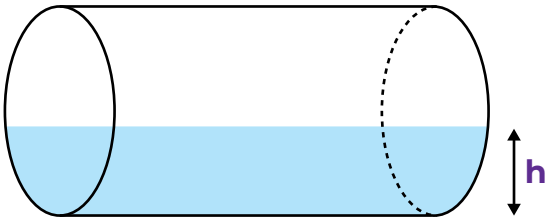
Maths Fest Puzzles - Hints

Puzzle 1

Hint: Can you write an expression for the proportion of the cross-sectional area taken up by the liquid? A clue for doing this is thinking about sectors and triangles.



Puzzle 2

Hint: We have interpreted this question to mean the ball halves its speed uniformly over each set of 5 seconds. Sketch a speed-time graph. The distance travelled is the area under the speed-time graph.

Puzzle 3

Hint: Turn over all the coins from one group, and none from the other.

More of a hint: Let's imagine that your first group has p coins in it, and that y of those are heads up. Can you write an expression for the number of heads-up coins in the group after you turn them all over?

You need to find a value of p so that this expression is equal to the number of heads-up coins there must be in the other group (which doesn't get turned over).

Puzzle 4

Hint: It's not as complex as you think! Your total number of cards needs to be one higher than your friend's, so the total of either the number of reds, or the number of blacks, in your hand must be higher than in your friend's. What's the likelihood it's your black total that is higher, rather than your red total?

Puzzle 5

Hint: All the spiders are saying different numbers, so at most one of them can be telling the truth. If more than one of them were telling the truth, there would be multiple identical answers. Think about how many legs the spiders might have in total.

Puzzle 6

Hint: Draw the 4 circles - don't assume the number pattern will necessarily continue.

Puzzle 7

Hint: Think about the place value of the digits! The number is some multiple of the first/last digit, plus some multiple of the second/third digit.

Puzzle 8

Hint: Call the numbers on the cards a,b,c and d. If you add up the four totals you are given, how many lots of a+b+c+d does this give you? It might be useful to start by working out the total of the numbers on all the cards.