ENGLISH HERITAGE
EDUCATION

SELF-LED ACTIVITY
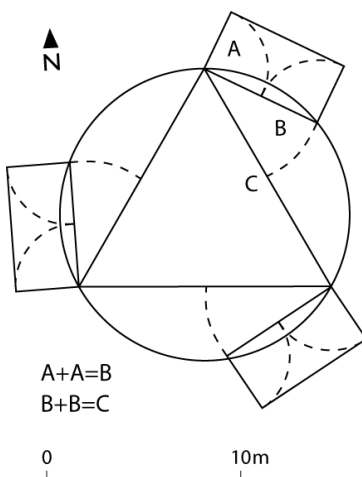# CASTLE GEOMETRY

KS3

Recommended for

KS3 (Maths, Design and Technology)

Learning objectives

• Understand that Orford Castle's shape was carefully designed using simple geometry.

• Practise skills of scaling.

• Measure the length of a shape and use this to calculate its area.

Time to complete

Approx. 20 minutes

A+A=B
B+B=C

0 ———————— 10m

A plan of the polygonal keep at Orford Castle. Students can work from a larger version on the next page.

SUMMARY

The master mason was in charge of building the castle. He designed the building and employed all the men he needed to get the job done. Medieval masons didn't have the computer software architects use today. Most medieval buildings were designed using squares and circles. Simple geometry was used to work out the proportions with a compass and a square, and then scaled up.

The keep at Orford Castle is geometric, its dimensions based on a circle of about 15m in diameter. The width and positioning of the three towers are determined by an equilateral triangle set within the circle, the width of each turret being half the length of the side of the triangle.

MAIN ACTIVITY

The diagram on the next page helps students to understand the geometry of Orford Castle and take approximate measurements. They should measure the length of A, B and C with a ruler and then scale this up. One centimetre on the diagram equals 200 centimetres (or 2 metres) in real life, so students are working with a scale of 1:200. Therefore, they will need to multiply their ruler measurements by 200 to find the actual length of the side they are measuring (in centimetres). They can then divide this number by 100 to convert it into metres.

The answers are:

1) A=1.6cm or 3.2m   **2)** B=3.2cm or 6.4m   **3)** A+A=B

4) C=6.4cm or 12.8m   **5)** 3.2cm × 6.4m=20.48m^2
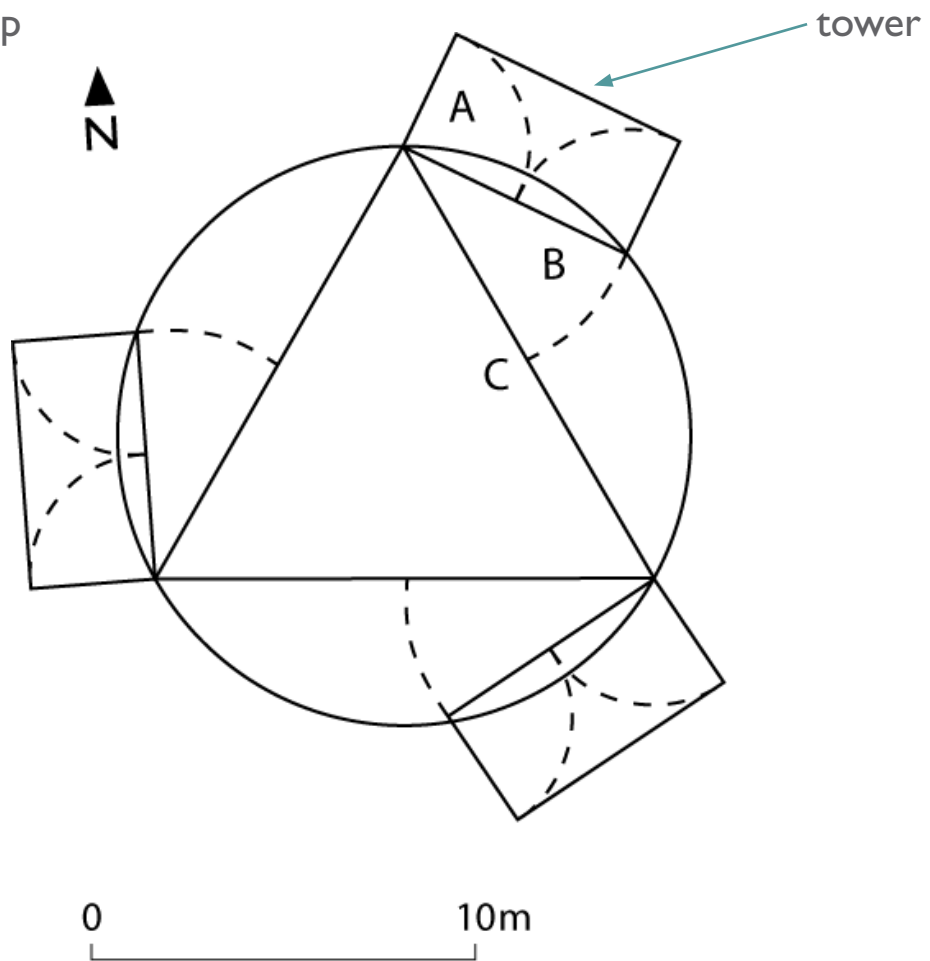
MORE LEARNING IDEAS

During your visit, walk around the outside of the keep and inspect the scale and shape of it. Ask students: is it bigger or smaller than you imagined from the diagram?

Back in the classroom, ask students to design their own castle keep, using the basic principles of geometry which they saw demonstrated at Orford Castle.

CASTLE GEOMETRY

A diagram of the keep at Orford Castle:

N

tower

A

B

C

0   10m

1 **Measure** the length of A.

A = _ _ _ _ m

2 **Measure** the length of B.

B = _ _ _ _ m

3 **Complete** the formula.

_ _ _ _ + _ _ _ _ = B

4 If B + B = C, **calculate** the length of C.

C = _ _ _ _ m

5 **Find** the area of the tower.

(Remember: area = width x length.)

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ m²