

Team _____

QUESTION 1

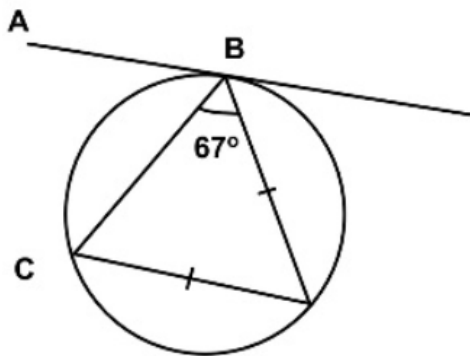
What is the smallest whole number by which 88200 must be multiplied to make a cube number ?

Answer:

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QUESTION 2

Find angle $\hat{ABC}$, where A and B are points on the tangent to the circle



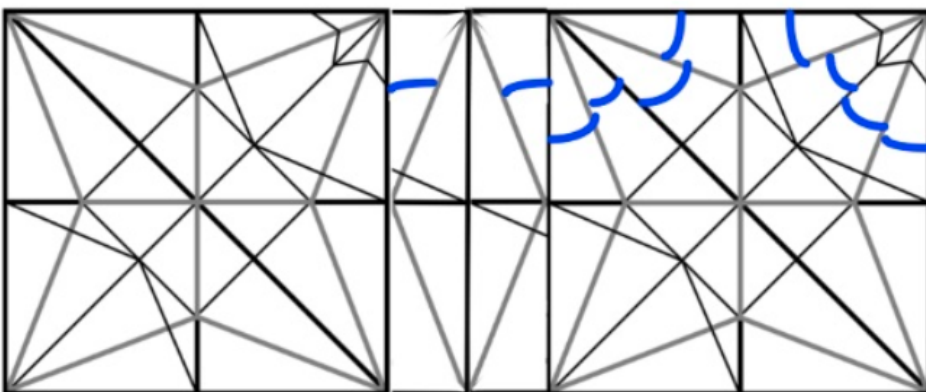
Answer:

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QUESTION 3

John Penfold has created a new 3D origami shape.
The flat sheet of paper with the main fold lines is shown.
There is a lot of symmetry not all of it is shown, but the angles marked are all equal and the same shapes have the same dimensions.

What is the exact ratio of the sides of the sheet of paper in its simplest form ?
Write answer as a ratio 1:n. (1 being the shortest side)
and leave answer in surd or trigonometry function form.



Answer:

If a light is shone on an opaque regular icosahedron and in line with two of its opposing vertices what is the name of the 2D shape of the resulting shadow ?

Answer:

Work out $x^4 + \frac{1}{x^4}$ if $x - \frac{1}{x} = 16$

Answer:

Place as many circles as possible in this 4x4 grid in such a way that no two circles must be in the same row, column or any of the ten diagonals which can be drawn on the 2x2 or 3x3 or 4x4 grids.

Your solution cannot be one which has a circle in the place of the X

	X		

Answer:

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QUESTION 7

How many 7 digit numbers are there that contain at least one 7 ?

Answer:

Team _____

QUESTION 8

**Two friends with electric bicycles leave from the same place at 15:00.
The first one cycles West at 48 Km/h, the other cycles North at 36 Km/h.
At what time will they be exactly 135 Km apart ?
(answer in 24 hour clock format, i.e. 14:10)**

Answer:

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QUESTION 9

**The sides of a quadrilateral are 5, 9, 13, 15,
what is the maximum area it can have ?**

Answer:

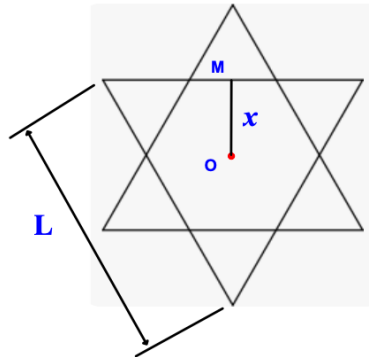
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QUESTION 10

The hexagram (six-pointed star) is an ancient symbol used in buddism, hinduism, judaism, christianity, Islam, astrology, alchemy to name a few.

It is made up of two overlapping equilateral triangles, making a regular hexagon and six smaller identical equilateral triangles.

Mia wants to draw a hexagram, so she decides to work out the distance X (from the centre O to the midpoint M of one side as shown) in terms of the length L of a side of the large triangle.

 $x =$

Find X in terms of the length L - a side of the large triangle.

Answer:

Team _____

QUESTION 11

A circle of diameter 5 is inscribed inside a right angle triangle with the shortest side of length 11. What is the product of the sides of the triangle ?

Answer:

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QUESTION 12

Purple mountain is only inhabited by Knights and Knaves.

Knights always tell the truth and Knaves always lie.

In front of the ski lift there are 33 inhabitants.

The one in front says: '... everyone behind me is a knight ... '

Everyone else in the queue says the person in front is a Knave.

How many knights are there ?

Answer: