
Bearings — Answer Sheet

Solutions to 01 — Worksheet. Mark yourself from this only after attempting the whole sheet.

Warm-up

W1. $048^\circ + 180^\circ = \boxed{228^\circ}$

W2. $210^\circ + 180^\circ = 390^\circ \Rightarrow 390^\circ - 360^\circ = \boxed{030^\circ}$ (had to wrap around 360°)

W3. Back bearing of X from Y: $070^\circ + 180^\circ = 250^\circ$. $\angle XYZ = 250^\circ - 160^\circ = \boxed{90^\circ}$.

Main Question

(a) Bearing of A from B (back bearing) = $065^\circ + 180^\circ = \boxed{245^\circ}$.

(b) $\angle ABC = 245^\circ - 152^\circ = \boxed{93^\circ}$. (Check it's sensible: this is the interior angle of the triangle at B, so it must be between 0° and 180° — it is.)

(c) Cosine rule, with $AB = 12$, $BC = 9$, $\angle ABC = 93^\circ$ the included angle:

$$AC^2 = AB^2 + BC^2 - 2 \cdot AB \cdot BC \cos(93^\circ) = 144 + 81 - 216 \cos(93^\circ)$$

$\cos(93^\circ) = -0.05234$, so:

$$AC^2 = 225 - 216(-0.05234) = 225 + 11.30 = 236.30 \Rightarrow AC = \sqrt{236.30} = \boxed{15.37 \text{ km}}$$

(d) Sine rule to find $\angle BAC$:

$$\frac{BC}{\sin(\angle BAC)} = \frac{AC}{\sin(\angle ABC)} \Rightarrow \sin(\angle BAC) = \frac{BC \sin(\angle ABC)}{AC} = \frac{9 \sin(93^\circ)}{15.37} = \frac{8.988}{15.37} = 0.5846$$

$$\angle BAC = \sin^{-1}(0.5846) \approx \boxed{36^\circ}$$

Bearing of C from A = bearing of B from A **plus** $\angle BAC$ (the turn was to the right/clockwise, so C sits clockwise of the $A \rightarrow B$ line):

$$065^\circ + 36^\circ = \boxed{101^\circ}$$