A good final test of map-skills competence is to get pupils reading a set of instructions and then following a **route across a map**.

One way of doing this is to get them to work in pairs with their local Ordnance Survey maps. Each of them needs to do the following:

1. **Choose two places on the map (at least 5 kilometres apart).**
2. **Write a set of instructions describing how to get from one place to the other (but keep the places secret until they are ready).**
3. **The instructions must only include grid references, distances and directions plus a few symbols – no names allowed! Example: Leave the church at 733496 and head east along the A219 road for a distance of 2 km. Then turn right at the crossroads and walk northwards along the edge of the woods until you reach a small hospital.**
4. **They should aim to give about 5 to 10 instructions for their work partner to follow.**
5. **They should check their instructions to see that they actually work.**
6. **When they are ready, they can swap instructions. They should write down where they are at the end of each instruction so that a check can be made that the route followed is correct.**

The initial checklist of mapskills can be used to reward pupils – a **'Map Skills Wizard' Certificate** based loosely on Hogwarts grading can be awarded for different levels of competence and progress over the year.

If you haven't already done so, take a look at the Geograph website (**http://mapzone.ordnancesurvey.co.uk/mapzone/geograph.html**) which has set out to collect photographs of every grid square in the UK. Pupils will find a wealth of useful images to relate to the area shown on their local free Ordnance Survey Map. An interesting exercise is to duplicate this by subdividing the local map squares and getting pupils to take their own photos (using a digital camera or mobile phone camera) to bring into school and making up a collage for display alongside a copy of their local free map.

Those who become confident users of maps will be able to use both digital and paper maps as an important tool, both in their schoolwork and in their daily lives. A world without maps – what a ridiculous idea!

Routes and wizards

FREE MAPS FOR 11-YEAR-OLDS

Teaching with Ordnance Survey free maps in **England**

This resource is designed as an aid for teachers working with Year 7 pupils and their free Ordnance Survey local maps. It provides a variety of hints and tips for developing map-work skills and includes a handy checklist of what map-work skills young pupils in England should ideally have developed by the end of year 7.

Imagine a world without maps. What a disaster that would be! People have been drawing maps throughout human history and it could be argued that we now rather take them for granted. But why are they important to us and why would we miss them if they disappeared?

Posing this scenario to a class makes a useful lesson starter or it could be used in a plenary to stimulate discussion, leading perhaps to a homework task. In order to answer this question with pupils, it is useful to look at some of the people that regularly use maps.

Maps might be used by any or all of the following:

planners to decide where a new road or a new housing estate should be built.

a **home-delivery pizza company** trying to make sure that our pizza gets to us whilst it is still hot.

the **police** to plan a raid on houses used by a group of drug dealers.

tourists trying to get across London by tube train or across a large city by bus.

cyclists out on their mountain bikes trying to find a way over a large hill.

the army to plan an attack on an enemy town.

young people at a theme park trying to find the new ride that they have seen advertised.

Thanks to David Rayner and The Geographical Association for their assistance in producing this guide.

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The English National Curriculum

Ask pupils how many more examples they can think of to add to this list? Have a competition or set a homework to see who can come up with the longest list of map users and why a selection of them would argue that maps are important. Pupils could also collect maps as a homework task – the variety they are likely to produce would make a stimulating display. As teachers, we should challenge pupils with unusual maps, some of which they might not even realise are maps.

These days even the younger pupils realise that maps are just as likely to be electronic as printed on paper – many cars, for example, now have sat-nav systems that talk to you and describe the route that you are following on an electronic map. Already, there are many PDAs and mobile phones that contain electronic maps to help us find our way around? In the meantime, it is vitally important that pupils learn how to use paper maps properly as they move up through the education system. The old KS3 PoS are designed to give concise high level objectives rather than detailed guidance and Ordnance Survey materials can be used to good effect to support the high level National Curriculum aims by providing guidance on how these aims can be achieved.

'In developing geographical skills, pupils should be taught: a. to use atlases and globes, and maps and plans at a range of scales, including Ordnance Survey 1:25 000 and 1:50 000 scale maps, and b. to draw maps and plans at a range of scales, using symbols, keys and scales.'

The new KS3 PoS for Geography (implemented from September 2008) provide even less detail but there is still the statutory requirement for young students to 'use atlases, globes and maps at a range of scales…' The explanatory notes add that students should use 1:25 000 and 1:50 000 Ordnance Survey maps to interpret physical and human landscapes.

There are, however, many opportunities for building schemes of work that give specific emphasis to developing map-work skills and also at the same time for creating opportunities to link to other subjects such as literacy, numeracy, ICT and citizenship. Map-work can be done in isolation, and this is useful for introducing some of the basic skills. It is better, however, to integrate map-work into other work in order to enhance their skills. Projects on farming or settlement, for example, lend themselves to using Ordnance Survey maps in this way.

By the time the pupils finish in Year 7 at secondary school, what learning outcomes do we as teachers expect them to have achieved? The checklist supplied was developed after asking a sample of secondary school geography teachers what they expected after one year.

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helps to emphasize the need for more precise directions in certain situations. The 16-point compass, like 6-figure grid references, is a struggle for some pupils at this stage but it normally comes with practise. Uncertainty at Key Stage 3 inevitably leads to mistakes at GCSE, so it is worthwhile persevering. Pupils also need to know that on their Ordnance Survey local map the blue vertical grid lines always point to North at the top of the map. This provides a useful starting point when working directly on a large map.

When studying height on a map, it is useful to break the ideas into sections.

Start by describing and then ask pupils to find examples of spot heights and trig points (triangulation pillars). They can practise their grid references when they locate some examples. The eagle-eyed amongst them should notice and be able to explain the differences in where these two symbols are placed on a map.

If they can't find one of these symbols, they will need to look at the **contour lines**. These brown lines join up all the places that are the same height above sea level and are numbered every 5 metres on the 1:25 000 scale maps.

This sort of definition is useful as a starting point and you may want to get the pupils drawing some simple contour maps of their own – again, this can be fun as long as the maps are not made too complicated. The pupils can also, once they understand the principles, construct maps with heights for other pupils to draw in the contours.

One of the great benefits of getting even the young pupils to work with contours is that they begin to get an appreciation of the relief of an area. Once they grasp the basic concept:

Closely spaced contours = very steep land, tricky for walking
Widely spaced contours = gently sloping land, easier for walking

they are able to start seeing the 3-D map on the 2-D piece of paper.

One great aid to this sort of work is again provided by digital mapping software programs such as Memory-Map and Anquet, which have the facility to turn a section of map into an instant 3-D landscape. This can be rotated and tilted and the vertical exaggeration changed – pupils find this sort of interactive display fascinating and it creates a genuine interest in the map. It remains essential, however, for pupils to complete some basic exercises using contours to genuinely understand how things work. For those who are ready, it is best to get them working as soon as possible with real maps so that they get used to working with contours alongside all the other symbols crowded on to a map. If your local area is totally urbanised, contour work may need to be done on an alternative Ordnance Survey map.

Spot heights, contours and relief

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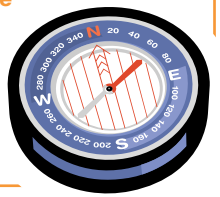
Area and compass

Although it may not be used very often, it is worthwhile getting pupils to do one more piece of maths work – measuring the area of things on the map. Measuring the **area** of regular shapes such as a playing field does not pose too many problems but irregular shapes such as a lake require more effort.

If pupils are first reminded of the basic maths on the whiteboard with a few simple examples to reinforce the idea, then this is easily transferred to practising measuring the area of regular shapes on a map. To estimate the area of irregular shapes, a useful technique is to use a tracing or acetate overlay with a grid of squares drawn on it. This can be laid over the shape and the approximate number of squares counted. The area can then be calculated. If digital maps are available, many of the packages have a facility to measure both linear distance and area. If the same maps are available in paper and digital format, then it can be a useful way of checking the accuracy of the estimations being made on the paper maps. Whatever their maths skills, most pupils enjoy working out the area covered by the whole of their free Ordnance Survey local map. They can do this easily by counting the number of one kilometre grid squares along each side and then multiplying their answers together. This system requires no conversion using the scale, so is much more straightforward.

Most pupils learn the four- and eight-point compass at junior school and a little reinforcement of this at secondary school is sufficient for the majority of children.

The use of an acrostic such as 'Naughty Elephants Squirt Water' is a useful reminder of the importance of getting the four main compass directions correct so that all other pairs of directions fall into place. Children love to make up their own versions and this can provide an interesting diversion as well as a useful link to literacy. It is better at this stage to also reinforce the idea that a compass consists of 360 degrees and they are only adding direction labels every 45 degrees. This is a large angle and



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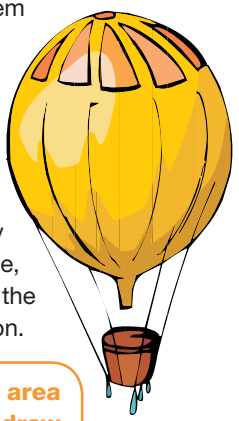
Ask your new pupils to go through the checklist of map skills and do an honest survey of what they can already confidently do. Tick box A is for pupils who feel they can confidently complete the task described. Tick box C is for pupils who do not understand the map skills task and tick box B is for those who are not confident or just not sure about the task described. The checklist can be used as a baseline assessment at the start of year 7 and repeated to show progression at the end of the year.

When first doing some map-work, it is important that pupils have a good understanding of what a map actually is. We can tell them that *'a map is a two-dimensional (2-D) representation of the real world'*, but it might well mean more if we tell them that it is what we might see if we floated up in a hot-air balloon and looked down from 500 metres or more above the ground. Using online aerial photos of urban areas, such as those on Google™ Maps (**http://maps.google.com/**), gives exactly the right kind of image and you can float up or down in your imaginary balloon by zooming in or out. It is important for pupils to realise, however, that although maps and photos do sometimes show the same information, they also sometimes show different information.



If you get a photo image and a map image of the same area and place them side by side, you can get the pupils to draw up a table of similarities and differences in terms of what is shown on each image. Ask them to think about and explain which is better in different circumstances and why?

Many of the GIS or mapping packages allow you to do this and the images can be studied on a computer screen or on an interactive white board if available. If access to technology is a problem, pairs of images could be printed on card and laminated.

Year 7

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Grids and scale

Pupils need to be reminded that the real world is complex and the only way of showing it on a map is to simplify it. This means choosing what to show and then using **symbols** to represent things from real life on the map. Most map symbols are, of course, very simple so that people can recognise them easily, but some are less obvious and will need to be learnt.

Ask pupils to identify a set of simple map symbols. These could be drawn on the whiteboard. Ask them then to look at the key on their local Ordnance Survey map and find and draw the symbols for a small list of less common items. It can be great fun with young pupils to get them to be competitive, so have a competition to find a square on their local Ordnance Survey map with the most symbols in it. A score of ten is excellent, but they may be able to find even more.

Teaching young pupils to understand **grid references** can be a frustrating experience. Some young people seem to grasp the concept quite quickly and others get really stuck. There is no simple technique that guarantees success, but using good visual material and preferably interactive material can make a difference. There are a number of online sources of information that are useful. Ordnance Survey itself has an excellent suite of online mapping exercises that includes grid references (**http://www.mapzone.co.uk/pageshomeworkhelp/gateway.cfm**) and GeoInteractive has downloadable PowerPoint® presentations that use interactive graphics to demonstrate the principles of grid references (**http://www.geointeractive.co.uk/**). Secondly, it is one of those tasks that really benefits from regular practise so build map-work and the use of grid references into your schemes of work at regular intervals. Once the pupils have grasped at least four-figure grid references, their use can be incorporated into other map-skills exercises (see later section for ideas).

Another difficult mapping concept is **scale**. Pupils who have weak numeracy skills will find the concept difficult but may well be able to tackle simple measuring exercises by being taught the correct routine without necessarily understanding how it works.

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When starting with straight line measurements, it can be useful to make up a range of exercises on paper that test their ability to measure and combine straight line measurements and calculations of true distances. A set of intersecting roads with the houses of several pupils at the ends of the roads makes the basis for a good exercise. For example:

1. Pavan wants to visit his friend David and then call in on Amy before he goes home. How far will he have to walk in total?

2. Emily also wants to visit David's house and then call in on Amy before going home. Will Emily have a longer or a shorter total journey than Pavan?

In real life, very few routes are straight. So, apart from Roman roads, how do we get pupils to **measure the distance** along a typical winding road or footpath?

Many of the textbooks suggest using string but, in a classroom context, finding 30 pieces of suitable string may not be an option. It is much better to get pupils from early on used to the technique of using a strip of A4 paper. It is quick and easy to prepare lots of thin strips before the lesson and it provides a good estimate of the true distance if done carefully. The only thing to watch is that pupils are prone to marking the map as well as the strip of paper. A useful set of instructions is given below:

- **Take a strip of A4 paper and make a mark at one end where the route that you are measuring starts.**
- **Lay the edge of the paper along the route and make a second mark where the road bends away.**
- **Then carefully turn the strip of paper so that it sits alongside the next straight section.**
- **Make another mark where the road bends again.**
- **Continue doing this until you arrive at the destination – then make one last mark.**
- **Now use a ruler to measure the distance between the first and last marks.**
- **Divide by four (1:25 000 scale maps) or by two (1:50 000 scale maps) and you have an answer in kilometres. Multiply by 5 and then divide the answer by 8 to convert to miles if required.**

Measuring distance

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