abstract We identified star clusters in archived HST/WFPC2 images of the merger and ultra-luminous infrared galaxy NGC 6240, with the aim of investigating whether star cluster properties (luminosity, age and mass) in such an extreme environment differ from those of clusters in less luminous starburst galaxies. We found 54 star clusters in all of the F450W, F547M and F814W exposures, of which 41 are located in the main body of NGC 6240 and 13 in the galactic tails. Given that only two colours are available to derive two independent variables (cluster reddening and age), we adopted an \textit{ad hoc} procedure to statistically derive cluster parameters under the assumption that the cluster metallicity is LMC-like. The colours of each cluster are fitted to STARBURST99 models of fixed mass and variable ages and reddenings. All cluster reddening and age solutions with $\chi^2 < 1$ are considered to be consistent with the data. Masses are derived by scaling the luminosity of the models with best-fit $\chi^2 < 1$ by the observed $V$ luminosity, after correction for reddening and distance. Therefore, each cluster is described by a range of reddening values, ages and masses; for each of these parameters we derive probability functions. We thus infer that the most probable age of the observed clusters is between 5 and 13 Myr and their most probable mass is about $(1-2) \times 10^5 \, M_\odot$. A low probability exists for clusters as massive as $10^8 \, M_\odot$, as well as for the trend that the mean cluster mass increases towards the double nuclei of NGC 6240. Comparison with star clusters in starburst galaxies seems to point to more massive clusters being formed in more massive galaxies and gas-rich mergers, while the overall cluster mass distribution might be relatively independent of the details of the associated starburst where dense, massive clusters preferentially form.