

Classroom to Campus: Math and Stats Challenge

Grade 11 – MCF3M

Topic C: Trigonometric Functions

Determining the Distance of a Ship from the Harbour Using Trigonometry

Maritime navigation relies on accurate distance calculations to ensure safe and efficient travel. When multiple ships approach a harbour, knowing their relative positions can help prevent collisions and improve docking procedures.

Ship A is sailing directly toward a harbour H that is 24.5 kilometres away. Ship B is also travelling towards the same harbour H. The captain of Ship A observes Ship B 40 degrees to his right. Meanwhile, the captain of Ship B calculates that Ship A is 55 degrees to his left. Based on this information:

- What type of triangle is formed by Ship A, Ship B, and the harbour H? Provide a sketch clearly labeling the positions of the ships A and B, and harbour H.
- How far is Ship B from the harbour H? (*Round your final answer to two decimal places. Include units.*)
- How far apart are Ship A and Ship B from each other? (*Round your final answer to two decimal places. Include units.*)
- If both ships are traveling at 32 km/h, how long (in minutes) will it take each ship to reach the harbour H? (*Round your final answers to two decimal places. Include units.*)
- If Ship A speeds up by 20% while Ship B slows down by 10%, how long will it take each ship to reach the harbour H? (*Round your final answers to two decimal places. Include units.*)
- If Ship B is traveling at 32 km/h, what should be the speed of Ship A so it arrives at the harbour H at the same time as Ship A? (*Round your final answer to two decimal places. Include units.*)

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