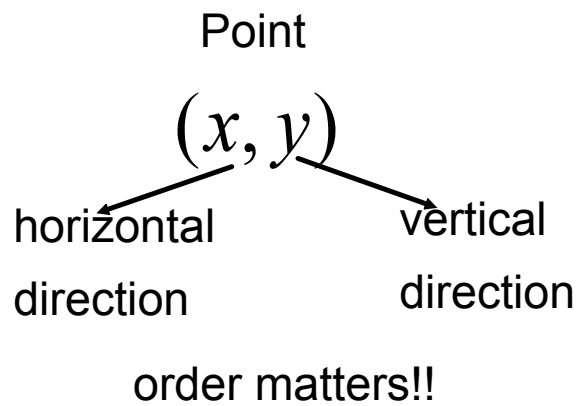
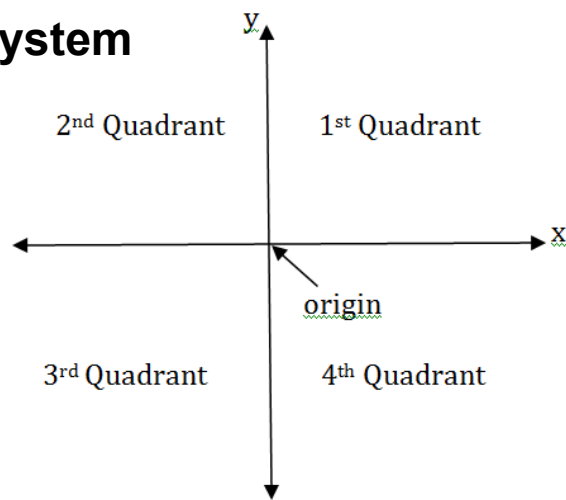


## Section 4.2: Linear Relations

### Cartesian Coordinate System

- $x$  -axis
- $y$  -axis
- origin
- Quadrants



**Example 1:**

Plot the following points on the coordinate grid below.

$A(-2,5)$

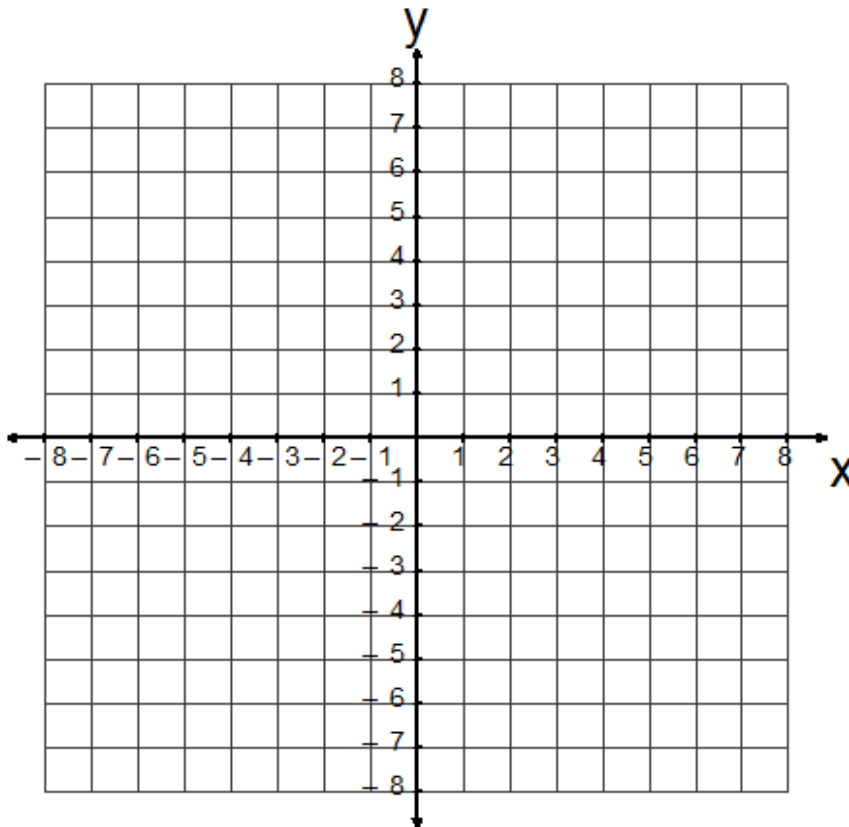
$C(5,-3)$

$E(-5,-4)$

$B(2,3)$

$D(0,3)$

$F(-6,0)$



**Think About:**

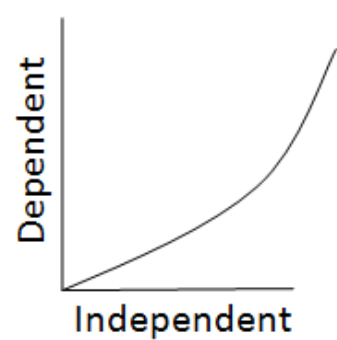
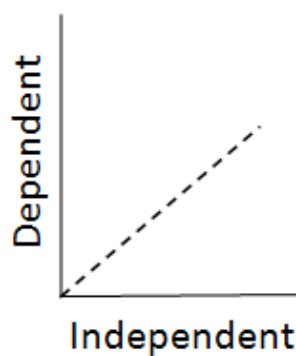
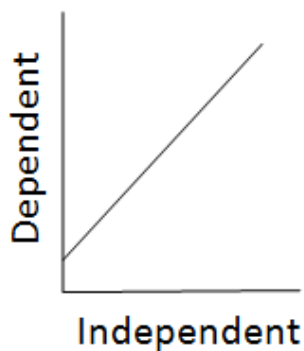
- Increase by the same amount on each axis
- Label each axis
- Title the graph
- Independent variable goes on the  $x$ -axis
- Dependent variable goes on the  $y$ -axis.

## Linear Relation

- when the relationship between the independent and dependent variables can be represented in a straight line graph.
- a constant change in one variable produces a constant change in the other variable.

### Example 2:

Which graph(s) represents a linear relation?

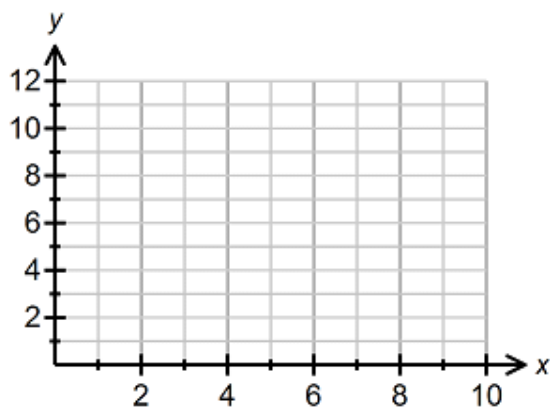


Example 3:

- Is each a linear relation?
- If the relation is linear, describe it and write an equation.
- If the relation is not linear, how do you know?

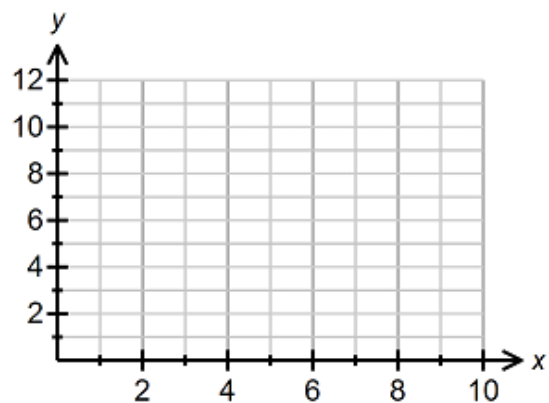
(i)

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



(ii)

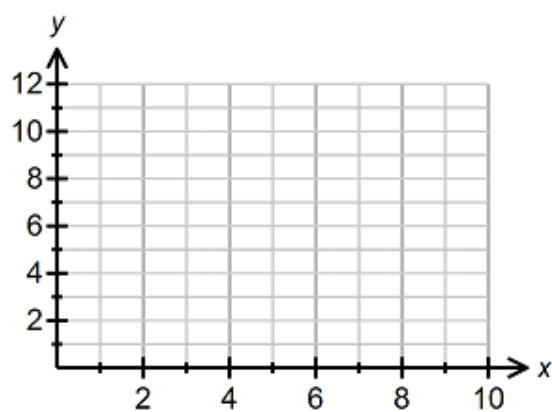
h	c
1	1
2	4
3	7
4	10
5	13



## Sec 4.2 Notes

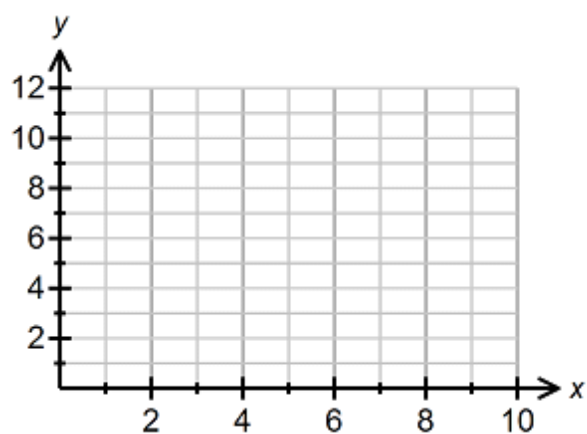
(iii)

x	y
1	9
2	8
3	7
4	6
5	5



(iv)

x	y
1	2
2	5
3	10
4	17
5	26



**Example 4:**

Complete the following tables, using the equations provided.

a)  $y = 2x + 1$

x	y
1	
2	
3	
4	
5	

b)  $y = 10 - x$

x	y
7	
5	
4	
2	
0	

## Linear Relations

### Example 5:

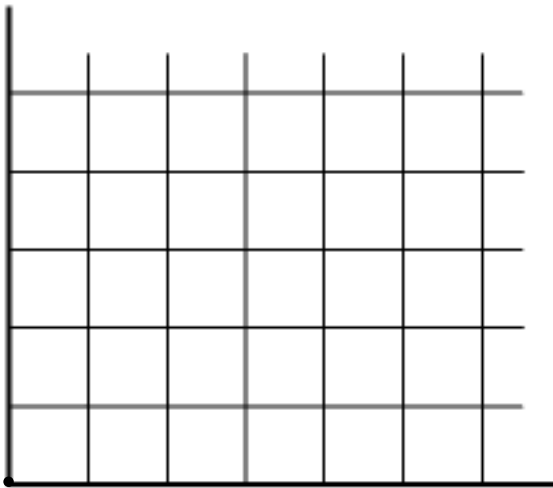
A scuba diver goes under water. The deeper he goes, the more water pressure he feels. Refer to the table to see the relationship between the depth and water pressure.

Diver's Depth (m)	Water Pressure (kPa)
0	0
5	50
10	100
15	150
20	200

- a) Describe the relationship between the diver's depth and water pressure....

(i) In words

(ii) In a Graph



Does it make sense to connect the points?

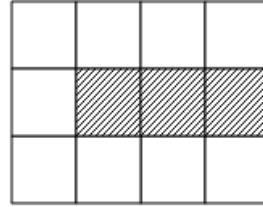
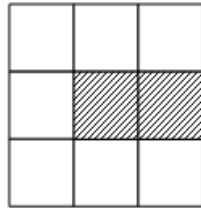
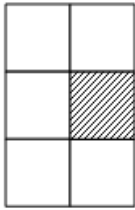
### Continuous Data

- ▶ We can find values between the plotted points
- ▶ In the graph, the points are connected

(iii) In an Equation.

**Example 6:**

Suppose the following pattern is continued.



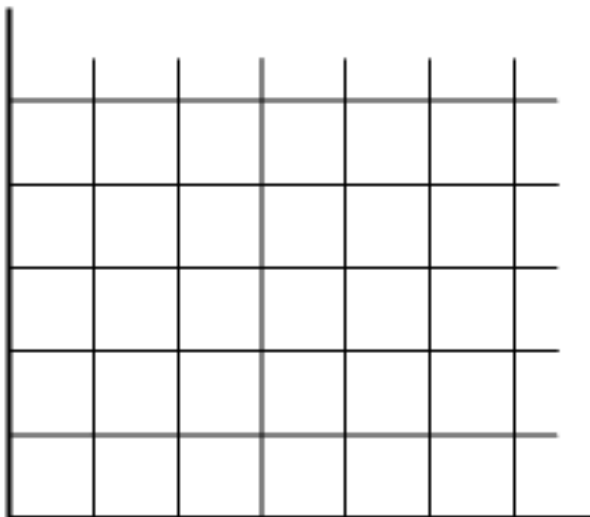
a) Create a table

Complete the table for the first 6 diagrams in this pattern.

Number of Shaded Squares	1	2	3	4	5	6
Number of White Squares						

b) Write an equation.

c) Sketch a graph.



**Does it make sense to connect the points?**

**Discrete Data**

- ▶ We cannot find values between the plotted points
- ▶ In the graph, the points are not connected



## Find the Missing Value

↳ from the equation

For each equation, find the missing value.

### Example 7:

Using the linear relation  $y = 2x + 5$ ,

a) What is the value of  $y$  if  $x = 3$  ?

b) What is the value of  $x$  when  $y = 25$  ?

### Example 8:

Using the linear relation  $y = 3x - 4$ , what is the value of  $x$  if  $y = 23$ ?

### Example 9:

Using the linear relation  $y = 1 - 2x$ , what is the value of  $y$  if  $x = -2$ ?

## Find the Missing Value

↳ from a table

### Example 10:

For each table, find the missing value.

a)

x	y
1	4
2	
3	22
4	31
5	

b)

x	y
0	2
2	8
4	14
6	
8	

c)

x	y
3	-9
	-8
5	
6	
	-5

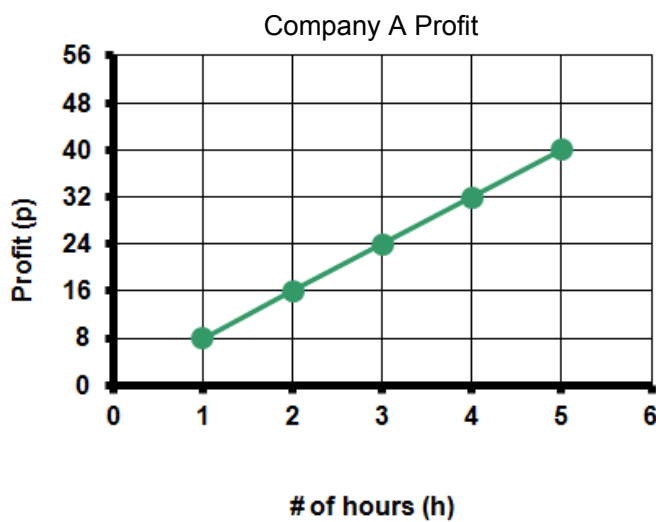
## Find the missing value

↳ from a graph

### Example 11:

For each graph, find the missing value.

a) What is the profit for working 2.5 hours?



**Interpolating**  
↳ estimate a value between two plotted points

b) What is the profit for working 6 hours?

**Extrapolating**  
↳ estimate a value that lies beyond the plotted points.

## Sec 4.2 Notes

Pages	Questions	Extra Practice
Section 4.2 Pg 170	#4abcd, 5abcd, 7cd, 8abcde, 9ab, 10adf, 13, 15, 18	6,7ab, 9cd, 10bce, 11, 14,