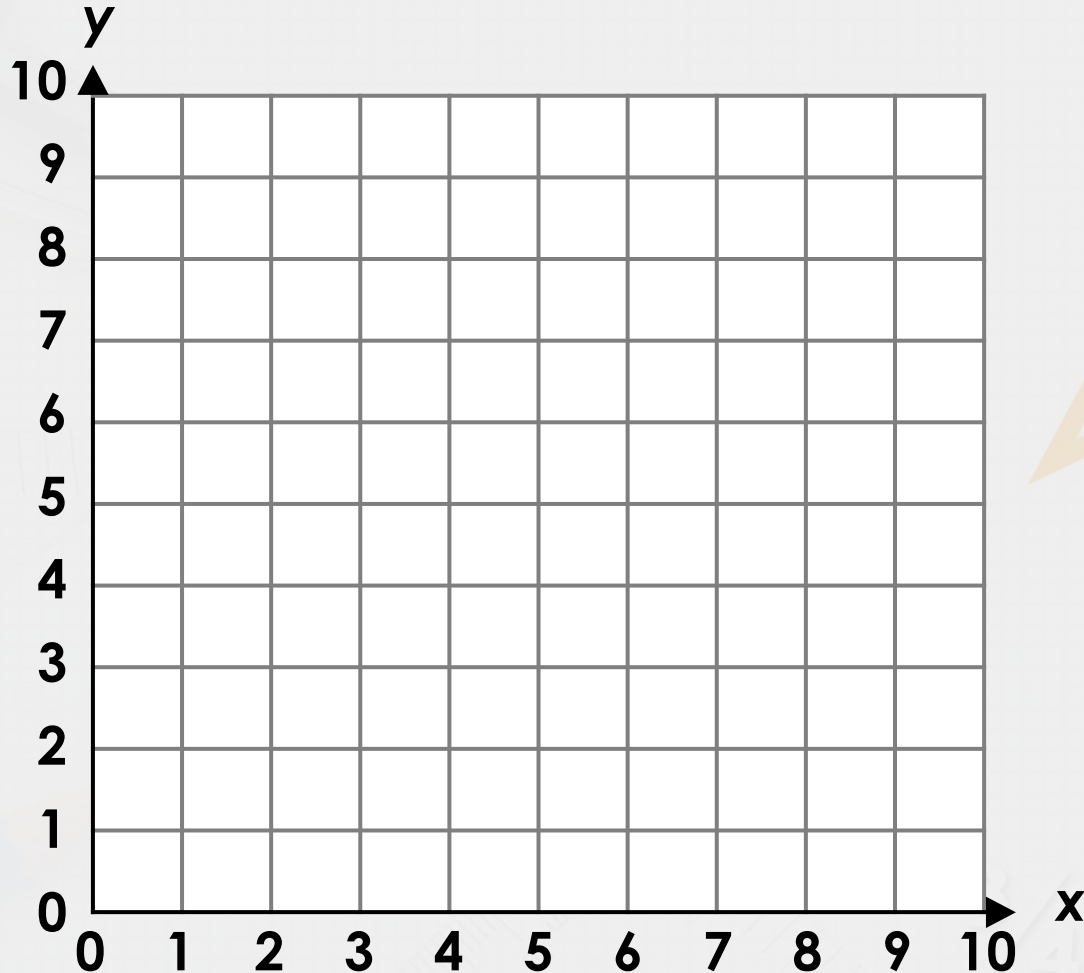


Step 1: Describe Position

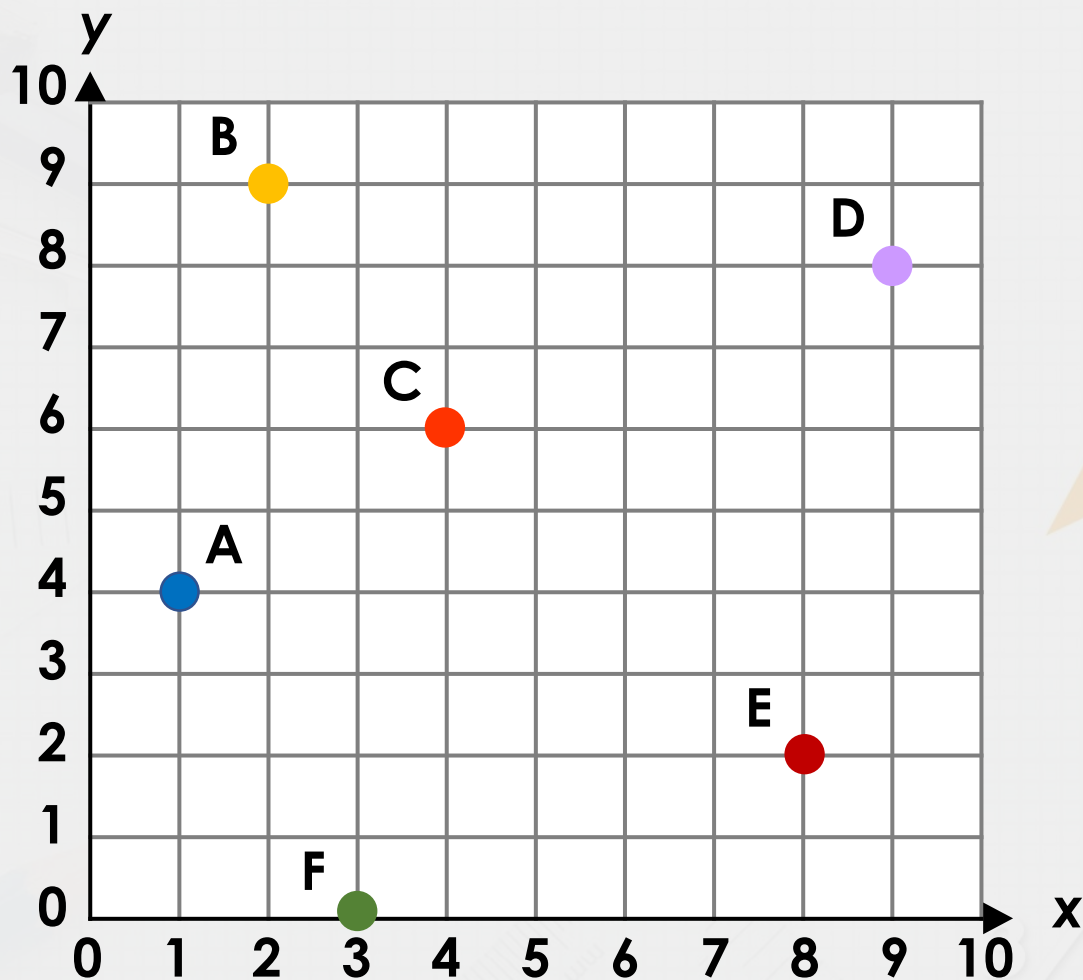
Introduction

The digits in a pair of coordinates add to make 8. What could the coordinates be? Plot them and record them.



Varied Fluency 1

Are the coordinates of each point correct?



$$A = (1, 4)$$

$$B = (9, 2)$$

$$C = (4, 6)$$

$$D = (8, 9)$$

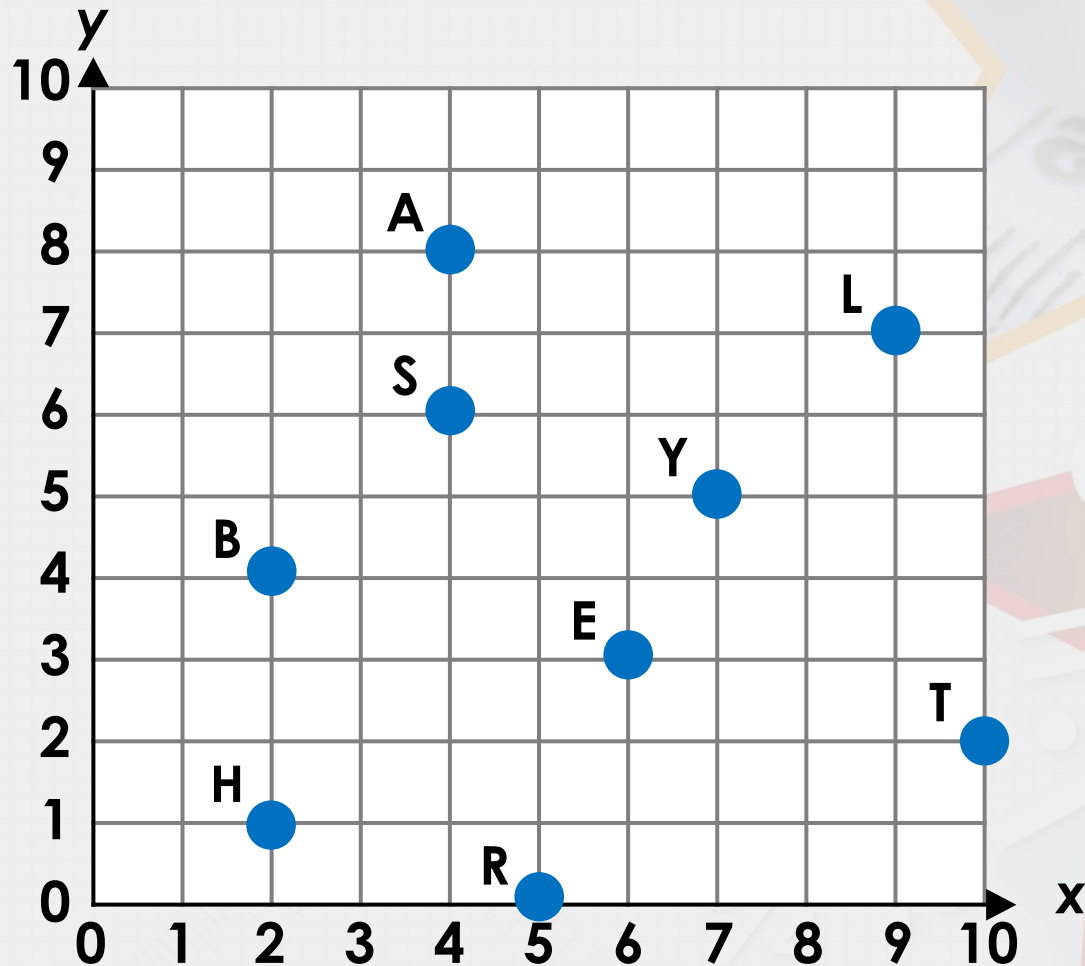
$$E = (8, 2)$$

$$F = (3, 1)$$

Varied Fluency 2

Find these coordinates in order. What word do the letters spell?

(6, 3) (4, 8) (5, 0) (9, 7) (7, 5)



Varied Fluency 3

Complete the coordinates below and plot any missing points on the grid.

$$A = (5, 3)$$

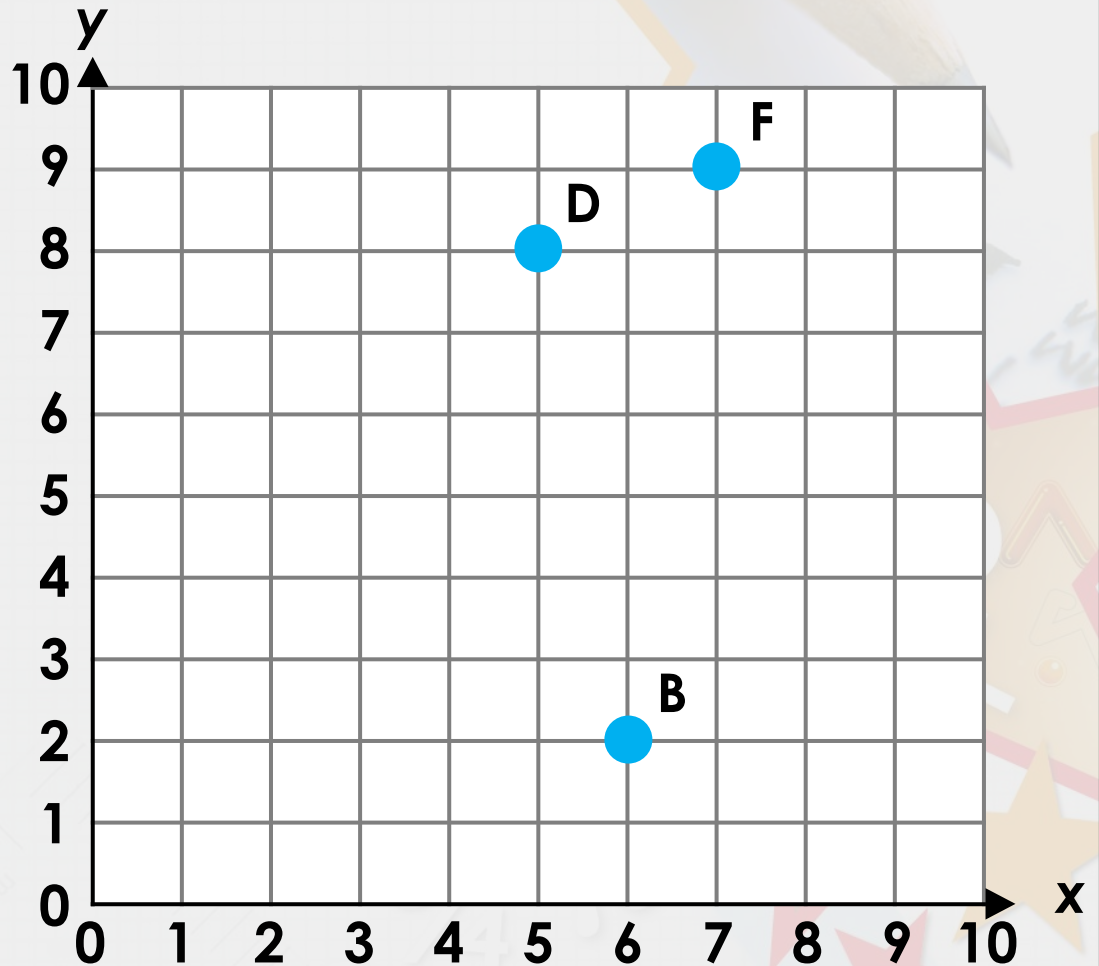
$$B = (,)$$

$$C = (1, 7)$$

$$D = (,)$$

$$E = (4, 6)$$

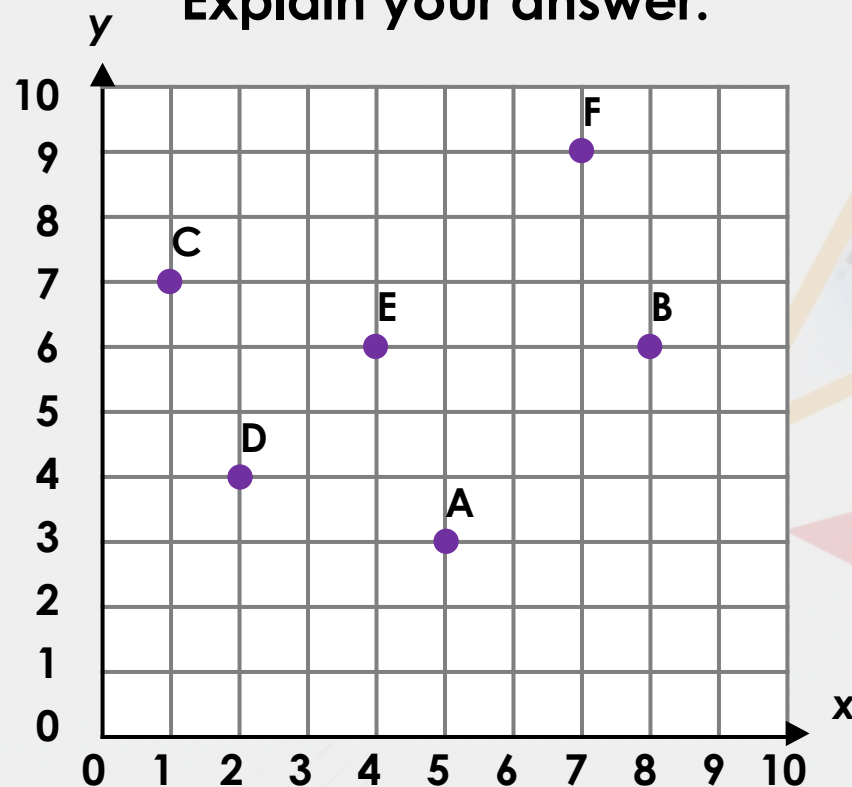
$$F = (,)$$



Reasoning 1

I'm thinking of a coordinate. The value of x is between 3 and 6 and the value of y is between 2 and 5. Which coordinate could it be?

Explain your answer.

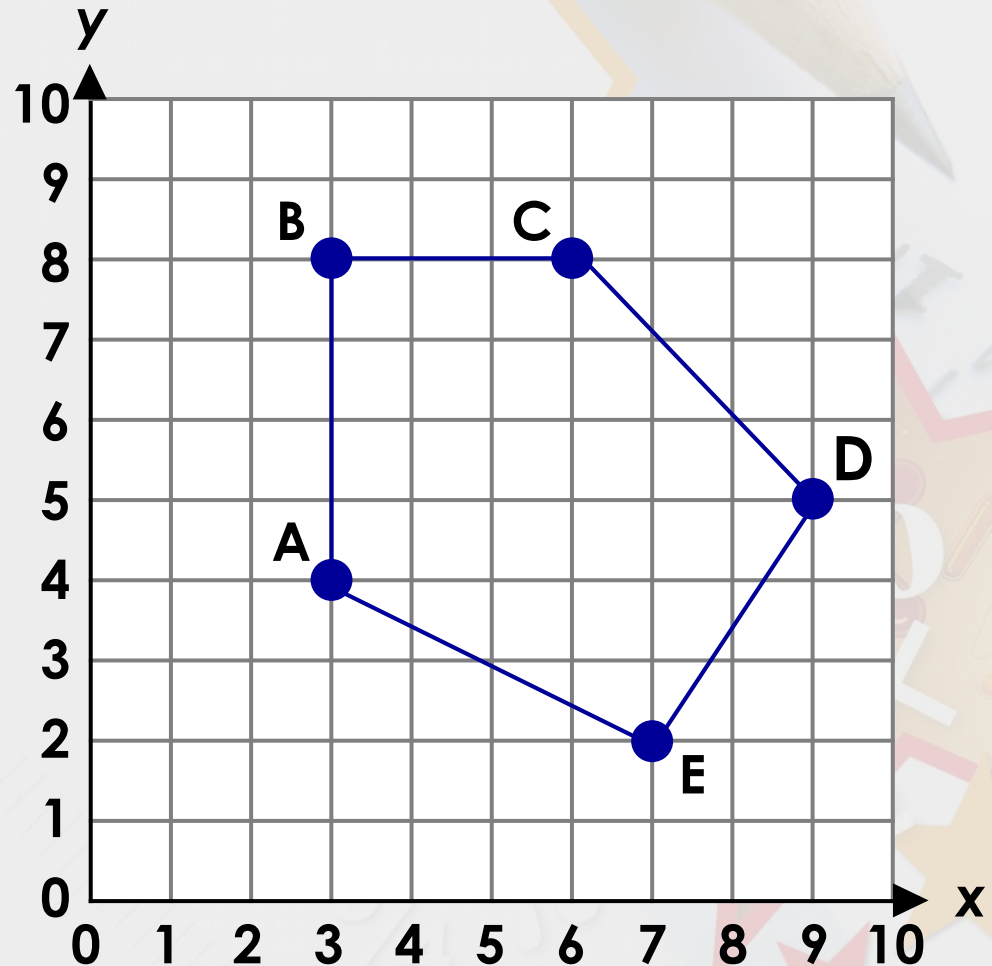


Problem Solving 1

Billy has written the coordinates for a pentagon. Correct any mistakes he has made.



- Point A = (4, 3)
- Point B = (3, 8)
- Point C = (6, 8)
- Point D = (9, 5)
- Point E = (2, 7)



Problem Solving 2

$A = (3, 5)$, $C = (8, 3)$. Use this information to work out the coordinates of points B, D, E and F.

Point A = $(3, 5)$

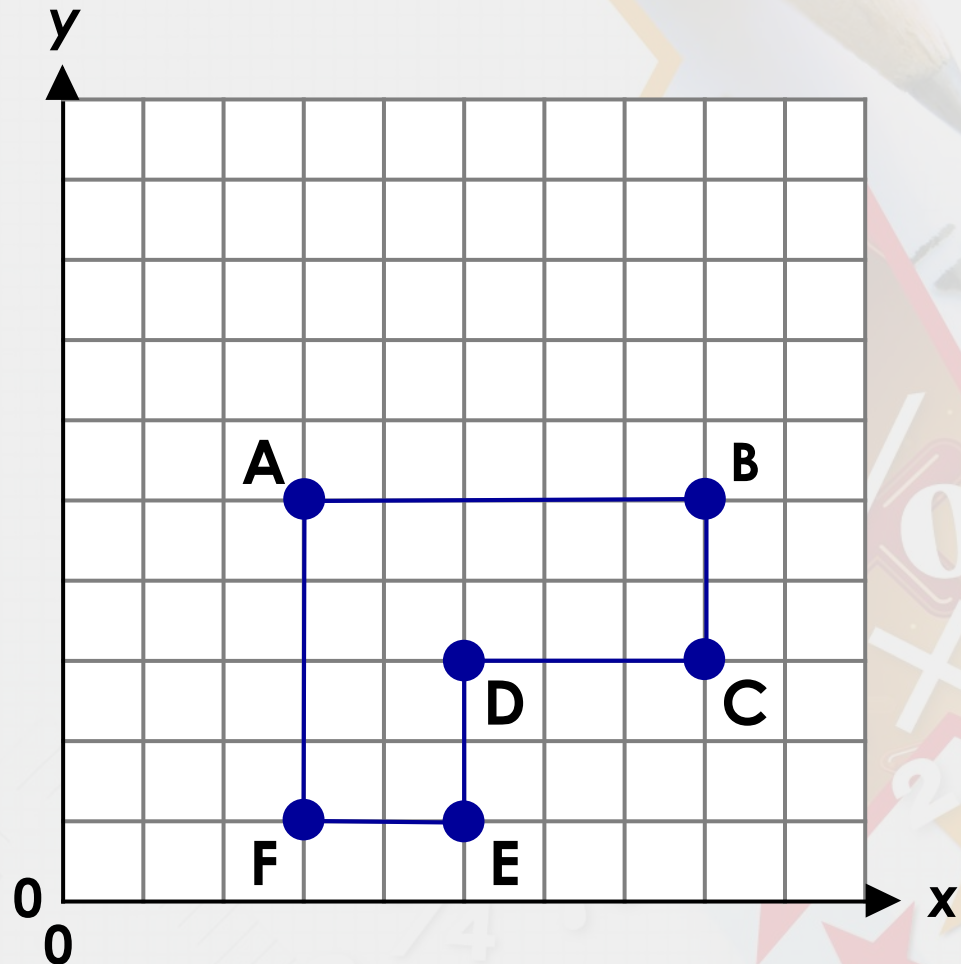
Point B = (\quad , \quad)

Point C = $(8, 3)$

Point D = (\quad , \quad)

Point E = (\quad , \quad)

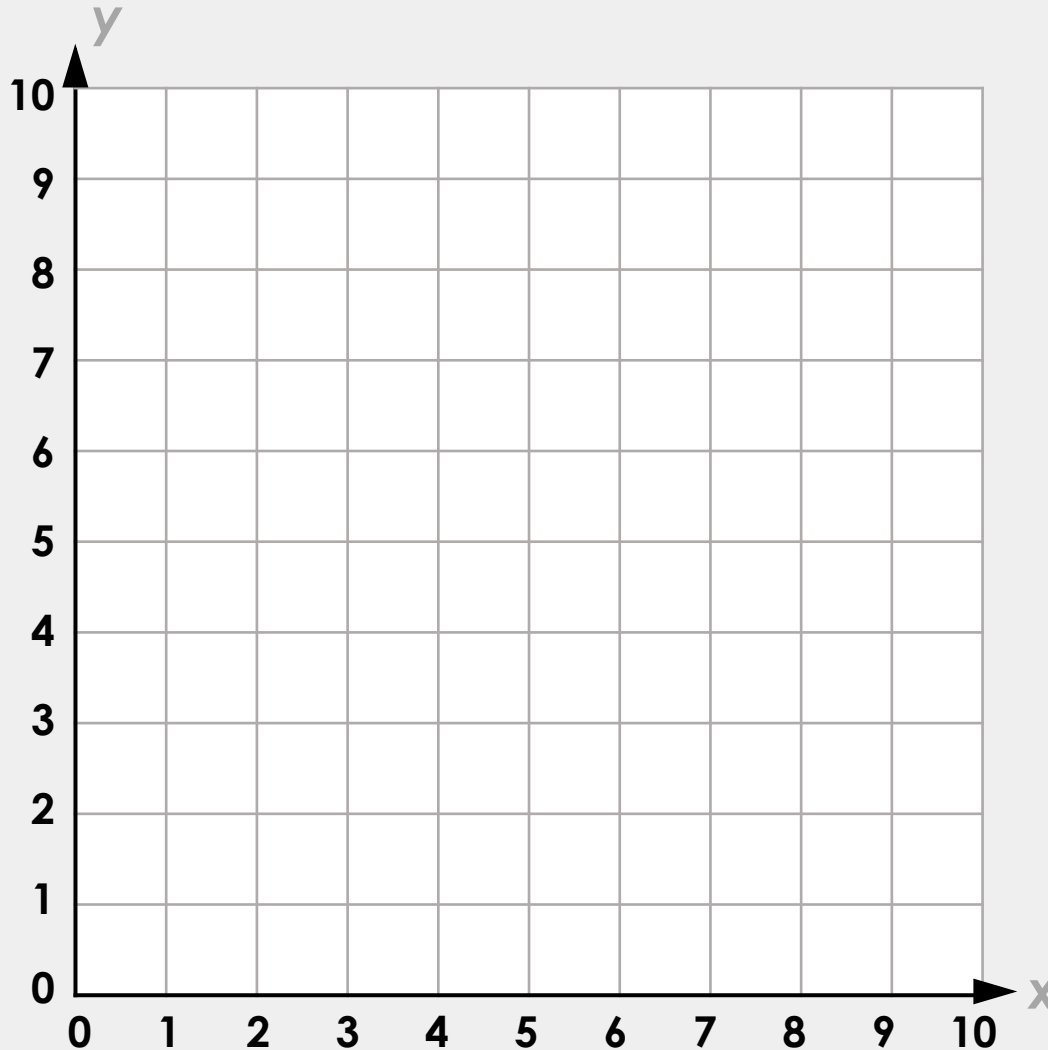
Point F = (\quad , \quad)



Step 2: Draw on a Grid

Introduction

When plotted, which coordinates will make a parallelogram?



$(3, 4)$ $(4, 3)$
 $(7, 4)$ $(4, 7)$
 $(2, 6)$ $(6, 2)$
 $(2, 2)$ $(0, 2)$

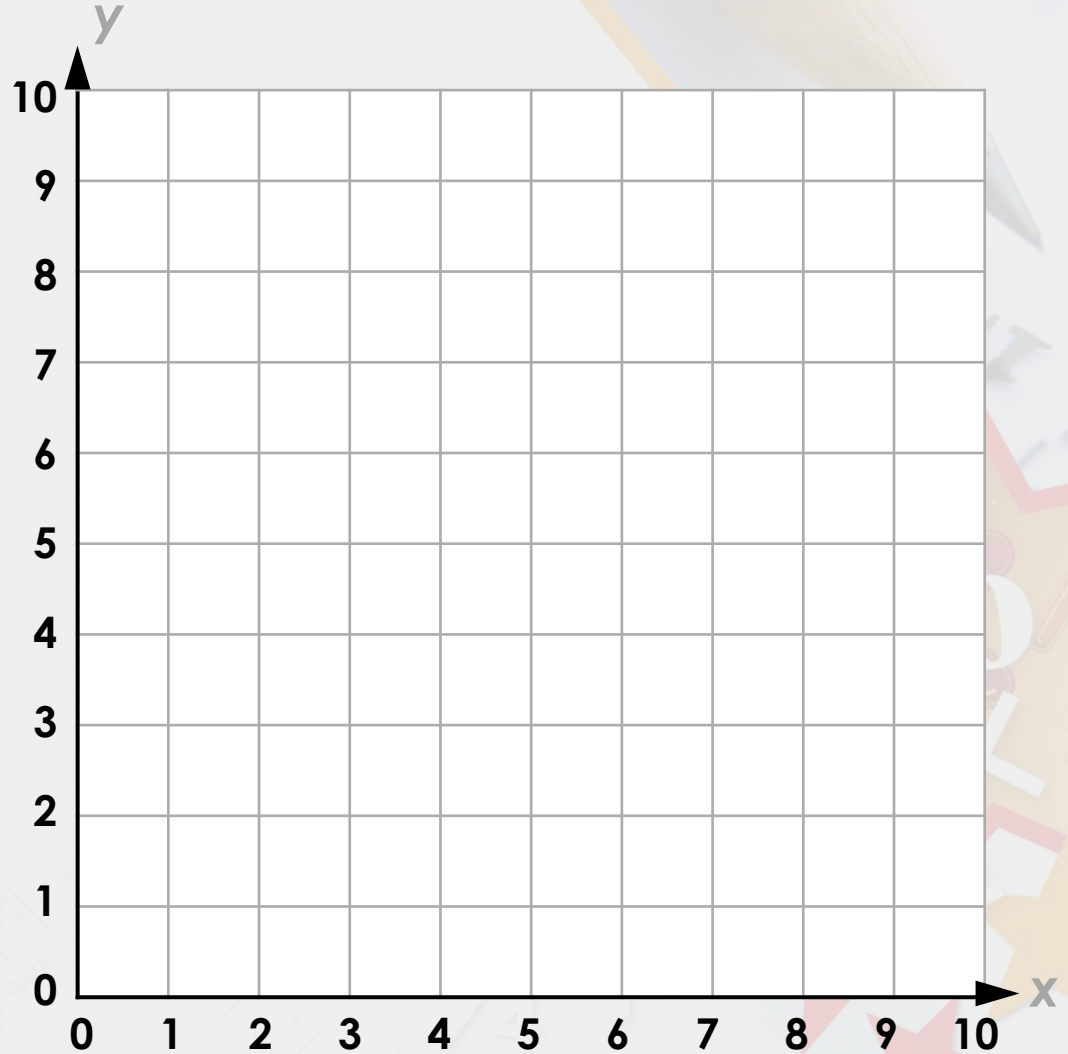
Varied Fluency 1

Plot the points for the coordinates on the grid.

(2, 1)

(5, 4)

(3, 5)



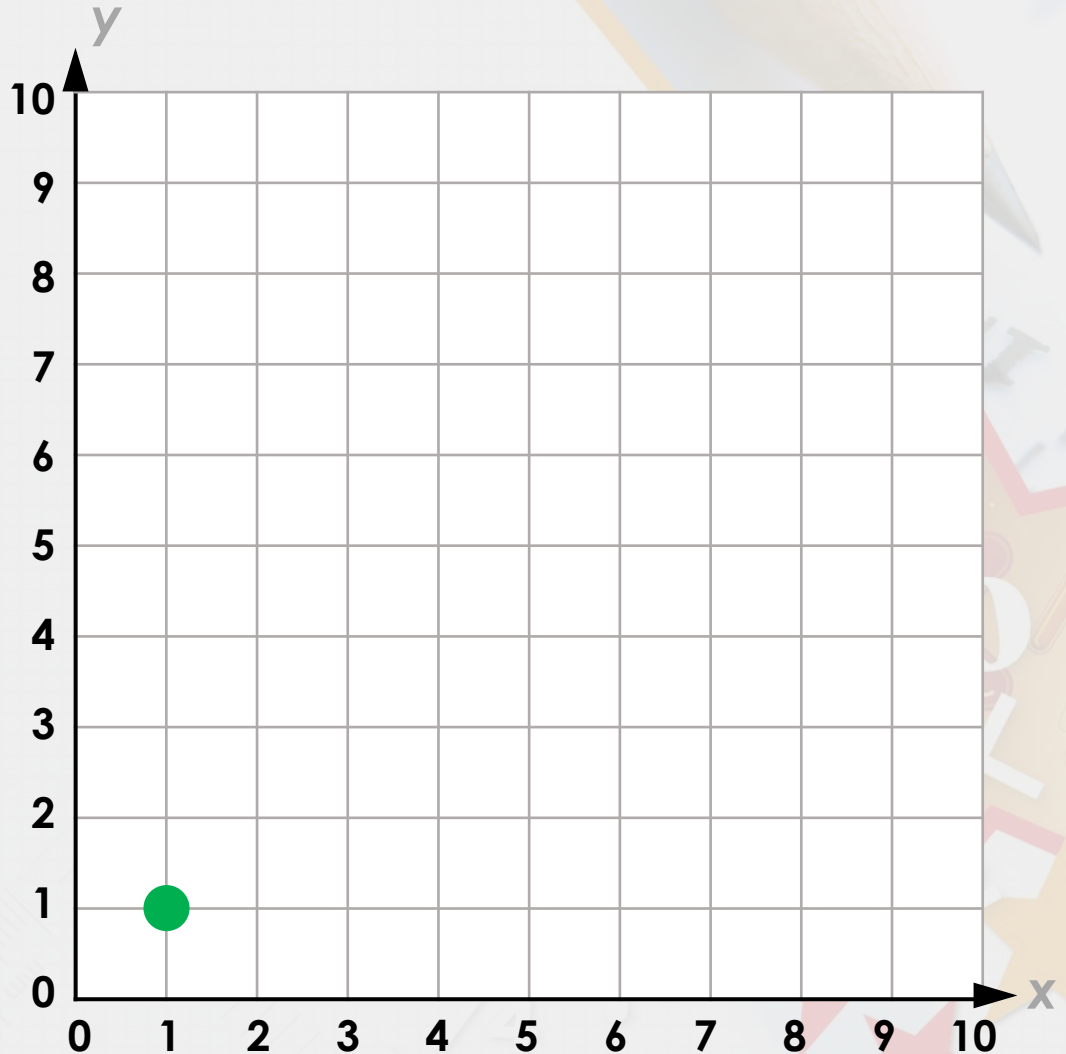
Varied Fluency 2

Draw a right-angled triangle. Start at point A. Write the coordinates.

(1, 1)

(,)

(,)



Varied Fluency 3

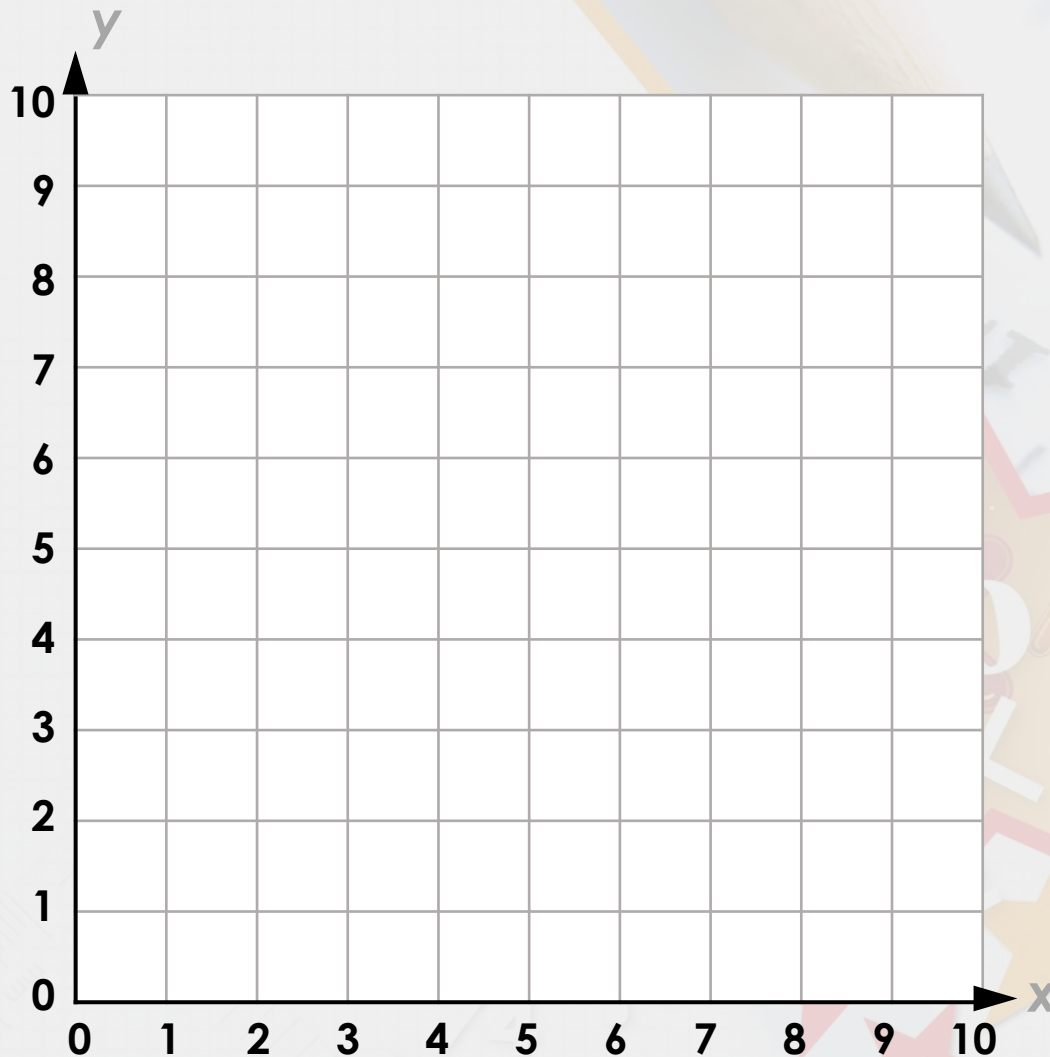
These are the coordinates for the vertices of a square. True or false?

(2, 1)

(7, 1)

(2, 6)

(7, 7)



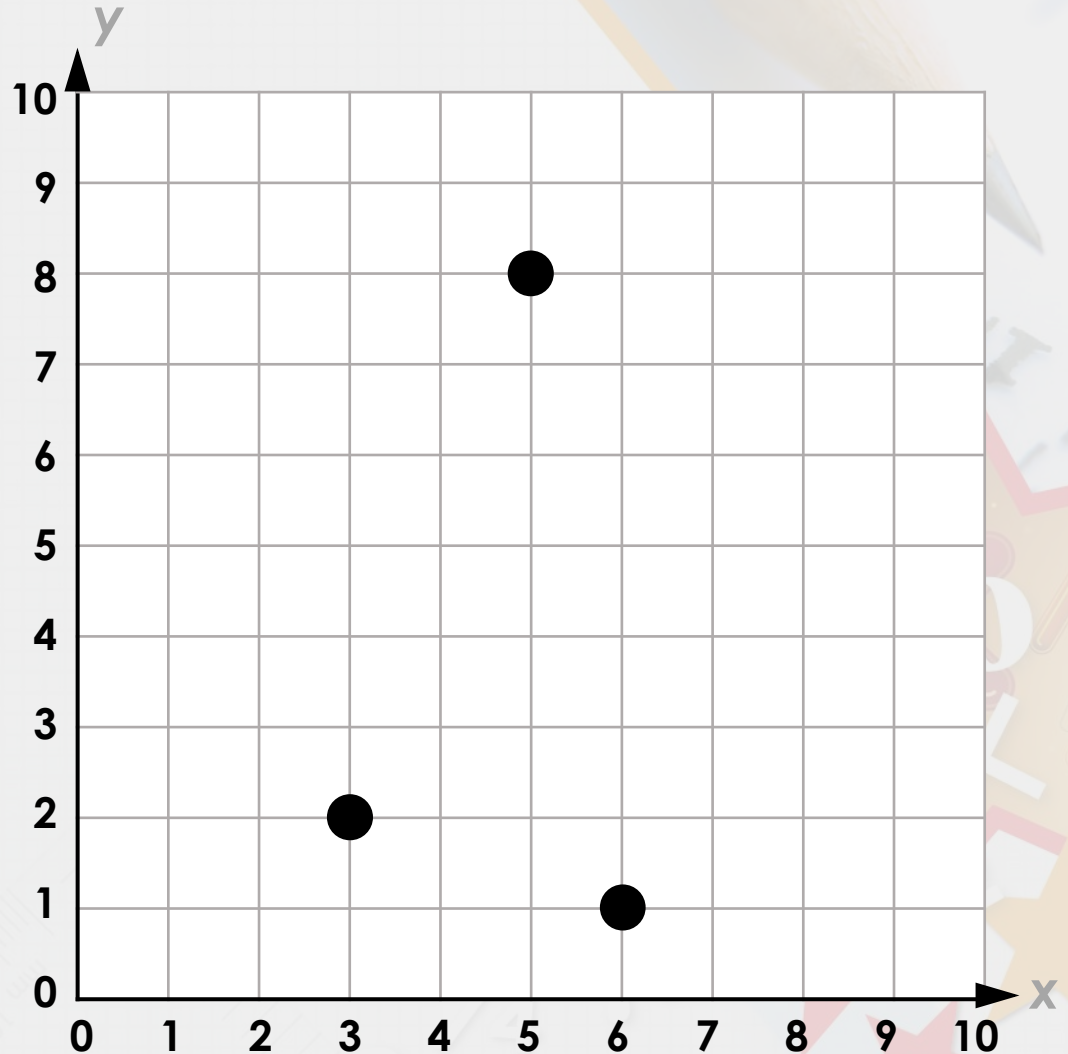
Reasoning 1

Chloe is plotting coordinates. Explain her mistake.

(3, 2)

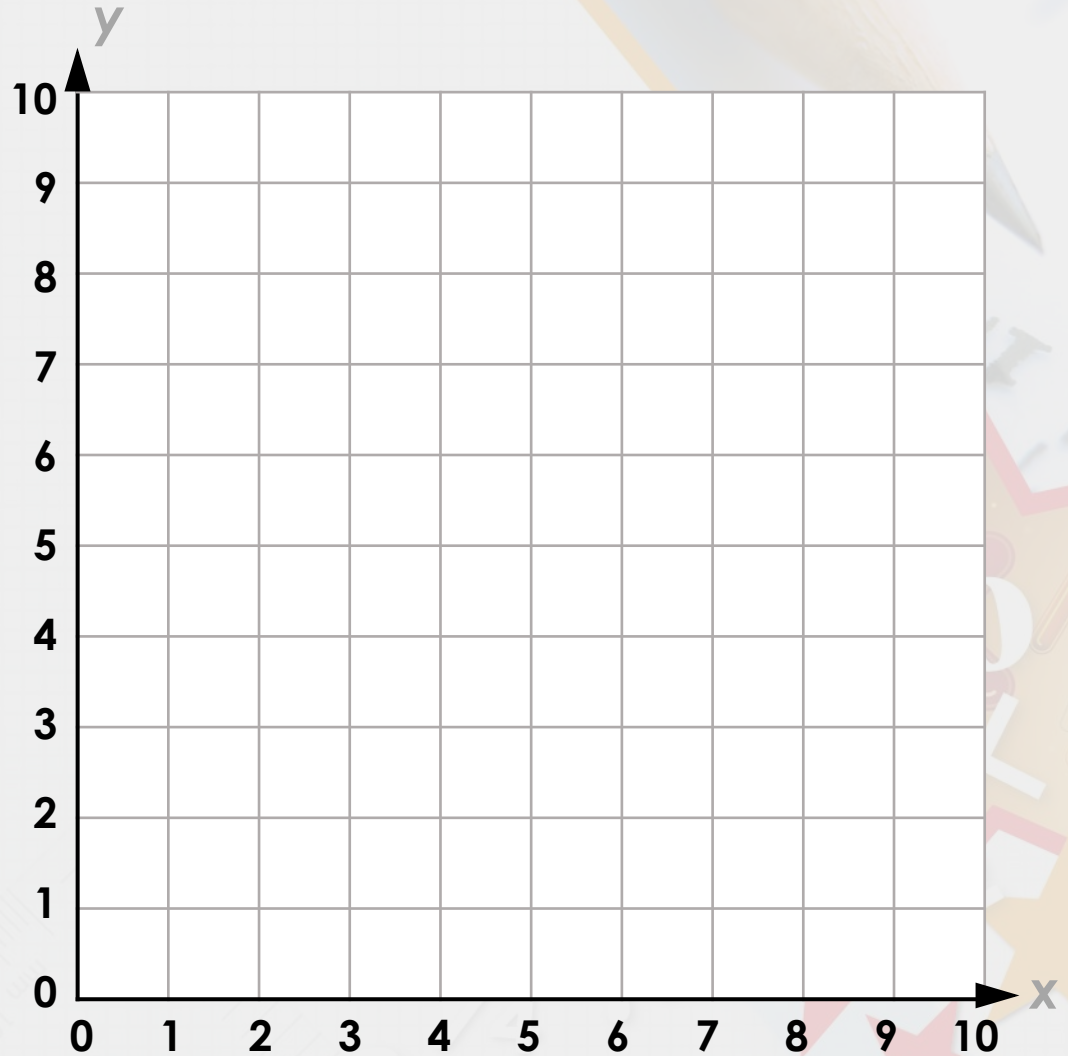
(5, 8)

(1, 6)



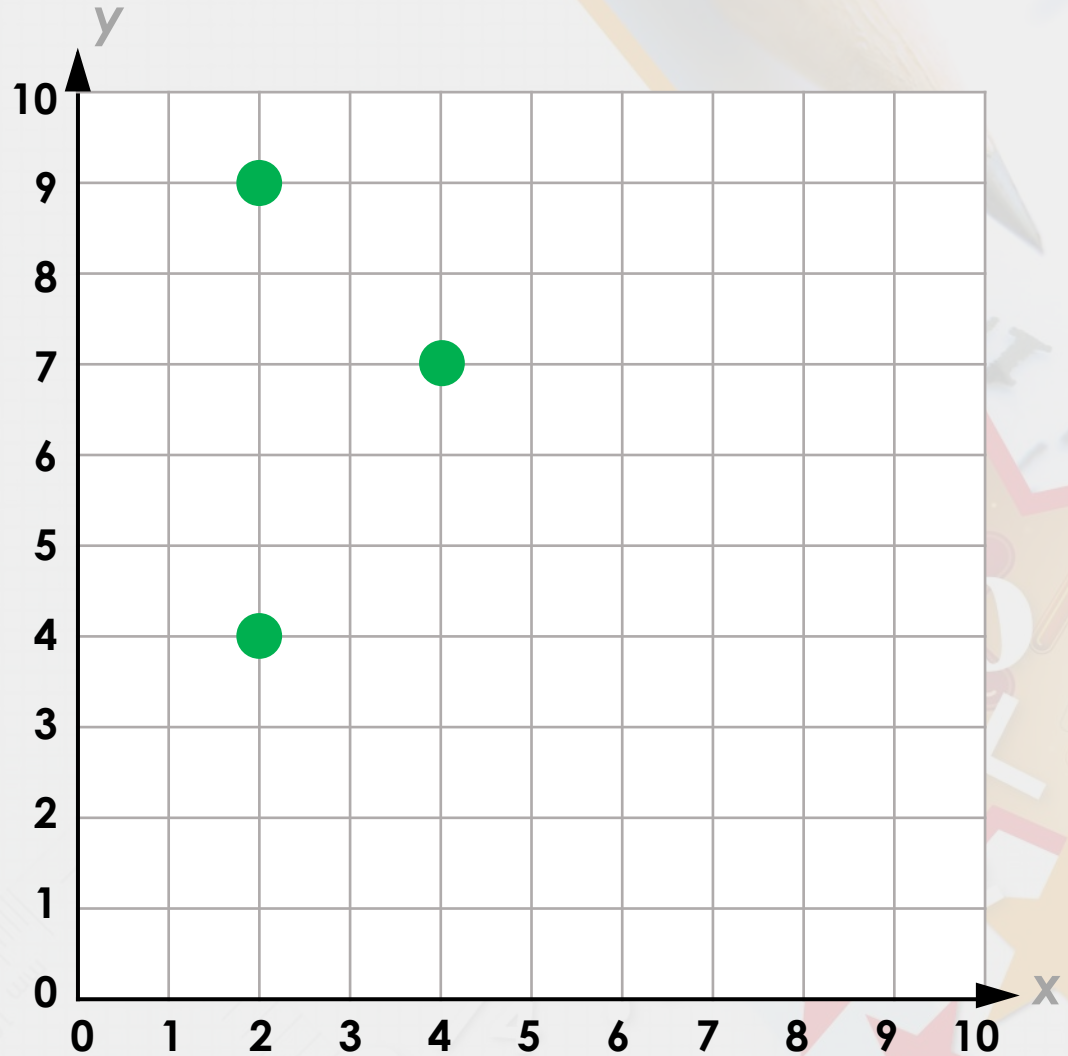
Problem Solving 1

Identify and plot six pairs of coordinates, each with a total of less than 10.



Problem Solving 2

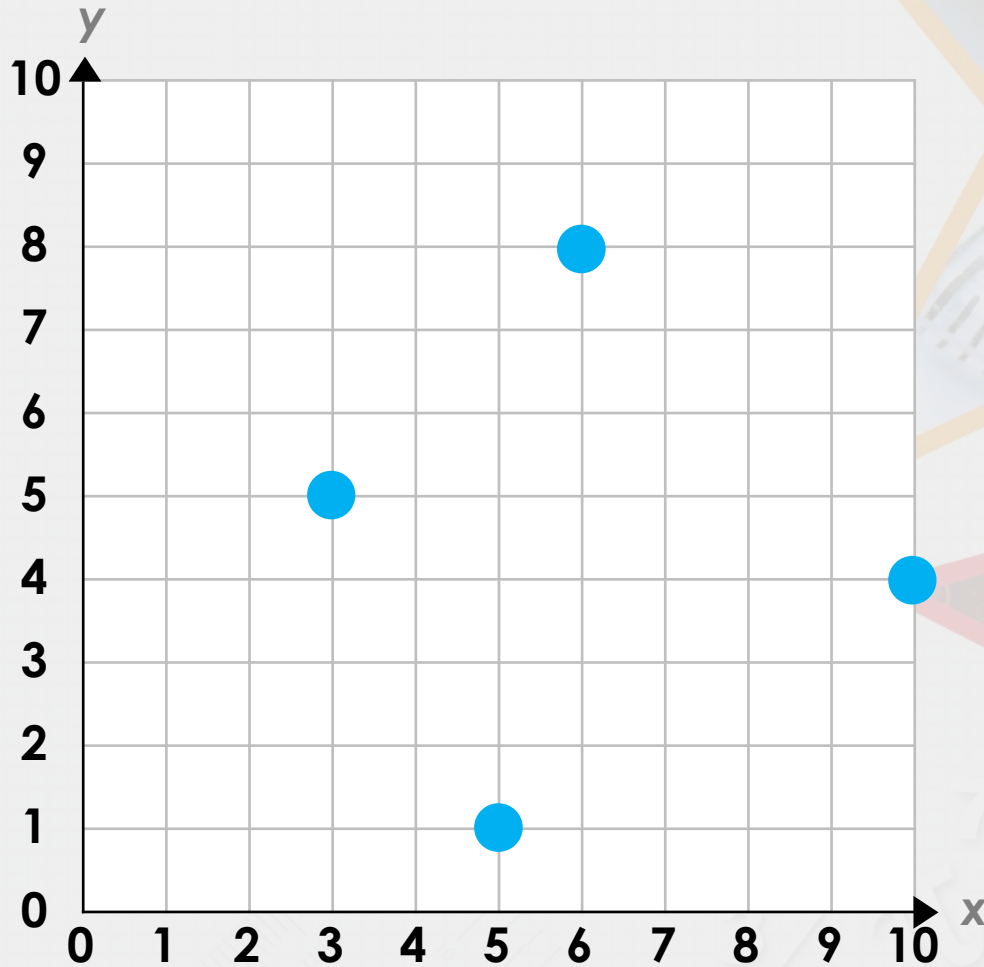
Plot 2 missing coordinates to make a letter made up of straight lines.



Step 3: Move on a Grid

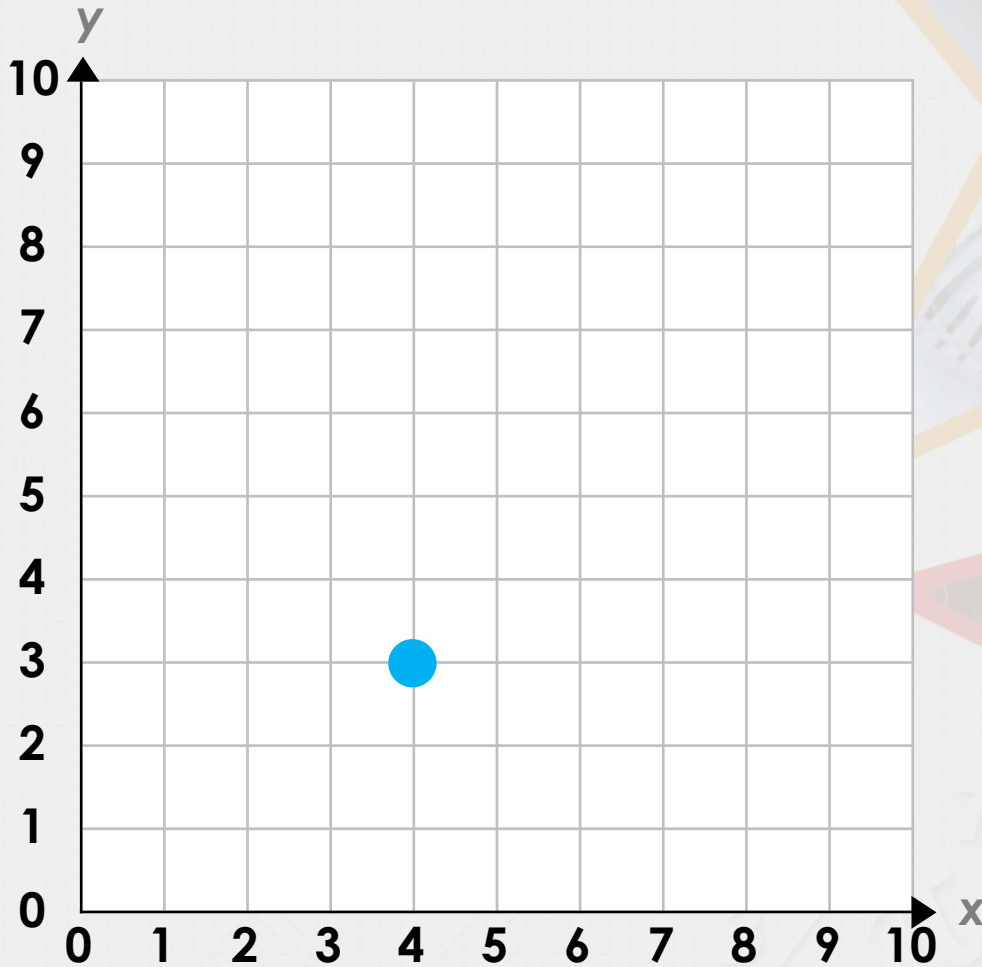
Introduction

Identify the coordinates for each point on the grid.



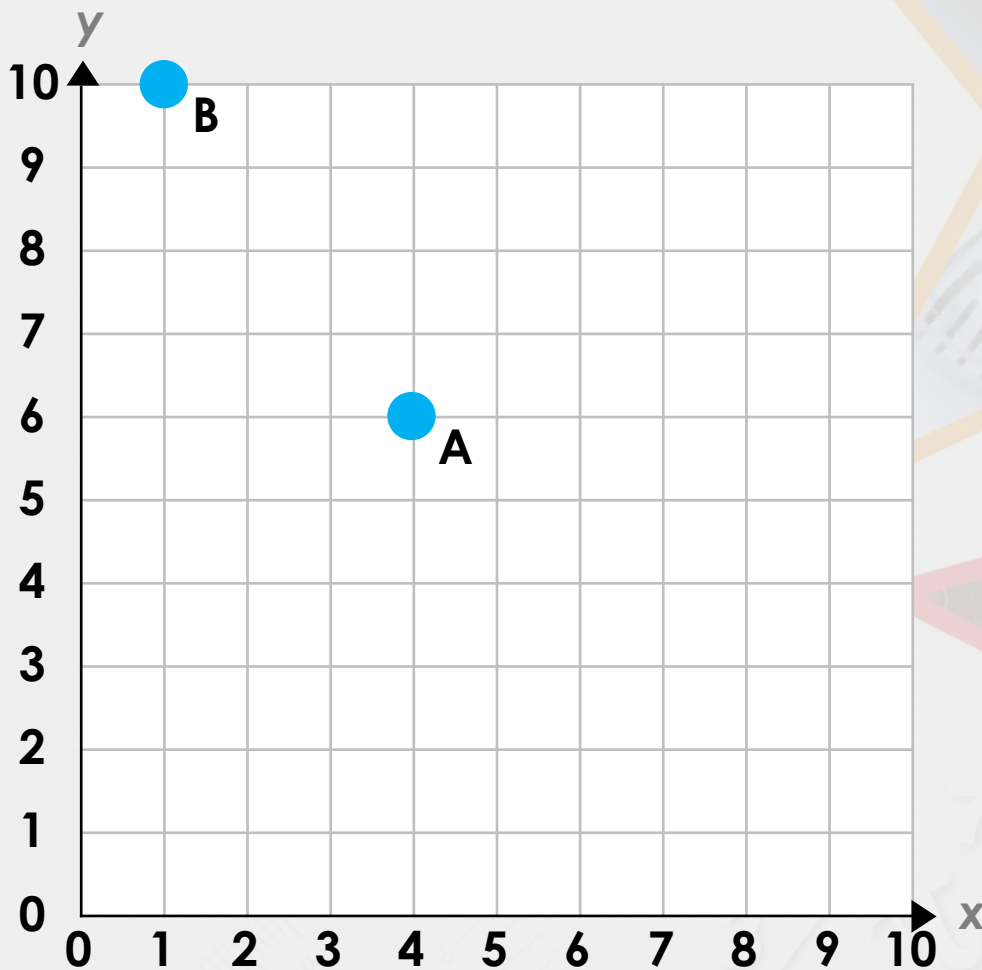
Varied Fluency 1

Translate the point 4 left and 3 up. Record the new coordinates.



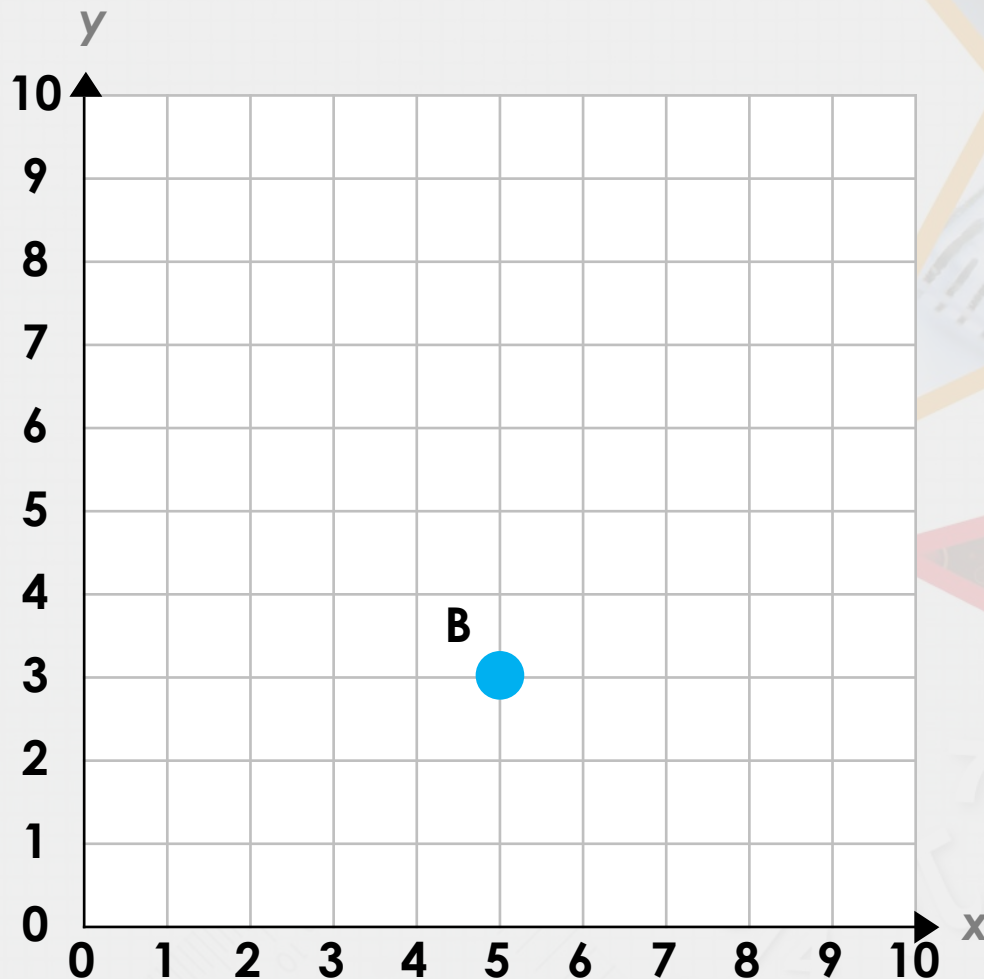
Varied Fluency 2

True or False? Point A has been translated 3 right and 4 up to point B.



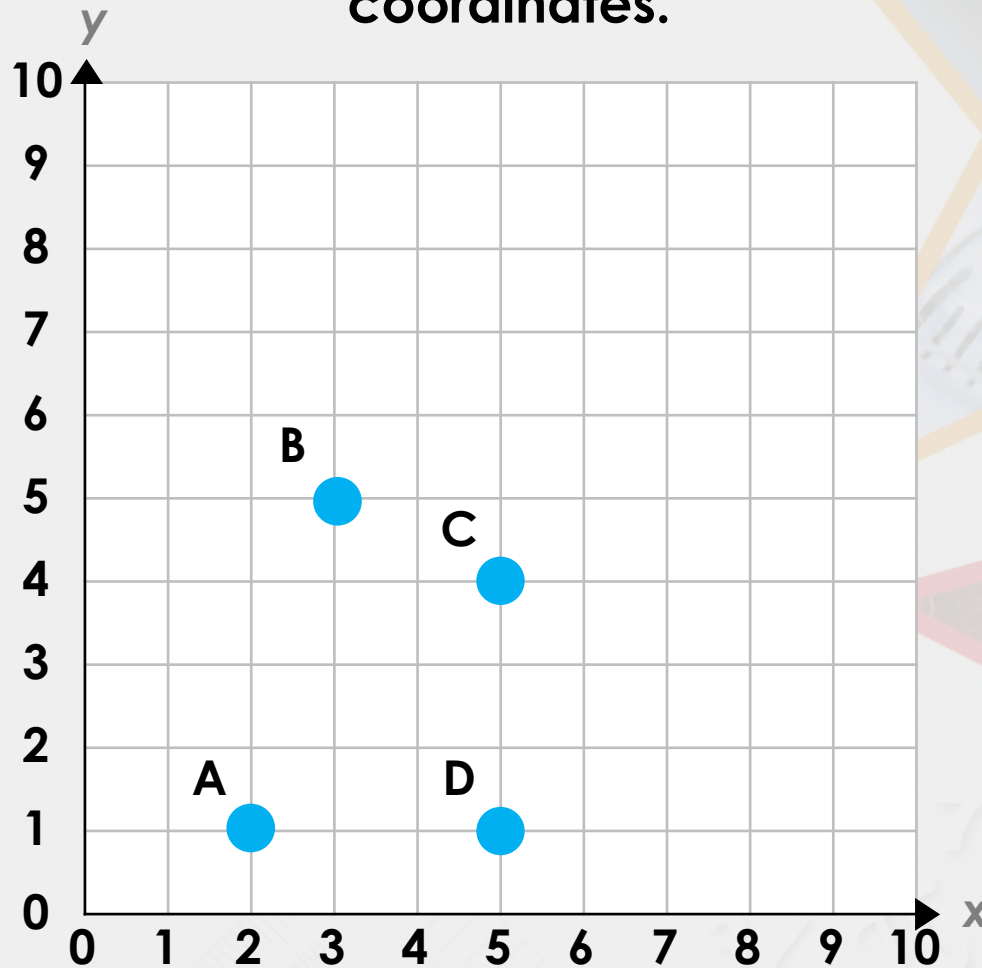
Varied Fluency 3

Point A has been translated 3 squares right and 5 squares down to point B. Record the original coordinates for point A.



Problem Solving 1

Move one point to create the vertices for a square. Record the new coordinates.



Reasoning 1

Points are placed on the following coordinates:

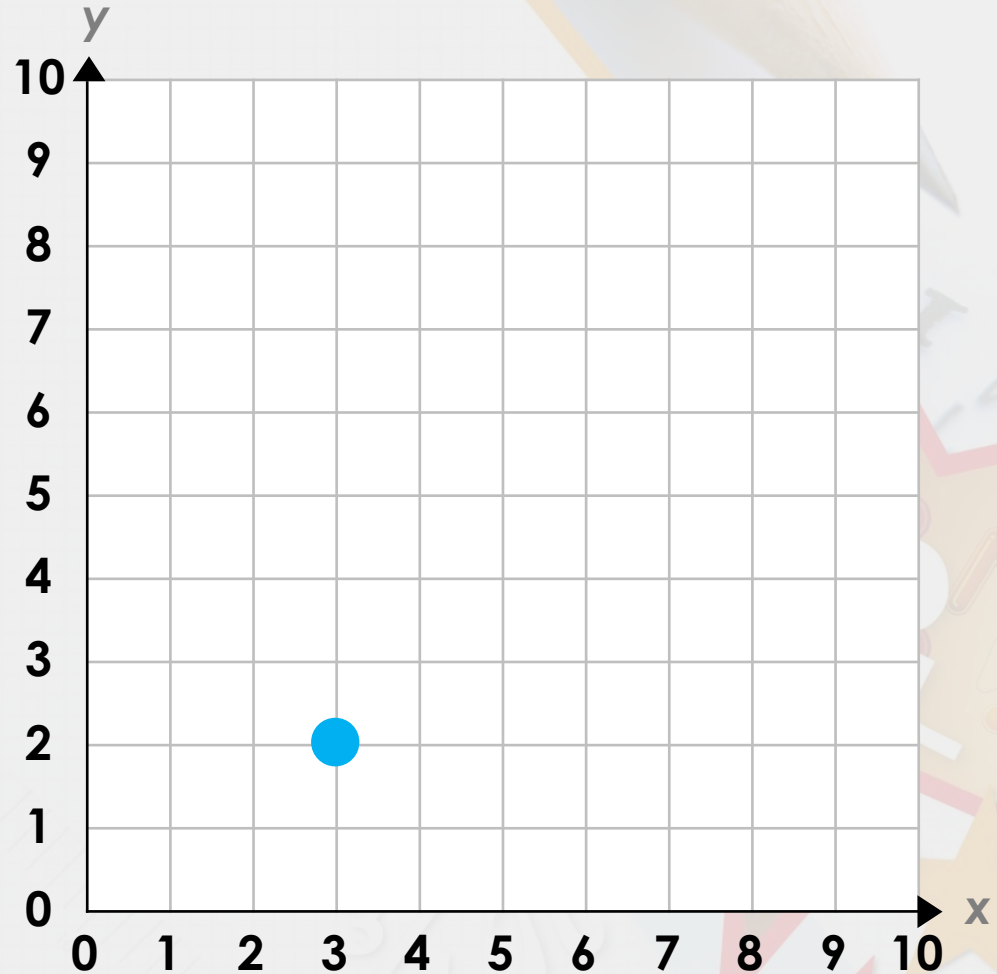
$(7, 5)$ $(4, 7)$ $(5, 4)$

Each of the points have been moved 2 squares in one direction and 2 squares in another.

What could the new coordinates be?
Find 2 possibilities.

Reasoning 2

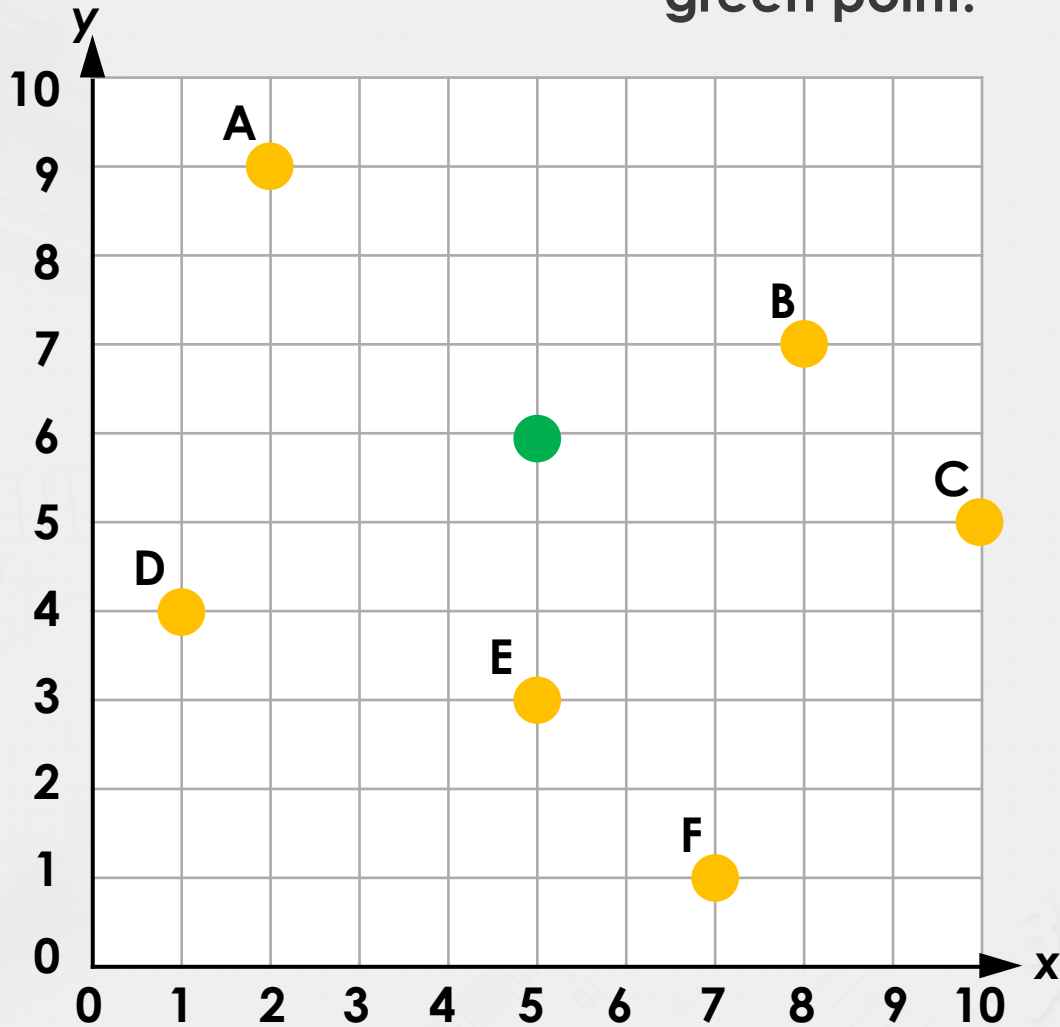
The point was moved 1 right and 2 up.
Greg thinks the original co-ordinates were $(4, 4)$.
Is he correct? Prove it.



Step 4: Describe Movement

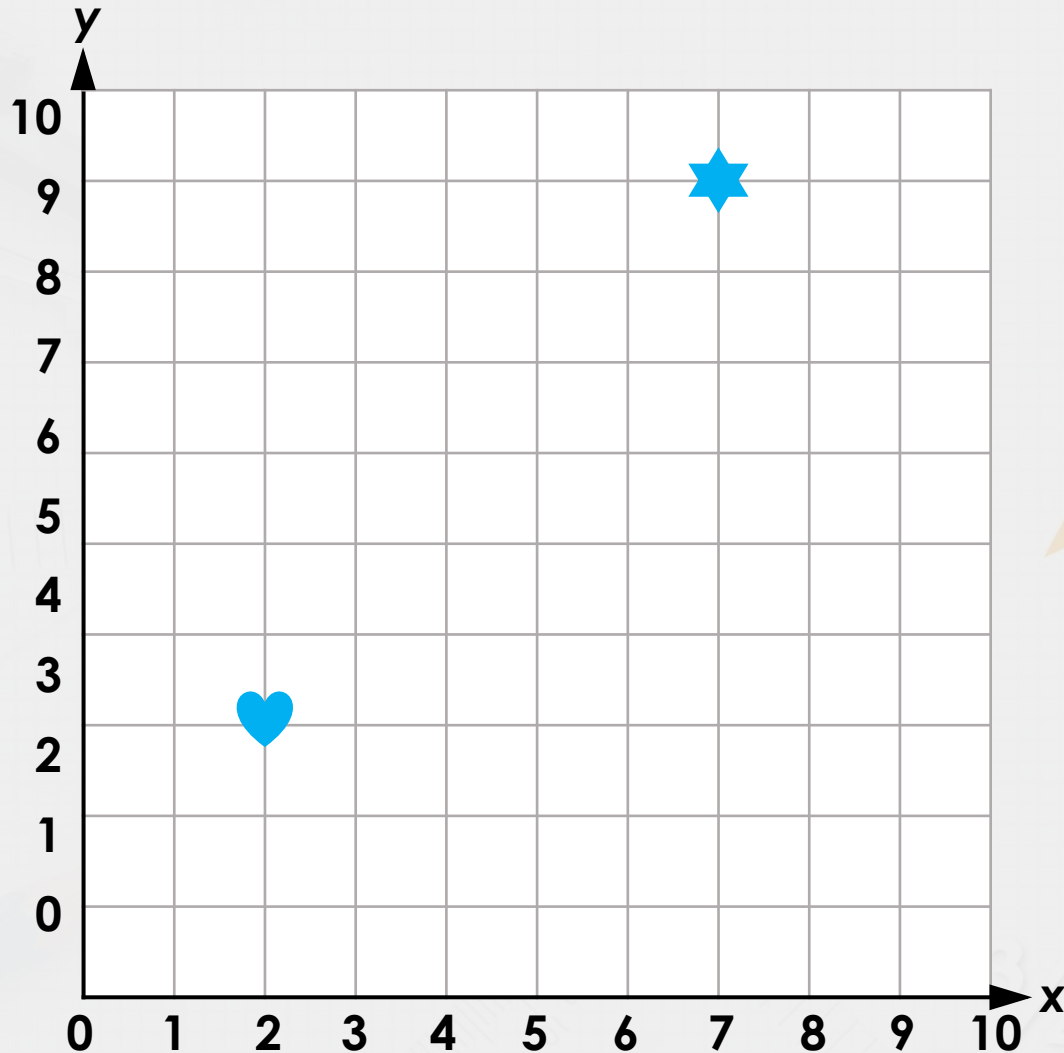
Introduction

Describe how each of the orange points must move to get to the green point.



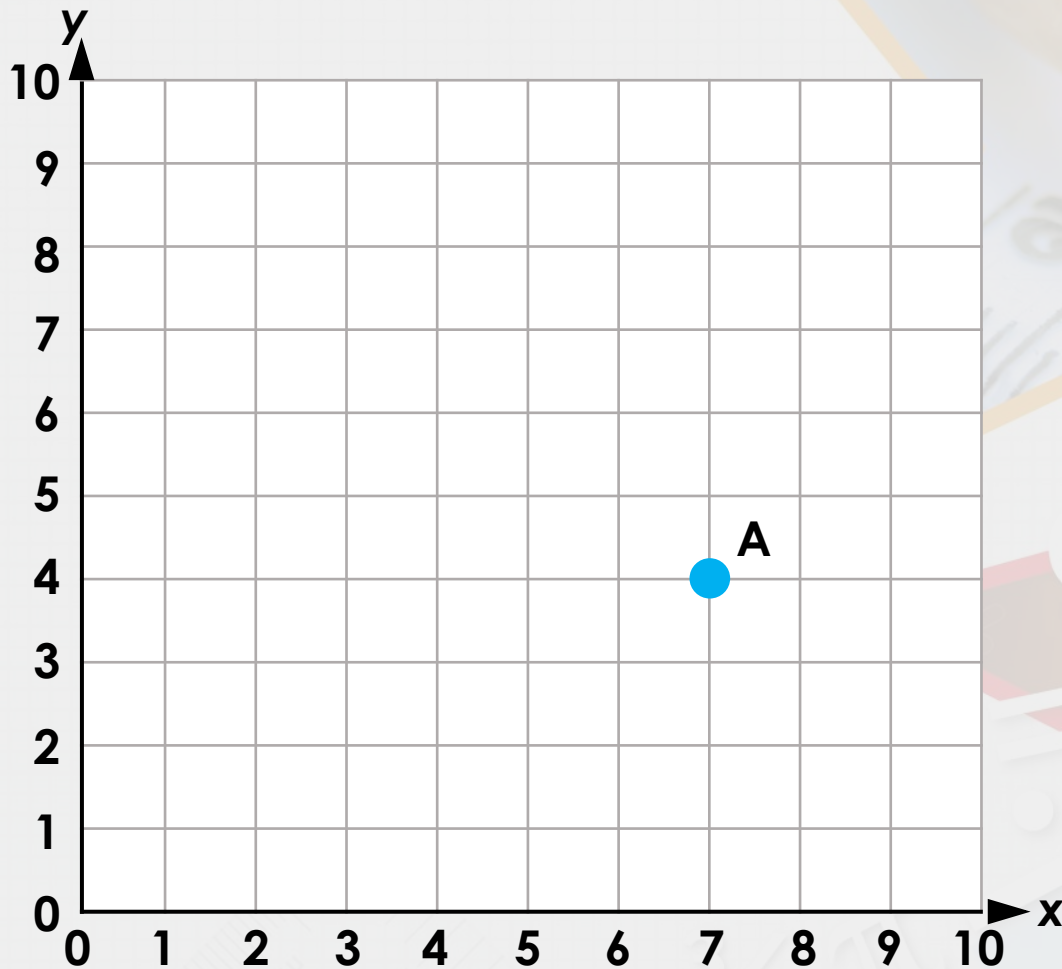
Varied Fluency 1

Describe the movement needed for the heart to get to the star.



Varied Fluency 2

Translate point A 6 left and 4 up. What are the new coordinates?



Varied Fluency 3

A point is plotted on a grid at $(5, 8)$.

It is translated 3 left and 4 down.

What are the new coordinates?

Varied Fluency 4

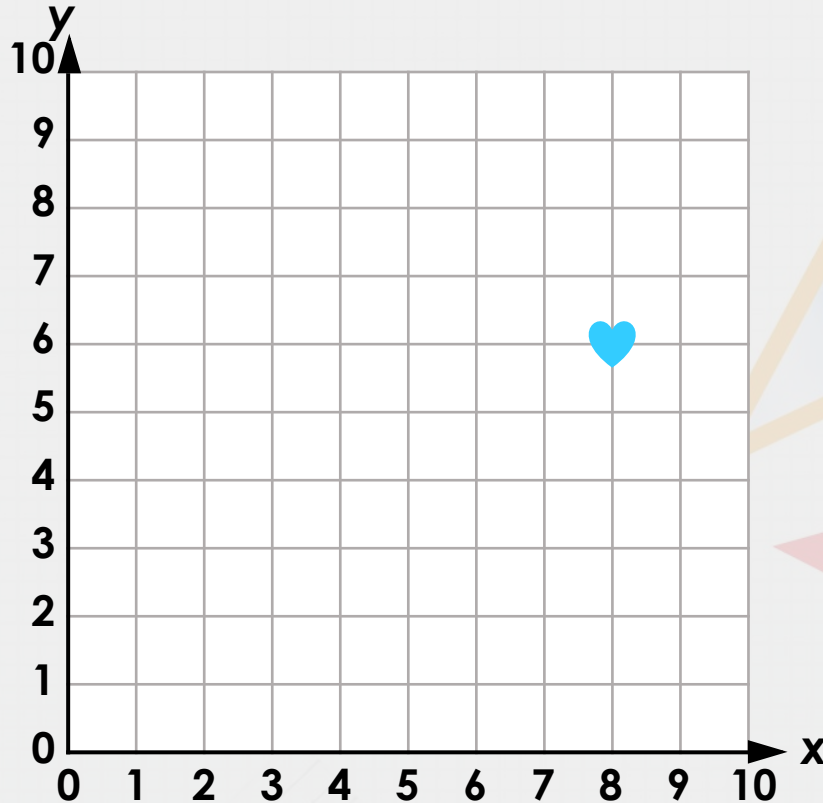
Rebecca has plotted a point on a grid at $(2, 5)$.

It is translated to $(9, 7)$.

How is it translated?

Reasoning 1

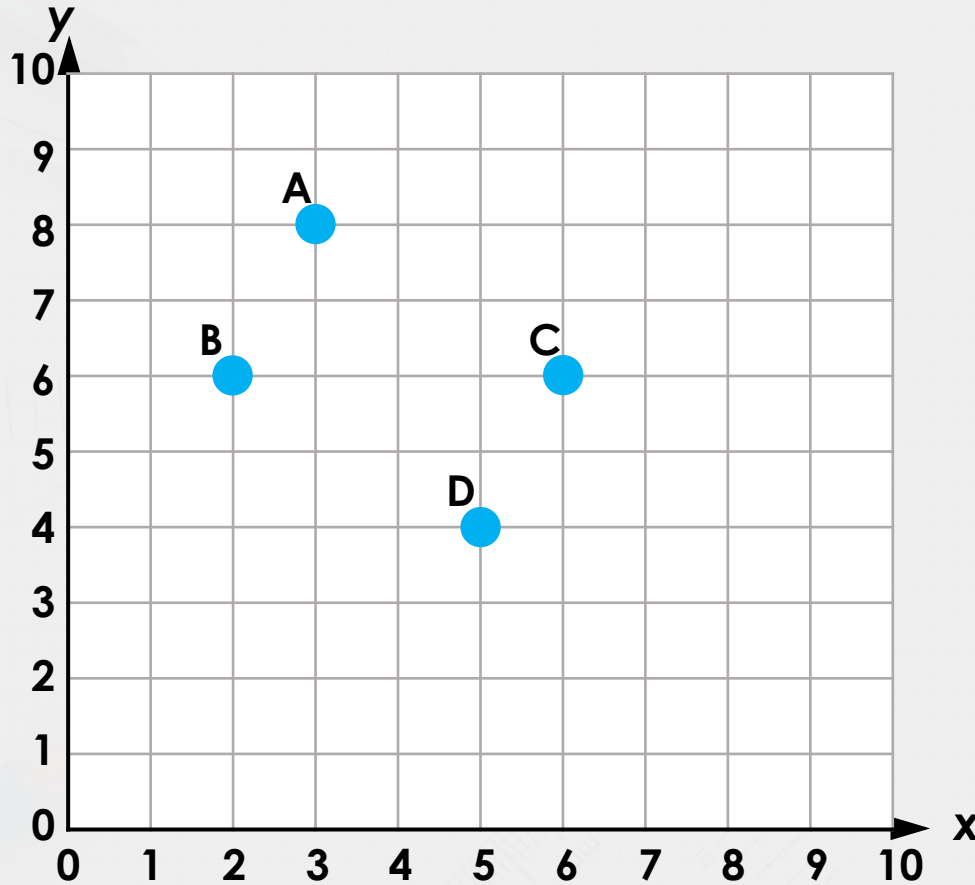
The heart has been translated. Its starting coordinates were $(3, 9)$.
Kate says it has moved 3 right and 4 down.



Is she correct? Explain.

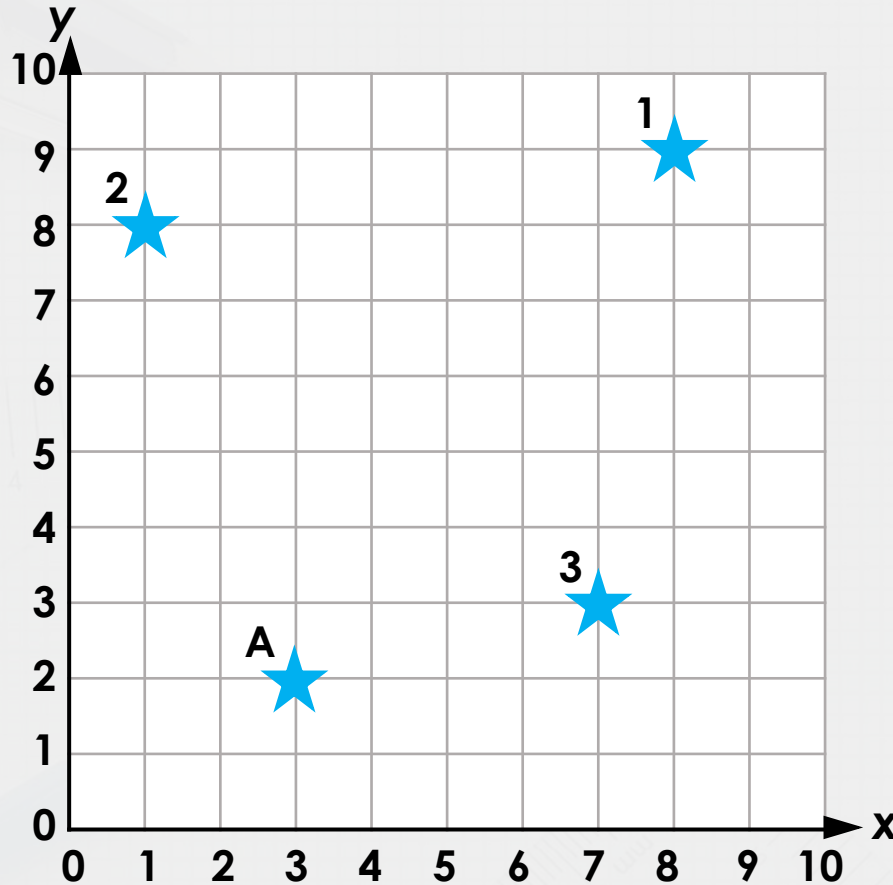
Problem Solving 1

Points A and B make exactly the same translations. Write the translations made and the coordinates of the start and finish positions of each point.



Problem Solving 2

Star A has been translated three times. Match each numbered point to the correct translation statement.



A. 2 left and 6 up

B. 4 right and 1 up

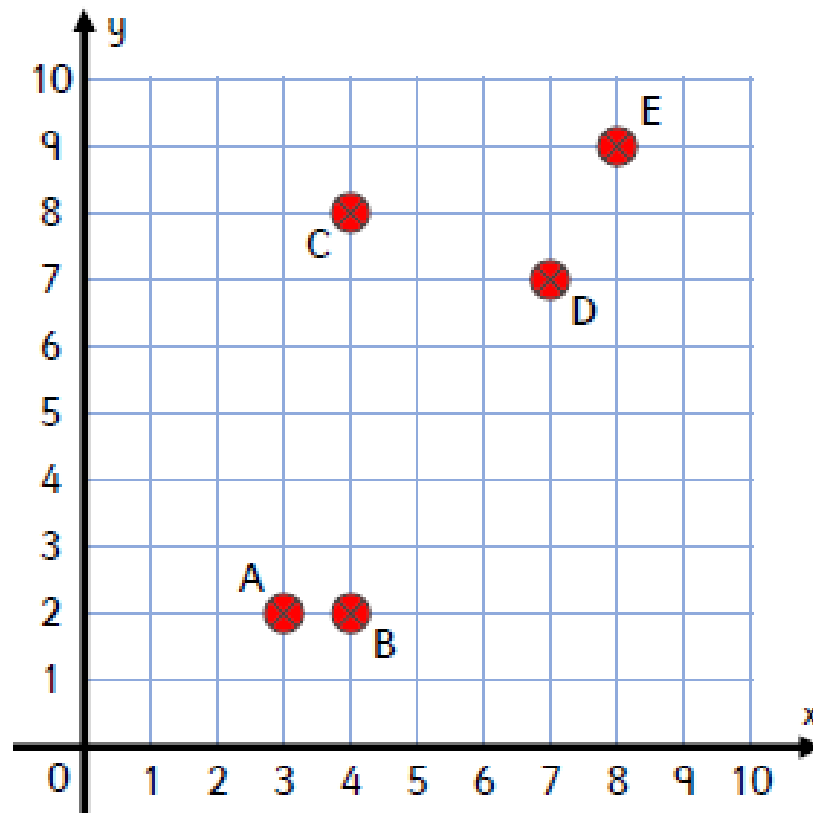
C. 5 right and 7 up

Step 5



Takanori needs to prepare for the *Shipwreckers* Grand Tournament. Last year he came second to his greatest rival, Brenda 'Bullseye' Baird. This year he is going to beat her any way he can. That is his plan, at least. He needs to come up with his tactics and practise his moves. He has been making plans on his laptop for weeks.

'RIKU!' Takanori shouts. His little brother has been playing around with Takanori's things again! Riku has written over one of Takanori's *Shipwreckers* plans!



Shot Plan #6

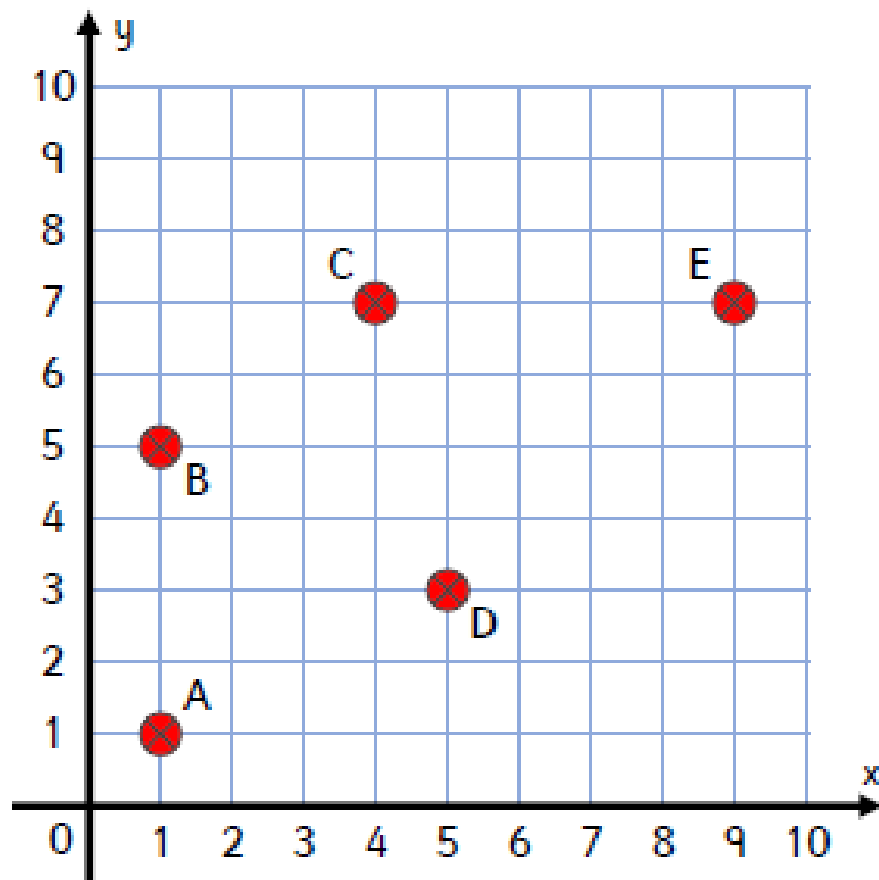
- Shot A: (3, 2)
- Shot B: (4, 2)
- Shot C: (4, 8)
- Shot D: (7, 7)
- Shot E: (9, 8)

Takanori had written his plan on the paper but Riku has scribbled it out and written what *he* thinks are the right coordinates.

1. Compare the shots marked on the grid to the coordinates written on the paper. Find and explain the mistakes Riku has made when writing down the coordinates.



Takanori corrects his brother's mistakes. Now it is time to come up with another shot plan. Takanori wants to make sure he can remember the plan so he can use it in the tournament. He marks the shots on a *Shipwreckers* grid. After that, he comes up with rules to help him remember the coordinates.



Shot Plan #7 Rules

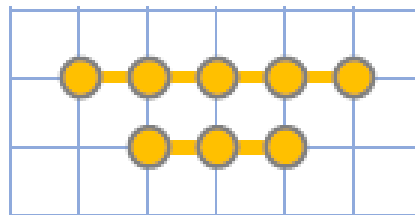
Coordinates must have:

- Odd numbers only
- No multiples of 3

2. Do the shots marked on the grid have coordinates which match Takanori's rules? If he has made any errors, explain them.

Takanori now needs to think about where he will place his ships on the grid. He wants to make sure they are well spread out so that Brenda will not be able to hit them easily.

He starts by thinking about placing just two ships. He needs to think of a rule which will spread them out as much as possible. *Shipwreckers* ships are marked as lines and circles. Here are the two ships he is using (they can be placed either horizontally or vertically on a *Shipwreckers* grid) and the ideas he has had for rules:



Rule idea #1

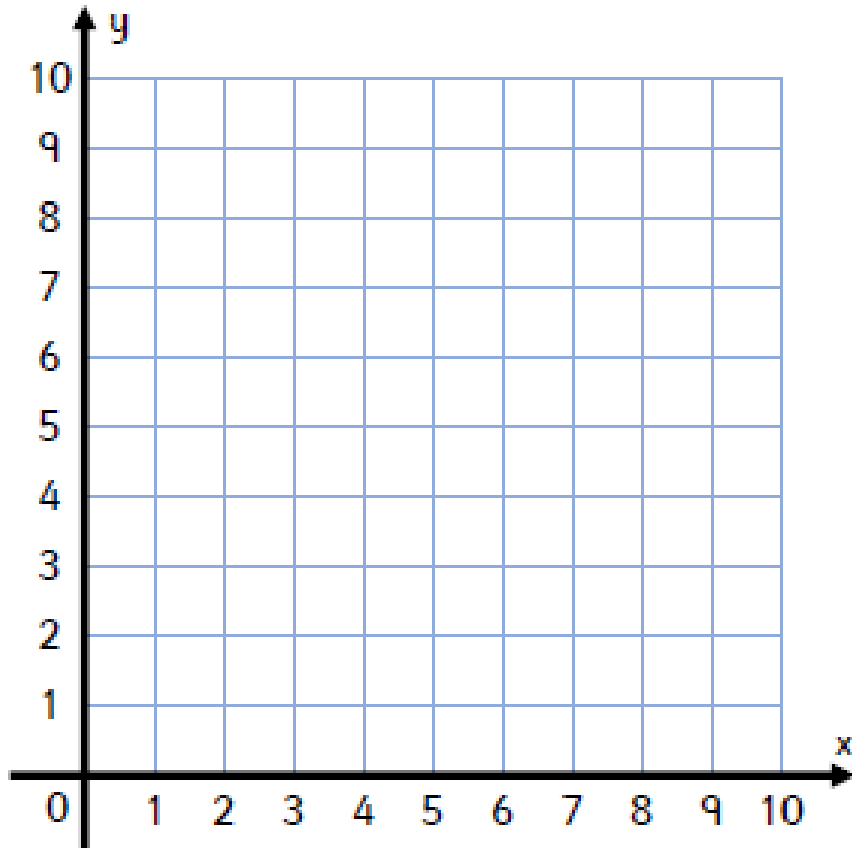
'All y-axis coordinates must be a multiple of 4.'

Rule idea #2

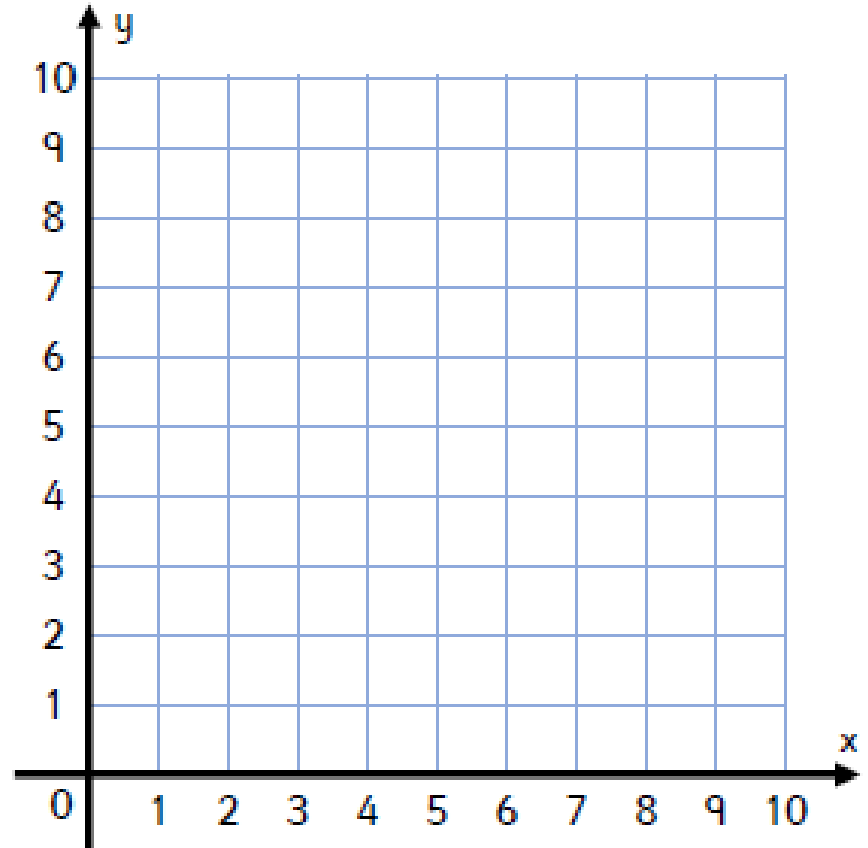
'All x-axis coordinates must be a multiple of 3.'

3. Draw two ships on each grid, as far apart as the rules allow. Which rule will let Takanori place his ships the furthest apart?

Rule idea #1

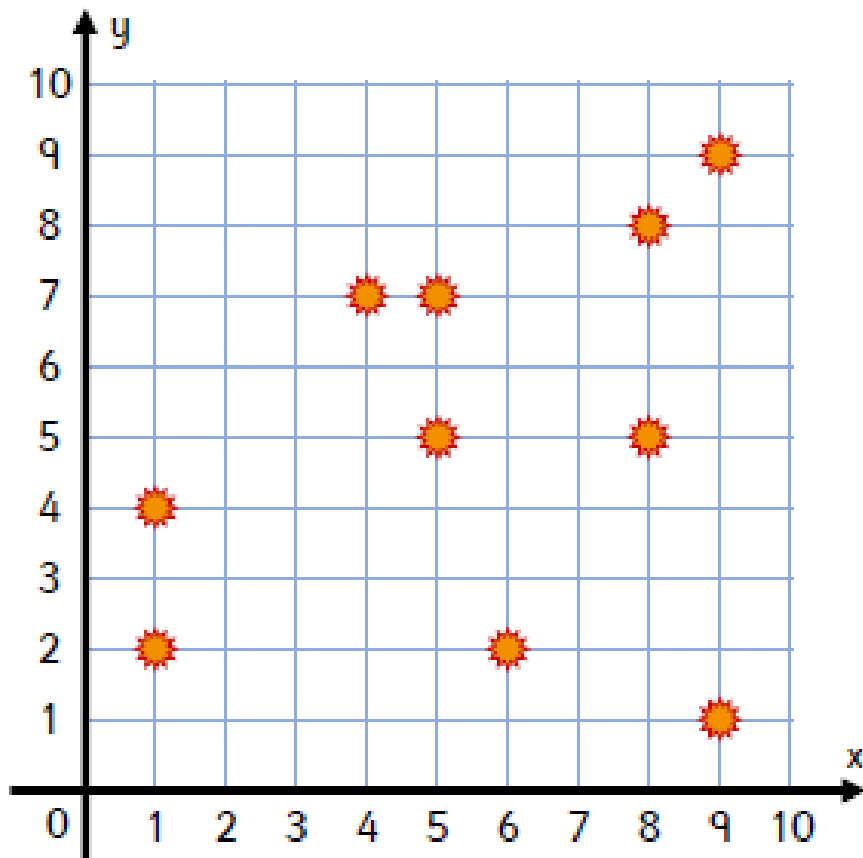


Rule idea #2



Takanori now wants to find 'safe zones' which avoid Brenda's favourite shots.

4. Plot the coordinates on the grid and join them up with lines to mark each zone. Which set of coordinates marks out a zone where none of Brenda's shots land?



Safe Zone ideas

Set A: (2,9) (4,9) (5,8) (3,6)

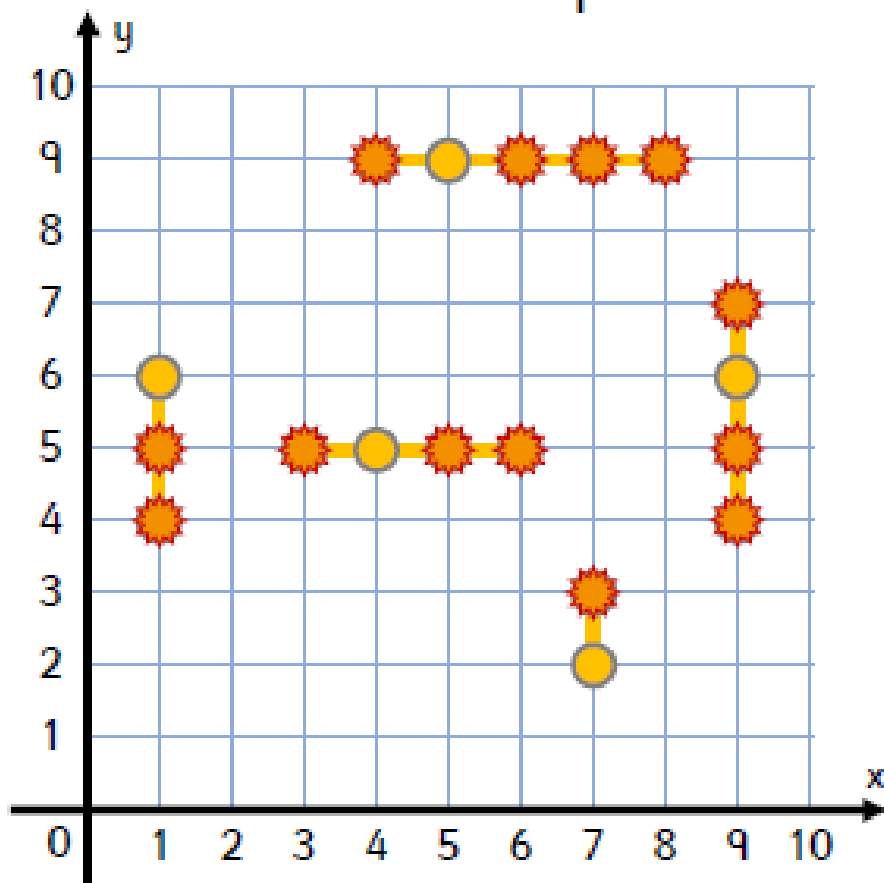
Set B: (7,9) (10,10) (10,8) (8,6)

Set C: (1,1) (2,3) (8,4) (4,1)

Set ____ marks out a 'safe zone' where none of Brenda's shots land.

5. Look at the shots Jason said. Look at Takanori's ship grid. Look at the coordinates on each computer. Has either player's computer got the coordinates right? Do all of Takanori's ships get sunk?

Takanori's ships



Player: Jason

(4,5) (1,6) (7,2)
(5,9) (9,6)

Player: Takanori

(4,5) (1,6) (7,2)
(5,8) (8,6)