**Travelling Salesman Problem: THEME PARK**

**Question Worksheet**

**TASK**

You are helping to organise a school trip to Hamilton’s Adventure Park in October.

Your teacher is arranging the transport. A coach will drop you off at the Park gates at 10am, but they need to know what time you will be leaving. The coach will be staying at the Park until you are ready to leave and will be charging an hourly rate during this time. The school is funding the trip, although they only have a limited budget and they want to make it as cheap as possible.

Therefore, in order to keep the transport costs as low as possible, it is up to you to plan the quickest route around Hamilton’s Adventure Park. As you will have standard tickets, you need to allocate time to queue for entry to the Park. You will also need to allow time for you and your friends to visit each main attraction once before returning to the Park gates, and include a 30 minute lunch break.

**INFORMATION GATHERING**

1. **What information do you need to consider for this task?**

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. **Complete the table below to complete the network and show the quickest routes between all attractions**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Park Gates** | **Animal Kingdom** | **Carnival Land** | **Corkscrew** | **Log Flume** | **Wonder Wheel** | **The Hole** | **Roller Coaster** |
| **Park Gates** | - | 8m | 12m |  |  | 14m |  |  |
| **Animal Kingdom** | 8m | - |  | 3m | 6m30s |  |  |  |
| **Carnival Land** | 12m |  | - |  |  | 6m30s |  | 10m30s |
| **Corkscrew** |  | 3m |  | - | 6m30s |  |  |  |
| **Log Flume** |  | 6m30s |  | 6m30s | - | 13m30s | 11m |  |
| **Wonder Wheel** | 14m |  | 6m30s |  | 13m30s | - | 9m | 9m30s |
| **The Hole** |  |  |  |  | 11m | 9m | - | 10m30s |
| **Roller Coaster** |  |  | 10m30s |  |  | 9m30s | 10m30s | - |

Lowest Upper Bound - Nearest Neighbour Algorithm

1. Pick any starting point
2. Consider the paths that join your starting point to other (not yet visited ) attractions. Pick the path with the smallest time and add this to the route.
3. Repeat step 2 until all attractions have been chosen (do not repeat attractions)
4. Add the path that joins the last attraction to the starting point to complete the route

**3. Applying the Nearest Neighbour Algorithm, complete the Table below:**

|  |  |  |
| --- | --- | --- |
| **Starting vertex** | **Tour using Nearest Neighbour Algorithm** | **Time of tour** |
| **Park Gates** |  |  |
| **Animal Kingdom** |  |  |
| **Carnival Land** |  |  |
| **Corkscrew** |  |  |
| **Log Flume** |  |  |
| **Wonder Wheel** |  |  |
| **The Hole** |  |  |
| **Roller Coaster** |  |  |

**a. What is the most reasonable tour time and route of Hamilton’s Adventure Park?**

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………………………………………………

**b. Using the tour time from Question (a) and the information from Question 1, use the space below to outline how long you will be in the Park altogether and what time you will need the coach to collect you from the Park Gates.**

…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………