Once In a Lifetime?

by William J. Bruce
Professor Emeritus, Department of Mathematics
University of Alberta, Edmonton

The following problem is suitable for beginners of elementary algebra and can be proved at that level. Consider three cases as follows:

A. When will a parent be twice as many years old as any one child of the family?

 Solution: Let P years be the parent's age when the child is born.
 Let C be the child's age in years.
 Then $P + C$ is the parent's age when the child is C years old.
 If the parent is twice as old as the child, then

$$P + C = 2C.$$

 So, $P = C.$

 Therefore, when a child reaches the age that the parent was when the child was born, the parent will be twice as old in years as the child. And this can occur only once in a lifetime for each child.

B. When will a parent be three times as many years old as any one child of the family?

 Solution: Proceeding as in case A, we obtain

$$P + C = 3C.$$

 So, $P = 2C$, and P must be an even number.

 Therefore, this can occur only once in a lifetime for each child *provided* that the age of the parent in years was an even number when the child was born.

C. When will a parent be four times as many years old as any one child of the family?

 Solution: Here we obtain $P + C = 4C.$

 So, $P = 3C$, and P must be divisible by 3.

 Therefore, this can occur only once in a lifetime for each child *provided* that the age of the parent in years was a multiple of 3 when the child was born.

Other extensions are left for the reader to explore.