

A Map Ride across the World

by Radha HS

Anu and Amin waved until they couldn't see the airplane anymore. "When will he visit?" the twins chorused. "Next year," replied Amma. The twins' brother Aanand had left Bengaluru to study in New York. Though he was ten years older than them, they would miss him terribly. "How far is New York?" asked Anu. "About 13,400 kilometres," replied Amma. Stepping out of the airport, they saw a flock of birds up in the sky. "If I were a bird, I would fly and visit him," announced Amin. "And would the human-bird know the route?" asked Amma. "We would find the shortest path," said Anu.

As soon as they got home, Anu brought her globe down. She looked up Bengaluru and New York. Then, she placed a scale between the two places ... well, she tried. "Need a bendy scale!" she exclaimed. "How about a piece of thread?" suggested Amma. Anu held a piece of thread taut between Bengaluru and New York City.

"We need to fly over Pakistan, Afghanistan, Kazakhstan, Russia, Sweden, Norway, the Atlantic Ocean and Canada to reach New York and Aanand," rattled off Anu. "So when are the human-birds flying out?" teased Amma.

Meanwhile, Amin opened the world map in his atlas. He drew the shortest path between

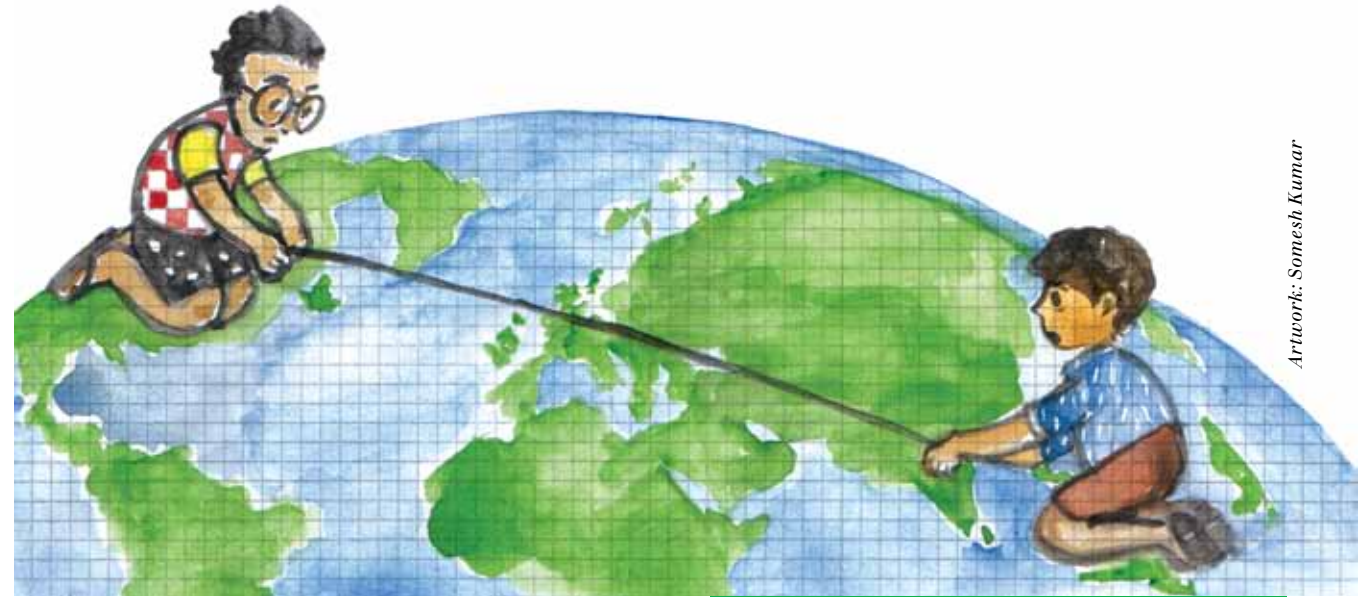
Bengaluru (BLR) and New York City (NYC), like the straight line in the map below.

"We need to cross the Arabian Sea, Saudi Arabia, Egypt, Libya, Algeria, Morocco and the Atlantic Ocean to reach New York. That's strange, Amma. This list of countries is different from the ones Anu read out. How can that be?" Amin asked.



"Anu, repeat the names of countries from your path on the globe. Amin, trace a path through them on the flat map." This path looked like the dotted line in the pic.

"It's longer than the path I had drawn!"
 "Yes. But in reality, the thread on the globe did trace the shortest path."
 "But Amma, globes are difficult to carry around!"
 "Yes, Amin, that's why we use flat maps. Imagine peeling off the globe's top-layer and patting it flat."



Artwork: Somesh Kumar

"I have tried the reverse – wrapping a rectangular piece of paper about a round chocolate – and it got wrinkly," Amin replied.

"A peeled off globe cannot be patted flat without tears and wrinkles. That's why a single map cannot represent all the Earth's features. Different projections are used to represent various features of the Earth on flat maps," explained Amma.

"Projections?"
 "Yes Anu, mathematical procedures to transform data from curved to flat surfaces."
 "We need a map which will help us find the shortest route between places," said Amin.
 "That would be a Great Circles map used by airplane pilots," replied Amma.
 "What if we wanted to get around New York City?" Anu quipped.

"Then you would need a city map. The Great Circles map would have distorted the information that you require to get around a city."

"Are maps used by weather scientists different from a pilot's map?" asked Amin.
 "Yes. Map-makers or cartographers figure out the best projection to represent specific information from the spherical globe onto flat paper."
 "Let's find out a little more about maps before we fly off!" Anu and Amin chorused. ●

If the arc which represents the shortest distance between BLR and NYC on the globe is continued in both directions, it eventually meets, forming a Great Circle. If the globe is cut along the Great Circle, it will fall apart in two hemispheres. Every Great Circle has the same length, which is the circumference of the Earth. The shortest distance between any two places always lies on a Great Circle. Also think about this: are latitudes and longitudes Great Circles? Try mapping the shortest distances between any two places at this link: www.gcmap.com/mapui

Try This!
 You will need a globe, an orange/mosambi, a marker and a knife. Use the marker to roughly draw the outline of continents on the fruit, using the globe as reference. Cut the fruit into four quarters. Get the peel off carefully. Now assemble the four pieces on a flat surface and try to pat them flat. You'll understand a cartographer's problem!

