For each space in the table, write the equation of a line going through the point (x, y).
You can not use the same line more than once.

	$x = -2$	$x = -1$	$x = 0$	$x = 1$	$x = 2$
$y = -2$					
$y = -1$					
$y = 0$					
$y = 1$					
$y = 2$					

Jonny started his grid like this. Can you finish it?

	$x = -2$	$x = -1$	$x = 0$	$x = 1$	$x = 2$
$y = -2$	$y = 3x + 4$	$y = 3x + 1$	$y = 3x - 2$	$y = 3x - 5$	
$y = -1$	$y = x + 1$	$y = x$	$y = x - 1$		
$y = 0$	$y = -x - 2$	$y = -x - 1$			
$y = 1$	$y = -3x - 5$				
$y = 2$					

Charlotte started her grid like this. Which boxes will she struggle to fill in with this pattern?

	$x = -2$	$x = -1$	$x = 0$	$x = 1$	$x = 2$
$y = -2$			$y = x - 2$		
$y = -1$			$y = x - 1$		
$y = 0$	$y = 3x + 6$	$y = 2x + 2$	$y = x$	$y = 2x - 2$	$y = 3x - 6$
$y = 1$			$y = x + 1$		
$y = 2$			$y = x + 2$		

Justin completed a similar task, but with different values for x and y.
Can you tell what values he completed it for?

	$\boldsymbol{x} = \square$	$\boldsymbol{x} = \square$	$\boldsymbol{x} = \square$	$\boldsymbol{x} = \square$	$\boldsymbol{x} = \square$
$\boldsymbol{y} = \square$	$y = x + 1$	$y = x$	$y = x - 1$	$y = x - 2$	$y = x - 3$
$\boldsymbol{y} = \square$	$y = 2x + 2$	$y = 2x$	$y = 2x - 2$	$y = 2x - 4$	$y = 2x - 6$
$\boldsymbol{y} = \square$	$y = 3x + 3$	$y = 3x$	$y = 3x - 3$	$y = 3x - 6$	$y = 3x - 9$
$\boldsymbol{y} = \square$	$y = 4x + 4$	$y = 4x$	$y = 4x - 4$	$y = 4x - 8$	$y = 4x - 12$
$\boldsymbol{y} = \square$	$y = 5x + 5$	$y = 5x$	$y = 5x - 5$	$y = 5x - 10$	$y = 5x - 15$

Kathryn likes lines that go through the origin.
For each space in the table, write the equation of the line going through both the point (x, y) and the origin.

	$\boldsymbol{x = -2}$	$\boldsymbol{x = -1}$	$\boldsymbol{x = 0}$	$\boldsymbol{x = 1}$	$\boldsymbol{x = 2}$
$\boldsymbol{y = -2}$					
$\boldsymbol{y = -1}$					
$\boldsymbol{y = 0}$					
$\boldsymbol{y = 1}$					
$\boldsymbol{y = 2}$					

Which space could have multiple answers?
What patterns can you explain?

Kathryn likes lines that go through the origin.
For each space in the table, write the equation of the line going through both the point (x, y) and the origin.

	$x=-2$	$x=-1$	$x=0$	$x=1$	$x=2$
$y=-2$	$y=x$	$y=2x$	$x=0$	$y=-2x$	$y=-x$
$y=-1$	$y=\frac{1}{2}x$	$y=x$	$x=0$	$y=-x$	$y=-\frac{1}{2}x$
$y=0$	$y=0$	$y=0$		$y=0$	$y=0$
$y=1$	$y=-\frac{1}{2}x$	$y=-x$	$x=0$	$y=x$	$y=\frac{1}{2}x$
$y=2$	$y=-x$	$y=-2x$	$x=0$	$y=2x$	$y=x$

Which space could have multiple answers?
What patterns can you explain?

Fill in all the gaps with whole numbers so that each line goes through the point (x, y).
Can you do it without repeating any numbers?

	$\boldsymbol{x} = \square$	$\boldsymbol{x} = \square$	$\boldsymbol{x} = \square$	$\boldsymbol{x} = \square$
$\boldsymbol{y} = \square$	$y = \square x$	$y = \square x$	$y = \square x$	$y = \square x$
$\boldsymbol{y} = \square$	$y = \square x$	$y = \square x$	$y = \square x$	$y = \square x$
$\boldsymbol{y} = \square$	$y = \square x$	$y = \square x$	$y = \square x$	$y = \square x$
$\boldsymbol{y} = \square$	$y = \square x$	$y = \square x$	$y = \square x$	$y = \square x$

This is Nathan’s solution.

	$x = \boxed{105}$	$x = \boxed{70}$	$x = \boxed{42}$	$x = \boxed{30}$
$y = \boxed{210}$	$y = \boxed{2}x$	$y = \boxed{3}x$	$y = \boxed{5}x$	$y = \boxed{7}x$
$y = \boxed{420}$	$y = \boxed{4}x$	$y = \boxed{6}x$	$y = \boxed{10}x$	$y = \boxed{14}x$
$y = \boxed{840}$	$y = \boxed{8}x$	$y = \boxed{12}x$	$y = \boxed{20}x$	$y = \boxed{28}x$
$y = \boxed{1680}$	$y = \boxed{16}x$	$y = \boxed{24}x$	$y = \boxed{40}x$	$y = \boxed{56}x$

1) What is special about the number 210?
2) Can you find a way to complete the grid with smaller numbers, but still with no repetitions?