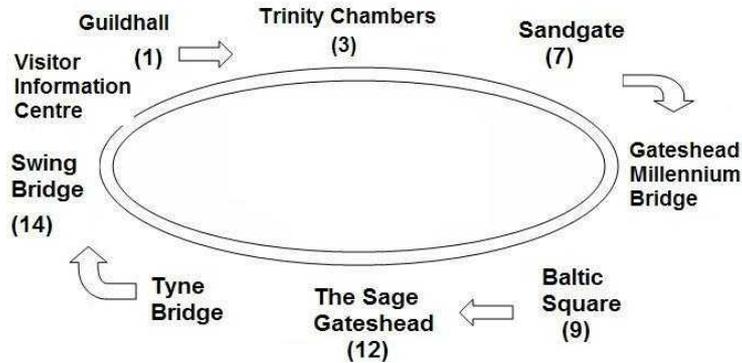# Maths on the Quayside

From the **Guildhall**, which houses the **Visitor Information Centre** walk over to the railings by the river.

(1) Look back at the Guildhall and up to the clock tower.

a) Which way is the wind blowing today? _____

b) How many sides does the clock tower have? _____

c) What is the name of a shape with this many sides?

_____

(2) a) The railings by the river side comprise horizontal bars and large bollards. Estimate how many bollards there are between the Swing Bridge and the Millennium Bridge.

_____

b) Use your answer to (a) to workout how far it is approximately from the Swing Bridge to the Millennium Bridge in Metres?

_____

(3) a) How many lions are there in total?

_____

b) How many crowns can you see?

_____

c) How many more crowns would be needed to equal the number of lions?
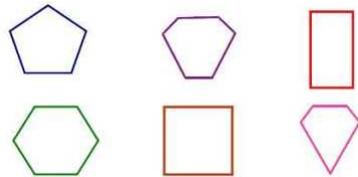
_____

(4) The Trinity Chambers building is almost symmetrical, viewed from the front. Draw a sketch to redesign the front of the building to make it symmetrical, aiming to make the smallest possible number of changes.

(5) How many different alarm shapes can you see in the block of buildings? Draw a circle around each one as you find them.

Throughout the trail keep a look out for different shaped burglar alarms, and draw them in the box below.

**(6)** a) Check the timetable, and find the times for the first and last bus on Friday.

_____ & _____

b) On Friday how many hours and minutes out of a 24 hour day do the buses not run?

_____

Walk along to **Gateshead Millennium Bridge,** taking care along the **Quayside** Bus route, and find a large statue with a chain and mace called the River God, situated in the middle of the roundabout.

(7) The River God is blowing a kiss to the Siren statue in Sandgate. It is said that Sirens lured sailors to their death with the beauty of their singing. Carefully cross the road to the 'maze'. There are many twisting trails between the two statues. How many ways can you find to walk from either start point to the Siren? You may move forwards or sideways but never backwards.
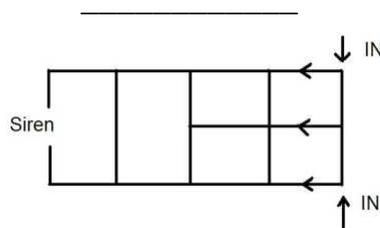
Cross back to the **Quayside** and look at the **Tyne Bridge**.

(8) a) Using the squares and triangles drawn on the picture below, calculate the approximate area enclosed between the arc of the bridge and the road. Count a square as one unit^2 and a triangle as a half unit^2.

_____

b) Using one unit^2 as equal to 15m^2, recalculate your result from (a) in m^2

_____

c) How could you improve this approximate calculation?

_____

(9) a) On the ground is a pattern of squares within squares. How many small squares make up a larger square pattern?

_____

b) Write down or draw one more pattern you can see on the ground?

_____

_____

_____

(10) Look at the lifts in the Baltic building. Approximately how many seconds does it take for the lift to go from the top of the building to the bottom without stopping?

_____

(11) a) Draw an imaginary line between yourself and a point beyond all the roads and paths on the other side of the river. Working in pairs for 3 minutes, complete the tally chart below for all that cross your imaginary line.
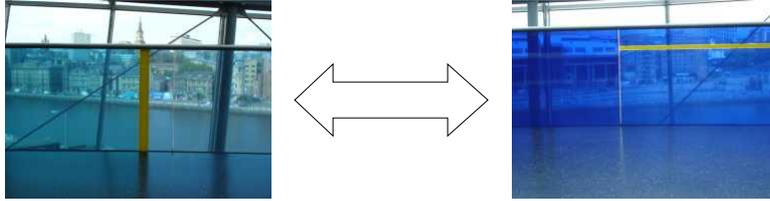
Boats	
Buses	
Cars	
Vans	
Cyclists	

b) Estimate the number of vans that would cross your line in an hour?

_____

(12) The blue/green glass banister is called 'Ribbon of Colour'.

Find the section in between the vertical and horizontal yellow lines shown above. Write down a pattern you can see in the colours between these points.

_____

(13) The main staircases have hand rails that are marked with Braille dots on the edge. Find them and then calculate how many dots there are in total on any one staircase.

_____

Come out of **The Sage Gateshead** and walk across **St Mary's Square**. Follow the path down to the **Tyne Bridge**. Take care crossing the road under the **Tyne Bridge** and then continue along to the **Swing Bridge**.

(14) a) As you cross the Swing Bridge back to the Guildhall. Count **OUT LOUD** as you walk across the bridge. How many steps do you take across the bridge?

_____

b) Using your step as a guide, estimate the length of the bridge in metres?

_____

Walk down the steps to the **Guildhall**.

(15) a) You will see some regular patterns using circular arcs in the cobbled stones outside the Guildhall. Each arc encloses a region of cobbled stones, about the same size. How many rows of stones are needed to form one of the circular patterns?

_____

b) Using only the shapes you can see on the ground, draw a different symmetrical pattern in the box.

Here is a puzzle, called **Collingwood's Rule**
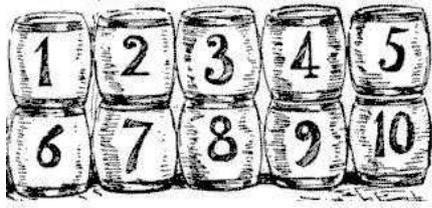
Admiral Lord Collingwood had ten barrels of precious goods for sale. They were numbered, and were arranged in two rows, one on top of the other, as shown in the picture. The smaller the number on the barrel, the greater its value. The best quality was numbered "1" and the worst numbered "10".
Collingwood's Rule was that he never let his sailors put a barrel either beneath or to the right of one of less value. The arrangement shown above is the simplest way of complying with this condition. But there are many other ways, for example like this. Here, again, no barrel has a smaller number than itself on its right or beneath it.

How many different ways can you arrange his barrels in two rows without breaking Collingwood's Rule?

Hint, start with four barrels (1,2,3,4) and find the number of ways for this. Then try with six barrels (1,2,3,4,5,6) and see if you can see a pattern developing.

Admiral Lord Collingwood lived in Newcastle. He was born in 1748 at 86 Side Street (off Dean Street), just up from the Quayside Maths Trail. Like all great sailors he liked to keep his ship well ordered.

Do you have a maths question or problem?
Write to Dr Maths, Evening Chronicle, Groat Market, Newcastle, NE1 1ED or email: DRMaths@hotmail.co.uk