The British Museum

How do you construct a 50p?

Notes for teachers

KS3 geometry and measures

Students will construct a reuleaux heptagon and then analyse the shape geometrically.

Learning outcomes

- use straight edge and compasses for construction
- measure angles to the nearest degree
- identify all the symmetries of a 2D shape
- mathematically describe shapes using words and diagrams
- search for a solution using reasoned argument

Equipment required

- 50p coins
- ruler
- compass
- protractor
- tracing paper (optional)
- mirror (optional)

Activity information

- Students should consider strategies to construct a reuleaux heptagon, the shape of a 50p.
- Construction hints could be given: it is based on a regular heptagon; the width is constant throughout the shape; all points on a single side are equidistant from the opposite vertex.
- The construction diagram could also be displayed without the instructions.
- Full, printable construction instructions are provided on the next page.
- Once the reuleaux heptagon has been constructed, students should analyse it geometrically. This could include considering the order of rotation, tangents to the shape and mathematically similar shapes.
- Students should then consider why a reuleaux heptagon is used instead of a regular heptagon; reuleaux shapes are used in other currencies around the world. Considerations could include practical implications, such as using coins in a car park machine.

Construction diagram
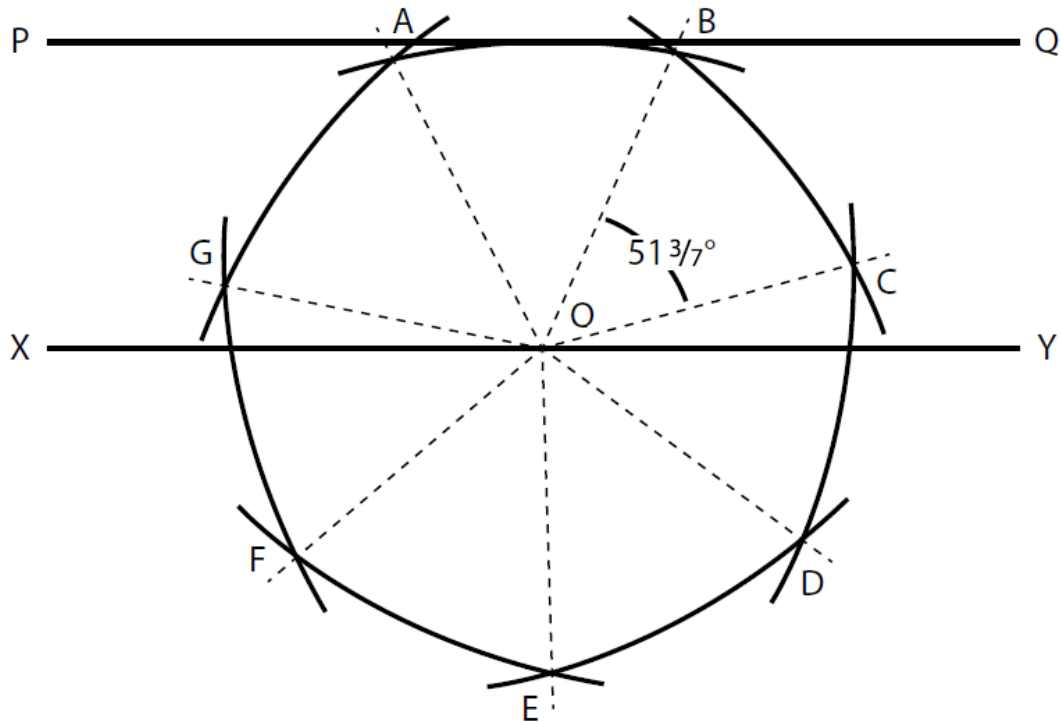
Construction instructions

1. Draw a line 8cm long. Label the ends X and Y and mark the centre O.

2. Draw a parallel line 3cm above and label it PQ.

3. Line the centre of your protractor up with O and then mark every $51\frac{3}{7}°$.

4. Extend a line from the centre O out through each of the points you have just marked.

5. Label your lines A to G in the same order as the diagram.

6. Set your compass to 6cm.

7. Put the point of your compass where your line A crosses your line PQ, then draw an arc between your lines E and D.

8. Next put the point of your compass on your line E where the arc crosses it and draw an arc between A and B.

9. Repeat this with line D and so on until you have completed your shape.

10. When you have finished rub out your connecting lines to leave you with your equilateral curve heptagon.