$$\sum_{k=1}^{3} z_k^{20} = \frac{2a_{n-2}^{10}}{a_n^{10}} + \frac{a_{n-1}^{20}}{a_n^{20}} - \frac{20a_{n-2}a_{n-3}^{6}}{a_n^{7}} + \frac{20a_{n-1}^{17}a_{n-3}}{a_n^{18}} - \frac{20a_{n-1}^{18}a_{n-2}}{a_n^{19}} - \frac{80a_{n-2}^{7}a_{n-3}^{2}}{a_n^{9}} - \frac{100a_{n-1}^{2}a_{n-2}^{9}}{a_n^{11}} + \frac{150a_{n-1}^{14}a_{n-3}^{2}}{a_n^{16}} + \frac{170a_{n-1}^{16}a_{n-2}^{2}}{a_n^{18}} + \frac{520a_{n-1}^{11}a_{n-3}^{3}}{a_n^{14}} - \frac{800a_{n-1}^{14}a_{n-2}^{3}}{a_n^{17}} + \frac{175a_{n-2}^{4}a_{n-3}^{4}}{a_n^{8}} + \frac{825a_{n-1}^{8}a_{n-3}^{4}}{a_n^{12}} + \frac{825a_{n-1}^{4}a_{n-2}^{8}}{a_n^{12}} + \frac{2275a_{n-1}^{12}a_{n-2}^{4}}{a_n^{16}} + \frac{504a_{n-1}^{5}a_{n-3}^{5}}{a_n^{10}} - \frac{4004a_{n-1}^{10}a_{n-2}^{5}}{a_n^{15}} - \frac{2640a_{n-1}^{6}a_{n-2}^{7}}{a_n^{13}} + \frac{4290a_{n-1}^{8}a_{n-2}^{6}}{a_n^{14}} - \frac{180a_{n-1}a_{n-2}^{8}a_{n-3}}{a_n^{10}} - \frac{320a_{n-1}^{15}a_{n-2}a_{n-3}}{a_n^{17}} + \frac{420a_{n-1}a_{n-2}^{2}a_{n-3}^{5}}{a_n^{8}} - \frac{1820a_{n-1}^{12}a_{n-2}a_{n-3}^{2}}{a_n^{15}} + \frac{2100a_{n-1}^{13}a_{n-2}^{2}a_{n-3}}{a_n^{16}} - \frac{1120a_{n-1}^{3}a_{n-2}a_{n-3}^{5}}{a_n^{9}} - \frac{1120a_{n-1}a_{n-2}^{5}a_{n-3}^{3}}{a_n^{9}} - \frac{2400a_{n-1}^{3}a_{n-2}^{7}a_{n-3}}{a_n^{11}} - \frac{4400a_{n-1}^{9}a_{n-2}a_{n-3}^{3}}{a_n^{13}} - \frac{7280a_{n-1}^{11}a_{n-2}^{3}a_{n-3}}{a_n^{15}} - \frac{4200a_{n-1}^{6}a_{n-2}a_{n-3}^{4}}{a_n^{11}} + \frac{14300a_{n-1}^{9}a_{n-2}^{4}a_{n-3}}{a_n^{14}} + \frac{9240a_{n-1}^{5}a_{n-2}^{6}a_{n-3}}{a_n^{12}} - \frac{15840a_{n-1}^{7}a_{n-2}^{5}a_{n-3}}{a_n^{13}} + \frac{1050a_{n-1}^{2}a_{n-3}^{4}a_{n-3}^{2}}{a_n^{8}} + \frac{2520a_{n-1}^{2}a_{n-2}^{6}a_{n-3}^{2}}{a_n^{10}} + \frac{8580a_{n-1}^{10}a_{n-2}^{2}a_{n-3}^{2}}{a_n^{14}} - \frac{2800a_{n-1}^{2}a_{n-2}^{3}a_{n-3}^{4}}{a_n^{9}} + \frac{13200a_{n-1}^{7}a_{n-2}^{2}a_{n-3}^{3}}{a_n^{12}} - \frac{19800a_{n-1}^{8}a_{n-2}^{3}a_{n-3}^{2}}{a_n^{13}} + \frac{6300a_{n-1}^{4}a_{n-2}^{2}a_{n-3}^{4}}{a_n^{10}} - \frac{12600a_{n-1}^{4}a_{n-2}^{5}a_{n-3}^{2}}{a_n^{11}} + \frac{23100a_{n-1}^{6}a_{n-2}^{4}a_{n-3}^{2}}{a_n^{12}} + \frac{8400a_{n-1}^{3}a_{n-2}^{4}a_{n-3}^{3}}{a_n^{10}} - \frac{16800a_{n-1}^{5}a_{n-2}^{3}a_{n-3}^{3}}{a_n^{11}}$$

$$\sum_{k=1}^{3} z_k^{18} = \frac{3a_{n-3}^{6}}{a_n^{6}} - \frac{2a_{n-2}^{9}}{a_n^{9}} + \frac{a_{n-1}^{18}}{a_n^{18}} + \frac{18a_{n-1}^{15}a_{n-3}}{a_n^{16}} - \frac{18a_{n-1}^{16}a_{n-2}}{a_n^{17}} + \frac{63a_{n-2}^{6}a_{n-3}^{2}}{a_n^{8}} + \frac{81a_{n-1}^{2}a_{n-2}^{8}}{a_n^{10}} + \frac{117a_{n-1}^{12}a_{n-3}^{2}}{a_n^{14}} + \frac{135a_{n-1}^{14}a_{n-2}^{2}}{a_n^{16}} - \frac{90a_{n-2}^{3}a_{n-3}^{4}}{a_n^{7}} + \frac{126a_{n-1}^{3}a_{n-3}^{5}}{a_n^{8}} + \frac{330a_{n-1}^{9}a_{n-3}^{3}}{a_n^{12}} - \frac{546a_{n-1}^{12}a_{n-2}^{3}}{a_n^{15}} + \frac{378a_{n-1}^{6}a_{n-3}^{4}}{a_n^{10}} - \frac{540a_{n-1}^{4}a_{n-2}^{7}}{a_n^{11}} + \frac{1287a_{n-1}^{10}a_{n-2}^{4}}{a_n^{14}} - \frac{1782a_{n-1}^{8}a_{n-2}^{5}}{a_n^{13}} + \frac{1386a_{n-1}^{6}a_{n-2}^{6}}{a_n^{12}} - \frac{108a_{n-1}a_{n-2}a_{n-3}^{5}}{a_n^{7}} - \frac{144a_{n-1}a_{n-2}^{7}a_{n-3}}{a_n^{9}} - \frac{252a_{n-1}^{13}a_{n-2}a_{n-3}}{a_n^{15}} - \frac{1188a_{n-1}^{10}a_{n-2}a_{n-3}^{2}}{a_n^{13}} + \frac{1404a_{n-1}^{11}a_{n-2}^{2}a_{n-3}}{a_n^{14}} + \frac{630a_{n-1}a_{n-2}^{4}a_{n-3}^{3}}{a_n^{8}} + \frac{1512a_{n-1}^{3}a_{n-2}^{6}a_{n-3}}{a_n^{10}} - \frac{2160a_{n-1}^{7}a_{n-2}a_{n-3}^{3}}{a_n^{11}} - \frac{3960a_{n-1}^{9}a_{n-2}^{3}a_{n-3}}{a_n^{13}} - \frac{1260a_{n-1}^{4}a_{n-2}a_{n-3}^{4}}{a_n^{9}} + \frac{5940a_{n-1}^{7}a_{n-2}^{4}a_{n-3}}{a_n^{12}} - \frac{4536a_{n-1}^{5}a_{n-2}^{5}a_{n-3}}{a_n^{11}} + \frac{945a_{n-1}^{2}a_{n-2}^{2}a_{n-3}^{4}}{a_n^{8}} - \frac{1512a_{n-1}^{2}a_{n-2}^{5}a_{n-3}^{2}}{a_n^{9}} + \frac{4455a_{n-1}^{8}a_{n-2}^{2}a_{n-3}^{2}}{a_n^{12}} + \frac{4536a_{n-1}^{5}a_{n-2}^{2}a_{n-3}^{3}}{a_n^{10}} - \frac{7560a_{n-1}^{6}a_{n-2}^{3}a_{n-3}^{2}}{a_n^{11}} + \frac{5670a_{n-1}^{4}a_{n-2}^{4}a_{n-3}^{2}}{a_n^{10}} - \frac{3360a_{n-1}^{3}a_{n-2}^{3}a_{n-3}^{3}}{a_n^{9}}$$