
10


NE
SE
100
120


START

Measures, Shape & Space

Distances, Angles and Bearings

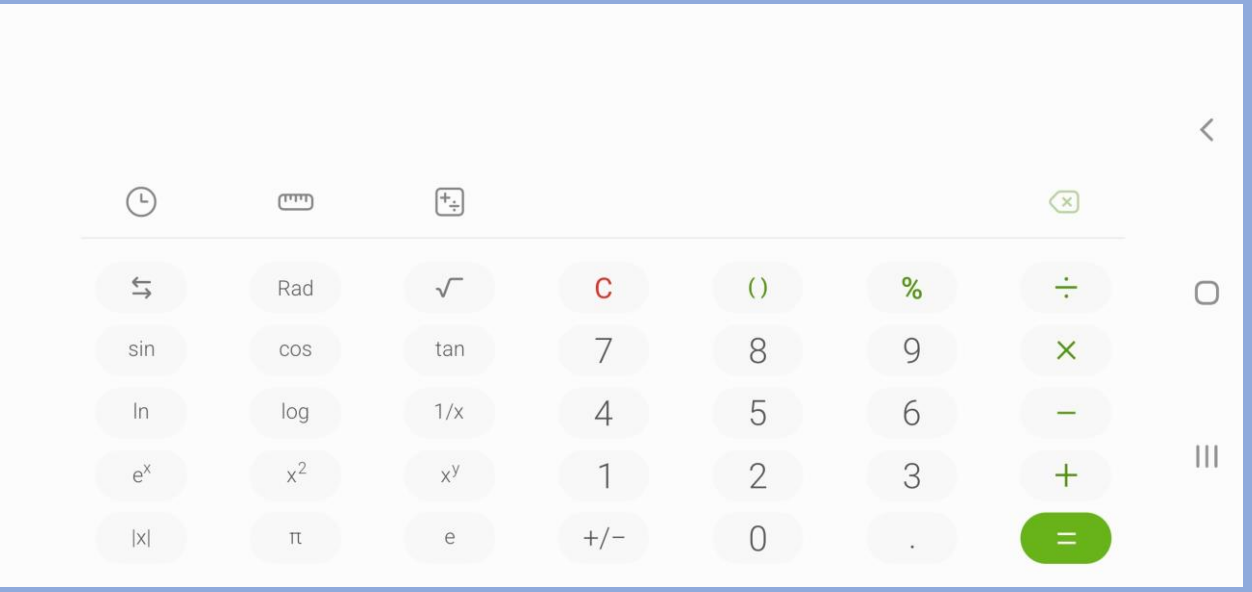
Maps and Map Scales

Coordinates

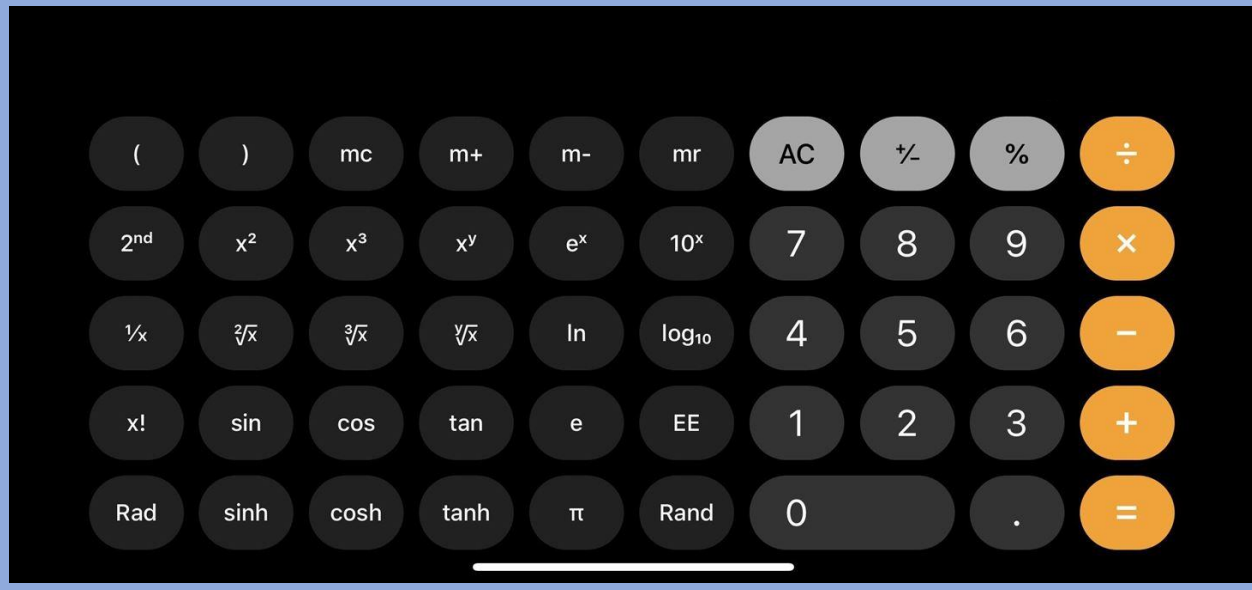
(Navigation)

Lesson 1 – Part 1

Android



Apple



Rotate your phone in the calculator app to reveal additional functions.

PowerPoint Slides Online

www.reachoutcf.com

www.reachoutcf.com/resources

Scan the QR Code

Session Intentions: Monday 5th Feb 2024

- To define positional vocabulary (appropriate wording) to describe position and direction. (E3.M20)
- To compare metric measurements of mm, cm, m and km. (E3.M15)
- To use angles when describing position and direction, and measure angles in degrees. (L1.M26)
- To recognise and make use of map scales. (L1.M21)
- To calculate values of angles, and describe a position with coordinates. (L2.M19)
- To describe a route from ReachOut to the Train Station.
- To describe a route to the summit of Ben Nevis using Ordnance Survey Maps.
- To describe a route from Lukla to Everest Base Camp using National Geographic Maps.

Navigation

NOUN the process or activity of accurately ascertaining one's position and planning and following a route.

From the Latin: navigatio – the act of sailing or voyaging.

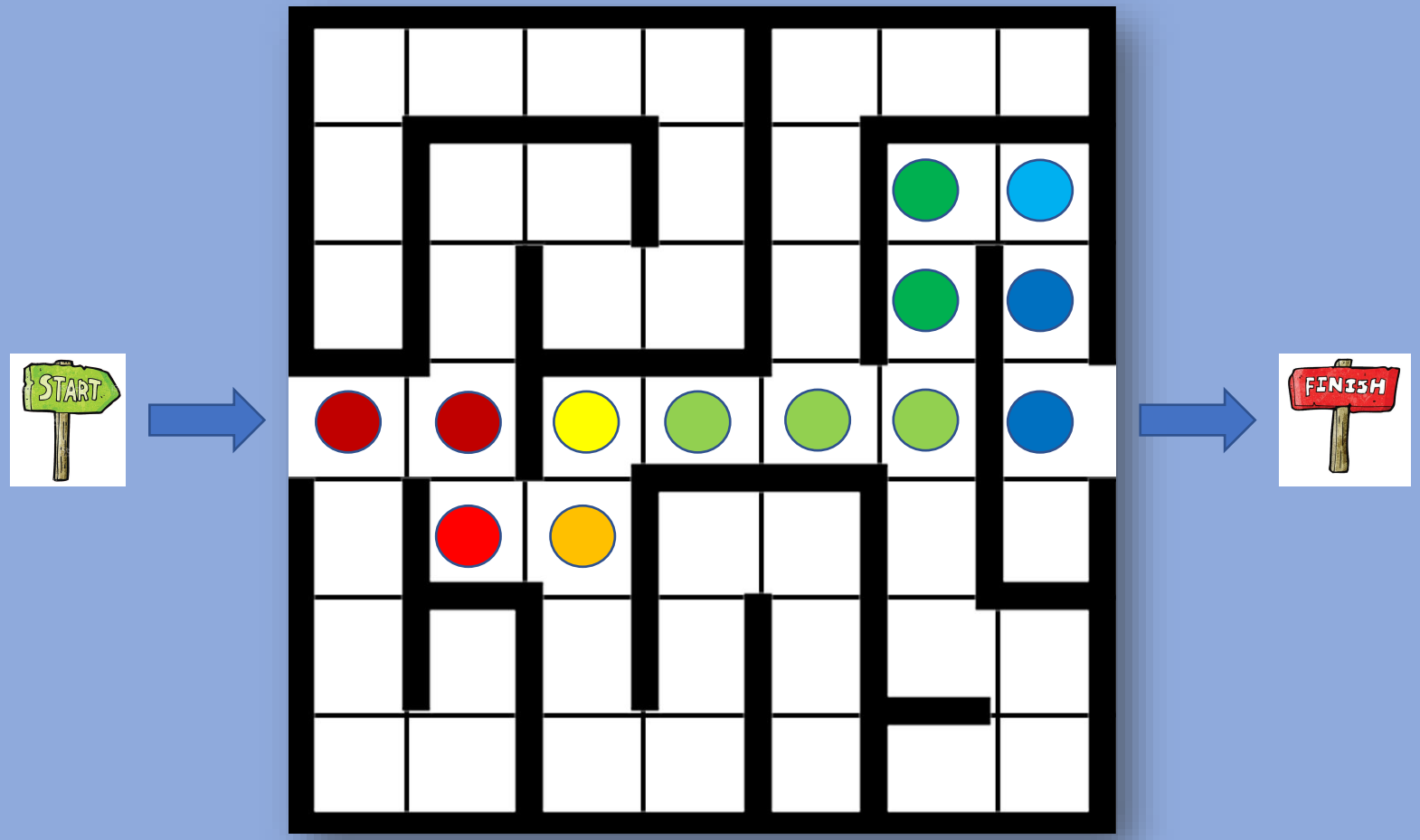
Group Activity: A-maze-ing Directions.

- Split into two equal teams.
- Each team will be given a simple maze with a start and finish point.
- Solve the maze in your group (find the shortest route through).
- Write down a list of simple directions to solve your maze.
- You have 10 minutes.

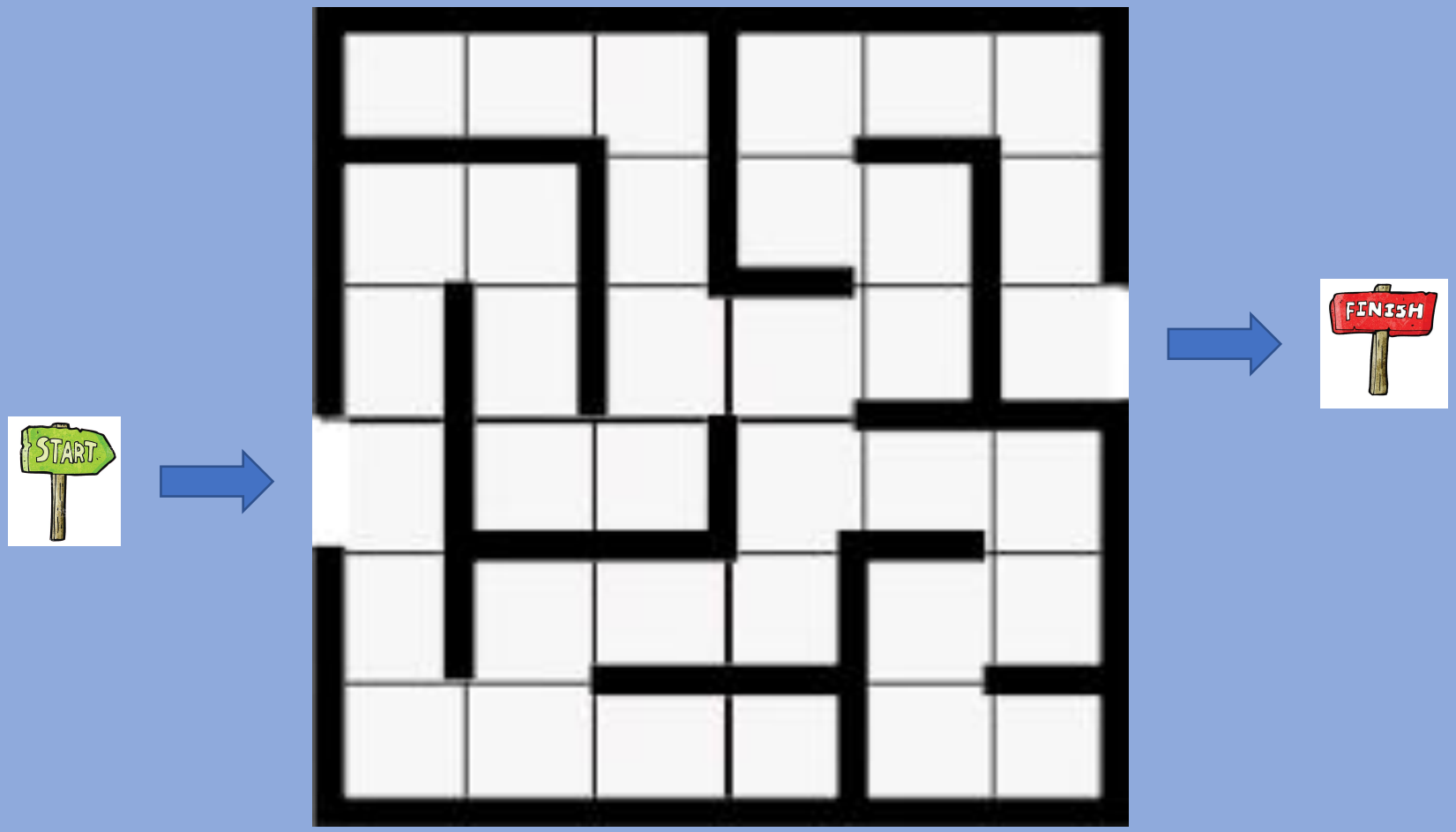
- Each team will then be given a copy of the maze the other team had.
- Each team will then read out their instructions and the other team will use these directions alone to navigate the maze.
- You will score the other teams directions based upon clarity and whether or not they got you out of the maze.

Example

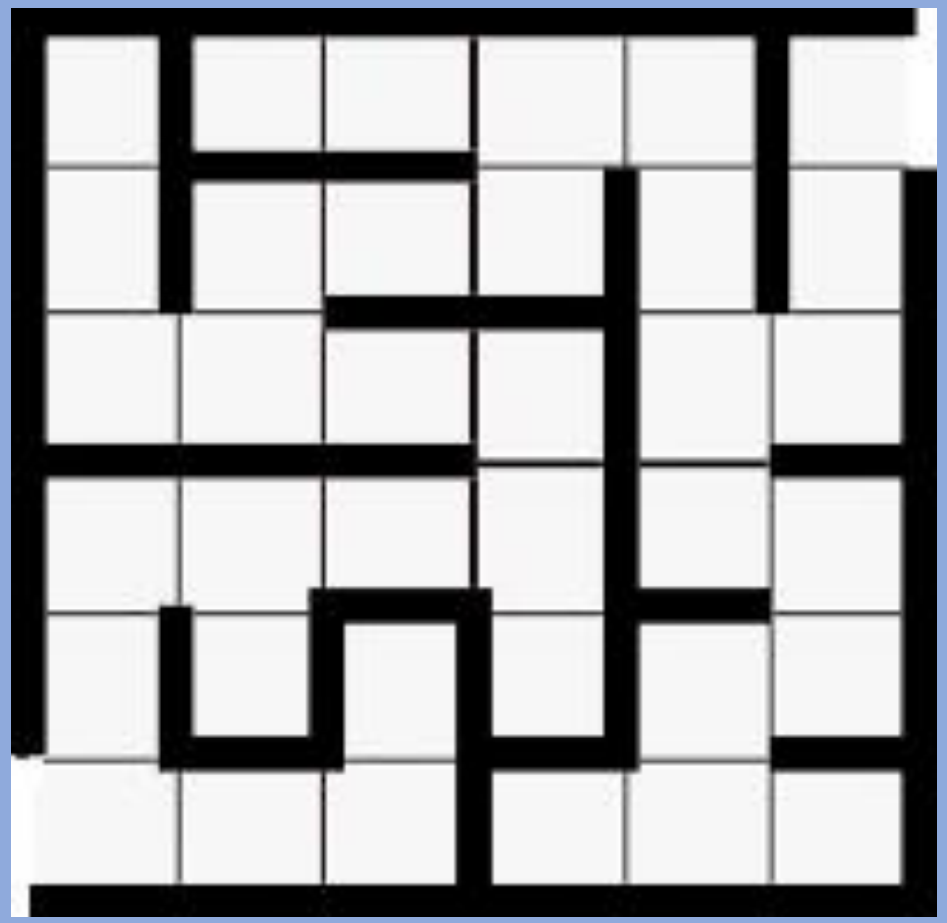
- Walk forward two squares.
- Turn right and walk forward one square.
- Turn left and walk forward one square.
- Turn left and walk forward one square.
- Turn right and walk forward three squares.
- Turn left and walk forward two squares.
- Turn right and walk forward one square.
- Turn right and walk forward two squares.
- Exit the maze to the left.



Maze puzzle 1



Maze puzzle 2



Thirty Seconds Left…

Peer Assessment:
Review the directions you were given

- Score the other team based upon:

  - Clarity of instructions. Were they easy to understand? / 5
    (Note: Directions can be clear even if they are not accurate!)

  - How far in the maze did you progress? (5 points if all the way) / 5

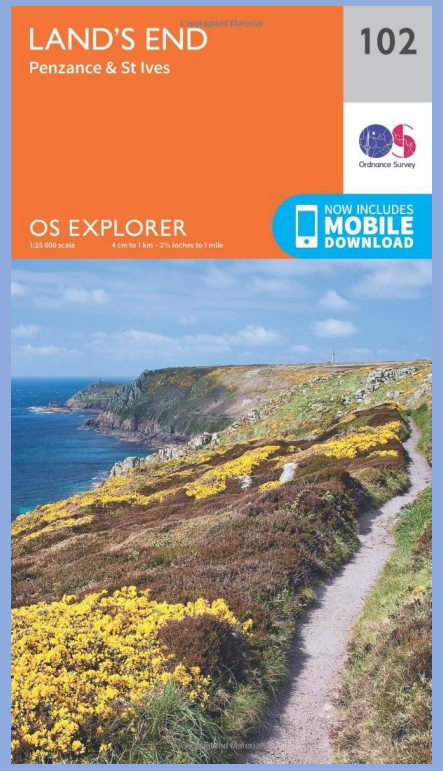
  - Overall score out of 5? / 5
    (Would you ask this team for directions again?)

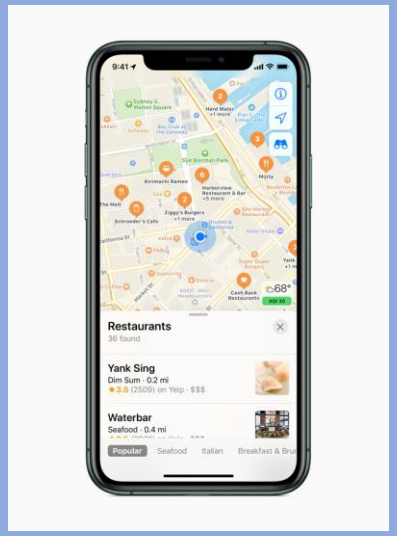
Total Score: / 15

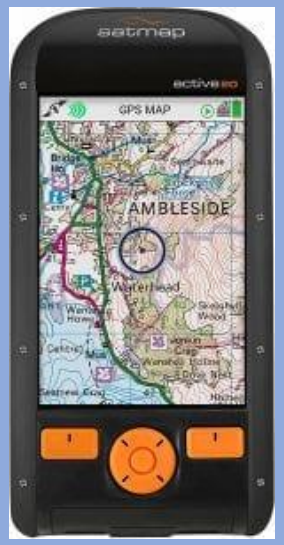
Question: What do you think are the most important features of Navigational instructions (describing a route)?

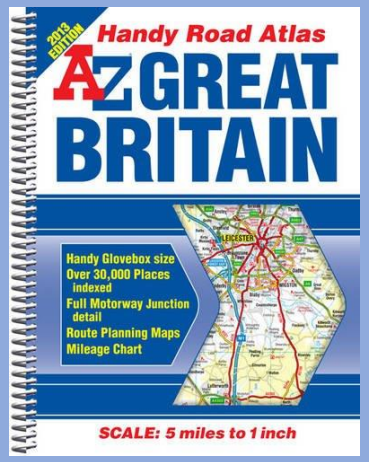
- Direction – Which way to go.
- Distance – How far to move in a certain direction.
- What else could be useful?
  - Starting Point, Finishing Point.
  - Time taken - Duration

Discussion: What forms of navigation have you used?



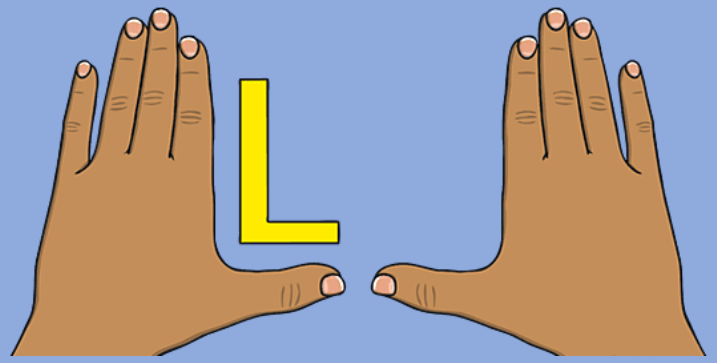




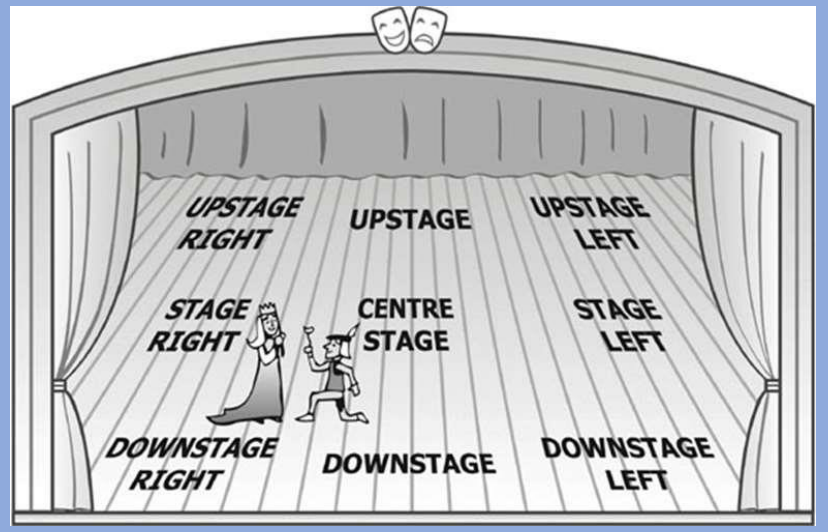


Describing Movement – Left and Right

- Left and Right

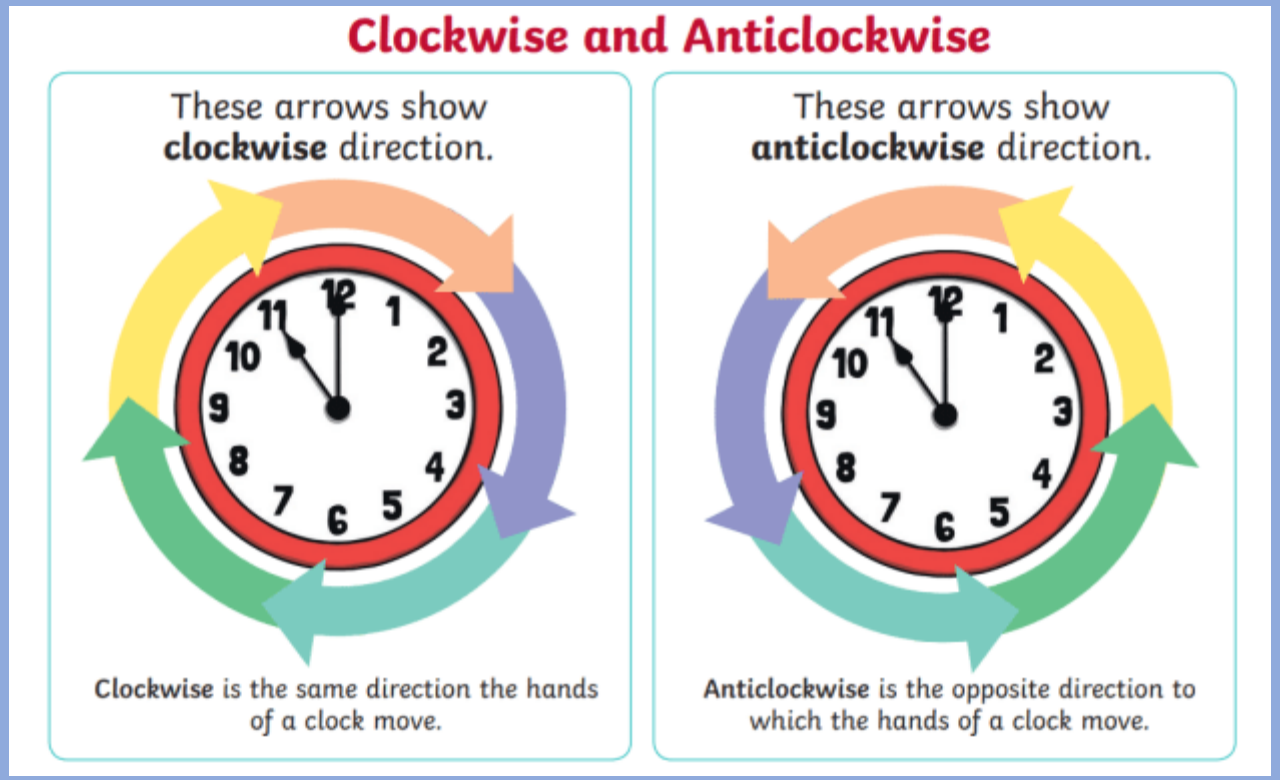


- Remember, if you are facing somebody, their left and right will be reversed from your perspective. A similar concept would be watching actors on a stage – stage left and stage right.



Describing Movement – Clockwise and Anticlockwise

- We can describe turning movements with reference to a clock.



Describing Movement – Clockwise and Anticlockwise Turns

- How many degrees in a whole turn?
- 360

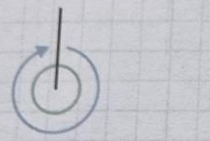
- How many degrees in a half turn?
- 180

- How many degrees in a quarter turn?
- 90

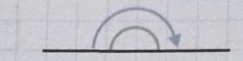
- A turn to the right is clockwise or anticlockwise?
- Clockwise

- If the dial was turned three quarters of a turn to the right, what would the oven be set to now?
- 180

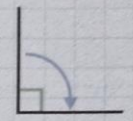
1) **Whole turn** — turning one whole circle.



2) **Half turn** — turning half a circle.

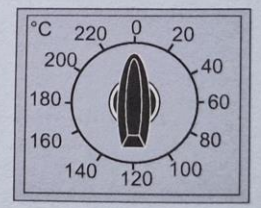


3) **Quarter turn** — turning a quarter of a circle.



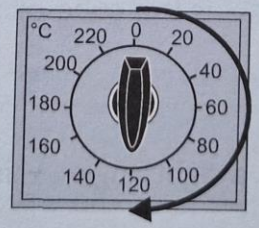
EXAMPLE:

The dial on an oven is set to 0 °C.
The dial is turned half a turn to the right.



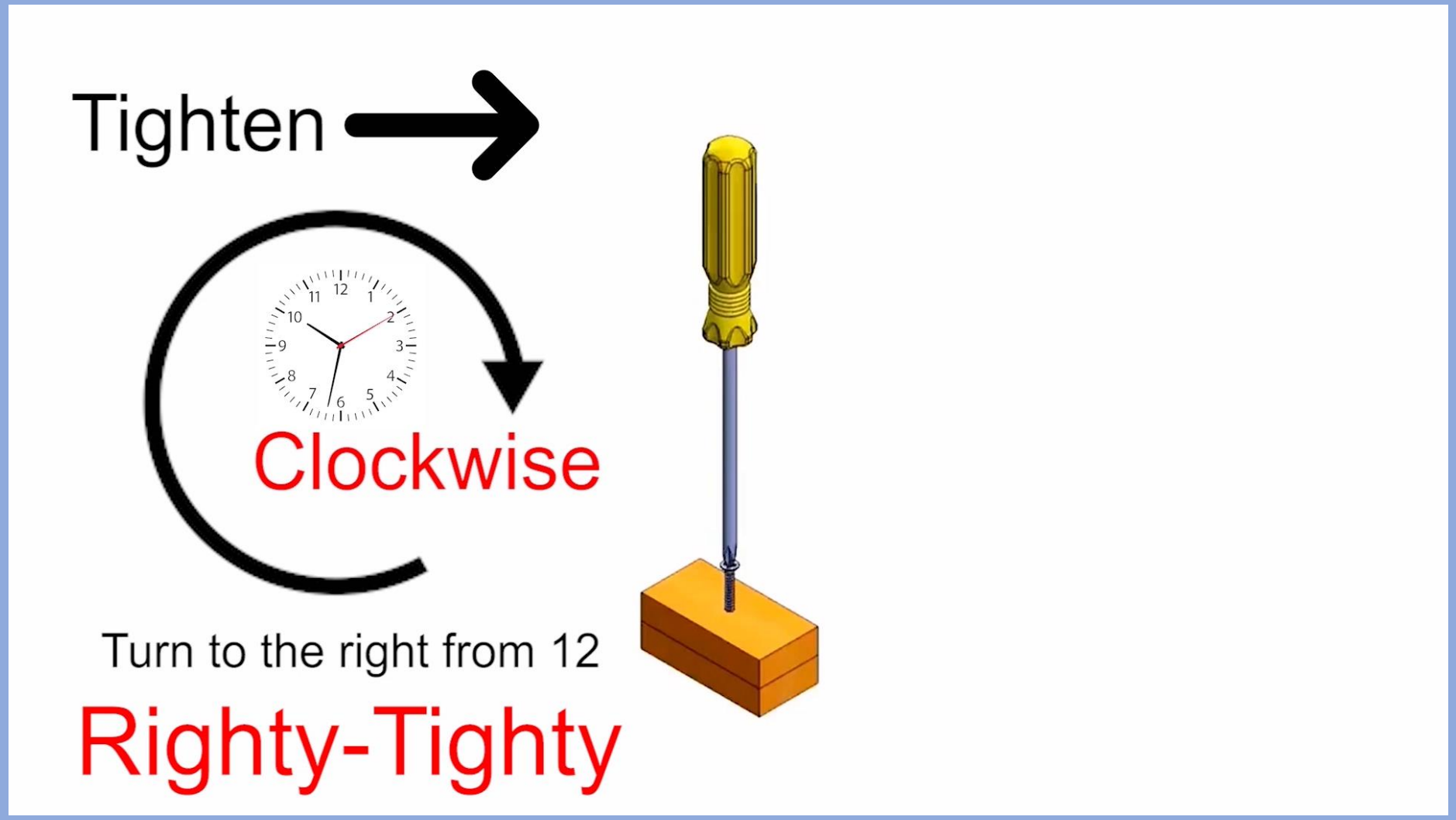
What temperature is the oven set to now?

1) Half a turn means turning half a circle.
2) To the right is going this way: →
3) So the dial moves like this:



The oven is set to **120 °C**.

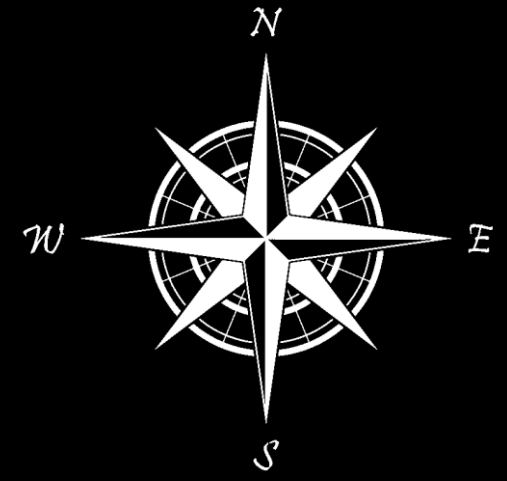
Real World Applications of Clockwise and Anticlockwise Directions: Righty Tighty, Lefty Loosey



The Compass – A handy mnemonic

Naughty Elephants Squirt Water

North East South West



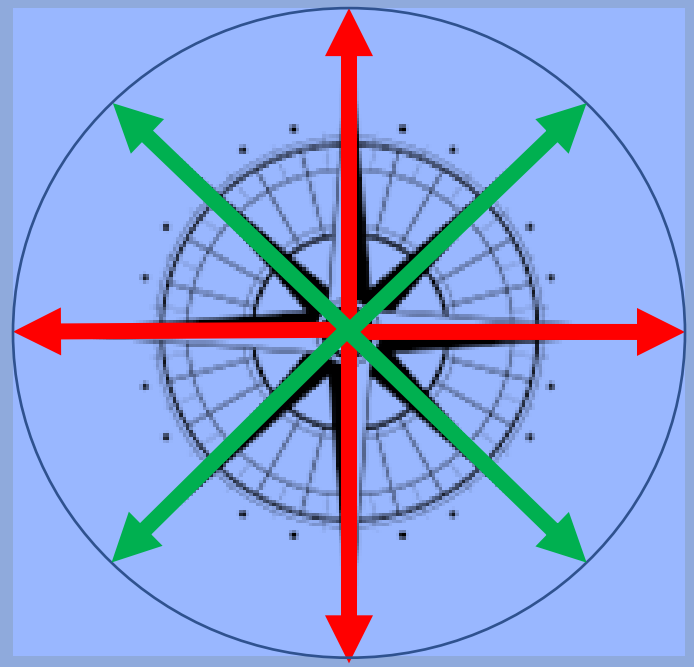
Points of a compass clockwise from North.

The Compass Rose
Cardinal Points

NORTH
000°
Or
360°

NORTHWEST
315°

NORTHEAST
045°



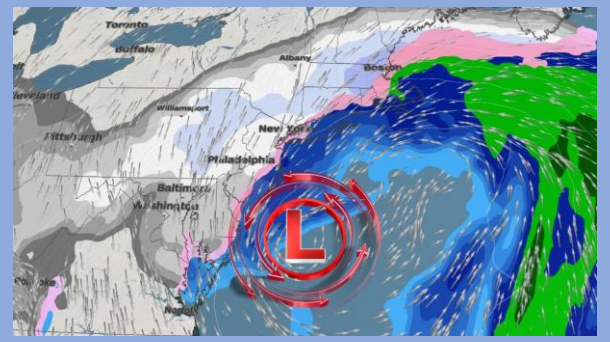
WEST
270°

EAST
090°

SOUTHWEST
225°

SOUTH
180°

SOUTHEAST
135°



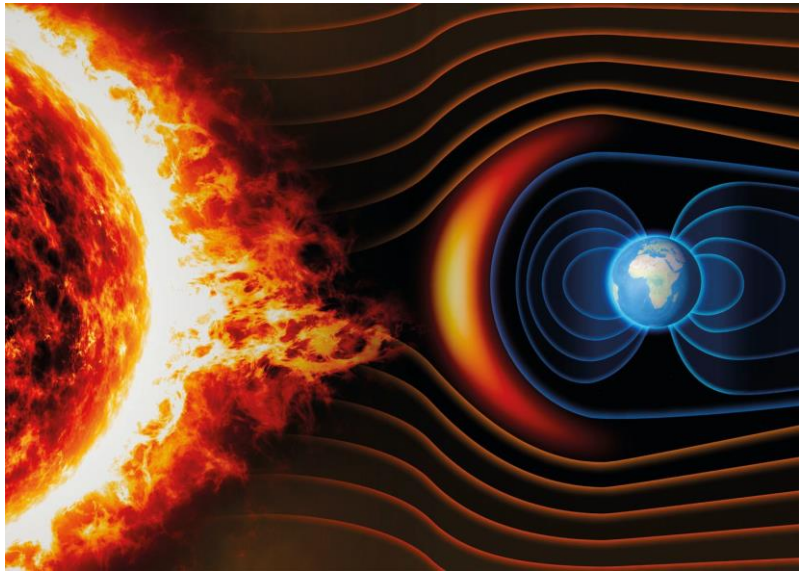
A Nor'easter is the name of a storm that delivers NE winds to the East Coast of the USA.

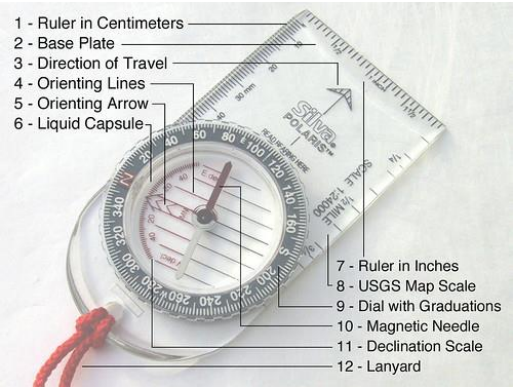
A Sou'wester is an oilskin hat worn by seafarers with a large brim at the back to prevent water going down the neck.

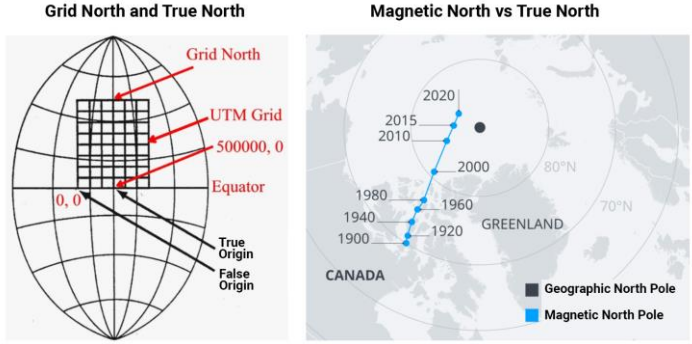
Aurora Borealis Video

The Earth is a BIG Magnet!

- The Earth's core is made up of molten iron which moves due to convection and generates a magnetic field.
- A compass has a small needle of magnetized metal which aligns with the Earth's magnetic field.
- The True North Pole is the point about which the Earth rotates in space forming an axis to the South Pole.
- As the Earth is a sphere it can be difficult to draw flat maps accurately. This results in a difference between Grid North and True North.
- The Magnetic North Pole moves and occasionally changes polarity (this is a slow process and polarity changes only occur once every 800,000 years or so!)
- The red end of the needle points towards the Magnetic North Pole.



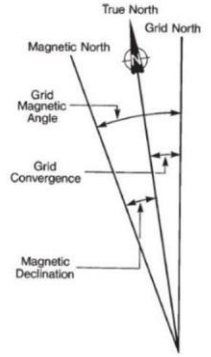




Source: attackpoint.org and dw.com

- True North
- Grid North
- Magnetic North

- Grid Magnetic Angle
- Magnetic Declination
- Grid Convergence



Practice Exam Questions

- We will now look at a practice exam questions at the different levels of Maths you are studying.

- Try to complete the question on your own and write down your answer.

- And remember…

Always Read the Question

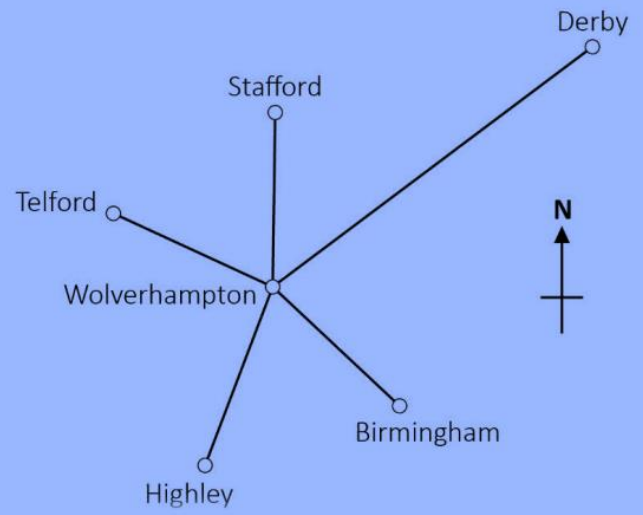
And always re-read the questions at the end.

Sample Exam Question – EL3

Activity 3: Sales manager

Asha is the sales manager for six shops.

3 (a) Asha travels from Jack's shop in Wolverhampton to the other shops.



Which direction is the Derby shop from Wolverhampton?

[1 mark]

Sample Exam Question – L1

2 (d) Asmita parks her car on the road in Candlesby.

The car is facing north west.

When she has finished the visit, Asmita turns her car round ready to drive south east.

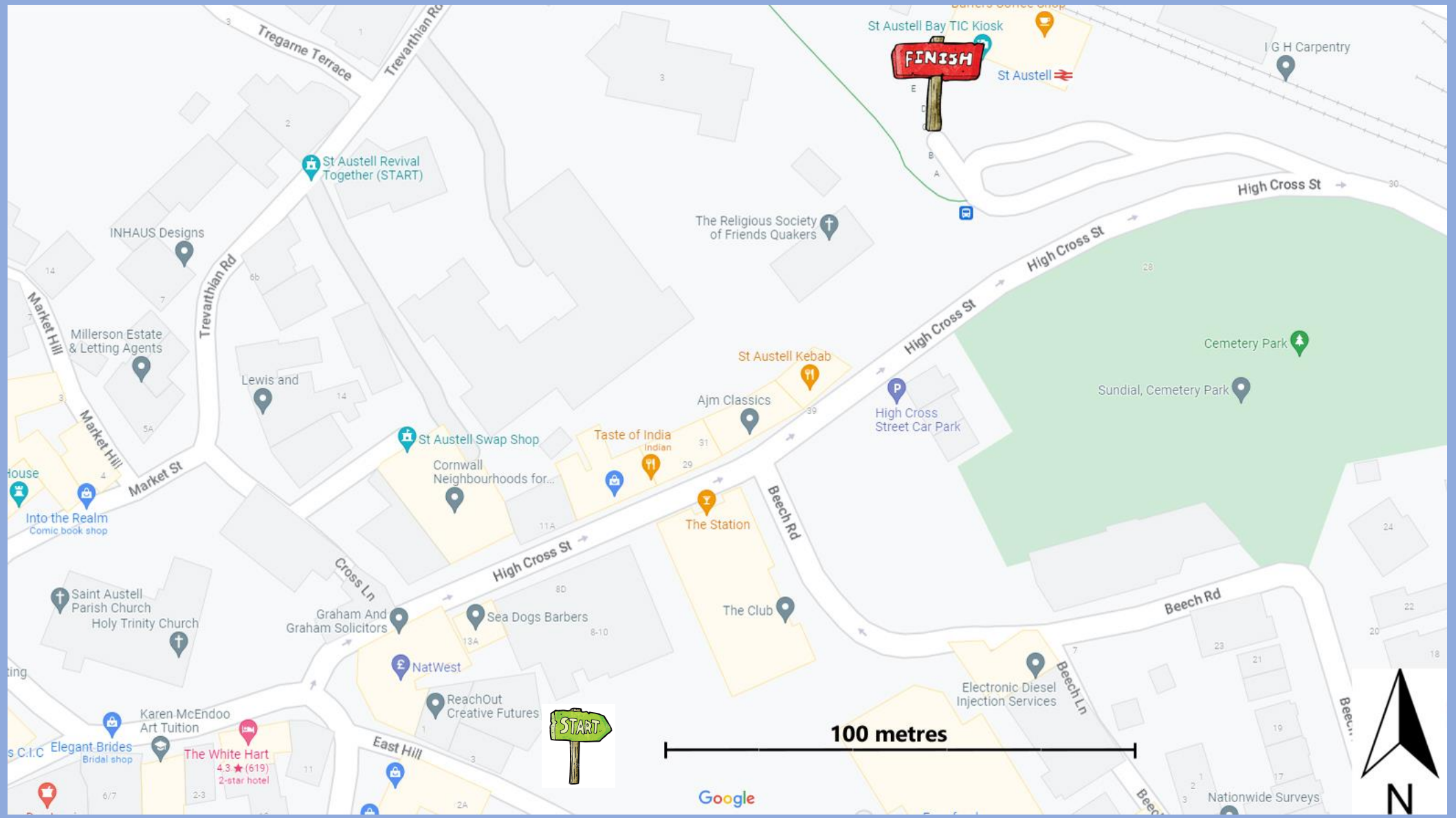
Through how many degrees has the car turned?

[1 mark]

Your answer: °

Group Exercise – Directions to the Train Station

Group Exercise – Directions to the Train Station



Exercise Directions to the Train Station

- Work in pairs.
- Write a series of directions as if you were describing to someone how to get to St. Austell Train Station from ReachOut Creative Futures.
- Include positional vocabulary, such as turn left or right, where appropriate.
- Include compass directions, such as head north or east.

- Using the scale provided, **estimate distances**.

- We will score each groups directions afterwards.

Peer Assessment:
Review the directions you were given

- Score the other team based upon:

  - Clarity of instructions. Were they easy to understand? / 5
    (Note: Directions can be clear even if they are not accurate!)

  - How far in the maze did you progress? (5 points if all the way) / 5

  - Overall score out of 5? / 5
    (Would you ask this team for directions again?)

Total Score: / 15

Directions to the station – sample answer

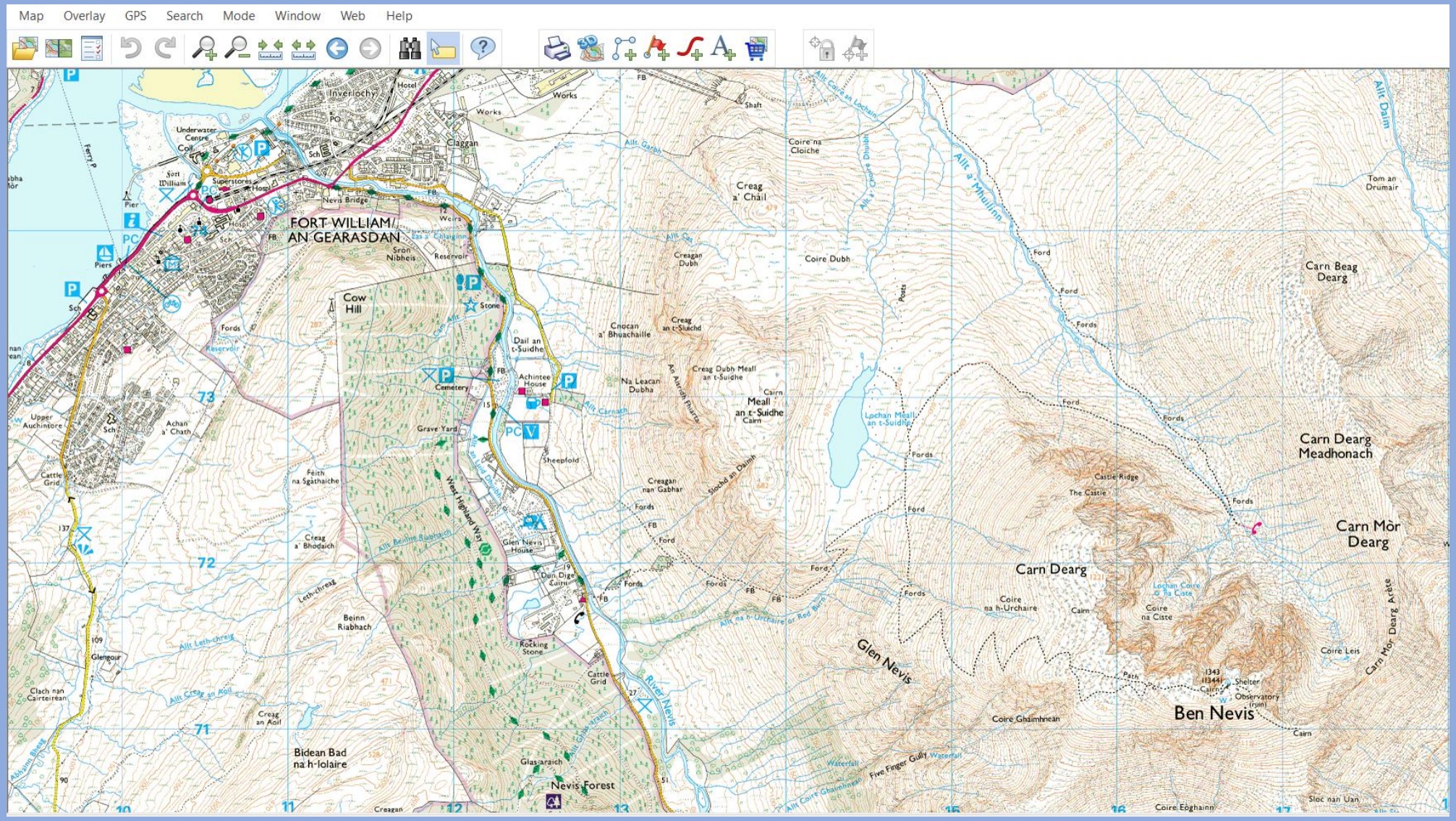
- As you leave ReachOut Creative Futures, turn right and walk to the end of East Hill.

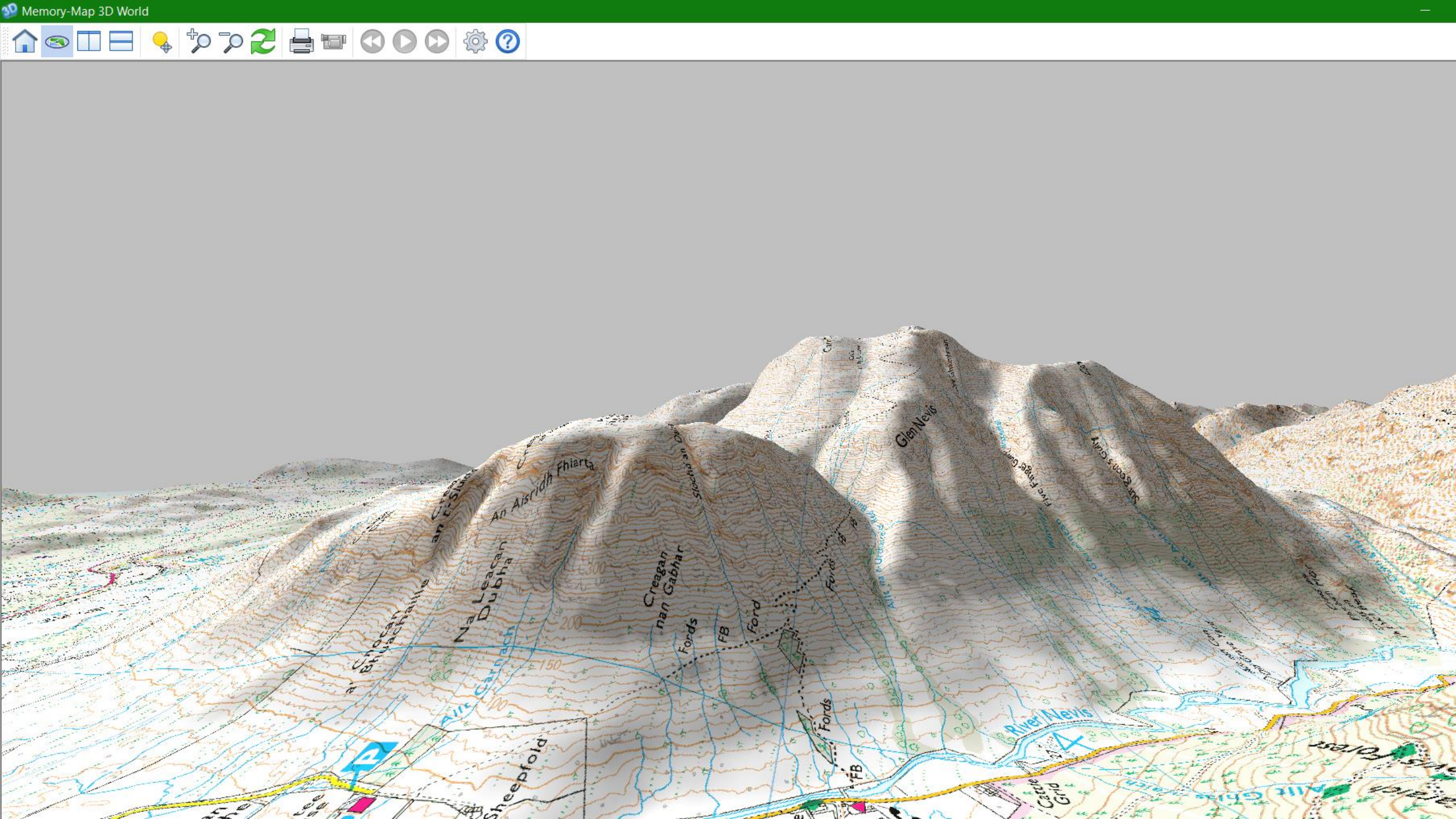
- Turn right, and follow High Cross Street for 300 metres in a north-easterly direction.

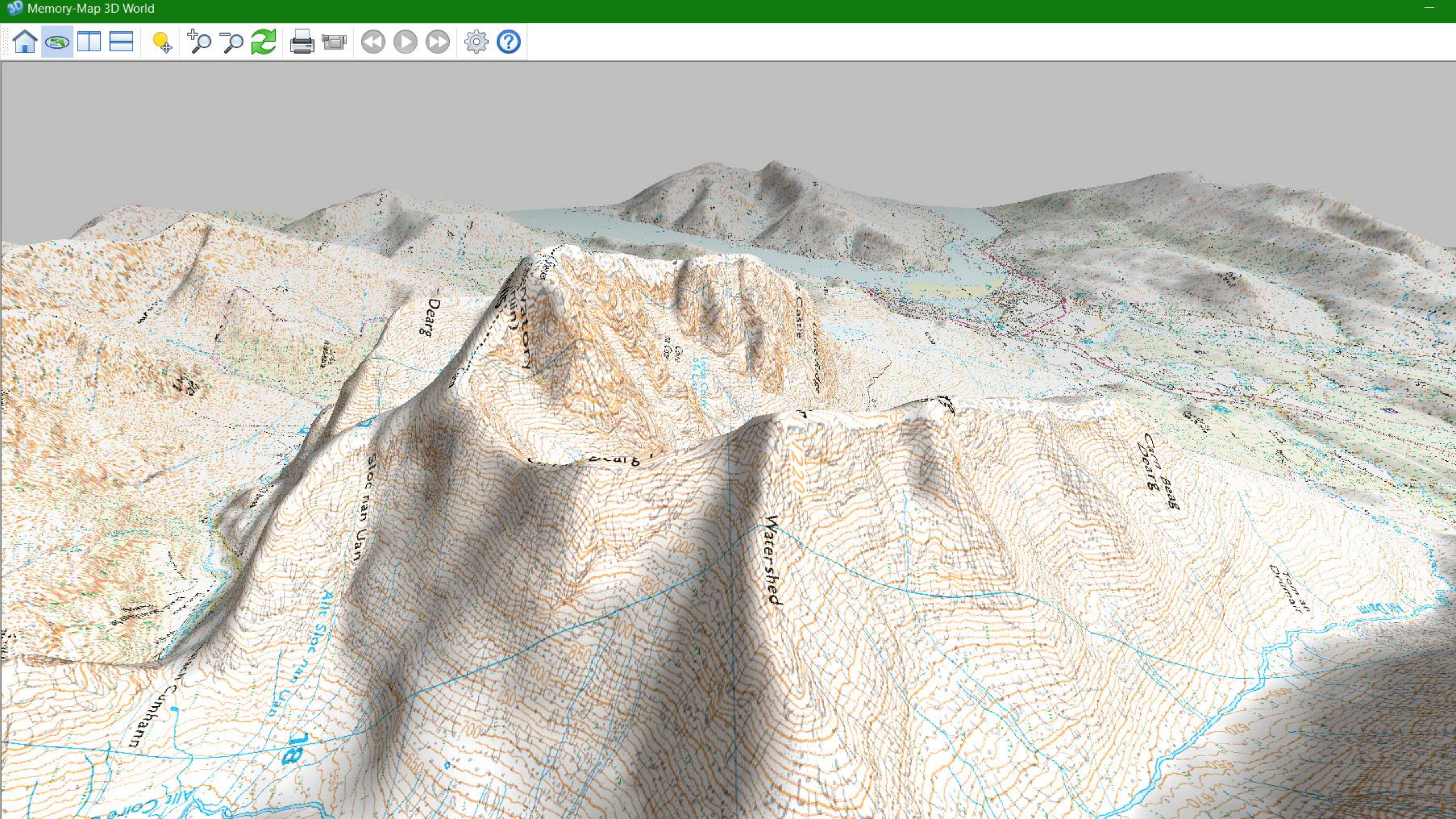
- After 300 metres, turn left into the Train Station.

A Route from Glen Nevis YHA to the Summit of Ben Nevis

OS – Explorer Map: Ben Nevis & Fort William
Scale: 1:25,000




Memory-Map 3D World
An Aisridh Fhiarta
Glen Nevis
Creagan nan Gabhar
Na Leacan Dubha
Fords
FB
ford
River Nevis
Sheepfold



Memory-Map 3D World
Dearg
Sloc nan Uan
Watershed
Allt Sloc nan Uan
Carn Beag Dearg

Ordnance Survey

Explorer™ series (1:25 000 scale)

Explorer Map symbols

ROADS AND PATHS — Not necessarily rights of way

- M1 or A6(M) — Motorway; Service Area; 7 Junction Number
- A 35 — Dual carriageway
- A 31(T) or A35 — Trunk or Main road
- B 3074 — Secondary road
- Narrow road with passing places
- Road under construction
- Road generally more than 4 m wide
- Road generally less than 4 m wide
- Other road, drive or track, fenced and unfenced
- Gradient: steeper than 20% (1 in 5); 14% (1 in 7) to 20% (1 in 5)
- Ferry — (V) Vehicle; (P) Passenger
- Path

RAILWAYS

- Multiple track / Single track — Standard gauge
- Narrow gauge / Light Rapid Transit System with station
- Road over; road under; level crossing
- Cutting; tunnel; embankment
- Station, open to passengers; siding

PUBLIC RIGHTS OF WAY — Not shown on maps of Scotland

- Footpath
- Bridleway
- Byway open to all traffic
- Road used as a public path

The representation on this map of any other road, track or path is no evidence of the existence of a right of way

OTHER PUBLIC ACCESS

- Other routes with public access

The exact nature of the rights on these routes and the existence of any restrictions may be checked with the local highway authority. Alignments are based on the best information available.

- National Trail / Long Distance Route; Recreational route
- Permitted footpath / Permitted bridleway — See note below

Footpaths and bridleways along which landowners have permitted public use but which are not rights of way. The agreement may be withdrawn.

- Off road cycle routes

BOUNDARIES

- National
- County
- Constituency (Const), Electoral Region (ER) or Burgh Const
- Civil Parish (CP) or Community (C)
- Unitary Authority (UA), Metropolitan District (Met Dist), London Borough (LB) or District
- National Park

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

- Site of antiquity
- 1066 — Site of battle (with date)
- VILLA — Roman
- Castle — Non-Roman
- Visible earthwork

NB. Due to changes in specification there are differences on some sheets

Made, printed and published by Ordnance Survey, Southampton, United Kingdom. **For educational use only.**

GENERAL FEATURES

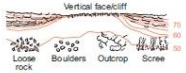
- Gravel pit
- Sand pit
- Other pit or quarry
- Landfill site or slag heap
- Current or former Place of worship — with tower / with spire, minaret, or dome
- Place of worship
- Building; important building
- Glasshouse
- Youth hostel
- Bunkhouse/camping barn/ other hostel (selected areas only)
- Bus or coach station
- Lighthouse; disused lighthouse;
- Beacon
- Triangulation pillar
- Mast
- Windmill; with or without sails
- Wind pump; wind generator
- pylon / pole — Electricity transmission line
- Slopes

- BP — Boundary post
- BS — Boundary stone
- CH — Clubhouse
- FB — Footbridge
- MP; MS — Milepost; milestone
- Mon — Monument
- PO — Post office
- Pol Sta — Police station (selected areas only)
- Sch — School
- TH — Town Hall
- NTL — Normal tidal limit
- W; Spr — Well; spring

HEIGHTS AND NATURAL FEATURES

- 52 · — Ground survey height
- 284 · — Air survey height

Surface heights are to the nearest metre above mean sea level. Heights shown close to a triangulation pillar refer to the ground level height at the pillar and not necessarily at the summit



- Water
- Mud
- Sand; sand and shingle

VEGETATION

Vegetation limits are defined by positioning of symbols

- Coniferous trees
- Non-coniferous trees
- Coppice
- Orchard
- Scrub
- Bracken, heath or rough grassland
- Marsh, reeds or saltings.

ACCESS LAND

- Access land boundary and tint
- Access land in wooded area
- Access information point

DANGER AREA — Firing and test ranges in the area. Danger! Observe warning notices

MANAGED ACCESS — Access permitted within managed controls, for example, local byelaws

Portrayal of access land on this map is intended as a guide to land which is normally available for access on foot, for example access land created under the Countryside and Rights of Way Act 2000, and land managed by the National Trust, Forestry Commission and Woodland Trust. Access for other activities may also exist. Some restrictions will apply; some land will be excluded from open access rights. The depiction of rights of access does not imply or express any warranty as to its accuracy or completeness. Observe local signs and follow the Countryside Code.

TOURIST AND LEISURE INFORMATION

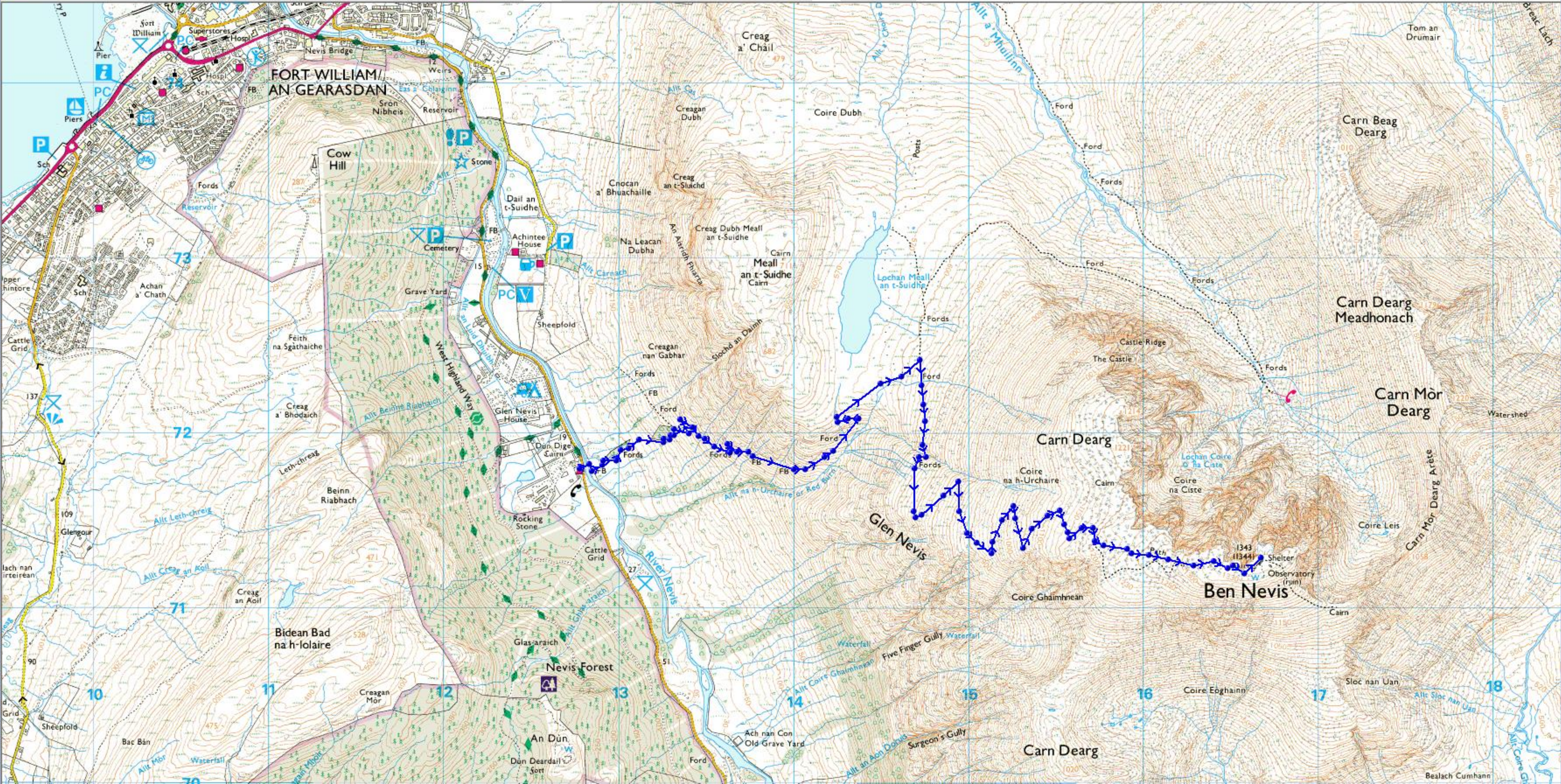
- Building of historic interest
- Cadw (Welsh heritage)
- Camp site
- Caravan site
- Camping and caravan site
- Castle / fort
- Cathedral / Abbey
- Country park
- Cycle trail
- English Heritage property
- Fishing
- Forestry Commission visitor centre
- Garden / arboretum
- Golf course or links
- Information centre
- Information centre, seasonal
- Horse riding
- Museum
- Nature reserve
- National Trust property
- Other tourist feature
- Parking
- P&R — Park and ride, all year / seasonal
- Picnic site
- Preserved railway
- PC — Public Convenience
- Public house/s
- Recreation / leisure / sports centre
- Slipway
- Telephone (public / motoring organisation / emergency)
- Theme / pleasure park
- Viewpoint
- Visitor centre
- National Park Information Point
- Walks / trails
- Water activites

In Part 2…

- We will plot a simplified route from Glen Nevis YHA to the summit of Ben Nevis.
- Using the red plot, you will measure the **Distance** of each leg using the scale 1:25,000.
- You will establish the **Heading** (N, NE, E etc.) and give the **Bearing** (the angle).
- You will then fill in the **Route Card** for this journey.

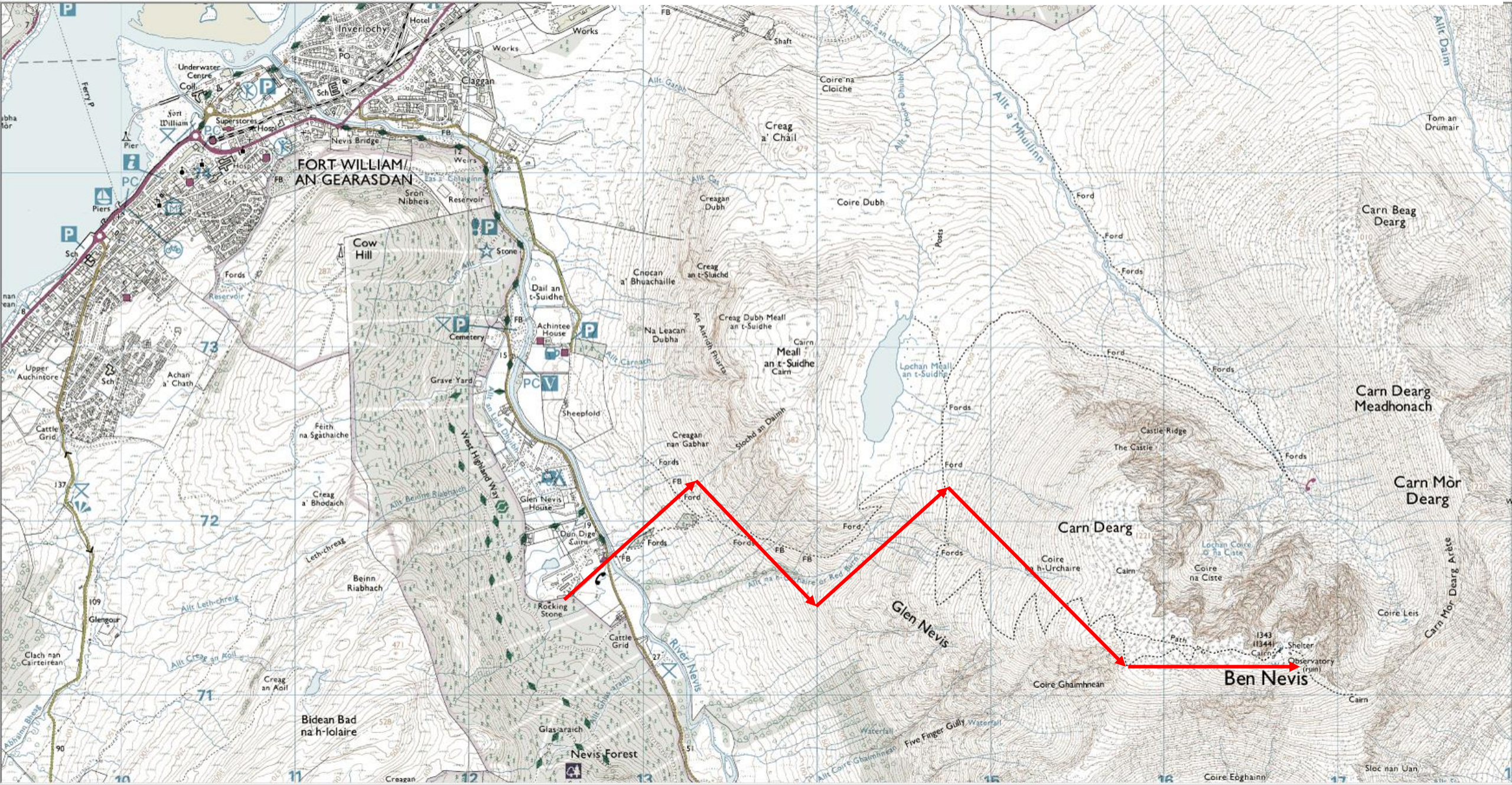
Memory-Map - [OS 1:25k GB North - 2015]

Map Overlay GPS Search Mode Window Web Help



Map Overlay GPS Search Mode Window Web Help

A simplified plot for directions from Glen Nevis YHA to the summit of Ben Nevis



Common Map Scales

- Maps are scale drawings of real locations from a bird's eye (aerial) perspective. Typical map scales for walking and hiking include:

- 1:10,000 - 1cm on the map represents 10,000cm or 100m or 0.1km.
  (A 10cm line on the map would be 1km long in real life)

- 1:25,000 - 1cm on the map represents 25,000cm or 250m or 0.25km.
  (A 4cm line on the map would be 1km long in real life)

- 1:50,000 - 1cm on the map represents 50,000cm or 500m or 0.5km.
  (A 2cm line on the map would be 1km long in real life)

Walking in the Mountains

- When you go walking in the mountains, always make sure you have a map and compass in addition to any other forms of navigation (GPS, mobile apps etc.)
- Make sure you know how to use a map and compass before setting off.
- Make sure your phone is fully charged and protect it from water (rain/snow) and the cold!
- Make sure you are wearing appropriate clothing for the conditions and have spare layers that are both wind and waterproof.
- Be aware that mountain tops are often colder and windier than conditions at lower levels.
- If you are in any doubt, or weather conditions deteriorate, turn back while you can.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