How to Make Your Own Protractor

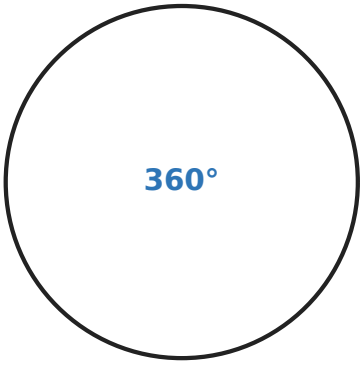
A protractor is built on one simple idea: a full turn is 360°. By repeatedly folding a paper circle into equal halves, we can create equal angle divisions and make a simple handmade protractor.

You will need

A sheet of paper, pencil, ruler, scissors and a circular object/compass to draw a circle.

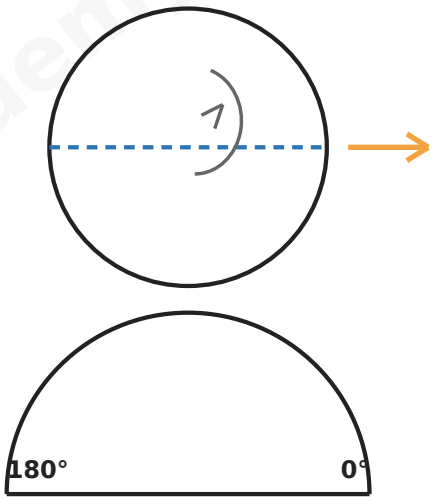
1 Draw and cut a circle

Draw a circle of any convenient size and cut it out. One complete turn around the centre is 360°.



2 Fold the circle into two equal halves

Fold the circle exactly through its centre. Open it, then cut along the crease if you want a separate semicircular protractor. A half turn is 180°.



Semicircle = 1/2 of 360° = 180°

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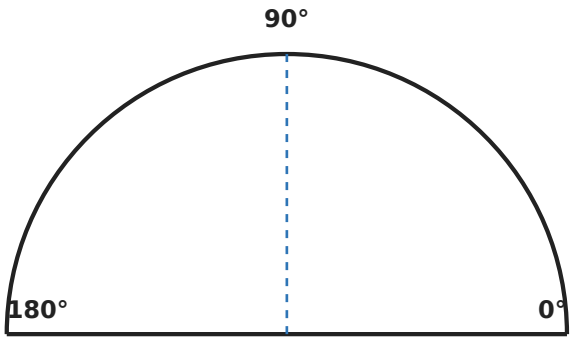
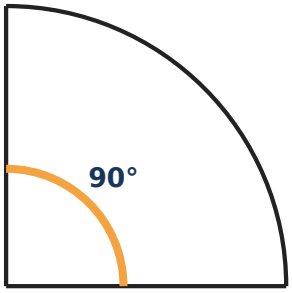
Step 3 - Mark 90°

3 Fold the semicircle exactly in half. The new crease divides the 180° semicircle into two equal angles.



After unfolding



Folded shape: 1/4 turn

Why is it 90°?

A quarter turn is 1/4 of 360° = 90°. It is also half of a semicircle: 1/2 of 180° = 90°.

Mark it on your paper:

Write 90° at the top of the semicircle. Keep 0° at the right end and 180° at the left end.

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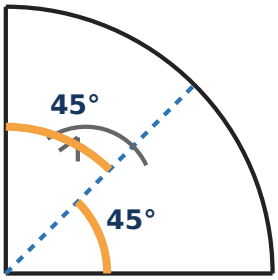
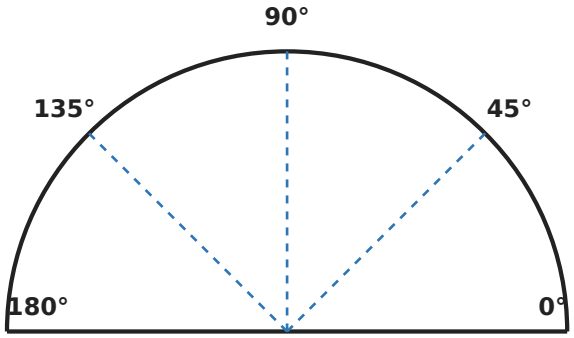
Step 4 - Make 45° and 135°

4 Fold the quarter-circle in half once more. This bisects the 90° angle and creates an angle of 45°.



90° ÷ 2 = 45°



The matching crease on the left is 180° - 45° = 135°

Record these new markings

On the right side mark 45°. On the left side mark 135°. Your paper now shows 0°, 45°, 90°, 135° and 180°.

Key idea: each fold cuts an angle into two equal parts.

This process is called bisecting an angle.

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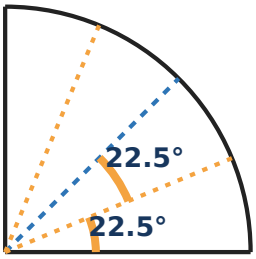
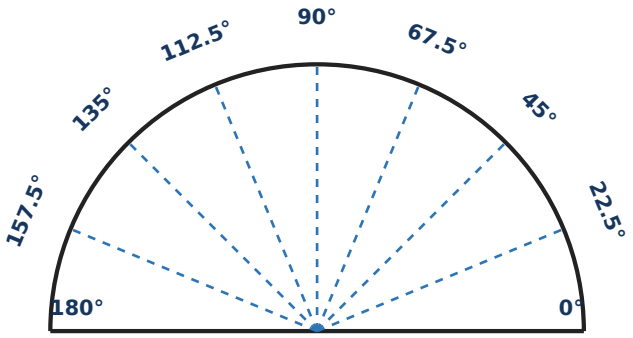
Step 5 - Make 22.5° Divisions

5 Fold the 45° section in half again. Now each small angle is 22.5°, because 45° ÷ 2 = 22.5°.





45° ÷ 2 = 22.5°

When you unfold the sheet

You get eight equal angle sections across the semicircle. Since the semicircle is 180°, each section measures 180° ÷ 8 = 22.5°.

Mark all the crease values in order:

0°, 22.5°, 45°, 67.5°, 90°, 112.5°, 135°, 157.5°, 180°.

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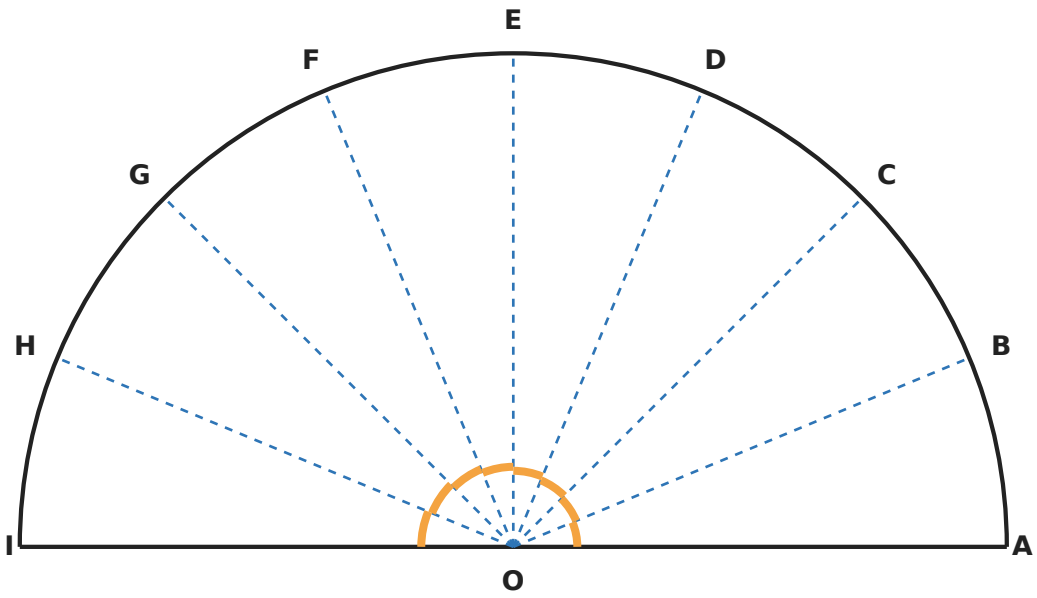
Your Handmade Protractor

After unfolding, label the rays from right to left as OA, OB, OC, OD, OE, OF, OG, OH, OI. The folds form eight equal angles.



All the small angles are equal

∠AOB = ∠BOC = ∠COD = ∠DOE = ∠EOF = ∠FOG = ∠GOH = ∠HOI = 22.5°.

Why?

Repeated half-folding divided the 180° semicircle into 8 equal parts. Therefore each part is 180° ÷ 8 = 22.5°.

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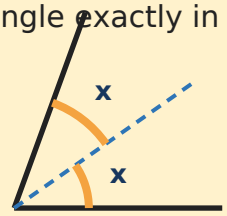
Angle Bisector - The Idea Behind the Folds

What is an angle bisector?

An angle bisector is a line or ray that divides an angle into two equal angles. Every time you fold an angle exactly in half, the crease acts like an angle bisector.



The dashed ray divides the angle into two equal parts.

Quick summary

Full circle	**360°**
Semicircle	**180°**
Quarter circle	**90°**
Next half-fold	**45°**
One more half-fold	**22.5°**

Try it yourself

1. Make the paper protractor.

2. Use it to compare angles in your notebook.

3. Can you make even smaller equal angles by folding once more?

Hint: 22.5° ÷ 2 = 11.25°.

Remember

A protractor works because angles can be compared with equal divisions of a turn. Paper folding helps us see how those equal divisions are created.

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