Case study 4: Paper folding

You can explore shapes and angles by simply folding paper. Origami is an ancient Japanese art using folded paper to create beautiful shapes and figures.

Task 1
Take a square sheet of plain paper and fold it in half diagonally.

- a If you open it out you should have two triangles. What type of triangles are they?
- b If you open it out, how many triangles do you have now?
- c When you open it out again, how many triangles are there now?
- d Look at one of the triangles. Write down its three angles.
- e Construct an accurate drawing of the whole triangle pattern.

Check that:
- Your triangles are congruent
- Your angles are accurate

Task 2
Take a square sheet of plain paper. Fold in half vertically, then unfold it again.

- Bring A down to F and make a crease. Open it out again.
- Now do the same with B and F.
- Now do the same with C and E, then D and E.
- Open out the square and look at the creases.

a How many triangles are there? What type of triangle are they?
b How many quadrilaterals are there? What type of quadrilateral are they?
c Construct an accurate drawing of the whole pattern.

Task 3
You can make an origami penguin by following these steps.

What shapes did you create when folding the penguin? Try to describe them as mathematically as possible.

Is there a line of symmetry on your penguin?

Could you have created this penguin if you had started with paper which wasn’t square?