

Teaching Notes for Kiwi Kapers 3 Worksheet 1

The population distribution is shown in the first dot plot and box plot.

The second dot plot and box plot is the distribution of **sample medians** for samples of size 30 from the kiwi population. Ideally you should work with the sample medians from the all the samples done as a class in Kiwi Kapers 2, and there is a space to graph them. In case you do not have these medians recorded, a set of 35 samples has been generated using technology to mimic student results in Kiwi Kapers 2.

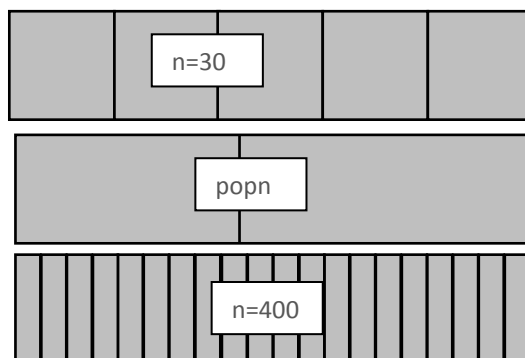
The third dot plot and box plot show the distribution of **sample medians** for samples of size 400 from the kiwi population. Again we have used technology to do this. There are 35 samples for $n = 400$ which is close to the number of samples we took as a class for $n = 30$.

The two sample sizes $n = 30$ and $n = 400$ have been deliberately chosen as the difference in width of the IQR for sample medians is dramatic when compared with the population IQR and with one another. The pictures to the below show the number of sample median IQR's that equal the population IQR, which you may decide to show students.

Q1 Answer: Samples of size 30 generate sample medians with an IQR of about $1/5^{\text{th}}$ the width of the population IQR.

Q2 Answer: Samples of size 400 generate sample medians with an IQR of about $1/20^{\text{th}}$ the width of the population IQR.

Students should be able to see these differences from the summary picture.

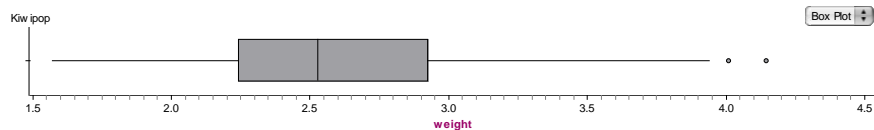
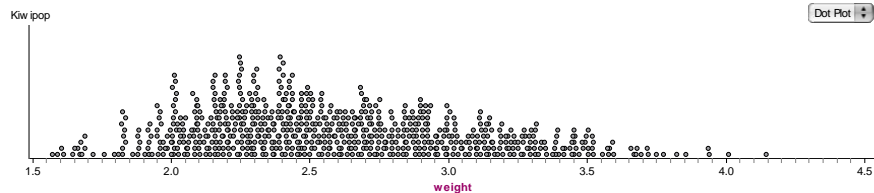


Q3 is more challenging. It is looking for the $1/\sqrt{n}$ link: IQR for sample medians (sample size = n) is approximately $1/\sqrt{n}$ of the population IQR. When $n = 400$ the IQR of the sample medians is approximately $1/\sqrt{400}$ or $1/20^{\text{th}}$ of population IQR. When $n = 30$ the IQR of the sample medians is approximately $1/\sqrt{30}$ or $\sim 1/5^{\text{th}}$ of population IQR.

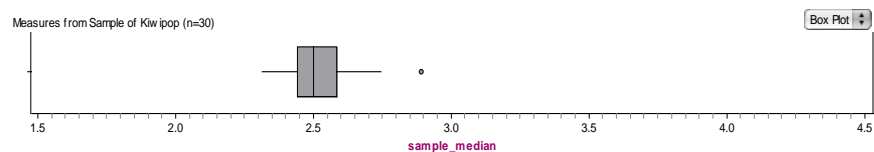
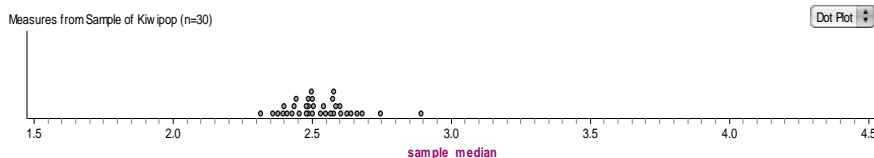
Note: we chose not to use $n = 25$ as all the previous work had been with samples of size 30.

Kiwi Kapers 3 Worksheet 1

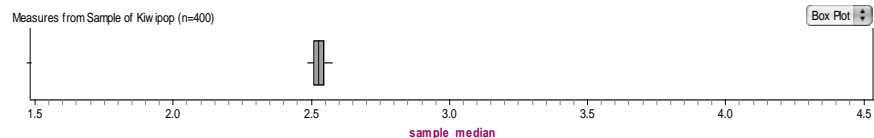
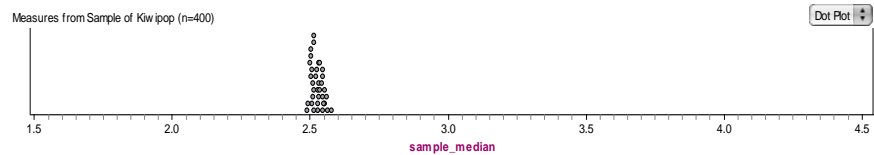
Entire kiwi population weights, median weight = 2.529 kg



Sample medians for samples of size 30

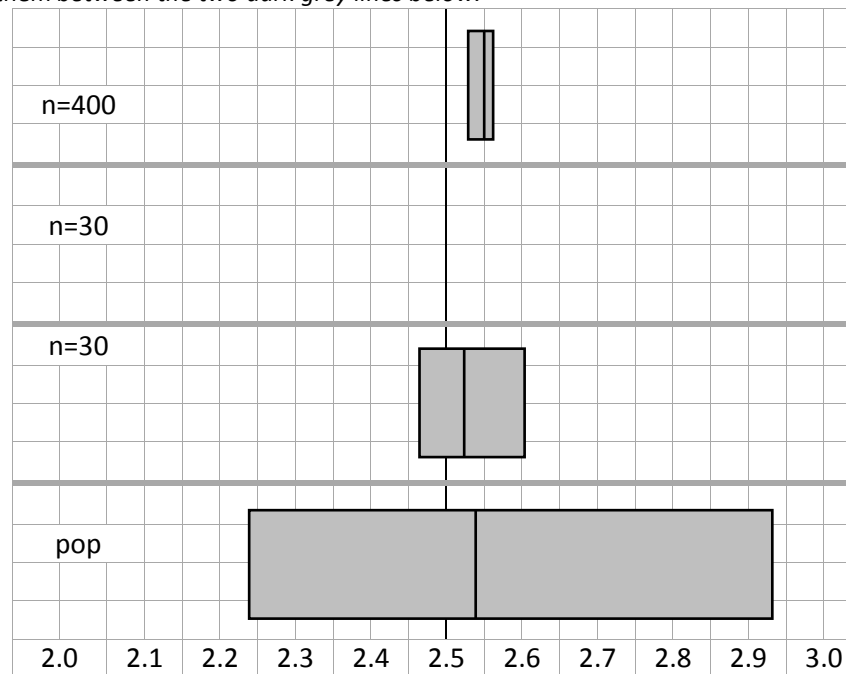


Sample medians for samples of size 400



Kiwi Kapers 3 Worksheet 1 continued

You have a class set of medians of sample medians for samples of size 30 from Kiwi Kapers 2. Find the median, upper quartile and lower quartile of these sample medians and add them *between the two dark grey lines below*.



Measure the widths of the four boxes and use the measurements to complete the statements below. **Aim for a simple fraction with a numerator of 1.**

1. I notice that the width of the IQR for *sample medians when the sample size, n, is 30* is approximately _____ (as a fraction) of the width of the population IQR.
2. I notice that the width of the IQR for *sample medians when the sample size, n, is 400* is approximately _____ (as a fraction) of the width of the population IQR.
3. Given the extra information that for samples of size 100 sample medians have IQR about $1/10^{\text{th}}$ the width of the population IQR, and using your answers above, describe the apparent relationship between the widths of the IQR for sample medians of sample size n and the population IQR.

Look for a simple relationship between n and the denominator of your fraction.
