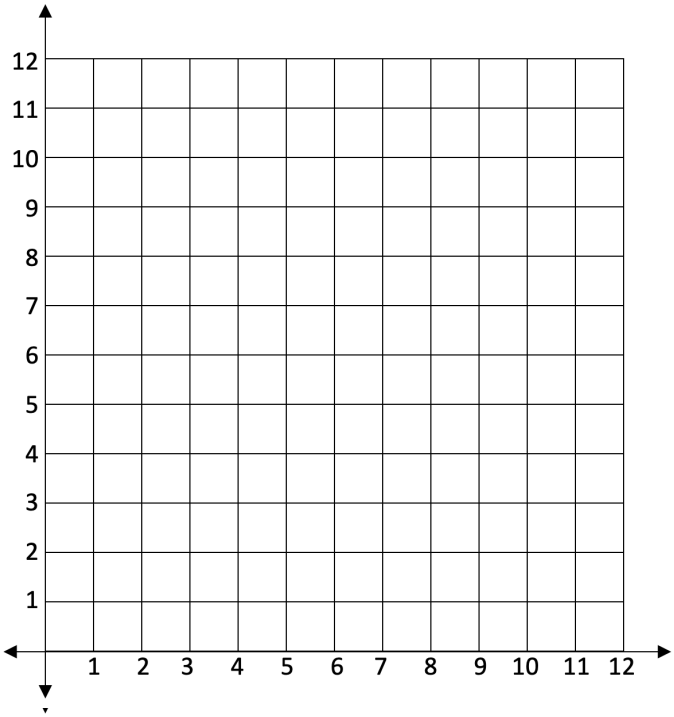
Do you expect the lines to be parallel?

$x = y$

x	y
1	
2	
3	

$x + 1 = y$

x	y
1	
2	
3	



What do equations have to have in common in order to be parallel when graphed?

_____

_____

_____

_____

Name: ANSWER KEY

G5 U6 Lesson 4 - Independent Work

Follow the directions. Then fill in each table using the equations and graph the points.

1. What similarities do you see in the equations?

They both have 2x.

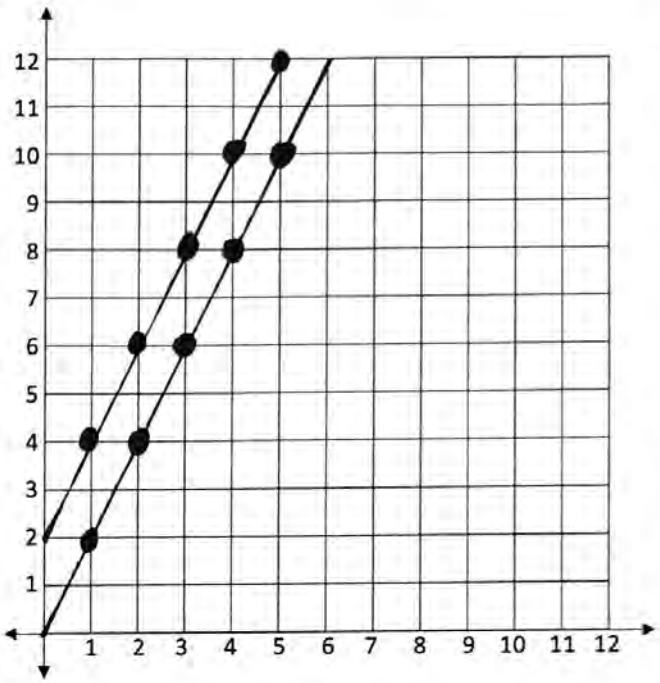
Do you expect the lines to be parallel? yes

$2x = y$

x	y
1	2
2	4
3	6
4	8
5	10

$2x + 2 = y$

x	y
1	4
2	6
3	8
4	10
5	12



2. What similarities do you see in the equations?

They both have +1

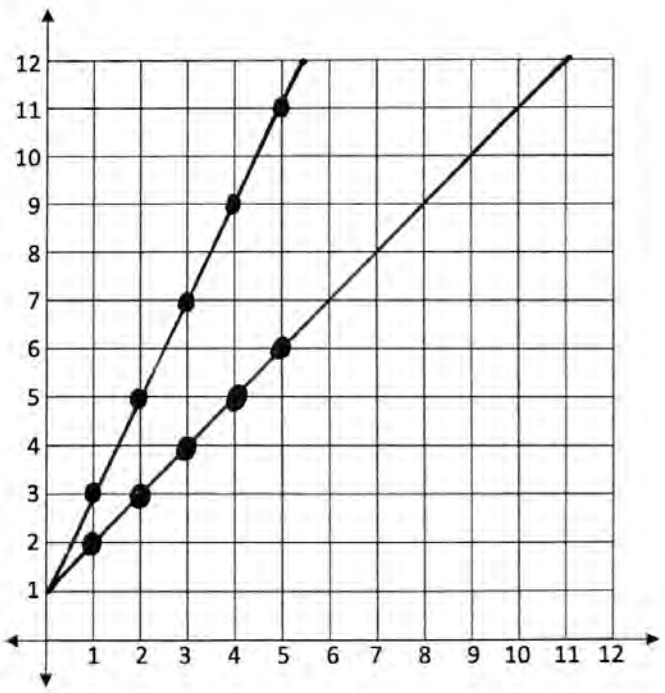
Do you expect the lines to be parallel? no

$x + 1 = y$

x	y
1	2
2	3
3	4
4	5
5	6

$2x + 1 = y$

x	y
1	3
2	5
3	7
4	9
5	11



3. What similarities do you see in the equations?

They don't have any + or −.

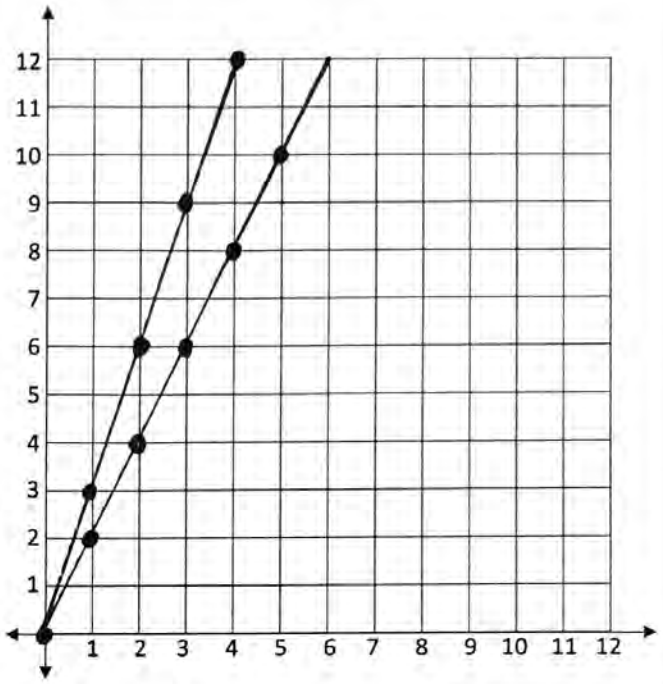
Do you expect the lines to be parallel? no

2x = y

x	y
0	0
1	2
2	4
3	6
4	8

3x = y

x	y
0	0
1	3
2	6
3	9
4	12



4. What similarities do you see in the equations?

They both have x alone.

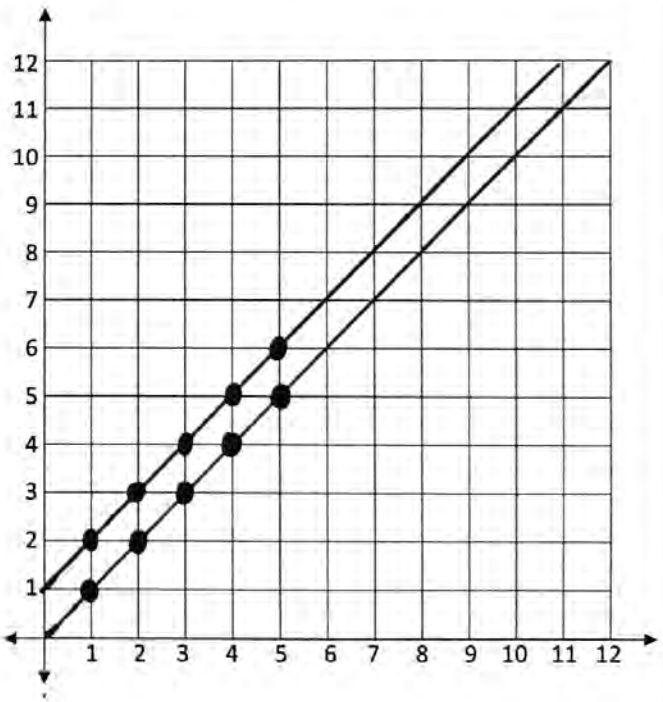
Do you expect the lines to be parallel? yes

x = y

x	y
1	1
2	2
3	3
4	4
5	5

x + 1 = y

x	y
1	2
2	3
3	4
4	5
5	6



What do equations have to have in common in order to be parallel when graphed?

They have to have the same number multiplied times x.

Name: ANSWER KEY

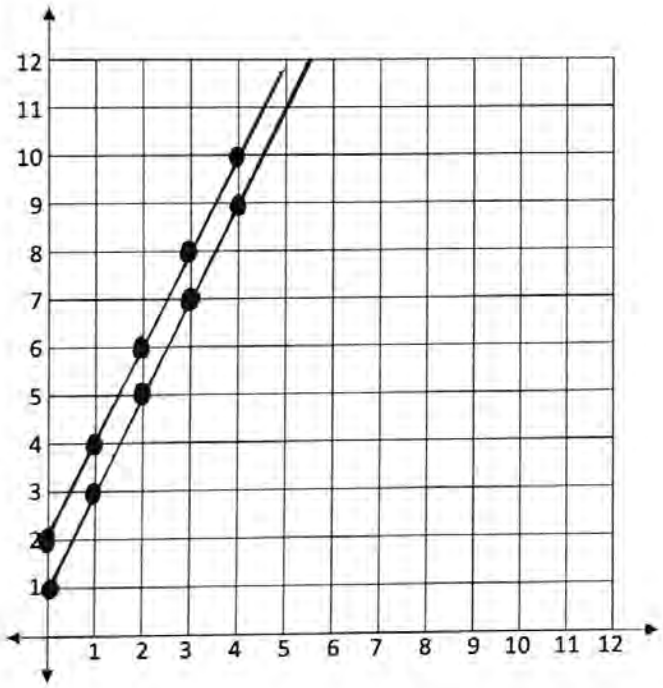
Jennifer had $1 then she got a job that paid $2 per hour. If x is the number of hours she works then y is the number of dollars she will have.

The equation to show the relationship for Jennifer is 2x + 1 = y.

Elijah had $2 then he got a job that paid $2 per hour. If x is the number of hours he works then y is the number of dollars he will have.

The equation to show the relationship for Elijah is 2x + 2 = y.

Fill in the table for each equation and graph the coordinates.



Jennifer

x	y
0	1
1	3
2	5
3	7
4	9

Elijah

x	y
0	2
1	4
2	6
3	8
4	10

How much money will Jennifer earn for working 4 hours? 9

How much money will Elijah earn for working 4 hours? 10

What do you notice about the lines you made? They are parallel. They don't intersect.

In the equations, what part is the same? They both have 2x

Whenever equations have the same multiplier, **they will** be parallel.

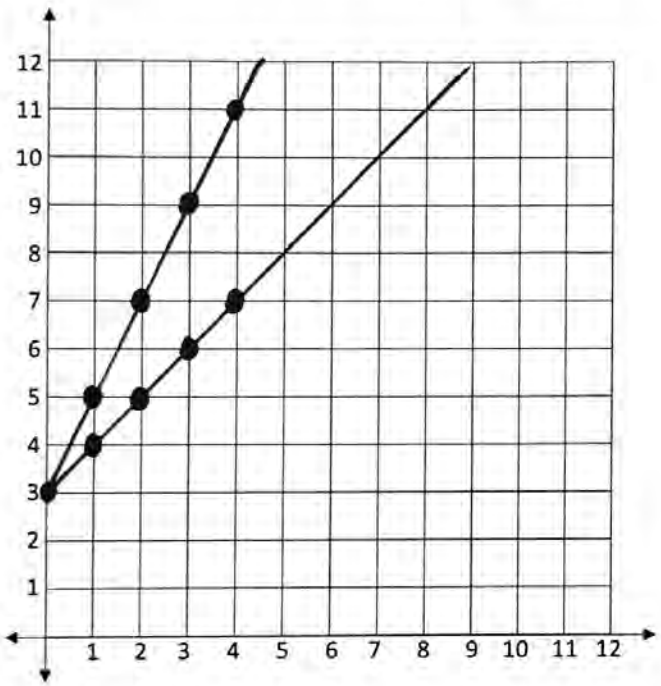
Miles had $3 then he got a job that paid $1 per hour. If x is the number of hours he works then y is the number of dollars he will have.

The equation to show the relationship for Miles is 1x + 3 = y.

Nathaniel had $3 then he got a job that paid $2 per hour. If x is the number of hours he works then y is the number of dollars he will have.

The equation to show the relationship for Nathaniel is 2x + 3 = y.

Fill in the table for each equation and graph the coordinates.



Miles

x	y
0	3
1	4
2	5
3	6
4	7

Nathaniel

x	y
0	3
1	5
2	7
3	9
4	11

How much money will Miles earn for working 4 hours? 7

How much money will Nathaniel earn for working 4 hours? 11

What do you notice about the lines you made? They are not parallel. They intersect.

In the equations, what part is the same? Both equations have +3.

Whenever equations have the same addend **, they will** intersect **.**

G5 U6 Lesson 5

Write equations for parallel lines

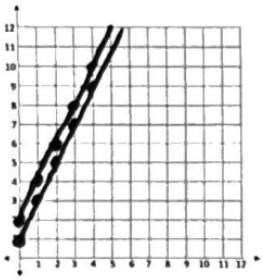
G1 U1 Lesson 5 - Today we will write equations for parallel lines.

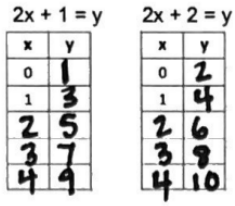
Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): This is the last day of the graphing equations on the coordinate plane. You guys are getting really good at this and we are not really doing anything new. We are just applying what we've already learned to come up with some of our own equations. Let's go!

Let's Review (Slide 3): We discussed this question in our last lesson so now you can tell me. What similarity will the equations of parallel lines have? Possible Student Answers, Key Points:

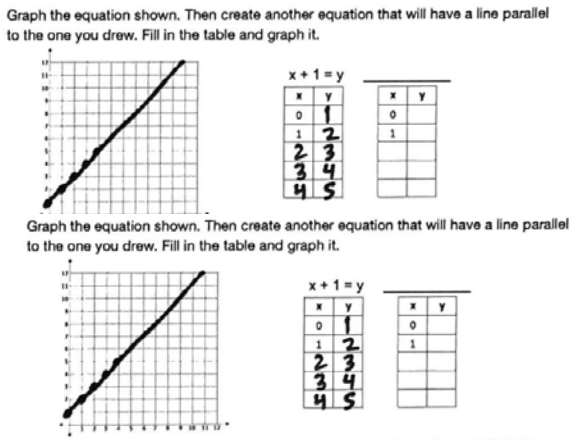
- When the equations have the same number at the beginning they will be parallel lines.
- Equations with the same number multiplying x will make parallel lines.





So we expect these two lines to be parallel. Let's check. Who can find the first point and tell me how to graph it? What about the next point? *Collect answers from the class. Record them in the table and graph them. As the kids talk, the teacher should write. So that this doesn't take too long, do not have kids come up to the board one at a time.* And look! The lines are parallel just like we predicted.

Let's Talk (Slide 4): Now let's try to construct parallel lines on our own. *Read the directions on the slide.*

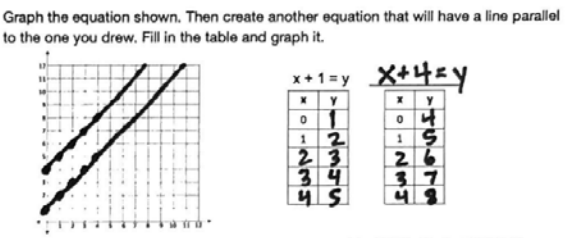


We'll do the equation we're given first. Who can find the first point and tell me how to graph it? What about the next point? *Collect answers from the class. Record them in the table and graph them. As the kids talk, the teacher should write. So that this doesn't take too long, do not have kids come up to the board one at a time.*

Now we need another equation and we need it to be parallel to the one we already drew. We know that parallel lines have equations with the same number multiplying the x. What number is multiplying the x in the equation we were given? *Survey the class. It is likely one of the kids will say that nothing is multiplying the x. That is incorrect and you will want to be very explicit about saying that it is not nothing.* It is easy to think that nothing is multiplying x because we don't see a number before the x. But in math, nothing means zero. So if it were really nothing, there would be a zero there. This is hard to see but it is actually 1. When x is all by itself, we are secretly saying there is 1x. *Write the 1 before the x in the equation.*

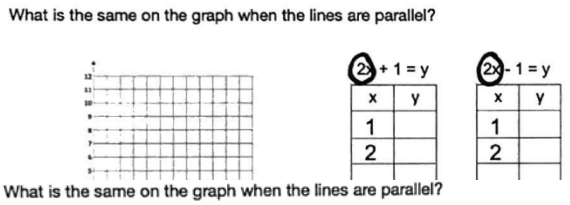
Back to finding another equation. We need it to be parallel to the one we already drew. We know that parallel lines have equations with the same number multiplying the x. And now we know this equation has 1x. Who can give me an equation that will be parallel to this one? Possible Student Answers, Key Points:

- x = y or 1x = y
- x + 2 = y or 1x + 2 = y
- x + 3 = y or 1x + 3 = y



There are many right answers. *Possible answers are x = y or 1x = y, x + 2 = y or 1x + 2 = y, etc.* As long as we have x on it's own which is secretly 1x, we'll have a parallel line. Let's do x + 4 = y. *Write the equation on the line.* Who can find the first point and tell me how to graph it? What about the next point? *Collect answers from the class. Record them in the table and graph them. As the kids talk, the teacher should write. So that this doesn't take too long, do not have kids come up to the board one at a time.* And look! The line is parallel! Hooray!

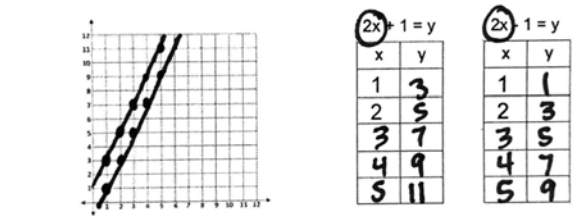
Let's Think (Slide 5): We know if the number multiplying x is the same, the lines will be parallel. Let's be really clear on what is the same on the graph when the lines are parallel.



Let's graph these and I'll show you what I mean. First of all, do you think they will be parallel? Why or why not? Possible Student Answers, Key Points:

- Yes, they both have 2x.
- They will be parallel because they have the same number multiplying x.

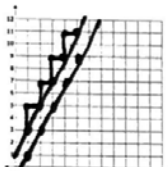
Circle the 2x on both equations.



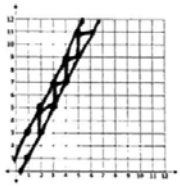
Let's graph these. Who can find the first point and tell me how to graph it? What about the next point? *Collect answers from the class. Record them in the table and graph them. As the kids talk, the teacher should write. So that this doesn't take too long, do not have kids come up to the board one at a time.*

Great job! We see they are parallel just like we predicted. Now we were asked what is the same on the graph when the lines are parallel. Why do you think these lines never touch? Possible Student Answers, Key Points:

- They are side by side and never touch.
- They go the same way.
- They follow the same path.
- They point in the same direction.



The reason that they go side by side and never touch is because they go in the exact same direction. They go up the same way. One way for us to see that is to think about each point going up like a staircase. Up and over and up and over. In this case, up 2 over 1, up 2 over 1. *Draw in the staircase for the first line.*



Erase it and then draw in the staircase for the next line. The up and over is the same for both lines. Up 2 over 1, up 2 over 1. The staircase is the same for both lines. We call that the slope. You don't need to draw the slope or find the slope yet. But it is a good way to make sure the lines are really parallel.

Let's Try it (Slides 7): Now we'll write equations for more parallel lines together. I will walk you through step by step.

WARM WELCOME

Today we will write equations for parallel lines.

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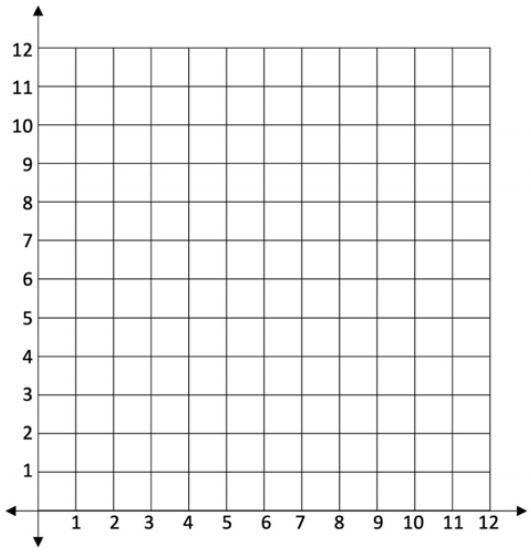
Let's Review:

What similarity will the equations of parallel lines have?



$2x + 1 = y$

x	y
0	
1	

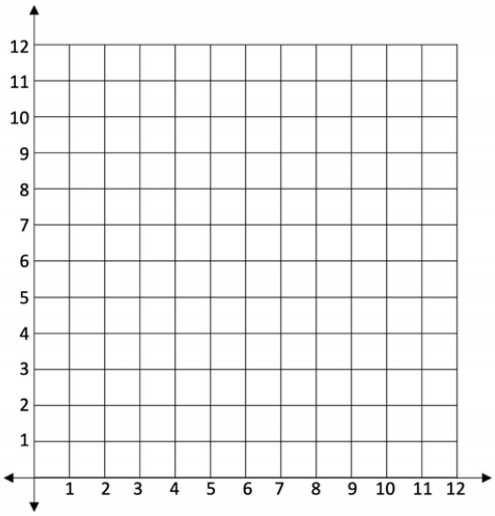
$2x + 2 = y$

x	y
0	
1	

Let's Talk:

Let's try to construct parallel lines of our own.

Graph the equation shown. Then create another equation that will have a line parallel to the one you drew. Fill in the table and graph it.



$x + 1 = y$

x	y
0	
1	

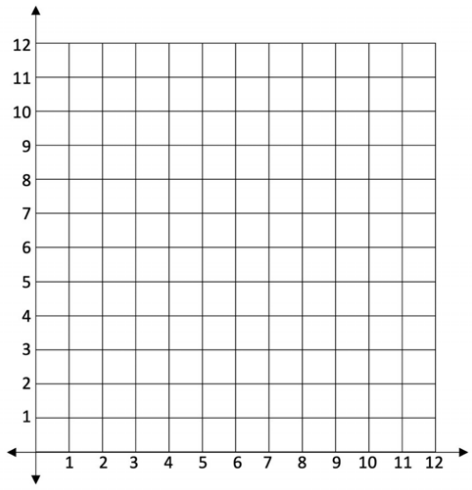
_____

x	y
0	
1	

Let's Think:

We know if the number multiplying x is the same, the lines will be parallel.

What is the same on the graph when the lines are parallel?



$2x + 2 = y$

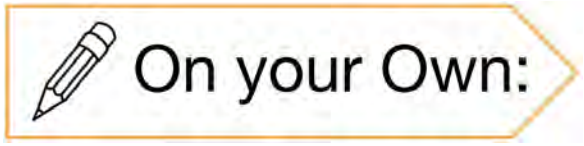
x	y
1	
2	

$2x - 2 = y$

x	y
1	
2	

Let's Try It:

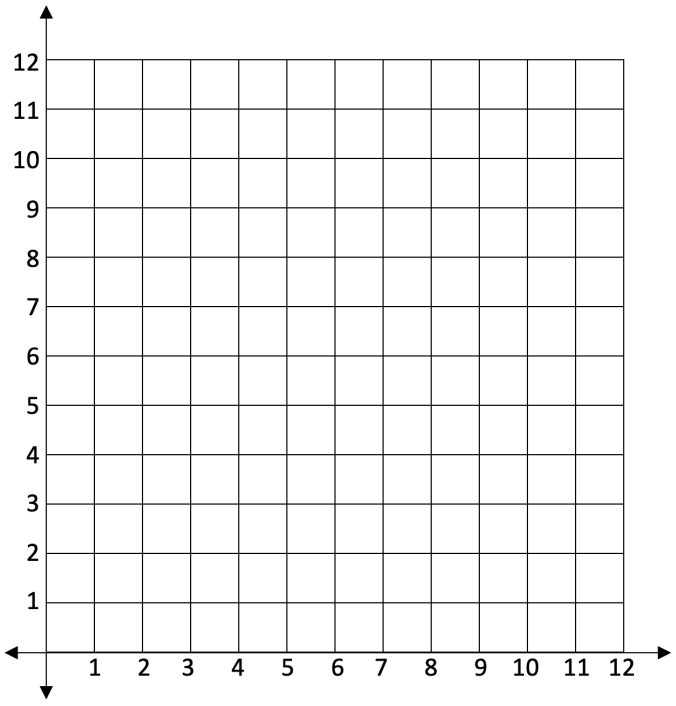
Let's practice plotting two equations and we will notice patterns in their graphs.



Now it's time for you to plot two equations and you can make a prediction about them!

Name: _____ G5 U6 Lesson 5 - Let's Try It

Graph the first equation.



$2x + 1 = y$ _____

x	y
0	
1	

x	y
0	
1	

Use the question below to write a second equation that will have a line that is parallel to the first one.

What does the second equation need to have to have a line parallel to the first equation? _____

Graph the second equation. Is it parallel to the first one? _____

Draw a staircase on each line and check that they are parallel. Each line goes up ___ and over ___.

Name: _____ G5 U6 Lesson 5 - Independent Work

Remember: Equations with the same multiplication will be parallel.

1. Use the rule x + 1 = y to fill in the first table.

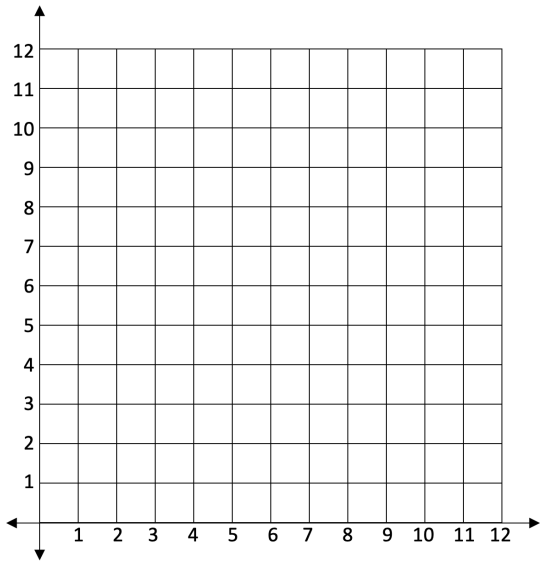
x	y
0	
1	

x	y
0	
1	

Create another equation tha
the one you drew.

_____

Use it to fill in the second table and graph it.



2. Use the rule 2x = y to fill in the first table.

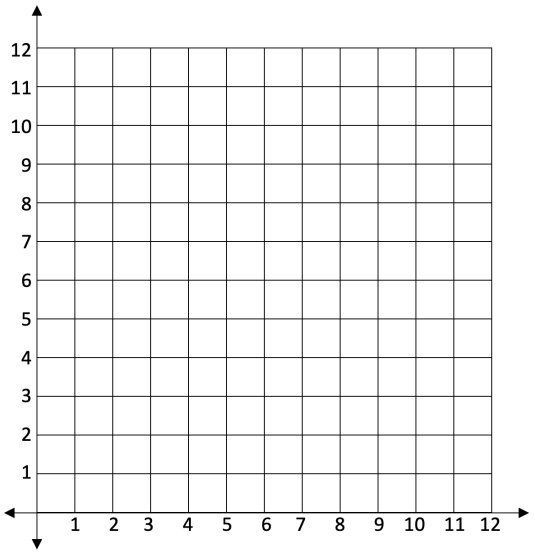
x	y
0	
1	

x	y
0	
1	

Create another equation tha
the one you drew.

_____

Use it to fill in the second table and graph it.



3. Use the rule 3x + 2 = y to fill in the first table.

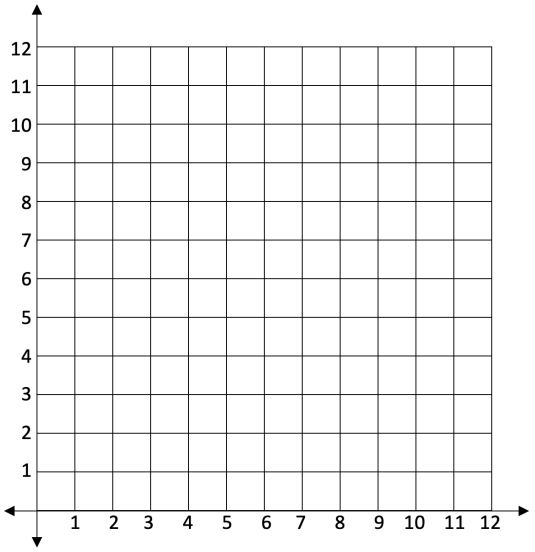
x	y
0	
1	

x	y
0	
1	

Create another equation tha
the one you drew.

_____

Use it to fill in the second table and graph it.

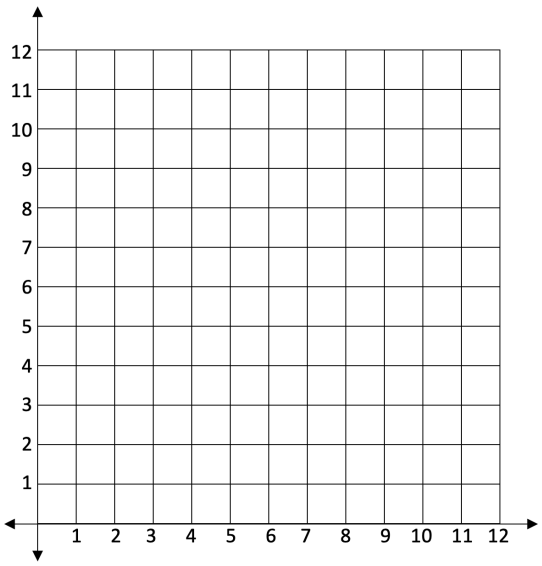


Remember: Equations with the same multiplication will be parallel.

1. Use the rule 3x + 1 = y to fill in the first table.

x	y
0	
1	

x	y
0	
1	



Create another equation tha
the one you drew.

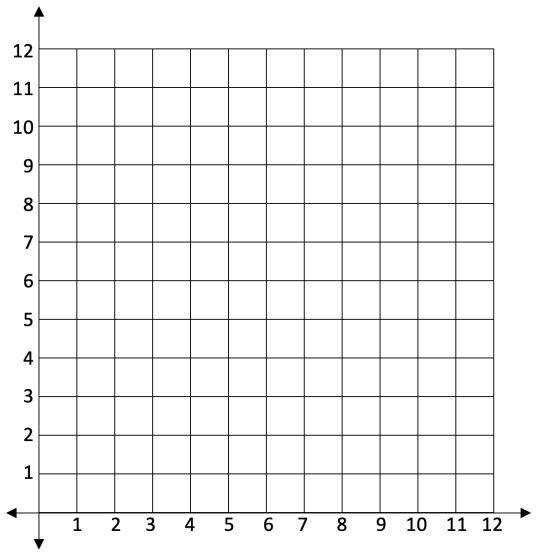
_____

Use it to fill in the second table and graph it.

2. Use the rule x + 3 = y to fill in the first table.

x	y
0	
1	

x	y
0	
1	



Create another equation tha
the one you drew.

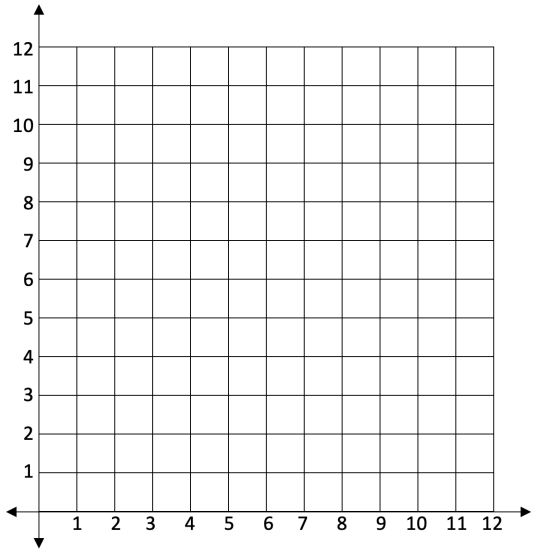
_____

Use it to fill in the second table and graph it.

3. Use the rule 2x + 2 = y to fill in the first table.

x	y
0	
1	

x	y
0	
1	



Create another equation tha
the one you drew.

_____

Use it to fill in the second table and graph it.

Name: ANSWER KEY

Remember: Equations with the same multiplication will be parallel.

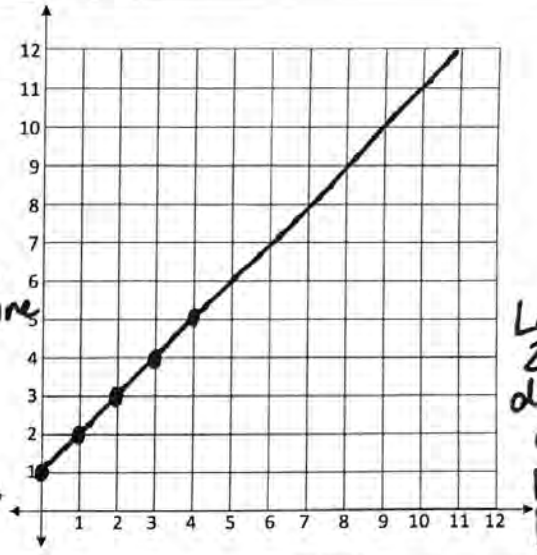
1. Use the rule x + 1 = y to fill in the first table.

x	y
0	1
1	2
2	3
3	4
4	5

x	y
0	
1	
2	
3	
4	

Tables and graphs will vary.

There is more than one right equation



Location of 2nd line depends on equation. It must be parallel.

Create another equation that will have a line parallel to the one you drew.

x = y or x + 2 = y, x + 3 = y, etc.

Use it to fill in the second table and graph it.

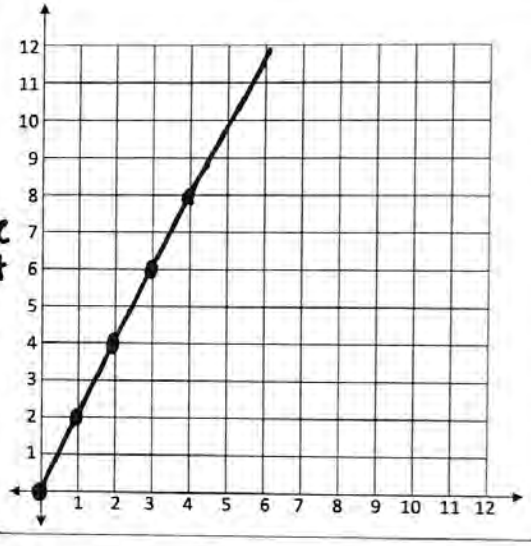
2. Use the rule 2x = y to fill in the first table.

x	y
0	0
1	2
2	4
3	6
4	8

x	y
0	
1	
2	
3	
4	

Tables and graphs will vary.

There is more than one right equation.



Create another equation that will have a line parallel to the one you drew.

2x - 1 = y or 2x + 1 = y, etc.

Use it to fill in the second table and graph it.

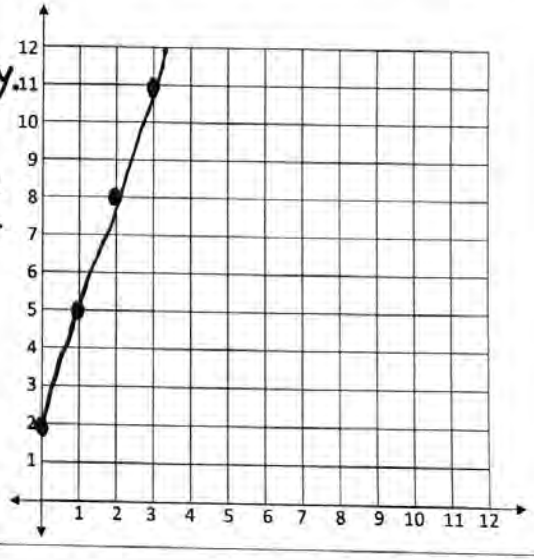
3. Use the rule 3x + 2 = y to fill in the first table.

x	y
0	2
1	5
2	8
3	11
4	14

x	y
0	
1	
2	
3	
4	

Tables and graphs will vary.

There is more than one right equation.



Create another equation that will have a line parallel to the one you drew.

3x = y, 3x - 1 = y, 3x + 3 = y, etc.

Use it to fill in the second table and graph it.

Remember: Equations with the same multiplication will b

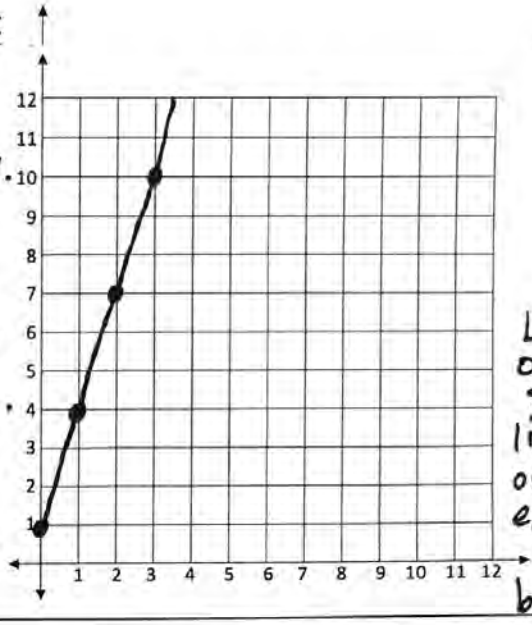
1. Use the rule $3x + 1 = y$ to fill in the first table.

x	y
0	1
1	4
2	7
3	10
4	13

x	y
0	
1	
2	
3	
4	

Tables and graphs will vary.

There is more than one right equation.



Location of the second line depends on the equation. It must be parallel.

Create another equation that will have a line parallel to the one you drew.

$3x = y$, $3x + 2 = y$, $3x + 3 = y$, etc.

Use it to fill in the second table and graph it.

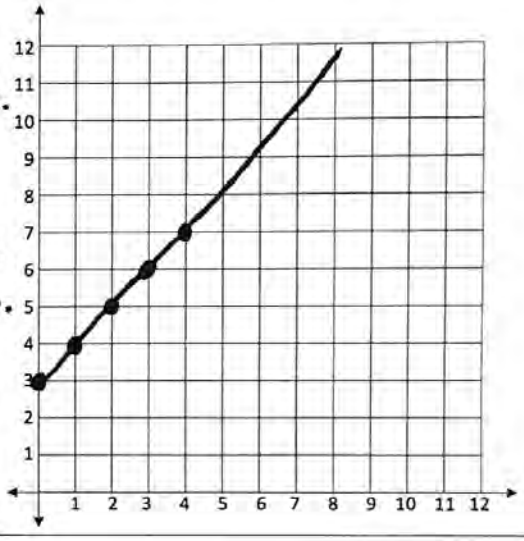
2. Use the rule $x + 3 = y$ to fill in the first table.

x	y
0	3
1	4
2	5
3	6
4	7

x	y
0	
1	
2	
3	
4	

Tables and graphs will vary.

There is more than one right equation.



Create another equation that will have a line parallel to the one you drew.

$x = y$, $x + 1 = y$, $x + 2 = y$, etc.

Use it to fill in the second table and graph it.

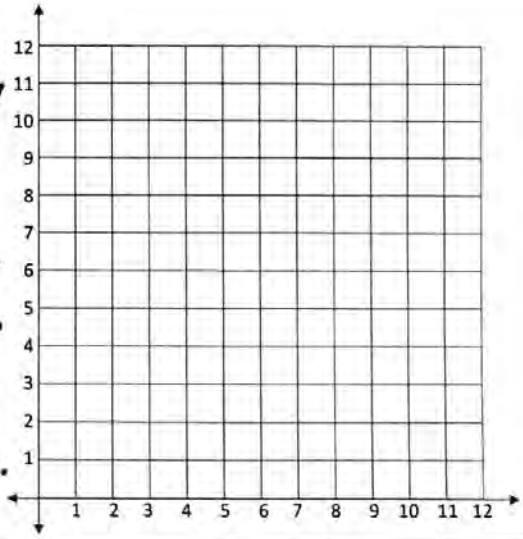
3. Use the rule $2x + 2 = y$ to fill in the first table.

x	y
0	2
1	4
2	6
3	8
4	10

x	y
0	
1	
2	
3	
4	

Tables and graphs will vary

There is more than one right equation.



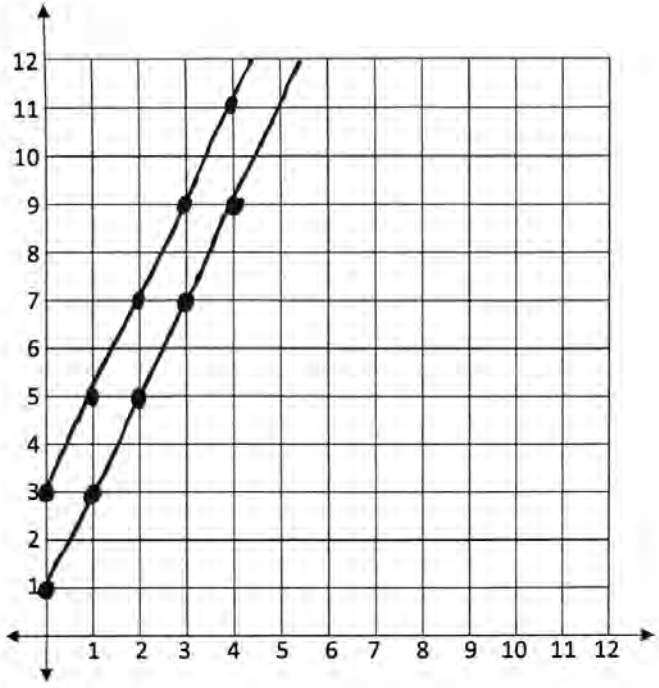
Create another equation that will have a line parallel to the one you drew.

$2x = y$, $2x + 1 = y$, $2x + 3 = y$, etc.

Use it to fill in the second table and graph it.

Name: ANSWER KEY

Graph the first equation.



$2x + 1 = y$

x	y
0	1
1	3
2	5
3	7
4	9

$2x + 3 = y$

x	y
0	3
1	5
2	7
3	9
4	11

(The table will vary based on the equation.)

(There is more than one right equation. You can choose any one that has 2x in it.)

Use the question below to write a second equation that will have a line that is parallel to the first one.

What does the second equation need to have to have a line parallel to the first equation? 2x

Graph the second equation. Is it parallel to the first one? yes (The second line will vary depending on the equation.)

Draw a staircase on each line and check that they are parallel. Each line goes up 2 and over 1.