

## Optional activity (Sequence 2)

# Building and using small compasses

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This session permits to get the children used to the compasses, useful for the readings of the shadows. Hence the children will be able to focus later on the measurements with the solar sticks in forgetting how to handle this instrument still fascinating!

A few days before the session, you will ask the children who own a compass to bring it with them to the class.

**Duration :** one half an hour session in the classroom.

**Location:** classroom.

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## Equipment

### For each group of 3 to 5 pupils:

One small ordinary compass,  
The tracing paper with the plots of the shadows,  
One black pencil.

In option, to build a  
"floating compass":  
One big darning needle,  
One magnet,  
One polystyrene square,  
One plastic plate with water (plus a sponge or a  
floorcloth!)

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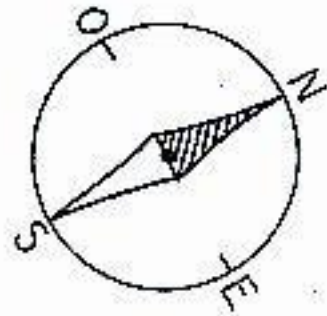
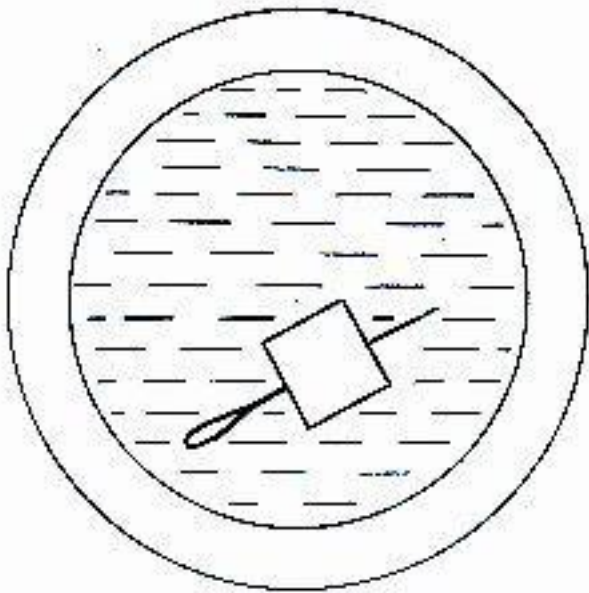
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## Preliminary investigation

Once the children have in hand the magnet, the polystyrene and the plastic plate, they first look for making the magnet floating by putting it on the polystyrene square: it is true that by trying to put it successively on all its sides, especially on the edge sides, the children see at a time that the magnet is rotating and then earnestly orientates itself along a given direction: a template compass (not too close to the plate with the magnet otherwise it would loose its North!) confirms that this orientation is indeed related with the North/South direction. Then one just has to paste the needle on the magnet so that its point shows the North.

However, this assembly is very unstable and depends on the shape of the magnet. Hence one will propose to the children to replace the magnet too heavy by a darning needle one has to magnetize. For this, ask the

children to rub the needle with the magnet. The pupils finally rub it but without knowing exactly how: in fact one must always go in the same direction (no up and down by no means!) and this repeated at least twenty times. In this way one gives to the needle the magnet's magnetism. Next, once the needle is "magnetized", one passes the needle in the slice of the polystyrene square by going through from one side to the other, and the floating compass is ready (fig. 3) !



Remark : Your pupils might notice something weird when there magnetized needle is put in the water : some of them will indeed point towards North, but the other ones will point South, the opposite direction... Why is that? It is related to the fact that the two sides of a magnet have an opposite polarity ( one is negative whereas the other one is positive). Therefore, if the needles have been rubbed, some with a positive side and the others with the negative side, the latter will have the opposite orientation with regard to the North. This double polarity is easy to mount. Pick two magnets (bare ones if possible), and approach them face to face; according to the faces you show, they can either attract each other (opposite polarities) or repel each other (identical polarities). You can then test this double polarity rubbing some needles with one face and some with the other one, making provisions and checking them afterwards.

### Other activities.

You can also add to this approach a study of the four cardinal points and of the intermediate directions (the ones given by a compass card : North-East, North-West, South-East, South-West, but also North-North-East, North-East-East, and so on...)

Then you can suggest activities of orientation during which the pupils will try to define as well as possible the orientation of an element of the landscape (building, gate, tree, hill...) without however trying to evaluate in an angular point of view before having studied the notion of angle and learnt how to use a protractor.

Last, the pupils will learn to locate themselves on a map starting by orienting the map itself in regard with the North given by their compass, and then determining the direction of a place in regard with another one.