

THE COMPASS

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|------------------------------------|--|
| Name of the object | Compass |
| Recommended ages (from...) | From 8 years old |
| Thematic areas combined (STEAM) | Science (Physic forces, Magnetism, Navigation) History |
| Materials needed | <ul style="list-style-type: none"> • A metal sewing needle • A magnet • A cork • A bowl • Water (enough to fill the bowl 3/4 full) • A sheet of paper • A marker • A drawing compass • Scissors • A ruler • Colored pencils (optional) • A Stapler (or a glue gun) • A plastic Square |
| Instructions step by step | <p>Step 1. Setting up all the materials and looking at the instructions and models.</p> <p>Step 2. Drawing the compass background according to your geometry skills.</p> <p>Step 3. Assembling the Compass and observing</p> <p>Step 4: Use your compass!</p> |



Step by step: how to make a compass out of everyday objects

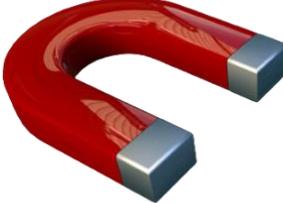
Step 1

Set up the materials

Time needed: 10 minutes

Set all materials on a table and check that you have everything.

Checklist:

| | |
|---|--|
| <input type="checkbox"/> A metal sewing needle |  |
| <input type="checkbox"/> A magnet |  |
| <input type="checkbox"/> A cork/ a 5cm/5cm piece of Styrofoam |  |
| <input type="checkbox"/> A bowl |  |

| | |
|--|--|
| <ul style="list-style-type: none"><input type="checkbox"/> Water (enough to fill the bowl 3/4) |  |
| <ul style="list-style-type: none"><input type="checkbox"/> A plastic square |  |
| <ul style="list-style-type: none"><input type="checkbox"/> A sheet of drawing paper |  |
| <ul style="list-style-type: none"><input type="checkbox"/> A pencil or black marker |  |
| <ul style="list-style-type: none"><input type="checkbox"/> A drawing compass and a ruler |  |



| | |
|---|---|
| <input type="checkbox"/> Scissors |  |
| <input type="checkbox"/> Colored pencils/markers (optional) |  |
| <input type="checkbox"/> A stapler (or a glue gun) |  |

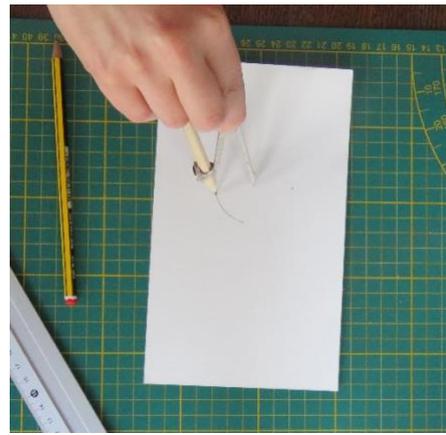
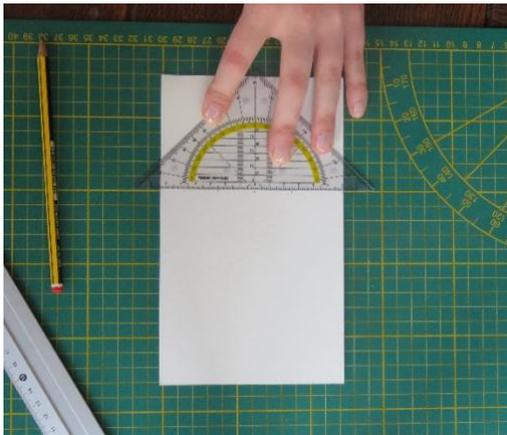
Prepare the materials.

Step 2

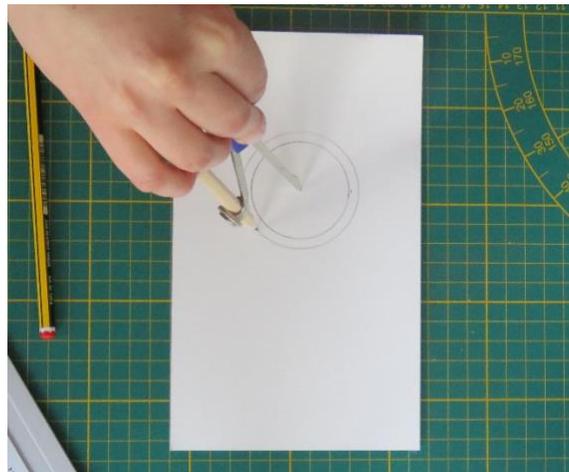
Draw the compass background with your geometry competences.

Time needed: 20 minutes

Take the sheet of drawing paper. On it, with your drawing compass, draw a 5cm diameter circle. (If you have several groups that need to make it, you may pre-divide the sheets of paper into smaller sheets for the pupils to avoid waste. Just be careful to leave enough space on each piece of paper to draw the circle.)

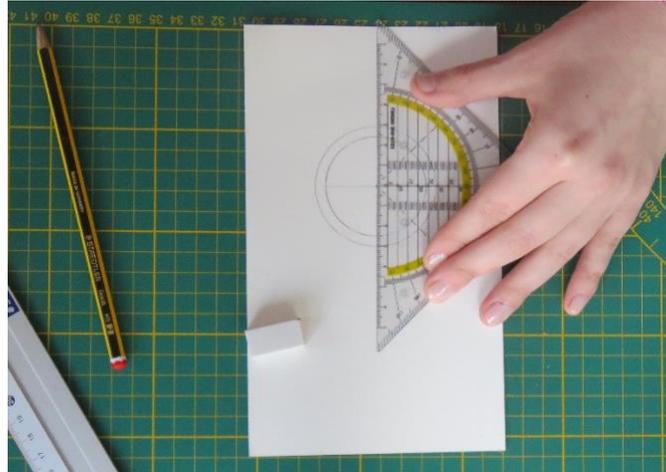


Once the base circle is drawn, you may add half-a-centimetre to your compass and draw a second circle around in order to create the outline of the Compass. (This is not mandatory; it is just for aesthetics).





Once the circle is drawn, you may use your compass and/or your square to find the centre of the circle. Once the centre is identified, you can use a plastic square to draw the 4 cardinal points.



Once you have done that, you may simply write the four cardinal points (North, South, West and East) following this model.

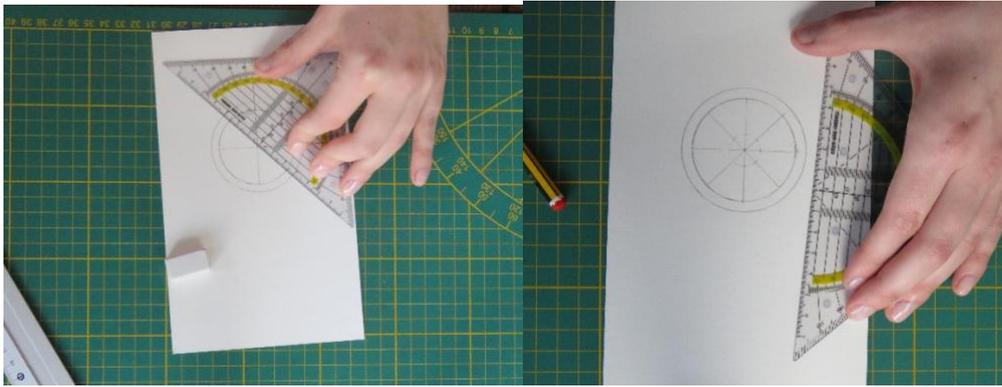


Once that is done, you may choose to skip to the step: “cutting out the compass” in bold below.

However, we will draw the rosette of the compass entirely first (this is optional).

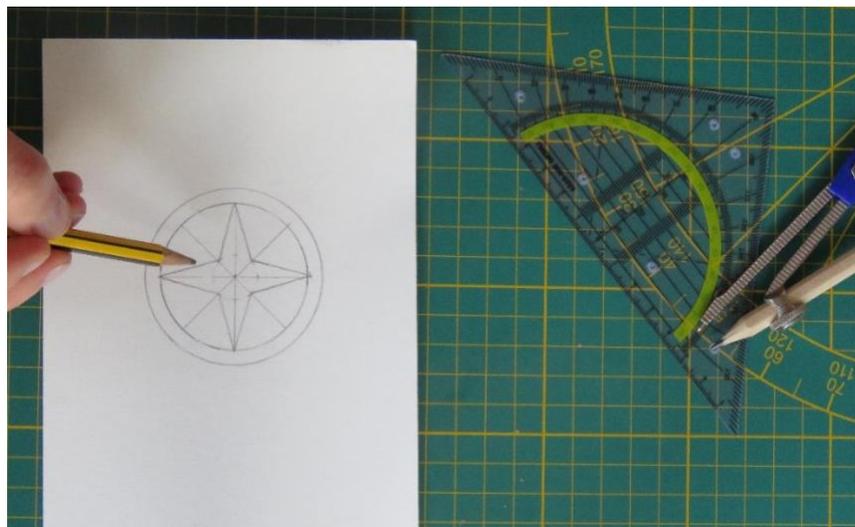


Using the square, draw the lines at 45° in between the cardinal lines.



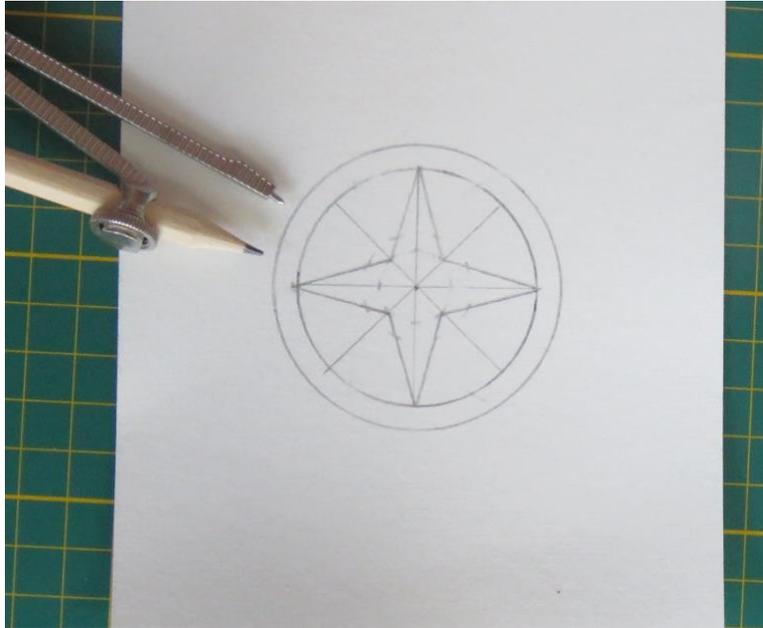
Then, using the compass, trace a across all lines at a half-centimetre from the centre.

Going from the 4 cardinal points draw lines towards the crossing traces neat the centre of each neighbouring lines. (the result should make a 4-points stars)





Using the compass again, add 3-4 millimetres from the centre (so, around 8mm) and traces lines on the star's shape.



Link those traces with the top of the mid-way lines (in relation with the cardinal points.) to create a second star-like shape.





Add the cardinal points if not done yet and trace everything over with a thin black marker, rub out the pencil marks and colour the shapes.





(If you skipped the whole rosette drawing, start back here)

Once ready, cut out your compass rosette.

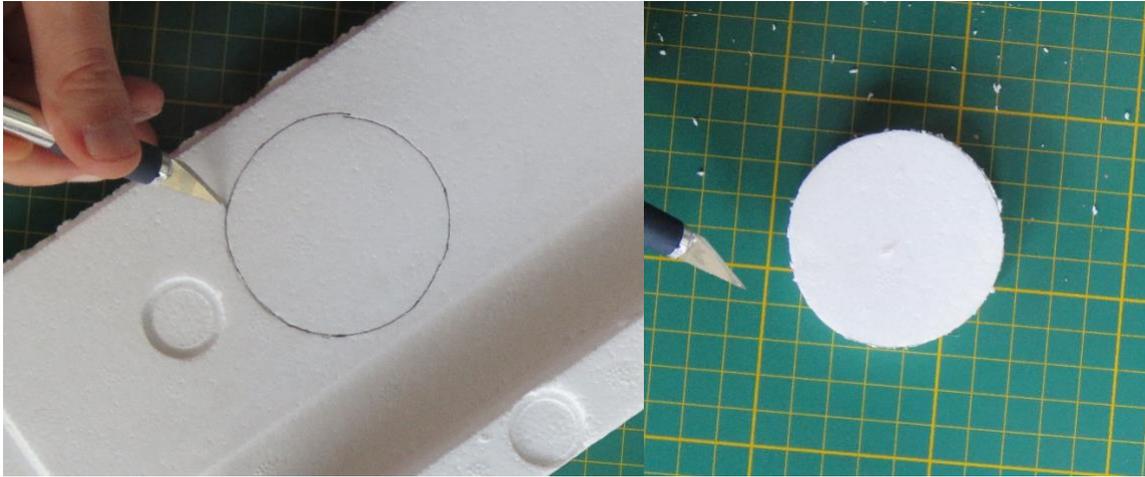


Use your rosette to trace the shape of your Styrofoam piece or use the tracing compass if needed.

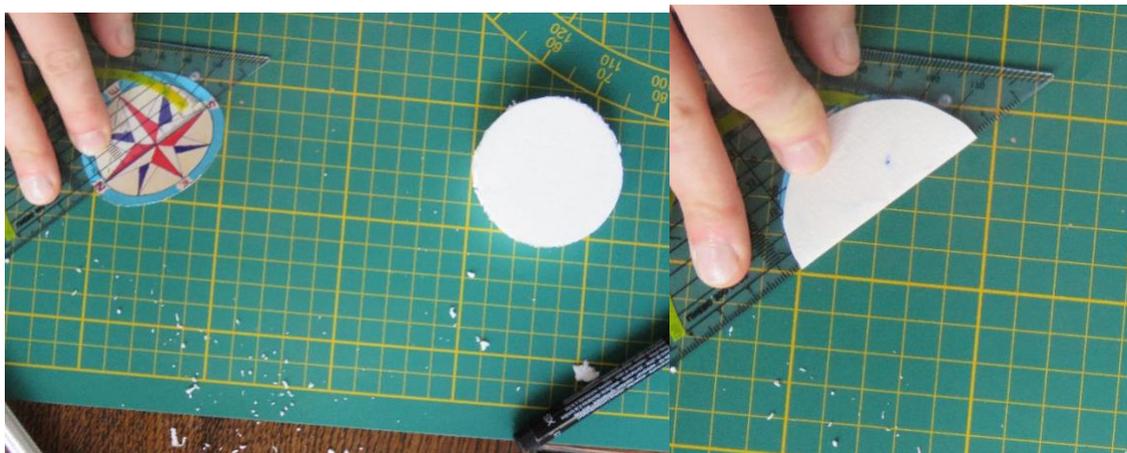


Cut the Styrofoam out.

(Note: you may use a piece of cork instead. In case of cutting this out, the teacher may want to do it themselves, or supervise closely in order to avoid accidents.)



Fold the rosette circle in half, in a way that the North and South cardinal points (opposite to one another) are aligned with the fold mark and on the inside of the fold crease. You make use a ruler or the square to achieve a crisp fold.







Step 3

Assemble the compass

Time needed: 5 minutes

If the cork is not flat, you may cut it into a thick slice. The idea is that it is flat, but floats and allows us to have the paper part not touching the water. A 1.5cm thick slice of cork should be sufficient, though it can be a little thicker. If you cannot find a cork, you may use a flat piece of Styrofoam instead, as was prepared in the previous step.

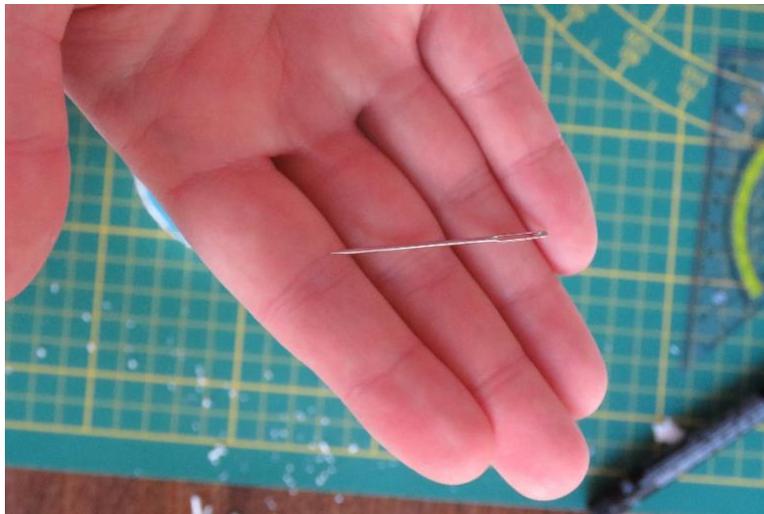
Once the paper compass is ready, you may staple it (with the staple following the crease so that the crease stays a little present) onto the cork slice with its drawn part up and the cork on the bottom. In case you have no stapler, you may also use a glue gun (as shown in the pictures) to glue your compass rosette onto your floating part.



The crease we have made will serve as a holder for the needle afterwards.



Take the needle and the magnet. Brush the needle point with the negative side of your magnet a few times. Hold the needle near the thread hole, take your magnet and stroke it down the length of your needle 50 times. Magnetize the other end with the reverse side of the magnet.



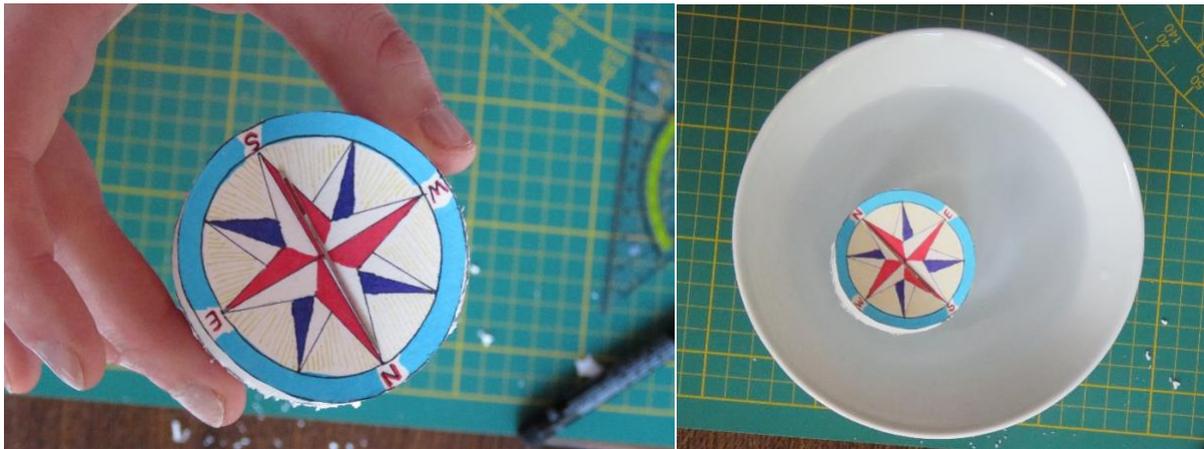
Step 4

Use your compass

Time needed: 5 – 10 minutes

Fill a bowl with water. Place the cork with the drawn compass on the water, paper side up.

Drop the needle inside the crease of the paper and watch as it aligns with the North. (Be careful not to leave the magnet near the side of the bowl).



To go further, you may experiment with the magnet to show how these may affect a compass.

You may also compare it to a compass on an App (with a phone).

You may ask the pupils to explain the phenomenon that makes it point towards the North.

Additional content:

- How to Make a Homemade Compass - DIY Compass:

https://www.youtube.com/watch?v=4_tQQFHpSa4

- How to make a Compass at home:

<https://www.youtube.com/watch?v=dy1fTbMnZNA>