



## 11 Kerfuffle at Sugarloaf Mountain

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### Challenge

A tense atmosphere wafts around Sugarloaf Mountain, a snowy mountain in the middle of the Erz Mountains near the small town Rüodeschanerow. The cable car, which runs from Candy Valley to Point Jelly Bean, is out of order. Hence, Santa Claus has to take his sleigh to deliver all the presents to the young and old inhabitants of Point Jelly Bean.

The reindeers are not happy to hear that: The shortest path from Candy Valley to Point Jelly Bean along the cable car is far too steep; so they have to gallop all around the mountain. However, road engineer Greta Gnome is able to calm the grumpy animals: “The shortest path from Candy Valley to Point Jelly Bean that goes all around the Sugarloaf Mountain is not awfully long. Besides, you can sled downhill on a quite significant part of this path.”

Now, we want to know: How long is the shortest path  $x$  from Candy Valley to Point Jelly Bean that goes all around Sugarloaf Mountain? And how long is the part  $y$  of this path that leads downhill?

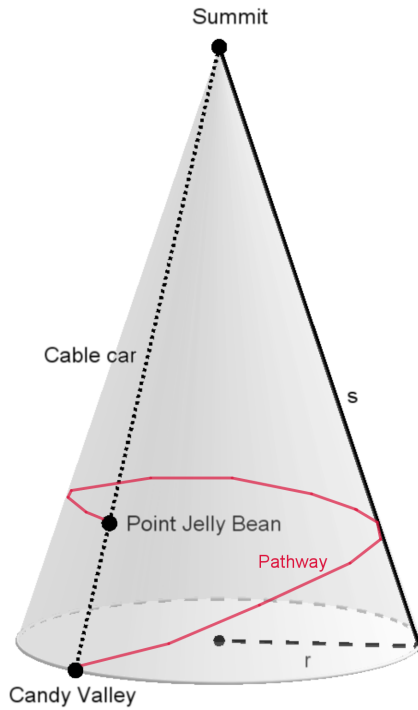


Figure 1: Sugarloaf Mountain is exactly formed like a right circular cone. Its directrix has radius  $r = 20$  km; its generatrices  $s$  are 60 km long. Candy Valley is situated at the foot of Sugarloaf Mountain. Point Jelly Bean lies on the generatrix joining Candy Valley and the summit of the Mountain; its distance from Candy Valley on this generatrix is 10 km.



Artwork: Sonja Rörig

### Possible answers:

1. One has  $x \approx 92$  km and  $y \approx 39$  km.
2. One has  $x \approx 92$  km and  $y \approx 40$  km.
3. One has  $x \approx 93$  km and  $y \approx 40$  km.
4. One has  $x \approx 93$  km and  $y \approx 41$  km.
5. One has  $x \approx 94$  km and  $y \approx 41$  km.
6. One has  $x \approx 94$  km and  $y \approx 42$  km.
7. One has  $x \approx 95$  km and  $y \approx 42$  km.
8. One has  $x \approx 95$  km and  $y \approx 43$  km.
9. One has  $x \approx 96$  km and  $y \approx 43$  km.
10. One has  $x \approx 96$  km and  $y \approx 44$  km.