



3 The Elves' Circular Storages

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Project: MATH+

Challenge

Due to a recent increase in storms, the elves from two storage buildings want to connect their facilities with conveyor belts. This would allow them to transfer goods between the storages without having to go outside. Looking from above, the two storage buildings have the form of a circle, the first one with a radius of 50 meters and the second one with a radius of 70 meters. The centers of the two facilities are exactly 200 meters apart. The elves want to built two conveyor belts that are each, as presented in 1, tangent to the buildings and run exactly from one building to the other, but no further.

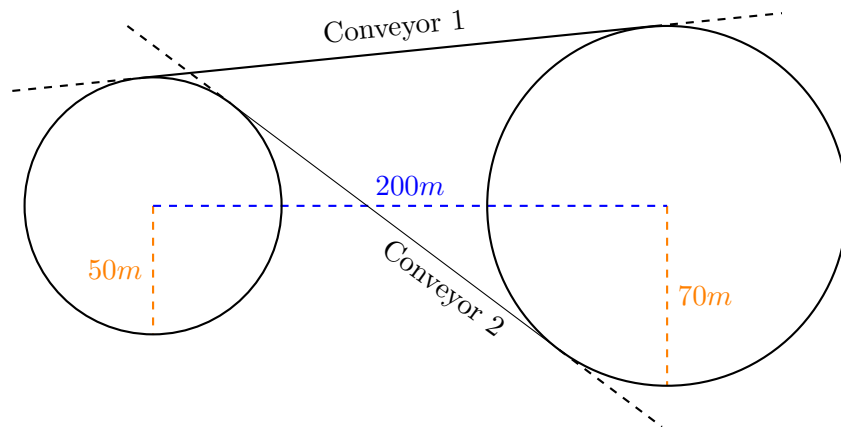


Figure 1: Top view of the buildings with the two conveyor belts drawn in.

Unfortunately, there is a storm out there right now, such that the elves cannot measure the length of each of the conveyor belts. But they need to know the correct lengths of the two conveyor belts, to order enough material for the building process. Can the elves figure out the correct lengths without measuring, and if they can, what are the lengths of the conveyor belts 1 and 2 (rounded to full meters)?

Possible answers:

1. It is not possible to determine the lengths.
2. Conveyor 1: 250 m , Conveyor 2: 233 m
3. Conveyor 1: 150 m, Conveyor 2: 220 m
4. Conveyor 1: 161 m, Conveyor 2: 233 m
5. Conveyor 1: 161 m, Conveyor 2: 160 m
6. Conveyor 1: 200 m, Conveyor 2: 200 m
7. Conveyor 1: 201 m, Conveyor 2: 233 m
8. Conveyor 1: 201 m, Conveyor 2: 160 m
9. Conveyor 1: 199 m, Conveyor 2: 233 m
10. Conveyor 1: 199 m, Conveyor 2: 160 m