



# July 4<sup>th</sup> Challenge!


The Washington Monument, designed by Robert Mills and eventually completed by Thomas Casey and the U.S. Army Corps of Engineers, honors and memorializes the first president of the United States, George Washington, and sits at the center<sup>1</sup> of the nation's capital. The structure was completed in two phases of construction, one private (1848-1854) and one public (1876-1884). Built in the shape of an Egyptian obelisk, evoking the timelessness of ancient civilizations, the Washington Monument embodies the awe, respect, and gratitude the nation felt for its most essential Founding Father. When completed, the Washington Monument was the tallest building in the world at 555 feet, 5-1/8 inches.

Have you ever walked up the Washington Monument? It's a long ways up to view the awesome skyline of our Nation's capital. The 897 stairs took about 20 minutes to ascend up and 10 minutes descend back down to the bottom. In 1959, when the elevator broke down, a 23-year old Jerry Zettle in 18 minutes—11 up and 7 down.

The challenge for everyone today is to figure out how many "Washington Monuments" you were able to walk, hike, run, or bike. With some basic math and measurements would you be able to walk 125 Washington Monuments or ride 329 Washington Monuments? Go ahead and try! Below is some data to help you out.

---

<sup>1</sup> Not exactly the center. The Washington Monument is shifted about 300' to the east of the north-south axis of the White House and the east west axis of the US Capitol due to unfavorable soil conditions at the intersection of those two axes.



Question	How to Get it	Your Answer
How many stairs are in the Washington Monument?	Read above	_____ Stairs
What distance do you cover when you climb one step?	Typically, it is the height of the step (called the Riser Height) plus the depth of the step (called the Tread Depth). Measure a step in your house.	_____ Inches
How much distance do you cover to get to the top of the Washington Monument?	Multiply the distance of one step by the number of steps in the Washington Monument.	___ Steps X ___ Inches = _____ Inches
Can you convert this distance number from inches to feet?	Divide by how many inches there are in one foot.	___ Inches / ___ Inches per foot = _____ feet
Can you convert this distance number from feet to miles?	Divide by how many feet there are in one mile.	___ feet / feet per mile = _____ miles of Washington Monument
Do you know how many Washington Monuments away from Earth the moon is?	Figure out how many miles away from Earth the moon is. Divide this number by the miles you calculated above.	_____ mile between Earth and Moon / _____ miles of Washington Monument = _____ Washington Monuments





As you go out a take a walk, go on a hike, go for a run, or ride your bike, measures your distance and we can do some calculations to convert from distance to Washington Monuments! For many people, we may not know the distance but can keep track of how many steps we take with a pedometer. That is good data to have. But, we need to know what your step length is (or the distance you cover when you walk and your left foot moves in front of your right foot). If you have not estimated this already, it is easy to do. Here are the steps:

1. Use a tape measure to mark a 100-foot course on flat ground.
2. Walk at a normal speed from one end of the course to the other, counting your steps as you go.
3. Divide the total number of steps into 100, and you'll find out the length of one step. For example, if you took 50 steps to go 100 feet, your step length is 2 feet. If it took you 40 steps, figure 2 1/2 feet per step.

You can also estimate this for Hiking and Running. Typically, a person will take shorter steps when hiking due to the weight of the pack and the terrain. When someone is running, their step length increases. Can you estimate what your average step lengths for these activities? For biking, we just use your average walking step length.

Activity	Your Average Step Length	Distance Covered in Miles	Estimated Steps Taken (Distance Covered) x (5280 feet/mile))/(Average Step Length)	Washington Monuments Traveled (Estimated Steps) / (Steps in the Washington Monument)
Walking				
Hiking				
Running				
Biking				





## EXAMPLE

Activity	Step Length	Distance Covered	Estimated Steps Taken	Washington Monuments Traveled
Walking	2.5 feet	2 mile	$((2 \text{ miles}) \times (5280 \text{ feet/mile})) / (2.5 \text{ feet}) = 4224 \text{ Steps}$	4,224 Steps / 897 Steps in the Washington Monument = 4.71 Washington Monuments Walked
Hiking	2 feet	4 mile	$((4 \text{ miles}) \times (5280 \text{ feet/mile})) / (2 \text{ feet}) = 10,560 \text{ Steps}$	10,560 Steps / 897 Steps in the Washington Monument = 11.77 Washington Monuments Hiked
Running	3.3 feet	5 mile	$((5 \text{ miles}) \times (5280 \text{ feet/mile})) / (3.3 \text{ feet}) = 8,000 \text{ Steps}$	8,000 Steps / 897 Steps in the Washington Monument = 8.92 Washington Monuments Ran
Biking	2.5 feet	10 miles	$((10 \text{ miles}) \times (5280 \text{ feet/mile})) / (2.5 \text{ feet}) = 21,120 \text{ Steps}$	21,120 / 897 Steps in the Washington Monument = 23.55 Washington Monuments Biked