Close-up Lens Set (+1, +2 and +4) for Raspberry Pi HQ Camera 16 mm Telephoto Lens

Author: Kim Miikki
Date: 30.6.2020

Higher magnification of subjects can be achieved by adding close-up lenses to a Raspberry Pi 16 mm telephoto lens. Magnification is due to a shorter focal length which allows to capture pictures closer to the subject.

A set of a 37 mm +1, +2 and +4 diopters stackable close-up lenses where used in June 2020 to determine the minimum focusing distance of the subject (a ruler) and to calculate the magnification as a function of diopters. The camera was moved to the shortest distance of the subject which the lens or lens and close-up lens(es) could be focused. Focusing distances were measured in these experiments from the camera sensor to the subject.

Figure 1 shows the minimum focusing distance:

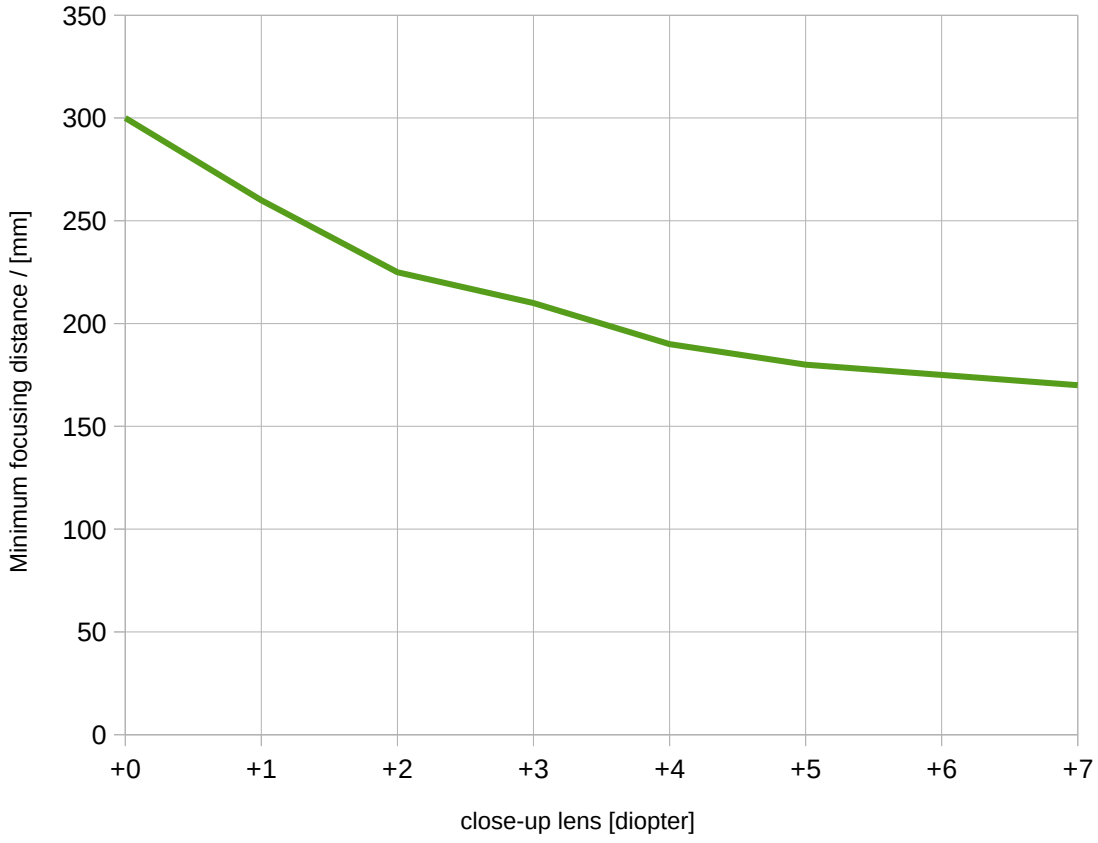

Figure 1. Minimum focusing distance between camera sensor and the subject.

Image magnification is defined as $\beta = y'/y$, where y' is sensor size and y *is* subject size. A HQ camera sensor area is 6.287 mm x 4.712 mm, from where 6.287 mm were used for the calculation of β. The results are shown in Table 1 and Figure 2.

Close-up [diopter]	y [mm]	β	d [mm]
0	97	0.065	300
+1	80	0.079	260
+2	67	0.094	225
+3	59	0.107	210
+4	51	0.123	190
+5	46	0.137	180
+6	42	0.150	175
+7	39	0.161	170

Table 1. Subject size (y), image magnification (β) and minimum focusing distances (d) with different close-up lens combinations.

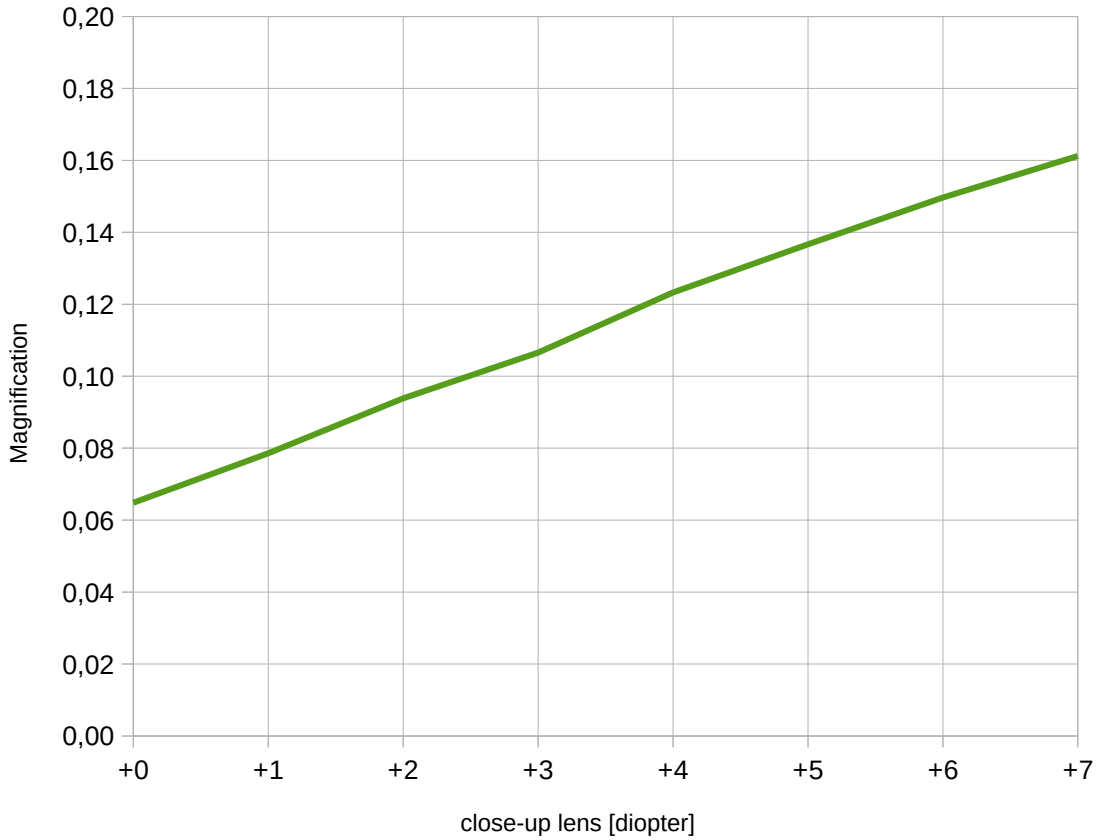

Figure 2. Magnification of different close-up lens combinations.