

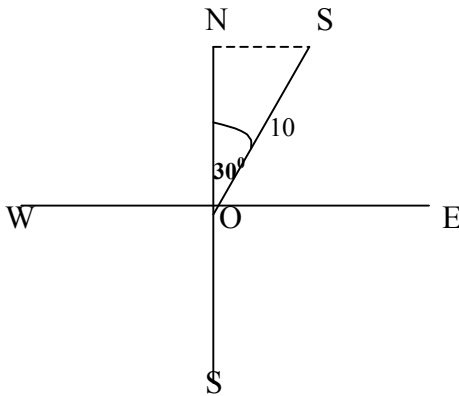
**Applications of bearings    By Cliff Don-Daniel**

**Question 1**

A ship sailed 10 Km in a direction of  $N30^{\circ}E$  ( or  $030^{\circ}T$  ) . How far **a)** North is it from the starting point **b)** East is it from the starting point

**Solution a)**

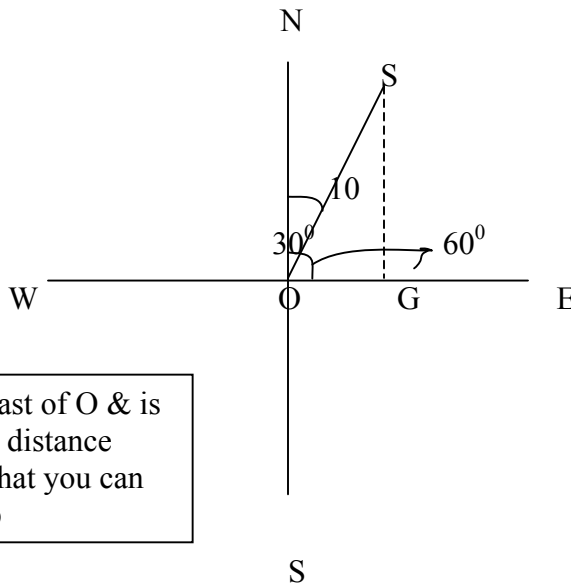
- Put the information on a diagram



Imagine ON is a pier & it's the distance you have to walk , north, such that you can see the ship at its closest.. So find ON. Angle  $ONS = 90^{\circ}$

- Write given data in the triangle. Here  $30^{\circ}$  &  $OS=10$
- Required to find **ON**..Why?...See text box
- Using trigonometry  $\text{Cos}30 = \frac{ON}{10}$
- Transpose & solve for ON.  $ON = 10 \text{cos} 30 = 10 \times 0.8660 = 8.66 \text{km}$
- **Ship is 8.66 Kms North from its starting pont.**

**b)**



Note G is east of O & is the shortest distance **East** such that you can see the ship

- Angle  $SOG = (90-30) = 60^{\circ}$
- Required to find OG

- $\text{Cos}60 = \frac{OG}{10}$
- $OG = 10 \text{Cos}60 = 10 \times 0.5$
- **OG = 5 Kms**

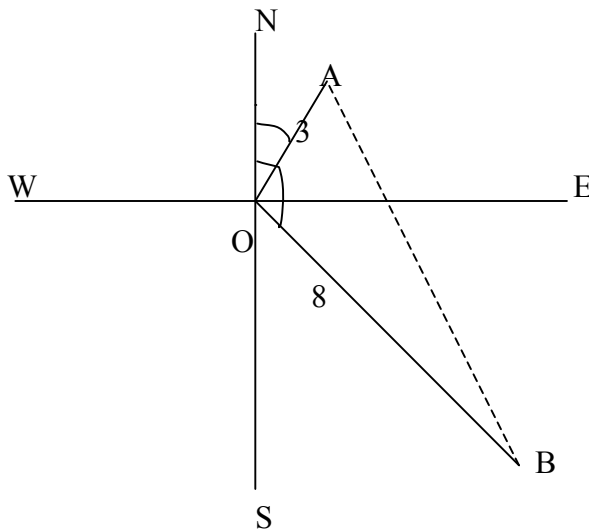
## Question 2

Two hikers Allen & Bertie set out camping from the same town T. Allen walks 3 Kms in the direction  $040^{\circ}$ T Bertie walks 8 Kms in the direction  $120^{\circ}$ T

- What is the distance between the two hikers
- What is the bearings of Allen from Bertie

### Solutions

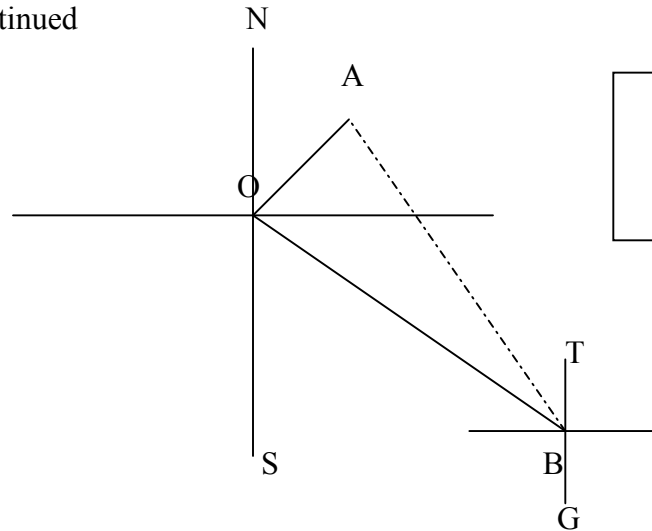
a)



- Angle NOA =  $40^{\circ}$  ( given)
- $\therefore$  Angle AOE =  $(90-40)=50^{\circ}$
- Angle NOB =  $120^{\circ}$  ( given)
- Angle EOB =  $(120-90)=30^{\circ}$
- **Angle AOB =  $(30+50) = 80^{\circ}$**

- Now consider Triangle AOB We need to **find AB**
- Apply Cosine rule.  $AB^2 = OA^2 + OB^2 - 2(OA)(OB)\cos AOB$
- $AB^2 = 3^2 + 8^2 - 2 \times 3 \times 8 \cos 80 = 9 + 64 - 48 \times 0.1736 = 73 - 8.332 = 64.668$
- $AB = \sqrt{64.668}$
- Distance between the 2 hikers is 8.042 Kms

Question 2 Continued



- Draw a compass bearing through B
- Call it TG which is parallel to ON
- Angle NOB=Angle OBT Alternate angles.

- Aim is to find  $\angle OBA$  &  $\angle ABT$
  - $\angle OBA$  found by Sine rule.  $\frac{3}{\sin OBA} = \frac{8.042}{\sin 80} = \frac{3}{\sin OBA} = \frac{8.042}{0.9848} = 8.166$
  - Invert both sides  $\frac{\sin OBA}{3} = \frac{1}{8.166}$  Transpose to make  $\sin OBA$  the subject
  - $\sin OBA = \frac{3}{8.166} = 0.3673$
  - $\angle OBA = 21.54$
  - $\angle SOB = 180 - 120 = 60^\circ$  & also  $\angle SOB = \angle OBT$  (alternate Angles as OS is parallel to TG)
  - But  $\angle OBT = \angle OBA + \angle ABT$
  - $60^\circ = 21.54 + \angle ABT$
  - $\angle ABT = 60^\circ - 21.54 = 38.46^\circ$ ... This is  $N38.46^\circ W$  or  $(360 - 38.46)^\circ = 321.54^\circ T$
  - So the bearings of A from B is  **$321.54^\circ T$**  or  $N38.46^\circ W$
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