Maps And Map Reading (With Excercise Answers)

A map is a diagrammatic representation of an area of land showing physical features -- cities-- roads-- footpaths etc. It may be a paper or electronic map for use on a computer.

Choosing The Best Map For Rambling

The national mapping agency of Great Britain is The Ordnance Survey which has been producing maps for all purposes since the year 1746. It is generally recognised that the maps created by this company are among the best in the world, and we are fortunate in that the latest versions of their maps are readily available in both paper, and (more recently) in electronic form, for use with computers and mobile phones.

When we consider which is the best map to choose for walking there are two prime considerations which concern us :-

1/ The scale of the map must be such that there is enough room on the map for all of the necessary symbols to be shown clearly.

2/ The map must show ALL of the features that we need for navigation. (In particular we MUST have "field boundaries" such as walls or hedges shown).

In practical terms this narrows our choice of map type down to ONE only.

The Ordnance Survey EXPLORER series (which are produced at a SCALE of 1:25,000)
(Local map covering Biddulph is Explorer 258 "Stoke on trent and Newcastle U Lyme")

Scale (an explanation)

A distance of one unit on the map depicts 25,000 units on the land. So a kilometer square of land is depicted on the map by a square with sides measuring only 4 centimeters by 4 centimeters.

1Km = 1000 meters

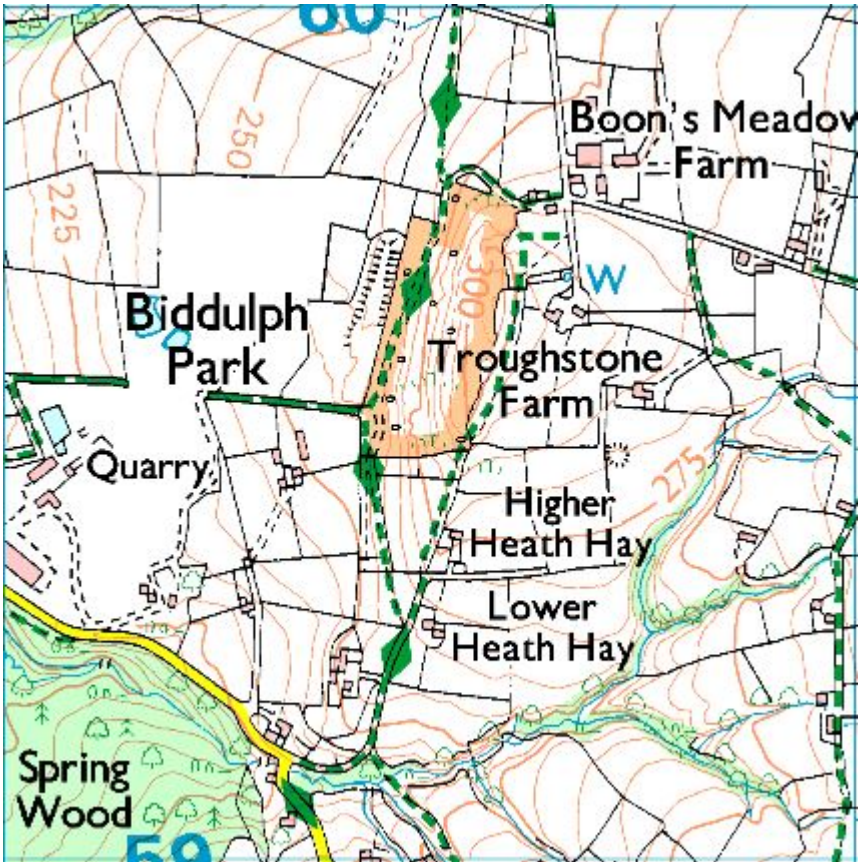
Devide 1000 meters by 25,000 = 0.04 meters

There are 100 cm in 1 meter therefore multiply 0.04 by 100 = 4cm

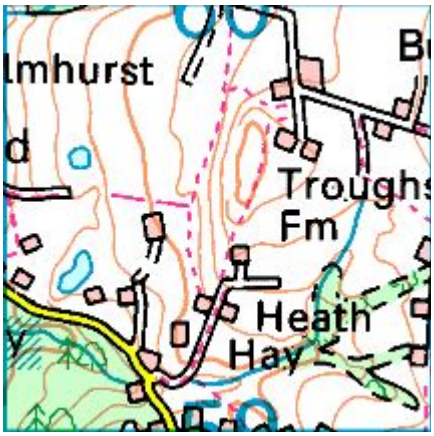
In a similar fashion a map using a 1:50,000 scale would have squares of 2 cm x 2cm

(THERE IS INSUFFICIENT ROOM TO FIT ALL INFORMATION NEEDED ON THE SMALLER MAP)

1:25,000 Map (Explorer)



1:50,000 Map (Landranger)

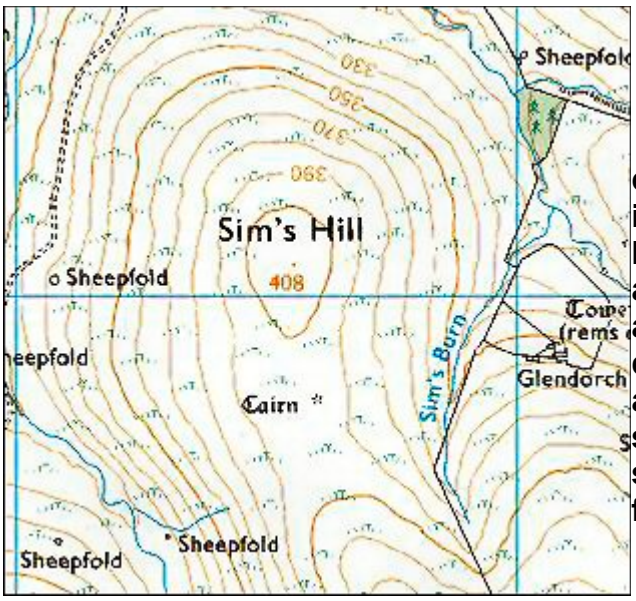


The Map Key (See appendix 1)

At the side of the map is a key to the symbols used in the body of the map, the most relevant symbols need to be memorized. Particular attention should be directed towards map features which may be visible "at a distance" such as churches and overhead power lines.

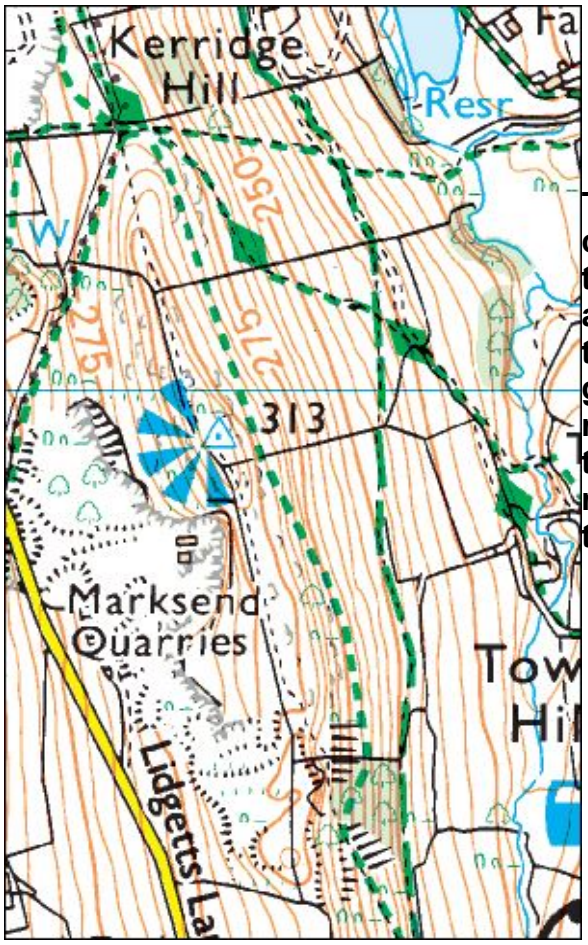
Contours The thin brown wavy lines which cover most of the map are called "contour lines". They are drawn between points on the map which are of equal height above sea level. They are generally spaced at intervals of 10 meters, (though this may vary), and along their length they are marked with a number which indicates the height of the land above sea level. Understanding how to read the information that these lines give us is very important, especially in the more hilly areas. There are certain "patterns" formed by the contour lines which show land features such as hill, valley, saddle etc. that we use to help us visualise the terrain over which we are walking.

A Hill



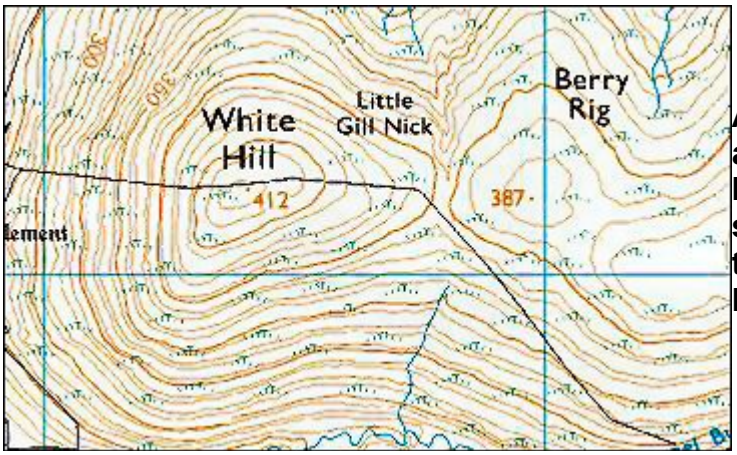
Characterised by a roughly circular series of contour lines. The distance between contour lines indicates the gradient the numbers on the contour lines indicate the height of the line above sea level and if they are the correct way up they show an ascending slope, if upside down the slope is descending. In this example the northern edge of another hill is indicated and the contours indicate a saddle between the two hills. Note the 408 meter spot height, the small streams , wide track and the field boundaries in this square

A Ridge



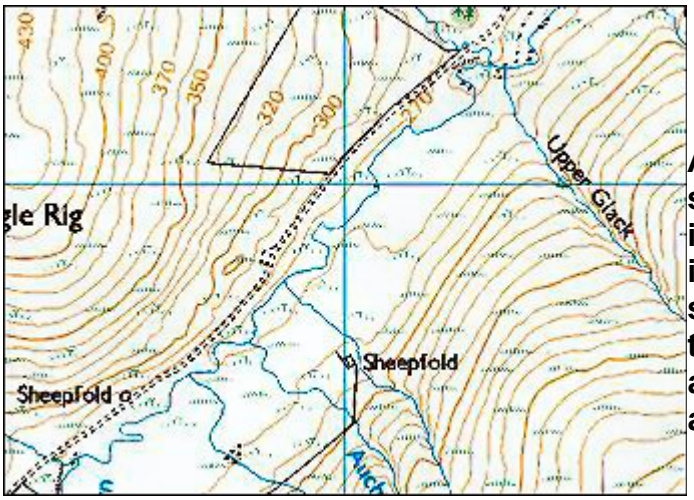
Typically a long narrow piece of land with steep contour lines on both sides. In this example there is a triangulation point roughly in the centre with a view in a westerly direction . There is a public footpath along the eastern side just below a track along the top. The green triangles on one of the paths indicate a named route. The most northerly path climbs up the side of the hill almost directly crossing the contour lines at right angles. It is therefore the steepest route to the top of the ridge.

A Saddle



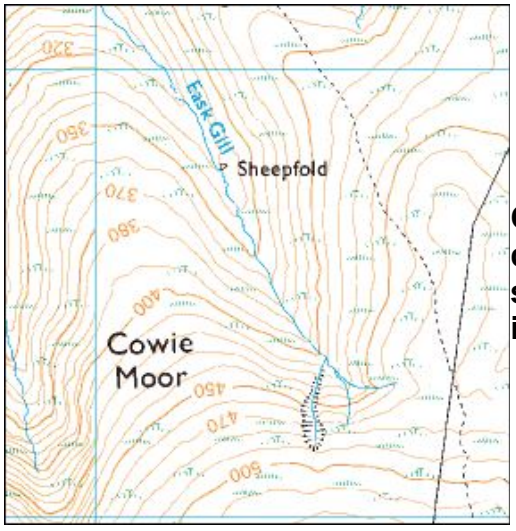
Appears as a figure of eight styled arrangement of contour lines generally between two hills. Note that this example shows a smaller saddle appearing just to the east of the 387 meter air surveyed spot height.

A Broad Valley



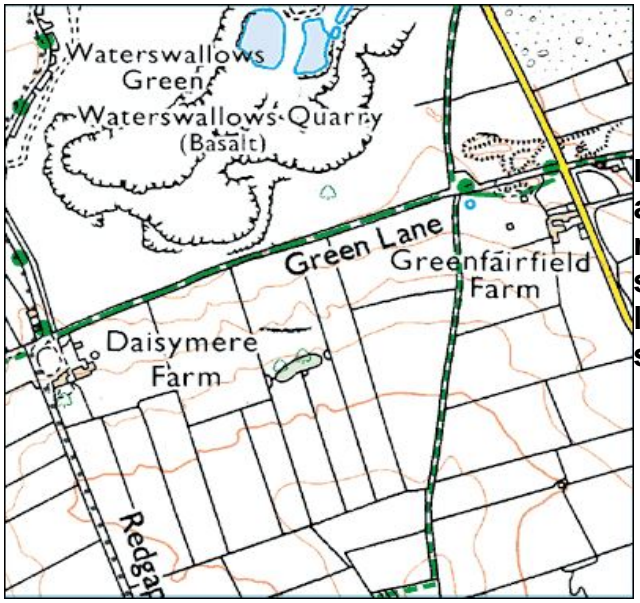
An area of land which is lacking in contours surrounded on both sides by steep contours indicates a broad valley. In this instance there is a stream flowing down the valley fed by four smaller streams flowing from the SE . Note that the contour lines around "Upper Glack" appear as pointed V shapes. The point of the V always points uphill .

A Steep sided valley



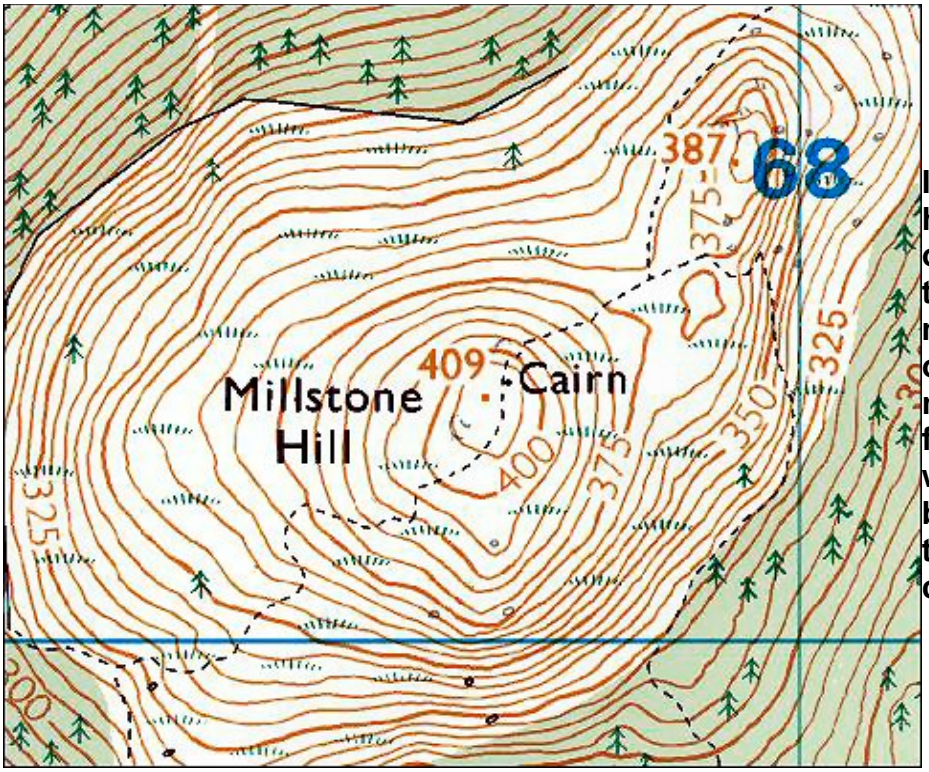
Characterised by a network of V shaped contours down which in this case a stream flows from the south east. A small pit, path and wall are also shown in this square

A deep depression



In this case a quarry. Note the Bridalway running across the centre of the square and the footpath running from north to south. The black lines surrounding the green dashes indicate a "green lane" and would indicate a hedge or wall on either side of the path.

Typical Mixed Terrain



In this square there are two hills, one higher than the other with a saddle between them at a height of 375 meters. The least steep side of Millstone hill is its northern slope but access from the coniferouse woodland from the north is blocked by a wall except to the north east. A track crosses the two hills

How Steep Is Steep?

Contour lines are spaced at either 5 or 10 meter intervals (10 meters in our example)

On the map 4cm = 1000 meters (25 meters per mm)

Measure the distance on the map in mm between contours on a slope (say 3mm) the distance over the ground is therefore 3 x 25 meters =75 meters.

The slope therefore rises (or falls) 10 meters in 75 meters and has a gradient of 1 in 7.5

Draw a triangle to scale to see the gradient



gradient 1 in 7.5

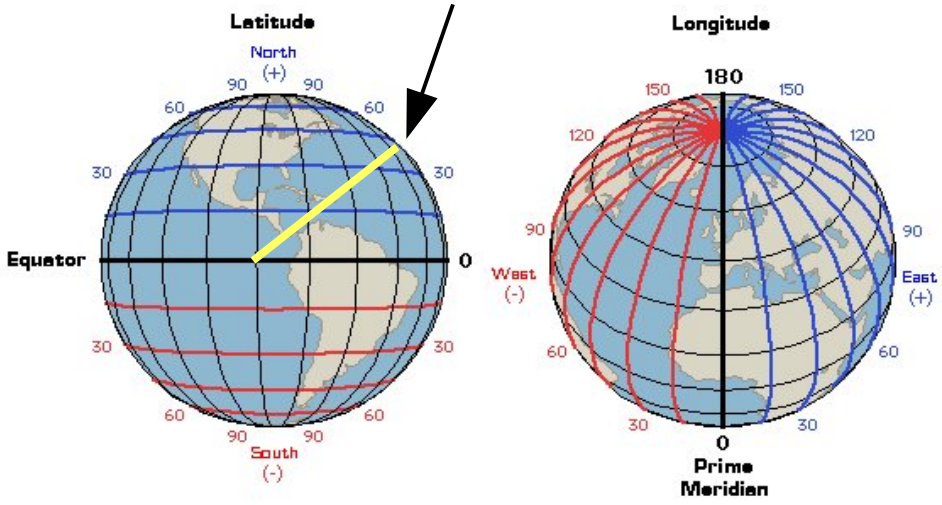


gradient 1 in 4

The National Grid (An Explanation)

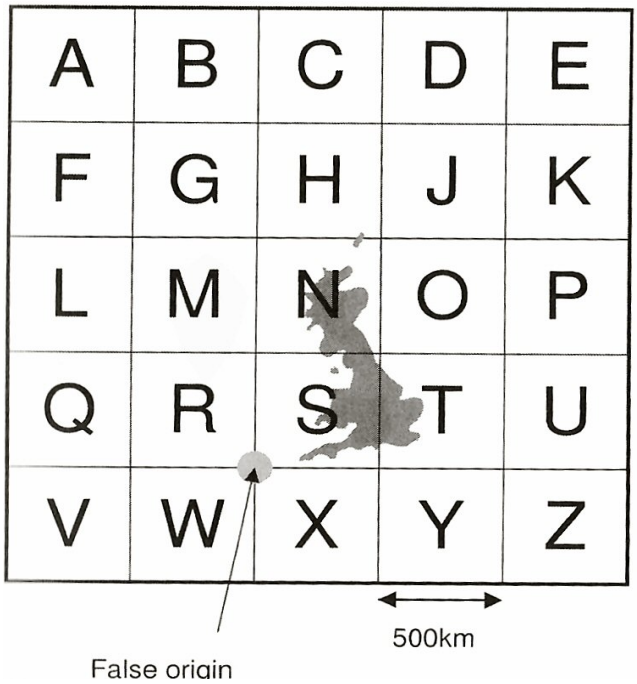
Ordnance survey decided NOT to use the traditional Latitude/Longitude system as used by the rest of the world to show position, because it involved using negative numbers.

GB at 53 degrees North 2 degees West



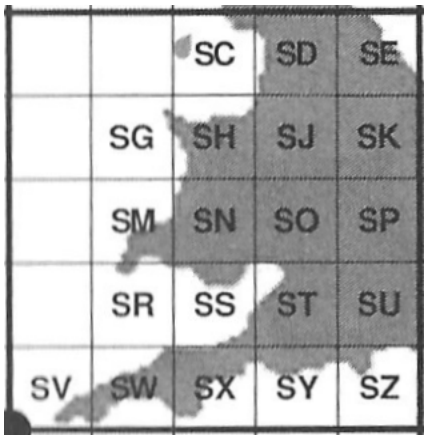
The position of Biddulph would be approximately +53 degrees Latitude (because we are ABOVE the Equator) and – 2 degrees Longitude (because we are to the WEST of the Prime Meridian which passes through Greenwich in London.)

Instead the Ordnance Survey adopted the "National Grid system" which divides the map into squares with its smallest sides representing 1 km by 1 km on the land.



Great Britain lies within a pattern of 500 X 500 Km Squares and occupies three squares only (N,S and T) Note the "origin" of the grid is to the South West of Great britain.

Each of the three 500 km squares is divided into twenty five 100 km x 100 km squares which are further lettered from top left to bottom right so square S looks like this.



Biddulph is situated within the square SJ

In order to be able to refer to a precise position within the square SJ, the square (which is 100km wide and 100 km high) is again divided into smaller squares, this time each side of the square is divided into 100 sections numbered 01 to 100. It now becomes possible to give the position of any feature on the map to an accuracy of 10 metres. Since each small square represents 1km on the ground it will be 4cm wide.

If a map were to show the whole of square SJ it would be 4 x 100 cm wide and high which is of course 4 meters by 4 meters which is too large for practical use consequently the Explorer map that you buy will always show only part of the square and MAY overlap into the next square . (The ordnance Survey have used approximately 400 different sized individually numbered maps to cover Great Britain). Examination of the back sheet of the map will clarify the situation.

If we use the local EXPLORER map which includes Biddulph as an example (Explorer 258 Stoke on Trent and Newcastle Under Lyme) the numbers along the top of the map go from left to right 80 – 81 – 82 etc ---- 99 – 00 (the 00 can be assumed to be 100) so the map shows an area of country (100 minus 80 wide) ie 20 Km long. Since 1Km is represented on the map by a distance of 4cm then the map is 80 cm long (about 2-1/2 feet). The height of the map is 30 Km. Since the rows of numbers along the top and up the side are consecutive AND TO NOT CONTAIN AN 00 ANYWHERE ALONG THE LINE OF NUMBERS (ignore the ends) then this indicates that the whole of the explorer map is in the SJ square. In each corner of the latest maps there is a large SJ marked in blue which confirms this.

The numbers along the top of the map are called "Eastings" because they are to the East (right) of the false origin. In a similar fashion the numbers up the sides of the map are called "Northings" since they are above (to the north of) the false origin.

We are now able to build up a grid reference which will indicate the position of any feature on the map and we will use the lake in the Biddulph Country park as an example.

The grid reference will take the form of the SJ map square letters followed by the Eastings number then the Northings number (along the corridor and then up the stairs is a good phrase to memorize).

An examination of the map shows that the symbol for the lake in the Biddulph Grange Country Park is shown inside a square which has the easting line 89 to its left hand side the northings line 59 just below it. The grid reference for the small island in the lake is therefore SJ 89 59. there are only four numbers used so this is termed a "four figure reference" it is telling us that the lake is somewhere inside this 1000 x 1000 meter square. This is not a very accurate position and certainly not good enough for use while navigating.
In order that the accuracy suits our needs we divide the 1km square into 100 smaller squares (10 x 10) by using a clear plastic overlay on the map called a "romer". (See appendix 2)

We can now add more numbers to our grid reference for the island position and the grid ref becomes SJ 899 591 and we now have a 6 figure reference which tells us that the lake lies within a 100 x 100 meter square.

For a rather large feature like a lake this is accurate enough, but continuing the subdivision of the square into 10 x 10 smaller squares allows us to pinpoint ANY feature to an accuracy of 10 meters using an 8 figure reference ie. SJ 8990 5914 to depict the island. A romer is essential in achieving this accuracy.(See appendix 2)

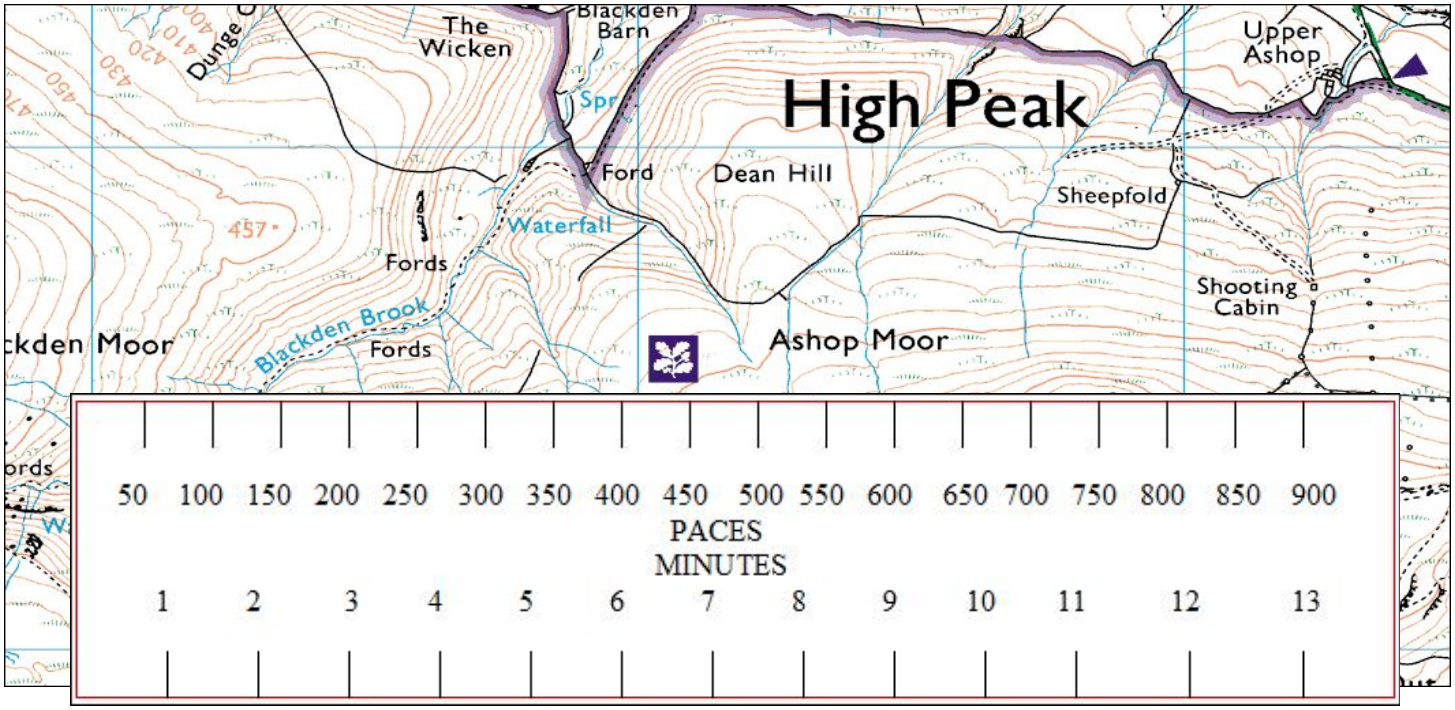


Experience Outdoors with the map

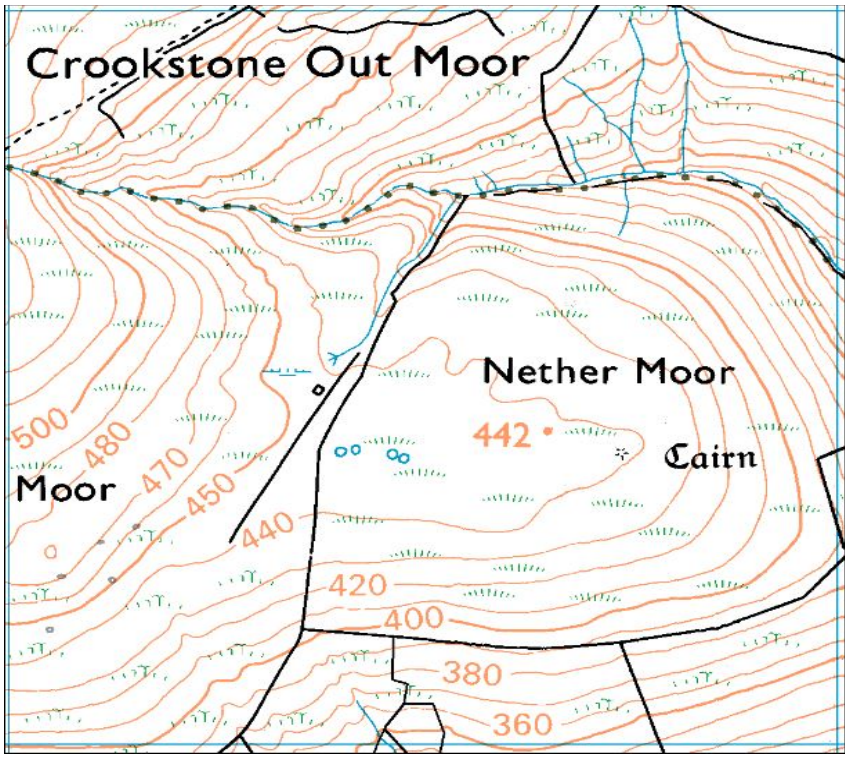
Getting familiar with distances and likely walking times

It is recommended that you find a local canal and measure the time that it takes to walk between two mileposts, take a note of how many paces (a double step) you take whilst traveling.

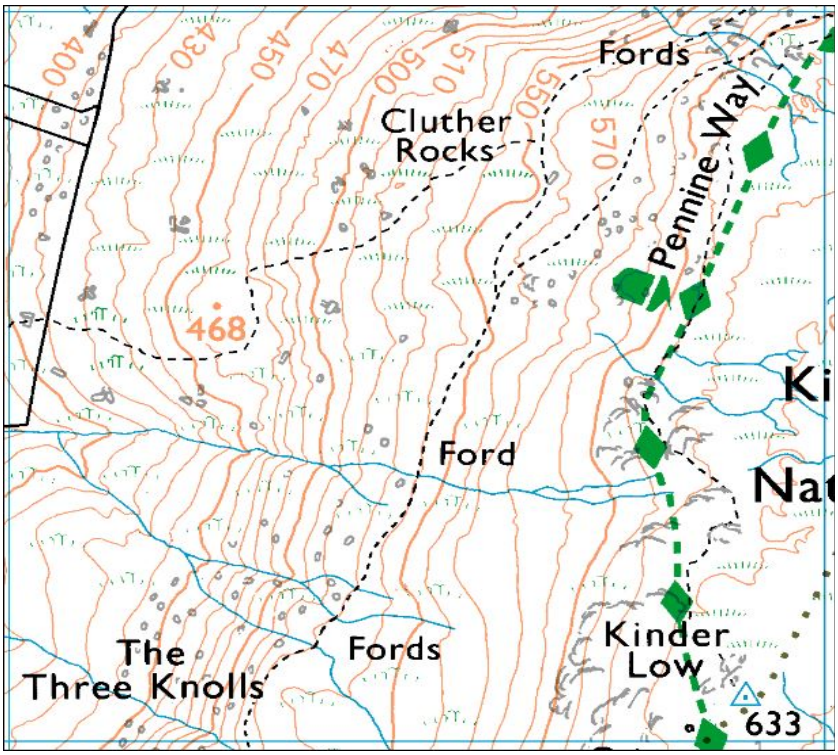
You can now calculate the information required to mark graduations on a ruler which can be laid on the map as an aid to your map reading. This will tell you the number of paces needed between points on the map and how long it is likely to take to walk the distance.



Exercises Using “The Dark Peak” Map (Outdoor Leisure 1)

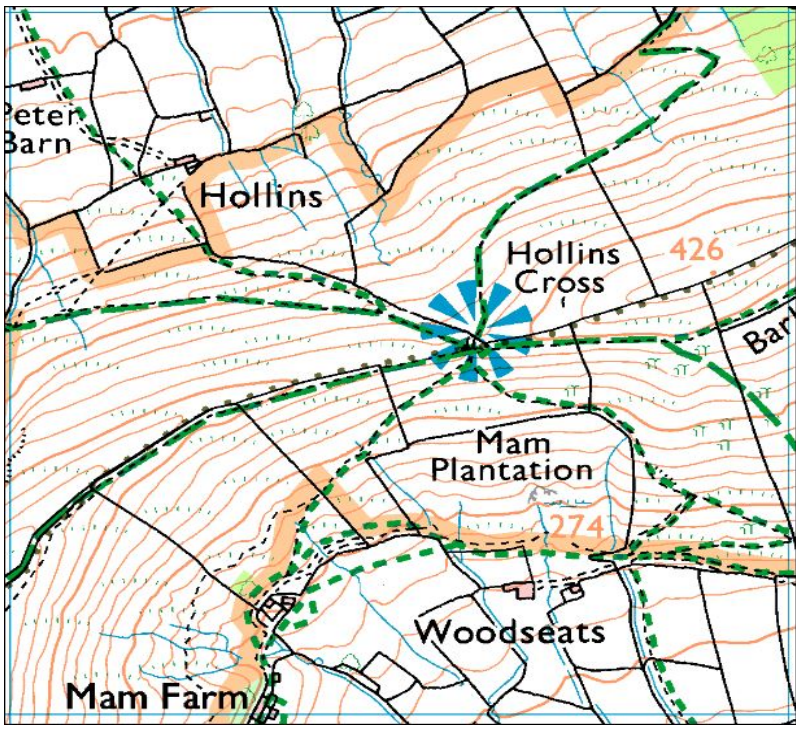


What land feature or feature is depicted within the 1km square SK 14 87 and in what direction does the stream flow and what is the height interval between adjacent contour lines ? **Answer, a steep sided valley-- from west to east – 10 meters**



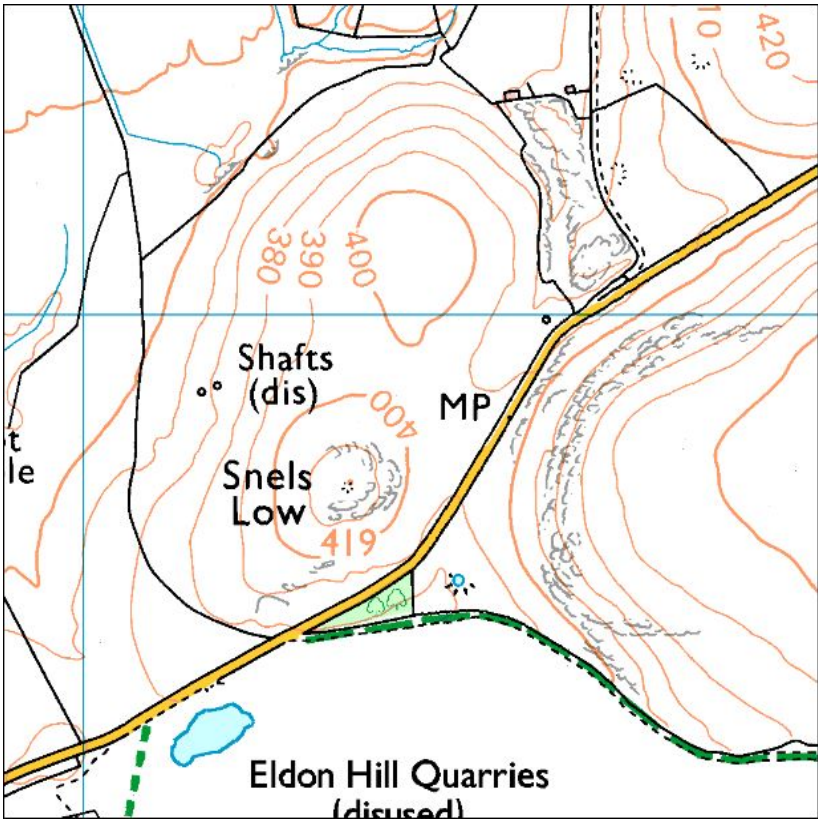
What symbol is in the bottom easterly corner of the 1km square SK 07 87

Answer, A triangulation (Trig) point



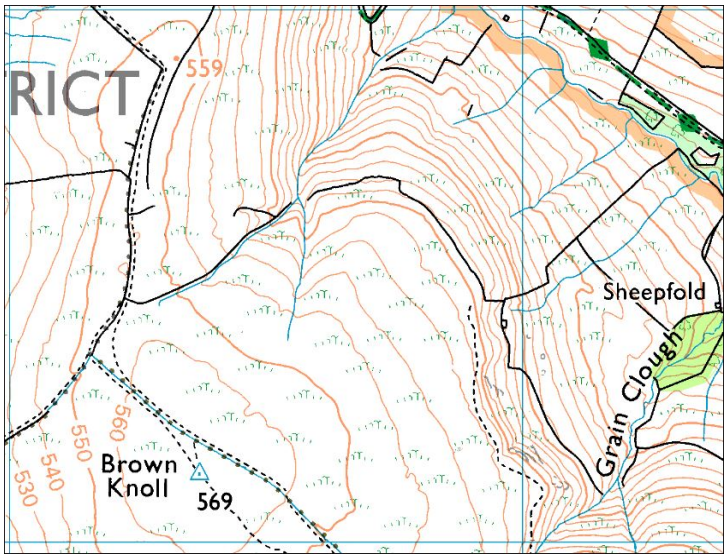
What feature is at Grid Ref. SK 1360 8454 ?

Answer, Hollins Cross



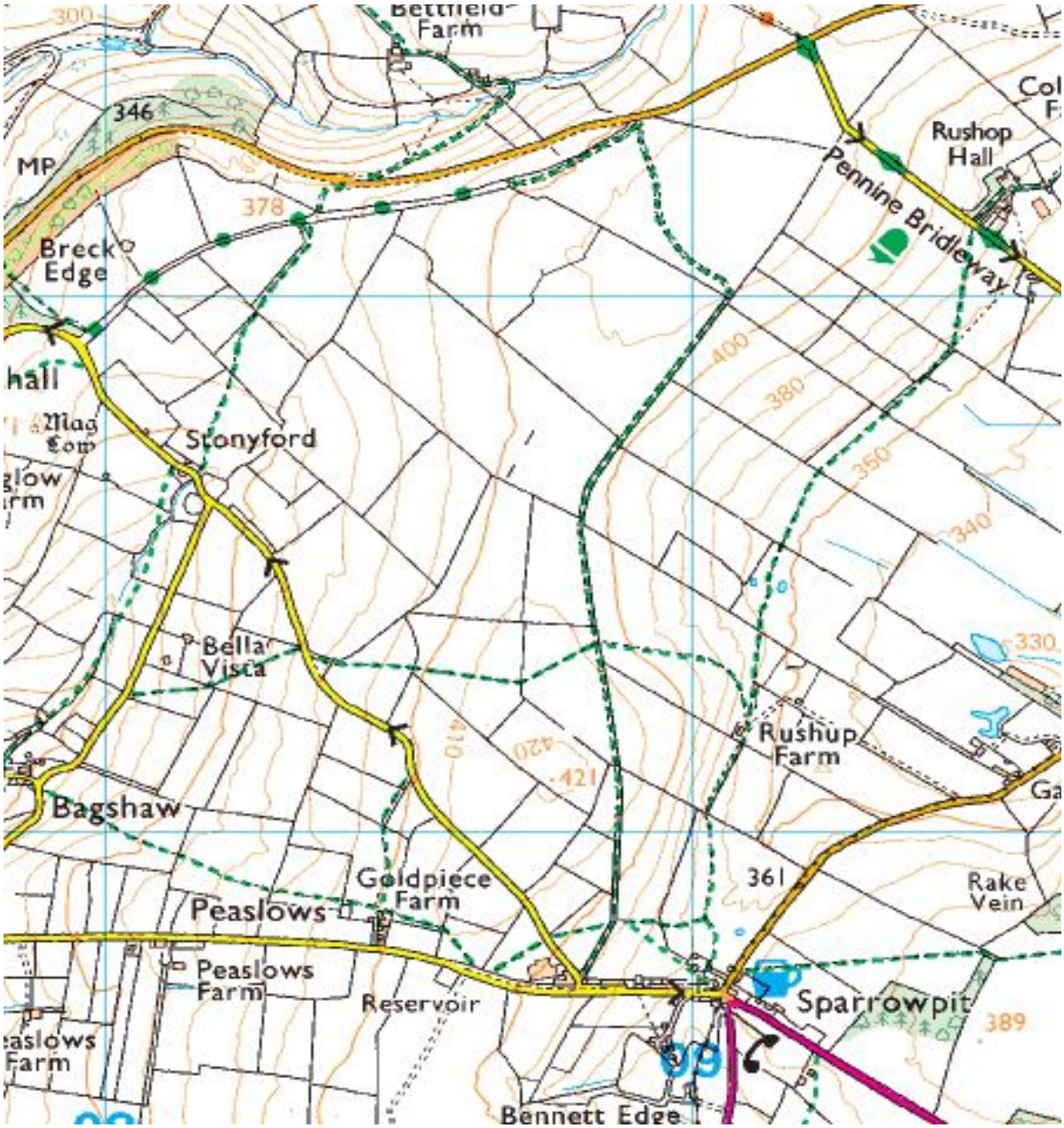
What land feature is indicated by the pattern of contour lines surrounding grid ref SK 1140 8194

Answer A saddle



If I am positioned at grid ref SK 0800 8500 can I see the sheepfold at grid ref. SK 0930 8547 ?

Answer = NO,Brown Knowl is in the way and blocks the View



Draw on the map three walking routes which start from Sparrowpit grid SK 0905 8070 to Stonyford at grid ref. SK 0815 8166. what is the length of each route in Kilometers and Miles ?

Entirely Up To You

End Of Lecture

Appendix 1

OS Explorer Map / 1:25 000 Scale Colour Raster

Customer Information

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0

Whilst we have endeavoured to ensure that the information in this product is accurate, we cannot guarantee that it is free from errors and omissions, in particular in relation to information sourced from third parties

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Communications

ROADS AND PATHS

Not necessarily rights of way

- Service area
- 7 — Junction number
- M1 or A6(M) — Motorway
- A35 — Dual carriageway
- A30 — Main road
- B3074 — 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 — Ferry; Ferry P - passenger only
- Path

RAILWAYS

- Multiple track / Single track — standard gauge
- Narrow gauge or Light rapid transit system (LRTS) and station
- Road over; road under; level crossing
- Cutting; tunnel; embankment
- Station, open to passengers; siding

PUBLIC RIGHTS OF WAY

(Rights of way are not shown on maps of Scotland)

- Footpath
- Bridleway
- Byway open to all traffic
- Restricted byway (not for use by mechanically propelled vehicles)

Public rights of way shown on this map have been taken from local authority definitive maps and later amendments.
Rights of way are liable to change and may not be clearly defined on the ground.
Please check with the relevant local authority for the latest information.

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 (not normally shown in urban areas)

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
- Permissive footpath / Permissive bridleway — Footpaths and bridleways along which landowners have permitted public use but which are not rights of way. The agreement may be withdrawn
- Traffic-free cycle route
- 1 — National cycle network route number - traffic free
- 1 — National cycle network route number - on road

Scotland

In Scotland, everyone has access rights in law* over most land and inland water, provided access is exercised responsibly. **This includes walking, cycling, horse-riding and water access, for recreational and educational purposes, and for crossing land or water.** Access rights do not apply to motorised activities, hunting, shooting or fishing, nor if your dog is not under proper control. The **Scottish Outdoor Access Code** is the reference point for responsible behaviour, and can be obtained at **www.outdooraccess-scotland.com** or by phoning your local Scottish Natural Heritage office. *Land Reform (Scotland) Act 2003

- National Trust for Scotland, always open / limited opening - observe local signs
- Forestry Commission Land / Woodland Trust Land

England & Scotland

- DANGER AREA — Firing and test ranges in the area. Danger! Observe warning notices
  Champs de tir et d'essai. Danger! Se conformer aux avertissements
  Schiess und Erprobungsgelände. Gefahr! Warnschilder beachten
  Visit **www.access.mod.uk** for information

ACCESS LAND

England

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.

Visit **www.countrysideaccess.gov.uk** for up-to-date information

- Access land boundary and tint
- Access land in woodland area
- Access information point
- MANAGED ACCESS — Access permitted within managed controls for example, local byelaws
  Visit **www.access.mod.uk**
  for information

General Information

VEGETATION

Limits of vegetation are defined by positioning of symbols

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

GENERAL FEATURES

- \+ — Place of worship
- Current or former place of worship — with tower / with spire, minaret or dome
- Building; important building
- Glasshouse
- Youth hostel
- Bunkhouse/camping barn/other hostel
- Bus or coach station
- Lighthouse; disused lighthouse; beacon
- Triangulation pillar; mast
- Windmill, with or without sails
- Wind pump; wind turbine
- pylon pole — Electricity transmission line
- Slopes
- Gravel pit / Sand pit
- Other pit or quarry / Landfill site or slag/spoil heap

BP/BS	Boundary post/stone
CG	Cattle grid
CH	Clubhouse
FB	Footbridge
MP; MS	Milepost ; milestone
Mon	Monument
PO	Post office
Pol Sta	Police station
Sch	School
TH	Town hall
NTL	Normal tidal limit
W; Spr	Well; spring

BOUNDARIES

- National
- County (England)
- Unitary Authority (UA), Metropolitan District (Met Dist), London Borough (LB) or District (Scotland & Wales are solely Unitary Authorities)
- Civil Parish (CP) (England) or Community (C) (Wales)
- National Park boundary

HEIGHTS AND NATURAL FEATURES

52 · Ground survey height
284 · Air survey height

Surface heights are to the nearest metre above mean sea level. Where two heights are shown, the first height is to the base of the triangulation pillar and the second (in brackets) to the highest natural point of the hill

Vertical face/cliff

75 60 50 — Contours may be at 5 or 10 metres vertical interval

Loose rock Boulders Outcrop Scree

Water / Mud / Sand; sand & shingle

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

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

Information provided by English Heritage for England and the Royal Commissions on the Ancient and Historical Monuments for Scotland and Wales

Appendix 2

First Reference Is SJ 8575 3292 Second Reference is SJ 8535 3265

