Australian Curriculum Year 6 Mathematics Sample assessment | Model response

Goal difference — the importance of zero

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| Yr-6-Math_Goal-difference_cover |
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| Numbers above and below zero can be used to compare the progress of sporting teams in competitions. |
| You will:   * analyse data in league tables * use data to judge how teams are performing and to predict future results. |

Section 1. League tables

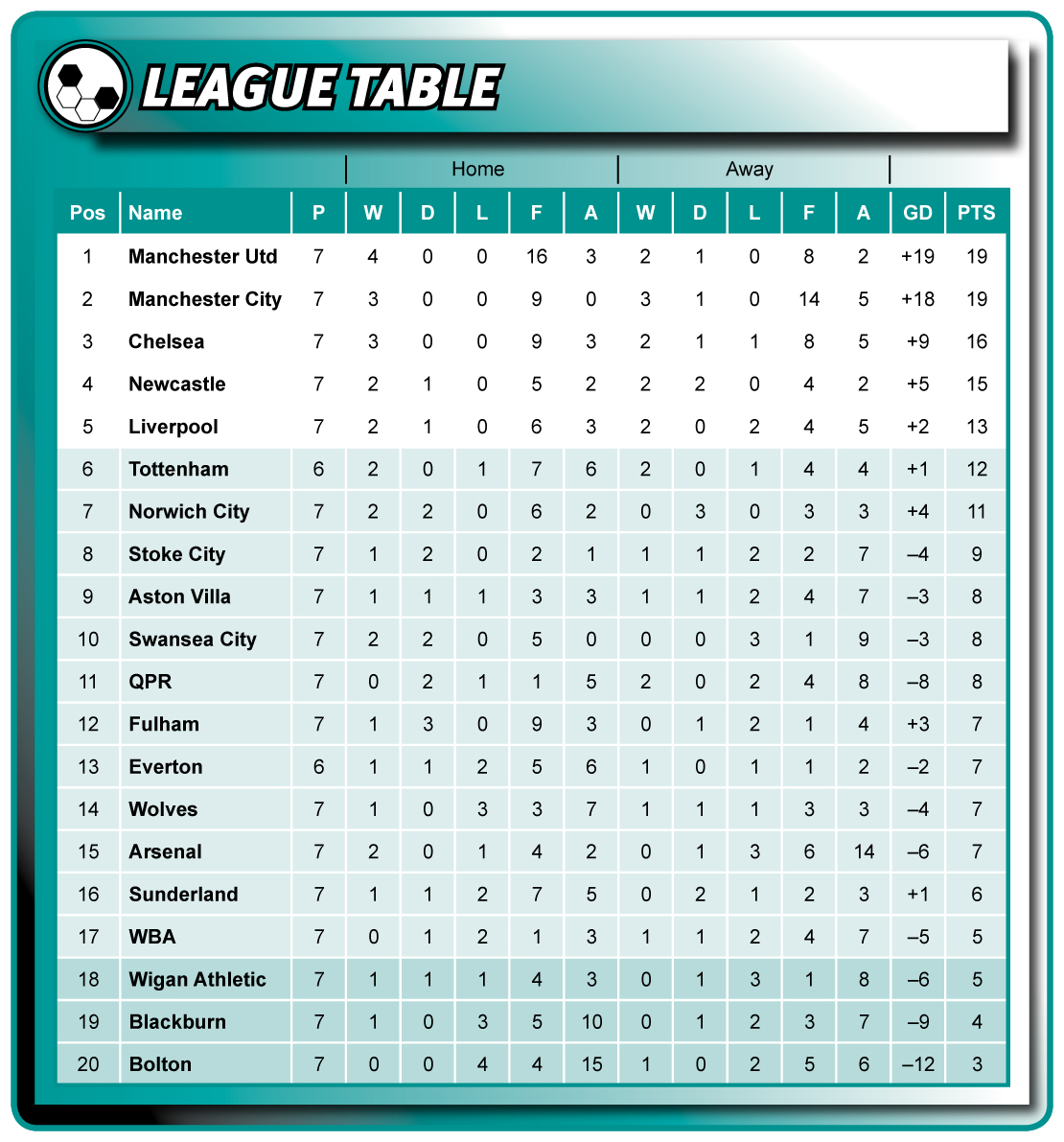
Focus question: How are the teams performing so far?

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| Description: Icons_classroom_task | As a class, explore how a table is used to show how teams progress in a competition. |

Look at a results table for a team sport. An example can be found on the English Premier League website, [*www.premierleague.com/page/LeagueTables*](http://www.premierleague.com/page/LeagueTables).

The table will look something like this.

Table 1: League table example



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| Description: Icons_classroom_task | Discuss these questions with your classmates. |

* What is the table showing?
* What do the letters stand for at the top of each column?
* What do the terms ‘Home’ and ‘Away’ mean?

Look at the **goal difference** (GD) column.

* What is ‘goal difference’?
* How is goal difference calculated?
* Use your calculator to test different ideas about how goal difference is calculated.
* Why are there negative numbers in the goal difference column?

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| Description: Icons_group_task | Work in a group to check the goal difference results for a number of teams. |

Think about a method you could use to check that a team’s goal difference has been calculated correctly. Use calculators to check your method.

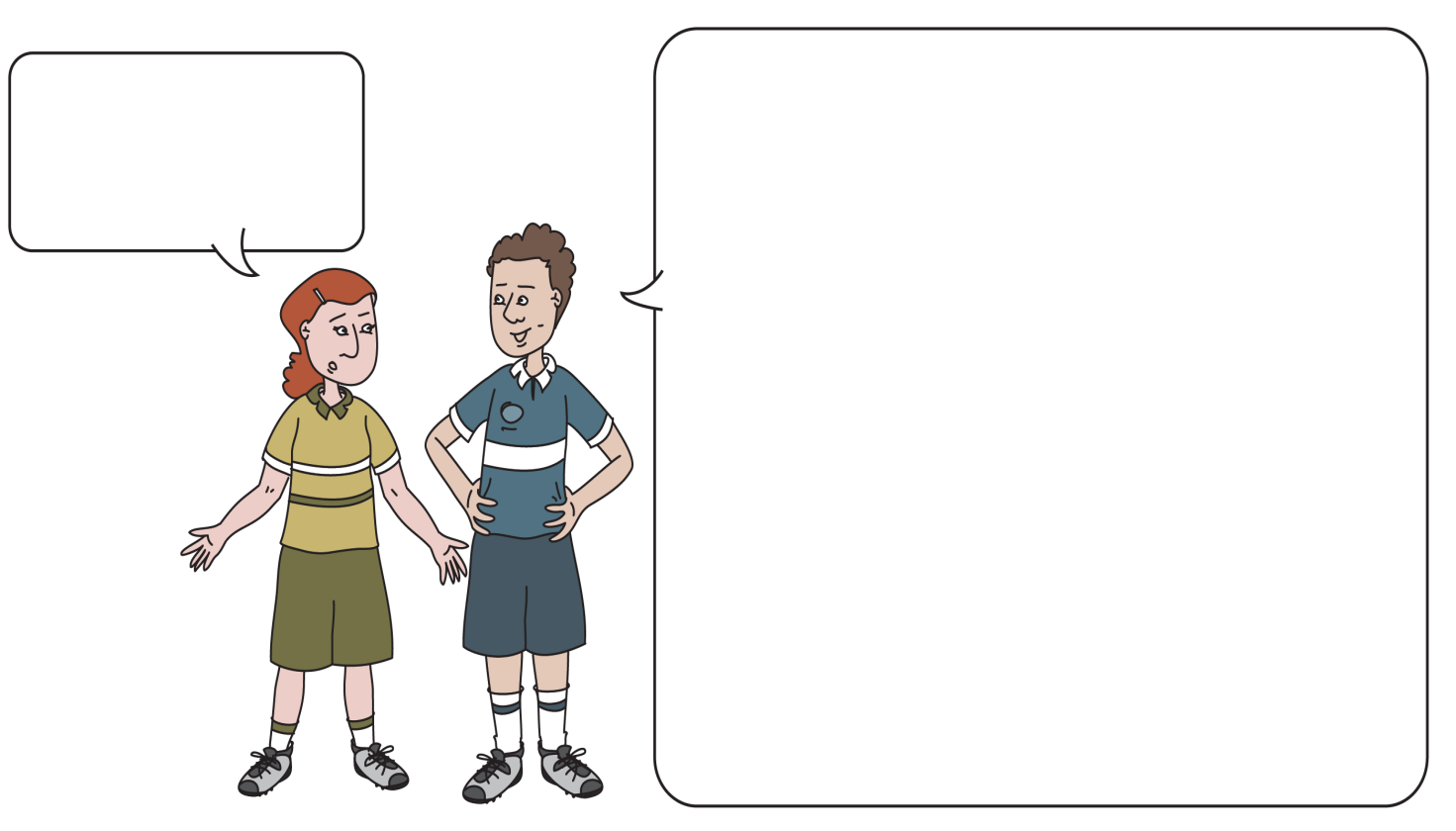
Report back to the class on:

* the method you used to check your team’s goal difference
* the accuracy of the results with the method that you used.

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| Icons_individual_task | Work individually to answer Question 1. |

Think about the uses we have for ‘zero’.

1. Complete the speech bubble below, giving reasons why you disagree with the person on the left.



**I don’t agree! There are *lots* of reasons that zero is important. First of all, …**

zero is a position on the number line — you can't leave out other numbers like 7 or 12 on a number line, so you can’t leave out zero.

Second, zero is a place holder in our number system. If you leave the zeros out of $1000 you’ll only have $1!

Also, zero is a reference point for positive and negative numbers — you can’t talk about temperatures below zero or negative goal differences without it. In a high-rise building, the ground floor is zero and the lift goes up and down from there — you can’t ignore that.

**‘Zero’ represents nothing, so I think you can ignore it.**

Section 2. Investigating a competition

Focus question: How are the teams performing so far?

Table 2 shows the draw and results for the first four games of an interschool soccer competition.

The Home team is listed first and in **bold**.

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| Description: Icons_classroom_task | As a class, discuss what the table is showing about how the teams have performed. |

Table 2: Interschool soccer competition results

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Week 1 | | Week 2 | | | Week 3 | | Week 4 | |
| **All Saints** vs Byfield | **4  1** | **All Saints** vs Cresthill | **5  3** | **Dalby** vs All Saints | | **0  5** | **Dalby** vs Highfields | **1  2** |
| **Cresthill** vs Dalby | **3  0** | **Byfield** vs Dalby | **2  0** | **Byfield** vs Eastside | | **1  4** | **Eastside** vs All Saints | **3  4** |
| **Eastside** vs Forestvale | **3  1** | **Green Valley** vs Eastside | **0  2** | **Cresthill** vs Highfields | | **2  2** | **Green Valley** vs Byfield | **0  3** |
| **Highfields** vs Green Valley | **0  6** | **Highfields** vs Forestvale | **0  1** | **Forestvale** vs Green Valley | | **2  3** | **Forestvale** vs Cresthill | **1  1** |

The data in Table 2 can be used to calculate each team’s points **for** and points **against** for their **home** games and their **away** games.

The calculations for one team have been completed for you below.

Sample calculation: Home and away results for All Saints

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| All Saints *home* game points *for:* 4 + 5 = 9  All Saints *home* game points *against*: 1 + 3 = 4  All Saints *away* game points *for*: 5 + 4 = 9  All Saints *away* game points *against*: 0 + 3 = 3 |

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| Icons_individual_task | Work individually to complete Questions 2 and 3. |

Table 3 analyses goals scored in the game. Some calculations have been done for you.   
You may need notepaper and a number line to work out the missing data.

1. Complete Table 3. For each team:
   1. calculate **for** and **against** points for **home** and **away** games   
      (look at the sample calculation on the previous page to help you)
   2. calculate the **total goal difference** at the end of Week 4 by:

* adding the total number of goals scored *for*
* then subtracting the total number of goals scored *against*.

**Hint:** Some teams will have a goal difference that is a negative number.

Table 3: Interschool soccer competition goal analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| School | Home games | | Away games | | Total goal difference |
| for | against | for | against |
| All Saints | 9 | 4 | 9 | 3 | 11 |
| Byfield | 3 | 4 | 4 | 4 | –1 |
| Cresthill | 5 | 2 | 4 | 6 | 1 |
| Dalby | 1 | 7 | 0 | 5 | –11 |
| Eastside | 6 | 5 | 6 | 1 | 6 |
| Forestvale | 3 | 4 | 2 | 3 | –2 |
| Green Valley | 0 | 5 | 9 | 2 | 2 |
| Highfields | 0 | 7 | 4 | 3 | –6 |

On the number line at the right, each line represents 1.

1. Complete the number line by following the steps below.
   1. Decide on the best place to put zero, and write it on the left side of the number line.
   2. Write numerals to show where each school’s goal difference fits on the line.
   3. Add a letter (**A** to **H**) next to the number that represents each school’s goal difference  
      on the right side of the number line.

Section 3. Interpreting data

Focus question: How does the table help us to compare teams?

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| Icons_individual_task | Work individually to complete Section 3. |

You can use the data in Table 3 to make judgments about how the teams are performing.

Analyse the data to see which teams have the best **attack** and **defence**, considering:

* a good **attacking** team usually scores a lot of goals
* a good **defending** team has very few goals scored against them.

1. Who is the strongest **attacking** team?

All Saints

Explain the evidence that supports your opinion. Show any calculations you used.

A: 9 + 9 = 18 B: 3 + 4 = 7 C: 5 + 4 = 9 D: 1 + 0 = 1

E: 6 + 6 = 12 F: 3 + 2 = 5 G: 0 + 9 = 9 H: 0 + 4 = 4

I added both “for” results in the home and away columns and found that All Saints scored the most goals, with 18. The next best school was Eastside with 12.

1. Who is the strongest **defending** team?

Eastside

Explain the evidence that supports your opinion. Show any calculations you used.

A: 4 + 3 = 7 B: 4 + 4 = 8 C: 2 + 6 = 8 D: 7 + 5 = 12

E: 5 + 1 = 6 F: 4 + 3 = 7 G: 5 + 2 = 7 H: 7 + 3 = 10

I added both “against” results in the home and away columns and found that Eastside had the least goals scored against them (6 goals).

1. Think about whether there is an advantage in playing games at **home** in this competition.
   1. CompleteTable 4 below to analyse the data.

Table 4: Home and away results

|  |  |  |  |
| --- | --- | --- | --- |
| School | Wins at home | Wins away | Difference  ( + or – ) |
| All Saints | 2 | 2 | 0 |
| Byfield | 1 | 1 | 0 |
| Cresthill | 1 | 0 | 1 |
| Dalby | 0 | 0 | 0 |
| Eastside | 1 | 2 | –1 |
| Forestvale | 0 | 1 | –1 |
| Green Valley | 0 | 2 | –2 |
| Highfields | 0 | 1 | –1 |
| Total | 5 | 9 | –4 |

* 1. Use your data to explain whether it was an **advantage** to play at home.

Overall there were 5 games won at home and 9 won away, so the total home and away difference is –4.

This data shows that there was no advantage in playing at home.

Another way to analyse the data is to find out which teams are improving as the season progresses.

Think about how the data could help you to judge whether a team is performing better now than at the beginning of the season.

1. Which team has **improved** the most throughout the competition?
   1. Use Table 5 to help analyse the data. Decide what headings and columns you will use.

Table 5: Most improved teams

|  |  |  |  |
| --- | --- | --- | --- |
| School | GD #1: Week 1 & 2  goal difference | GD #2: Week 3 & 4  goal difference | Improvement  (GD #2 – GD #1) |
| All Saints | 9 – 4 = 5 | 9 – 3 = 6 | 6 – 5 = 1 |
| Byfield | 3 – 4 = –1 | 4 – 4 = 0 | 0 – (–1) = 1 |
| Cresthill | 6 – 5 = 1 | 3 – 3 = 0 | 0 – 1 = –1 |
| Dalby | 0 – 5 = –5 | 1 – 7 = –6 | (–6) – (–5) = –1 |
| Eastside | 5 – 1 = 4 | 7 – 5 = 2 | 2 – 4 = –2 |
| Forestvale | 2 – 3 = –1 | 3 – 4 = –1 | (–1) – (–1) = 0 |
| Green Valley | 6 – 2 = 4 | 3 – 5 = –2 | (–2) – 4 = –6 |
| Highfields | 0 – 7 = –7 | 4 – 3 = 1 | 1 – (–7) = 8 |

* 1. Use your data to explain which team has **improved** the most.

I worked out the goal difference for each team in weeks 1 and 2 (GD #1), and for weeks 3 and 4 (GD #2). Then I subtracted the results to find each team’s goal difference between the first two and last two games.

Highfields was way ahead with a goal difference improvement of 8.   
Next best were All Saints and Byfield, with an improvement of 1.

The data shows that Highfields improved the most through the season.

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| **Information for teachers:** There is no preferred strategy for solving this problem, and different strategies may support different opinions. Comparing just the first and last games would be a reasonable strategy; using a simple line graph to track each team would be an interesting analysis. Assessment is based on whether the student has presented and justified a logical solution. |

Data can’t predict the future, but it can help us to judge the most likely outcome.

1. Analyse the data to **predict** who is most likely to win the games in Week 5.

For each prediction, use your data to explain why you have chosen that team.

Table 6: Predictions

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| Week 5 | Prediction  *Who is most likely to win?* | Evidence  *How does your data support your prediction?  Explain why.* |
| All Saints vs Forestvale | All Saints | All Saints are undefeated and have an overall goal difference of 11, while Forestvale’s is –2.  Also, Forestvale are at 0 goal difference on their last two games compared to the first two, so they’re not improving. |
| Byfield vs Highfields | Byfield | Byfield have a better overall goal difference (–1 vs –6).  Byfield have lost two games but these were to the top teams. They also won their last game 3–0. |
| Cresthill vs Green Valley | Cresthill | Cresthill have been more consistent than Green Valley.  Green Valley have a slightly higher overall goal difference (2 vs 1) but they have one of the worst scores when their first two games are compared with their last two. |
| Dalby vs Eastside | Eastside | Dalby have an overall goal difference of –11 and have only scored one goal in their four games.  Eastside have scored 12 goals and their goal difference is 6.  Dalby have 0 wins while Eastside have 3. |

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| **Information for teachers:** Again there is no preferred solution. Consider how well a strategy is explained by analysing the data. |