

6 Linear Relations (1)



Words TO LEARN

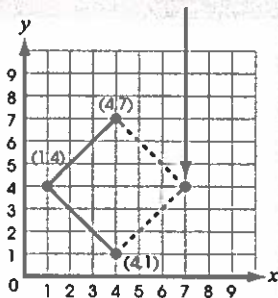
- Linear relation:** the relationship exhibited by two variables that appears as a straight line when graphed on a coordinate system
- Nonlinear relation:** the relationship exhibited by two variables that does not fit a straight line when graphed on a coordinate system

Example

Plot the points on the grids. Then answer the questions.

The points $(4,1)$, $(1,4)$, and $(4,7)$ are the vertices of a square. What are the coordinates of the fourth vertex of the square?

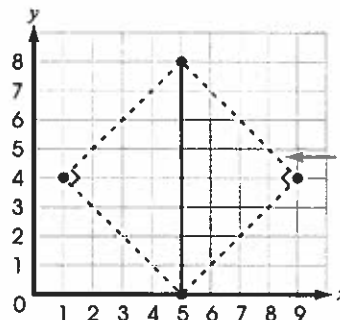
This is the 4th vertex. Its coordinates are $(7,4)$.



The 4th vertex is $(7,4)$.

Try This

The line joining the points $(5,0)$ and $(5,8)$ is the hypotenuse of a right triangle. What are the possible coordinates of the third vertex of the right triangle?



Trace the dotted lines.

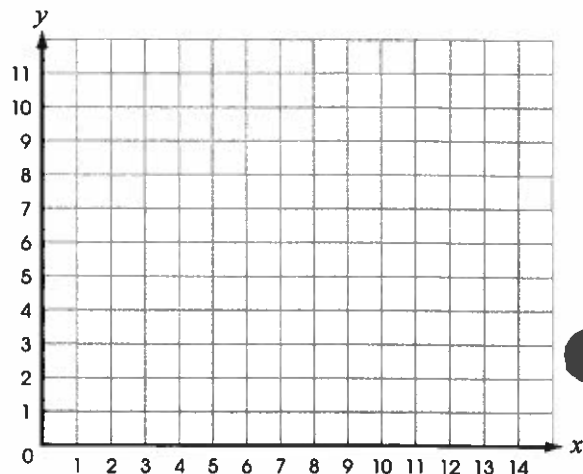
The possible coordinates are _____

Plot the points on the grid. Then write what geometric figure is formed by each group of points.

① $(1,10), (5,9), (7,4), (2,6)$ _____

② $(1,4), (4,6), (4,0), (1,1)$ _____

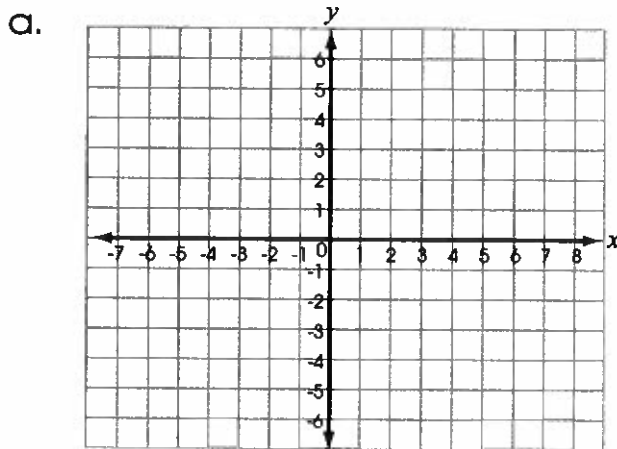
③ $(8,8), (11,8), (12,5), (11,2), (8,2), (9,5)$



Plot the points on the grid. Then answer the questions.

④ Plot these points on the grid. Then join the points.

A(-6,-4) **B**(-4,4) **C**(-2,-4) **D**(0,4) **E**(2,-4) **F**(4,4)



b. Write the coordinates of the next two points that fit the pattern.

c. Where does the line AB cross x-axis?

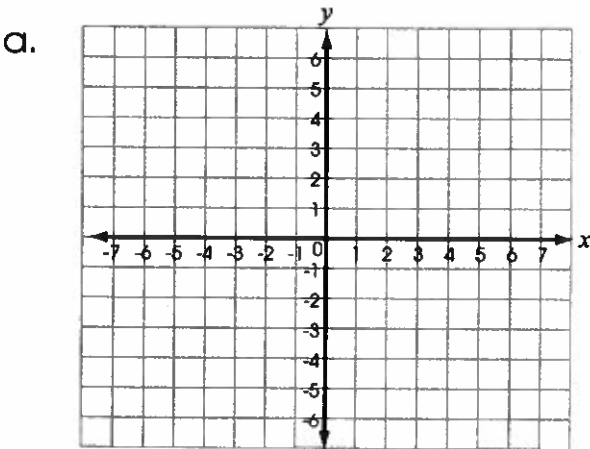
d. Is it possible to draw a straight line passing through the points B, D, and E?

⑤ Plot each group of points on the grid. Then join the points to form the right triangles.

Triangle A
(-3,4), (3,4), (3,-4)

Triangle B
(-6,4), (-2,-2), (-6,-2)

Triangle C
(4,0), (7,-4), (4,-4)



c. Which two triangles are similar?

d. Which triangle lies in the 4th quadrant?

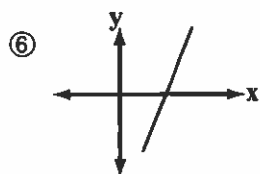
e. How should we move B so that it completely lies in the 3rd quadrant?

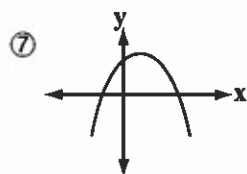
b. Find the area of each triangle.

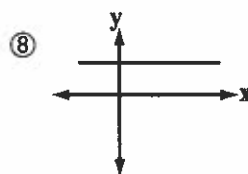
	Area	
A		square units
B		
C		

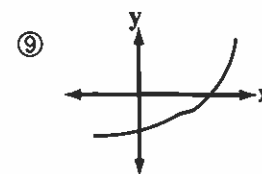
f. Draw a square with an area of 9 square units inside A. What are the vertices of the square?

State whether each graph shows a linear or nonlinear relationship.







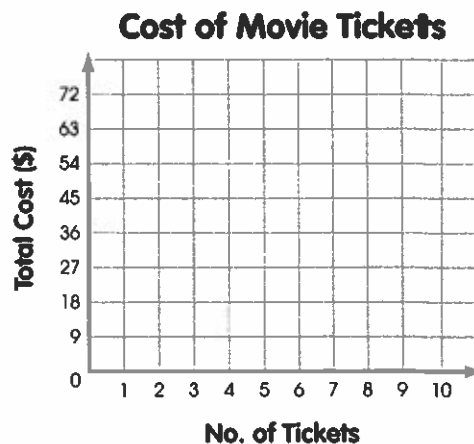


Complete the table of values and graph the relations. Then answer the questions.

⑩ Movie tickets cost \$9.00 each.

a.

No. of Tickets	Total Cost (\$)
0	0
1	9
2	
3	
4	



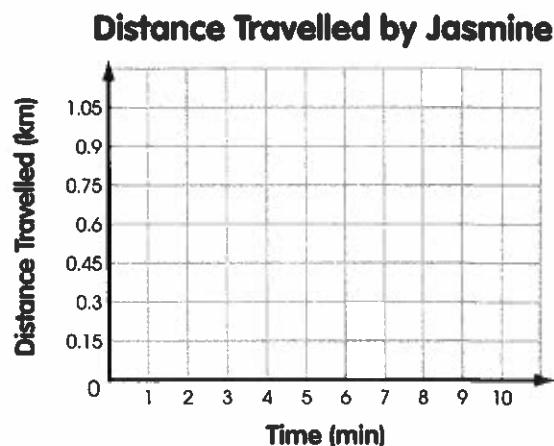
b. Describe the graph.

c. What is the total cost of 7 tickets?

⑪ Jasmine walks 0.15 km/min.

a.

Time (min)	Distance Travelled (km)
0	0
1	0.15
2	
3	
4	



b. Describe the graph.

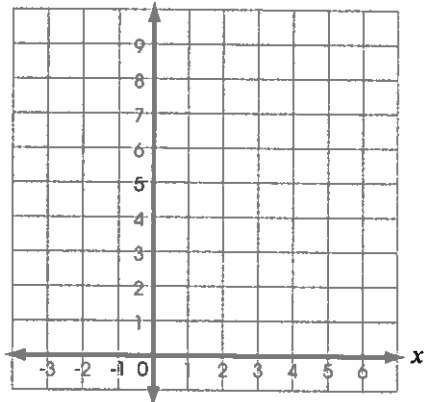
c. How far can Jasmine walk in 5 min?

d. How long does it take Jasmine to walk 0.9 km?

12 Here are the points: A(-2,9), B(-1,8), C(1,6), D(2,5), E(4,3), F(6,1).

a. Find the sum of the coordinates of each ordered pair. What do you notice?
 sum of the coordinates: A: ___ B: ___ C: ___ D: ___ E: ___ F: ___

b. Plot the points on the grid. Then describe the graph.



c. Does the point (8,-2) fit the pattern?

d. Write the coordinates of two other points that fit the pattern.

e. Check the equation that matches the graph.

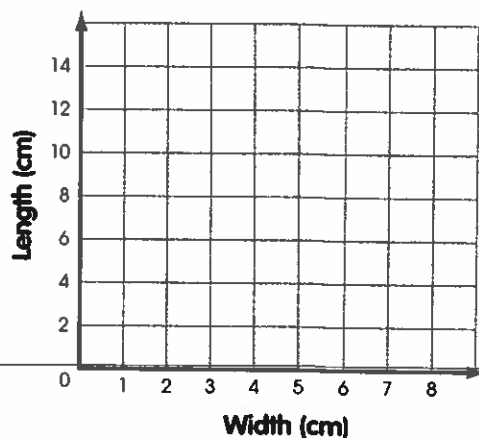
- (A) $y - x = 7$
- (B) $x + y = 7$
- (C) $x = 7 + y$

13 Eddie uses 24 1-cm sticks to build rectangles.

a. Find the possible widths and lengths of different rectangles. Then graph the relation.

Width (cm)	Length (cm)
1	11
2	
3	
4	
5	
6	

Rectangle with a Perimeter of 24 cm



b. Describe the graph.

c. Does the line intersect the x-axis or the y-axis? Explain.

Example

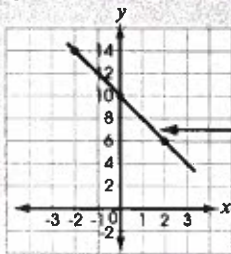
For each relationship, make a table of values. Then graph the relation and describe it.

Graph $y = 10 - 2x$. Use -2, 0, and 2 for the x-coordinates.

Table of Values:

x	y	$\leftarrow 10 - 2x$
-2	14	$\leftarrow 10 - 2(-2) = 14$
0	10	$\leftarrow 10 - 2(0) = 10$
2	6	$\leftarrow 10 - 2(2) = 6$

Plot the points:



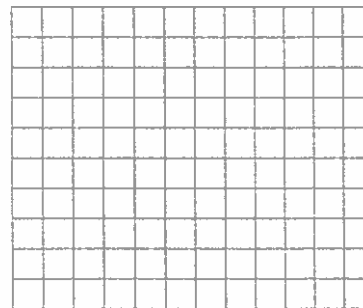
It is a straight line.

It is a linear relation.

Try This

Graph $y = 2x - 3$. Use -3, -1, 0, 1, and 3 for the x-coordinates.

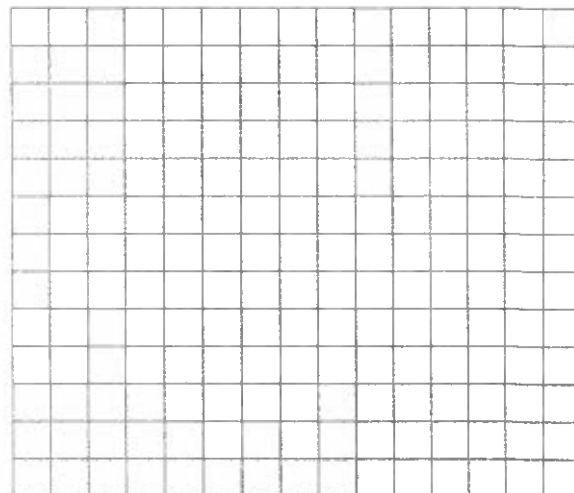
x	y	$\leftarrow 2x - 3$
-3	-9	$\leftarrow 2(-3) - 3 = -9$
-1		



Complete the tables of values. Graph the equations on the grid. Then answer the questions.

⑭

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



Describe the lines on the grid.
