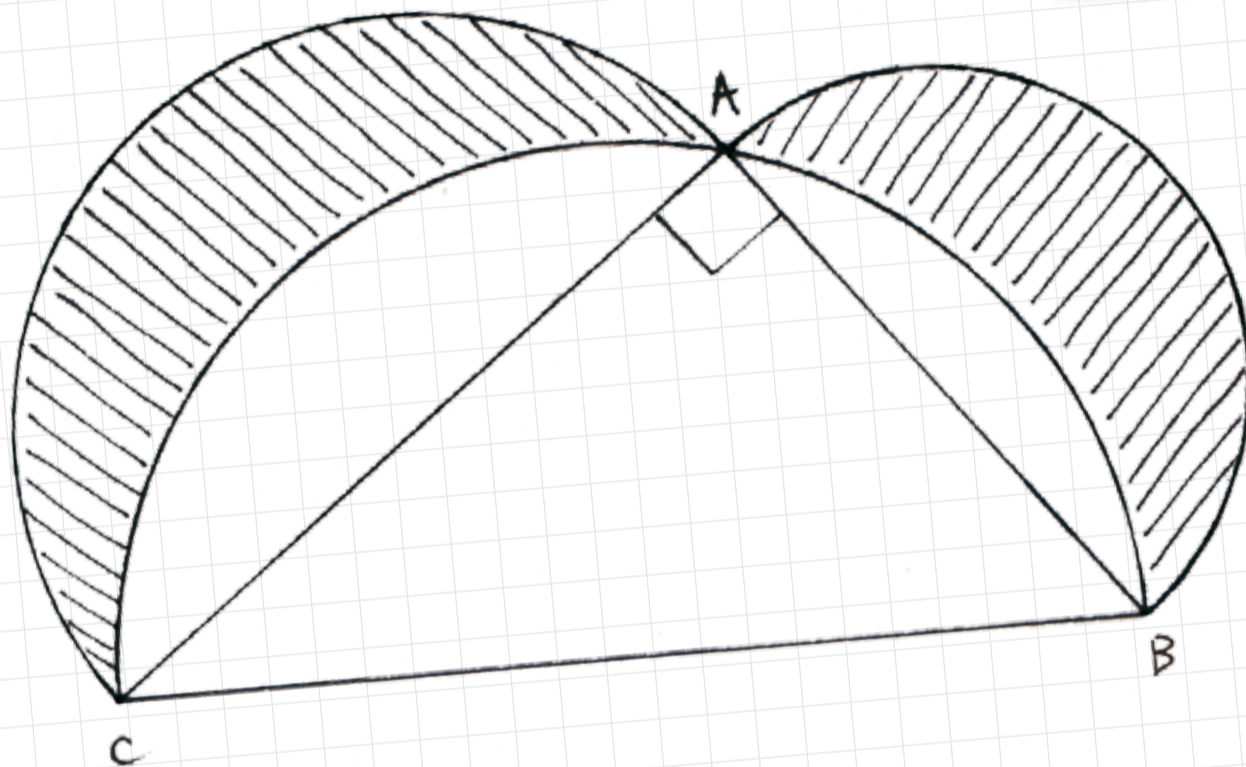


My favourite problem is...



This problem looks complicated but requires only a few simple techniques to reveal a remarkable solution and a 2500 year old theorem.



Triangle ABC has a right-angle at A.

Semi-circles are drawn with BA, AC and BC as diameters as shown.

.....
Given that $AC = 8$ and $BC = 10$, write down the value of one third of the total shaded area.

From Senior Team Mathematics Challenge (UKMT/FMSP)

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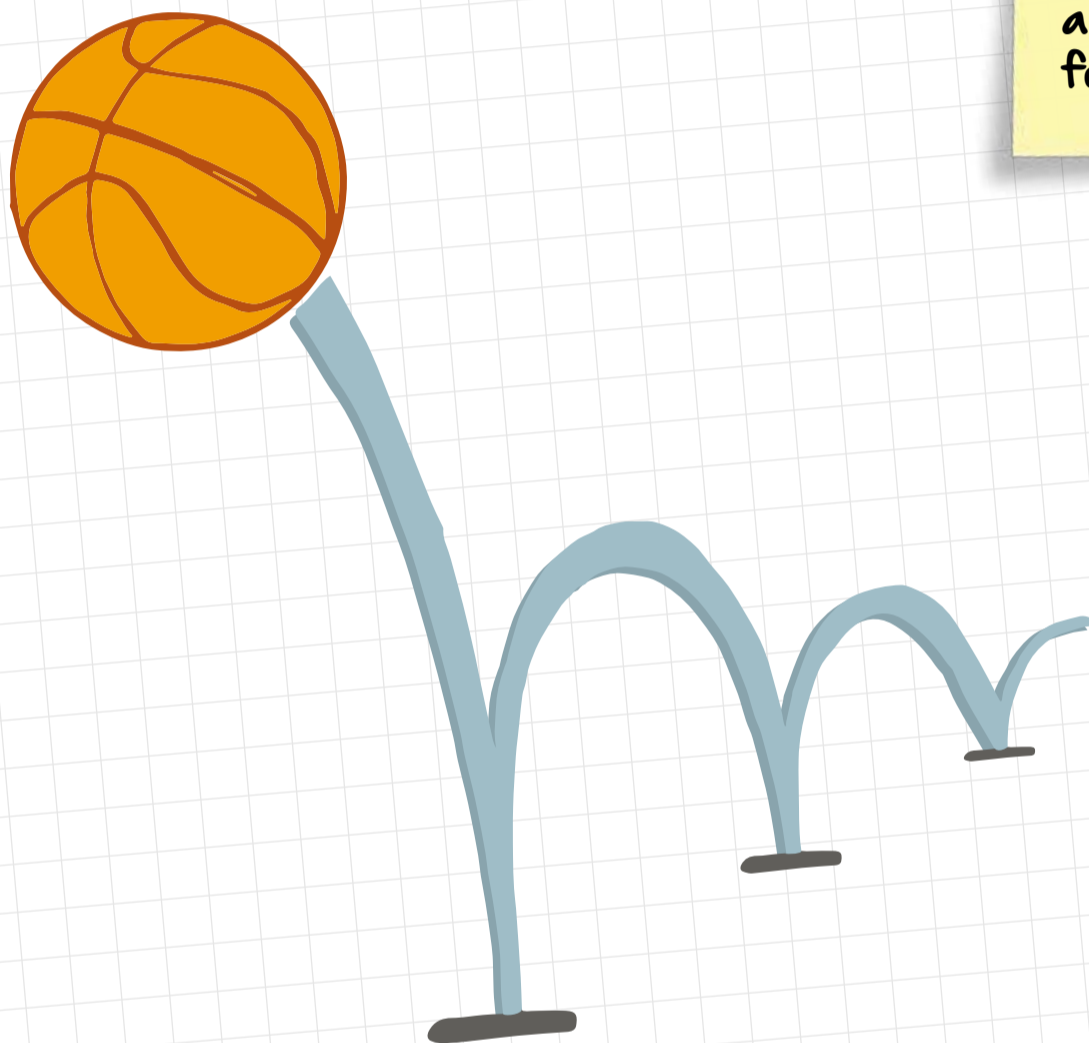
Scan the QR code to check the solution and find other problems.



www.furthermaths.org.uk/favourite

My favourite problem is...

The first part can be solved with decimals and percentages. It leads on to exploring a sequence of numbers with powers and using logarithms for solving equations.



A ball is dropped and bounces up to a height that is 75% of the height from which it was dropped. It continues to bounce, each time to a height that is 75% of the previous height.

.....
How many bounces does it make before it bounces up to less than 10% of the original height?
How many for less than 1%?

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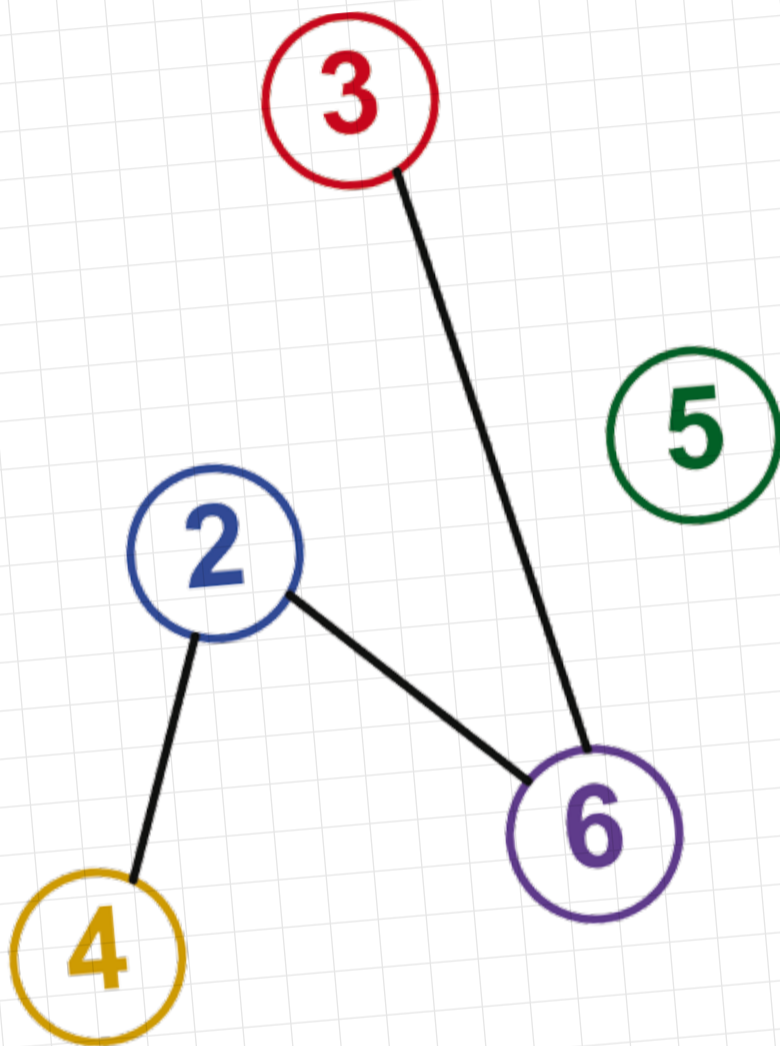


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My favourite problem is...



This problem is easy for anyone to start but gets increasingly complicated and requires a proof to know you have the best answer.



Starting with the number 2, integers are added, in order, so that any two numbers are joined if one of them is a factor of the other. The diagram shows the connections for the numbers 2 to 6.

.....
What is the maximum number that can be reached if no lines joining two numbers are allowed to cross?

Based on a problem from NRICH

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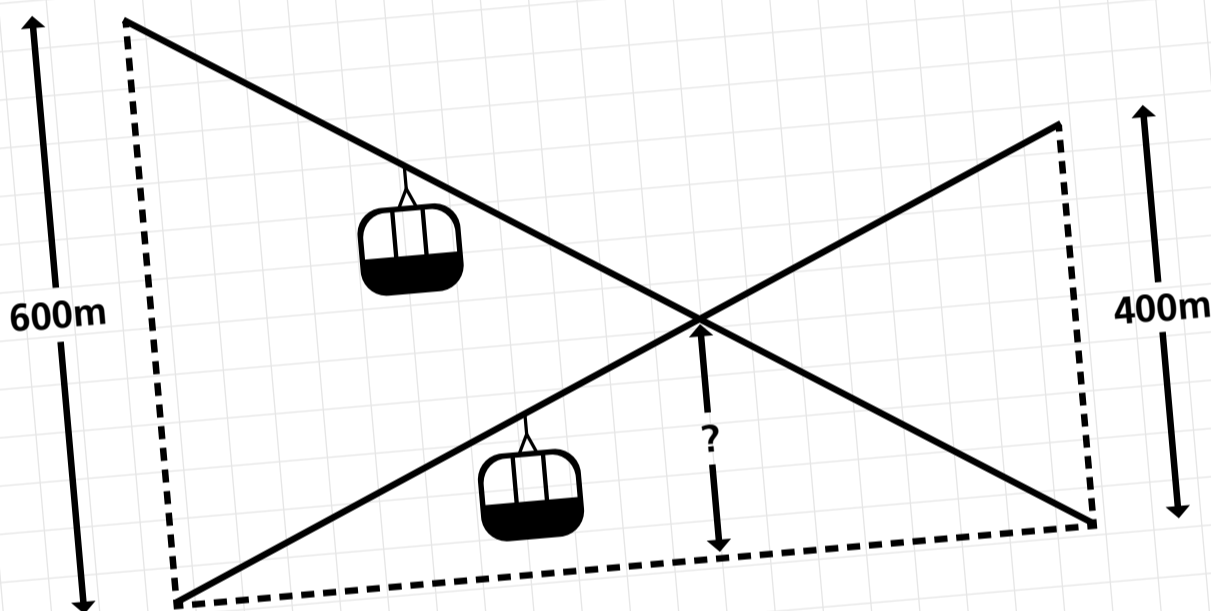


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My favourite problem is...



It's amazing that the height of the crossing can be calculated at all in this problem, surely it is necessary to know how far apart the two ground level stations are?



Two straight wires for cable cars are shown in the diagram. One car reaches a vertical height of 600m and the other a vertical height of 400m as shown.

At what height do the wires cross?

From Professor Stewart's Cabinet of Mathematical Curiosities by Ian Stewart

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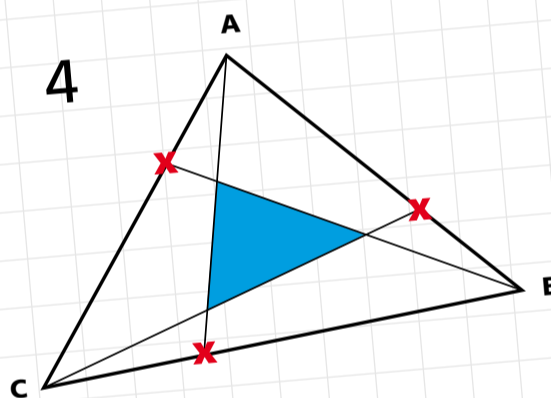
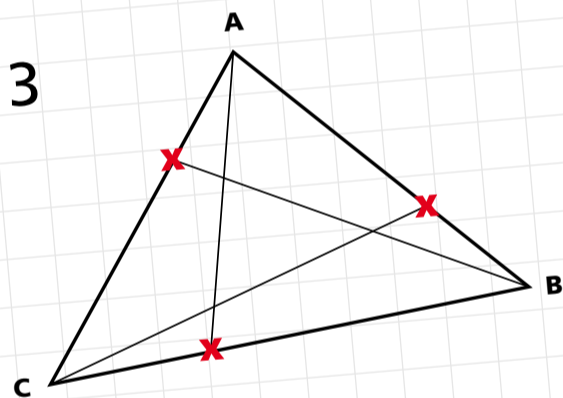
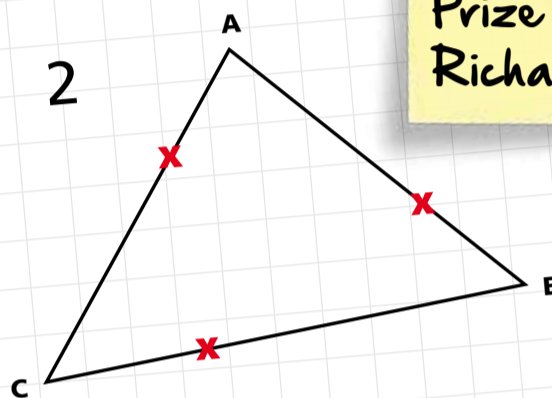
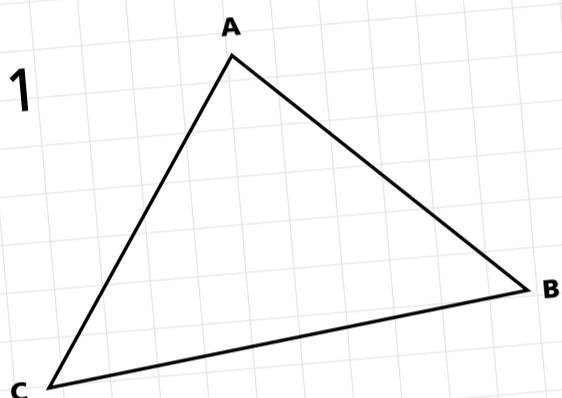


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MY FAVOURITE PROBLEM IS...



This problem can be solved in several ways, using techniques from GCSE or A level and even beyond that! The surprising result fascinated Nobel Prize winning Physicist Richard Feynman.



1. Start with any triangle.
2. Mark a point one third of the way along each edge moving anticlockwise from each corner.
3. Join these points to the 'opposite' corner to make a new triangle.
4. What fraction of the original triangle is the new triangle?

Based on a problem in The Mathematical Gazette

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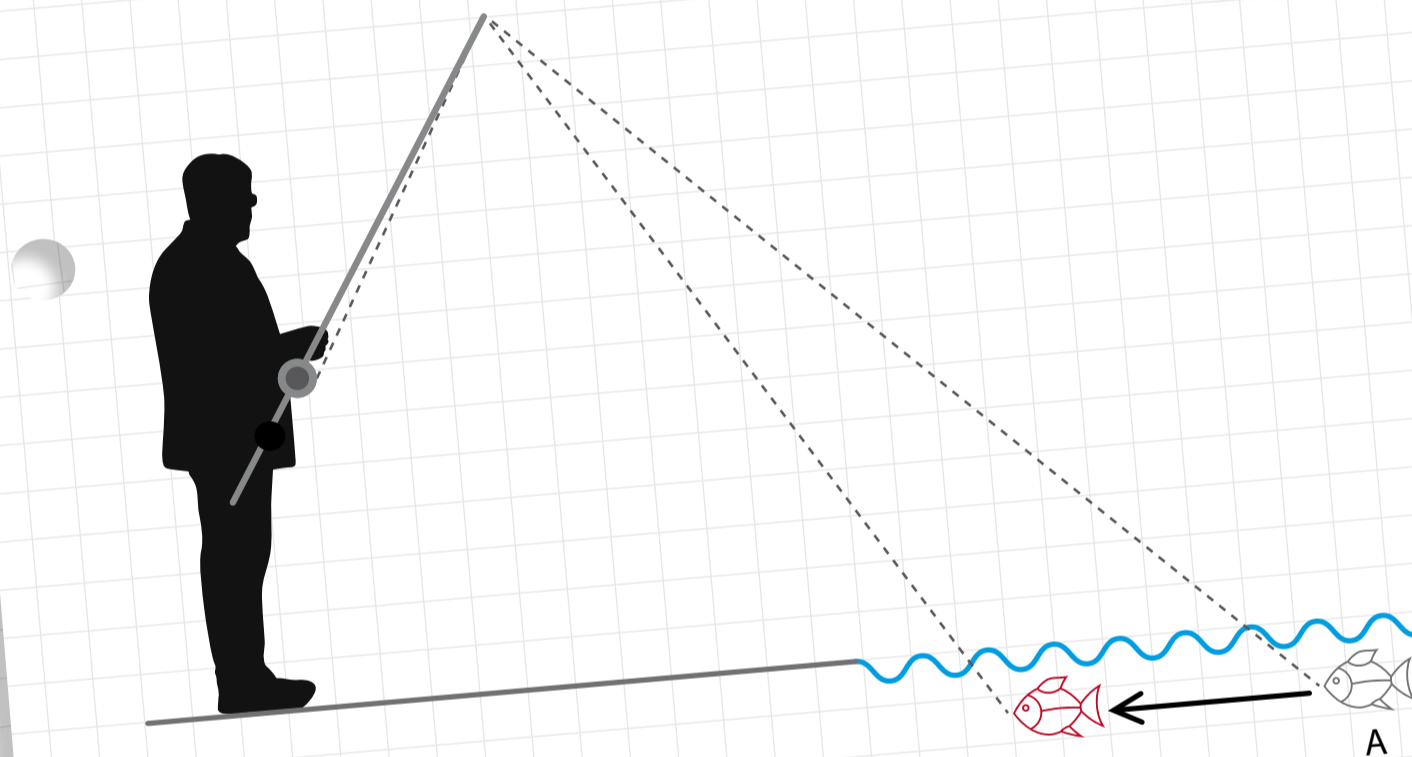


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My favourite problem is...



This deceptively simple problem can lead to complicated algebra but it does have a concise and very satisfying solution



A fisherman fishing from the edge of a pond hooks a fish at position A and begins to reel it in. He reels in 1m of line bringing the fish closer to the shore, parallel to the surface of the water.

Is the fish now closer to the shore by:
More than 1m; Less than 1m; or Exactly 1m?

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