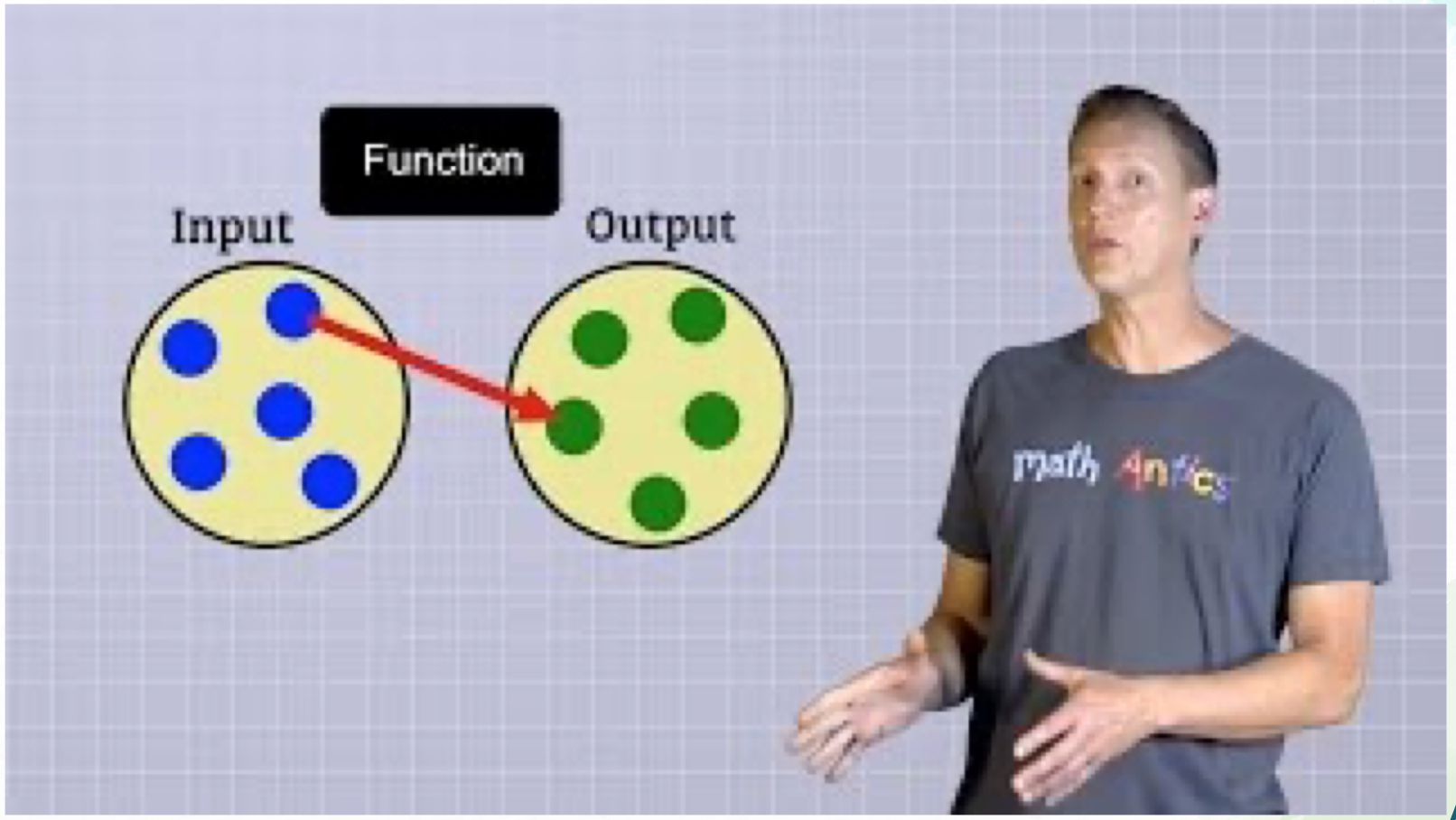
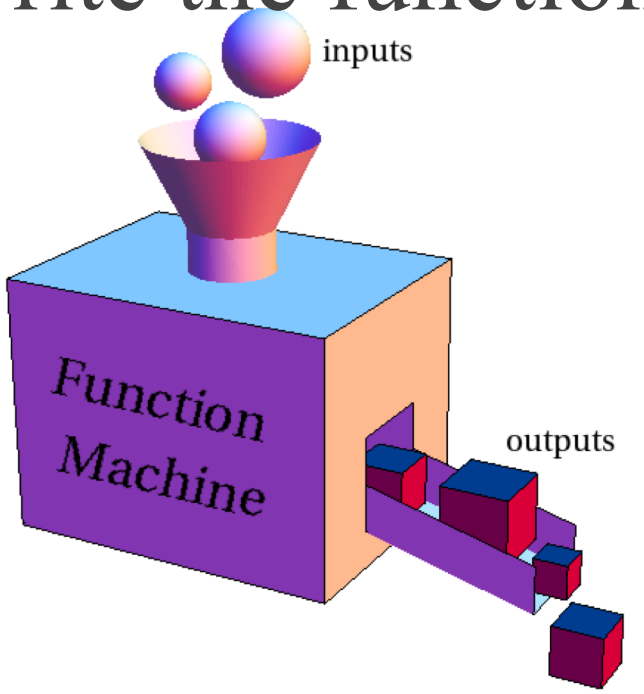
Linear relations

Algebra + Graphs= amazing times in grade 8

But first….Let’s bring it back to grade 5



Input/Output tables have a function. You can write the function using a variable.



***Instructions*:**

Look at the input value and determine what rule applies to get the output value:

Input	Output
1	6
2	7
3	8
4	9

Rule: add 5

n+5

What is the rule for this input/output table?

RULE: multiply by 3, or 3n

Input	Output
1	3
2	6
3	9
4	12

What is the rule for this input/output table?

Rule: multiply by 10

10n

Input	Output
1	10
2	20
3	30
4	40

What is the rule for this input output table?

Rule:

Subtract 8

n - 8

Input	Output
16	8
24	16
28	20
60	52

What is the rule for this input output table?

Input	Output
5	50
8	80
20	200
100	1,000

Rule: multiply by 10

10n

What is the rule for this input output table?

Rule: subtract 2

x - 2

Input (x)	Output(y)
4	2
7	5
10	8
30	28

Complete the table if the rule is add one

Input (x)	Output (x+1)
1	
2	
3	
4	

Complete the table if the rule is add one

Input (x)	Output (x+1)
1	2
2	3
3	4
4	5

Complete the table if the rule is multiply by 2

Input (x)	Output
1	
2	
3	
10	

Complete the table if the rule is multiply by 2

Input (x)	Output (2x)
1	2
2	4
3	6
10	20

Complete the table if the rule is multiply by 2 then add 3

Input (x)	Output
1	
2	
3	
15	

Complete the table if the rule is multiply by 2 then add three

Input (x)	Output (2x+3)
1	5
2	7
3	9
15	33

Complete the table if the rule is add three then multiply by 2

Input (x)	Output
1	
2	
3	
7	

Complete the table if the rule is add three then multiply by 2

Input (x)	Output 2(x+3)
1	8
2	10
3	12
7	20

Input a	0	1	2	3	4
Output b	5	6	7	8	9

Solution:

You can see that you obtain each output by adding 5 to the input.

Answer: The function rule given by the table is

$$b = a + 5$$

How can a function table help you find the input or the output?

When data is organized, we can use the function rule and the input to find the output or work backward using the output and the function rule to find the input.

Task 1

The output is 8 more than the input.

1. **Write an equation describing the function rule.**
2. **Complete the input-output table.**
3. **Describe the input-output pattern.**
4. **List the ordered pairs.**

Input	Output
10	
12	
14	

Task 2

The output is 5 times the input.

1. **Write an equation describing the function rule.**
2. **Complete the input-output table.**
3. **Describe the input-output pattern.**
4. **List the ordered pairs.**

Input	Output
5	
6	
7	

Task 3

The output is two times the input plus four.

1. **Write an equation describing the function rule.**
2. **Complete the input-output table.**
3. **Describe the input-output pattern.**
4. **List the ordered pairs.**

Input	Output
3	
4	
5	

Task 4

The output is half the input.

1. **Write an equation describing the function rule.**
2. **Complete the input-output table.**
3. **Describe the input-output pattern.**
4. **List the ordered pairs.**

Input	Output
30	
40	
50	

VOCABULARY

The set of all input values is called the ***domain*** of a function. The set of all output values is called the ***range*** of a function.

What did you learn?

MATH ANTICS!!!!

Ticket Out the Door

Isaiah is buying jelly beans. In bulk, they cost $3 per pound, and a candy dish costs $2. The function rule, Y= 3x + 2 where *x* is the number of pounds, can be used to find the total cost (*Y*) of *x* pounds of jelly beans and 1 dish.

1.Make a table that shows the total cost of buying 2, 3, AND 4 pounds of jelly beans and 1 dish.

Graphing Linear Relationships

Lambly has a summer job working for a tree planting company in British Columbia.

She gets $10 for every 100 trees she plants. That means if she plants

- 200 trees she gets $20
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- 400 trees she gets $40

This pattern can be shown on a coordinate grid. The pattern is a **linear relation. This means that the relationship forms a straight line.**

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100	10
200	20
300	30
400	40

The equation for this linear relationship would be:

_____

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Input *x*	Output *y*
100	10
200	20
300	30
400	40

$$\frac{x}{10} = y$$

The equation for this linear relationship would be:

A number (x) divided by ten equals y

How can we graph this relationship?

A **graph** shows the relationship between the input and output.

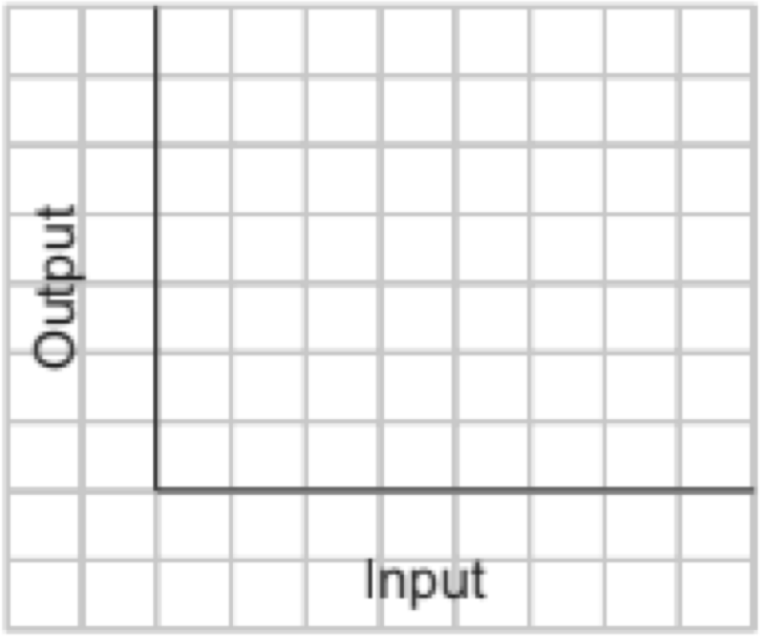
The **input** runs along the **x axis** on a Cartesian plane.

The **output** runs along the **y axis** on a Cartesian plane.

We use the input and output information to obtain **ordered pairs or coordinates** which are locations on the Cartesian plane.

We write ordered pairs in the format:

(x,y)



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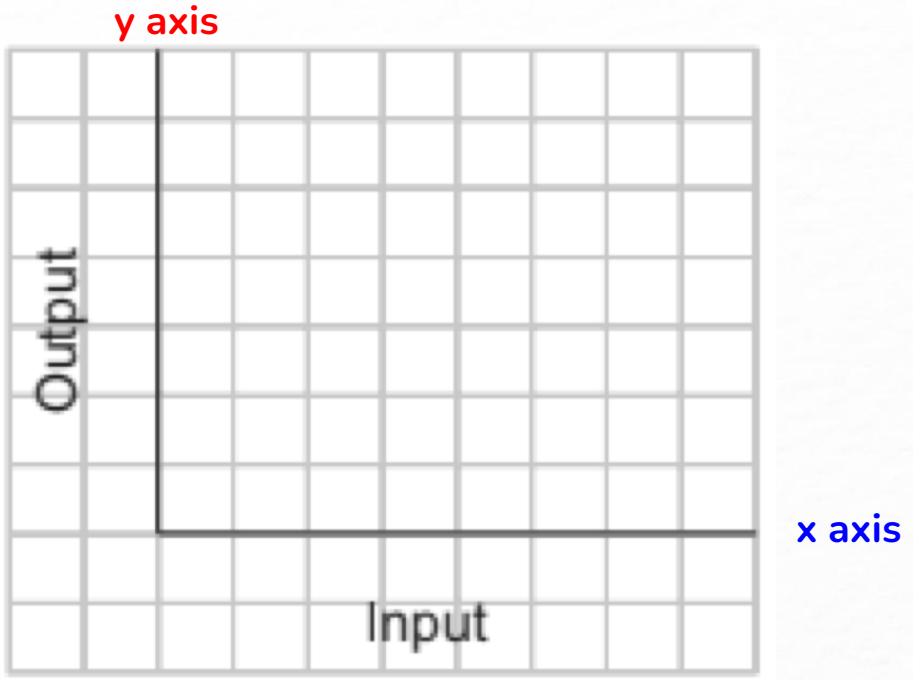
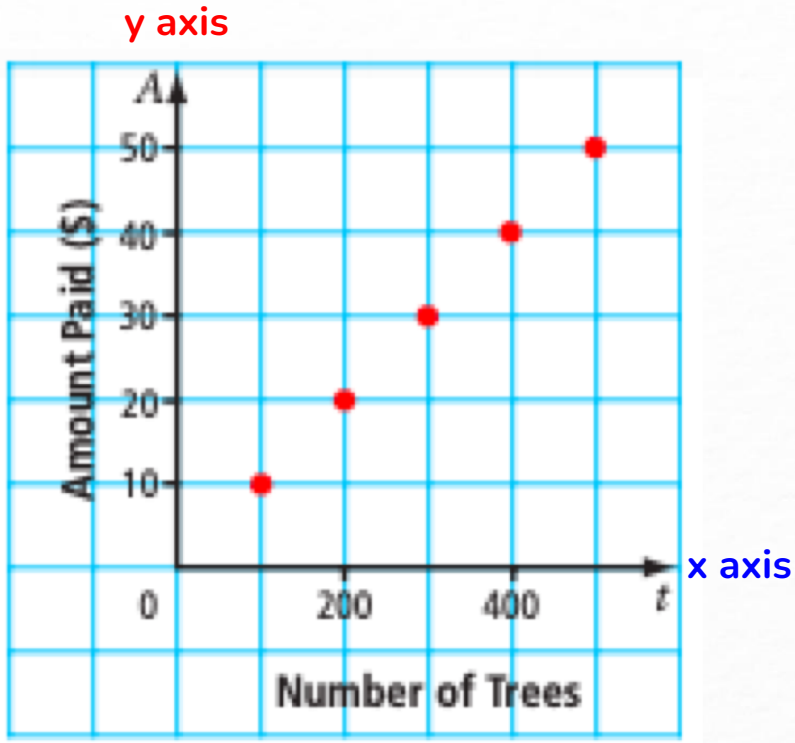


How can we graph this relationship?

Our table of values allows us to determine the ordered pairs needed to graph:

Input x	Output y	Ordered Pairs (x,y)
100	10	(100,10)
200	20	(200, 20)
300	30	(300,30)
400	40	(400,40)

Input x	Output y	Ordered Pairs (x,y)
100	10	(100,10)
200	20	(200, 20)
300	30	(300,30)
400	40	(400,40)



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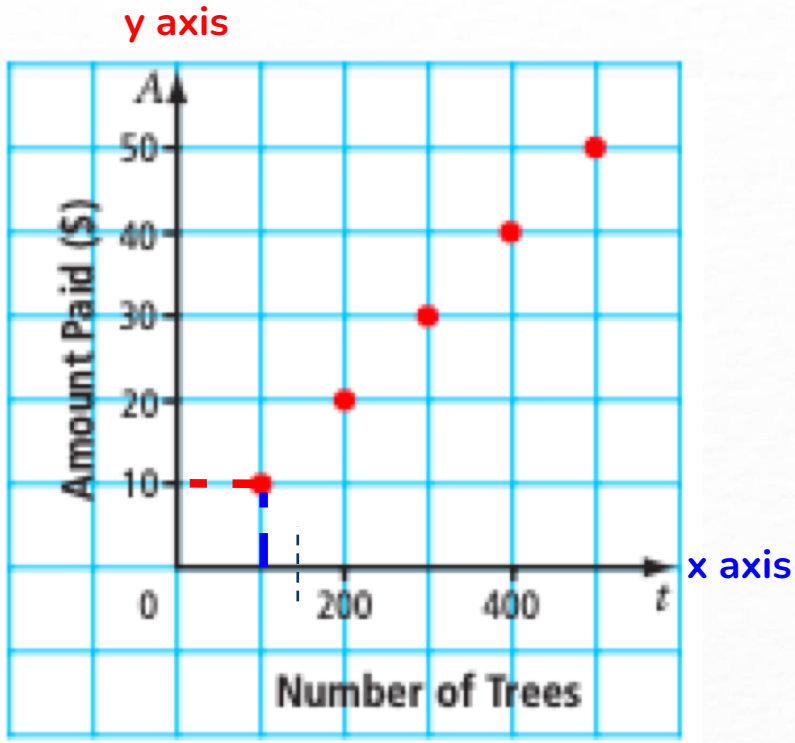
200	20	(200, 20)
300	30	(300,30)
400	40	(400,40)



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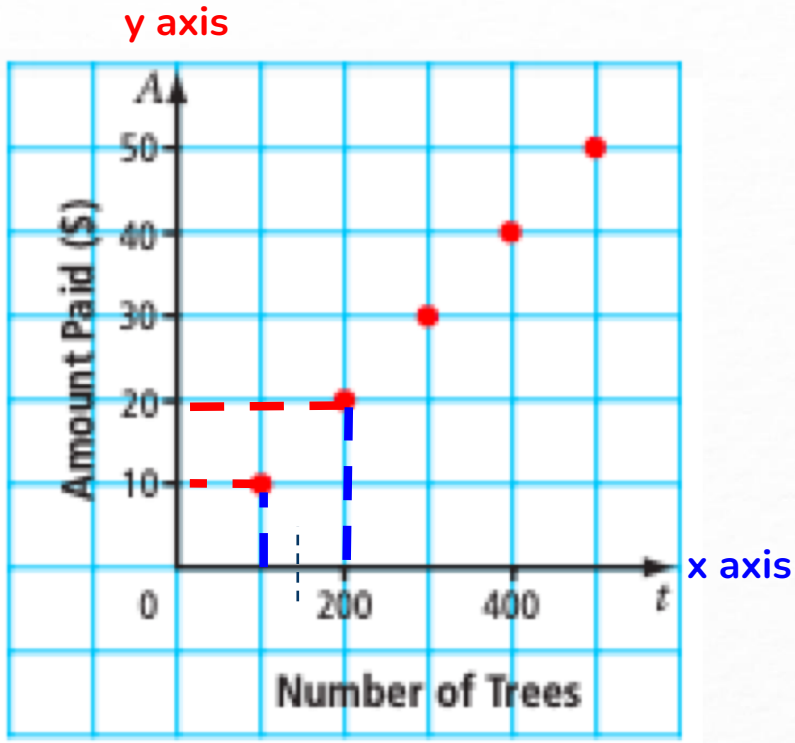
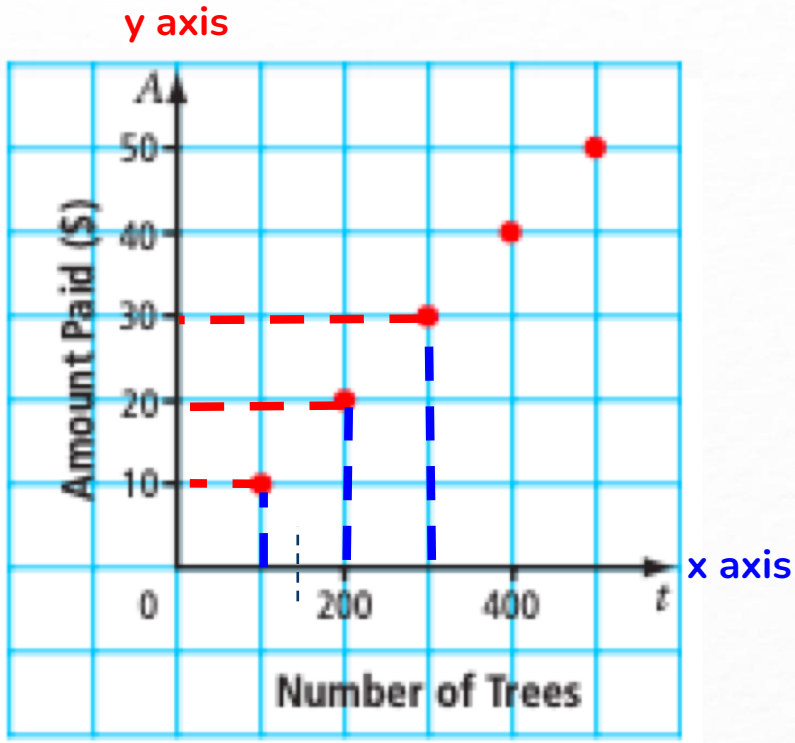
100	10	(100,10)
200	20	(200, 20)
300	30	(300,30)
400	40	(400,40)



Input x	Output y	Ordered Pairs (x,y)
100	10	(100,10)
200	20	(200, 20)
300	30	(300,30)
400	40	(400,40)



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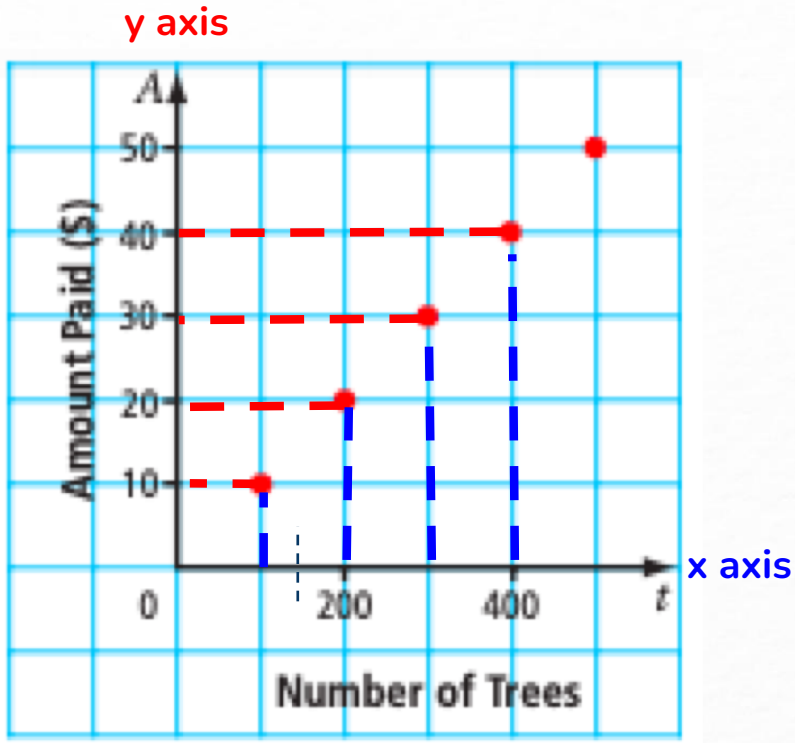
100	10	(100,10)
200	20	(200, 20)
300	30	(300,30)
400	40	(400,40)



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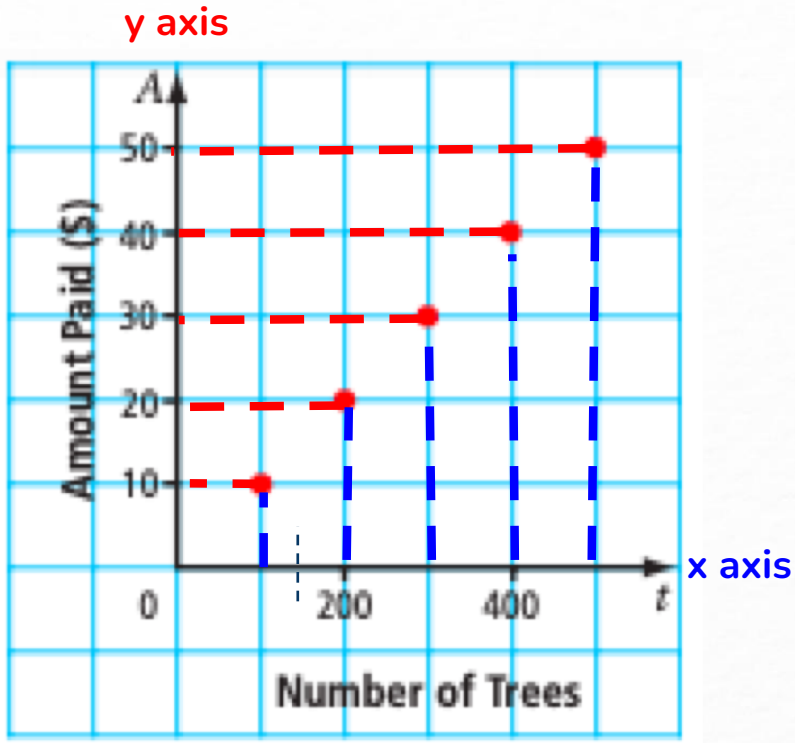
200	20	(200, 20)
300	30	(300,30)
400	40	(400,40)



Ash earns $100 a day catching pokemon. For each pokemon he catches he earns an additional $10.

- If Ash catches **zero** pokemon on Sunday, how much money would he earn?
- If Ash catches **one** pokemon on Sunday, how much money would he earn?
- If Ash catches **two** pokemon on Sunday, how much money would he earn?
- If Ash catches **five** pokemon on Sunday, how much money would he earn?

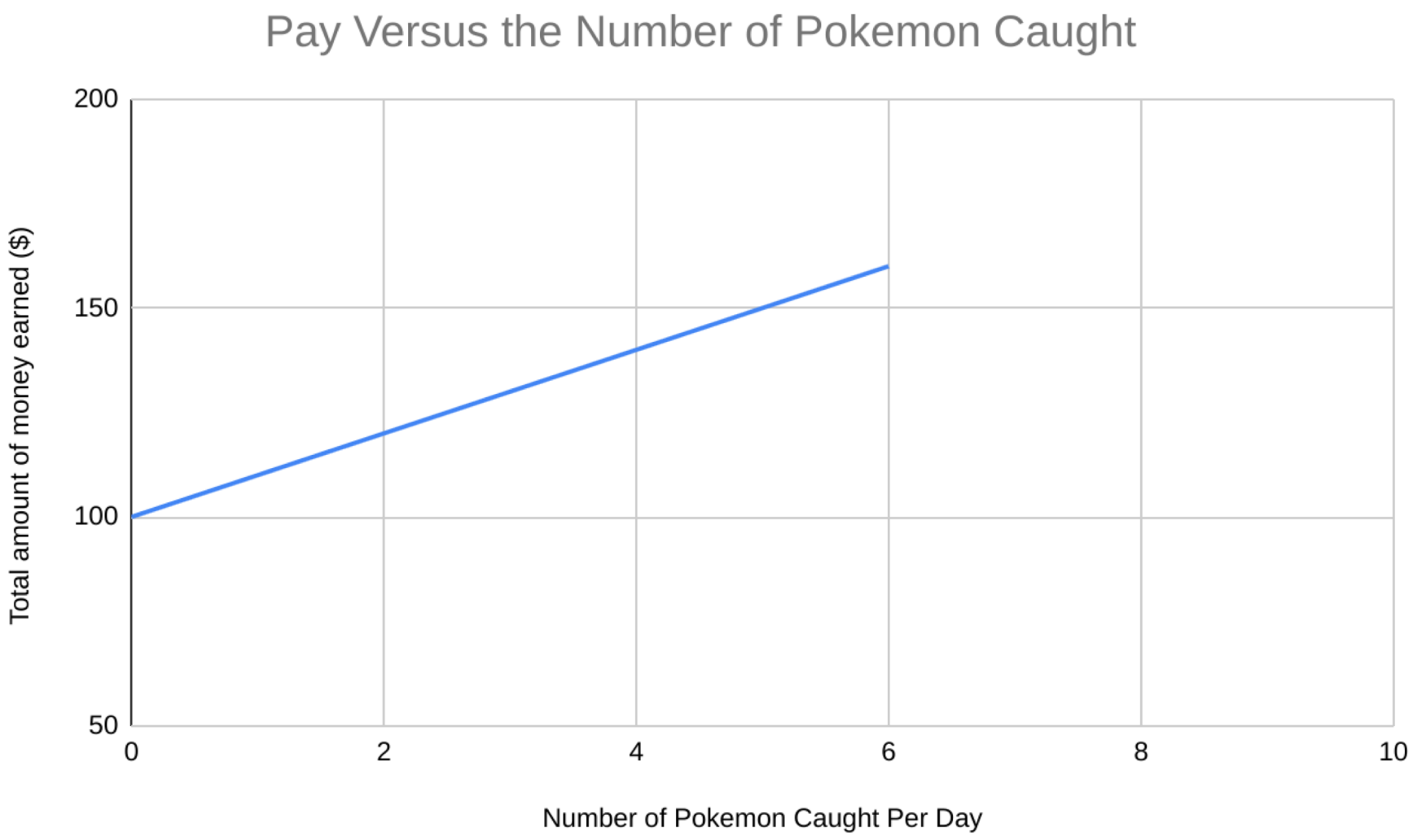
Input x	Output y	Ordered Pairs (x,y)

Input x	Output y	Ordered Pairs (x,y)
0	100	(0,100)
1	110	(1,110)
2	120	(2,120)
5	150	(5,150)

Write an equation to show how much money he will earn in one day

$$10x + 100 = y$$

Graph the relationship


Pay Versus the Number of Pokemon Caught
Total amount of money earned ($)
200
150
100
50
0
2
4
6
8
10
Number of Pokemon Caught Per Day

Graph the relationship between the figure number and the number of shapes for the visual pattern you created