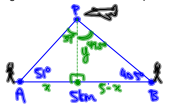
Applications of Trigonometry Dec 19/2011

Ex.1. Two observers who are 5 km apart. At the same time, they see a small airplane flying above and between them. One observer measures a 51° angle of inclination, while the other measures a 40.5° inclination angle. What is the altitude of the plane?



$\tan 51° = \frac{y}{x}$ $\tan 40.5 = \frac{y}{5-x}$

want y, eliminate x

$x \tan 51° = y$ $x = \frac{y}{\tan 51°}$ ① $(5-x)\tan 40.5° = y$ ②

Sub ① into ②

$\left(5 - \left(\frac{y}{\tan 51°}\right)\right)\tan 40.5° = y$

$5\tan 40.5° - \frac{y \tan 40.5°}{\tan 51°} = y$

$4.2704 - 0.6916y + 0.6916y = y + 0.6916y$

$4.2704 = 1.6916y$

$y = 2.5245$

∴ the plane is 2.5 km high.

$x \tan 51° = y$ $(5-x)\tan 40.5° = y$

$x \tan 51° = (5-x)\tan 40.5°$

$x \tan 51° = 5\tan 40.5° - x\tan 40.5°$

$x(1.2349) = 4.2704 - x(0.8541)$

$+x(0.8541)$ $+x(0.8541)$

$2.0891x = 4.2704$

$x = 2.044$

Sub x into $y = x \tan 51°$

$y = (2.044)(1.2349)$

$y = 2.5$

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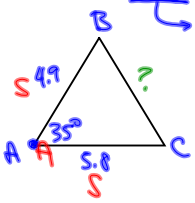
Ex.2

Shannon works for a landscaping business. Her job is to measure properties. For a triangular piece of land, two sides measure 4.9 m and 5.8 m and meet at a common point separated by a 35° angle.
Find the total perimeter of the piece of land.



need 3rd side

Cosine law

$a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = 4.9^2 + 5.8^2 - 2(4.9)(5.8)\cos 35°$

$a^2 = 11.0894$

$a = 3.3301$

$P = 4.9 + 5.8 + 3.3301$

$P = 14.0$

∴ the perimeter is 14.0 m

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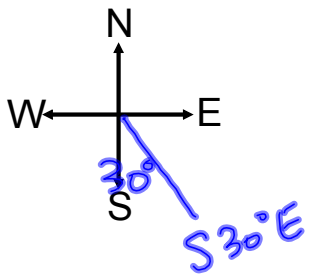
Compass Directions & Bearings

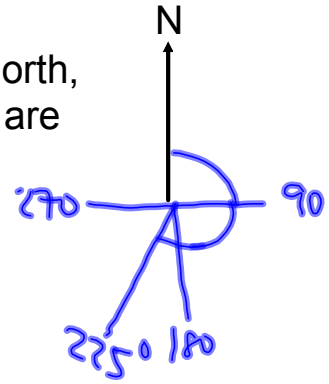
(a) A compass direction is measured from N, S, E, or W. The angles are always between 0° and 90°.



e.g. S30°E

start here — turn this amount

(b) A bearing is always measured from north, in a clockwise direction. The values are from 000 to 360 (but less than 360).



e.g. bearing 225

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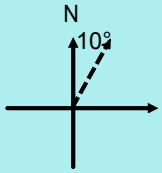
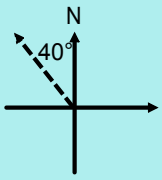
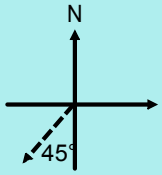
Compass Direction	Bearing	Path
N10°E	010	
N40°W	320	
SW	225	

S 45° W

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Assigned Work:

p.450 # 4 (see Ex.2), 9 (see Ex.1)
p.450 # 5, 8, 11, 13, 15

Tomorrow is a review period.

Review Questions:

p.416 #2, 3, 5, 6, 9, 13, 14, 16
p.453 #2, 3, 7, 8, 11, 12

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