



This is a picture taken by International Space Station astronauts of Washington, DC, and can be found among many other pictures at <http://eol.jsc.nasa.gov/Coll/EarthObservatory/PostedSort.htm>. The bridge at the bottom-center of the image is the George Mason Bridge (1) and it is 0.75 kilometers from end to end across the main part of the Potomac River (2).

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. It is the most important number to determine because without it, you don't know how big the objects in the image are!

Step 1: Measure the length of the George Mason Bridge with a metric ruler. How many millimeters long is the image of the bridge?

Step 2: The information in the introduction says that the bridge is actually 0.75 kilometers long. Convert this number into 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:** About what is the distance between the US Capitol Building (3) and the Washington Monument (4)?

**Question 2:** About how wide are the major boulevards and roadways?

**Question 3:** About how wide is the Potomac River?

**Question 4:** How big is the smallest feature you can measure, and what do you think it is?

**Question 5:** How big is the area covered by this image in kilometers rounded to the nearest tenth?

**Question 6:** What other features can you recognize in this image?

You can use GOOGLE-Earth to help find other interesting landmarks in the image!

## Answer Key:

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. It is the most important number to determine because without it, you don't know how big the objects in the image are!

It is highly recommended that students use GOOGLE-Earth and dial-in 'Washington DC' to zoom-in on this area in higher resolution. They can use the various tools to bring up the labels for roads, buildings and geographic features.

Step 1: Measure the length of the Mason Bridge with a metric ruler. How many millimeters long is the image of the bridge? **Answer: 15 millimeters**

Step 2: The information in the introduction says that the bridge is actually 0.75 kilometers long. Convert this number into meters. **Answer: 750 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: The image scale is 50 meters/mm**

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: About what is the distance between the US Capitol Building and the Washington Monument?  
**Answer: 72 millimeters on the image x 50 meters/mm = 3,600 meters or 3.6 kilometers.**

Question 2: About how wide are the major boulevards and roadways?  
**Answer: The thick black lines are about 1.0 millimeter wide or 1.0mm x 50 meters/mm = 50 meters.**

Question 3: About how wide is the Potomac River?  
**Answer: The river banks are about 12 millimeters apart along most of the river, so their true width is 12 mm x 50 meters/mm = 600 meters or 0.6 kilometers.**

Question 4: How big is the smallest feature you can measure...and what do you think it is?  
**Answer: Students should be able to find many buildings that look like white spots with barely a square shape. These would be about 1 millimeter wide or 50 meters in true physical size.**

Question 5: How big is the area covered by this image in kilometers rounded to the nearest tenth?  
**Answer; The field is 169 millimeters by 97 millimeters which is 8.5 kilometers x 4.9 kilometers in true size.**

Question 6: What other features can you recognize in this image?  
**Answer: Students should be able to figure out the following features without using GOOGLE:**

1. Rivers and waterways
2. Large and small buildings
3. Major boulevards
4. Minor streets
5. Bridges
6. Areas with trees and plant life