#### Geological mapwork from scratch 3: valley with dipping geology Draw your own cross sections and 3D geological model

A valley with a river looks like this:



The straight glen of the Allt Mhuic from its headwaters on Carn Dubh, Scotland.

the Geograph project. Copyright Richard Webb, licensed under the Creative Commons Attribution-ShareAlike 2.0 license. For the map of a valley below, with dipping geology, draw geological cross sections, A –B, C–D, E–F, G–H, I–J, K–L and M–N. using the cross section profiles on the following pages.

Then use cross sections K–L and M–N and the map to sketch the geology onto the 3D block diagram – to show the 3D geology of the area.

Map of a valley with a river and dipping geology (a black and white version for non-colour printers, is given at the end)





Topographic profiles (horizontal scale equals vertical scale)

Earthlearningidea - http://www.earthlearningidea.com/



## The back up

**Title:** Geological mapwork from scratch 3: valley with dipping geology.

**Subtitle:** Draw your own cross sections and 3D geological model.

**Topic:** Part of a series introducing simple geological mapwork. A table of the progression and spiralling of spatial thinking skills involved through the series is given on the final page.

#### Age range of pupils: 14 - 19 years

#### Time needed to complete activity: 40 mins

Pupil learning outcomes: Pupils can:

- add geological boundaries to topographical profiles to produce cross sections of geological maps;
- sketch geology onto 3D block diagrams;
- begin constructing a set of mapwork rules;
- use the exercise to understand three dimensional topography and how it interacts with three dimensional geology.

#### Context:

Pupils are shown a photograph of a straight valley. They are given a simple geological map of such a landform, with beds dipping southward at  $14^{\circ}$ . They are asked add the geology to topographical cross sections of the valley to produce geological cross sections.

- A–B is drawn by realising it is a true dip section, and so the angle of dip of the boundaries is shown by the dip arrow on the map (14°), so that they should be drawn using a protractor.
- C–D is a section at right angles to the dip direction (and so parallel to the strike), so that the apparent dip of the boundaries will be 0° and they will appear horizontal; they can be drawn as on previous mapwork exercises, by marking the geological boundaries on the cross section, and joining them with straight lines.
- E–F requires the same thinking, but also realisation that the thickness of the limestone is obtained from the previous section.
- G–H and I–J can also be constructed using intersections of the geological boundaries with the contours, and illustrate how apparent dip reduces as the sections become more parallel with the strike.
- K–L and M–N are quick to draw, using principles established previously, but then allow geology to be sketched in on the 3D block model diagram, using the map as well.

Both map and block diagram show how outcrops in a valley 'V' in the direction of dip of the beds.

The map has been constructed using structure contours to ensure that the topographical contours and geological boundaries are correctly drawn – thus pupils need an accurate version of the map to work on.

Further simple mapwork exercises can be developed using this approach, for example by :

- having geology dipping north at perhaps 45°;
- using a spur as a base map, instead of a valley;
- using a map of a series of spurs and valleys.

#### Following up the activity:

Pupils could be asked to begin to compile a simple set of mapwork rules, as follows:

- horizontal boundaries follow the contours;
- vertical boundaries cut the contours as straight lines;
- in cross sections drawn parallel to the dip of the geology, the angle of dip of the boundaries can be drawn with a protractor, providing the horizontal and vertical scales of the cross section are the same;
- when a cross section is drawn at right angles to the dip (parallel to the strike) the beds appear horizontal (have an apparent dip of 0°);
- apparent dip is always less than true dip;
- in a valley, the boundaries 'V' in the direction of dip of the beds (providing the dip of the beds is steeper than the valley floor).

#### Underlying principles:

- Geological boundaries can be added to topographical cross sections and block diagrams, to show the three dimensional geological structure.
- An understanding of simple three dimensional geology allows a set of mapwork rules to be developed, as above.
- Pupils who have difficulty in visualising three dimensional geology can draw correct cross sections by applying these rules.

#### Thinking skill development:

The drawing of topographical and geological cross sections involves spatial thinking skills. The more complex the cross sections become, the more spatial interpretation is needed, including interpolation and extrapolation skills.

#### **Resource list:**

- a print off of the map and blank topographic profiles, per pupil
- drawing materials, including pencil, eraser, ruler, protractor and pencil crayons

#### Useful links:

Higher level mapwork exercises with online tutorials are available for free download from the Open University: <u>http://podcast.open.ac.uk/</u> <u>oulearn/science/podcast-s260\_mapwork#</u>

**Source:** This is the third of a series of simple introductory geological map exercises developed by Joe Crossley and Joe Whitehead. Part I of these series of exercises (from which this exercise comes) was published in '*Geology Teaching*' the journal of the Association of Teachers of Geology in 1979 (Volume 4, No. 2, pages 56 – 61).

© Earthlearningidea team. The Earthlearningidea team seeks to produce a teaching idea regularly, at minimal cost, with minimal resources, for teacher educators and teachers of Earth science through school-level geography or science, with an online discussion around every idea in order to develop a global support network. 'Earthlearningidea' has little funding and is produced largely by voluntary effort.

Copyright is waived for original material contained in this activity if it is required for use within the laboratory or classroom. Copyright material contained herein from other publishers rests with them. Any organisation wishing to use this material should contact the Earthlearningidea team.

Every effort has been made to locate and contact copyright holders of materials included in this activity in order to obtain their permission. Please contact us if, however, you believe your copyright is being infringed: we welcome any information that will help us to update our records.

If you have any difficulty with the readability of these documents, please contact the Earthlearningidea team for further help. Contact the Earthlearningidea team at: info@earthlearningidea.com

Map of a valley with a river and dipping geology



### Earthlearningidea - http://www.earthlearningidea.com/

# The progression and spiralling of spatial thinking skills shown by the Earthlearningidea 'Geological mapwork from scratch' exercises and the 'Geological mapwork from models' exercises

Intervention         Participation         Participation         Participation           Adject Non scratch 2: solution 1111         Constant 1111         Constant 1111         Participation 2         Participation 2 </th <th colspan="2">Exercise</th> <th colspan="2">Topographic</th> <th>Geological</th> <th>Strategies and skills</th>	Exercise		Topographic		Geological	Strategies and skills
Incompany International         Add anotage input Modulation Costs actions and plant Modulation Costs actions in the international internatinteristical international international interational i	Manwork from agreetab 1:		Conical b		Surfaces	Dist and draw simple tanggraphic grass sections
Intgrowch from scratch 2: valley with simple geology         Skoping valley (maxwork from scratch 3: valley with dipping geology         Flat and from scratch 3: valley with dipping from scratch 3: valley with motion 1         Flat and from scratch 3: valley with slopping from scratch 3: valley with slopping from valley with slopping from valley with slopping from valley with slopping from valley with slopping from valley with slopping from valley valley with slopping from valley valley with slopping from valley with slopping from valley with slopping from valley with slopping fro	a conical hill		Conical fill		horizontal	<ul> <li>Add geological boundary intersections and join with straight horizontal lines</li> </ul>
Valley with simple geology         Photizontal         Add geological boundary intersections and join with straight, horizontal lines           Magwork from scratch 3: valley with dying         Sloping valley         Dipping surfaces provide         Dipping surfaces provide valley with dying a profractor provide valley geological boundary intersections and join with straight lines         Dipping provide valley with dying a profractor provide valley geological boundary intersections and join with straight lines           Magwork from scratch 3: rommodel 1         Plain version 1         Filt         Filt and horizontal         Add geological boundary data to cross sections and join with straight lines subscratch         Add geological boundary data to cross sections and join with straight lines           Magwork from scratch 3: rommodel 2         Filt         Filt and horizontal         Plain and horizontal         Add geological boundary data to cross sections and join with straight horizontal lines stratces           Magwork from scratch 3: rommodel 2         Valley with horizontal         Filt and horizontal         Add geological boundary data to cross sections which intersect the topographic surface to draw a boundary on the scratce           Magwork from models 3: tron         Valley with valley with scratch         Valley with horizontal         Dipping surfaces, vertical         Dipping surfaces, vertical         Scratch arabit boundary in the cross sections which intersect the topographic surface to draw in boundaries on the surface </td <td colspan="2">Mapwork from scratch 2:</td> <td colspan="2">Sloping valley</td> <td>Flat and</td> <td>Plot and draw simple topographic cross sections</td>	Mapwork from scratch 2:		Sloping valley		Flat and	Plot and draw simple topographic cross sections
geology         • Sketch geology not a 3b block diagram           Maywork from models 1         Sloping valley         Dipping surfaces         • Far who dip on a cross section using a protractor           Maywork from models 1         Plain         Flat         • Add geological boundary data to cross sections and join with straight lines           Maywork         Plain         Flat         Dipping surfaces         • Add geological boundary data to cross sections and join with straight lines           Maywork         Valley with origina         Flat         Dipping         • Add geological boundary data to cross sections which intersect the topographic surface to diverse boundary data to cross sections which intersect the topographic surface to diverse boundary data to cross sections which intersect the topographic surface to diverse boundary data to cross sections which intersect the topographic surface to diverse boundary data to cross sections which intersect the topographic surface to diverse boundary data to cross sections which intersect the topographic surface to diverse boundary data to cross sections subit intersect the topography.           Maywork from models 2:         Valley with horizontal         • Add geological boundary data to cross sections subit intersect the topography.           Maywork from models 3:         Valley with horizontal         • Dipping surfaces.           floor         Valley with horizontal         • Dipping surface.           floor         Valley valley         Dipping surface.         • Add geological boundaris on the surface on secti	valley with simple		, 5		horizontal	Add geological boundary intersections and join with straight, horizontal lines
Magwork from exclub.3:         Sloping valley         Dipping surfaces         • Draw the dip on a cross section using a protractor           Magwork from exclub.3:         Plain         Flat         • Dipping surfaces         • Add geological boundary intersections and join with straight lines           Magwork from exclub.3:         Version 1         Flat         Flat and         • Add geological boundary data to cross sections and join with straight lines           Magwork from exclub.3:         Version 1         Flat         Flat and         • Add geological boundary data to cross sections with intersect the topographic surface to the transport function with straight lines           Magwork from models 2:         Version 1         Flat and         • Add geological boundary data to cross sections with intersect the topographic surface to the transport function with straight ines           Magwork from models 3:         Version 1         Flat and         • Add geological boundary data to cross sections with intersect the topographic surface to the transport function of the topographic surface to the transport function of the transport function of the transport function of the topographic surface to transport function of the topographic surface to trans transport function of the topographic surface to trans transport function of the transport	geology					Sketch geology onto a 3D block diagram
Value y with upping geology              Plain value y with opping value y with soping value y with value y with soping value y with soping value y with soping value y with value y with value y with value y with value y with value y with	Mapwork from scratch 3:		Sloping valley		Dipping surfaces	Draw true dip on a cross section using a protractor
Mapwork from model 1         Plain version 1         Flat         Flat and horizontal         Add geological boundary data to cross sections and join with straight, horizontal lines scherb peology on a 3D book dagram           Magwork from model 1         Plain version 2         Flat         Dipping surfaces; vertical faalure <ul> <li>Add geological boundary data to cross sections which intersect the topographic surface to draw a boundary on the surface</li> <li>Add geological boundary data to cross sections which intersect the topographic surface to draw a boundary on the surface</li> <li>Add a vertical traduum (Multication (</li></ul>	deology	upping				Add geological boundary intersections and join with straight lines     Appreciate that apparent din is always less than true din
Mapwork from models 1         Plain version 1         Flat         Flat and horizontal         Add geological boundary data to cross sections and join with straight, horizontal lines from the section of	geelegy					<ul> <li>Appreciate that, in valleys, geological boundaries usually 'V' in the direction of dip.</li> </ul>
Maywork from models 1         Plain version 1         Flat         Flat and horizontal         Flat and horizontal         Flat and horizontal         Add geological boundary data to cross sections and join with straight, horizontal lines surfaces; vertical feature         Add geological boundary data to cross sections which intersect the topographic surface to draw a boundary on the cross sections which intersect the topographic surface to draw a boundary on the cross sections which intersect the topographic surface to draw a boundary on the cross sections which intersect the topographic surface to draw a boundary on the cross sections which intersect the topographic surface to draw a boundary on the cross sections which intersect the topographic surface to draw a boundary on the cross section using a protractor           Mapwork from models 2;         Cuesta version 2         Asymmetrical ridge         Dipping surfaces; vertical feature         • Draw true dip on a cross section using a protractor           Valley with horizontal floor         Valley with solffeat         Valley with solffeat         Dipping surfaces surfaces; vertical floor         • Draw true dip on a cross section which intersect the topographic surface to draw in boundaries on the cross sections which messes the topographic surface to draw in boundaries on the cross sections which messes the topographic surface to draw in boundaries on the cross sections which intersect the topographic surface to draw in boundaries on the cross sections which intersect the topography whis sloping floor           Mapwork from models 4;         Ridge/ valley with sloping floor version 2         Ridge/valley with sloping floor         Ridge/valley with sloping floor         Ridge/valley with						<ul> <li>Sketch geology onto a 3D block diagram</li> </ul>
Magwork from models 1         Plain version 1         Flat and horizontal         Add geological boundary data to cross sections and join with straight, horizontal lines were sections and join with straight, horizontal lines were sections which intersect the topographic surface to draw a boundary on the cross sections and join with straight, horizontal lines were sections which intersect the topographic surface to draw a boundary on the cross sections to construct straight, horizontal lines were sections which intersect the topographic surface to draw a boundary on the cross sections to construct straight, horizontal lines were sections which intersect the topographic surface to draw a boundaries           Magwork from models 2: version 1         Agymmetrical version 2         Dipping surfaces; vertical feature (u) that moves a geological boundary in the drave coundaries sections which intersect the topographic surface to draw in boundaries on the cross section using a protractor           Magwork from models 3: valley with horizontal floor         Valley with horizontal floor         Dipping surfaces; vertical feature (u) that moves a geological boundaries (d) and a vertical feature (u) that moves a geological formations and topography were in 1           Magwork from models 4: vertical were in the vertice in the vertice in the vertice is alway greater than true thickness is alway greater and than there alway this were sections which intersect the topography version 2           Magwork from models 5: plain (u) with sindigning floor versin 2         Ridger valle						Begin to compile a list of mapwork rules
Models 1         Version 1         Indizonal           Plain version 2         Flat         Dipping surfaces; vertical feature         Add geological boundary data to cross sections which intersect the topographic surface to draw a boundary on the surface           Magwork from models 2         Cuesta version 1         Asymmetrical ridge         Flat and horizontal         Add geological boundary data to cross sections to construct straight, horizontal lines feature         Add avertical feature (4/w) Add avertical feature (1/w) Add avertical feature (1/w) Add avertical feature (1/w) functors; version 2         Asymmetrical ridge         Dipping surfaces; vertical feature         Dipping version 2           Waley with volley with sipping floor         Valley with sipping floor         Valley with sipping floor         Dipping surfaces; vertical feature         Dipping surfaces; vertical feature<	Mapwork	Plain	Flat	Flat and	Flat and	Add geological boundary data to cross sections and join with straight, horizontal lines
Network version 2         Plain version 2         Flat         Dipping version 1         Add geological boundary data to cross sections and join with straight lines of the cross sections and join with straight lines of the cross sections and join with straight lines of the cross sections and join with straight lines of the cross sections and join with straight lines of the cross sections and join with straight lines of the cross sections and join with straight lines of the surface; vertical indige           Magwork Coresta         Asymmetrical version 1         Asymmetrical version 2         Plat and horizontal lines indige         Add available caburic (kyke)           Magwork Coresta         Cuesta version 1         Asymmetrical version 1         Dipping surfaces; vertical feature (kyke)         Dipping surfaces; vertical feature (kyke)         Dipping surfaces; vertical feature (kyke)           Magwork from models 3: valley with horizontal floor         Valley with sicping loor         Dipping surfaces; vertical feature (kyke)         Dipping surfaces in the surface sections which intersect the topographic surface to draw in boundaries on the cross sections to construct straight lines + Add a vertical feature (kyke)           Magwork from models 4: version 1         Nidge / valley with sicping loor         Dipping surfaces         Add a vertical feature (kyke)           Magwork from models 5: version 2         Nidge / valley with sicping loor         Dipping surfaces         Add a vertical feature (kyke)           Magwork from models 5: valley with sicping loor         Dipping surfaces         Dipping surfaces	trom models 1	version 1			norizontal	
version 2         ward assessment of the spondarises on the drass sections which intersect the topographic surface to draw a boundary on the surface.         • Use boundarises on the drass sections which intersect the topographic surface to draw a boundary on the surface.           Mapwork from models 2         Cuesta version 1         Asymmetrical feature (dyke)         • Add a vertical feature (dyke)           Cuesta version 2         Asymmetrical feature (dyke)         • Add a vertical feature (dyke)         • Add a vertical feature (dyke)           Mapwork from models 3:         Valley with horizontal floor         • Draw true dip on a cross section using a protractor           Walley with horizontal floor         • Draw true dip on a cross section using a protractor         • Add a vertical feature (duit) that moves a geological boundary           Walley with horizontal floor         • Draw true dip on a cross section using a protractor         • Add parallel geological boundaries           Mapwork from models 4         • Ridge / with sipping floor         • Dipping surfaces; vertical feature (dyke)         • Draw true dip on a cross section using a protractor           Mapwork from models 4         • Ridge / with sipping floor         • Dipping surfaces         • Add paralle geological boundaries on the surface           * Ridge / with sipping floor         • Ridge / valley with sipping floor         • Dipping surfaces         • Add paralle geological boundaries on the surface           * Valley with sipping floor         • Ridge / valley w	models i	Plain	Flat		Dipping	Add geological boundary data to cross sections and join with straight lines
Mapwork from models 2         Cuesta version 1         Asymmetrical ridge         Flat and horizontal broizontal         Add geological boundary data to cross sections to construct straight, horizontal lines for instruction           Mapwork from models 2         Cuesta version 2         Asymmetrical ridge         Dipping surfaces: vertical feature         - Add a vertical feature (gluke)         - Add a vertical feature (gluk) horizontal floor         - Draw true dip on a cross section using a protractor           Mapwork from models 3: valley with horizontal floor         Valley with horizontal floor         Use boundaries on the surface horizontal floor         - Draw true dip on a cross section using a protractor           Mapwork from models 4         Ridge/ valley with horizontal floor         Valley with horizontal floor         Dipping surfaces: vertical feature         - Draw true dip on a cross section using a protractor           Mapwork from worsion 2         Ridge/ valley with horizontal floor         Ridge/ valley with loging floor         Name protecial boundaries on the surface horizontal floor         Dipping surfaces horizontal floor         - Draw true dip cross sections thich intersect the into between tough and weak geological formations and topography horizontal floor           Mapwork from models 5: version 2         Ridge/ valley with horizontal floor         Ridge/ valley with horizontal floor         - Dipping surfaces horizontal horizontal horizontal horizontal floor         Dipping surfaces horizontal horizontal horizontal horizontal horizontal horinthecopentics the in horizontas horizontal horizontal ho		version 2			surfaces; vertical	Use boundaries on the cross sections which intersect the topographic surface to
Mapwork from models 2         Cuesta version 1         Asymmetrical ridge         Flat and horizontal ridge         Add a vertical feature (dyke)           Add a vertical feature (dyke)         Asymmetrical ridge         Asymmetrical ridge         Asymmetrical ridge         Asymmetrical ridge         Asymmetrical ridge         Add a vertical feature (dyke)           Mapwork from models 3: floor         Valley with horizontal floor         Asymmetrical ridge         Asymmetrical ridge         Dipping valley with sloping floor         Dipping valley with sloping floor         Dipping valley with sloping floor         Dipping valley with sloping floor         Parw true dip on a cross section using a protractor           Mapwork rom models 4: from version 1         Ridge/valley valley with sloping floor         Valley with sloping floor         Dipping surfaces floor         Dipping surfaces valley with sloping floor         Paretalle geological boundaries valley with sloping floor         Pidge/valley valley with sloping floor         Pidge/valley valley with sloping floor         Dipping surfaces valley valley floor         Add peological boundaries valley valley coros sections to construct straight lines valley with sloping floor version 2         Ridge/valley valley with sloping floor         Dipping surfaces valley valley valley with sloping floor version 2         Ridge/valley valley with sloping floor version 2         Ridge/valley valley with sloping floor version 2         Pint models 6: robust different version 2         Flat valley with sloping floor version 2         Namat and tear dip faults: dipping be					feature	draw a boundary on the surface
Magwork modes         Cuesta version 1         Asymmetrical dge         Flat and horizontal         Add geological boundary data to cross sections to construct straight, norizontal version 2         Asymmetrical ndge         Dipping surfaces; vertical horizontal         - Draw true dip on a cross section using a protractor           Magwork from models 3: valley with horizontal floor         Valley with horizontal         Dipping surfaces; vertical floor         Dipping surfaces; vertical floor         Dipping surfaces; vertical floor         - Draw true dip on a cross section using a protractor           Magwork from models 3: valley with horizontal floor         Valley with horizontal         Dipping surfaces; vertical floor         Dipping surfaces; vertical floor         Dipping surfaces; vertical floor         - Draw true dip on a cross section using a protractor           Magwork from models 4 valley with vorsion 1         Ridge/ valley with vit sioping floor version 2         Ridge/ valley with sioping floor         Dipping surfaces         - Add geological boundaries - Add geological boundaries - Add geological boundaries         - Draw true dip on a cross section using a protractor           Magwork from models 5: valley with version 2         Ridge/ valley with sioping floor version 2         Dipping surfaces         - Add geological boundaries - Appreciate the ink between tough and weak geological formations and topography - Interpolate approximate true dip rom across sections using a protractor - Add avarial locundaries on the surface - Construct parallel boundaries           Magwork from models 5: plain with sitoping floor vall	Manuali	Quanta	A		Elet en el	Add a vertical feature (dyke)
Many models 2         Values and the surfaces of the surface of the s	Mapwork	Cuesta	Asymmetrical ridge		Flat and horizontal	<ul> <li>Add geological boundary data to cross sections to construct straight, horizontal lines</li> </ul>
Cuesta version 2         Asymmetrical ridge         Dipping surfaces; vertical feature         Draw true dip on a cross section using a protractor           Mapwork from models 3: valley with horizontal floor         Valley with horizontal floor         Dipping surfaces; vertical feature	models 2	VEISION				
version 2         iridge         surfaces; vertical feature         • Add parallel geological boundaries           Mapwork from models 3: thoor         Valley with horizontal floor         Prove factor horizontal floor         Prove factor horizontal floor <t< td=""><td></td><td>Cuesta</td><td colspan="2" rowspan="3">Asymmetrical ridge</td><td rowspan="3">Dipping surfaces; vertical feature</td><td>Draw true dip on a cross section using a protractor</td></t<>		Cuesta	Asymmetrical ridge		Dipping surfaces; vertical feature	Draw true dip on a cross section using a protractor
Mapwork from models 3: valley with horizontal floor         Valley with brizontal floor         Dipping surfaces; vertical feature         - Draw true dip on a cross section using a protractor           Mapwork from models 3: valley with horizontal floor         Valley with horizontal floor         Dipping surfaces; vertical feature         - Draw true dip on a cross sections which intersect the topographic surface to draw in boundaries on the surface           Mapwork from models 4         Ridge/ valley with sloping floor         Ridge/ valley with sloping floor         Dipping surfaces         - Add a vertical feature (dyk) equological boundaries on the surface           Mapwork from models 4         Ridge/ valley with sloping floor         Ridge/ valley with sloping floor         Dipping surfaces         - Add a vertical feature (dyk) equological boundaries on the surface           Mapwork from models 5: varison 2         Ridge/ valley with sloping floor         Dipping surfaces         - Add parallel geological boundaries on the surface           - Or more valley with brizer valley with plan: cuestar valley with plan: cuestar valley with plan: cuestar valley with plan: with faulted rocks 1         All the model faults: dipping bedding above         Surfaces folded into open folds above         - The strategies and skills described into open folds above         - The strategies and skills described into open folds           Mapwork from models 6: plain with faulted rocks 1         Flat         Normal and tear dip faults; dipping bedding bedding         - Draw an unconformity and a pluol with a metamorphic auroele		version 2				Add parallel geological boundaries
Appreciate the link between togin and weak geological formations and topography     willey with horizontal     floor						Add a vertical feature (fault) that moves a geological boundary
Mapwork from models 5: plain with faulted rocks 1       All the model faulty: dipping bedding       Dipping surfaces feature       Dipping surfaces feature       Dipping surfaces feature         Mapwork from models 4       Ridge/ valley with soping floor       Ridge/ valley with soping flo	Manwark from models 2		Vallay with		Dipping	Appreciate the link between tough and weak geological formations and topography
floor       floor       feature       • Use boundaries on the cross sections which intersect the topographic surface to draw in boundaries on the surface         Mapwork from models 4       Ridge/ valley with sloping floor version 1       Ridge/ valley with sloping floor version 2       Dipping surfaces 0       Oraw the diperson a cross sections to construct straight lines 0         Mapwork from models 5: plain; cuesta; valley with hardrows above       All the model floor fidge/ valley with sloping floor version 2       Dipping surfaces folded 1       The strategies and skills described in the box above and, in addition: 1       Hardrows above and, in addition: 1         Mapwork from models 6: plain; cuesta; valley with hardrows above similar and tear dip faults; dipping bedding 2       Flat       Normal and tear dip faults; dipping bedding 2         Mapwork from models 6: plain with faulted rocks 1       Flat       Normal and tear dip faults; dipping bedding 2       Draw the effects of normal and a tear dip faults on cross sections 3         plain with faulted rocks 3       Fl	vallev with horizontal		horizontal		surfaces: vertical	Add parallel deological boundaries
Mapwork from models 4       Ridge/ valley with sloping floor       Normal and tear dip faults; dipping bedding       Dipping surfaces valley with sloping floor       Surfaces folded into open folds above       Surfaces folded into open folds       Surfaces folded into open folds       The strategies and skills described in the box above and, in addition: - Draw the effects of a normal and tear dip faults; dipping bedding       Diver tof daxes and fold axial planes         Mapwork from models 6: plain with faulted rocks 1       Flat       Normal and tear dip faults; dipping bedding       Draw the effects of anormal and tear dip faults on cross sections         Mapwork from models 8: plain with faulted ro	floor		floor		feature	<ul> <li>Use boundaries on the cross sections which intersect the topographic surface to</li> </ul>
Mapwork       Ridge/ valey with models 4       Ridge/ valey with sloping floor version 1       Ridge/ with sloping floor       Ridge/ with sloping floor       Dipping surfaces vade averical feature (dyke)       Add geological boundaries vade averical feature (dyke)         Mapwork from models 4.       Ridge/ valey with sloping floor version 1       Ridge/ with sloping floor       Ridge/ with sloping floor       Dipping surfaces version 1       Nidge/ valey with sloping floor version 2       Ridge/ with sloping floor       Dipping surfaces version 2       Dipping surfaces version 2       Valey with sloping floor version 2       Ridge/ with sloping floor       Dipping surfaces version 2       Opping surfaces version 2       Valey with sloping floor version 2       Ridge/ valey with sloping floor version 2       Ridge/ valey with sloping floor version 2       Ridge/ valey with sloping floor version 2       Ridge/ valey with sloping floor version 2       Nith emodel surfaces folded into open folds       Surfaces folded into open folds       The strategies and skills described in the box above and, in addition: version 2       The strategies and skills described in the box above and, in addition: version 2         Mapwork from models 5: plain with faulted rocks 1       Flat       Normal and tear dip faults; dipping bedding       The strategies and skill described in the box above and, in addition: version 4       Vale version 4         Mapwork from models 6: plain with faulted rocks 2       Flat       Normal and reverse strike faults; dipping bedding       Draw the effects of normal and reverse strike faults						draw in boundaries on the surface
Mapwork from models 4         Ridge/ valley with soping floor         Ridge/ valley with soping floor         Ridge/ valley with soping floor         Ridge/ valley with soping floor         Ridge/ valley with soping floor         Normal and tear dip faults; dipping bedding         The strategies and skile described in the box above and, in addition: valley with soping floor         In the model into open folds           Mapwork from models 6: plain with faulted rocks 1         Flat         Normal and reverse strike faults; dipping bedding         Oraw the effects of a normal and a tara dipger bedding         In the effects of varical leatures) Draw the effects of varical leatures)						Construct parallel boundaries on the surface
Mapwork rom models 4       Ridge/ valley with sloping floor version 1       Ridge/ valley with sloping floor version 1       Dipping surfaces       Add a version and the protocol of the surface section using a protocol of the surface section using a protocol of the surface section which intersect the topographic surface to darge and the opposite is true of ridge section using a protocol of the surface section using a protocol of the surface of the surface section using a protocol of the surface of the surface section using a protocol of the surface of the surface of the surface section using a protocol of the surface of t						Appreciate that, in valleys, geological boundaries usually 'V' in the direction of dip
Mapwork from models 4         Ridge/ valey with sloping floor         Ridge/ valey with sloping floor         Dipping surfaces plan version 1         Dipping surfaces floor         Add geological boundary data to cross sections to construct straight lines Add parallel geological boundaries           Mapwork from version 1         Ridge/ valey with sloping floor version 2         Ridge/ valey with sloping floor         Dipping surfaces         Dipping surfaces         Add parallel geological boundaries to Add parallel geological boundaries to Add parallel geological boundaries to cross section using a protractor           Mapwork from models 5: plain; cuesta; valley with horizontal floor; ridge         All the model landforms above         Surfaces folded into open folds into open folds         The strategies and skills described in the box above and, in addition: I dentify fold with equally dipping limbs, and those with limbs dipping at different angles           Mapwork from models 6: plain; cuesta; valley with horizontal floor; ridge         Flat         Normal and tear dip faults; dipping bedding         Draw the effects of a normal and a tear dip fault on cross sections           Mapwork from models 6: plain with faulted rocks 1         Flat         Normal and reverse strike faults; dipping bedding         Draw the effects of normal and reverse sections sections           Mapwork from models 8: plain with faulted rocks 2         Flat         Normal and reverse strike faults; dipping bedding         Draw the effects of normal and a reverse sections strike faults; dipping bedding         Draw the effects of ormal and reverse strike faults on cross sections						<ul> <li>Appreciate that apparent thickness is always greater than true thickness</li> <li>Add a vertical feature (dyke)</li> </ul>
from models 4       valley with sloping floor version 2       with sloping floor       with sloping floor       with sloping floor       Add parallel geological boundaries       • Add parallel geological boundaries         Add parallel geological boundaries       • Add parallel geological boundaries       • Add parallel geological boundaries       • Add parallel geological boundaries         Walley with sloping floor version 2       • Ridge/ valley with sloping floor       • Ridge/ valley with sloping floor       Dipping surfaces       • Draw true dip non a cross section using a protractor • Add parallel geological boundaries to cross sections         Mapwork from models 5: plain; cuesta; valley with horizontal floor; ridge/ valley with sloping floor       All the model landforms above       Surfaces folded into open folds       The strategies and skill described in the box above and, in addition: • Identify folds with equally dipping limbs, and those with limbs dipping at different angles         Mapwork from models 6: plain with faulted rocks 1       Flat       Normal and tear dip faults; dipping bedding       • Draw the effects of a normal and a tear dip fault on cross sections         Mapwork from models 7: plain with faulted rocks 2       Flat       Normal and reverse strike faults; dipping bedding       • Draw the effects of rormal and reverse strike faults; dipping bedding       • Draw the effects of normal and reverse strike faults on cross sections         Mapwork from models 7: plain with faulted rocks 2       Flat       Normal and reverse strike faults: dipping bedding       • Draw the e	Mapwork	Ridae/	Ridge/ va	llev	Dipping surfaces	Add geological boundary data to cross sections to construct straight lines
models 4       sloping floor       floor       Propreciate the link between tough and weak geological formations and topography         interpolate approximate true dip from apparent dip       Praw true dip on a cross section using a protractor         valiey with sloping floor       Ridge/ valiey with sloping floor       Bipping surfaces         interpolate approximate true dip on a cross section using a protractor       Add parallel geological boundaries to cross sections         version 2       Praw true dip on a cross section using a protractor       Add parallel geological boundaries on the surface         Mapwork from models 5:       All the model landforms above       Surfaces folded into open folds       The strategies and skills described in the box above and, in addition:         Plain ; cueska; valley with halted rocks 1       All the model into open folds       The strategies and skills described in the box above and, in addition:         Plain ; cueska; valley with faulted rocks 1       Plat       Normal and tear dip faults; dipping bedding faults; dipping bedding faults; dipping bedding bed	from	valley with	with sloping floor		Dipping canadoo	Add parallel geological boundaries
Version 1	models 4	sloping floor				Appreciate the link between tough and weak geological formations and topography
Hidge/ valley with sloping floor version 2Hidge/valley with sloping floorDipping suffacesDraw true dip on a cross section using a protractor • Ad parallel geological boundaries on the surface • Ad parallel geological boundaries on the surface • Construct parallel boundaries on the surface • Appreciate that, in valleys, geological boundaries on the surface • Appreciate that, in valleys, geological boundaries on the surface • Appreciate that, in valleys, geological boundaries on the surface • Appreciate that, in valleys, geological boundaries on the surface • Appreciate that, in valleys, geological boundaries on the surface • Appreciate that, in valleys, geological boundaries on the surface • Appreciate that, in valleys, geological boundaries on the surface • Appreciate that, in valleys, geological boundaries on the surface • Appreciate that, in valleys, geological boundaries on the surface • Appreciate inverted topography • Draw fold axes and fold axial planes • Draw the different types of fault can have similar effects on outcrop patterns of dipping beds (but different types of fault can have similar effects on outcrop patterns of dipping beds (but different types of fault can have similar effects on outcrop patternsMapwork from models 8: plain with faulted rocks 3FlatNormal and reverse strike faults; dipping bedding• Draw the effects of different sorts of faults on cross sections • Use these to explain how different types of fault can have similar effects on outcrop patternsMapwork from models 8: plain with faulted rocks 3FlatNormal, reverse, trivst and strike-slip faults at 45° to the strike; dipping bedding• Draw the effects of different sorts of faults on cross sections • Use this to explain how different types of fault can have similar effects on		version 1	<b>B</b> : 1 /			Interpolate approximate true dip from apparent dip
Value parallel geological boundaries on the cross sectionssloping floorversion 2Mapwork from models 5: plain; cuests; valley with horizontal floor; ridge/ valley with sloping floorAll the model plain; cuests; valley with horizontal floor; ridge/ valley with sloping floorMapwork from models 6: plain with faulted rocks 1FlatMapwork from models 7: plain with faulted rocks 2FlatMapwork from models 8: plain with faulted rocks 3FlatMapwork from models 8: plain with faulted rocks 3FlatNormal and teverse strike faults; dipping beddingDivging beddingDivging bedding		Ridge/	Ridge/ va	lley	Dipping surfaces	Draw true dip on a cross section using a protractor      Add parallel geological boundaries to group postions
version 2       version 2       of aw in boundaries on the surface         Mapwork from models 5: plain; cuesta; valley with horizontal floor; ridge, valley with sloping floor       All the model landforms above       Surfaces folded into open folds       The strategies and skills described in the box above and, in addition: • Identify folds with equally dipping limbs, and those with limbs dipping at different angles         Mapwork from models 6: plain with faulted rocks 1       Flat       Normal and tear dip faults; dipping bedding       • Draw the effects of a normal and a tear dip fault on cross sections • Use these to explain how different types of fault can have similar effects on outcrop patterns of dipping bedding         Mapwork from models 8: plain with faulted rocks 3       Flat       Normal and reverse strike faults; dipping bedding       • Draw the effects of normal and reverse strike faults on cross sections • Use these to explain how different types of fault can have similar effects on outcrop patterns         Mapwork from models 8: plain with faulted rocks 3       Flat       Normal, reverse, thrust 45° to the strike; dipping bedding       • Draw the effects of different sorts of faults on cross sections • Use these to explain how different types of fault can have similar effects on outcrop patterns         DIY dip and strike model       Dipping surface       Dipping bedding       • Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available         Geological mapwork: Surface geology and the geological map.       Not given, assumed fairly       Relatively complex       •		sloping floor	floor	iy		<ul> <li>Add parallel geological boundaries to cross sections</li> <li>Lise boundaries on the cross sections which intersect the topographic surface to</li> </ul>
Mapwork from models 5: plain, cuesta; valley with horizontal floor; ridge/ valley with sloping floorAll the model landforms aboveSurfaces folded into open foldsConstruct parallel boundaries on the surface • Appreciate that, in valleys, geological boundaries usually 'V' in the direction of dip and the opposite is true of ridgesMapwork from models 6: plain with faulted rocks 1FlatNormal and tear dip faults; dipping bedding• Draw the effects of a normal and a tear dip faults; dipping bedding• Draw the effects of a normal and a tear dip fault can have similar effects on outcrop patterns of dipping beds (but different types of fault can have similar effects on outcrop patternsMapwork from models 8: plain with faulted rocks 2FlatNormal and reverse strike faults; dipping bedding• Draw the effects of normal and reverse strike faults; dipping bedding• Draw the effects of normal and reverse strike faults; dipping beddingMapwork from models 8: plain with faulted rocks 3FlatNormal and reverse, thrust and strike suip bedding• Draw the effects of normal and reverse strike faults or cross sections • Use these to explain how different types of fault can have similar effects on outcrop patternsMapwork from models 8: plain with faulted rocks 3FlatNormal, reverse, thrust ad strike suip bedding• Draw the effects of different sorts of faults on cross sections • Use these to explain how different types of fault can have similar effects on outcrop patternsMapwork from models 8: plain with faulted rocks 3FlatNormal, reverse, thrust ad strike suip faults at 45° to the strike; dipping bedding• Draw the effects of different sorts of faults		version 2				draw in boundaries on the surface
Mapwork from models 5:       All the model plain; cuesta; valley with horizontal floor; ridge/ valley with sloping floor       All the model landforms above       Surfaces folded into open folds       The strategies and skills described in the box above and, in addition:         Mapwork from models 6:       Flat       Normal and tear dip faults; dipping bedding       Draw to ld axes and fold axial planes         Mapwork from models 7:       Flat       Normal and reverse strike faults; dipping bedding       Flat       Normal and reverse strike faults; dipping bedding       Draw the effects of normal and reverse strike faults on cross sections         Mapwork from models 8: plain with faulted rocks 2       Flat       Normal and reverse strike faults; dipping bedding       Draw the effects of normal and reverse strike faults on cross sections         Mapwork from models 8: plain with faulted rocks 3       Flat       Normal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding       Draw the effects of different sorts of fault can have similar effects on outcrop patterns         Mapwork from models 8: plain with faulted rocks 3       Flat       Normal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding       Draw the effects of different sorts of fault can have similar effects on outcrop patterns         DIY dip and strike model       Dipping       Dipping bed       Platively complex       Platively complex       Maesuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available       M						Construct parallel boundaries on the surface
Mapwork from models 5: plain; cuesta; valley with horizontal floor; ridge/ valley with sloping floor       All the model landforms above       Surfaces folded into open folds       The strategies and skills described in the box above and, in addition:         Mapwork from models 6: plain with faulted rocks 1       Flat       Normal and tear dip faults; dipping bedding       The strategies and skills described in the box above and, in addition:         Mapwork from models 6: plain with faulted rocks 1       Flat       Normal and tear dip faults; dipping bedding       That the strategies and skills described in the box above and, in addition:         Mapwork from models 7: plain with faulted rocks 2       Flat       Normal and reverse strike faults; dipping bedding       Normal and reverse strike faults; dipping bedding       The strategies and skills described in the box above and, in addition:         Mapwork from models 8: plain with faulted rocks 2       Flat       Normal and reverse strike faults; dipping bedding       Draw the effects of normal and reverse strike faults on cross sections         Mapwork from models 8: plain with faulted rocks 3       Flat       Normal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding       Draw the effects of different sorts of faults on cross sections         Use this to explain how different types of fault can have similar effects on outcrop patterns       Draw the effects of different types of fault can have similar effects on outcrop patterns         Mapwork from models 8: plain with faulted rocks 3       Dipping bed       Dipping bed						Appreciate that, in valleys, geological boundaries usually 'V' in the direction of dip
Mapwork from models 8: plain; curved valley with sloping floorFlatNormal and tear dip faults; dipping bedding beddingFlatNormal and tear dip faults; dipping beddingOraw the effects of a normal and a tear dip faults on cross sectionsMapwork from models 7: plain with faulted rocks 1FlatNormal and reverse strike faults; dipping beddingFlatNormal and reverse strike faults; dipping bedding• Draw the effects of normal and reverse strike faults on cross sectionsMapwork from models 8: plain with faulted rocks 3FlatNormal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding• Draw the effects of different sorts of fault can have similar effects on outcrop patternsMapwork from models 8: plain with faulted rocks 3FlatNormal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding• Draw the effects of different sorts of fault can have similar effects on outcrop patternsDIY dip and strike modelDipping surfaceDipping bed assumed fairly complex• Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is availableGeological mapwork: Surface geology and the geological map work:Not given, assumed fairly complexRelatively complex• Measuring dip, strike and apparent to places on a geological map where they might be found.	Mapwork fr	om modole 5:	All the me	dol	Surfaces folded	and the opposite is true of ridges
horizontal floor; ridge/ valley with sloping flooraboveanglesanglesMapwork from models 6: plain with faulted rocks 1FlatNormal and tear dip faults; dipping beddingDraw the effects of a normal and a tear dip fault on cross sectionsMapwork from models 7: plain with faulted rocks 2FlatNormal and reverse strike faults; dipping bedding• Draw the effects of normal and reverse strike faults on cross sectionsMapwork from models 8: plain with faulted rocks 3FlatNormal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding• Draw the effects of different sorts of fault can have similar effects on outcrop patternsMapwork from models 8: plain with faulted rocks 3FlatNormal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding• Draw the effects of different sorts of fault can have similar effects on outcrop patternsDIY dip and strike modelDipping surfaceDipping bed• Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available• Match surface geological features to places on a geological map where they might be found.	plain; cuesta; valley with horizontal floor; ridge/		landforms above		into open folds	<ul> <li>Identify folds with equally dipping limbs, and those with limbs dipping at different</li> </ul>
valley with sloping floorAppreciate inverted topographyValley with sloping floor- Appreciate inverted topographyMapwork from models 6: plain with faulted rocks 1FlatNormal and tear dip faults; dipping beddingMapwork from models 7: plain with faulted rocks 2FlatNormal and reverse strike faults; dipping bedding- Draw the effects of a normal and a tear dip fault on cross sectionsMapwork from models 7: plain with faulted rocks 2FlatNormal and reverse strike faults; dipping bedding- Draw the effects of normal and reverse strike faults on cross sectionsMapwork from models 8: plain with faulted rocks 3FlatNormal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding- Draw the effects of different sorts of faults on cross sectionsDIY dip and strike modelDipping surfaceDipping bed surface- Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is availableGeological mapwork: Surface geology and the geological map work:Not given, assumed fairly faultRelatively complex- Match surface geological features to places on a geological map where they might be found.						angles
<ul> <li>Draw fold axes and fold axial planes</li> <li>Draw fold axes and fold axial planes</li> <li>Draw an unconformity and a pluton with a metamorphic aureole</li> <li>Draw an unconformity and a pluton with a metamorphic aureole</li> <li>Draw the effects of a normal and a tear dip fault on cross sections</li> <li>Use these to explain how different types of fault can have similar effects on outcrop patterns of dipping bedding</li> <li>Draw the effects of normal and reverse strike faults; dipping bedding</li> <li>Draw the effects of normal and reverse strike faults on cross sections</li> <li>Use these to explain how different types of fault can have similar effects on outcrop patterns</li> <li>Draw the effects of normal and reverse strike faults on cross sections</li> <li>Use these to explain how different types of fault can have similar effects on outcrop patterns</li> <li>Draw the effects of different sorts of faults on cross sections</li> <li>Use these to explain how different types of fault can have similar effects on outcrop patterns</li> <li>Draw the effects of different sorts of faults on cross sections</li> <li>Use this to explain how different types of fault can have similar effects on outcrop patterns</li> <li>Draw the effects of different sorts of faults on cross sections</li> <li>Use this to explain how different types of fault can have similar effects on outcrop patterns</li> <li>Draw the effects of different sorts of fault can have similar effects on outcrop patterns</li> <li>Draw the effects of different sorts of fault can have similar effects on outcrop patterns</li> <li>Use this to explain how different types of fault can have similar effects on outcrop patterns</li> <li>Use this to explain how different types of fault can have similar effects on outcrop patterns</li> <li>Use this to explain how different types of fault can have similar effects on outcrop patterns</li> <li>Use this to explain how differ</li></ul>	valley with sloping floor					Appreciate inverted topography
Mapwork from models 6: plain with faulted rocks 1       Flat       Normal and tear dip faults; dipping bedding       • Draw the effects of a normal and a tear dip fault on cross sections         Mapwork from models 7: plain with faulted rocks 2       Flat       Normal and reverse strike faults; dipping bedding       • Draw the effects of normal and a tear dip fault on cross sections         Mapwork from models 8: plain with faulted rocks 3       Flat       Normal and reverse strike faults; dipping bedding       • Draw the effects of normal and reverse strike faults on cross sections         Mapwork from models 8: plain with faulted rocks 3       Flat       Normal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding       • Draw the effects of different sorts of faults on cross sections         • DIY dip and strike model       Dipping surface       Dipping bed       • Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available         Geological mapwork: Surface geology and the geological map work:       Not given, assumed fairly complex       Relatively complex       • Match surface geological features to places on a geological map where they might be found.						Draw fold axes and fold axial planes
Mapwork from models 0: plain with faulted rocks 1FlatNormal and reverse faults; dipping beddingDraw the effects of a normal and reverse strike faults; dipping bedding beddingDraw the effects of normal and reverse strike faults on cross sectionsMapwork from models 7: plain with faulted rocks 2FlatNormal and reverse strike faults; dipping beddingDraw the effects of normal and reverse strike faults on cross sectionsMapwork from models 8: plain with faulted rocks 3FlatNormal, reverse, thrust and strike-slip faults at 45° to the strike; dipping beddingDraw the effects of different sorts of faults on cross sectionsDIY dip and strike modelDipping surfaceDipping bedMeasuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is availableGeological mapwork: Surface geology and the geological map work:Not given, assumed fairly complexRelatively complexMatch surface geological features to places on a geological map where they might be found.	Manwork from models 6:		Flat Norn		al and tear din	Draw an unconformity and a pluton with a metamorphic aureole      Draw the effects of a normal and a tear din fault on cross sections
Mapwork from models 7: plain with faulted rocks 2       Flat       Normal and reverse strike faults; dipping bedding       • Draw the effects of normal and reverse strike faults on cross sections         Mapwork from models 8: plain with faulted rocks 3       Flat       Normal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding       • Draw the effects of different sorts of faults on cross sections         DIY dip and strike model       Dipping surface       Dipping bed       • Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available         Geological mapwork: Surface geology and the geological map       Not given, assumed fairly complex       Relatively complex       • Match surface geological features to places on a geological map where they might be found.	plain with faulted rocks 1		fault	s; dipping bedding	<ul> <li>Use these to explain how different types of fault can have similar effects on outcrop</li> </ul>	
Mapwork from models 7: plain with faulted rocks 2       Flat       Normal and reverse strike faults; dipping bedding       • Draw the effects of normal and reverse strike faults on cross sections         Mapwork from models 8: plain with faulted rocks 3       Flat       Normal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding       • Draw the effects of different sorts of faults on cross sections         DIY dip and strike model       Dipping surface       Dipping bed       • Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available         Geological mapwork: Surface geology and the geological map       Not given, assumed fairly       Relatively complex       • Match surface geological features to places on a geological map where they might be found.					patterns of dipping beds (but different effects of vertical features)	
plain with faulted rocks 2       strike faults; dipping bedding       • Use these to explain how different types of fault can have similar effects on outcrop patterns         Mapwork from models 8:       Flat       Normal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding       • Draw the effects of different sorts of faults on cross sections         DIY dip and strike model       Dipping surface       Dipping bed       • Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available         Geological mapwork:       Not given, assumed fairly complex       Relatively complex       • Match surface geological features to places on a geological map where they might be found.	Mapwork from models 7:		Flat Nor	Norm	nal and reverse	Draw the effects of normal and reverse strike faults on cross sections
Mapwork from models 8: plain with faulted rocks 3       Flat       Normal, reverse, thrust and strike-slip faults at 45° to the strike; dipping bedding       • Draw the effects of different sorts of faults on cross sections         DIY dip and strike model       Dipping surface       Dipping bedding       • Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available         Geological mapwork:       Not given, assumed fairly       Relatively complex       • Match surface geological features to places on a geological map where they might be found.	plain with faulted rocks 2		strike f		e taults; dipping	Use these to explain how different types of fault can have similar effects on outcrop     netternet
plain with faulted rocks 3       International rocks, under and strike-slip faults at and strike-slip faults at dipping bedding       Draw the effects of unrefer sorts of national of closs sections         DIY dip and strike model       Dipping surface       Dipping bedding       • Use this to explain how different types of fault can have similar effects on outcrop patterns         Geological mapwork:       Not given, assumed fairly complex       Relatively complex       • Match surface geological features to places on a geological map where they might be found.	Mapwork from models 8.		Flat Normal reverse thrust		nal reverse thrust	palletits     Draw the effects of different sorts of faults on cross sections
45° to the strike; dipping bedding     Dipping bedding       DIY dip and strike model     Dipping surface     Dipping bed       Geological mapwork:     Not given, assumed fairly     Relatively complex	plain with fa	aulted rocks 3	and s		strike-slip faults at	Use this to explain how different types of fault can have similar effects on outcrop
DIY dip and strike model         Dipping surface         Dipping bedding           Geological mapwork:         Not given, assumed fairly         Relatively complex              • Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available           Geological mapwork:         Not given, assumed fairly         Relatively complex              • Match surface geological features to places on a geological map where they might be found.			45° to		o the strike;	patterns
DIY dip and strike model         Dipping surface         Dipping bed         • Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available           Geological mapwork:         Not given, assumed fairly         Relatively complex         • Match surface geological features to places on a geological map where they might be found.	DIV dia and studies used.		dippii		ng bedding	
Geological mapwork: Not given, Surface geology and the assumed fairly fat fat each or factor of the surface geological features to places on a geological map where they might be found.	אוט מוף and strike model		surface		Dipping bed	<ul> <li>Measuring dip, strike and apparent dip on a model dipping surface, using a DIY clinometer if no other clinometer is available</li> </ul>
Surface geology and the assumed fairly complex be found.	Geological mapwork:		Not given,		Relatively	Match surface geological features to places on a geological map where they might
	Surface geology and the		assumed fairly		complex	be tound.