If the function.

$$g(x)=\begin{cases} k\sqrt{x+1} & , \ 0 \le x \le 3 \\ mx+2 & , \ 3 < x \le 5 \end{cases}$$

is differentiable, then the value of $k+m$ is :

(1) $\frac{10}{3}$

(2) 4

(3) 2 ✓

(4) $\frac{16}{5}$

Since $g(x)$ is differentiable,
it implies that $g(x)$ is continuous
in the given interval

$$g'(x)=\begin{cases} \dfrac{k}{2\sqrt{x+1}} & 0 \le x \le 3 \\ m & 3 < x \le 5 \end{cases}$$

$\Rightarrow$ at $x=3$

$$\frac{k}{2\sqrt{4}} = m \Rightarrow k = 4m$$

Since $g(x)$ is continuous at $x=3$

$$k\sqrt{4} = 3m+2 \Rightarrow 2k = 3m+2$$

Using these equations
we get $m = \frac{2}{5}$; $k = \frac{8}{5}$

$\therefore m+k = 2$

$\therefore$ Correct option is (3)