

# Independent and Dependent Variables



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# Warm Up

Solve each equation.

1.  $x + 17 = 23$  **6**

2.  $8 + y = 39$  **31**

3.  $3x = 48$  **16**

4).  $\frac{y}{5} = 12$  **60**

5). Together Lyle and Adam have \$22.75. Adam has \$12.20. How much money does Lyle have? **\$10.55**

The **independent variable** changes independently. It is the **x** value.

The **dependent variable** changes in response to the independent variable. It is the **y** value.

The **dependent variable**, **y**, depends on the number chosen for **x** (**independent variable**).

## Example 1:

Identify the independent and dependent variable.

The middle school band gets \$12 for every car they wash at a car wash.

The amount of money the band earns at the car wash **depends** on how many cars the band washes.

The **independent variable** is the number of cars the band washes.

The **dependent variable** is the amount of money the band earns.

**Example 2:**

Identify the independent and dependent variable.

Tim runs 15 miles per hour.

The number of miles Tim runs **depends** on the number of hours he runs.

The **independent variable** is the number of hours Tim runs.

The **dependent variable** is the number of miles Tim runs.

## Practice

Identify the independent and dependent variable.

1. Lily sells cookies for \$2.50 to earn money.

Independent is the number of cookies sold.

Dependent is the amount of money Lily earns

2. Gus has a pay as you go phone. It costs 10 cents per minute.

Independent is the number of minutes used.

Dependent is the amount of money Gus pays for using the phone.

# Closure

Write a statement about how the independent variable depends on the dependent variable and then identify the independent and dependent variable.

Pizza House charges \$15 for a cheese pizza plus \$1.00 per topping.

**The cost of the pizza depends on the number of toppings on the pizza.**

**Independent- number of toppings**

**Dependent- total cost of pizza with toppings**

# Using Tables



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# Warm Up

Identify the independent and dependent variables.

Ind – hours traveled

Dep – total miles traveled

1). Joe's car is traveling 55 miles per hour on a trip to the beach.

2). Jerri charges \$5.00 per hour to babysit.

Ind – hours

Dep – total cost for babysitting

3). Tammie pays \$4.00 for every cup of coffee she buys from the

Ind – cups of coffee

local coffee shop.

Dep – total amount spent on coffee

## Example 1:

John makes \$5.00 for every lawn he mows. How much money will he make if he mows 4 lawns? 6 lawns? 100 lawns?

The number of lawns he mows is the independent variable ( $x$ ).

The total amount of money John makes is the dependent variable ( $y$ ).

Lawns ( $x$ )	Total ( $y$ )
4	\$20
6	\$30
100	\$500

You can use a table to record the answers.

**Example 1:**  
**How did we get the values in the total column?**

<b>Lawns (x)</b>	<b>Total (y)</b>
<b>4</b>	<b>\$20</b>
<b>6</b>	<b>\$30</b>
<b>100</b>	<b>\$500</b>

**Multiply the number of lawns by \$5.00.**

**Example 2:**

**Bob's SUV gets 18 miles per gallon.  
How many miles can he go on 3  
gallons? 6 gallons? 9 gallons?**

<b>Gallons (x)</b>	<b>Miles (y)</b>
<b>3</b>	<b>54</b>
<b>6</b>	<b>108</b>
<b>9</b>	<b>162</b>

## Example 2:

How did we get the values in the miles column?

Gallons (x)	Miles (y)
3	54
6	108
9	162

**Multiply the number of gallons by 18.**

**Example 3: Paul's Pizza Palace charges \$10.00 for a large cheese pizza plus \$2.00 for each topping. How much does it cost to buy a large cheese pizza with 2 toppings? 3 toppings? 4 toppings?**

<b>Toppings (x)</b>	<b>Cost (y)</b>
<b>2</b>	<b>\$14.00</b>
<b>3</b>	<b>\$16.00</b>
<b>4</b>	<b>\$18.00</b>

## Example 3:

How did we get the values in the cost column?

Toppings (x)	Cost (y)
2	\$14.00
3	\$16.00
4	\$18.00

**\$10.00 + \$2.00**  
**(number of**  
**toppings)**

## Practice

A frozen yogurt cost \$3.50 for a medium serving and \$0.75 for each topping. How much will a yogurt cost with 2 toppings? 3 toppings? 4 toppings?

Identify the independent and dependent variable. Make a table to show the price of the yogurt.

**Independent- toppings Dependent- cost**

Toppings (x)	Cost (y)
2	\$5.00
3	\$5.75
4	\$6.50



# Closure

Tim's cell phone company charges \$30 for the first 300 minutes and 10 cents for every minute over 300. How much will Tim's cell phone bill be if he uses 345 minutes? 456 minutes? 654 minutes?

Minutes over 300 (x)	Phone bill (y)
45	\$34.50
156	\$45.60
354	\$65.40

# Writing Equations from Tables



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# Warm Up

John gets paid \$15 for every lawn he mows. How much money will he get if he mows 3 lawns? 6 lawns? 20 lawns?

Fill in the following table. What is the independent variable? Dependent variable?

Lawn	Price paid
3	45
6	90
20	300

**Independent Variable- Lawns mowed**

**Dependent Variable- Price paid**

Look at the following table.  
What is happening to  $x$  that gives you  $y$ ?

X	Y
1	6
3	8
5	10
7	12

By looking at the table you can see that when you add 5 to  $x$  you get the  $y$  value. The  $y$  value is the dependent variable and  $x$  is the independent.

We can write an equation using 2 variables for this table. The equation for the table is :

$$y = x + 5$$

## Example 1:

Give the equation for the following table:

x	y
2	14
5	35
7	49

When you look at the x and y values, you see that y is 7 times the value of x.

The equation for the table is:

$$y = 7x$$

## Example 2:

Give the equation for the following table:

X	Y
15	19
20	24
32	36

When you look at the x and y values, you see that y is four more than x.

The equation for the table is:

$$y = x + 4$$

### Example 3:

Give the equation for the following table:

X	Y
0	1
2	5
6	13

When you look at this table you can see that there are 2 operations that will be performed on x to give you the y value. The x is multiplied by 2 and then added to 1.

$$Y = 2x + 1$$

# Practice.

Write the equation for each table.

1).

X	Y
0	6
5	11
11	17

$$Y = x + 6$$

2).

X	Y
0	3
2	9
4	15

$$Y = 3x + 3$$

3).

X	Y
3	12
10	40
15	60

$$Y = 4x$$

4).

X	Y
10	5
15	7.5
18	9

$$Y = 1/2x$$



# Closure

Create your own table and write an equation for it.

# Graphing Independent and Dependent Variables



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# Warm Up

1). Fill in the following table for the equation  $y = 10x$ .

X	Y = 10X	X
1		10
10		100
21		210

2). Write the equation for each table.

a).

X	Y
1	5
2	6
3	7
4	8

$$Y = x + 4$$

b).

X	Y
0	0
1	5
2	10
3	15

$$Y = 5x$$

You can graph data in a table on the coordinate plane.

The  $x$ -coordinate is your independent variable and your  $y$ -coordinate is your dependent variable.

### Example 1:

Jin's car can get 24 miles per gallon. What are your independent and dependent variables? Complete the table and give the equation.

Gallons(x)	Miles(y)
1	24
3	72 ?
5 ?	120

The independent variable is gallons.

The dependent variable is miles.

$$Y = 24x$$

## Example 1:

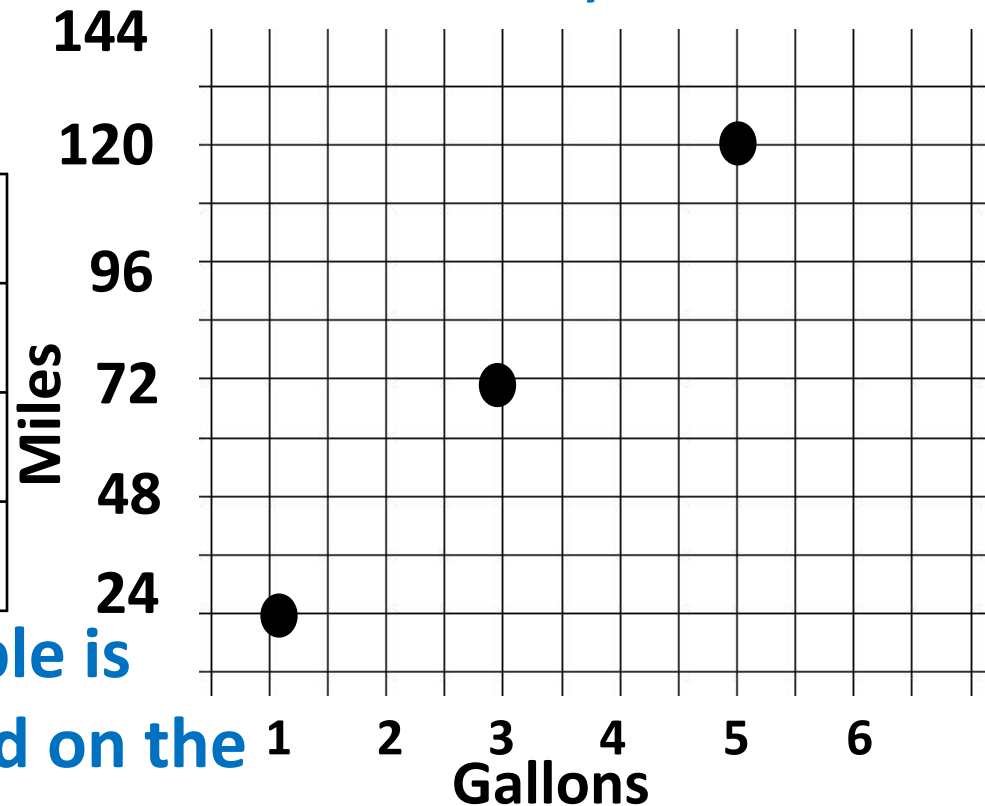
Jin's car can get 24 miles per gallon. Graph your data.

The coordinates you will use to graph the equation on a coordinate plane will be:

$(1, 24)$ ,  $(3, 72)$ ,  $(5, 120)$

The dependent variable is the miles which is graphed on the y-axis.

Gallons(x)	Miles(y)
1	24
3	72
5	120



The independent variable is gallons which is graphed on the x-axis.

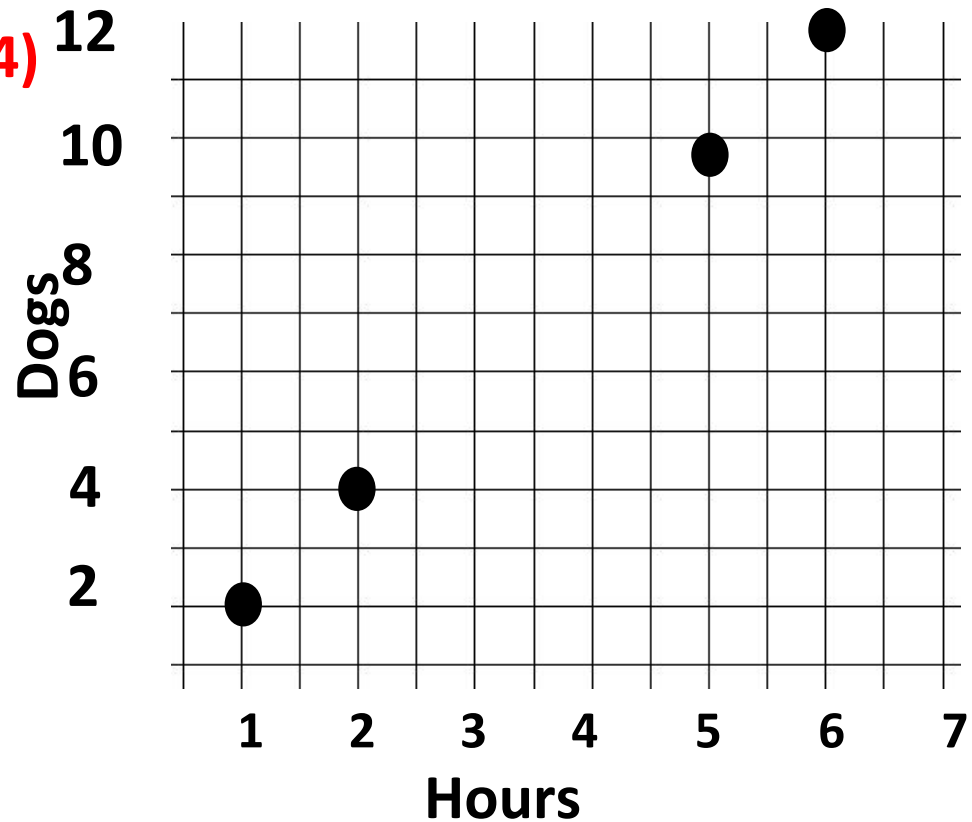
## Example 2:

Kelly can wash 4 dogs in 2 hours. Fill in the table and graph your data.

The coordinates you will use to graph the equation on a coordinate plane will be:

$(1, 2)$ ,  $(2, 4)$ ,  $(5, 10)$ ,  $(7, 14)$

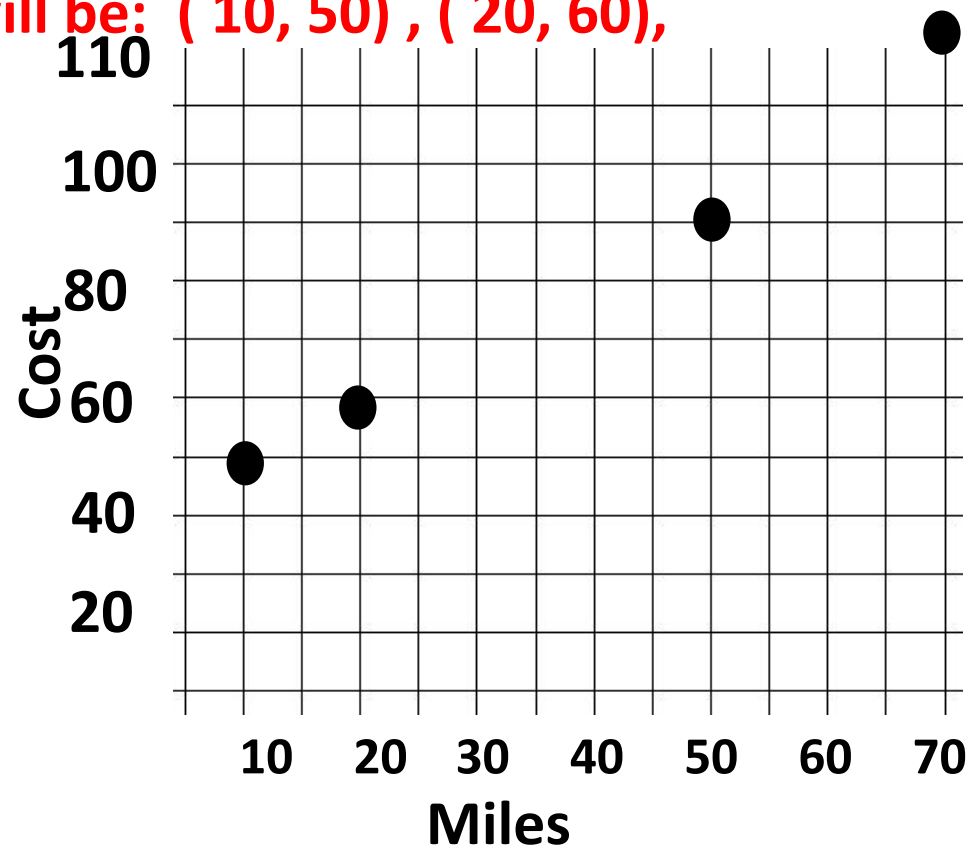
Hours(x)	Dogs(y)
1	2
2	4
5	10
6	12



### Example 3:

A car rents for \$40 a day and \$1 for every mile driven. Fill in the table and graph your data. The coordinates you will use to graph the equation on a coordinate plane will be: ( 10, 50) , ( 20, 60), ( 50, 90), (100, 140)

Miles(x)	Cost(y)
10	50
20	60
50	90
70	110





## Practice

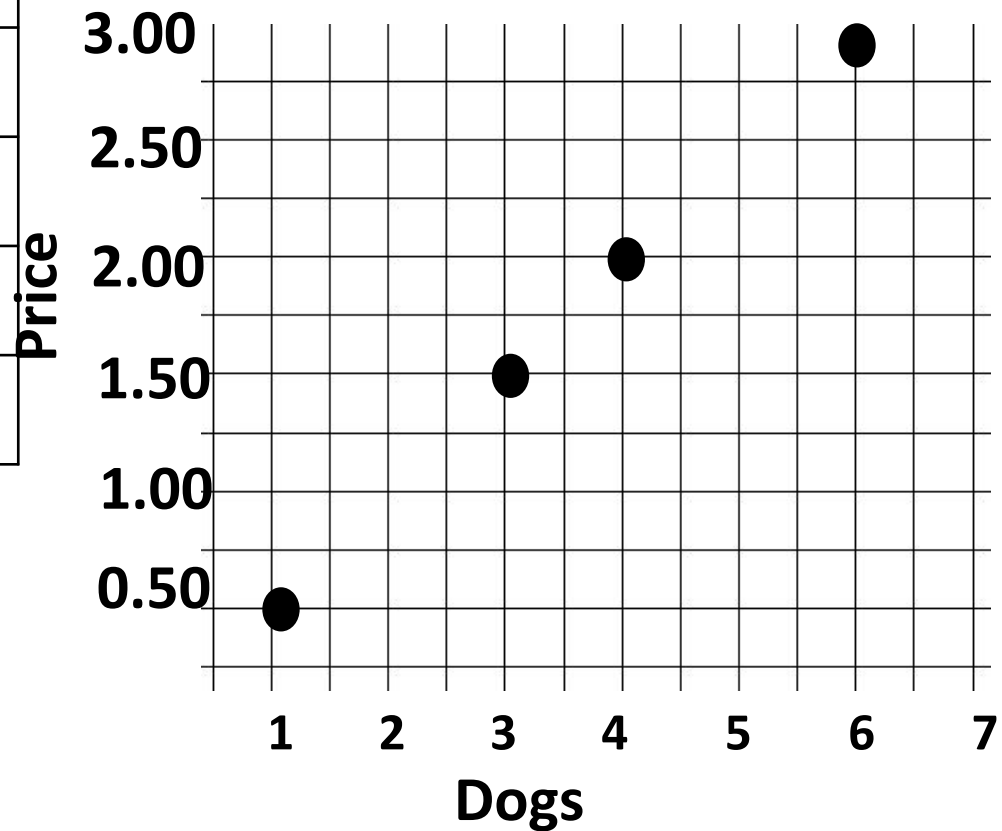
Create a table and graph the data for each problem. Write the equation for each.

- 1). Kim bought 4 hot dogs for \$ 2.00.
- 2). Joe can rake the leaves from 3 yards in 2 hours.
- 3). Ian bought a coffee for \$3. Each refill cost \$1.

1). Kim bought 4 hot dogs for \$2.00.

**Sample answers**

Hot Dog(x)	Price(y)
1	\$0.50
3	\$1.50
4	\$2.00
6	\$3.00



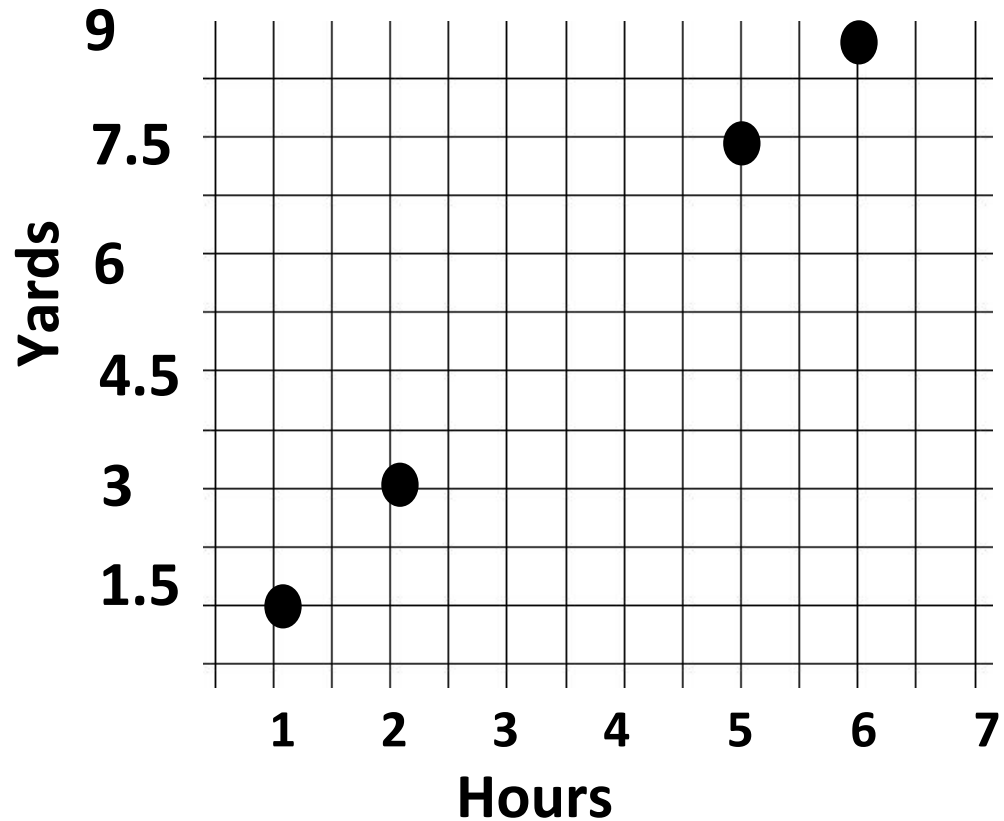
**$Y=0.5x$**

2). Joe can rake the leaves from 3 yards in 2 hours.

Sample answers

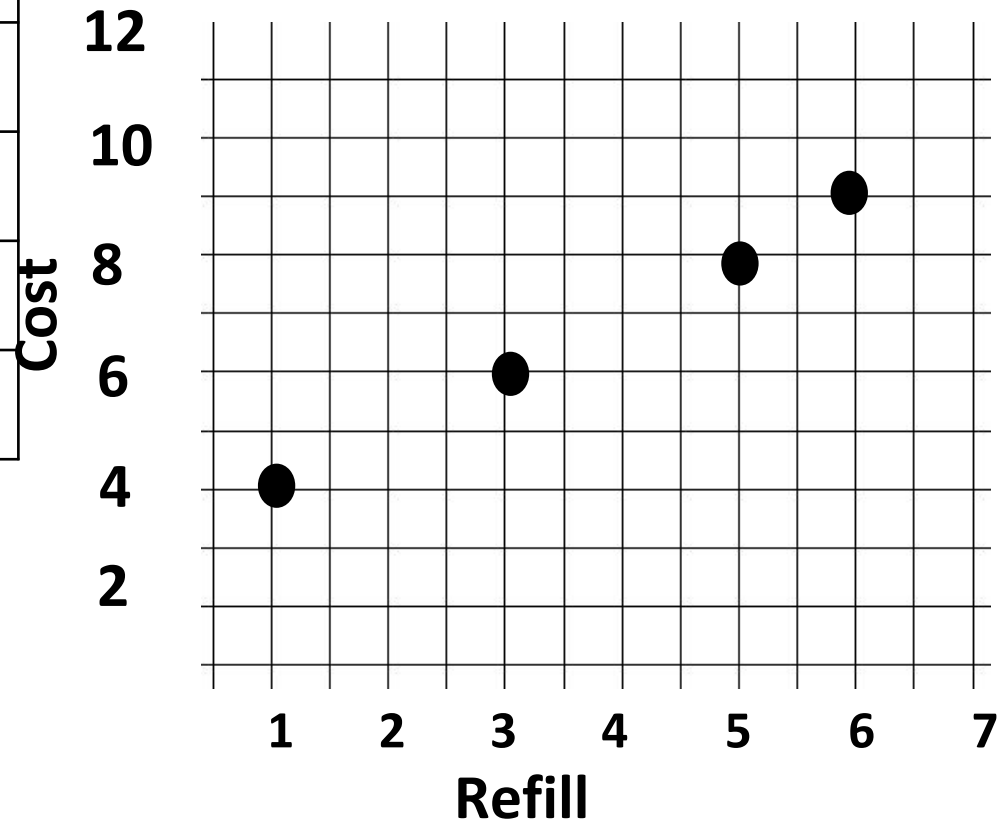
Hours (x)	Yards (y)
1	1.5
2	3
5	7.5
6	9

$$Y = 1.50x$$



3). Ian bought a coffee for \$3. Each refill cost \$1. **Sample answers**

Refill(x)	Cost(y)
1	4
3	6
5	8
6	9



$$Y = x + 3$$

# Closure

Which variable is the x-coordinate?

Independent

Which variable is the y-coordinate?

Dependent