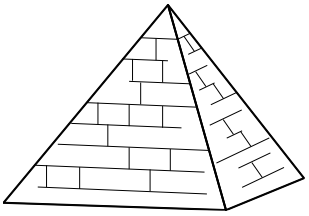
MATHCOUNTS® Problem of the Week Archive

Monumental Architecture – September 18, 2023

Problems & Solutions

The Washington Monument in Washington, D.C. is an obelisk. An obelisk is a tall monument with four gently sloping sides and a pyramid shape on top. The obelisk structure first appeared in Ancient Egyptian architecture.



The Great Pyramid of Giza, another famous architectural design of the Ancient Egyptians, has a square base of side length 756 feet. The square base of the pyramid on top of the Washington Monument has side length 34 feet. The perimeter of the square base of the Great Pyramid is how many times bigger than the square base of the pyramid at the top of the Washington Monument? Express your answer to the nearest whole number.

The perimeter of the square base of the Great Pyramid of Giza is 4 × 756 feet = 3024 feet. The perimeter of the base of the pyramid on top of the Washington Monument is 4 × 34 feet = 136 feet. Compared to the perimeter of the base of the pyramid on top of the Washington Monument, the perimeter of the base of the Great Pyramid is 3024 feet ÷ 136 feet ≈ ***22*** *times larger.*

The Washington Monument is 100 feet taller than the Great Pyramid of Giza. If the Washington Monument and the Great Pyramid each were 355 feet shorter, the Washington Monument would be twice as tall as the Great Pyramid. How many feet tall is the Washington Monument?

Using the information in the problem, we can write two equations. Let w represent the height of the Washington Monument, in feet and p represent the height of the Great Pyramid of Giza, in feet. From the first part of the problem, which states that the Washington Monument is 100 feet taller than the Great Pyramid, we can write w = p + 100. From the second part of the problem, we can write 2 × (p – 355) = w − 355. If we isolate p in the first equation by subtracting 100 from both sides, we get p = w – 100. We can then plug this into the second equation and solve for w:

2 × (w – 100 – 355) = w – 355

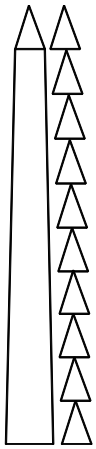
2 × (w – 455) = w – 355

2w – 910 = w – 355

w = 555

Since we defined w as the height of the Washington Monument, in feet, the Washington Monument is ***555*** *feet tall.*

The entire Washington Monument is ten times as high as the pyramid on top. Based on the previous problem, if this pyramid was removed, how tall would the Washington Monument be? Express your answer to the nearest tenth of a foot.



If the entire Washington Monument is ten times the height of the pyramid on top, the height of the pyramid must be 555 feet ÷ 10 = 55.5 feet. If the pyramid was removed from the top of the monument, the new height would be 555 feet – 55.5 feet = ***499.5*** *feet.*

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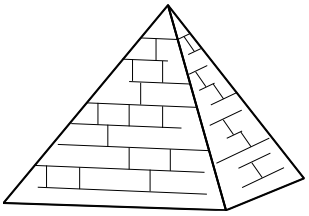

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