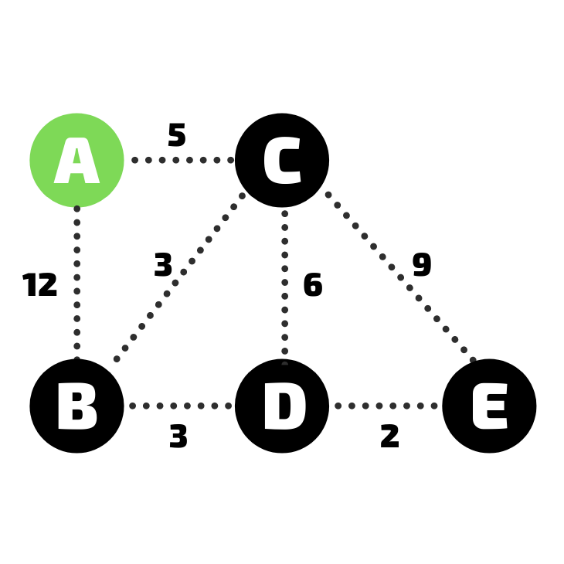
**Pathfinding Algorithms for A-level**

**ANSWERS to Handout 1 – Exercises in Dijkstra and A\* pathfinding**

**Activity 1 – Isaac Dijkstra Questions**

Open [**bit.ly/iapath23**](https://bit.ly/iapath23) and answer the two questions, reproduced here for convenience:

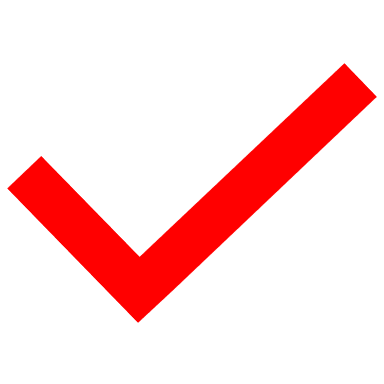
1. Ali is planning to visit his friend Eli. The graph shown below illustrates the connections between Ali's house (node A) and that of Eli (node E).

Ali will use Dijkstra's algorithm to find the shortest path between the two houses. The algorithm selects the next current node by picking the node from the unvisited list with the **lowest cost**.

Which of the following options shows the final visited list produced by running the algorithm?

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | a. Visited list | | | | Node | **Cost (from start)** | **Previous** | | A | 0 | none | | C | 5 | A | | B | 8 | C | | D | 11 | B | | E | 13 | D | | |  |  |  | | --- | --- | --- | | Checkmark with solid fillb. Visited list | | | | Node | **Cost (from start)** | **Previous** | | A | 0 | none | | C | 5 | A | | B | 8 | C | | D | 11 | C | | E | 13 | D | |
| |  |  |  | | --- | --- | --- | | c. Visited list | | | | Node | **Cost (from start)** | **Previous** | | A | 0 | none | | B | 8 | C | | C | 5 | A | | D | 11 | C | | E | 13 | D | | |  |  |  | | --- | --- | --- | | d. Visited list | | | | Node | **Cost (from start)** | **Previous** | | A | 0 | none | | B | 12 | A | | C | 5 | A | | D | 11 | C | | E | 13 | D | |

2. Using the correct visited list, which option shows the shortest path from A to E?

1. A-B-D-E
2. A-C-D-E
3. A-C-B-D-E
4. A-C-E

**Activity 2 – A\* Question**

3. Complete the table using the A\* algorithm

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **12**  **6**  **4**  **0**  6  3  7  5 | |  |  |  |  | | --- | --- | --- | --- | | **Node** | **g-score** | **f-score** | **Previous** | | A | 0 | 12 | none | | B | 6 | 12 | A | | C | 7 | 11 | A | | D | 12 | 12 | C | |

**Activity 3 – Isaac Gameboard**

Now complete the gameboard on Isaac Computer Science at [**bit.ly/iapathfinding**](https://bit.ly/iapathfinding) Use the hints to help you.