

HARD SUMS CLUB

November 2005 Newsletter

www.hardsumsclub.com

Have circles got mystic properties?

The circle has something mystic about it. Think about the mystery surrounding the crop circle. Would there be such a mystery surrounding a crop square?



In maths the definition of a circle is the locus of all points equidistant from a central point. This means a set of points all the same distance from one central point. The equation of a circle is formed from this only needing the radius and the centre of the circle in order to define the circle.

In the Islamic culture the **circle** is a unit of measure. The circle is the basis for the organization of space. It is a starting point in architecture, poetry, music and even calligraphy. From a circle it is possible to construct many regular polygons.

The decimal system we use did not appear as a standard until the eighth century A.D. Before exact units of measurement were used, the scale from one building's plan was used to create another building by referring to the **geometric patterns**. Egyptian rope-stretchers and temple surveyors developed a reproducible method by using pegs and cords to trace circles and straight lines on sand. They established geometric procedures for generating precise and accurate constructions.

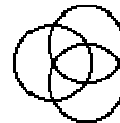
1. Draw a circle with a compass.
2. Without changing the opening (radius) on the compass, draw another circle whose centre is on the rim of the first circle.
3. If you connect the centres and one of the points where the circles cross, you get an equilateral triangle.



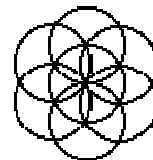
Why do all the sides have the same length?



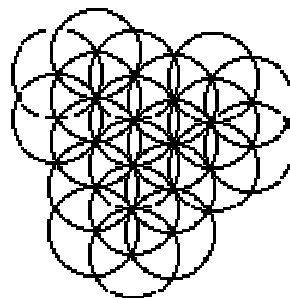
4. Again without changing the radius, draw another circle whose centre is one of the intersection points.



5. Keep drawing new circles at the new intersection points.



Does this design have rotation symmetry? By what angles?
Does this design have reflection symmetry? Across what lines?



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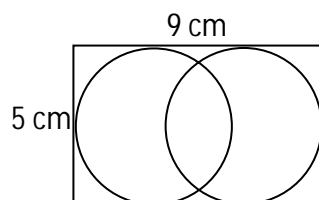
November quiz

Send your solutions to bcl@hardsumsclub.com

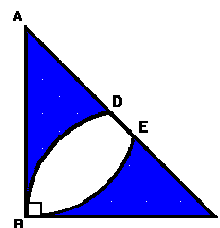
- Can you guess this number?
 - The number is not an odd number.
 - It has exactly four factors.
 - If you reverse the digits, a prime number is formed.
 - The sum of the digits is a two digit prime number.
 - The number is less than the square root of 10^4 .
 - One of the digits is a square number.

What number are we thinking of?

- How far apart are the centres of the two circles?



- Triangle ABC is an isosceles right angled triangle with $BC = AB = 2$.
A circular arc of radius 2 with centre C meets the hypotenuse at D. A circular arc of radius 2 with centre a meets the hypotenuse E. What is the area of the shaded region?



November Latin square

Place the numbers 1, 2, 3 and 4 in the following grid so that each row and each column has each of the numbers 1, 2, 3 and 4 in it. Do so in such a way that the arrangement is symmetric with respect to the main diagonal (top left – bottom right)

November's strategy game – Turning Turtles

This is a variation on last month's game. You still start with 10 coins all head-up. At your go you **MUST** turn a heads-up coin so that it becomes tails-up. You can then choose to turn a coin to the left of the first one and turn this over too. Either heads – tails or tails – heads. You win if you can get all coins tails up.

Websites of the month

<http://www.10ticks.co.uk/games.asp#>
Pretty good maths games.
www.hardsumsclub.com
Find out the solutions to last month

A final thought

Two useful formula for circle questions are the circumference = $2\pi r$ and the area is πr^2 where r is the radius and π is pi an irrational number approximately equal to 3.14. Read more about π next month.

