*A problem-solving and modelling task suitable for students working with* ***Statistics (Focus: B-to-B stem/leaf plots)***

**Modelling Northern Qld**

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**QCAA approach to problem solving and mathematical modelling**

(<https://www.qcaa.qld.edu.au/downloads/portal/syllabuses/snr_maths_methods_19_syll.pdf>)

**How important is height for the Townsville Fire players?**

Australian Curriculum Content Descriptors:

**Year 9**

Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including ‘skewed’, ‘symmetric’ and ‘bi modal’ (ACMSP282)

1. How important is the height of the Townsville Fire players when compared to other teams? Do you know if this highly successful team tends to be “taller” or “shorter” than other WNBL teams? Add your opinion here before you continue:

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Research & Formulate

1. How would you go about figuring out if a team is “taller” or “shorter” than another team? Would you include the heights of particularly tall or short players or would you leave them out of your analysis? Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Let’s start with some background info about the Townsville Fire and the heights of the current players.**

**The JCU Townsville Fire are a professional female basketball competing in the Australian Women’s National Basketball League (WNBL). They are the only professional sporting team of any discipline in the northern half of Australia.**

The Townsville Fire was established for the 2001/2002 WNBL season by the Townsville Basketball Inc. but folded at the end of the 2010/2011 season. The team was reformed by the 2011/2012 season and made the Grand Finals in the 2012/2013 and 2013/2014 seasons. In 2014 Townsville Fire announced that James Cook University would be the principal partner for 3 years and the team would be known as the JCU Townsville Fire for this period.

So who is on the team? In October 2017, these are the players and their heights.

**Table 1. 2017-2018 JCU Townsville Fire Roster**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Position** | **Number** | **Nationality** | **Name** | **Height (m)** |
| SG | 1 | USA | MINCY, Laurin | 1.83 |
| SG | 3 | Aust | GOODCHILD, Miela | 1.75 |
| PG | 6 | “ | DONNELLY, Mikhaela | 1.73 |
| SG | 7 | “ | ANDREWS, Haylee | 1.75 |
| C | 8 | “ | BATKOVIC, Suzy (Captain) | 1.94 |
| SF | 10 | “ | MURRAY, Mia | 1.84 |
| PF | 14 | “ | GARBIN, Darcee | 1.88 |
| C | 15 | “ | AOKUSO, Zitina | 1.92 |
| SF | 21 | “ | WHITTLE, Marena | 1.80 |
| PG | 22 | “ | WILSON, Kelly | 1.70 |
| PF | 23 | “ | GEORGE, Cayla | 1.93 |
| SG | 24 | USA | WIESE, Sydney | 1.83 |
| PG | 32 | Aust | COCKS, Micaela | 1.74 |

Legend: C – Centre; PF – Power Forward; PG – Point guard; SF – Small Forward; SG – Shooting Guard

What do you understand by the term *data*? What data is present in Table 1?

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1. To compare the heights of players in different teams, we could construct a back-to-back histogram or a back-to-back stem-and-leaf plot. Which of these options would allow us to see the individual heights of the players as well as to compare the spread of players’ heights for the two teams? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Below is data relating to two opposition teams of the Townville Fire. The “Sydney Uni Games” players were in first place on the Championship ladder at the time these statistics were captured and the “Canberra Capitals” were in last place.

|  |  |
| --- | --- |
| Sydney Uni Games players  | Canberra Capitals players  |
| **Name** | **Height (m)** | **Name** | **Height (m)** |
| [Walmsley, Susannah](https://en.wikipedia.org/w/index.php?title=Susannah_Walmsley&action=edit&redlink=1) | 1.70 | [Bass, Mistie](https://en.wikipedia.org/wiki/Mistie_Bass) | 1.93  |
| [Moffatt, Hayley](https://en.wikipedia.org/wiki/Hayley_Moffatt) | 1.76  | [Magbegor, Eziyoda](https://en.wikipedia.org/wiki/Eziyoda_Magbegor) | 1.93 |
| [Tupaea, Tahlia](https://en.wikipedia.org/wiki/Tahlia_Tupaea) | 1.75  | [Hurst, Natalie](https://en.wikipedia.org/wiki/Natalie_Hurst) **(C)** | 1.63 |
| [Hamson, Jennifer](https://en.wikipedia.org/wiki/Jennifer_Hamson) | 2.00  | [Bourne, Callie](https://en.wikipedia.org/w/index.php?title=Callie_Bourne&action=edit&redlink=1) | 1.80 |
| [McLean, Cassidy](https://en.wikipedia.org/w/index.php?title=Cassidy_McLean&action=edit&redlink=1) | 1.78  | [Gaze, Kate](https://en.wikipedia.org/wiki/Kate_Gaze) | 1.78  |
| [Wilson, Alex](https://en.wikipedia.org/wiki/Alex_Wilson_%28basketball%29) | 1.80  | [Jarry, Rachel](https://en.wikipedia.org/wiki/Rachel_Jarry) | 1.85  |
| [Greaves, Shanae](https://en.wikipedia.org/wiki/Shanae_Greaves) | 1.85  | [Wehrung, Abigail](https://en.wikipedia.org/wiki/Abigail_Wehrung) | 1.78  |
| [Ebzery, Katie-Rae](https://en.wikipedia.org/wiki/Katie-Rae_Ebzery) | 1.78  | [Paalvast, Chevannah](https://en.wikipedia.org/wiki/Chevannah_Paalvast) | 1.80  |
| [Boag, Carly](https://en.wikipedia.org/wiki/Carly_Boag) | 1.88  | [Froling, Keely](https://en.wikipedia.org/wiki/Keely_Froling) | 1.88 |
| [Snell, Belinda](https://en.wikipedia.org/wiki/Belinda_Snell) **(C)** | 1.80  | [Scherf, Lauren](https://en.wikipedia.org/wiki/Lauren_Scherf) | 1.96  |
| [McSpadden, Lara](https://en.wikipedia.org/wiki/Lara_McSpadden) | 1.94  | [Rocci, Maddison](https://en.wikipedia.org/w/index.php?title=Maddison_Rocci&action=edit&redlink=1) | 1.67  |
| [Taylor, Asia](https://en.wikipedia.org/wiki/Asia_Taylor) | 1.85  | [Hooper, Jordan](https://en.wikipedia.org/wiki/Jordan_Hooper) | 1.88  |
| [Graham, Sarah](https://en.wikipedia.org/wiki/Sarah_Graham_%28basketball%29) | 1.63  | [Bass, Mistie](https://en.wikipedia.org/wiki/Mistie_Bass) | 1.93  |
| [Walmsley, Susannah](https://en.wikipedia.org/w/index.php?title=Susannah_Walmsley&action=edit&redlink=1) | 1.70 | [Magbegor, Eziyoda](https://en.wikipedia.org/wiki/Eziyoda_Magbegor) | 1.93  |

When you look at the raw scores below, what do you notice about the heights of the players in the high performing team versus the low performing team? Anything noticeable yet? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. To analyse the data relating to player heights and to keep individual heights visible in the data, you would have identified a back-to-back stem-and-leaf plot as the best option. Construct the graph in the space below comparing the Townsville Fire with the top performing team, the Sydney Uni Games. Make sure that you think carefully about the stem you need to use first and set up a legend before you complete the rest of the graph.

Solve

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *Title goes here (make it clear what data is being displayed)*

 Townsville Fire Sydney Uni Games

Legend

1. Describe the shape of each side of the stem-and-leaf plot in terms of symmetry and skewness. What does that tell you about the height of the players in each team? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Describe the spread of the data on each side of the plot. What does that tell you about the height of the players in each team?

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Evaluate & verify

1. How do your findings compare to your initial thoughts about height and performance for a basketball team? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Now construct another graph in the space below comparing the Townsville Fire with the bottom performing team, the Canberra Capitals. It would make sense to keep the same legend and stems as your first stem-and-leaf plot so that you can compare your graphs more easily later on.

Solve

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *Title goes here (make it clear what data is being displayed)*

 Townsville Fire Canberra Capitals

Legend

1. Describe the shape of each side of the stem-and-leaf plot in terms of symmetry and skewness. What does that tell you about the height of the players in each team? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Describe the spread of the data on each side of the plot. What does that tell you about the height of the players in each team?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Evaluate & verify

1. How do your findings compare to your initial thoughts about height and performance for a basketball team? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Who would you say is the “tallest”, the “second tallest” and the “shortest” team, based on the stem-and-leaf plots?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. To verify your choice, calculate the mean and median player height for each team (lines for working are provided below). Could you use any of these calculations to strengthen your argument in Question 13 or would that change your answer? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Communicate

1. The Townsville Fire and Sydney Uni Games are well above the Canberra Capitals at this stage of the season. Based on your data analysis, would you say that height might be a significant factor for the Canberra Capitals’ poor season so far or not? Should they invest in some taller players for next season? Justify your response with what you found out from the stem-and-leaf plots and your mean/median calculations.

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**Sources for local information**:

<https://en.wikipedia.org/wiki/Townsville_Fire>

<https://en.wikipedia.org/wiki/2017%E2%80%9318_Townsville_Fire_season>

<https://en.wikipedia.org/wiki/2017%E2%80%9318_Sydney_Uni_Flames_season>

<https://en.wikipedia.org/wiki/2017%E2%80%9318_Canberra_Capitals_season>