PDST

Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

Geographical Investigation

Glendalough River Study

2019/2020

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Safety in the Field

It is imperative that teachers undertaking fieldwork read Section 2, Assessment (pages 36 – 47) and Section 3, The Geographical Investigation (pages 52 – 54) of the **Guidelines for Teachers** published by the NCCA and available on their web site at NCCA.ie

Safety is paramount in fieldwork both for students and their teachers alike. Fieldstudy sites whether urban or rural can be hazardous so it is essential that they are chosen carefully. A full **risk assessment** should be carried out of all potential fieldstudy sites and only safe sites should be visited.

Due cognizance should be taken of all school policies with regard to field work. Students, their parents or guardians and the school authorities should be fully informed of all aspects of the proposed trip and in particular of the safety requirements well in advance.

During the work in the field one should be vigilant as unexpected hazards can arise no matter how well one is prepared.

List of safety equipment
Grab rope
First aid kit
Life jacket for river work
Well charged phone with contact numbers stored in it

Risk Assessment

Pre-field work visit took place on:

Date:_____ **Time:**_____ **Duration:** _____

Locations: 6 figure grid references

_____

Weather forecast:

_____

Mobile phone coverage:

_____

Emergency services telephone number:

_____

Location of nearest A&E unit:

_____

Activities to be carried out:

_____

_____

_____

_____

Hazards	Risk	Controls

Signature _____ **Date** _____

Planning Template

Planning Geographical Investigations		
	Task 1	Task 2
Aim/hypothesis/ objectives		
Planning		
Gathering		
Results		
Conclusions		
Evaluation		
Presentation		

Using Maps in the Field

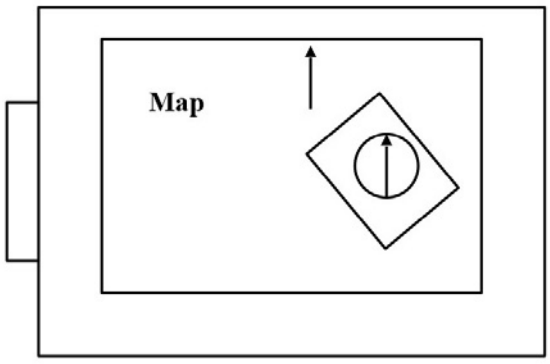
Introduction

Maps are at the heart of geography and are key secondary resources for field work. With the advent of Scoilnet Maps, Ordnance Survey maps, both current and historical, are available free online in every school for all regions along with colour aerial photography. Layers of information including geology, national monuments etc. can also be accessed.

Possible Uses

The 1:50,000 Discovery Series maps are useful for locating prospective fieldstudy locations and for classroom based investigations. They are also useful in the field to assist in the interpretation of the landscape and for locating sites and phenomena using grid references.

Larger scale maps such as the 1; 2,500 Rural and Urban Place maps are useful for work in the field allowing one to record the exact location of study sites. They can also be used to record phenomena such as land use, traffic flows, environmental quality etc. Using maps in the field requires the ability to orient the map, that is, to get it facing in the right direction. It is also essential to be able to relate the map to the landscape and to locate one's present position in the landscape accurately on the map. Orientation can be practised with large scale maps in the school or local environment before one ventures further afield.



Equipment Required

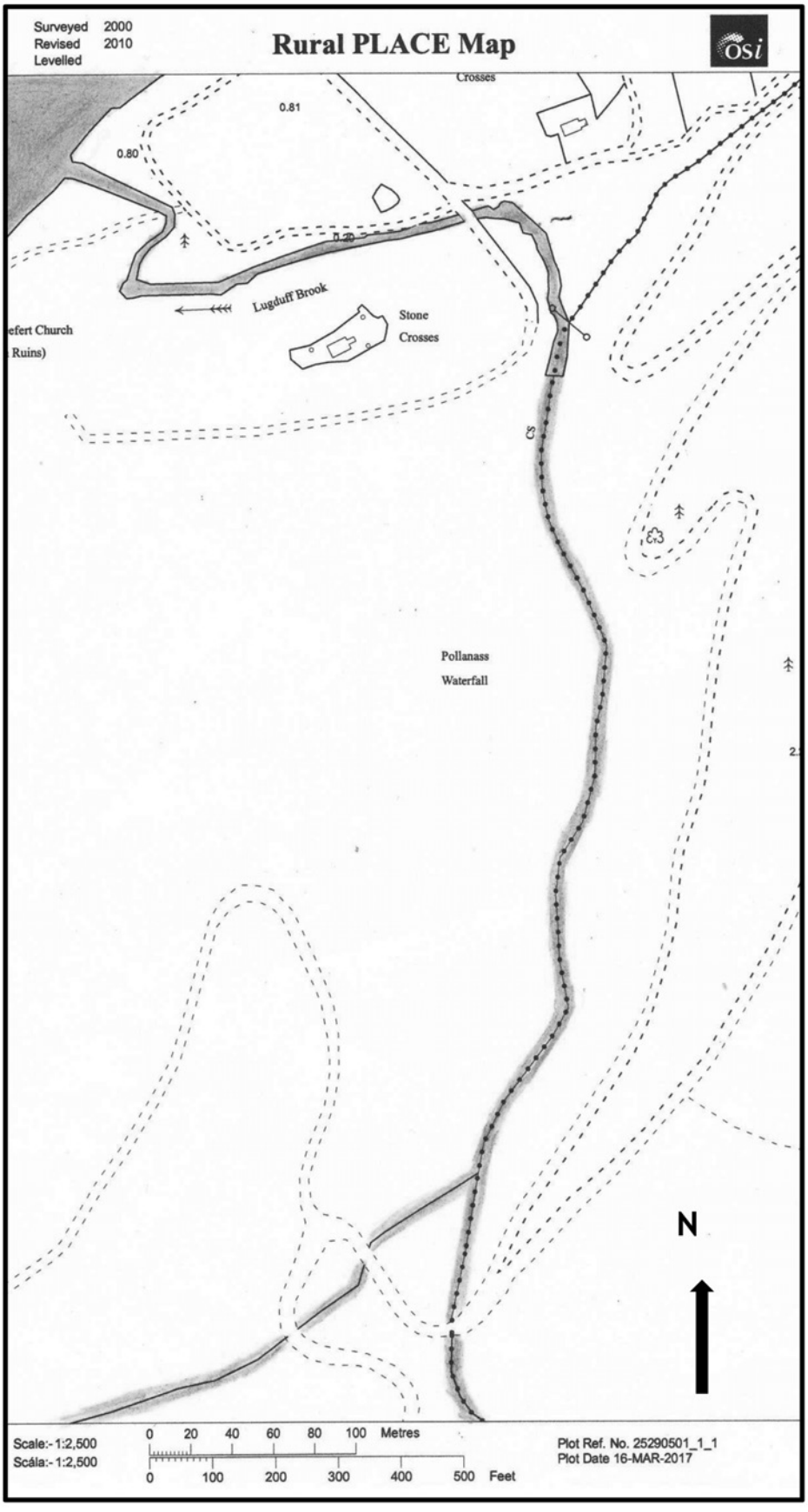
Map, clipboard, Silva compass or digital compass

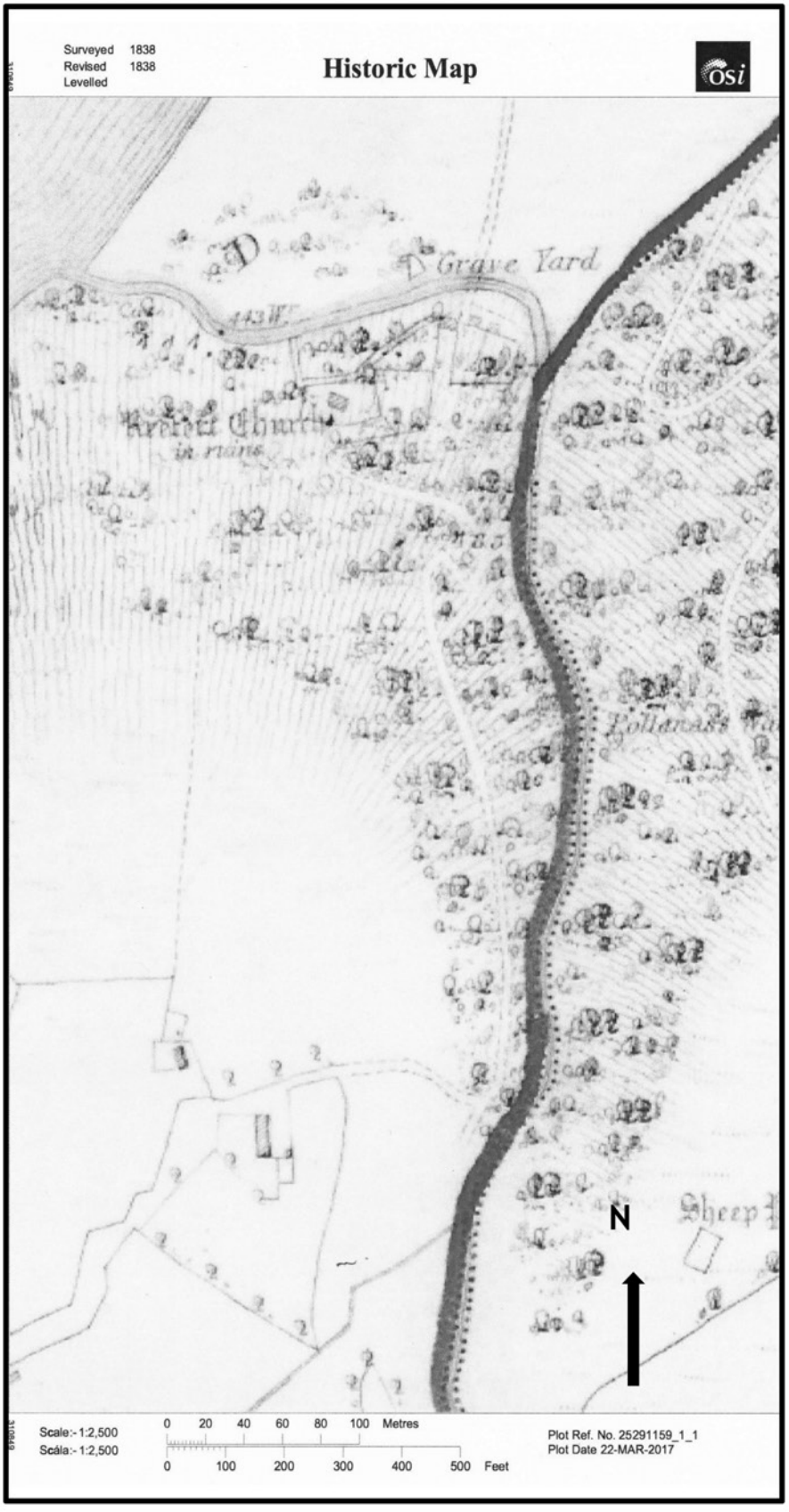
Technique

- Gather equipment
- Clip your map onto the clipboard
- Place the compass on your hand and let the needle come to rest
- The red arrow on the compass points to north
- Turn around so that you are facing north
- Turn the map so that the top of the map and the north sign points in the direction you are facing. It is now oriented correctly
- Find things which are visible on the landscape and on the map
- Relate the landscape to the map and find your location
- Mark your location on the map with a letter, number or symbol
- Put a key on the map

Record stages in activities

Steps in activity	Sinuosity	Valley Profile	Load Analysis		
			Long Axis	Roundness	Rock type
Result					
Conclusions					
Evaluation					


Surveyed 2000
Revised 2010
Levelled
Rural PLACE Map
osi
Crosses
0.81
0.80
0.20
Lugduff Brook
Stone
Crosses
efert Church
Ruins)
CS
CS3
Pollanass
Waterfall
N
Scale:- 1:2,500
Scála:- 1:2,500
0 20 40 60 80 100 Metres
0 100 200 300 400 500 Feet
Plot Ref. No. 25290501_1_1
Plot Date 16-MAR-2017


Surveyed 1838
Revised 1838
Levelled
Historic Map
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Grave Yard
143ft
in ruins
N
Scale:- 1:2,500
Scála:- 1:2,500
0 20 40 60 80 100 Metres
0 100 200 300 400 500 Feet
Plot Ref. No. 25291159_1_1
Plot Date 22-MAR-2017

Fieldsketching

Introduction

Sketching in the field develops observation skills. It is also a technique for recording phenomena in the physical or cultural landscape for later analysis.

Possible Uses

Fieldsketches are used in physical geography to identify and record river, coastal and glacial landforms. They are used in human geography to record building type and condition or for environmental surveys.

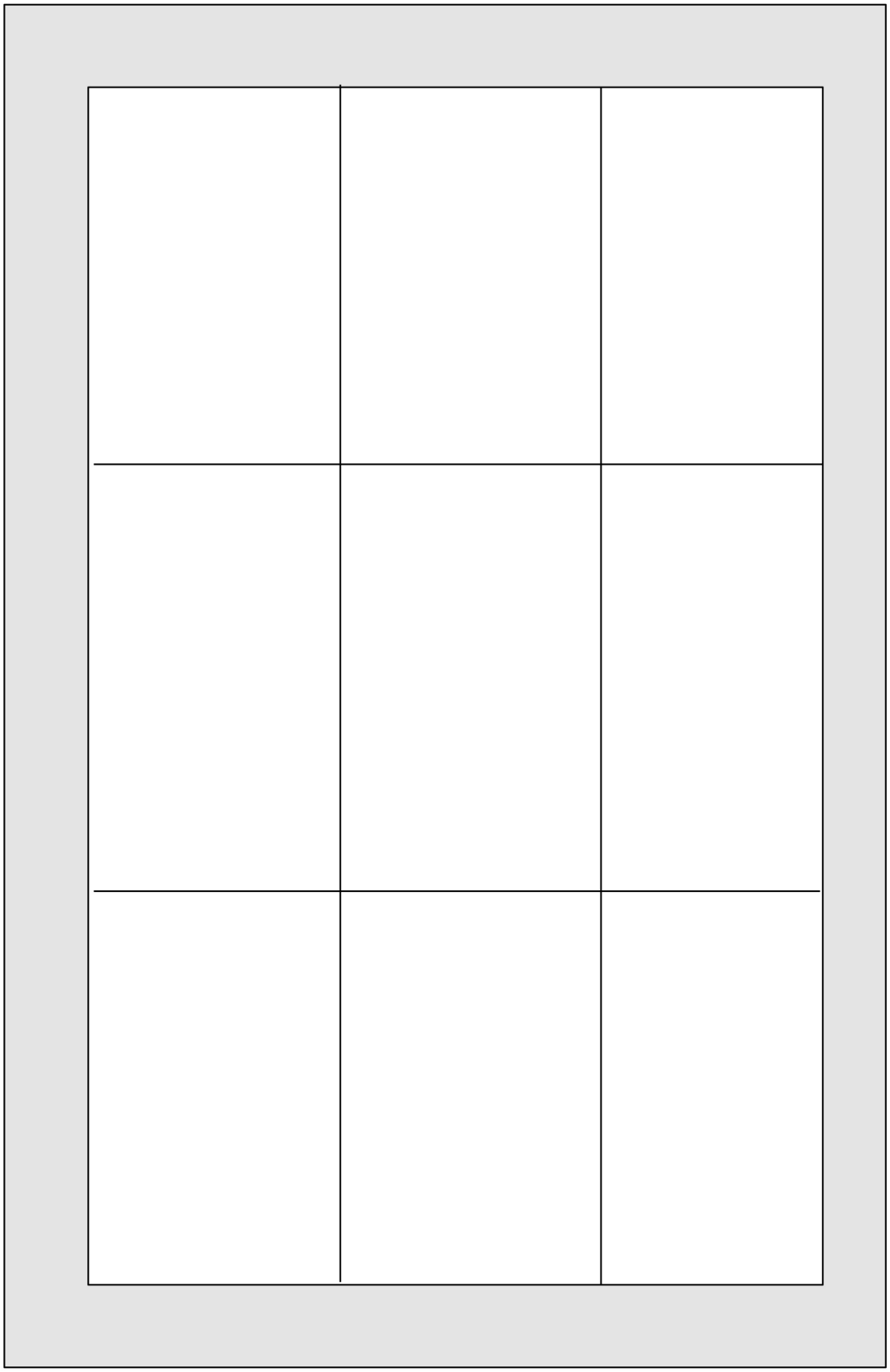
Equipment

Viewfinder, clipboard, record sheet with a grid on it, pencil, compass

Technique

- Observe the site and choose a viewpoint
- Identify the relevant features
- Using the compass note the direction you are facing
- Record the direction on the sketch with an arrow
- Decide on portrait or landscape format
- Frame the scene with the viewfinder
- Or get a partner to hold the viewfinder up for you
- Give the partner instructions to move in or out until you have the view you want
- Identify the main lines such as the horizon, river bank etc.
- Draw these lines onto the grid
- Title and date the sketch
- Annotate the sketch
- Insert a key if you use symbols, colour or shading

Field sketch



Plotting a River Cross-Section

Introduction

This task has many different aspects to it and therefore lends itself to co-operative group work by students. It also delivers a variety of different results from which conclusions may be drawn and which are easily processed into different types of presentations.

Possible uses

This task can be used for contrasting depth along or across a river bed and between opposite sides of a meander.

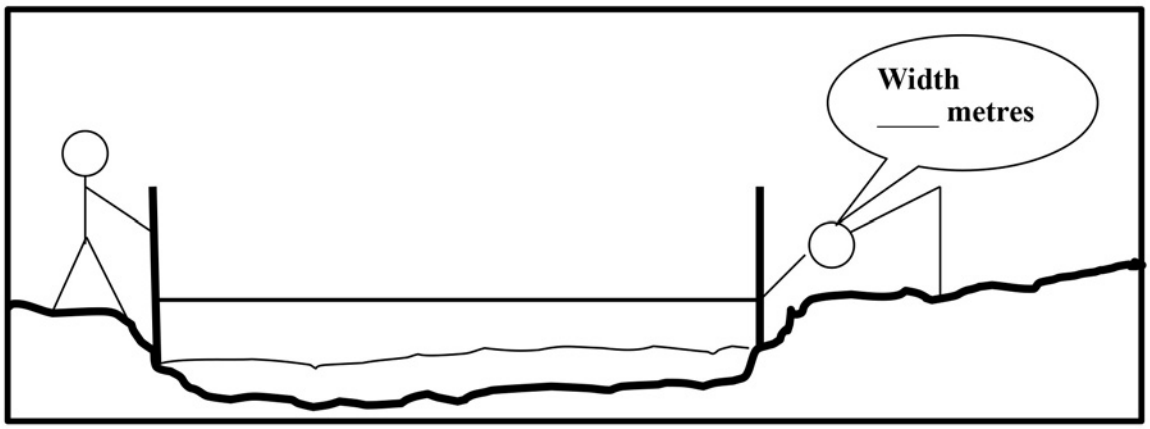
Equipment

Ranging poles, at least two, metre stick, measuring tape, rope marked in metre/half metre sections, hammer, Wellingtons/waders, clipboard, pencil, and life jackets.

Technique

- Students could work in groups of two or more taking turns to perform each aspect of the task. Students must wear appropriate clothing and footwear.

- Place two ranging pole directly across from each other on opposite banks of the river and secure them in place

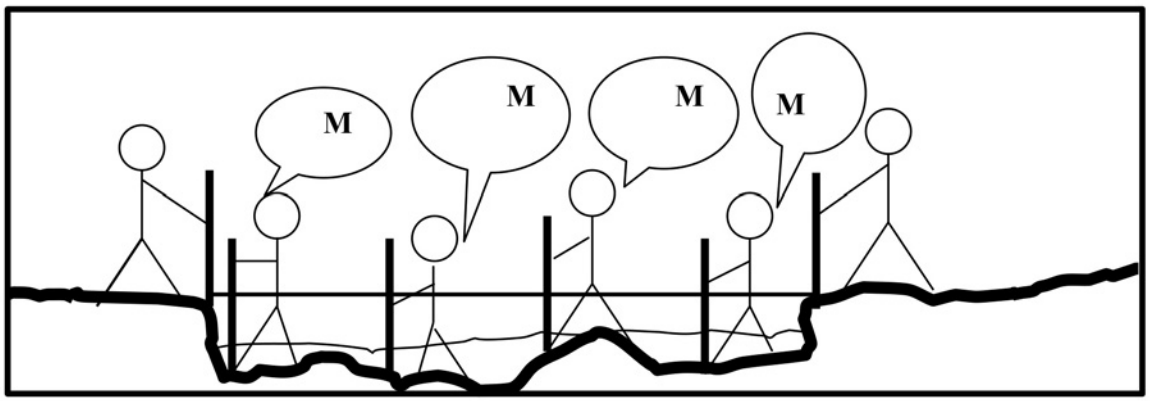


- Tie the marked rope onto pole number one and carefully stretch it across the river and tie it to pole number two on the opposite bank. Make sure the rope is as taut as possible

- Use the tape to measure the width of the river along the rope from pole one to pole two. Write your answer onto your record sheet

- Using the metre stick (holding it upside down helps the student read it more easily) measure the depth of the water at each metre/half metre section of the taut rope. Write the depths into the worksheets. Students could take turns doing different aspects of this task e.g. writing or measuring

- Transfer the data from the worksheet to a trend graph on a sheet of graph paper using a pencil and a clipboard for support



River Width & Depth - Record Sheet

Width in metres	

Depth 1 in metres	
Depth 2 in metres	
Depth 3 in metres	
Depth 4 in metres	
Depth 5 in metres	
Depth 6 in metres	
Depth 7 in metres	
Depth 8 in metres	
Depth 9 in metres	
Depth 10 in metres	
Depth 11 in metres	
Depth 12 in metres	
Total of depths in metres	
Average depth in metres Total ÷ Number of depths	

Measuring Speed Using Floats

Introduction

Speed can be measured using floats.

Possible uses

Floats can be used for measuring the speed or velocity of any moving body of water such as a river or coastal current.

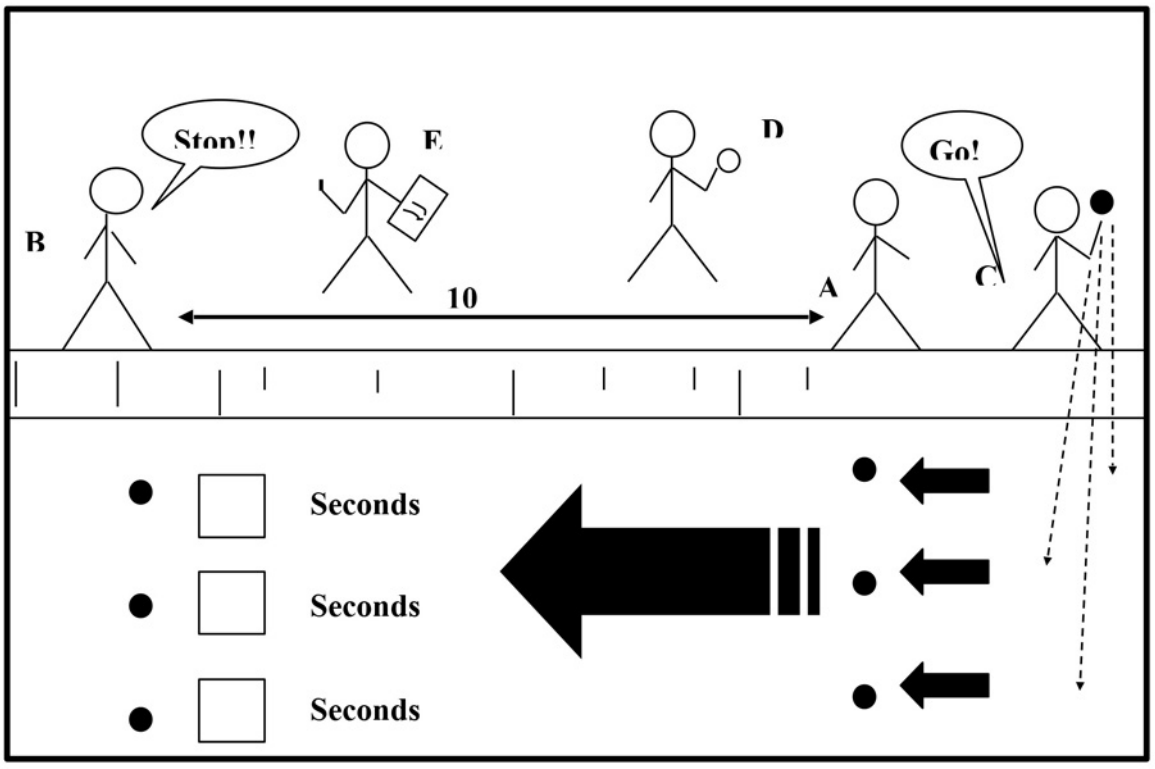
Equipment

Tape measure, stopwatch, Wellington's/waders, floats (oranges), ranging poles, metre stick, recording sheet, compass

Technique

- Using the tape, measure out a 10m section of the moving water.
- Mark each end of the 10 metres section by pushing a ranging pole into the ground
- Secure the poles
- Throw an orange into the moving water and using the stopwatch record the length of time it takes the orange to travel 10 metres
- Repeat this exercise 5 times
- Oranges may be timed travelling at different points across the river including close to each bank and in the centre
- Record the number of seconds each orange takes to travel 10 metres
- Calculate the average time it takes the oranges to travel 10 metres
- Calculate the average distance an orange travels in one second

Velocity/Speed of a River



Velocity Record Sheet

	Left bank seconds	Centre seconds	Right bank seconds
Ist Orange			
2nd Orange			
3rd Orange			
Total secs.			
Average			

Average velocity of all oranges ☐ seconds

Calculating Discharge

Discharge is a measure of the volume of water passing a point on a river bank in a second. The units of measurement used for river discharge are cubic metres per second or cumecs. To calculate the discharge of a river one needs its cross-sectional area and the distance the river travels in a second. River discharge is a measure of its energy and so its ability to do work such as erosion and transport.

Calculations

1. Calculate the cross-sectional area in square metres by multiplying the width by the average depth of the river.

   Cross sectional area =

   Width in metres _____ X the average depth in metres _____

   = _____ m^2

2. Calculate the speed or distance travelled by the river in 1 second by dividing the distance, which was 10 metres, by the average number of seconds taken to travel that distance.

   Distance

   _____ = __ m distance in a second

   Average number of seconds

3. Calculate **discharge** by multiplying the cross-sectional Area by the distance travelled in a second

   Cross sectional area __ M^2 X distance travelled in a second __ M

   = discharge _____ in cubic metres per second (Cumecs)

Measuring Slope

Introduction

Slope measurement can be used in a variety of contexts to identify the presence of a wide range of landforms.

Possible uses

Slope transects can be used to draw profiles of river, coastal and glacial features such as valleys, moraines, beaches, dunes and drumlins. They can also be used to show the gradient of rivers, roads or railway lines.

Equipment

Ranging poles, measuring tape, clinometer, recording sheet, compass, graph

Technique

- Identify a transect (survey) line.
- Mark the start and end of the transect line.
- Using the compass record the orientation of this line.
- Sketch a profile of the transect indicating the break of slope points.
- Label these points A, B, C etc.
- Locate ranging poles at each of the break of slope points
- Select the first two surveying points along the transect line (A & B)
- Measure and record the distance between these points
- Use the clinometer to measure the foresight and backsight angles of the slope between these points
- Move to point B and repeat the exercise of measuring the distance and angle between points B & C
- Repeat this exercise for each slope section along the transect line
- Graph the distance and angles to construct the profile

Slope - Record Sheet

Sketch of Slope Profile

Slope section		A - B	B - C	C - D	D - E	F - G
Length in metres						
Angle	Fore sight					
	Back sight					
	Average					

Investigating Transportation in Solution

Introduction

Transportation of load by solution can also be analysed by measuring the pH of waters samples with either pH papers, universal indicator or an electronic pH meter.

Possible uses

Low pH values can indicate acidification of water bodies and changing pH values can indicate changes in the dissolved load of a water body so pH tests are relevant in physical and environmental geography.

Equipment

Compass, map, bucket, rope, sterilized containers, pH papers, or pH meter, or universal indicator, pH colour chart, record sheets

Technique

- Pick a suitable location to conduct the exercise
- Orient your O.S map with the help of the compass
- Record the location on the map
- Collect water from the river using a bucket and rope
- Place the water into sterilized vessels
- Insert the pH paper or meter or universal indicator into the sample
- Compare the results to a pH colour chart
- Record your readings in your recording sheet
- Repeat this exercise at a few different sites
- Record the readings on the recording sheet
- Get an average for those readings and record this

pH tests - Record Sheet

Site 1	
Sample	pH value
1	
2	
3	
4	
5	
	Average pH Value

Site 2	
Sample	pH value
1	
2	
3	
4	
5	
	Average pH Value

Site 3	
Sample	pH value
1	
2	
3	
4	
5	
	Average pH Value

Sinuosity

Introduction

Sinuosity is a measure of how curved a line is.

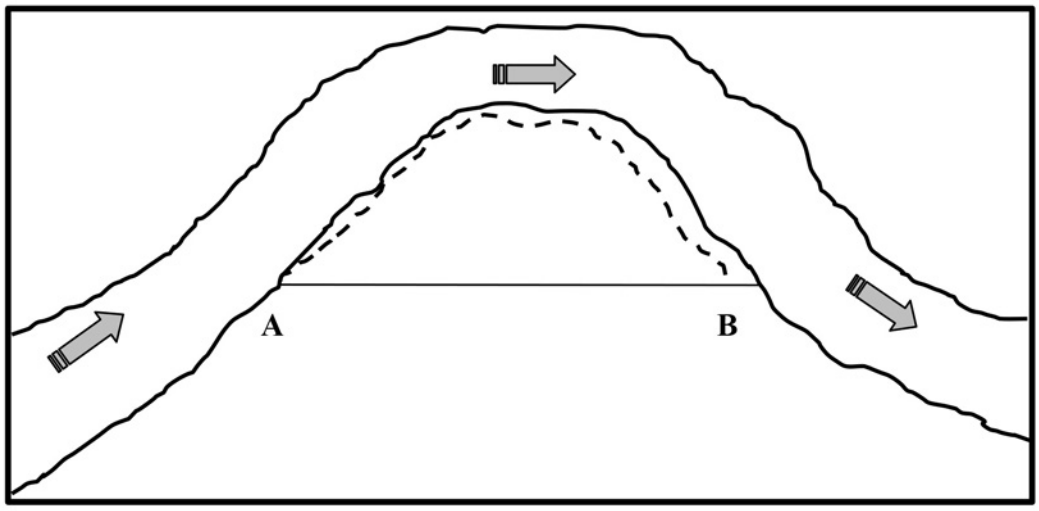
Possible uses

A sinuosity ratio compares the straight distance to the curved distance between two points along a river bend or road. It is used to determine if a river or road is meandering or merely sinuous. Sinuosity takes the guess work out of deciding whether a river or road is meandering or not.

Equipment

Tape measure, 1:50,000 map, ranging poles,

Technique



- Identify a curve in the river/road from a high viewpoint
- Draw a sketch of the curve
- Locate the point where the curve on the river/road changes direction, mark this as point A as shown in the diagram.
- Locate the next change in direction of the river/road and mark this point on the diagram as B

- These points are called points of inflection
- Measure or pace the distance between A and B along the curve of the river/road and record the distance or number of paces
- Measure and record the straight line distance between points A & B
- If the curved distance is more than one and a half times the straight distance the river/road is meandering

Sinuosity Record Sheet

Sketch of bend

Straight Distance ☐

Curved Distance ☐

Straight Distance : Curved Distance = Sinuosity Ratio

If value is 1:1.5 or greater the river is meandering
If value is 1:1 the river channel is straight

Load Analysis – Size of Particles

Introduction

The river's load can be analysed as part of a fieldstudy.

Possible Uses

Sediments deposited by rivers, waves, currents and glaciers can be sampled and their size, shape and rock type recorded and analysed

Equipment

Quadrat, pebbleometer, callipers, scrubbing brush, bucket, acid, penknife, clipboard, plastic gloves, recording sheet

Technique

- Gather equipment – quadrat, pebbleometer, callipers
- Allocate jobs to group members- gatherer, measurer, etc.
- Choose a safe site on the material
- Locate site on the map
- To get a random sample the gatherer throws the quadrat onto the river bed a number of times and picks the particles from the four corners each time
- Put the particles in the pebbleometer and measure the long axis
- Measurer uses callipers to measure small particles
- Recorder notes the measurements
- Repeat this process until you have enough measurements
- Replace the particles where they came from

Size of Particles - Record Sheet

Sample	Long Axis
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Total of long axes ÷ Number = Average grain size

Load Analysis – Geology of Particles

Load Analysis – Geology of Particles

Introduction

The geological composition of various materials can be analysed as part of a fieldstudy.

Possible Uses

Sediments deposited by rivers can be sampled and their rock type determined to see where they originated

Equipment

Quadrat, scrubbing brush, bucket, dilute hydrochloric acid, penknife, magnifying glass, clipboard, plastic gloves, recording sheet

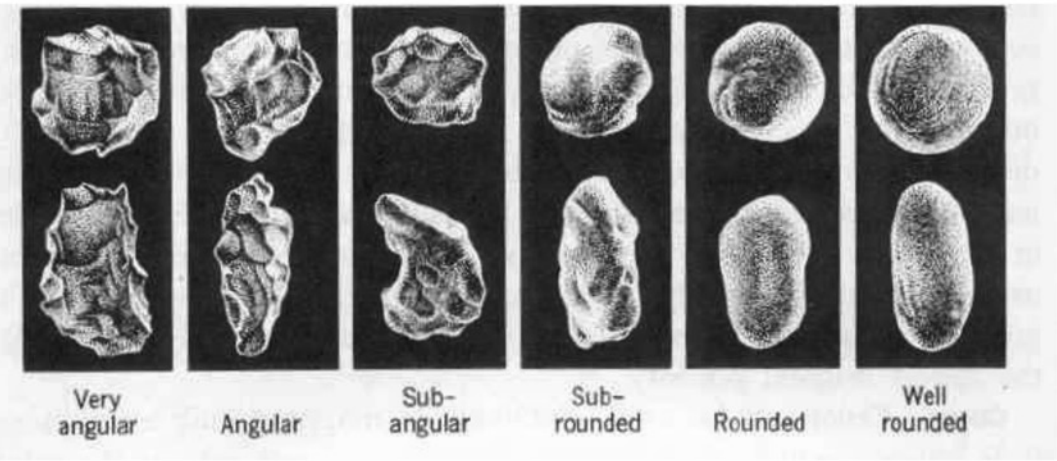
Technique for analysis of load size

- Choose a safe site on the fabric to be analysed
- To get a random sample the gatherer throws the quadrat onto the river bed a number of times and picks the particles from the four corners each time
- Wash the particles in the bucket with the scrubbing brush
- Allow the particles to dry
- Sort the particles into groups which look the same
- Do acid and scratch tests on a typical sample from each group
- Examine the samples with the magnifying glass
- Compare samples with known samples or photographs
- Identify the sample
- Count the number of each rock identified and record this
- Work out the percentages of each rock type
- Replace the particles where they came from

Load Analysis – Geology - Record Sheet

Rock Name	Quantity	Percentage
Total		100%

Load Analysis – Roundness - Record Sheet



Powers Roundness Chart

Degree of Roundness	Number	Percentage
Very angular		
Angular		
Sub-angular		
Sub-rounded		
Rounded		
Well rounded		
Total		100%

Activity Worksheet

Name of Activity _____

Stages in gathering data

Evaluation of activity

Resources for Geographical Investigations

Digital Resources

osi.ie

gsi.ie

cso.ie

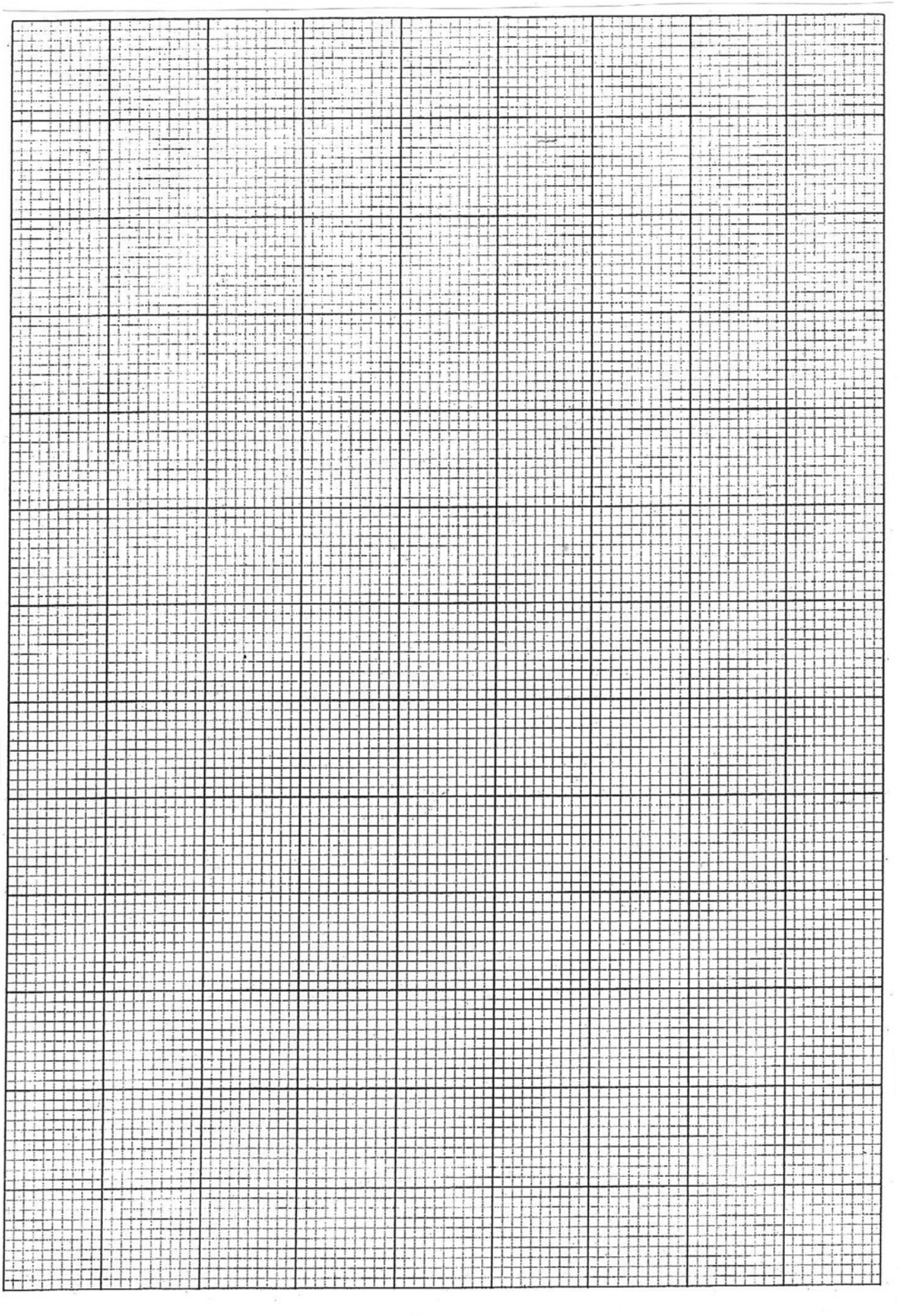
ncca.ie

examinations.ie

field-studies-council.org/

Written Resources

Geographical Exploration – Investigating Ireland's Heritage, The Heritage Council, 2004



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An Roinn Oideachais agus Scileanna
Department of Education and Skills

Dublin West Education Centre

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