Water on Mars!

NASA/JPL/Malin Space Science Systems

This NASA, Mars Orbiter image was taken of a crater wall in the southern hemisphere of mars from an altitude of 450 kilometers. It shows the exciting evidence of water gullies flowing downhill from the top left to the lower right.

The scale of an image is found by measuring with a ruler the distance between two points on the image whose separation in physical units you know. In this case, we are told the length of the dark bar is a distance of 300 meters.

Step 1: Measure the length of the bar with a metric ruler. How many millimeters long is the bar?

Step 2: Use clues in the image description to determine a physical distance or length. Convert this to meters.

Step 3: Divide your answer to Step 2 by your answer to Step 1 to get the image scale in meters per millimeter to two significant figures.

Once you know the image scale, you can measure the size of any feature in the image in units of millimeters. Then multiply it by the image scale from Step 3 to get the actual size of the feature in meters to two significant figures.

Question 1: What are the dimensions, in kilometers, of this image?
Question 2: How wide, in meters, are the streams half-way down their flow channels?
Question 3: What is the smallest feature you can see in the image?
Question 4: How wide is the top of the crater wall at its sharpest edge?

Answer Key:

This NASA, Mars Orbiter image was taken of a crater wall in the southern hemisphere of mars from an altitude of 450 kilometers. It shows the exciting evidence of water gullies flowing downhill from the top left to the lower right.

The scale of an image is found by measuring with a ruler the distance between two points on the image whose separation in physical units you know. In this case, we are told the length of the dark bar is a distance of 300 meters.

Step 1: Measure the length of the bar with a metric ruler. How many millimeters long is the bar?
Answer: 13 millimeters.

Step 2: Use clues in the image description to determine a physical distance or length. Convert this to meters.
Answer: 300 meters

Step 3: Divide your answer to Step 2 by your answer to Step 1 to get the image scale in meters per millimeter to two significant figures.
Answer: 300 meters / 13 mm = 23 meters / millimeter.

Once you know the image scale, you can measure the size of any feature in the image in units of millimeters. Then multiply it by the image scale from Step 3 to get the actual size of the feature in meters to two significant figures.

Question 1: What are the dimensions, in kilometers, of this image?
Answer: 134 mm x 120 mm = 3.1 km x 2.8 km

Question 2: How wide, in meters, are the streams half-way down their flow channels?
Answer: 0.5 millimeters = 12 meters.

Question 3: What is the smallest feature you can see in the image?
Answer: Sand dunes in upper left of image = 0.3 millimeters or 7 meters wide.

Question 4: How wide is the top of the crater wall at its sharpest edge?
Answer: 0.2 millimeters or 4 meters wide.