Question 2 .If x,y,z are the sides of a pedal triangle, then x+y+z is equal to:-

Solution. We know that the sides of a pedal triangle are-
EF=a*cos A, DE=c*cos C and FD=b*cos B.

$\Rightarrow x+y+z=a\cos A+b\cos B+c\cos C$
$=2R\sin A\cos A+2R\sin B\cos B+2R\sin c\cos C$

By Sine Rule:

$$\begin{cases} & \because \\ \frac{a}{\sin A}=2R\Rightarrow a=2R\sin A \\ \frac{b}{\sin B}=2R\Rightarrow b=2R\sin B \\ \&\frac{c}{\sin C}=2R\Rightarrow C=2R\sin C \end{cases}$$

$=R(2\sin A\cos A+2\sin B\cos B+2\sin C\cos C)$
$=R(\sin 2A+\sin 2B+\sin 2C)$

$\{\because \sin 2x=2\sin x\cdot\cos x$

$=4R\sin A\cdot\sin B\cdot\sin C$
$=4R\frac{a}{2R}\times\frac{b}{2R}\times\frac{c}{2R}$ (using sine rule)
$=\frac{abc}{2R^2}$
$=\frac{2\times abc}{4R^2}$
$=\frac{2\Delta}{R}\quad\left(\because\Delta=\frac{abc}{4R}\right)$
$\Rightarrow$ If x,y,z are the sides of pedal triangle, then
$x+y+z$ is equal to $\frac{2\Delta}{R}$