The Mathematical Association of Western Australia Inc.
MAΣWA

Math World

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The Dartboard

1. What would you score if you threw a dart into each number in turn (not scoring doubles or trebles)?

2. What would you score if you went 'round the board' scoring only 'doubles'?
3. 'Trebles'?
4. In the game 501 using the full dartboard, what is the fewest number of darts required to finish with 501?

Search the internet for 501 dart-game finishes. There are some amazing YouTube clips.

Babylonian Fractions

The Babylonians had no notation for a fraction such as $\frac{2}{5}$ or $\frac{3}{5}$ but only for unit fractions (fractions with a numerator of 1) such as $\frac{1}{2}$ or $\frac{1}{5}$.

This meant that a fraction like $\frac{2}{5}$ would have to be expressed as a sum or difference of unit fractions.

Thus $\frac{2}{3} = \frac{1}{3} + \frac{1}{3}$ or $\frac{1}{3} = \frac{1}{6} + \frac{1}{6}$

Find ways of expressing $\frac{2}{5}$ and $\frac{1}{12}$ as sums or differences of different unit fractions (i.e. not repeating the same fraction).

Forgotten PIN

Tom has forgotten his PIN number for his bank card.

However, he remembers various clues to his number.

The number has four digits.

The product of the extreme digits is 36.

The product of the middle digits is 24.

Write down all the possible four-digit numbers that could be Tom's PIN number.

Tom is still confused, but then he remembers more clues:

The units digit and the thousands digit are not the same.

The sum of the digits is 23.

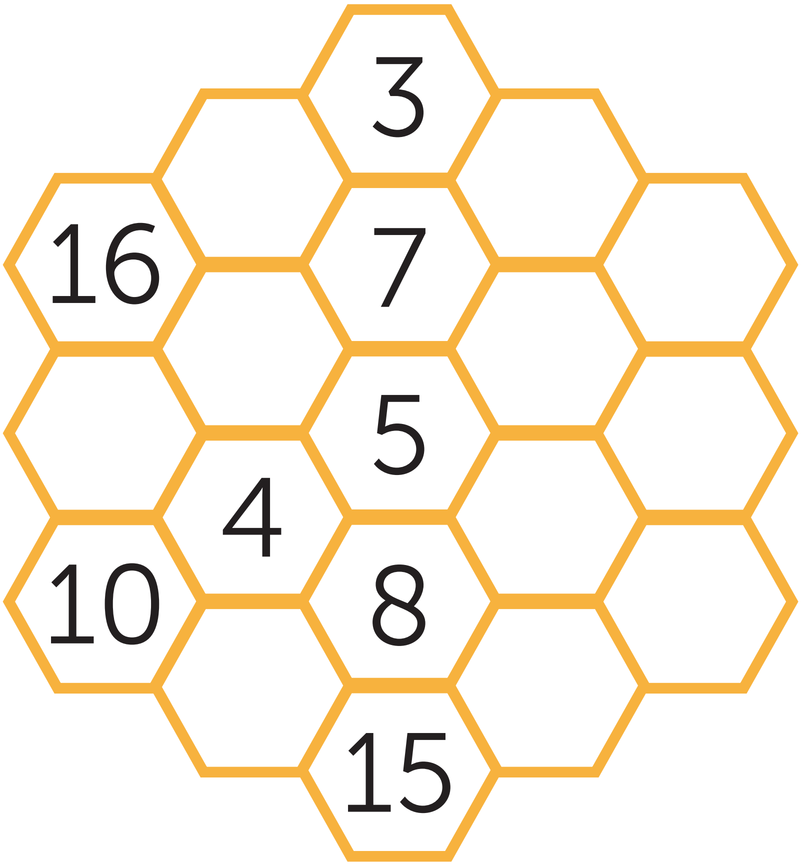
Write down all of the possible four-digit numbers that could be Tom's PIN number now.

He also remembers that the number is even and that the units digit is smaller than the tens digit.

He is now confident enough to use his card. Write down the correct PIN.

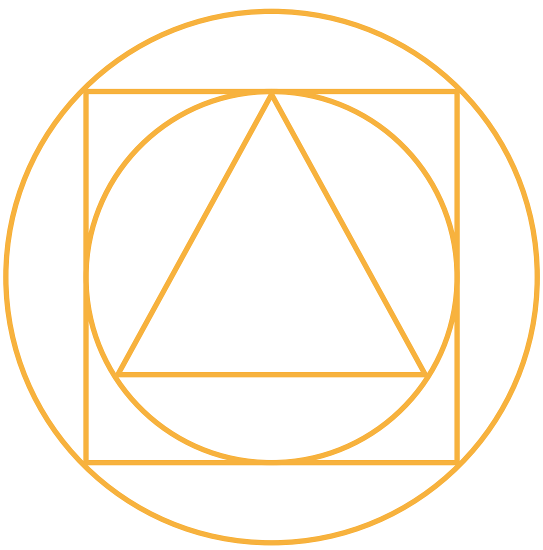
Magic Hexagon

Fill in the hexagons with the numbers 1, 2, 3, 4, 5, 6, ..., 19 so that the total of the numbers on every vertical path and every diagonal path is always the same.



Shapes Within Shapes

Find the length of the sides of the equilateral triangle, if the diameter of the outside circle is 80 mm.



Three Consecutive Numbers

Consider a set of three consecutive numbers, for example: 7, 8, 9. Compare the square of the middle number with the product of the outer pair.

$$7 \times 9 = 63$$
$$8 \times 8 = 64$$

The answers 63 and 64 are also consecutive

Does this work with other sets of three consecutive numbers? Try 10, 11, 12.

$$10 \times 12 = 120$$
$$11 \times 11 = 121$$

Yes, it works here. Can you prove that it is generally true?

Answers

The Dartboard

1: 210 2: 420 3: 630

4: 9 shots: (8x 60s & 1x 21), assuming you are not playing a variant which requires a double/bullseye to win

Babylonian Fractions

$$\frac{2}{5} = \frac{1}{5} + \frac{1}{6} + \frac{1}{30}$$

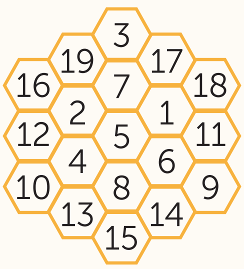
$$\frac{1}{12} = \frac{1}{3} - \frac{1}{4}$$

Forgotten PIN

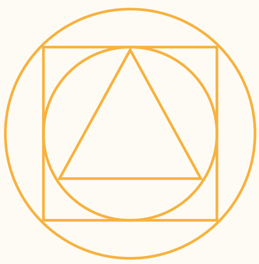
9464

Magic Hexagon

Here is one answer



Shapes within Shapes



Length of each side of triangle is 49 mm

Three Consecutive Numbers

Yes it is always true.

If the middle number is n, the others are n-1 and n+1.
n^2 and $(n-1)(n+1) = n^2-1$ are consecutive numbers.

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