1 Question 01

Prove that if a, b and c form a Pythagorean triplet i.e. $a^2 + b^2 = c^2$, then ka, kb and kc also form a Pythagorean triplet where k is a real positive constant.

Given,

$$a^2 + b^2 = c^2 \tag{1}$$

To prove that:

$$(ka)^2 + (kb)^2 = (kc)^2 \tag{2}$$

Starting with the LHS of 2:

$$\begin{aligned} LHS &= (ka)^2 + (kb)^2 \\ \text{or, } LHS &= k^2a^2 + k^2b^2 \\ \text{or, } LHS &= k^2(a^2 + b^2) \end{aligned}$$

But from 1, we know that

$$\begin{aligned} a^2 + b^2 &= c^2 \\ \text{which makes } LHS &= k^2c^2 \end{aligned}$$

which is what we set out to prove.

Therefore if $a, b,$ and c form a Pythagorean triplet then so do ka, kb and kc. Hence Proved.

(3)