

## Mapping API's: Turf.js in the Browser Console

Welcome to the Essential ArcGIS Task Sheet Series. This series supplements the Iowa State University Geospatial Technology Training Program short course series. The task sheets are designed to provide quick, easy instructions for performing mapping tasks.

Turf.js is an open source JavaScript library for advanced geospatial analysis that allows for spatial operations to be preformed in the browser. The full build of Turf is around 500kb which is a fair bit of javascript to load. You can use <https://turfjs-builder.herokuapp.com/> to create a custom build of the library containing only the modules you need instead of using the content delivery network (CDN) of the library. This task sheet will get you started with using different Turf.js functions such as creating points, polygons, and calculating distance and area.

### 1. Introduction

Turf.js provides geo-calculations and processing within the JavaScript running in the browser and saves the results as variables, arrays or JSON in memory. It is therefore possible to do many calculations without the need of a mapping API such as Google Maps or Leaflet.js. However, a Mapping API is necessary to visualize the results. Visit <http://turfjs.org/> and click on the **GETTING STARTED** link at the top of the left menu. This page will cover using Turf.js in the browser, however it should be noted that Turf.js can also be run within Node.

- Create a basic HTML page.
- Within the `<HEAD>` tag, add the following link to the Turf.js library.

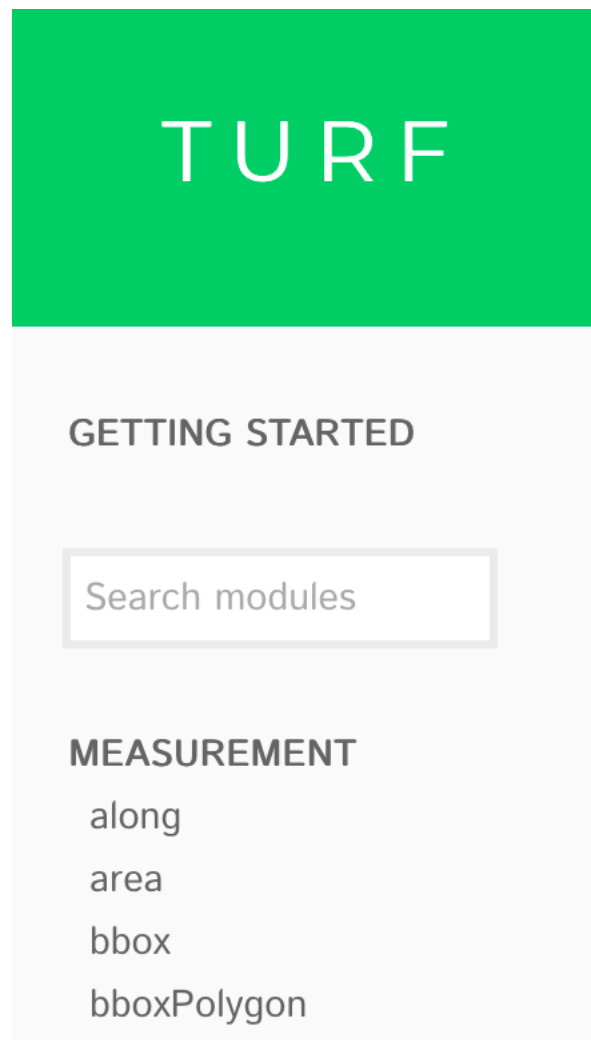
```
<script src="https://npmcdn.com/@turf/turf/turf.min.js"></script>
```

### 2. Add Points to Turf.

Three points around Ames, Iowa will be added using the syntax `turf.point([Longitude, Latitude])` ;

- Add the three points. Each point will be named with a variable as shown in the code below.

```
//ISU College of Design  
var point1 = turf.point([-93.6532,42.0286]) ;  
  
//Ada Hayden Park Bridge  
var point2 = turf.point([-93.6251,42.0680]) ;  
  
//~center of the polygon which is defined in the  
next step  
var point3 = turf.point([ -93.64964, 42.08]) ;
```



The left menu of the Turf.js website located at <http://turfjs.org/getting-started> includes links to the different functions and tools the Turf library provides.

### 3. Add a Polygon

Polygons are created using `turf.polygon([[ [coords 1], [coords 2], [coords 3], [coords 1] ]])` syntax where the first and last coordinates are the same. Note `var polygon` is used to name data in this example.

- Create a polygon that is roughly one square mile.

```
//Square mile North of Ames, Iowa
var polygon = turf.polygon([[
[-93.65917682647705,42.07787144344134],
[-93.63999366760254,42.07787144344134],
[-93.63999366760254,42.09252225064463],
[-93.65917682647705,42.09252225064463],
[-93.65917682647705,42.07787144344134]
]]);
```

### 4. Turf Calculations

Calculate the area of a polygon using `turf.area(variable name)`.

- Enter the code below and display the results in the Console. Because the output will contain several decimal places, use `.toFixed(2)` to limit to two decimals

```
var area = turf.area(polygon);
console.log(area + " sq meters");
console.log((area * 0.0000038610).toFixed(2) +
" sq miles");
console.log("-----");
```

- The distance between two points uses the syntax `turf.distance(point A, point B)`. Optional unites include degrees, radians, miles, and kilometers.

```
var options = {units: 'miles'};
var distance = turf.distance(point1, point2,
options);
console.log("Distance from pt 1 to 2: " +
distance.toFixed(2) + " "+options.units);
console.log("-----");
```

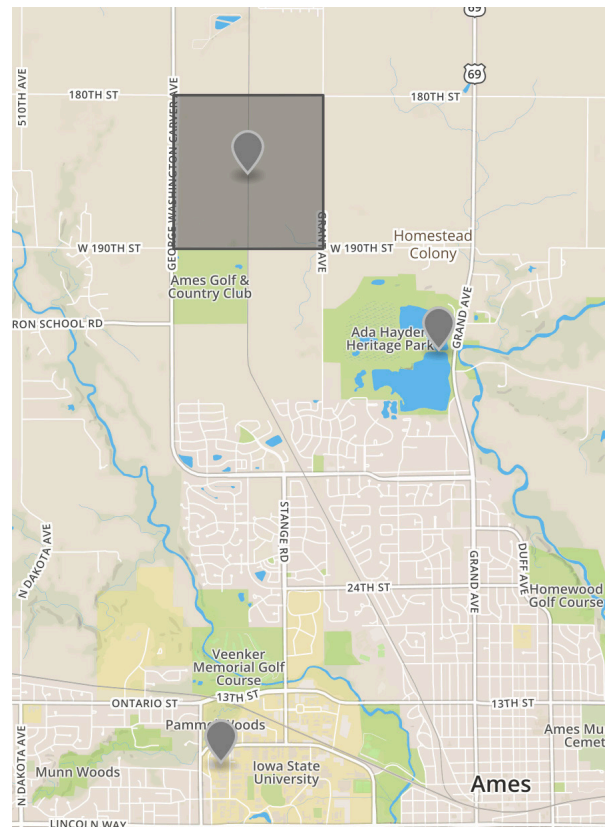
- The bearing between two points can be calculated using `turf.bearing(point A, point B)`. Enter the following code to find the bearing between the College of Design and Ada Hayden Park Bridge.

```
var bearing1 = turf.bearing(point1, point2);
console.log("College of Design to Ada Hayden
Park Bridge bearing : "+bearing1.toFixed(2)+
" degrees");
```

### Contact:

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Reference Map.

### Example output from the Console

```
"2584730.2298141676 sq meters"
"1.00 sq miles"
"-----"
"Distance from pt 1 to 2: 3.08 miles"
"-----"
"College of Design to Ada Hayden Park
Bridge bearing : 27.90 degrees"
"College of Design to center of polygon
bearing : 2.94 degrees"
```