

Horse of a Different Colour

“Horse of a different colour” is an idiomatic expression that means “an unrelated or irrelevant matter; something that has no bearing on the discussion or question.”



Horse of a different colour from Wizard of Oz

Hungarian mathematician George Pólya (1887-1985) posed the following exercise:

Exercise: Find the error in the following argument, which purports to prove by mathematical induction that all horses are of the same colour.

Base case: If there is only one horse, there is only one colour.

Inductive step: Suppose in any set of k horses, they all have the same colour. Consider a set of $k + 1$ horses. Number them $1, 2, 3, \dots, k + 1$. By the inductive hypothesis all horses in the set $\{1, 2, 3, \dots, k\}$ have the same colour and likewise all horses in the set $\{2, 3, 4, \dots, k + 1\}$ have the same colour. Since these sets overlap, there must be only one colour among all $k + 1$ horses.

Therefore, by the Principle of Mathematical Induction all horses are of the same colour.