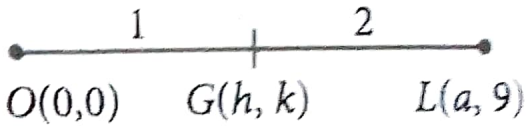
21. (145) : We can observe that all the three points A, B, C lie on the circle $x^2 + y^2 = 100$, so circumcentre is $(0, 0)$.

Since, centroid divides the line joining orthocentre and circumcentre in the ratio 2 : 1, then



$$\frac{a+0}{3} = h \Rightarrow a = 3h$$

and $\frac{9+0}{3} = k \Rightarrow k = 3$

Also, $\frac{6 + 10\cos\alpha - 10\sin\alpha}{3} = h$

$\Rightarrow 10(\cos\alpha - \sin\alpha) = 3h - 6$ ...(i)

and $\frac{8 + 10\cos\alpha - 10\sin\alpha}{3} = k$

$\Rightarrow 10(\cos\alpha - \sin\alpha) = 3k - 8 = 9 - 8 = 1$ ...(ii)

On squaring, $100(1 - \sin 2\alpha) = 1 \Rightarrow 100\sin 2\alpha = 99$

From (i) and (ii), we get $h = \frac{7}{3}$

Now, $5a - 3h + 6k + 100\sin 2\alpha$

$= 15h - 3h + 6k + 100\sin 2\alpha = 12 \times \frac{7}{3} + 18 + 99 = 145$