

Part 1 - Find the treasure:

Pirate Green Beard has stolen a substantial amount of gold and diamonds. With the police hot on his tail he had to hide the treasure on treasure island. He left the instructions only to his most trusted crew. After a few years of laying low, unfortunately pirate Green Beard met his demise battling the Kraken. Now it’s up to you to use trigonometry to uncover the location of the lost treasure.

Follow the instructions to find the treasure. The first one has been done for you.

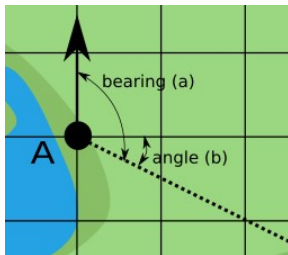
Instructions:

Avoid the dangers and find the treasure. Calculate the route according to the steps below. The first step has been done for you as an example. Work in pairs.

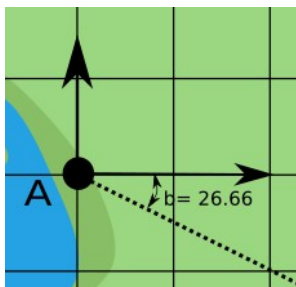
- Start at point A
- Step 1: The bearing is 116.66° . The total eastwards distance is 2 km. Calculate the north/south distance and mark the path on the map.
- Step 2: The bearing is 45° . The total northwards distance is 1 km. Calculate the east/west distance and mark the path on the map.
- Step 3: Travel due north-west. Cover a distance of 1.414 km.
- Step 4: Travel at a bearing of 63.43° and cover a distance of 2.24 km.
- Step 5: Travel due north-east. Cover a distance of 1.414 km.

Example calculation:

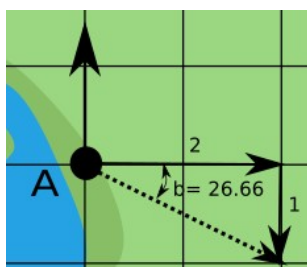
- We know that the **bearing** is relative angle between the North and the given direction in the clockwise direction.



- Therefore we can calculate the angle b as: $b = a - 90^\circ$
- In this case: $b = 116.66^\circ - 90^\circ = 26.66^\circ$
- We know the eastwards distance covered is 2 km.



- We can use the tangent function to calculate the southward distance. $d = 2 \tan(b) = 1$
- Mark the answer on the map.



Part 2: Hide the treasure

Alas! Just as you collected the treasure you were ambushed by the nefarious Governor Marlow. After an exciting cannon-fight and chase on the high seas you managed to escape. But you had to stash the treasure on another island in order to allow for your speedy getaway.

Now you must create one more treasure map so that you or your pirate friends will be able to find the treasure back in a few years.

Instructions:

- Work in pairs.
- Sketch a map of your own on grid paper, including dangers and the (secret) target point.
- Use trigonometry to create a step-by-step guide on how reach the treasure while avoiding all the dangers.
- Give your map to another group and see if they are able to reach the target.