# 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 Football: Penalties **and Numbers** 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 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: Penalties and Numbers

## Lesson Summary

Children observe and explore the action of taking a penalty in a football activity/game. They explore and discuss the challenges and the strategies used by both the striker and the goalkeeper. By making observations and collecting data from their own practical attempts at taking penalties, the children consider how data can help them improve their game and are encouraged to offer constructive advice to other players.

The children discuss the skills they have used (observation, data collection, gathering information, pattern seeking to make predictions) and the similarities between how these are used by the footballers and the astronomers.

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| Curriculum Phase: | Upper Key Stage 2 |
| Suggested duration: | 60-90mins |
| Location: | Classroom and outdoor or indoor space suitable for sport activities |
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| Resources: | * Stargoal Video * Blank paper or prepared Data Collection sheet\* & pencils (or digital device) to record data * Size 4 footballs (medium balls suitable for your group) * Cones (or goals) * Meet the Team- People Profiles   \*Depending upon the ability of your group (or time available), you may allow them to choose what and how to collect their data, or provide pre-prepared sheets (examples below). |
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| National Curriculum Links: | **Working Scientifically:**   * Pattern seeking using skills including asking questions; making predictions; observing and recording data; interpreting and communicating results, evaluating. |
| **Physical education:**   * Participating in team games; exploring and developing simple tactics for attacking and defending including outwitting opponents. * Developing an understanding of how to improve, learning how to evaluate and recognise own success. |
| **Mathematics:**   * Interpret and construct simple tally charts * Reason mathematically by following a simple line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language. |
| **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). |
| Key Vocabulary | **Science**: Working Scientifically: observe, compare, record, patterns, data, results, interpret, fair testing, variables, prediction, findings, evidence, justify, accuracy, conclusion, explanation, evaluate, improve.  **Physical Education:** sending and receiving, kicking, scoring, saving, chipping, lifting, direction, travel, inside/outside, lift, drop, momentum, swing, strike, aim, downward, direction, angle, swerve, attacking, defending, outwitting opponents, strategy, tactics.  **Mathematics:** probable, likely/unlikely, certain/uncertain, possible/impossible, tally, data, statistics, predictions.  **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. In predicting and describing the likelihood of events occurring (e.g. successful penalty) can help develop simple mathematical and scientific thinking skills and the basic process of making informed choices.

The children use mathematical and scientific vocabulary appropriately to describe the likelihood of events (i.e. successfully scoring a penalty) including, *probable, likely/unlikely, certain/uncertain, possible/impossible, and fair/unfair.* They interpret data gathered to make reasonable predictions of the likelihood of an event (scored penalty) occurring, and the potential variables that exist (reaction time, goalkeeper strengths, striker skills and accuracy).

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 taking penalties, 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: Penalties**  Explore your pupils' ideas, feelings and thoughts about football and penalties. Suggested prompts: Do you play football?Have any of you taken a penalty? And did you score?Do you like taking penalties? Why/why not? How do you feel?  * What makes a good penalty? * What tactics might help score a penalty? * What skills would help a player score a penalty? * How do you think a goalkeeper feels when a penalty is being taken * How does a goalkeeper usually move before a penalty is taken? * How might the goalkeeper respond when a goal is saved or scored? How do spectators or team players respond? |
| Introduce video | We are going to meet children in another school, working with astronomers (Alis, Sownak, Ryan and Isabel) and professional footballers (Grace and Brooke). |
| Play video | *Video content: Astronomers and children discuss penalties.* |
| Pause at ~35sec | **Class discussion - What makes a good penalty?**  Suggested prompts:   * What makes a good penalty? * Where might you aim to score? * What might you do to influence the goalkeeper? * Is there a guaranteed way to score a penalty? |
| Play video | *Video content: Astronomers and children discuss penalties.* |
| (optional) Pause at ~2min 25sec | **Class discussion: Compare your class’s responses to those on the video.**  How do the ideas of children in your class compare to the ideas of the astronomers and the children in the video? |
| Play video | *Video content: The children and professional* footballers, Brooke and Grace, discuss penalty taking. |
| (optional)  Pause at ~3min 35sec | **Class discussion: What other questions would you ask the football players?** |
| Play video | *Video content: Astronomer Ryan discusses the importance of penalties in football and why footballers spend hours practicing them. The children (in teams) observe and analyse penalties to help develop a winning strategy.* Class discussion: Learning more about penalties In football, a goalkeeper is trying to predict where the kicker will aim in order to stop the ball entering the goal. Sometimes they predict correctly and save the goal successfully. Sometimes they predict incorrectly, and a penalty is scored.  Football teams often observe and analyse the game play of opponent teams, learning about where penalty takers aim and have shot a penalty in the past. They use this information to improve their chances of stopping a goal. For example, if the penalty taker often aims left, the goalkeeper will dive left – and hopefully will save the goal. |
| Pause at ~4min 5sec | Class physical activity: An enquiry into taking penaltiesIntroducing and preparing for the enquirySuggested prompts:We are going to have a go at taking our own penalties, observing and recording the results and thinking about strategies for successful scoring.What information might be good to collect?Thinking about the movement of the goalkeeper and the penalty taker/player. What information might we wish to collect to help make predictions or help a goalkeeper or penalty taker?How will we collect this information as data? The children decide **what** to record and their own way of recording their observations. For some groups you may want to provide a Data Collection sheet (Examples below). |
| **Physical Activity** | **Physical Activity: Observing and Recording Data**  **Option 1: Taking penalties with a goalkeeper**  Follow the instructions in the video. Children work in small groups taking turns and changing roles.   1. Goalkeeper 2. Penalty taker 3. Observers/data recorders   Following the physical exploration and observation of penalty taking, bring the whole class together to compare and discuss their observations and findings.  **Option 2: Taking penaltieswithout a goalkeeper**   * The class works in small groups, each with two teams (Team A and Team B). * There is no goalkeeper. Instead, each group will choose which way their ‘invisible’ goalkeeper will jump/dive. * Teams take turns to shoot at the goal from the penalty spot (adapt the goal size/distance according to your children’s abilities), recording their observations on Research Sheets (see example below).   An example activity:   * Team B secretly decides which way their imaginary goalkeeper will jump, then blows a whistle once they have decided. * A player from Team A prepares and takes a penalty. * Team B records their observations. * The rest of the players on Team A take their penalty shots, with Team B observing and recording. * The teams swap roles. * Once everyone has had a turn, the teams look for patterns in the data they collected.  Suggested prompts:  * What did your data show you? * With this new ‘research knowledge’ you have from your data and observations, if we were to play a game of penalties again, would we save more goals? |
| Play video | *Video Content: The children take penalties against professional goalkeeper, Grace. They observe what happens including the direction that she moves/dives, when she saves and when she misses.*  *Professional footballers, Brooke and Grace, discuss what it feels like to take penalties or to be the goalkeeper, and the strategies they consider when taking penalties.* |
| Pause at ~ 6min | **Class discussion: Strategies involved when taking/defending penalties** Suggested prompts:  * How did your findings compare to the children’s? * Do you agree with the advice the children gave to Grace for taking her penalties? * What strategies would you suggest to Grace (a penalty taker)? * What strategies would you suggest to Brooke (a goalkeeper)? |
| Play video | **Making comparisons to the work of astronomers**  *Video Content:* Ryan tells us a little more about how astronomers also analyse information to make predictions.  By making observations, recording data and analysing the data, just as in football, astronomers learn to improve predictions and improve understanding of the universe or football. |
| Plenary | **Class discussion** Suggested prompts:  * What did you choose to observe and record and why? * What did your findings show you? * If you were to repeat this activity, is there any other data you would record? * What did you find out about football and about astronomers from this video? * What further advice would you give to footballers? |

## Data Recording

Depending upon the ability of your group (or time available), you may allow them to choose what and how to collect their data, or provide pre-prepared sheets (examples below).

Get the children to consider what type of data they would like to record, what can be recorded easily and what would be useful in trying to improve tactics. Encourage children to discuss how they can best record this information, drawing parallels to their classwork in Maths and Science. They may wish to trial different methods and compare the benefits and challenges of these different forms.

Pupils may choose to record some of the following:

* The movement of the goalkeeper (to the left, the right or centre)
* Location of the kick (left or right foot strike)
* Placement of the ball (bottom left, top left, bottom right, top right, top middle, bottom middle)
* Apparent force of kick
* Player confidence
* Other strategies (e.g. directional change, fake/pretending, spaghetti legs/dancing)

## Recording Table Examples

**Example 1: Position of ball in the net**

* Make a tally of the number of goals scored/not scored.
* When a goal is scored, mark a cross where the ball hits the net.

*Tally chart: number of goals scored and not scored by Team B*

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| Goals scored | Goals not scored |
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*Position of goals scored in the net*

**Example 2: Players’ actions**

* Observe the striker’s and the goalkeeper’s actions

*Striker A Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

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|  | Foot used by striker (left or right) | Apparent force of kick (strong, weak) | Placement of the ball  (bottom left, top left, bottom right, top right, top middle, bottom middle) | What did the goalkeeper do?  (e.g. jump left/right) | Any strategies used?  (e.g. spaghetti legs) | Goal scored? |
| Attempt 1 |  |  |  |  |  |  |
| Attempt 2 |  |  |  |  |  |  |
| Attempt 3 |  |  |  |  |  |  |
| Attempt 4 |  |  |  |  |  |  |
| Attempt 5 |  |  |  |  |  |  |
| Attempt 6 |  |  |  |  |  |  |

## Possible extension activities

* Write some strategy ‘top tips’ for scoring or saving penalties, and make into an informative poster.
* Write a letter or make a short film/presentation to advise Grace or Brooke about how to improve their penalty strategies.
* Watch a professional penalty shoot-out or a game of football and record your own data. Write a letter to the player or club to advise them on how to improve.
* Football clubs need data analysts like you to help them improve at penalties. Think about all the skills you used here and write a job advert to highlight the skills needed.
* Find out more about the work of astronomers and the data they collect. Make a poster highlighting the similarities and differences between the roles of football analyst and the astronomer.