

# Assignment - 407 Trip Calculator

**Exercise - Create a simple toll calculator** Write a program that calculates the cost of a vehicle driving from one point on 407ETR, to another point. For this exercise, the toll rate will be `$0.25/km`. Please use the file `interchanges.json` to calculate the distances between interchanges.

You can use any language you would like to complete the assignment, however you will need to provide instructions on how to execute the program and unit tests.

## Example execution:

```
> costOfTrip('QEW', 'Highway 400')
18.45

> costOfTrip('Salem Road', 'QEW')
26.99

> costOfTrip('QEW', 'Salem Road')
30.33
```

## Optional Exercise - Calculate cost based on vehicle type and direction

As an optional exercise, use the file `rates.json` to calculate the `kmRate` based on the vehicle type and direction. Valid vehicle types are `["light", "heavy", "multi"]`.

Important note: Candidates will be evaluated on quality over quantity. Only do this optional exercise if you are happy with the quality of the work above.

```
> costOfTrip('light', 'QEW', 'Highway 400');
  { direction: 'eastbound', kmRate: '0.471', distance:
'73.810', tripCharge: '34.76' }

> costOfTrip('heavy', 'Salem Road', 'QEW');
  { direction: 'westbound', kmRate: '0.742', distance:
'107.964', tripCharge: '80.07' }

> costOfTrip('multi', 'QEW', 'Salem Road');
  { direction: 'eastbound', kmRate: '1.299', distance:
'121.339', tripCharge: '157.62' }
```

## Appendix

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### Light vehicle

- Cars, vans, limos, SUVs and light duty trucks are designated as light vehicles – as is any vehicle with a gross weight or registered weight of 5,000 kg or less.

### Heavy vehicles

- Single unit trucks, tractors and buses are designated as heavy vehicles – as is any vehicle with a gross weight or registered weight of over 5,000 kg.

### Multi-unit vehicles

- Trucks and tractors with one or more trailers with a gross weight or registered weight of over 5,000 kg are designated as a heavy multiple unit vehicles.

### RATES.JSON (also provided as a file)

```
{
  "rates": {
    "light": {
      "trip_toll_charge": 1,
      "camera_charge": 4.2,
```

```

        "eastbound": 0.4709,
        "westbound": 0.4218
    },
    "heavy": {
        "trip_toll_charge": 2,
        "camera_charge": 45,
        "eastbound": 0.7866,
        "westbound": 0.7416
    },
    "multi": {
        "trip_toll_charge": 3,
        "camera_charge": 50,
        "eastbound": 1.299,
        "westbound": 1.1124
    }
}
}

```

## INTERCHANGES.JSON (also provided as a file)

```

{
  "locations": {
    "1": {
      "name": "QEW",
      "lat": 43.336962,
      "lng": -79.830394,
      "routes": [
        {
          "toId": 2,
          "distance": 6.062
        }
      ]
    },
    "2": {
      "name": "Dundas Street",
      "lat": 43.383554,
      "lng": -79.833478,
      "routes": [

```

```
    {
      "toId": 3,
      "distance": 3.847
    },
    {
      "toId": 1,
      "distance": 6.062
    }
  ]
},
"3": {
  "name": "Appleby Line",
  "lat": 43.415415,
  "lng": -79.820271,
  "routes": [
    {
      "toId": 4,
      "distance": 4.153
    },
    {
      "toId": 2,
      "distance": 3.847
    }
  ]
},
"4": {
  "name": "Bronte Road",
  "lat": 43.445323,
  "lng": -79.789933,
  "routes": [
    {
      "toId": 5,
      "distance": 4.927
    },
    {
      "toId": 3,
      "distance": 4.153
    }
  ]
},
```

```
"5": {
  "name": "Neyagawa Blvd.",
  "lat": 43.484361,
  "lng": -79.766037,
  "routes": [
    {
      "toId": 6,
      "distance": 3.227
    },
    {
      "toId": 4,
      "distance": 4.927
    }
  ]
},
"6": {
  "name": "Trafalgar Road",
  "lat": 43.508828,
  "lng": -79.747886,
  "routes": [
    {
      "toId": 7,
      "distance": 2.917
    },
    {
      "toId": 5,
      "distance": 3.227
    }
  ]
},
"7": {
  "name": "Highway 403",
  "lat": 43.527953,
  "lng": -79.725364,
  "routes": [
    {
      "toId": 8,
      "distance": 4.299
    },
    {
```

```
        "toId": 6,
        "distance": 2.917
    }
]
},
"8": {
    "name": "Britannia Road",
    "lat": 43.552251,
    "lng": -79.762783,
    "routes": [
        {
            "toId": 9,
            "distance": 3.073
        },
        {
            "toId": 7,
            "distance": 4.299
        }
    ]
},
"9": {
    "name": "Derry Road",
    "lat": 43.571614,
    "lng": -79.789898,
    "routes": [
        {
            "toId": 10,
            "distance": 2.507
        },
        {
            "toId": 8,
            "distance": 3.073
        }
    ]
},
"10": {
    "name": "Highway 401",
    "lat": 43.588201,
    "lng": -79.810358,
    "routes": [
```

```
    {
      "toId": 11,
      "distance": 5.291
    },
    {
      "toId": 9,
      "distance": 2.507
    }
  ]
},
"11": {
  "name": "Mississauga Road",
  "lat": 43.617749,
  "lng": -79.762301,
  "routes": [
    {
      "toId": 12,
      "distance": 3.239
    },
    {
      "toId": 10,
      "distance": 5.291
    }
  ]
},
"12": {
  "name": "Mavis Road",
  "lat": 43.641017,
  "lng": -79.736903,
  "routes": [
    {
      "toId": 13,
      "distance": 2.31
    },
    {
      "toId": 11,
      "distance": 3.239
    }
  ]
},
```

```
"13": {
  "name": "Hurontario",
  "lat": 43.65363670486258,
  "lng": -79.71656084060669,
  "routes": [
    {
      "toId": 14,
      "distance": 2.147
    },
    {
      "toId": 12,
      "distance": 2.31
    }
  ]
},
"14": {
  "name": "Highway 410",
  "lat": 43.668861,
  "lng": -79.700151,
  "routes": [
    {
      "toId": 15,
      "distance": 2.223
    },
    {
      "toId": 13,
      "distance": 2.147
    }
  ]
},
"15": {
  "name": "Dixie Road",
  "lat": 43.687616,
  "lng": -79.691088,
  "routes": [
    {
      "toId": 16,
      "distance": 1.481,
      "exit": false
    },
  ],
```



```
    {
      "toId": 14,
      "distance": 2.223
    }
  ]
},
"16": {
  "name": "Bramalea Road",
  "lat": 43.699758,
  "lng": -79.683559,
  "routes": [
    {
      "toId": 17,
      "distance": 3.178
    },
    {
      "toId": 15,
      "distance": 1.481,
      "enter": false
    }
  ]
},
"17": {
  "name": "Airport Road",
  "lat": 43.726981,
  "lng": -79.673517,
  "routes": [
    {
      "toId": 18,
      "distance": 1.386,
      "exit": false
    },
    {
      "toId": 16,
      "distance": 3.178
    }
  ]
},
"18": {
  "name": "Goreway Drive",
```

```
"lat": 43.735763,  
"lng": -79.661533,  
"routes": [  
  {  
    "toId": 19,  
    "distance": 3.235  
  },  
  {  
    "toId": 17,  
    "distance": 1.386,  
    "enter": false  
  }  
]  
},  
"19": {  
  "name": "Highway 427",  
  "lat": 43.754636,  
  "lng": -79.631594,  
  "routes": [  
    {  
      "toId": 20,  
      "distance": 1.324  
    },  
    {  
      "toId": 18,  
      "distance": 3.235  
    }  
  ]  
},  
"20": {  
  "name": "Highway 27",  
  "lat": 43.758317,  
  "lng": -79.615983,  
  "routes": [  
    {  
      "toId": 22,  
      "distance": 4.061  
    },  
    {  
      "toId": 19,
```

```
        "distance": 1.324
      }
    ]
  },
  "22": {
    "name": "Pine Valley Drive",
    "lat": 43.773964,
    "lng": -79.570525,
    "routes": [
      {
        "toId": 23,
        "distance": 2.17
      },
      {
        "toId": 20,
        "distance": 4.061
      }
    ]
  },
  "23": {
    "name": "Weston Road",
    "lat": 43.781354,
    "lng": -79.545683,
    "routes": [
      {
        "toId": 24,
        "distance": 0.691,
        "enter": false
      },
      {
        "toId": 22,
        "distance": 2.17
      }
    ]
  },
  "24": {
    "name": "Highway 400",
    "lat": 43.783082,
    "lng": -79.53736,
    "routes": [
```

```
    {
      "toId": 25,
      "distance": 1.182
    },
    {
      "toId": 23,
      "distance": 0.691,
      "exit": false
    }
  ]
},
"25": {
  "name": "Jane Street",
  "lat": 43.786068,
  "lng": -79.523377,
  "routes": [
    {
      "toId": 26,
      "distance": 2.199
    },
    {
      "toId": 24,
      "distance": 1.182
    }
  ]
},
"26": {
  "name": "Keele Street",
  "lat": 43.792417,
  "lng": -79.497465,
  "routes": [
    {
      "toId": 28,
      "distance": 3.521
    },
    {
      "toId": 25,
      "distance": 2.199
    }
  ]
}
```

```
},
"28": {
  "name": "Dufferin Street",
  "lat": 43.817912,
  "lng": -79.477101,
  "routes": [
    {
      "toId": 29,
      "distance": 2.194
    },
    {
      "toId": 26,
      "distance": 3.521
    }
  ]
},
"29": {
  "name": "Bathurst Street",
  "lat": 43.82754,
  "lng": -79.45393,
  "routes": [
    {
      "toId": 30,
      "distance": 2.172
    },
    {
      "toId": 28,
      "distance": 2.194
    }
  ]
},
"30": {
  "name": "Yonge Street",
  "lat": 43.834275,
  "lng": -79.428642,
  "routes": [
    {
      "toId": 31,
      "distance": 1.93
    },
  ],
}
```

```
    {
      "toId": 29,
      "distance": 2.172
    }
  ]
},
"31": {
  "name": "Bayview Avenue",
  "lat": 43.83818,
  "lng": -79.406052,
  "routes": [
    {
      "toId": 32,
      "distance": 2.076
    },
    {
      "toId": 30,
      "distance": 1.93
    }
  ]
},
"32": {
  "name": "Leslie Street",
  "lat": 43.837158,
  "lng": -79.38048,
  "routes": [
    {
      "toId": 33,
      "distance": 0.997,
      "enter": false
    },
    {
      "toId": 31,
      "distance": 2.076
    }
  ]
},
"33": {
  "name": "Highway 404",
  "lat": 43.839019,
```

```
"lng": -79.368281,
"routes": [
  {
    "toId": 34,
    "distance": 1.029
  },
  {
    "toId": 32,
    "distance": 0.997,
    "exit": false
  }
]
},
"34": {
  "name": "Woodbine Avenue",
  "lat": 43.840981,
  "lng": -79.355793,
  "routes": [
    {
      "toId": 35,
      "distance": 2.078
    },
    {
      "toId": 33,
      "distance": 1.029
    }
  ]
},
"35": {
  "name": "Warden Avenue",
  "lat": 43.845134,
  "lng": -79.33061,
  "routes": [
    {
      "toId": 36,
      "distance": 1.93
    },
    {
      "toId": 34,
      "distance": 2.078
    }
  ]
}
```

```
    }
  ]
},
"36": {
  "name": "Kennedy Road",
  "lat": 43.850276,
  "lng": -79.307682,
  "routes": [
    {
      "toId": 37,
      "distance": 2.215
    },
    {
      "toId": 35,
      "distance": 1.93
    }
  ]
},
"37": {
  "name": "McCowan Road",
  "lat": 43.856272,
  "lng": -79.281407,
  "routes": [
    {
      "toId": 38,
      "distance": 2.103
    },
    {
      "toId": 36,
      "distance": 2.215
    }
  ]
},
"38": {
  "name": "Markham Road",
  "lat": 43.863426,
  "lng": -79.257273,
  "routes": [
    {
      "toId": 39,
```



```

        "distance": 2.074
      },
      {
        "toId": 37,
        "distance": 2.103
      }
    ]
  },
  "39": {
    "name": "Ninth Line",
    "lat": 43.870416,
    "lng": -79.233417,
    "routes": [
      {
        "toId": 40,
        "distance": 1.686
      },
      {
        "toId": 38,
        "distance": 2.074
      }
    ]
  },
  "40": {
    "name": "Donald Cousens Pkwy",
    "lat": 43.874745,
    "lng": -79.213274,
    "routes": [
      {
        "toId": 41,
        "distance": 2.976
      },
      {
        "toId": 39,
        "distance": 1.686
      }
    ]
  },
  "41": {
    "name": "York Durham Line",

```

```

    "lat": 43.89095,
    "lng": -79.185926,
    "routes": [
      {
        "toId": 42,
        "distance": 7.854,
        "exit": false
      },
      {
        "toId": 40,
        "distance": 2.976
      }
    ]
  },
  "42": {
    "name": "Sideline 26",
    "lat": 43.905468238681884,
    "lng": -79.14263248443604,
    "devcomment": "Sideline 26, 22 are just placeholders
for eventual interchanges. Distances between need to be
fixed when these are built!",
    "routes": [
      {
        "toId": 43,
        "distance": 0,
        "enter": false,
        "exit": false
      },
      {
        "toId": 41,
        "distance": 0,
        "enter": false
      }
    ]
  },
  "43": {
    "name": "Sideline 22",
    "lat": 43.909797,
    "lng": -79.124179,

```

```
    "devcomment": "Sideline 26, 22 are just placeholders  
for eventual interchanges. Distances between need to be  
fixed when these are built!",
```

```
    "routes": [  
      {  
        "toId": 44,  
        "distance": 0,  
        "enter": false  
      },  
      {  
        "toId": 42,  
        "distance": 0,  
        "enter": false,  
        "exit": false  
      }  
    ]  
  },  
  "44": {  
    "name": "Brock Road",  
    "lat": 43.916578,  
    "lng": -79.100486,  
    "routes": [  
      {  
        "toId": 45,  
        "distance": 7.313,  
        "startDate": "2013"  
      },  
      {  
        "toId": 43,  
        "distance": 7.854,  
        "exit": false,  
        "startDate": "1999-02"  
      }  
    ]  
  },  
  "45": {  
    "name": "Westney Road",  
    "lat": 43.937802,  
    "lng": -79.070252,  
    "routes": [  

```

```
    {
      "toId": 46,
      "distance": 0,
      "startDate": "2013"
    },
    {
      "toId": 44,
      "distance": 0,
      "startDate": "2013"
    }
  ]
},
"46": {
  "name": "Salem Road",
  "lat": 43.942808,
  "lng": -79.050339,
  "routes": [
    {
      "toId": 47,
      "distance": 0,
      "startDate": "2013"
    },
    {
      "toId": 45,
      "distance": 0,
      "startDate": "2013"
    }
  ]
}
}
```