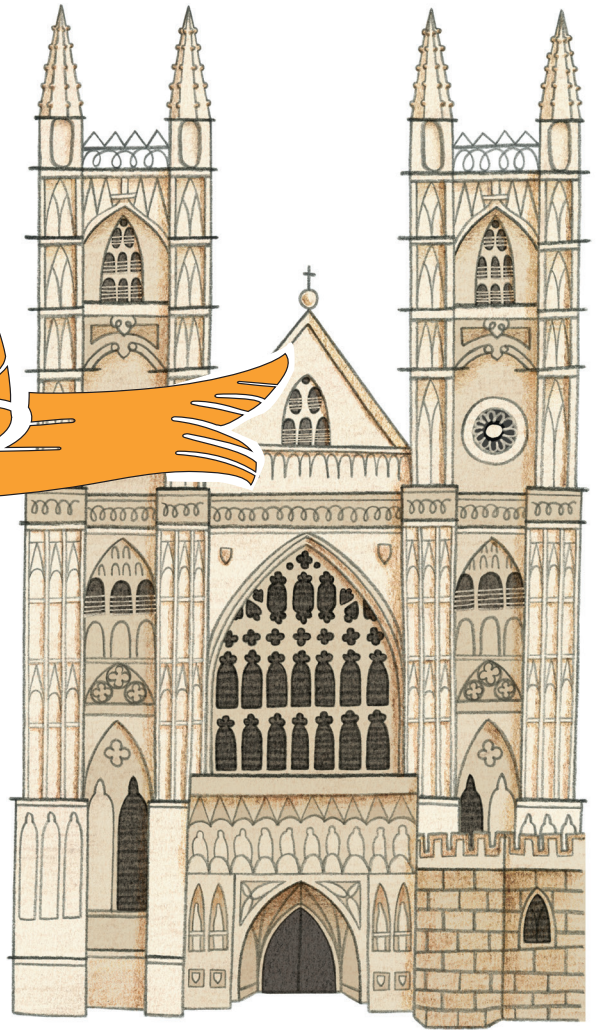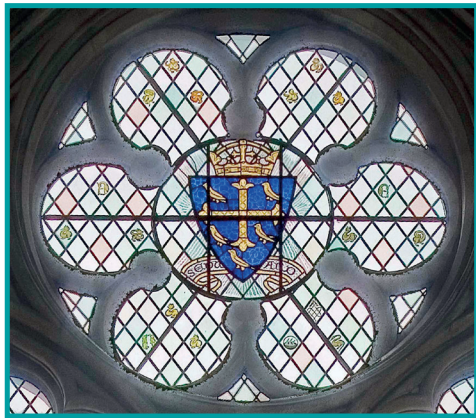# Westminster Abbey

Maths at the Abbey

Westminster Abbey was built over 1,000 years ago and is still a working church today. The medieval builders used maths skills to design and build this amazing church.

Geometric shapes often carry special meaning when used in church decoration. This is called 'sacred geometry'.
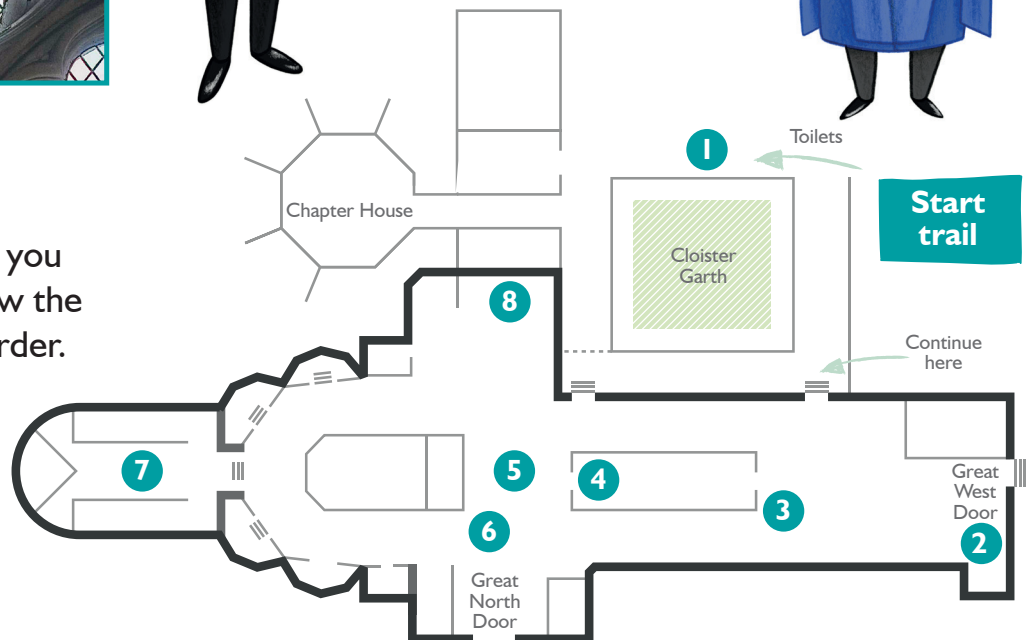
Top tip! If you have any questions, feel free to ask an Abbey Marshal or Abbey Guide in a red or blue gown.

Site Map

This map will help guide you around the Abbey. Follow the blue dots in numerical order.

Chapter House

Cloister Garth

Toilets

Start trail

Continue here

Great West Door

Great North Door

1
8
7
5
4
3
2
6

❶ The cloisters

The building you stand in today is around 750 years old, built in the 13th century. 'Master masons' designed and built complex churches like this one. They had no calculators or computers to help them. Instead, they used set squares, rulers and a pair of compasses. Sometimes they used their own bodies to help them calculate measurements.

Use the ruler on this page to measure your foot in centimetres. Write down the measurement:
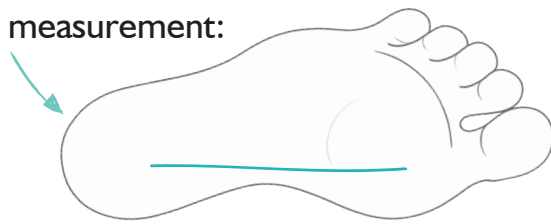
Round up or down to the nearest centimetre:

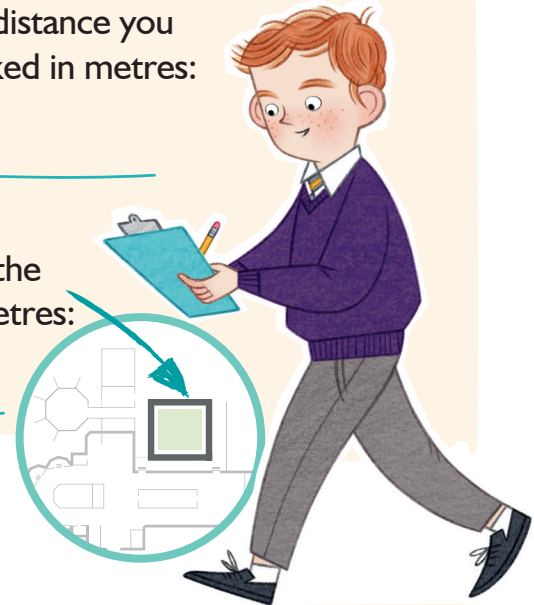**Choose any stone on the floor in the cloisters. Use your foot to estimate:**

The length of the stone:

_____

The perimeter of the stone:

_____

Stride down one side of the cloisters counting your strides.

One big stride measures about 1 metre. Estimate the distance you have just walked in metres:

_____

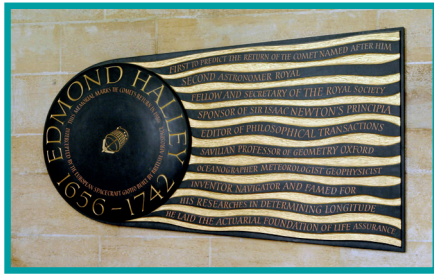Estimate the perimeter of the cloisters in metres:

_____

Use this space for working out your answers.

To estimate means to roughly calculate.

The perimeter is the distance all the way around the outside of a shape.

Westminster Abbey is full of memorials and graves.

Look for the memorial to Edmond Halley on the south cloister wall.

Halley was an astronomer. He identified that one specific comet passes Earth roughly every 75 years during its orbit.

He correctly predicted that it would be seen in 1758 even though he died before this happened. 'Halley's comet' was last seen in 1986.

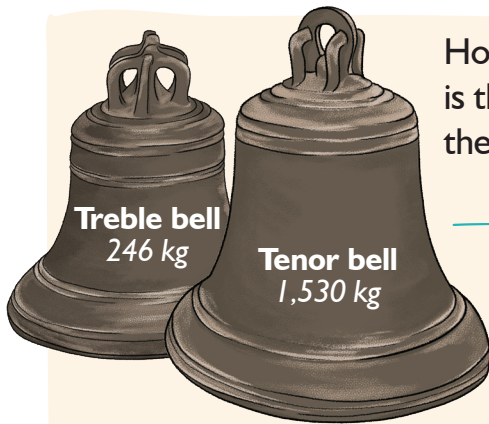**When can we expect to see it again?**

_____

Clue: 1986 + 75.

Work out how old you will be in the year that Halley's comet returns:

_____

Enter the Abbey.

2 The nave

**Can you spot the little hidden door to the right of the Great West Door?**
The little door leads to the bell tower. The Abbey has ten bells and you may hear some of them being rung during your visit today.

How much heavier is the tenor bell than the treble?

_____

Treble bell
246 kg

Tenor bell
1,530 kg

If the average weight of an adult is 60 kg, roughly how many adults would weigh the equivalent of the tenor bell?

_____

Use this space for working out your answers.
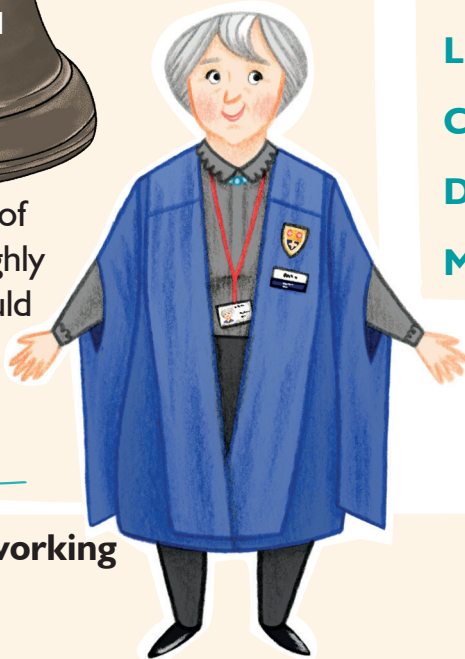
As you move around the Abbey, you may notice that some of the memorials are written in Latin and contain Roman numerals.

What do you think these Roman numerals mean?

III _____

V _____

X _____

L _____

C _____

D _____

M _____

Clue: Many words we use today are based on Roman numerals e.g. a millennium is 1,000 years, a century is 100 years.

3 Isaac Newton

Find the memorial for Isaac Newton.

Newton was a famous mathematician and scientist. His memorial shows us many of the things he worked on: astronomy, telescopes, experiments with light.

Newton was a polymath. Polymaths know a lot about lots of different things.

Can you work out when he was born and when he died?

_____

_____

Can you write today's date in Roman numerals?

_____

_____

Clue: NAT = born and OBIT = died.

4 The quire

This is where the choir of Westminster Abbey sits.

Look around you.
What shapes can you identify in the decorations?

_____

_____

_____

_____

In churches, shapes are often used to remind people of Christian belief. For example, a circle represents God because, like God, it has no beginning and no end.
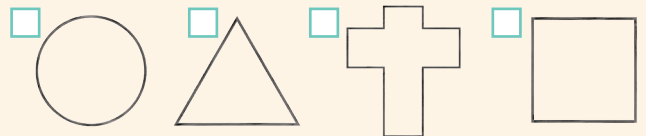
The trefoil is ONE shape, but it has THREE parts.

What do you think the trefoil might represent in a church?

_____
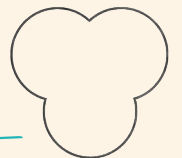
What shape is the whole church built in? Tick the shape you think.

☐ ◯   ☐ △   ☐ ✝   ☐ ▢

Clue: Look up!

Why might this shape have been chosen for the church building?

_____

_____

5 Cosmati Pavement

The Cosmati Pavement is over 700 years old.

Kings and queens are crowned on it.

The coloured stones are arranged to make beautiful patterns and shapes.

There used to be a riddle written around the edge of the pavement which was supposed to predict the date of the end of the world! The riddle involved multiplying by 3.

Complete the answers below by multiplying by 3 to get your next answer.

A. Hedgehogs live for 3 years.
(Multiply 3 x 3 to get your next answer.)

B. Dogs live for ___ years.
Keep multiplying each answer you get by 3!

C. Horses live for ____ years.

D. Man lives for ____ years.

E. Stags live for _____ years.

F. Ravens live for _____ years.

G. Eagles live for _____ years.

H. Whales live for _____ years.

I. The world will end in the year

_____!

You could use a calculator or do some working out in the space provided.

Use this space for working out your answers.

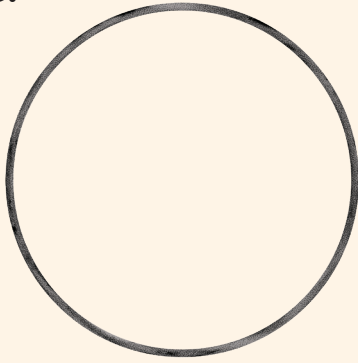Discuss: How important was maths to the design and building of Westminster Abbey?
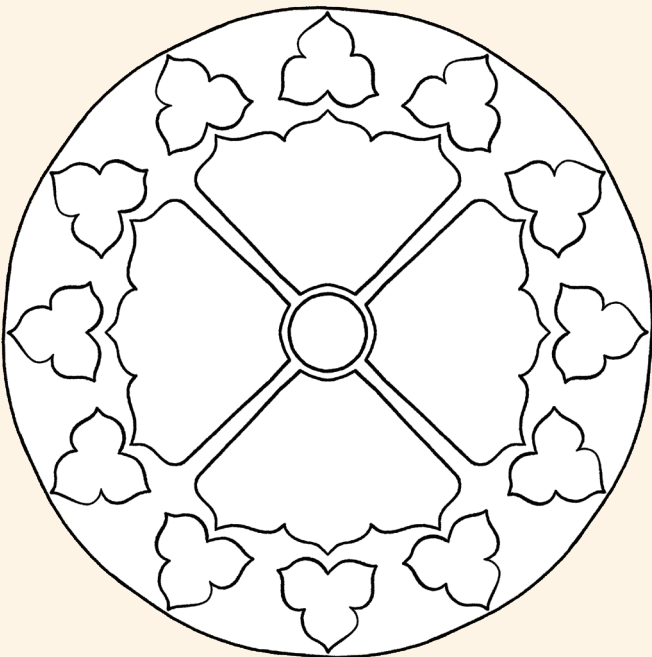
6 **Rose window**

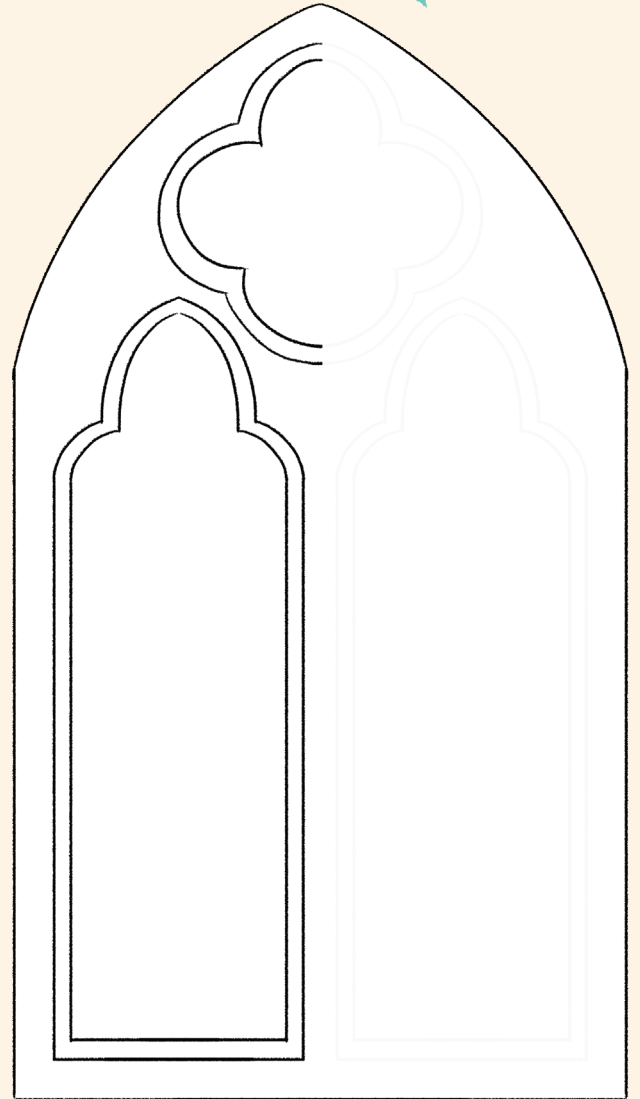Churches are often designed using symmetry as a symbol of God's perfect plan for the world.

How many lines of symmetry does a circle have?

Complete this window design to make it symmetrical.

Draw the lines of symmetry on this rose window. How many can you find?

How many lines of symmetry can you find in this design?

_____

❼ The Lady Chapel

This chapel was built by the first Tudor king, Henry VII.

He was known for being good at saving money. However, he spent £20,000 on building this part of the Abbey.

Henry introduced a new gold coin. It was the largest and most valuable gold coin ever to be made in England and was called the sovereign.

The sovereign measured 42 mm in diameter. **Use the ruler to help you work out how big this coin was.**

The sovereign was the first coin that was worth £1. Write down something you can buy for around £1 today:

_____

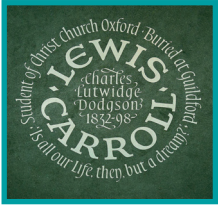In Tudor times, £1 would be equivalent to £700 today.

Calculate how much seven Tudor pounds would be worth in today's money:

_____

Use this space for working out your answer.

8 Poets' Corner

Look for the memorial to Lewis Carroll. He was a mathematician but is best remembered today for the book he wrote: *Alice's Adventures in Wonderland*.

The story is about Alice who dreamed she fell down a rabbit hole and met all sorts of characters including a grinning cat, the Hatter and the Queen of Hearts.

In a deck of cards, royal (picture) cards are worth 10 points each. The ace (A) can be worth 1 or 11 points.

If the ace is worth 1 point, how many points do all the cards in the hearts add up to?

Use this space for working out your answers.

On leaving the Abbey, you may wish to sit for a few minutes on the benches in the cloisters and reflect on how mathematical skills were essential for the building of this ancient church.

We hope you have enjoyed your visit to Westminster Abbey today!