Spatial Functions

Introduction
Spatial functions in the Formula tool can create, return information about and analyze relationships between spatial objects. While most of these same functions can be performed using tools in the Spatial tool palette, executing spatial functions in the formula tool allows for an additional level of flexibility and streamlined processing in workflow development.

Designer
A dataset contains geographic coordinates for the starting and stopping point of a truck as it drives each segment of its delivery route. Use Spatial functions in the Formula tool's function library to create points, and then lines, to construct a spatial object of the truck's route.

Create a new column called [Start] and set its outgoing data type to a Spatial Object.

Open the Function library. Click the Spatial category and select the "CreatePoint" function.

Create Point Function Parameters
The Create Point function creates a point spatial object from longitude, or x, and latitude, or y, values. In the placeholders for X and Y, insert the column names for the Start Longitude and Start Latitude.

In the placeholder for X, insert the variable [Start Longitude].

In the placeholder for Y, insert the variable [Start Latitude].

Create another expression to output a spatial object for the end point of each segment of the route. After running the workflow, two new columns appear in the Results window: one with the spatial object for the start location and another with the end location for each delivery route segment.

Create Lines
Construct lines that connect the starting and ending points for each route segment. In another expression editor, create a column called [Segment], which will also be written out as a spatial data type. This time select the function "Create Line", which will use the point spatial objects in the columns [Start] and [End] in place of the placeholders for points 1 and 2, respectively. After running the workflow, another column contains the line segments for each segment of the delivery route.

Spatial Information
The Formula tool contains functions to return data on a spatial object's attributes, such as its dimensions or type.

To demonstrate, investigate the spatial object [Segment] more closely. This spatial object is a line, which means its length can be calculated to understand the distance covered by each segment of the truck's delivery route.

Create a new column called [Length] and assign it a numeric date type: Double.

Click the Function Library and expand the Spatial function category. Select the function "Length" from the list to insert it into the Expression Editor.

Spatial Relationships
The Length expression requires two pieces of information: the spatial object to analyze and the unit in which to return the object's length. Insert the column [Segment] into the placeholder for "object". The default unit for calculating distance is "Miles", abbreviated by "Mi", but length can also be calculated in kilometers, feet, and meters. Change the units to kilometers by entering "Km" in quotes. After running the workflow, a new column with the length of each line spatial object indicates the distance that the delivery truck traveled on each route segment.

One of the most powerful aspects of spatial analysis is being able to answer questions about how spatial objects relate to each other. The Formula tool contains spatial functions that can help answer these types of questions in the forms of spatial objects and True and False values.

Choose a function below to learn more about it.

The function "Intersection" outputs a spatial object that represents the intersection between two selected spatial objects. When using this function and others that spatially process data, the column's outgoing data type should be set to Spatial Object.

The function "Intersects" evaluates whether two spatial objects intersect and returns a result of True, or 1, or False, or zero. Other spatial functions, such as Contains, Touches and Within, evaluate the presence or absence of these spatial relationships.