

Problem B: Caves

Filename: `caves`

Time limit: 12 seconds

Grace and Christian are on an expedition to survey the ancient **Caves of Central Florida**, a vast subterranean network where every chamber is connected to others by mystical tunnels. Each tunnel takes a different amount of time to traverse, depending on its age and construction — some are smooth and recent, others are rugged and ancient.

As they map the cave, Grace, the ever-curious historian, becomes intrigued: "*What if there's a hidden symmetry in the effort it takes to travel between chambers?*" Christian, a seasoned structural engineer, agrees. Together, they resolve to compute the **total time** required to travel between **every pair of chambers** in the cave system.

Fortunately, the tunnel network forms a **tree** — a connected structure with no cycles — so there is exactly one unique path between any two rooms. This makes it possible to define the shortest distance between any two rooms as the sum of the travel times along that path.

Each room is a node, and each tunnel is a **bidirectional edge** with a **positive travel time**. Their goal is to determine the **sum of all shortest travel times between all pairs of distinct rooms**.

The Problem

Given a tree (i.e., a connected graph with $n-1$ edges and no cycles), compute the total sum of shortest travel times between all pairs of distinct nodes.

Formally, for every pair of nodes (u,v) with $1 \leq u < v \leq n$, find the unique path between them and add up the total weight (travel times) of all such paths.

The Input

The first line of input will contain an integer, **c**, representing the number of input cases.

The first line of each input case will contain a single integer, **n**, indicating the number of rooms in the cave system.

The following **n-1** lines each contain three integers, **u**, **v**, and **w**, indicating a bidirectional tunnel between room **u** and room **v** which takes **w** minutes to traverse.

The Output

For each test case, print a single integer — the sum of the shortest travel times between all pairs of rooms.

Input Bounds and Corresponding Credit

30 Points	70 Points
<ul style="list-style-type: none">• $1 \leq c \leq 10$• $1 \leq n \leq 100$• $1 \leq u, v \leq n$• $1 \leq w \leq 10$	<ul style="list-style-type: none">• $1 \leq c \leq 20$• $1 \leq n \leq 10^5$• $1 \leq u, v \leq n$• $1 \leq w \leq 10$

Samples

Input	Output
2	20
4	30
1 2 1	
2 3 2	
3 4 3	
3	
1 2 5	
2 3 10	