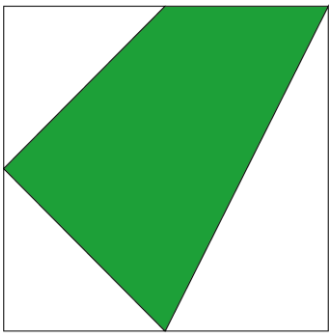
Maths Challenge - Week 301 – Problems

Welcome to week 301 of our weekly maths challenge, with problems and puzzles posed by David Browning, Rod Marshall, Ian Stewart, Annie Stothers and the u3a Maths and Stats Subject Adviser - David Martin. If you would like to share your ideas on how to solve these puzzles please join our learning forum or discuss within your u3a and interest group. Check back each week for the solutions and let us know how you get on by contacting the u3a office. New maths puzzles will go up onto the website every Thursday.

Question 1.



What fraction of the square is occupied by the central quadrilateral which has three of its vertices at midpoints of the sides of the square?

Question 2.

Fiona measured the interior angles of a regular polygon and found that they were 150°. What polygon was she measuring?

Question 3.

In the game of bridge, each of the four players is dealt 13 cards. Each player usually counts the number of honour points in their hand with four points for an ace, three for a king, two for a queen and one for a jack. If a player has two aces, two kings and one jack in the first 11 cards that they look at, what is the probability that their 13 cards will have exactly 20 honour points?

Question 4.

A simple model for the deceleration of a high-speed train can be expressed in the form $v_n = av_{n-1}, n = 1, 2, 3 \ldots$ where v_n is the speed after n time steps, a is a constant and the calculations are performed at fixed time steps Δt. Using this formula with $a = 0.75$ and $\Delta t = 5$ seconds, how long would it take for a train to decelerate from a cruising speed of 300 km/h to a crawling speed of 10 ± 1 km/h and how far would the train travel in this time?