Zion National Park

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Abstract

In this paper I discuss one of my favorite places, Zion National Park. Included is a description of the history and geology of this magical place.

1 One of My Favorite Places

"Zion National Park is located in the Southwestern United States, near Springdale, Utah. A prominent feature of the 229-square-mile (590 km2) park is Zion Canyon, which is 15 miles (24 km) long and up to half a mile (800 m) deep, cut through the reddish and tan-colored Navajo Sandstone by the North Fork of the Virgin River. The lowest elevation is 3,666 ft (1,117 m) at Coalpits Wash and the highest elevation is 8,726 ft (2,660 m) at Horse Ranch Mountain. Located at the junction of the Colorado Plateau, Great Basin, and Mojave Desert regions, the park's unique geography and variety of life zones allow for unusual plant and animal diversity. Numerous plant species as well as 289 species of birds, 75 mammals (including 19 species of bat), and 32 reptiles inhabit the park's four life zones: desert, riparian, woodland, and coniferous forest. Zion National Park includes mountains, canyons, buttes, mesas, monoliths, rivers, slot canyons, and natural arches."

But it is the deep emotional contact with the Earth that makes Zion so special. N. Scott Momaday said it best, "It is here that I am most conscious of being, here that wonder comes upon my blood, here I want to live forever; and it is no matter that I must die."

2 Activities

There is a variety of activities available such as:

- Hiking
- Photography
- Cycling
- Canyoneering
- Horseback riding

I especially love the hiking. My top four hikes are:

1. The Narrows of the Virgin River. This has to be one of the top hikes in the country. You can hike for miles in a canyon so narrow that the river stretches from canyon wall to canyon wall. You are really hiking by wading in the river for miles!

2. Angel's Landing (see Figure 2). A bit nerve wracking if you have a fear of heights. There are parts of this trail where there are foot holds carved in the rock and a drop of hundreds of feet. The views are fantastic.

Figure 1: Starting up the Observation Point Trail in winter. (Author's photograph)
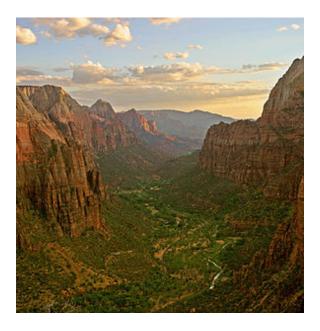

Figure 2: A view of Zion Valley from Angels Landing [Wikipedia, 2012a]

3. Observation Point. An wonderful sampler of the trails in Zion ending in a spectacular view of the main canyon including looking down on Angel's Landing 1.

4. Hidden Canyon. A great hike off of the Observation point trail to a secret world of a crack canyon high on the wall of the mail canyon.

3   History

"The Historic period begins in the late 18th century with the exploration of southern Utah by Padres Silvestre Vélez de Escalante and Francisco Atanasio Domínguez. The padres passed near what is now the Kolob Canyons Visitor Center on October 13, 1776, becoming the first people of European descent known to visit the area. In 1825, trapper and trader Jedediah Smith explored some of the downstream areas while under contract with the American Fur Company. [Wikipedia, 2012b]"

Table 1: Seasonal Average Temperatures in Zion

Month	Low (°F)	High (°F)
Jan	29	52
Apr	43	73
Jul	68	100
Oct	49	78

4   Natural History

The park is a both a wonderland of amazing scenery and sacred place of contemplation. It is a perfect combination of terrain, flora, and fauna with a pleasant dry warm climate.

4.1   Geology

"Zion National Park is located along the edge of a region known as the Colorado Plateau. The rock layers have been uplifted, tilted, and eroded, forming a feature called the Grand Staircase, a series of colorful cliffs stretching between Bryce Canyon and the Grand Canyon. The bottom layer of rock at Bryce Canyon is the top layer at Zion, and the bottom layer at Zion is the top layer at the Grand Canyon.[Service, 2012]"

"Zion was a relatively flat basin near sea level 240 million years ago. As sands, gravels, and muds eroded from surrounding mountains, streams carried these materials into the basin and deposited them in layers. The sheer weight of these accumulated layers caused the basin to sink, so that the top surface always remained near sea level. As the land rose and fell and as the climate changed, the depositional environment fluctuated from shallow seas to coastal plains to a desert of massive windblown sand. This process of sedimentation continued until over 10,000 feet of material accumulated.[Service, 2012]"

4.2   Weather

The weather there never gets **too cold** because of its *southerly latitude* and never gets **too hot** because of its *elevation* (see Table 1).

5   Conclusion

In this paper we took a brief tour of Zion National Park. We discussed its history and geology and saw just a few of the wealth of activities available to visitors.

6   Math Extras

6.1   Four Math Expressions

Here are four math expressions you need to duplicate:

$$x = \frac{b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$F_{n+1} = F_n + F_{n-1}$$

$$\Phi(z) = \frac{1}{\sqrt{2\pi}} \int_0^z e^{-x^2/2} dx$$

$$\sum_{n=1}^{k} n = \frac{k(k+1)}{2}$$

6.2 Math Expressions in Align Environment

Use the **align environment** for the next equations about Catalan Numbers, C_n. Don't forget to use the \\ to get a new line on just the right lines. Note that the first equation below uses a command for binomial or combinations not just two large parentheses. The command you are looking for is `binom` which takes two arguments. Go find it in the documentation you were supplied. The last equation has two large parentheses around it. In that case, use the correct for of the left and right commands to do that.

You need to duplicate this aligned expressions using the `align` environment.

$$C_n = \frac{1}{n+1}\binom{2n}{n} \tag{1}$$

$$= \frac{(2n)!}{(n+1)!n!} \tag{2}$$

$$= \frac{2^n(2n-1)!!}{(n+1)!} \tag{3}$$

$$= \left(\frac{4^n\Gamma(n+\frac{1}{2})}{\sqrt{\pi}\Gamma(n+2)}\right) \tag{4}$$

6.3 In-line Math Expressions

Duplicate these two in-line math expressions:

Morbo the Annihilator is on TV channel $\sqrt{2}$ with Linda van Schoonhoven.

The simple identity is: $e^{\theta i} = \cos(\theta) + \sin(\theta)i$.

References

[Service, 2012] Service, N. P. (2012). Zion national park — geologic formations. [Online; accessed 26-November-2012].

[Wikipedia, 2012a] Wikipedia (2012a). Zion national park — wikipedia, the free encyclopedia. [Online; Picture by David Iliff; accessed 26-November-2012].

[Wikipedia, 2012b] Wikipedia (2012b). Zion national park — wikipedia, the free encyclopedia. [Online; accessed 26-November-2012].