



π IN THE SKY¹¹

ANSWER KEY

ORBIT OBSERVATION

How many orbits does NISAR execute in one day?

- 1 Determine Earth's circumference using the given radius and the formula for circumference of a sphere.

$$2\pi r \approx 2(3.14)(6,371 \text{ km}) \approx 40,030 \text{ km}$$

- 2 Use twice the width of the ground track to calculate the number of swaths needed to cover the entire globe, noting that the ground track passes the equator twice per orbit.

$$40,030 \text{ km} / 462 \text{ km} \approx 86.65 \text{ swaths}$$

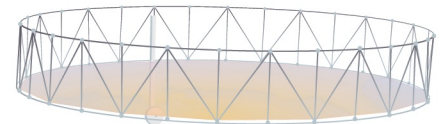
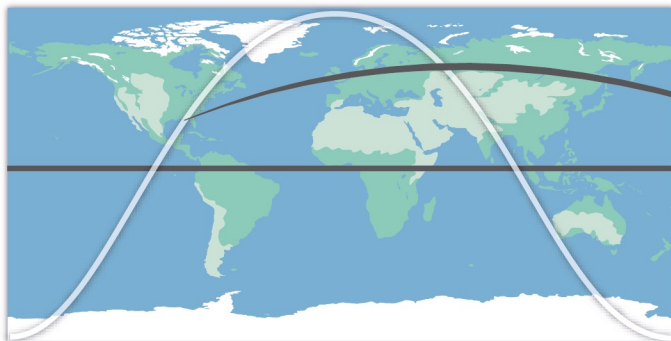
- 3 Divide the swaths by the number of days it takes to map Earth once to get the number of orbits per day.

$$86.65 \text{ swaths} / 6 \text{ days} \approx \mathbf{14.4 \text{ orbits/day}}$$

How much data is produced per orbit on average?

- 1 Divide the total data collected per day by the number of daily orbits.

$$85 \text{ TB/day} / 14.4 \text{ orbits/day} \approx \mathbf{5.9 \text{ TB per orbit}}$$



231 km
ground track