Mathematics Problems for week fifty-two www.u3a.org.uk posed by Gordon Burgin, Andrew Holt, Rod Marshall, Ian Stewart and David Martin

Problems

Week Fifty-two

Question 1.

Washington High School randomly selected freshmen, sophomore, junior, and senior students for a survey about potential changes to next year's schedule. Of students selected for the survey, 1/4 were freshmen and 1/3 were sophomores. Half of the remaining selected students were juniors. If 336 students were selected for the survey, how many were seniors? (For clarity, a student is either a freshman, sophomore, junior or senior student.)

Question 2.

When asked about the animals on his farm, the farmer replied: "I only keep sheep, cows and horses. At the moment, all bar 20 are sheep, all bar 30 are cows and all bar 40 are horses."

How many of each animal are on the farm?

Question 3.

To make a circular cushion, a member of a U3A sewing group needs two full circles of fabric each with a diameter of 60 cm. If the fabric they want to use is 90 cm wide, what is the minimum length of fabric that they have to buy?

Question 4.

Find the solutions to the simultaneous equations:

$3x^2 + xy - 2y^2 = -5$

$x^2 + 2xy + y^2 = 1$