# Stargoal

Thank you for using the Stargoal resources.

Stargoal is a collaboration between primary school pupils and staff, astronomers, sports scientists and footballers.

Each film can be used as a stand-alone resource or combined with others to investigate different areas of Science and Physical Education, with additional cross curricular opportunities including in English, Mathematics and PSHE.

This resource is designed to provide suggestions of how to use the Stargoal: Dive into Data video, with possible extensions to take the learning further.

## Health and Safety and Emotional Well-being

You should perform a full risk assessment before undertaking any of these suggested activities. All activities should be assessed according to your own setting and aligning to local guidelines and recommendations including appropriate warm up for physical activity i.e. CLEAPSS ([www.primary.cleapss.org.uk](http://www.primary.cleapss.org.uk/)) and Association for Physical Education ([www.afpe.org.uk/physical-education/](http://www.afpe.org.uk/physical-education/)).

Within the context of this activity, children will have successes and failures at playing football and goal scoring, and will also be asked to give constructive advice to other players. Consider the positive and safe learning environment to allow this to be an enjoyable experience for all.

# Stargoal: Dive into Data

## Lesson Summary

Children observe the movement and formation of players in a game of football. Using a recording tool (a heat map), pupils track and record players’ positions on the field of play as they attack and defend throughout the game. Children analyse and discuss what the data says about the individual player, a team and the game. They begin to understand how team managers and coaches might interpret and use such data collection to improve how a footballer or how a team plays. In a similar way, astronomers collect data and searching for patterns in order to make predictions and hypothesize about the Universe.

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| Curriculum Phase: | Upper Key Stage 2 |
| Suggested duration: | 60-90mins |
| Location: | Classroom and Outdoor or Indoor space suitable for sports activities |

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| Resources: | * Stargoal Video
* Recording Sheets (heat maps) - we used aerial diagram of a full football pitch, but you may want to adapt for your field of play
* Pencils
* Size 4 footballs (medium balls suitable for your group)
* Cones (or goals)
* Bibs
* Meet the Team- People Portraits
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| National Curriculum Objectives: | **Working Scientifically:** * Pattern seeking using skills including asking questions and making observations; making predictions; observing and recording data; interpreting and communicating results, evaluating.
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|  | **Physical education:** * Participating in team games; exploring and developing simple tactics for attacking and defending including movement and position in the game of play.
* Developing an understanding of how to improve and learn how to evaluate and recognise their own success.
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|  | **Mathematics:*** Collecting and analysing data to support simple problem solving
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|  | **PSHE including statutory RSHE:** * Facilitating the development of active citizenship e.g. How to treat themselves and others with respect; how to be polite and courteous, how to listen to other people and play and work cooperatively.
* Knowing and understanding that everyone has different strengths, building knowledge too, of the roles and responsibilities different people have (footballers, astronomers, scientists, schools).
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| Key Vocabulary | **Science**: Working scientifically: data collection, analysis, fair testing, tracking, observing, prediction, evidence, findings, conclusion, explanation, variables, evaluate, improve.**Physical Education:** Sending and receiving, kicking, player position, player progression, player movement, pitch, goal mouth, attacking, defending, outwitting opponents, strategy, tactics**Mathematics:** data, pattern, inference**PSHE & RSHE:** Talking about emotions accurately and sensitively, building knowledge of e.g. empathy, resilience, respect, cooperation, leadership, teamwork, strengths, challenge. |

## Background information

Using everyday language to identify outcomes of familiar events supports the development of critical thinking skills. This enables discussion around choices and consideration of alternative options when making decisions. Observing and describing events as they occur during an event (e.g. the movement of players and the ball within a game of football) can help develop simple observational language, scientific thinking skills and the basic processes of making informed choices.

The children use simple ‘movement tracking’ and their observations with simple scientific vocabulary to describe the likelihood of events (i.e. where a player might travel on a pitch). They interpret data gathered to make reasonable predictions of the likelihood of an event occurring (e.g. in a game of football, a specific player’s positioning on a football pitch, or player involvement within a game), and the potential variables that exist (e.g. player skill, team tactics).

The context of football supports Physical Education knowledge of evaluating to improve our own performance and the skills and strategies applied to outwit opponents in game related play.

## Science Capital Opportunities/Suggestions

We hope **Stargoal** will provide an opportunity to help develop and broaden your pupils’ Science Capital. The Science Capital Teaching Approach is an evidence-based justice-orientated approach to teaching science - For background and information about Science Capital see: [PSCTA](https://www.ucl.ac.uk/ioe/departments-and-centres/departments/education-practice-and-society/stem-participation-social-justice-research/primary-science-capital-project)

Do any children in the class have a particular interest in football? Could they act as an ‘expert’ supporting others in developing their skills in outwitting opponents, or giving examples of what has worked well for them, their teams, etc.?

Is there a local football team that the children are aware of/involved with? Perhaps a family member that plays and might be interested in being involved?

Similarly, some children may be particularly strong in data collection/data analysis, consider how they could be more involved in developing and extending this lesson.

This activity also gives an opportunity to develop personal learning skills including reflective practice, evaluating and improving our own skills, whilst considering the importance of supporting others and coaching positively.

## Suggestion of how to use the video

This video is designed with pause points for class/small group discussion, and/or physical activities. However, we encourage you to use this film in any way that works for your setting. For example, you could play the whole video then complete activities separately or complete all the activities before watching the video and following the discussion points.

**Challenging stereotypes**: Prior to watching these videos, you may be interested in your pupils’ pre-conceptions of particular careers, e.g. who plays football or who does astronomy? What do pupils think these job roles involve? After watching the films, do these ideas match what they have found?

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| Preparation –before watching video | **Class discussion: What is data?**Suggested prompts:* What do you understand about data? What does it mean? What is data?
* What examples of data can you think of?
* Can you think of any data that we might collect in football?
* Can you think of any data that we may collect in astronomy?
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| Introduce video | We are going to meet children in another school, working with astronomers Sownak, Alis and Isabel. |
| Play video | *Video content: Sownak, an astronomer, discusses what data is and examples of different types of data and how we use it.* |
| (optional) Pause at ~1min 05sec | **Class discussion: Compare your class’s responses to those on the video.** Suggested prompts:* How did Sownak and the children’s ideas about data compare to yours? Were they similar?
* Can you now think of more examples of data?
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| Play video | *Video content: The children, Sownak and professional footballers, Brooke and Grace, model the activity with half of the children playing a football match, and the other half using the Recording Sheets (heat maps) to record their observations of where players (and the ball) travel during the football game.* |
| Pause at ~ 3min 23secPhysical activity and data collection | Class physical activity: Tracking player/ball movement in a football game**Instructions:**Divide the class into two groups: **Group 1:** **Footballers -** they will play a short (suggested 5 mins) 2-sided game of football.**Group 2: Data Scientists** - they will work in pairs to observe and record data.**Group 1 Instructions:** * Divide into two teams to play a short (5 minute) game of football.
* You may want to assign roles/player positions or allow the freedom of play with no set positions other than the goalkeeper (this is likely to make a difference to the game and may add points for class discussion, related to team related play).

**Group 2 Instructions:*** Each pair of data scientists are assigned either a player or the ball to observe and track.
* The pairs are given a pencil and a Recording Sheet (heat map) which is an aerial diagram of a football pitch.
* Using the Recording sheet, the data scientists track either the ball or an assigned player, marking the ball’s/player’s position using a cross, line or their own idea. This shows the movement of the ball/player in the field of play.

**Findings:** The data scientists (Group 2) should find that where the ball/player spends more time on the football pitch is shaded darker/has more markings on their heat map. Areas where the ball/player spends less time will be clear or lighter.Encourage pupils to look for patterns as they collect their data, interpreting what their data may indicate.**Further Instructions*** Allow an opportunity for Group 1 and Group 2 to switch roles (data scientists/footballers).
* Introduce a second ball onto the pitch and play again, observing and tracking the pattern of movement and motion of the players/balls.

Encourage pupils to compare their data and their findings. Suggested prompts:* What patterns do you observe? (Darker areas v. lighter areas).
* Are there any differences between different players’ positions?
* What does the data tell us about the players, the ball and the activity during the game?
* What does the data tell us about the team or a player’s strengths?
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| Play video | *Video content: The group of children discuss their findings and make suggestions for improving the game of play.*  |
| Plenary | Compare your class’s responses to those of the children and the astronomers/professional footballers in the video.Suggested prompts:* What did the data scientists in the video do, and what did they find out?
* What evidence did they use to support their findings?
* What suggestions did they give to help the players improve?
* How does this compare to your findings?
* What suggestions would you have for your players?
* How easy is it to gather and analyse data?
* What might make you better data scientists or improved footballers?
* How could data similar to yours or other data help footballers improve and make their game-related play more successful?(e.g. player or team movement and coverage on a football pitch, player stamina, player possession of the ball, team domination, passing or dribbling strengths, creating space).
* Do you think observing professional footballers would give you similar or different results on your heat map? What does this tell us about player position on a pitch or the role players have in a team game?
* How does the astronomer use data in his work?
* What more would you like to find out about astronomy and scientific use of data?
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## Data Recording

**Recording Sheet** **Example:** (Heat Map) An aerial diagram of a football pitch.

Note: you may want to adapt this for your setting



## Possible extension activities

* Write interview questions for a chat show about different types of data, inviting astronomers and football coaches as your guests.
* Make a list of different sources of data that you notice. How is data collected and used in everyday occurrences?
* Watch a televised football game and track the position of a star player for 2-5mins at the start of a match and near the end of the match. What do you notice?
* What advice might you give to a ‘caretaker’ of a football pitch about where the most wear and tear may occur on their grassed football pitch.
* Looking at images of galaxies in the past and from present day, can we identify less/more interesting points in space? What does that tell us about space? What might astronomers be looking at and why?