Unit 20 · Bearing and Scale Drawing

STUDY NOTES

WHAT THE BLE ASKS

- **CDC's grid:** Geometry (Units 13, 14, 15, 16, 17, 18, 19, 20 together): 15 of 50 marks
- **In our 10 model papers:** 2-mark ×7 · 3-mark ×3
- **Model paper, question 11 (2 marks, understanding):** given one bearing, find the bearing back
- the Grade 7 model paper shows the other shape: draw a volleyball court to a scale, with its lines of symmetry (3 marks, application)

Key terms

Bearing: the direction of a place, as the angle turned **clockwise from the north line**, in **three digits**.

Back bearing: the bearing from the other end of the line.

Scale: how a length in a drawing stands for a length in the real thing.

Formulas

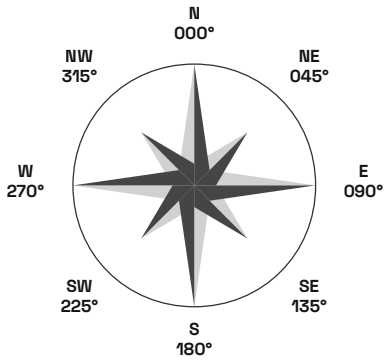
bearing + 180°	bearing under 180° **Use:** the bearing back
bearing − 180°	bearing 180° or more **Use:** the bearing back
map distance × scale	actual distance **Use:** from the map to the ground
actual distance ÷ scale	map distance **Use:** from the ground to the map

Bearing

Every bearing needs three things:

1. a **place to measure from**
2. a **north line** at that place
3. a **clockwise** turn

- 5° is written 005°; 50° is written 050°
- "the bearing of the airport **from** the zoo": the north line goes at the zoo
- swap the two places and the bearing changes

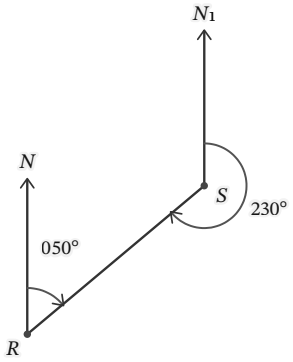


The eight directions as bearings. North is 000°, and a full turn returns to it at 360°.

- north-west is 315°, not 45°: clockwise, you go right round through east and south
- over 180° with a protractor: measure the small angle on the left of north, take it from 360°: 30° → 330°

The bearing back

- from the other end you face exactly the opposite way: half a turn
- 050° from R to S gives 050° + 180° = 230° from S to R
- the two numbers always stay 180° apart



A north line at both places; the bearing back is measured from *S*'s own.

- true over a school, a town or a district, where north lines are as good as parallel; not over thousands of kilometers, since north lines all meet at the North Pole

Runways: named by the bearing a pilot faces, to the nearest 10°, last zero left off. Kathmandu's **02** is about 020° and its **20** about 200°: a bearing and its bearing back. They count from **magnetic north**, not the map's north.

Scale

- very big and very small things can both be drawn on a sheet
- every measurement is multiplied by the same number, so the drawing keeps its proportions
- a map shrinks lengths, not angles: every angle and bearing stays as it is

Three ways to write one scale:

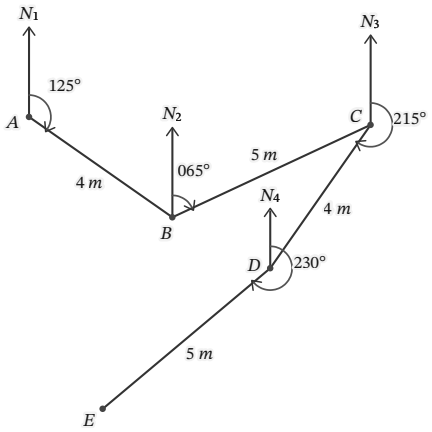
- **in words:** 1 cm = 500 m
- **as a ratio:** 1 : 50,000 (500 m is 50,000 cm); no units: 1 of anything on the map is 50,000 of the same thing on the ground
- **as a bar:** a line marked with what it measures on the ground
- scale 1 : 200: 1 cm on paper is 200 cm in real life
- the scale from a drawing: drawing length : real length: 2 squares for 6 → 1 : 3
- ten times smaller: 1 : 10; ten times bigger: 10 : 1
- a bar stays true when a map is copied larger or zoomed; “1 cm = 500 m” doesn't

Drawing to a scale

1. choose the scale and write it on the drawing
2. change each real length to its length on paper
3. draw the lines; the angles stay as they are

Drawing a route

1. draw a north line at the start
2. measure the bearing clockwise and draw the leg to scale
3. draw a new north line at the end of that leg
4. repeat for each leg



A route of four legs: each leg starts from its own north line.

Where it is used

- ships and airplanes: routes planned as bearings and distances
- maps: on a phone's map the bar changes as you zoom in
- house plans: a mistake on paper can become a wall in the wrong place
- walking: a compass, a map and the bearing of a far hilltop keep you straight when trees hide it

COMMON MISTAKES

✗ 50° for a bearing
✓ 050°.

✗ turning anticlockwise, north-west as 45°
✓ clockwise: 315°.

✗ measuring from the wrong place's north line
✓ bearing of *A* from *B*: the north line goes at *B*.

✗ leaving out the north line at a corner of a route
✓ draw one at every place.

✗ no scale on a scale drawing
✓ write it.

✗ mixing units
✓ 1 : 100 with centimeters on paper gives centimeters on the ground, not meters.