

# SPORTS SALARIES

## Lesson 1: Salary Samples

### Australian Curriculum: Mathematics (Year 8)

**ACMSP206:** Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes.

**ACMSP207:** Investigate the effect of individual data values, including outliers, on the mean and median.

**ACMSP284:** Investigate techniques for collecting data, including census, sampling and observation.

**ACMSP293:** Explore the variation of means and proportions of random samples drawn from the same population.

### Lesson abstract

Students are given an NBA “team”, composed of a random sample of 15 NBA players. They graph the spread of salaries in their team and calculate the mean and median salaries. Students discuss how a real NBA team may be different from their randomly sampled teams.

### Mathematical purpose (for students)

We will explore variation in the salaries of NBA players.

### Mathematical purpose (for teachers)

Students take random samples from a dataset, graph their data, and calculate mean and median. They compare and justify the means and medians of each random sample and discuss the variation.

Suggested presentation 1-2 lessons of one hour each.

Vocabulary encountered Lesson materials

- |                 |  |
|-----------------|--|
| • mean          | • 1a Student Samples PDF; or                   |
| • median        | • 1b Make Your Own Random NBA Team Spreadsheet |
| • outlier       | • Post-it notes                                |
| • random sample |  |
| • spread        |  |
| • variation     |  |

Note: This lesson can be conducted either using printed worksheets or in Microsoft Excel, as suits your class.

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We value your feedback after this lesson via our website.

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# Introduction

Discuss with students:

- *How much do you think NBA players are paid?*
- *Do you think every NBA player is paid the same salary?*
- *How do you think player salaries might vary in a team? How much do you think they might vary across teams?*

Explain to students that they will be investigating the salaries of real NBA players from the 2016-17 NBA season. They will take a random sample of 15 players, graph their salaries, and then compare their findings.

## Random samples

There are two options for providing students with a random sample of NBA players:

- *1a Student Samples* PDF contains 30 student sheets, each displaying a different random sample of 15 NBA players. Give each student a sheet.
- *1b Make Your Own Random NBA Team Spreadsheet* will generate a random sample of 15 NBA players. Ask students to open the Spreadsheet and click the “Generate me a team!” button. They may need to click the “Enable Content” button at the top of the spreadsheet for the button to work correctly.

Once students have obtained their random sample, they can come up with a name for their team.

Students create a data display showing the spread of player salaries in their team. You can ask students to use stem-and-leaf plots, histograms, dot plots or alternatives as appropriate for your class. See [Teacher Sheet - My Random NBA Team](#) for an example of a completed worksheet.

As a class, compare findings. Ask students to describe the shapes of their data displays:

- *Are all the data points clustered closely together?*
- *Are there any outlying salaries?*
- *What does the variation in your team look like?*
- *Does every team have a similar spread of salaries?*

Come to the conclusion that you need a simple way to compare each team. What are some useful ways of comparing different datasets? Lead students to see that it may be useful to compare the *mean and median* salaries of each team.

Have students calculate the **mean** and **median** salaries for their teams. Ask: *does anyone have a team with:*

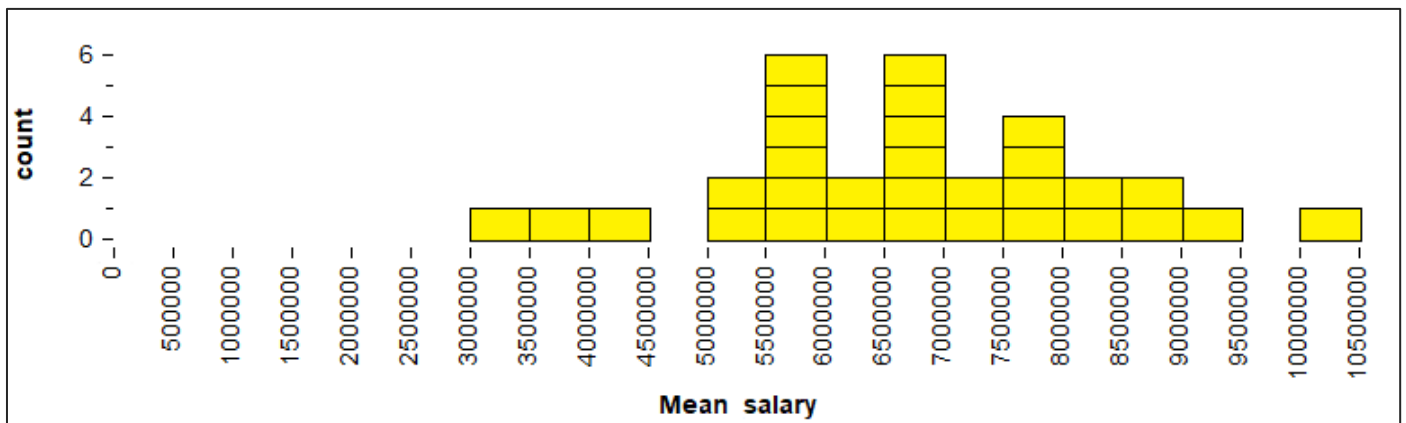
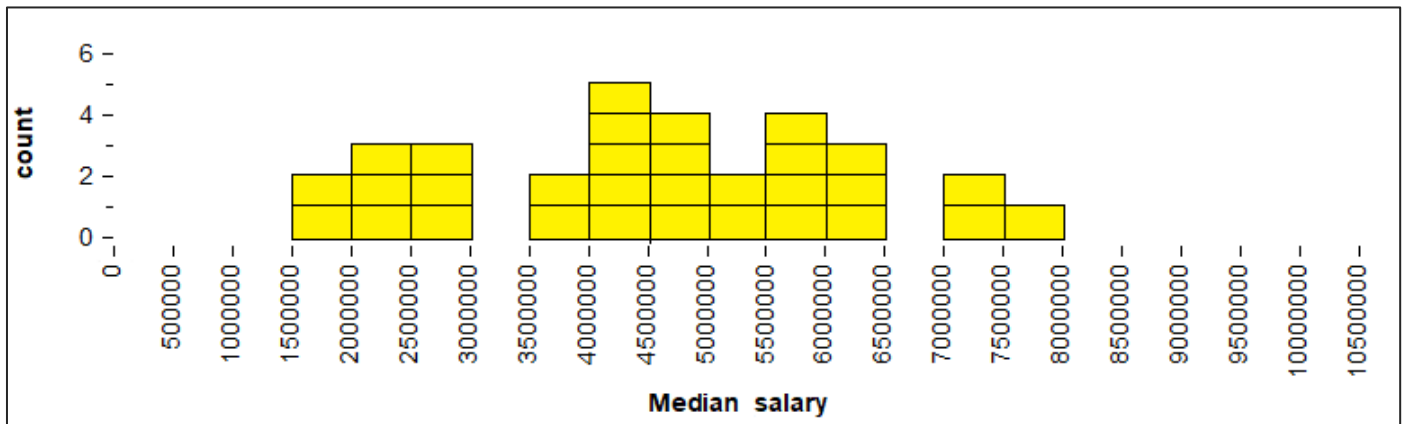
- *A high mean and a high median? Can you explain why, looking at your data?*
- *A low mean and a low median? Can you explain why, looking at your data?*
- *A high mean and a low median? Can you explain why, looking at your data?*
- *A low mean and a high median? Can you explain why, looking at your data?*

### Possible responses

- My team has a high mean and a high median because all of the players are paid very high salaries.
- My team has a low mean and a low median because all of the players are paid very low salaries.
- My team has a high mean and a low median because most players are paid very low salaries, but a few players are paid very high salaries.
- My team has a low mean and a high median because a few players are paid very low salaries but most players are paid high salaries.

# Comparing findings

Create two class histograms, one for mean salaries and one for median salaries. One way of doing this is to draw a plot on the whiteboard and have students record their teams' names and mean and median salaries on post-it notes and place them on the plot. The histograms below are for the teams in *1a Student Samples* PDF. The class histograms will be similar.



Ask students what they notice about the histograms. Focus on:

- The shape of these histograms, showing the large amount of variation and the wide spread of data.
- The mean salaries tend to be higher than the median salaries. *What might this tell us about our data?*

Take a photo of the class histograms for comparison in Lesson 2.

# Reflection

Discuss:

- *How do certain salaries (outliers) affect the mean and median of the team?*
- *Who would you expect to win in a match between the highest median salary and the lowest median salary? Why?*
- *Who would you expect to win between the team with the highest median salary and the highest mean salary? Why?*
- *Do you think that real NBA teams are formed by randomly selecting fifteen players? Why not?*

# Teacher Sheet - My Random NBA Team

Name: \_\_\_\_\_

Team Name: reSolve Rebounders

Player	Salary
Taj Gibson	8,950,000
Tony Allen	5,505,618
Salah Mejri	874,636
Brandon Knight	12,606,250
Aron Baynes	6,500,000
Spencer Hawes	6,348,759
Anthony Tolliver	8,000,000
Wilson Chandler	11,233,146
Robert Covington	1,015,696
Jarnell Stokes	980,431
Dante Exum	3,940,320
Shabazz Muhammad	3,046,299
Bobby Portis	1,453,680
Will Barton	3,533,333
Manu Ginobili	14,000,000

Stem (millions)	Leaf
0	874,636 980,431
1	015,696 453,680
2	
3	046,299 533,333 940,320
4	
5	505,618
6	348,759 500,000
7	
8	000,000 950,000
9	
10	
11	233,146
12	606,250
13	
14	000,000