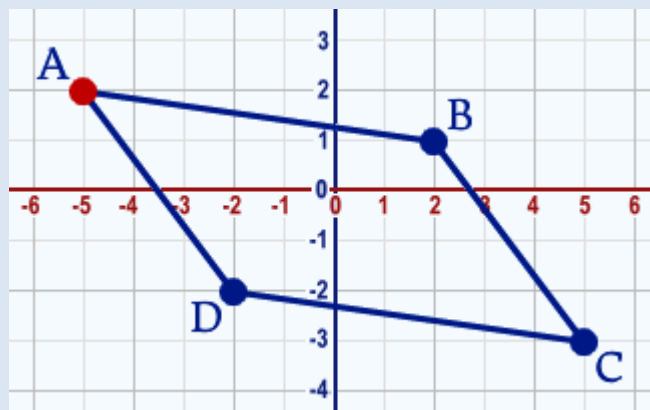


CO-ORDINATES AND GEOMETRY

MODULE 6: INVESTIGATION 2

Coordinate Shapes





ACTIVITY 6.2.1


Letters and Coordinates

MODULE 6: INVESTIGATION 2

Activity 6.2.1 – Letters and Coordinates



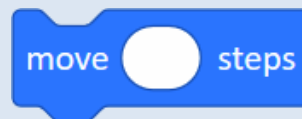
Open project **62-Grid Letters**.

- Explore the project, its backdrops, the **red point** sprite, its costumes and *setup script*. **Run it** by clicking .

- What are the names of the costumes of the sprite?
- Are there any variables in the project?

?

- Build a script for the **red point**: **when up arrow key pressed** it will **point in direction up (0)** and **move** to the next **grid point**.



MODULE 6: INVESTIGATION 2

Activity 6.2.1 – Letters and Coordinates



- Build corresponding reactions for the **down arrow**, **left arrow** and **right arrow**.

- What is the value of the **grid** variable? How can you find out? ?
- How does it correspond with the backdrop?

MODULE 6: INVESTIGATION 2

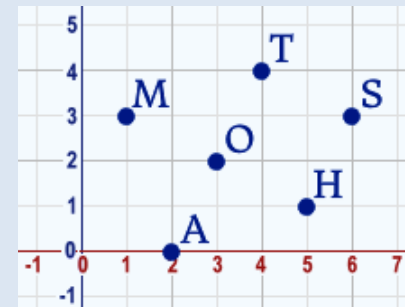
Activity 6.2.1 – Letters and Coordinates



- Choose a letter and build another script for the **red point**: if that letter key is pressed, the sprite will **switch costume to** that letter, **stamp** and **switch costume** back to **red point**.

Repeat the same process for some other letters.

Scatter your letters by stamping them across the grid.



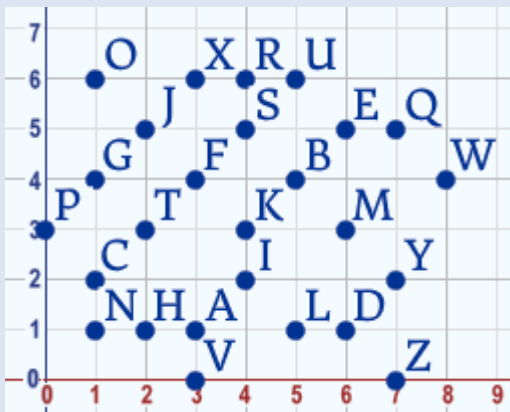
- Spell out the word using the picture above and the following coordinates:
(5, 1) (3, 2) (4, 4)

MODULE 6: INVESTIGATION 2

Activity 6.2.1 – Letters and Coordinates



Referring to the picture, spell out the following words:



(0, 3) (3, 1) (4, 6) (4, 2) (4, 5)

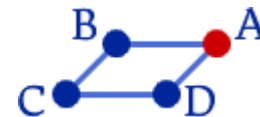
(5, 4) (3, 1) (1, 1) (1, 4) (4, 3) (1, 6) (4, 3)

(3, 0) (4, 2) (6, 5) (1, 1) (1, 1) (3, 1)

Try one or more of the challenges and games on the following 3 slides.

MODULE 6: INVESTIGATION 2

Activity 6.2.1 – Letters and Coordinates



Coordinate Challenge (from nRich.com)

Can you position the following 10 letters in their correct places according to the eight clues below?



1. The letters at (1, 1) (1, 2) and (1, 3) are all symmetrical about a vertical line.
2. The letter at (4, 2) is not symmetrical in any way.
3. The letters at (1, 1), (2, 1) and (3, 1) are symmetrical about a horizontal line.
4. The letters at (0, 2), (2, 0) have rotational symmetry.
5. The letter at (3, 1) consists of just straight lines.
6. The letters at (3, 3) and (2, 0) consist of just curved lines.
7. The letters at (3, 3), (3, 2) and (3, 1) are consecutive in the alphabet.
8. The letters at (0, 2) and (1, 2) are at the two ends of the alphabet.

MODULE 6: INVESTIGATION 2

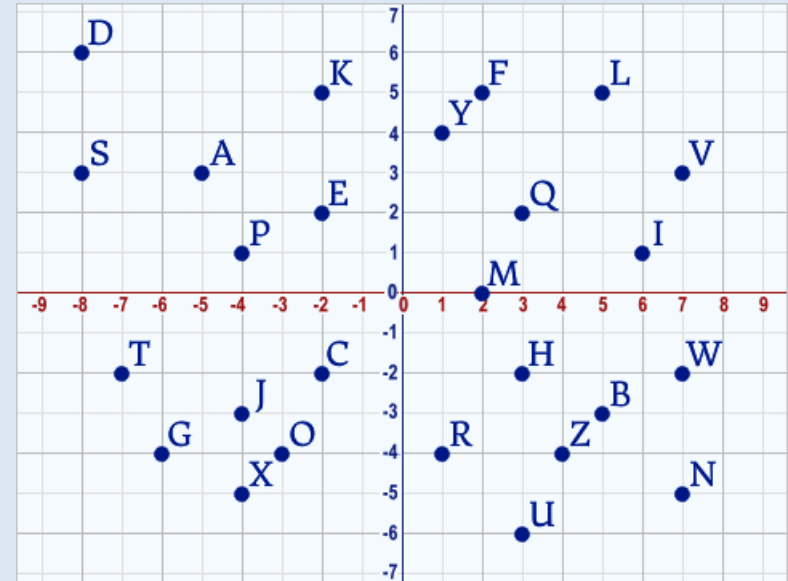
Activity 6.2.1 – Letters and Coordinates



Code breaking challenge

Pupils work in pairs.

1. Both pupils stamp the alphabet letters into the four quadrants.
2. Pupil 1 writes a secret question using the chosen coordinates from their alphabet grid.
3. Pupil 2 decodes the question and responds using the chosen coordinates from their alphabet grid.



MODULE 6: INVESTIGATION 2

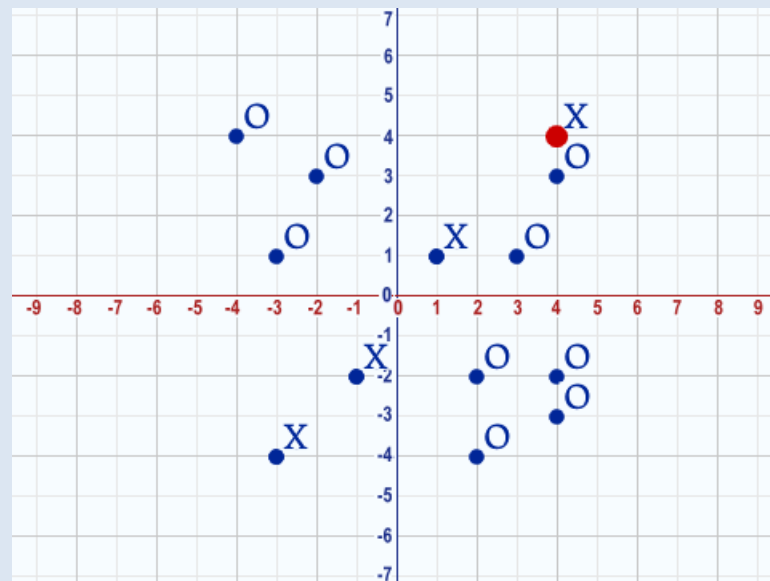
Activity 6.2.1 – Letters and Coordinates



Coordinate bingo

1. Use the **letter O** to stamp 15 different positions on the grid.
2. The 'Bingo Caller' calls out random coordinate positions.
3. Stamp the **letter X** if one of your chosen positions is called out.

If you cross out all your 15 coordinate points shout out "Bingo!"



MODULE 6: INVESTIGATION 2

Activity 6.2.2 – Busy Fleeeee And Clever Points



ACTIVITY 6.2.2

Busy Fleeeee And Clever Points

MODULE 6: INVESTIGATION 2

Activity 6.2.2 – Busy Fleeeee And Clever Points



Open project **62-Coordinates**.

- Explore the project, its backdrop and variable, its sprites and their scripts.

The **point A** sprite can be navigated by the arrow keys as the **red point** in the previous activity.

- What are the initial **Scratch coordinates** of each sprite?
- What are their **grid coordinates**? How do these correspond?

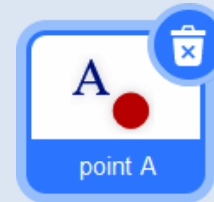
?

MODULE 6: INVESTIGATION 2

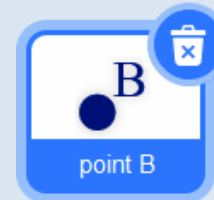
Activity 6.2.2 – Busy Fleeeee And Clever Points



■ For **point A** set its **drag mode** to *not draggable*, for **point B** to *draggable*.



set drag mode



set drag mode

■ Explore the difference in their behavior in the *full screen mode* (also called *player mode*).

MODULE 6: INVESTIGATION 2

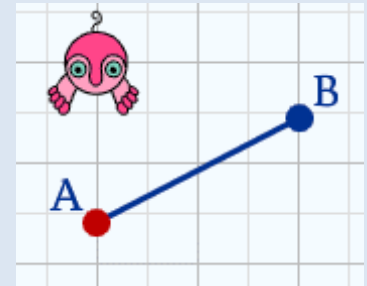
Activity 6.2.2 – Busy Fleeeee And Clever Points



- Build a following script for **Fleeeee**: jump to **point A**, connect it with **point B** by line (by **go to...** block), then jump back to the top left corner. Use this script as a definition of a new block **connect**.

- Build a **when space key pressed** script for **Fleeeee** to connect **points A** and **B**.

Debug it so that **point A** can be moved by arrow keys and re-connected to **point B** whenever the space key is pressed.



- Replace **when space key pressed** hat block with **when green flag clicked** block and add **forever** in the script...

...so that **points A** and **B** look as if connected by an *elastic band* forever

Add the **clear** block before the **connect** – to clear the previous line.

MODULE 6: INVESTIGATION 2

Activity 6.2.2 – [Extension] Busy Fleeeee And Clever Points

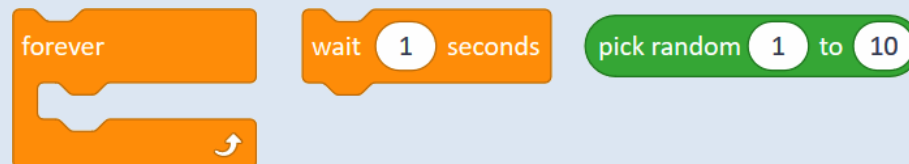


- **[Extension]** Explore the definitions of the **nod** and **blink** blocks to animate the **Fleeeee**. What exactly do they do?

When the **nod** block is run, **Fleeeee** nods _____ times.

When the **blink** block is run, **Fleeeee** blinks _____ times.

- **[Extension]** To run **nod** or **blink** again and again, we may use **forever** with a *random time of waiting*:



Build **one script for nodding** and **one for blinking**, so that they do not always happen at the same time.

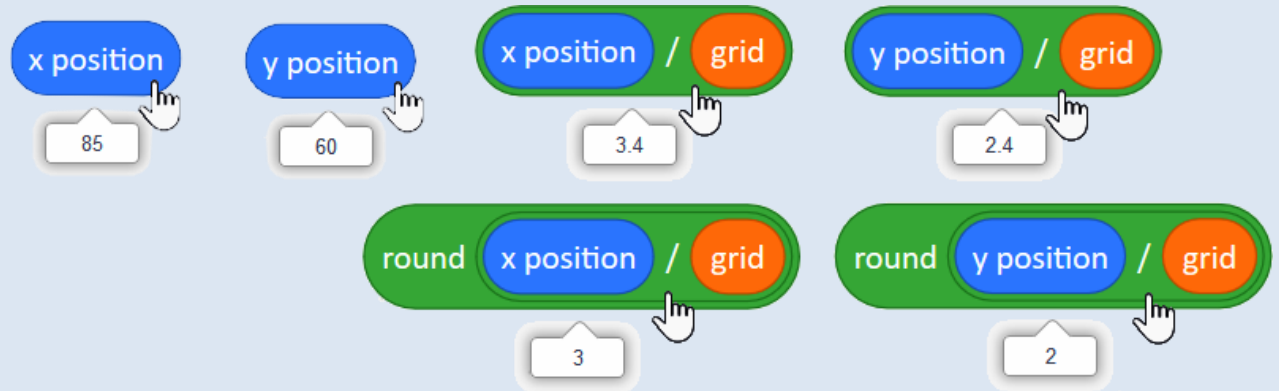
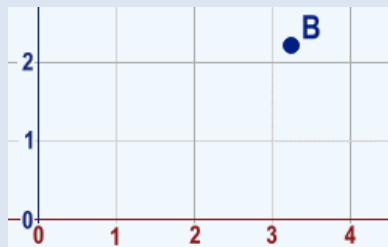
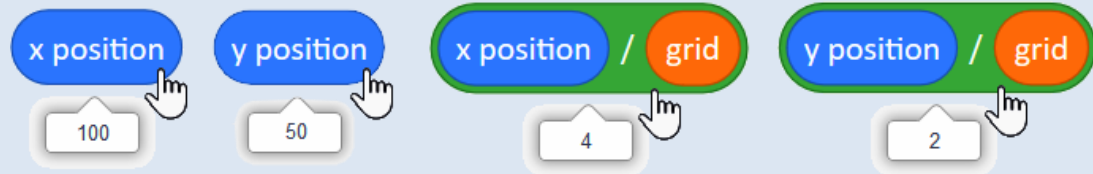
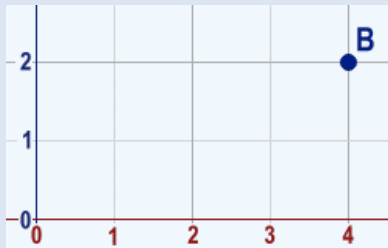
MODULE 6: INVESTIGATION 2

Activity 6.2.2 – [Extension] Busy Fleeeee And Clever Points



[Advanced Extension] When **point B** is dragged and then released, it will probably not be exactly in a grid point.

Build a script to make **point B** **forever snap** to the closest grid point.



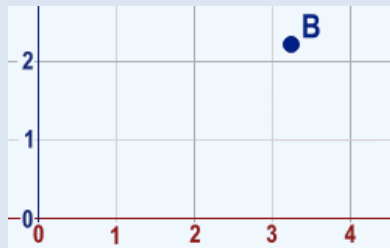
... continued ...

MODULE 6: INVESTIGATION 2

Activity 6.2.2 – [Extension] Busy Fleeeee And Clever Points



... continued ...



set x grid ▼ to round x position / grid

set y grid ▼ to round y position / grid

x position
85

y position
60

x grid
3

y grid
2

x grid * grid
75

y grid * grid
50

MODULE 6: INVESTIGATION 2

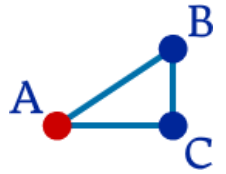
Activity 6.2.2 – [Extension] Busy Fleeeee And Clever Points



■ [Advanced Extension *continued*]

Below is a solution for **point B**. Is this similar to your script?
Discuss any differences.



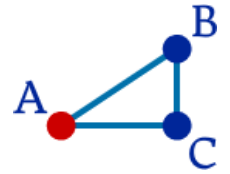


ACTIVITY 6.2.3

Tricky Triangles

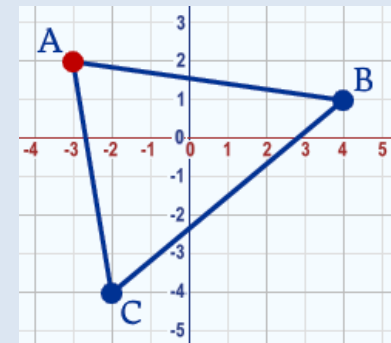
MODULE 6: INVESTIGATION 2

Activity 6.2.3 – Tricky Triangles



Continue in your **62-Coordinates** project.

- Explore the costumes of **point B**.
Duplicate **point B**, rename it to **point C**
and set its costume to **C**.
Set the initial coordinates in its *setup script*.

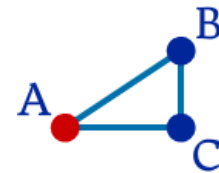


- Extend the **connect** script of the **Fleeeee** so that all three points are connected as a triangle.

Try one or more of the challenges on the following 3 slides.

MODULE 6: INVESTIGATION 2

Activity 6.2.3 – Tricky Triangles



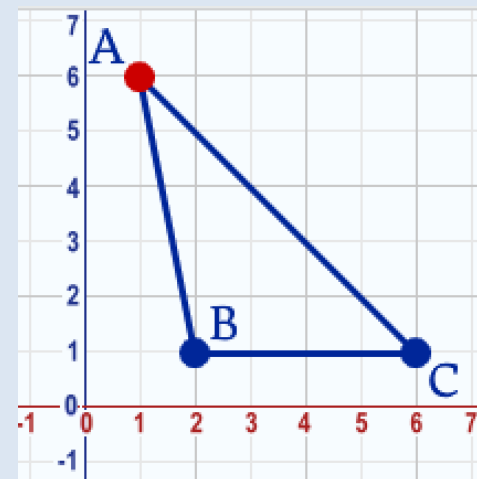
■ Interesting Isosceles *Whole class task*

Set B and C to be the vertices of a horizontal edge of a triangle.

Where should A be moved to create an isosceles triangle?

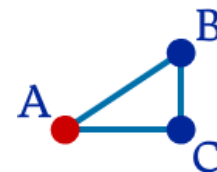
Is there another solution, another?

Can you **explain** your answer?



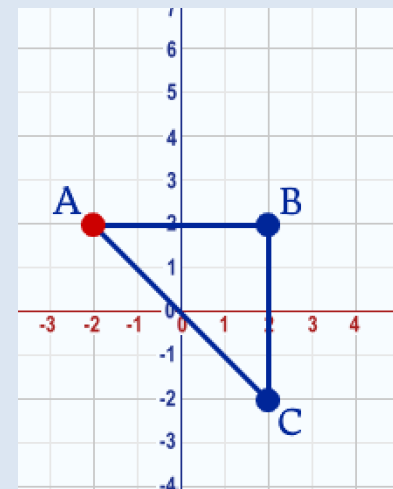
MODULE 6: INVESTIGATION 2

Activity 6.2.3 – Tricky Triangles



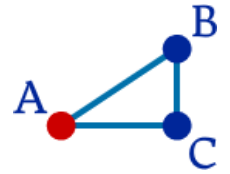
Types of Triangles *In pairs*

- 1. Move** A, B, C to create examples of *different* types of triangles.
- 2. Save** a picture of the stage for each example.
(Right click the stage).
- 3. Exchange** your examples with another pupil, compare your images.
What is the **same** and what is **different**?



MODULE 6: INVESTIGATION 2

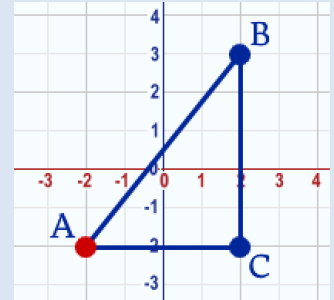
Activity 6.2.3 – Tricky Triangles



A Goes Up, A Comes Down *Individual task*

1. Drag A to $(-2, -2)$, B to $(2, 3)$ and C to $(2, -2)$

What type of triangle have you made?



2. Using **only** the up and down key board arrows...

What do you notice about the x-coordinate?

Can you make a different right-angle triangle?

[Extension] Change the triangle into **three** different isosceles triangles
Explain how you know the triangles are isosceles.



ACTIVITY 6.2.4

Quirky Quadrilaterals

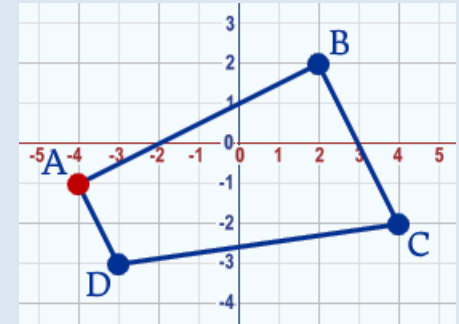
MODULE 6: INVESTIGATION 2

Activity 6.2.4 – Quirky Quadrilaterals



Continue in your **62-Coordinates** project.

- Duplicate **point C**, rename new sprite to **point D** and set its costume to **D**.
Set the initial coordinates in its *setup script*.



- Extend the **connect** script of the **Fleeeee** so that all four points are connected as a quadrilateral.

MODULE 6: INVESTIGATION 2

Activity 6.2.4 – Quirky Quadrilaterals



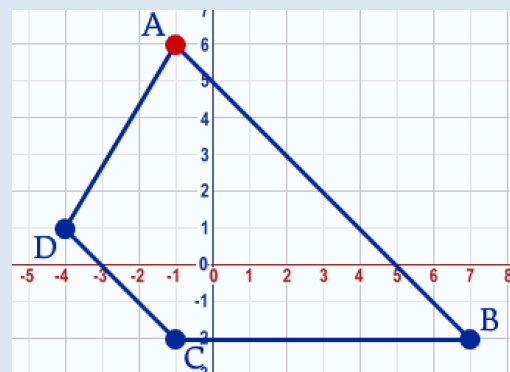
Coordinate Challenge *Whole class task*

Set B and C to be the vertices of an edge of a parallelogram (parallel to the x-axis), and D to another vertex as in the image.

What are the coordinates of A to create a parallelogram?

Can you **explain** your answer?

How do you know the sides are **parallel**?



MODULE 6: INVESTIGATION 2

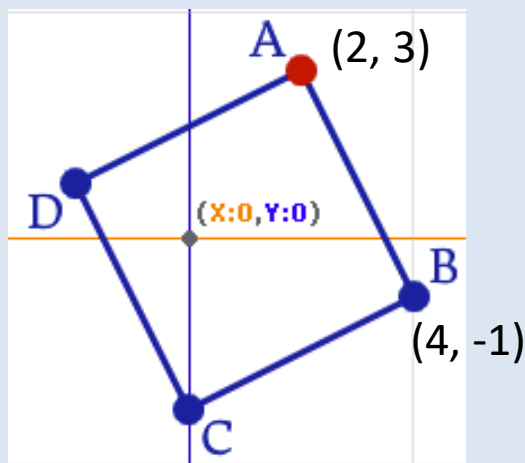
Activity 6.2.4 – Quirky Quadrilaterals



Coordinate Challenge cont. *Whole class task*

A square with vertices (ABCD) has coordinates A (2, 3) and B (4, -1)

What are the coordinates of C and D?



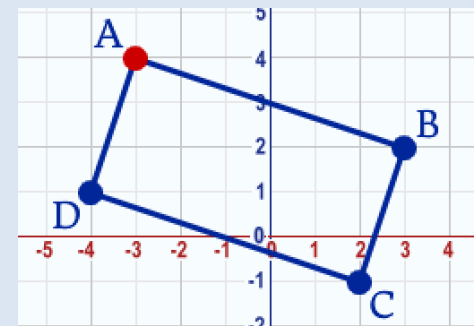
MODULE 6: INVESTIGATION 2

Activity 6.2.4 – Quirky Quadrilaterals



Types of Quadrilaterals *In pairs*

1. **Move** A, B, C to create examples of *different* types of quadrilaterals.



2. **Save** a picture of the stage for each example.
(Right click the stage).

3. **Exchange** your examples with another pupil, compare your images.

What is the **same** and what is **different**?

MODULE 6 INVESTIGATION 2: Check List



My Investigation 2 check list:

- ☐ I built a script to move a point around the coordinates grid and stamp a letter in a chosen position.
- ☐ I coded + decoded different words using my coordinates grid.
- ☐ I built a script that connects two points together.
- ☐ [Extension] I explored and edited the animations of Fleeeee.
- ☐ [Extension] I edited the script of **point B** to snap it to the closest grid point.
- ☐ I edited my **connect** script to connect 3 points together and created different types of triangles.
- ☐ I edited my **connect** script to connect 4 points together and created different types of quadrilaterals.