

**DISCRETE MATHEMATICS**  
**Knowledge has Organizing Power**

**Theme 2**  
**GRAPHS**  
**From Point to Whole**

**LESSON 4**  
**SHORTEST PATHS IN GRAPHS**  
**Do Less and Accomplish More**

**Wholeness of the Lesson**

A graph can have many paths, each with different lengths or different weights. We use algorithms to find the best or optimal path for a specific application.

*Science and Technology of Consciousness:* In Transcendental Meditation, the mantra gives us the fastest, most comfortable ride to the transcendental field.

**Main Points**

1. A *weighted graph* has numbers or *weights* assigned to each path. The sum of the weights on a given path tell us how efficient or costly the path is.  
*Science and Technology of Consciousness:* Regular practice of the Transcendental Meditation program increases our efficiency in activity.<sup>3</sup>
2. Dijkstra's algorithm is a greedy iterative algorithm that finds the shortest path from a given vertex to every other vertex in a weighted graph.  
*Science and Technology of Consciousness:* Nature functions according to the path of least action. With regular transcending, we develop the ability to act in accord with natural law, following the path of least action.
3. The traveling salesperson problem, which asks for the shortest Hamilton circuit in a weighted graph, is very hard; the best approaches can only give approximations to the shortest circuit.  
*Science and Technology of Consciousness:* Spontaneous right action is possible only when established in Cosmic Consciousness, when we are functioning from the field of all possibilities.

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<sup>1</sup>Frew, D.R. Transcendental Meditation and productivity. *Academy of Management Journal* 17: 362–368, 1974.

# UNITY CHART

Connecting the Parts of Knowledge  
with the Wholeness of Knowledge  
Finding an Optimal Path

1. There are many paths in a weighted graph, each having a different length or weight.

2. Using algorithms, we can find the best path for a given situation.

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3. **Transcendental Consciousness** is a field of all possibilities.

4. **Impulses within the transcendental field:** give a direction to manifestation.

5. **Wholeness moving within itself:** In Unity Consciousness, functioning from the field of all possibilities (the Self) we spontaneously perform right action.

