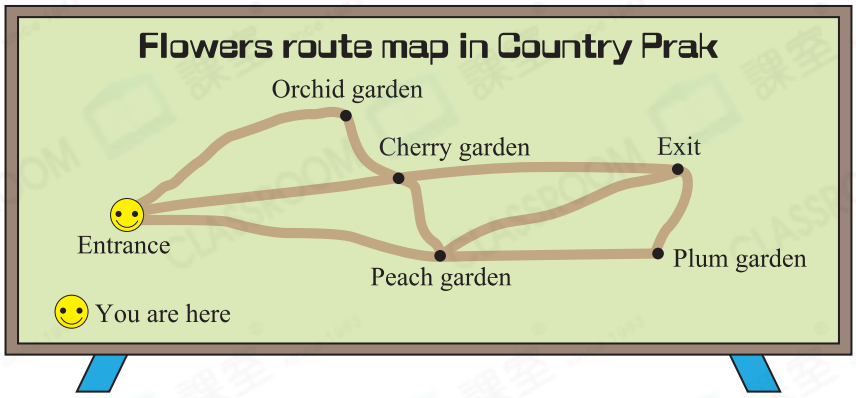
9 Eulerian Paths (Enrichment)

Date: _____

Mark: _____

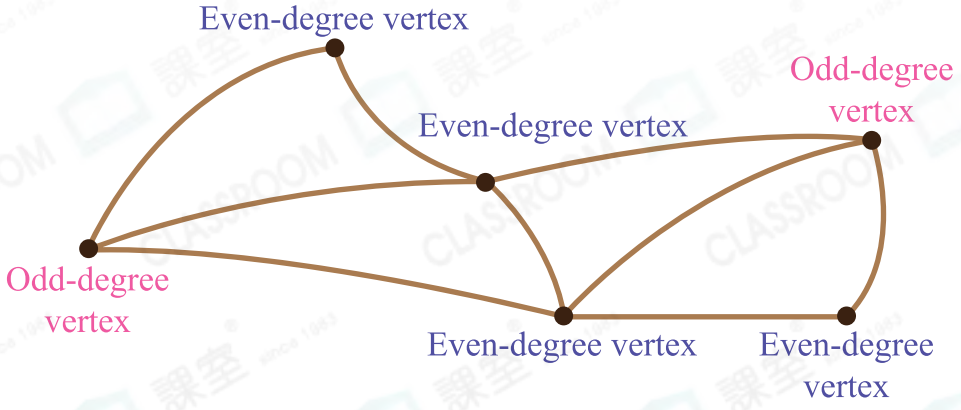
Non-repeating Path



Can we walk past all the paths while passing through each path once only, and finally leave at the exit?

Yes, we can. It is because the route in the map is an Eulerian path.

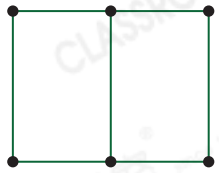
Graphs that have an Eulerian path

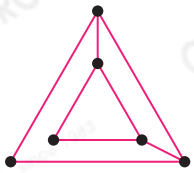


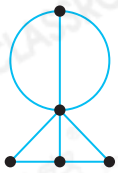
Even-degree vertex: The number of edges leading to the vertex is an even number.
Odd-degree vertex: The number of edges leading to the vertex is an odd number.

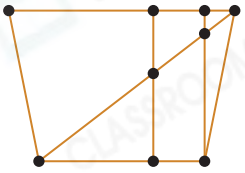
- For an Eulerian path, the number of odd-degree vertices must be 0 or 2.
- If the number of odd-degree vertices is 0, the path can start at any vertex and will end at the same vertex.
- If the number of odd-degree vertices is 2, the path can only start at one of the odd-degree vertices and must end at the other one.

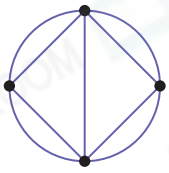
Determine whether the graphs below have an Eulerian path. If yes, put a '✓' in the box; if not, put a '✗' in it.

1.  ☐

2.  ☐

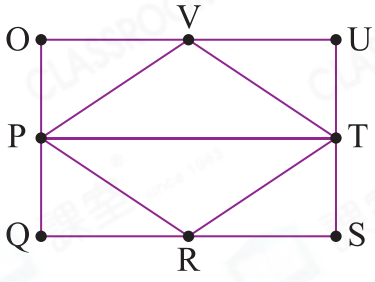
3.  ☐

4.  ☐

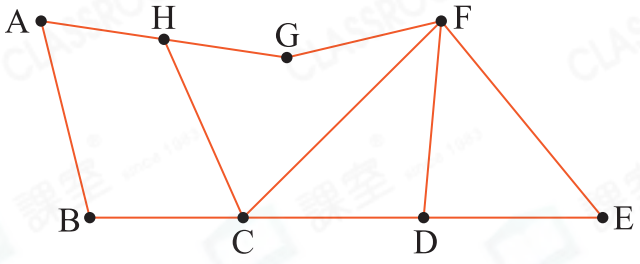
5.  ☐

6.  ☐

Answer the following questions.

7. 

The figure on the right is a floor plan of an exhibition. Oscar and Peter start walking from vertices O and P respectively. ☆ Oscar / Peter (☆ circle the answer) can walk past all the paths while passing through each path once only.

8. 

The above figure is a floor plan of a farm. The visitors can walk past all the paths from extrance to exit while passing through each path once only. The entrance should be placed at vertex _____ and the exit should be placed at vertex _____.

9. Draw a line on the figure on the right so that it has an Eulerian path.