

Module 02 – Transportation Modeling

Model Formulation

- **Decision Variables:** The units transported from each source to each destination
- **Objective Function:** Contains the computed total transportation cost (60.49), obtained using SUMPRODUCT of costs and transported amounts.
- **Constraints:**
 - Units transported (B10:H13) ≥ 0
 - Total units transported (B14:G13) \leq Demand (B15:G15)
 - Total units transported (H10:13) = Capacity (I10:I13)

Model Optimized for Profit

	Taffy Tundra	Sugar Swirl Spires	Marshmallow Meadows	Toblerone Tower	Swedish Fish Shores	Strawberry Swirl Stream		
Honeysuckle Hollow	\$0.09	\$0.09	\$0.06	\$0.16	\$0.08	\$0.16		
Gummy Grotto	\$0.09	\$0.16	\$0.06	\$0.16	\$0.08	\$0.09		
Gingerbread Glades	\$0.09	\$0.16	\$0.06	\$0.16	\$0.08	\$0.09		
Candy Button Bay	\$0.09	\$0.16	\$0.06	\$0.16	\$0.08	\$0.09		
Demand	114	126	117	116	113	125		
	Taffy Tundra	Sugar Swirl Spires	Marshmallow Meadows	Toblerone Tower	Swedish Fish Shores	Strawberry Swirl Stream	Sent	Capacity
Honeysuckle Hollow	0	116	0	0	0	0	116	116
Gummy Grotto	0	0	60	0	0	116	176	176
Gingerbread Glades	114	10	57	0	0	0	181	181
Candy Button Bay	0	0	0	68	113	9	190	190
Sent	114	126	117	68	113	125		663
Demand	114	126	117	116	113	125		
Objective Function	\$60.49							

The model provides an optimized transportation plan that minimizes total cost while ensuring supply meets demand across different locations. It determines the most cost-effective way to allocate shipments from four supply sources (Honeysuckle Hollow, Gummy Grotto, Gingerbread Glades, and Candy Button Bay) to six destinations (Taffy Tundra, Sugar Swirl Spires, Marshmallow Meadows, Toblerone Tower, Swedish Fish Shores, and Strawberry Swirl Stream).

Key Recommendations:

1. **Optimized Shipments:** The model assigns shipments to routes with the lowest transportation costs.
2. **Efficient Allocation:**
 - Gingerbread Glades supplies all of Taffy Tundra's demand (114 units).
 - Honeysuckle Hollow fulfills all of Sugar Swirl Spires' demand (116 units).
 - Gummy Grotto sends 60 units to Marshmallow Meadows and 116 units to Strawberry Swirl Stream.
 - Candy Button Bay supplies Toblerone Tower (68 units) and Swedish Fish Shores (113 units).
 - Gingerbread Glades also contributes 10 units to Sugar Swirl Spires and 57 units to Marshmallow Meadows.
 - Candy Button Bay sends 9 additional units to Strawberry Swirl Stream to meet its demand.

3. Total Cost: The optimized transportation cost is \$60.49.
4. Capacity Utilization: Each source operates within its capacity, and all demand is met exactly.

Model with Stipulation

If you add an additional constraint in the model such that all demand **must** be met (modifying the demand constraint from \leq to $=$) the solver fails to find a feasible solution because:

1. Supply may be insufficient to meet exact demand.
2. Rigid distribution removes flexibility in allocation.
3. Imbalance between supply & demand makes fulfillment impossible.