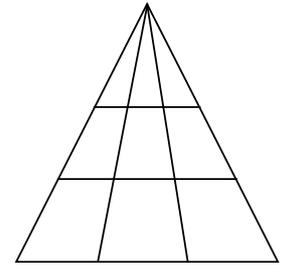
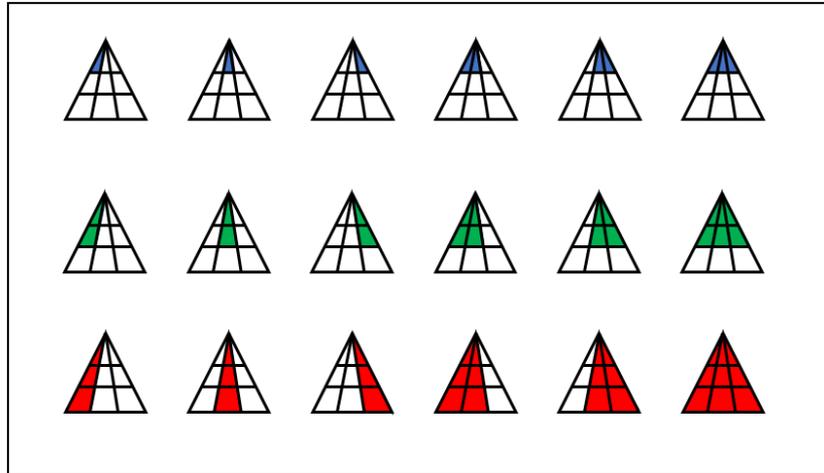


## Extra puzzles and riddles for 5 May

A How many triangles can you count in the figure at the right?

There are 18, these are shown in the diagram below.



B Imagine that you had a rope that was passed around the circumference of the Earth, stretched tightly over it, up hill and down dale, touching the surface everywhere. This rope would be about 25 000 miles long.

Now imagine that you cut the rope and splice an extra 6 feet length to it.

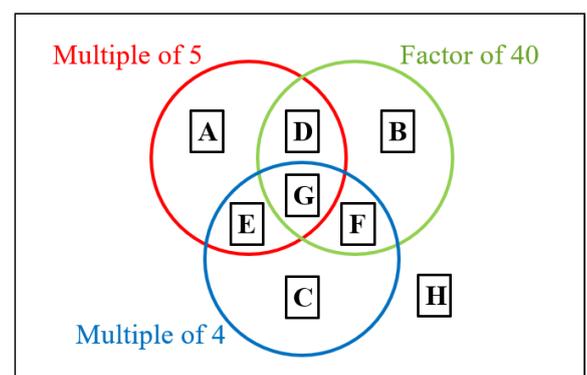
If you were able to raise this rope up at an equal distance from the surface everywhere, how much above the surface would it be?

Almost a foot! We'll forget about up hills and down dales, and treat the Earth like a sphere. Then the rope is a circle whose circumference is given by  $C = 2\pi R$ .

The difference between the two circumferences is 6 feet, or 72 inches. If we denote the difference in the two radii as  $h$ , then we have  $72'' = 2\pi h$ , which gives  $h = \frac{72''}{2\pi} = 11.5''$ .

C If your neighbour's peacock lays an egg in your garden, under the law that applies in England and Wales, are you allowed to keep the egg? Peacocks do not lay eggs, that is done by peahens!

D The image here contains a Venn diagram. Each circle contains only those whole numbers that satisfy the stated property, and every



number that satisfies that property.

For example the red circle contains only numbers that are a multiple of 5, but also every number that is a multiple of 5 (that is an infinite number of them!)

The green circle contains all the factors of 40, that is all the whole numbers that divide into 40 exactly with no remainder.

Can you give an example of numbers that are in the eight regions marked A to H?

There are many possible answers in some regions. Note that in those regions that are inside 2 or more circles the number must satisfy the requirements of each circle. (This is not as difficult as it may sound at first.)

Possible answers are: A (0), 5, 10, 15, . . .

B The only possible answers are 1, 2, 4, 5, 8, 10, 20, 40

C (0), 4, 8, 12, . . .

E (0), 20, 40, 60, . . .

F The only possible answers are 4, 8, 20, 40

G The only possible answers are 20, 40

H This lies outside all 3 circles, so includes all numbers that are not multiples of 4 or of 5 and are not factors of 40. So there is an infinite number of possibilities, including things like 3 (but not 1 or 2), 6, 7, 9, 11, . . . , 1066, . . . , 2019 (but not 2020)

E If an aeroplane crashes exactly on the French-Swiss border, in which country should the survivors be buried? Another trick question: you don't bury the **survivors** of a plane crash!

F What number should replace the question mark?

What property does the completed figure have?

The ? should be replaced by 8.

The figure then has the property that the numbers in each row and each column add up to 15.

