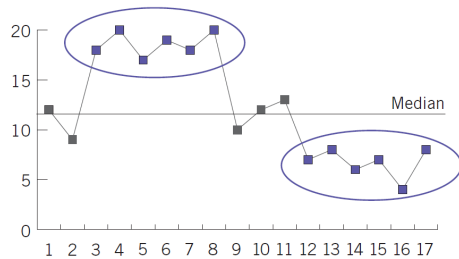


Four rules for identifying signals of change in run charts

Run charts are graphs that display data about a process or system over time; they are frequently used for monitoring quality improvement initiatives. The following is an introduction to the four rules for recognizing signals of change in run charts that should prompt you to ask questions about what may have caused the change. These rules help us to react appropriately while considering all the data, not each individual data point.

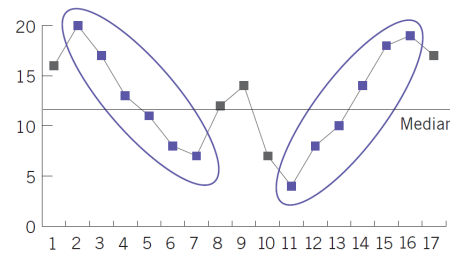
Rule 1: Shift



A shift is six or more consecutive data points either all above or all below the median.

Data points exactly equal to the median do not add to nor break a shift; these data points are ignored when counting.

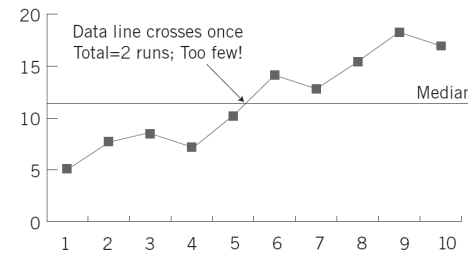
Rule 2: Trend



A trend is five or more consecutive data points either all going up or all going down.

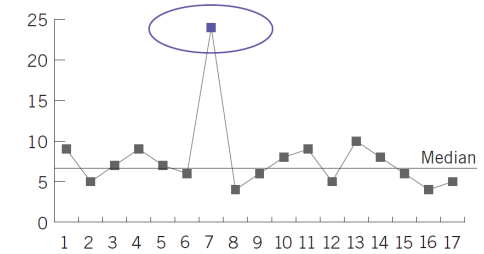
Consecutive identical points do not add to nor break a trend, but only the first of these points counts toward the total.

Rule 3: Too few or too many runs



The number of runs is found by counting the number of times the data line crosses the median, and adding one.

Rule 4: Astronomical point



An astronomical point is an unusually large or small number. It must be exceptional to every person viewing the chart.

Run Chart Rule 3 – The Number of Runs

Total count of number of data points displayed on the run chart (excluding any data points falling exactly on the median)	Minimum number of runs needed for random variation (if there are fewer than this number, non-random variation is detected)	Maximum number of runs allowed for random variation (if there are more than this number, non-random variation is detected)
10	3	9
11	3	10
12	3	11
13	4	11
14	4	12
15	5	12
16	5	13
17	5	13
18	6	14
19	6	15
20	6	16
21	7	16
22	7	17
23	7	17
24	8	18
25	8	18
26	9	19
27	10	19
28	10	20
29	10	20
30	11	21

Values described by Swed and Eisenhart, 1943, summarized by both Ott, 1975 and Provost and Murray, 2011