



Get the Data

Visit EOSS <http://1.usa.gov/GCEcT7> to recreate this exact scene. Recommended operating system: MS Windows Vista or later; Browser: Internet Explorer 8 or later.

The Mars Science Laboratory Lander called Phoenix will land in Gale Crater located 22 degrees from the North Pole of Mars. It will relay its data to the Mars Reconnaissance Orbiter (MRO), which will then transmit the data to Earth.

Step 1 - Pick a convenient spot on the surface of Mars near the North Pole, and advance the date and time until the MRO passes over this spot.

Step 2 - Advance the date and time until MRO once again passes over (or close by) the spot you selected.

Answering Questions

Problem 1 – How many hours will elapse between the times when MRO is overhead of the Phoenix Lander and the Curiosity Rover in Gale Crater?

Problem 2 - During a full Earth year, how many times will MRO fly over the Phoenix Lander area?

Math Challenge

The Mars Curiosity Rover will transmit up to 4,000 bytes of data every second. When the MRO flies overhead, Curiosity will have 20 minutes to transmit data to the MRO. How much data, in gigabytes, will Curiosity be able to transmit every Earth Year?

Answer Key

Problem 1 – How many hours will elapse between the times when MRO is overhead of the Phoenix Lander and the Curiosity Rover in Gale Crater?

Answer: **Through trial-and-error, students should be able to determine that MRO flies over the same spot on Mars about once every 12 hours.**

Problem 2 - During a full Earth year, how many times will MRO fly over the Phoenix Lander area?

Answer: **At a rate of about twice a day, it will 'transit' the Gale Crater about $2 \times 365 = 730$ times every Earth Year.**

The Mars Curiosity Rover will transmit up to 4,000 bytes of data every second. When the MRO flies overhead, Curiosity will have 20 minutes to transmit data to the MRO. How much data, in gigabytes, will Curiosity be able to transmit every Earth Year?

Answer: **$730 \text{ times every year} \times 20 \text{ minutes} \times (60 \text{ seconds}/1 \text{ minute}) \times (4,000 \text{ bytes}/1 \text{ minute}) = 3,504,000,000 \text{ bytes}$ or 3.504 gigabytes. Students may compare this to an equivalent number of songs on their portable player (1 song = 40 megabytes, so this is about 1000 songs!)**