# Marine Engineering Marine Ramp Design Using Trigonometry

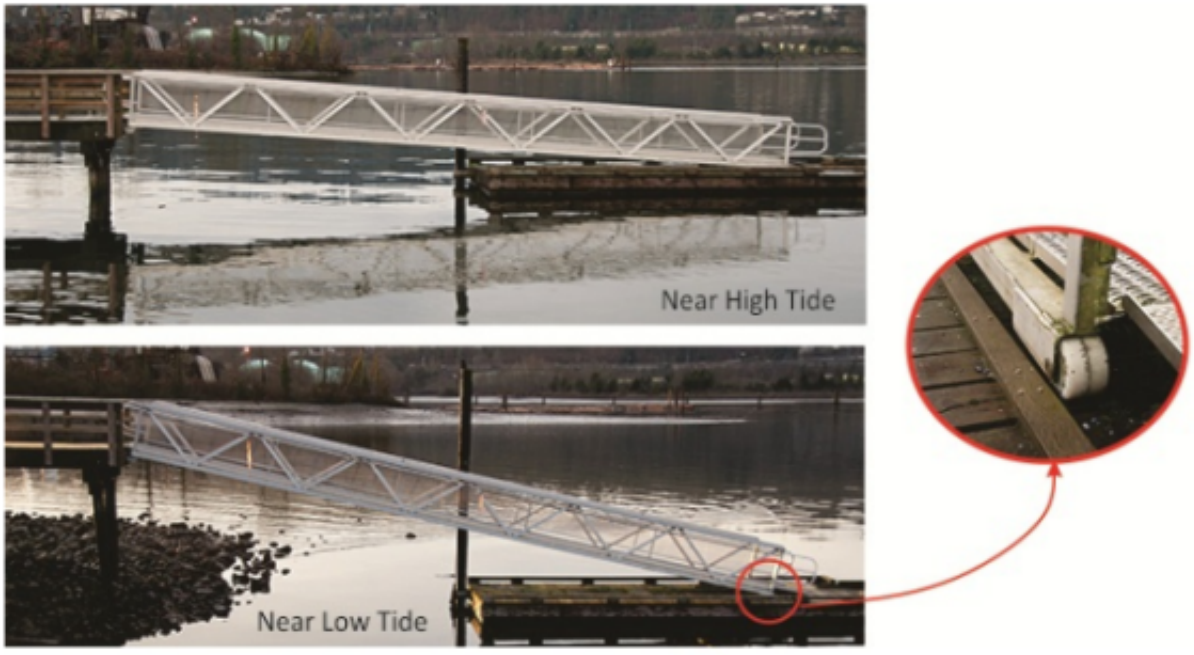
## EXAMPLE 3 Finished:

The following are screen captures of the finished question for Marine Engineering.

See the **Submitted Problem**[1]

At a Vancouver marina, a pedestrian ramp leads to a floating dock which moves up and down with the tide. The upper end of the ramp is hinged (it can rotate) and the lower end is supported by a roller that can roll back and forth along a track. As the tide rises and falls, the slope of the ramp changes, and the roller on the lower end moves in its track. Note: The diagram below is not to scale.

Since users of the marina carry equipment up and down the ramp, the slope of the ramp **must not exceed 34%**. The slope gives the relationship between the vertical and horizontal distances covered by the ramp (i.e. that the vertical drop can be **at most** 34% of the horizontal distance travelled). The difference in elevation between the lowest low tide and the highest high tide at this location is 4.1 m.




**Part A**

Assuming that the ramp is horizontal when the water level is at its highest (as shown above, determine the minimum length of the ramp such that its slope will never exceed 34%.

Give your answer in meters, **to 2 decimals**.

**Part B**

Using the minimum ramp length calculated above, determine the minimum length of the roller track (in mm) required to support the lower end of the ramp.

Give your answer in millimetres, to three significant figures.

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## Links

1. bcit.ca/bettermath/example3submitted

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