

# TIME & SPORT

## ANALYSING MOTION, PERFORMANCE AND SPORTING RECORDS

9-15

CMA

VA

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MNS

HSS

CREATIVE AND  
MANUAL  
ACTIVITIES

VISUAL ARTS

LANGUAGES

MATHEMATICS  
AND NATURAL  
SCIENCES

HUMAN  
AND SOCIAL  
SCIENCES



# Analysing motion, performance and sporting records

## Activity Sheet

### Introduction

The activities suggested in this sheet enable students to appreciate the historical, technological, sociological and other aspects of records and sporting performance. Students are encouraged to explore their own impressions of these ideas and are given the chance to take part in fun exercises on analysing the components of motion.

This document goes together with the **Information Sheet** on the same topic, which provides a brief historical summary of the subjects tackled here.

Various other activities from the Information and Activity Sheets on “**Measuring time**” may be added to those here or performed in advance.

### LINKS TO THE SCHOOL PROGRAMME

MITIC, HSS – History, Visual Arts, Transversal Skills, Languages, Media, Images & ICT ...

**Editor**  
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**Author**  
Miranda Larrosa

**English Translation**  
IOC Languages Services

**Graphic Design**  
DidWeDo s.à.r.l.

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This document is also available in French and German.

It can be downloaded from  
[www.olympic.org/education](http://www.olympic.org/education).

**Activity 1****Historical and general cultural issues****Teaching objective**

Sonder les connaissances des élèves par rapport aux records olympiques, au moyen de diverses questions. Cette Activity peut se faire de deux manières : avec une interrogation, spontanément en classe, ou avec une distribution des questions pour une recherche sur internet individuelle, suivie d'un partage des informations collectées avec l'ensemble de la classe.

**Links to the school programme**

HSS–History, MITIC, Transversal Skills, Media

**Additional information: Sheet on the modern Olympic Games (pp.16-17).**

Olympic Charter, chapter 5, Rules 56 and 57.

[www.olympic.org/musee/visiter/pedagogie/ressources-pedagogiques](http://www.olympic.org/musee/visiter/pedagogie/ressources-pedagogiques)

[www.olympic.org/fr/charte-olympique/documents-rapports-etudes-publications](http://www.olympic.org/fr/charte-olympique/documents-rapports-etudes-publications)

Why is difficult to compare sporting performances in the Ancient World with the present day? Can we say whether the heroes of the Ancient Olympic Games ran slower or faster than modern sprinters?

**What mattered to the Ancients was beating your competitors and coming first. They made no effort to develop methods of measuring time or results. No such data therefore exist.**

In class, ask students to name the different aspects involved in measuring sporting performance and times at the modern Olympics (especially for races). Invite students to think about their own memories of starting and finishing a race.

Referees, lane judges, finishing tape, stopwatch, digital chronometer, analogue photography, digital photography, photo-finish cameras, touchpads, etc.

How can you find out the results of an Olympic event at the modern Games?

In the stadium: giant screens, loudspeaker announcements, giant results boards. Elsewhere: television, newspapers, the Internet, books, word of mouth, etc.

**FOR OLDER PUPILS (AGES 12–15)**

Suppose the Ancient Greeks had been able to time a sports race, e.g. the 100 metres. Why would it still be difficult to compare the results with a modern race?

**Equipment: the Greeks ran naked and barefoot, the ground wasn't surfaced, etc.**

**Exercice 1**

In the class, draw up a list of the differences between Olympic champions in Ancient Greece and the modern Games.

**Ancient Games: one sole winner; modern Games: three medals – gold, silver and bronze – have been awarded since 1904. The modern Games also include team sports, with every team member receiving a medal. The idea of a record did not exist in Ancient Greece, but the winner was regarded as a mythical hero. Nowadays, records matter and performance is scrupulously measured and recorded.**

How were the winners of the ancient Games celebrated?

They were regarded as heroes, their names and feats were declaimed, laurel wreaths/garlands, winners given special privileges when they returned to their home city, etc. Additional information is available in the report on "The Olympic Games in the Ancient World".

[www.olympic.org/Documents/Reports/FR/fr\\_report\\_658.pdf](http://www.olympic.org/Documents/Reports/FR/fr_report_658.pdf)

What rewards does a modern Olympic champion receive?

Nowadays, a certificate is awarded to the eight best athletes in each event. Gold, silver and bronze medals are awarded to the top three athletes or teams, who are allowed to mount the podium. The national flags of the three medallists are raised and the national anthem of the winner is played. Their names are inscribed in the wall of the Olympic stadium.

**Activity 1****Historical and general cultural issues**

Even if you could measure their times, could you really compare the results achieved over the same distance by an athlete from the year 1900 or 1960 with the times of an athlete today? If not, why not?

Over the past century or so, huge advances have been made in track surfacing and sports equipment, as well as in athletes' training methods. The conditions in which races are run today are virtually impossible to compare with the past. It is important to remember that the idea of a record is relative, and that it is always linked to a specific event at one particular moment.

Ask students to name sports in which natural features (terrain and weather) might play a role and make it difficult or impossible to compare results between different years, or even to compare the results of different entrants in the same competition.

E.g. downhill skiing: the wind speed, wind direction and the condition of the snow can all influence the time of the run.

→ More generally: weather or altitudes to which foreign competitors are unaccustomed, technological advances, different equipment, etc.

## Activity 2

## Better equipment, faster times

## Teaching objective

Exercise students' observational and deductive skills. Analyse an image, making use of specialised vocabulary.

## Time

Allow 1 period.

## Links to the school programme

Visual Art, History

## Exercise 1

Show the students image N°.1 (see Appendix). Ask them to describe the image and explain what the men in the foreground are doing.



Those men are athletes. They are digging small holes in the ground which they will slide their toes into, so that they can push against them when the race starts.

If necessary, ask additional questions to guide the students. What have they got in their hands?

Trowels.

Where are they?

In a stadium. To be more precise, in an Olympic stadium at the start of the 100 metres.

What is the surface of the track?

Earth.

What are they wearing?

In the background, you can see men in uniform. In the foreground, some of the men are wearing suits while others are wearing sports kit, although this might not be immediately obvious to younger children. To help them, draw their attention to the shoes of the man kneeling in the centre of the picture.

→ If the students don't manage to see what the picture represents, show them the second photograph, which is more obvious.



## Exercise 2

N°.2. Same exercise as above. Ask the students to describe the photograph using specialised vocabulary.

Black & white, diagonal lines, single subject, centred, etc.

Ask them to specify the details.

Start line marked on the ground, rather loose sports kit, probably made of cotton, leather shoes, flat soles, no socks, etc.

**Activity 2****Better equipment, faster times**

**Nº. 3.** Ask the students to describe the photograph using specialised vocabulary.

Colour photo, subject partly outside frame. Close-up of feet and starting blocks.

Ask the class to list the differences between this picture from the year 2012 and the ones they have just seen, which were taken in 1928 and 1936, ignoring any aesthetic aspects. What can you say about the equipment used at the start of the race?

Competitors no longer have to dig holes. Starting blocks provide them with good support, and are higher up compared to holes dug in the ground. They can adjust the distance between their feet as well as the angle of support. They can use an identical starting position in every race.

What other differences can you see?

The shoes, with their plastic soles and small studs, look very sophisticated. The track has a special surface. The pre-painted lines are in white paint.

In conclusion, the modern runner will most likely get off to a faster start!

**Activity 2****Better equipment, faster times****FOR OLDER PUPILS (AGES 12–15)****Teaching objective**

**Exercise students' abilities to research and synthesise information on a set topic and then communicate it orally. Give the class an overall view of the technological advances that have contributed towards the improvement of sports times, both in general and at the Olympics in particular.**

**Time**

**Allow 3 periods**

**Links to the school programme**

**HSS–History, MITIC, Transversal Skills, Media, Languages.**

**Exercise 1****Length of presentations (15–20 min)****Number of students per group (3)**

In each group, two students should prepare the oral presentation while the third should analyse the images and comment on them in class. Alternatively, the work can also be divided up by topic, with each student tackling one topic and the associated images, dividing the speaking time between them.

The topics and outlines for the content of the presentation are set out below. Note that this is purely a suggestion and may be adjusted to fit the age of the students and the available time.

**Main topics and instructions:****Cycling**

General history of the bicycle, with particular focus on the early period including e.g. the penny-farthing.

Development of frame designs and materials. Pictures of different types/models, to include of bicycles "in action" in e.g. cycle races. Period to 1896: 5–10 illustrations.

Overview of inventions: 5–10 illustrations. Give details of the various Olympic disciplines that include cycling, with illustrations covering the period from the start of the modern era up to today. Mountain biking, BMX, triathlon, track cycling, road racing (5–10 illustrations).

Refer to one to three particular Olympic feats, records or historic moments (1–3 images).

**Running**

History of running from ancient times to the modern era (3–6 images).

Give details of the different running events at the modern Olympic Games, excluding the marathon.

Running at the modern Olympics up to 1930 (3–6 images).

Starting techniques and judging the finish (4–8 images).

Equipment, shoes, starting blocks and kit at the modern Olympic Games (5–10 images).

Refer to one to three particular Olympic feats, records or historic moments (1–3 images).

**Swimming:**

History of swimming from ancient times to the modern era (3–6 images).

The different swimming events at the modern Olympic Games. Don't forget to compare the men's and women's events (4–8 images).

Illustrate the different starting techniques over time (5–10 images).

Equipment used at the modern Olympic Games (3–6 images).

Refer to one to three particular Olympic feats, records or historic moments (1–3 images).

**Skiing:**

History of skis and skiing – how they were made, what they were used for (4–8 images). Skiing at the modern Olympic Games. Presentation of the history and the various disciplines (4–8 images).

Training equipment (2–3 images).

How materials, equipment etc. have developed over time (5–10 images).

Refer to one to three particular Olympic feats, records or historic moments (1–3 images).

**High jump:**

History of high jump and the different techniques used before the modern Olympic Games (4–8 images).

The work of Etienne-Jules Marey and George Demeny (2–4 images).

The high jump at the modern Olympic Games: description, different techniques and how they have evolved, comparison between men and women (4–8 images).

How the technology and equipment used at the Olympics have changed (5–10 images).

Refer to one to three particular Olympic feats, records or historic moments (1–3 images).

**Activity 2****Better equipment, faster times****Pole vault:**

History of the pole vault, changes in the heights achieved over time (5–10 images).

The work of Etienne-Jules Marey and George Demeny (2–4 images).

Pole vaulting at the modern Olympic Games. Comparison between men and women. How techniques, equipment and training resources have developed over time (6–12 images).

Refer to one to three particular Olympic feats, records or historic moments (1–3 images).

**Fencing:**

History of fencing up to the start of the modern Olympic era (4–8 images).

The work of Etienne-Jules Marey and George Demeny (2–4 images).

Fencing at the modern Olympic Games. History of techniques used and how they have evolved (4–8 images).

Changes in the equipment used during the history of the modern Olympics (3–6 images).

Refer to one to three particular Olympic feats, records or historic moments (1–3 images).

→ Other sports or disciplines can be covered along the same lines, such as the marathon, football, tennis, boxing etc.

Additional exercise: Ask for written summaries approximately one page of A4 in length. The summaries should be made up of a small number of captioned images (max. 4) and assembled into a class dossier.

**Activity 3****Olympic heroes****Teaching objective**

Find out how much students remember about Olympic feats, especially speed records. Familiarise them with using personal recollections as a basis for Internet research. Get them to express their responses to a sporting event or feat and determine what aspect of a record makes it most striking.

**Time**

Allow 1 period.

**Links to the school programme**

HSS–History, MITIC, Transversal Skills, Media, Languages.

Ask them to carry out research in the library or on the Internet so that they can give fuller answers in a later session.

Get the class to think about the following question: what kinds of thing do you tend to remember—for instance, names, particular feats, vague recollections, precise facts, times, nationalities, photos, sequences of TV footage—when you see e.g. a broadcast of the Olympic Games?

After completing their research, keen students could show a picture or a short video to the class, explaining why they chose it and what particularly interested them about it.

**Exercise 1**

Ask students to name some Olympic champions, from any sport or era, and encourage them to give as much detail as they can about what their champion achieved. This might be an exceptional performance, the breaking of a record or any other significant event. Make a note of their answers even if they come up with events or exploits without remembering the name of the athlete.

**Activity 4****Team and individual feats against the clock****Teaching objective**

Exercise students' physical coordination and reactions. Promote teamwork and familiarise students with the various forms that "winning" can take. Get them to explore their own feelings and be receptive to the feelings of others.

**Time**

Two periods for the races. Allow twenty minutes extra for questions, either straight after the races or later on.

**Links to the school programme**

Transversal Skills.

Ask students to imagine that they are gold medallists in the 100 metres.

Would they rather achieve a world record or set an Olympic record at the next Games? Ask them to give reasons for their answers, and conduct a show of hands.

What would give them more satisfaction? Winning a medal or trophy, an Olympic medal, a cash prize, having their picture or an article about themselves in the newspaper, feeling that they had achieved something exceptional, having an announcement posted in the school, having a special page on a social networking site, the acclamation of the crowd or the admiration of friends and family? Hold a vote and see which is the most popular choice.

What discipline would they most like to win at the Olympic Games?

**Related activity: Sheet 1 "Measuring time"  
Activity 6 "Image Analysis".**

**Exercise 1****Organise a race**

→ e.g. an 80 metre sprint  
(or 50 metres for younger children):

- Record individual times
- Form teams and run a relay race
- Run races in groups of five to find a single overall winner

**Variation:** Allow three or four students to act as judges—they should oversee the start, act as lane judges and time the races. Change the judging team for each race type.

After the races, ask students—both winners and losers—how they feel about the ideas of individual victory, team victory and recording the best time.

How do they feel about these ideas as spectators?

What were the most difficult parts of judging the races?

**Activity 5**

Creating motion from individual components – making a flip-book

**Teaching objective**

**Making this optical toy will enable students to understand from their own experience how individual components can be put together to create the illusion of motion.**

**Equipment required**

**box cutter, guillotine, scissors, glue stick, thick paper (120-160 g)**

**Links to the school programme**

**Visual Arts, MITIC.**

**Alternative for younger children:** Pre-print the images onto sheets of thick paper. The students will only have to cut them out and bind the strips together.

**Exercise 1**

For this exercise, you should use a large-scale Muybridge chronophotograph, such as Annie G. galloping, Animal locomotion (1887) or Bison cantering (1887). Print out a copy for each student. The more images the series contains, the more fluid the motion will be.

Get each student to cut out the pictures and glue them onto strips of stiff card or rigid plastic. These should be slightly taller than and twice the length of the images themselves. Make sure the pictures are properly aligned. One way to do this is to pierce the strips with a needle and use the holes as a guide. The pictures can be placed in sequential order or in reverse, depending on which direction the student wants his or her flip-book to move in.

Bind the strips together using staples or thread. Your flip-book is now ready to use!

**Activity 6****Images analysis****Teaching objective**

Get students to research documents on the Internet. Show them the results of photographic experiments that are significant for the history of sport and cinema. Encourage them to analyse and describe images using specialised vocabulary and make inferences about the content.

**Time**

Two periods

**Equipment required**

Computer with data projector, or other form of projection equipment.

**Links to the school programme**

Visual Arts, MITIC.

**Exercise 1**

Assign each student one of the following three names: **Etienne-Jules Marey, Eadweard Muybridge, Georges Dmenÿ**. Tell each student to look for one or two of their large-format chronophotographs on the Internet. Make it clear that they are not looking for a single image but for a series of separate images, or a subject repeated several times in a single frame.

Collect the pictures. Eliminate any that have been selected twice, then pick a few examples and project them for the class to analyse. Ask the students to describe and comment on the pictures.

If necessary, use the questions below to provoke discussion:

**A sequence of shots of a single movement placed together on a single image/plate.**

Why is the person or animal shown several times?

Because the shutter opens and closes several times on the same photographic plate. This enables you to see successive stages of a single movement.

What do the pictures show?

Frequently a person or animal.

If a sportsman is shown, ask the students to describe him and comment.

Sportsmen are often shown nude or dressed in white. The shots are taken either outdoors or in a photo studio, where the lighting can be better managed and a black background can be used to bring out the person/animal in motion more clearly. The background may also include lines drawn to show scale.

What is the purpose of picturing a sporting motion and why is it depicted this way?

In order to look at a movement in more detail than can be discerned by the naked eye; to capture the movement so as to understand how it works, identify its different stages and if possible determine how to improve it. These are the premises of biomechanics.

**Multiple images showing the different phases of a movement on separate plates.**

Ask the class to describe the images and imagine how the result might have been achieved.

There were various techniques. The pictures could be taken by setting up an array of several cameras to take shots at short intervals. There was also the “photographic gun”, a camera equipped with a disc that revolved as each shot was taken.

What do the pictures show?

Frequently a person or animal. If the pictures show a horse, mention the enduring debate between painters and scientists about whether a galloping horse lifted all four of its hooves off the ground at the same time. The first photographs of galloping horses were taken in an attempt to prove that it didn't. Muybridge initially used an array of twelve cameras, then an array of twenty-four.

What might the latter figure remind you of?

The 24 images per second recorded by a movie camera.

**Activity 6****Images analysis**

If a sportsman is shown, ask the students to describe him and comment.

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**Exercise 2**

**A single image showing white lines and points on the body of a person in motion, set against a black background.**

Ask the students to imagine how these pictures were obtained.

A person dressed in black clothing covered with small white points and lines was made to move against a black background.

What was the purpose of doing this?

It enabled a movement to be examined in detail while concentrating solely on the main lines of motion and articulation. These are the premises of biomechanics.

What other technique might this remind you of?

The motion capture technique used in modern films. This involves covering a person in sensors, the signals from which are used to “clothe” them in a digital costume.

## Annex

## Activity 2

## 1. Amsterdam Olympic Games 1928, athletics, men's 100 metres



**Annex**

## Activity 2

2. Berlin Olympic Games 1936, athletics—the starting position. Rather than starting blocks, athletes used holes dug in the track.



Annex

Activity 2

3. London Olympic Games 2012, athletics – an athlete prepares his starting blocks.

