

**Topic 3A  
The Spirit of the  
Olympics**

(1 lesson)

**T**his lesson focuses on the history of the Olympics. Students read an article and take notes on a graphic organizer to create a summary. The main academic language tasks are: skimming, distinguishing main ideas from supporting detail, extracting relevant information, making notes, summarizing, sentence combining, and participating in discussion.

**Outcomes**

**SLO 1.5** examine and interpret various visual media...

**SLO 4.2** Communicate effectively to work with others...

**SLO 4.6** Respond to and critique a variety of individual perspectives...

**SLO 6.2.7** Use elaboration to relate new information...

**SLO 6.2.8** Use imagery in the form of mental or actual pictures...

**SLO 6.3.2** Use co-operation to work together...

**Instructional and Learning Sequence**

**Sequence 1**

**Activation**

**Distribute Handout 1-15:** “The Olympic Games: A Picture Study.”

As a class, students name the sports pictured on the handout. (C) Ask students whether these sports represent the ancient Olympics or both the modern Summer and Winter Olympics.

To activate prior knowledge, students think about what they know about the ancient and modern Olympics. Give students questions to guide them (e.g., What were the ancient Olympics meant to celebrate? Do you know when they started and how they ended? Do you know what sports were included? How did the modern games begin? Who was responsible? Did the Summer and Winter Games begin at the same time in history? Was the purpose the same?).

Students share their thoughts with their classmates and record their ideas on a brainstorming web on the board. (C)

**Language Features**

**Vocabulary**

- names of Olympic sports, especially ancient Olympics sports, which may not be known to students
- names of sports equipment

**Academic Language Functions**

- explaining, describing

**Student Learning Tasks**

Name the sports pictured in **Handout 1-15: “The Olympic Games: A Picture Study.”**

Guided by the teacher’s questions, share your thoughts with classmates and record your ideas on the board.

**Teacher Notes and References**

**Handout 1-15: “The Olympic Games: A Picture Study”**



Add or adapt any questions as needed.

**Outcomes**

**SLO 1.1** Engage with increasingly difficult oral and/or visual texts...

**SLO 1.4** Show an awareness of organizational patterns...

**SLO 1.6** Interpret a range of texts from across the curriculum...

**SLO 4.1** Use language to encourage, support, and work with others.

**SLO 6.1.5** Use selective attention...

**SLO 1.4** Show an awareness of organizational patterns...

**SLO 2.1.1** Analyze and edit texts...

**SLO 2.1.2** Use standard Canadian spelling...

**SLO 4.6** Respond to and critique a variety of individual perspectives...

**SLO 6.2.3** Use grouping of items of common characteristics to classify...

**SLO 6.2.4** Use note taking to write down key words...

**SLO 6.2.9** Use summarization to make a mental or written summary...

**Instructional and Learning Sequence**

**Sequence 2**

**Refer Students to Appendix 2:** “How to Create a Summary.” Review with students how to create a good summary of paragraphs, using point-form notes and then creating a few sentences in their own words to summarize each paragraph. Students use Appendix 3: “Skimming and Scanning for Academic Purposes” to help them read. Read over this resource as a class and discuss the techniques suggested, making sure that students understand them. **(C)**

In triads, students skim **Handout 1-16:** “The Spirit of the Olympic Games.” Advise students that they will be creating a summary of this article later.

**Language Features**

**Vocabulary**

professionalized; exemplified; symmetrical and harmonious development; moral; nobility; nationalist; had charge of; integrity; riddled with controversy; propaganda; commercialism; illegal competitive advantage; performance-enhancing drugs; bribery; favouritism

**Structures**

note in the assigned reading; reduction through ellipsis; participial phrases; infinitive phrases; relative clauses

In pairs, students review and compare their highlighting, deciding what information is important to include in their summaries. **(P)**

Go over the note taking symbols and encourage students to use them. **(C)** The pairs compare their results, join a second pair, and repeat the process. **(G)**

**Language Features**

**Discourse Features**

**Discussion expressions/gambits:** to agree, to support, to question, to obtain more information, to add information, to disagree, etc.

**Note taking:** creating phrases, abbreviations, etc.

**Distribute Handout 1-17:** “Summary Organizer” and have students fill in the graphic organizer.

## Student Learning Tasks

Ask questions about how to create a summary.

In triads, discuss and ask questions about skimming and scanning.

- Given **Handout 1-16**: “The Spirit of the Olympic Games,” skim the article as follows:
  - Go over key vocabulary.
  - Look at the title, subtitles.
  - Read the first paragraph.
  - Read all the topic sentences and the conclusion.
  - Read in-depth, paragraph by paragraph, discussing and helping each other as you go.
  - Highlight the parts of the article that you feel summarize it. (G)

### Assignment

Using **Handout 1-17**: “Summary Organizer,” work individually to summarize each paragraph in point form (in your own words) in one block of the organizer. Some blocks will have several points, while others may have only one or two.

## Teacher Notes and References



**Appendix 2:** How to Create a Summary

**Appendix 3:** Skimming and Scanning for Academic Purposes

**Handout 1-16:** “The Spirit of the Olympic Games”



Tell the students they will be reading an article about the spirit of the Olympics and creating a summary.

Note that “The Spirit of the Olympic Games” does not have a real conclusion. Students will create their own conclusion later.

Some key vocabulary words are mentioned in the Language Features column. These should be dealt with before an in-depth reading. You may want to create a matching exercise or a fill-in-the-blanks exercise to teach these words, or you may have students try to use context to predict their meanings.

You may want to create mini-lessons to review or teach language features, using examples from the article.



**Handout 1-17:** “Summary Organizer”

**Appendix 4:** Note-Taking Symbols



For information on gambits, see the “Resources for Building Content-Based Language Lessons” section in Kehe and Kehe (2001), and the References in Keller and Warner (1988).

**Outcomes**

**SLO 2.1.1** Analyze and edit text...

**SLO 2.1.2** Use standard Canadian spelling...

**SLO 2.1.3** Use developing control of grammatical structures...

**SLO 2.3.1** Use the structures and language features...

**SLO 2.4** Use the steps in the writing process...

**SLO 6.2.9** Use summarization...

**SLO 6.2.13** Use recombination...

**SLO 2.1.3** Use developing control of grammatical structures...

**SLO 2.3.1** Use the structures and language features...

**SLO 6.2.11** Use transfer to make a language task easier...

**Instructional and Learning Sequence**

**Writing Task**

Students write a 200- to 250-word summary of **Handout 1-16**: “The Spirit of the Olympic Games” using the “Review Sentence Combinations” graphic organizer.

**Language Features**

**Discourse Features**

sentence combining using adjective, adverb, and prepositional phrases; coordinating conjunctions; appositives; participial phrases; subordination with noun, adjective, and adverbial clauses; semicolons, etc.  
 organization of paragraphs  
 structure of a conclusion

**Sequence 3**

**Roundup**

Consider using one or more of the following Roundup activities.

1. Review with students the learning strategies used in Lesson 3A. Students describe which strategy was most helpful and when and where they used it. Ask them where it would be helpful in other assignments. (C)
2. Review vocabulary words by using them in sentences. (C)
3. Review reduction by having students pick three sentences from the article and change them through reduction. (C)

**Student Learning Tasks****Assignment**

- Create a short summary of 250 words from the points on your graphic organizers,
    - combining at least three of the sentences in your summaries
    - writing a proper conclusion to the article
    - using the writing process (I)
- 
1. Orally describe which strategy was most helpful, when and where you used it, and where it would be helpful in other assignments.
  2. Choose five new vocabulary words from this lesson, and use each in a proper sentence showing the meaning of the word. (I)
  3. Practise reduction by picking three sentences from the article and changing them through reduction. (I)

**Assessment**

Observe and note students' level of control and selection of strategies, specific vocabulary, and/or reductions highlighted in this topic.

**Teacher Notes and References****Mini-lessons**

Go over sentence-combining techniques and review writing conclusions.



Remember to refer explicitly to one or two useful strategies during the lesson. In this lesson, note taking and summarizing are especially important. You may also wish to discuss the use of graphic organizers (imagery).







## The Spirit of the Olympic Games

### The Ancient Olympics

Although records cannot verify Olympic Games earlier than 776 BCE, Homer's *Iliad* tells of such contests at the Funeral of Patroclus, held during the Trojan War, about three to four hundred years earlier. The ancient Greek games were held at Olympia every fourth summer in Ancient Greece. They reached their height in the fifth to fourth century, BCE. They became more and more professionalized until, in the Roman period, they provoked much censure. They were eventually discontinued by Emperor Theodosius I of Rome at the end of the fourth century CE.

Among Greeks, the Games exemplified their attitude towards excellence in all things. Competition was an important part of Greek life and was a major motivational factor for the institution of the Games. Another basic Greek ideal, the striving for symmetrical and harmonious development of physical beauty, moral character, nobility of spirit and conduct, and intelligence, supported the Games. The Games, too, were nationalist in spirit; states were said to have been prouder of Olympic victories than of battles won. Women, foreigners, slaves, and dishonoured people were forbidden to complete. Contestants were required to train for ten months before the Games, had to remain thirty days under the eyes of officials in Elis who had charge of the Games, and had to take an oath that they had fulfilled the training requirements before participating. They also had to vow to conduct themselves with honour and integrity. At first, the Olympic Games were confined to running, but over time new events were added: the long run (720 BCE), when the loincloth was abandoned and athletes began competing naked; the pentathlon (708 BCE); boxing (688 BCE); chariot racing (680 BCE); the pancratium (648 BCE), involving boxing and wrestling for boys (632 BCE); and the foot race with armour (580 BCE).

Greek women, who were not even allowed to watch the Games, held their own Games, called the Heraea, starting as early as the sixth century BCE. They were also conducted every four years but with fewer events. These Games were discontinued about the time the Romans conquered Greece.

### The Beginning of the Modern Olympics

On April 6, 1896, in Athens, Greece at the Panathenean Stadium, the International Games were opened. This was the dream of Baron Pierre de Coubertin of France. The program included track and field, fencing, weightlifting, rifle and pistol shooting, tennis, cycling, swimming, gymnastics, wrestling, and the first modern-day marathon. Although 14 nations participated; most of the athletes were Greek. Pleased with the success of the event, de Coubertin stressed to organizers the importance of moving the Games all around the world: thus, the modern Summer Olympic Games became a reality.

### The Winter Olympics

It was not until 1924 that the International Committee sanctioned an "International Winter Sports Week" at Chamonix, France. The eleven-day event included Nordic skiing, speed skating, figure skating, ice hockey, and bobsledding; it was a huge success. The Winter Olympics were born.

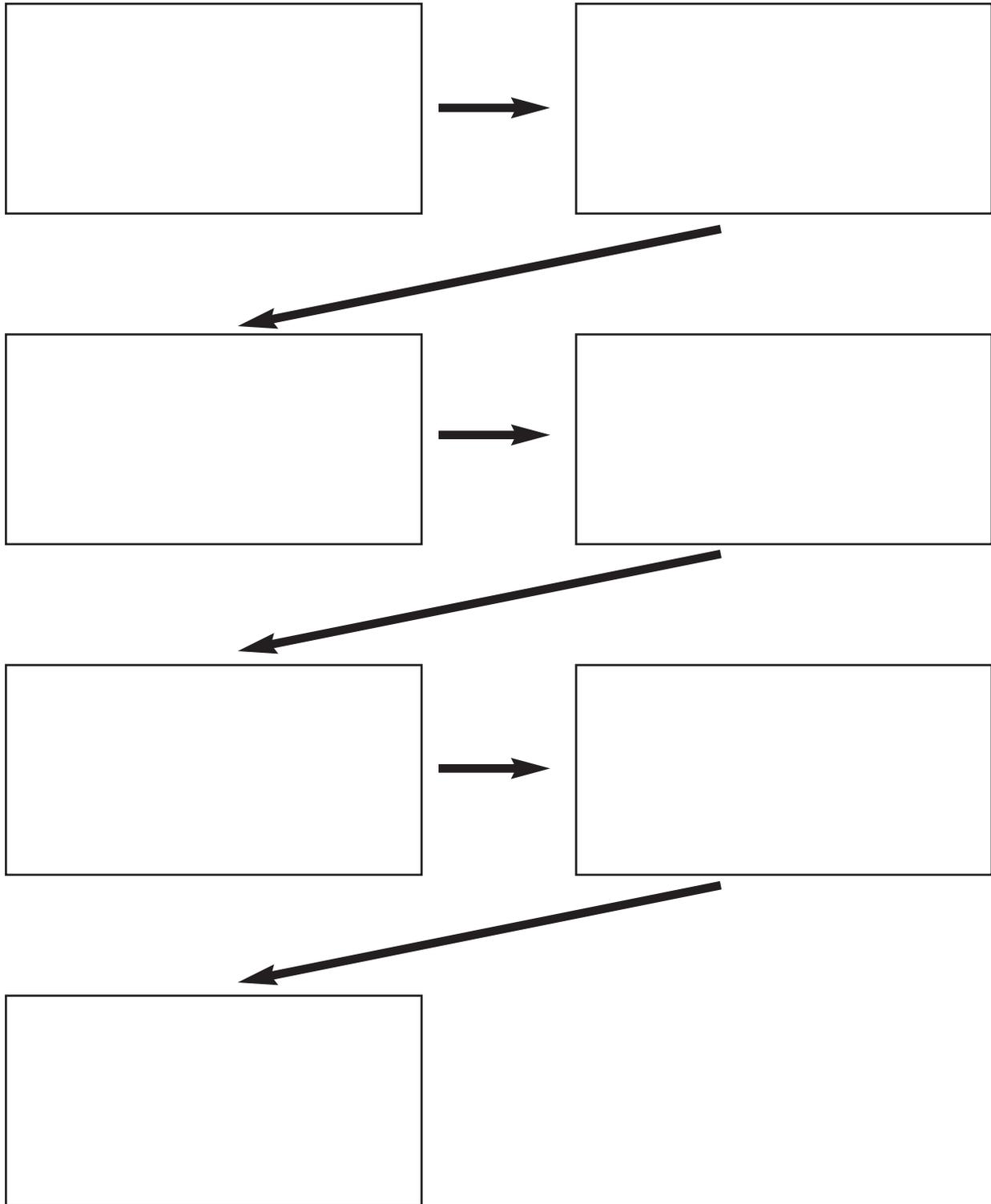
### Today

Today, the Winter and Summer Games alternate every two years. Over time, these Games have been riddled with controversy that has thwarted their ideals of world co-operation and athletic excellence. Between 1952 and 1988, the rivalry between the United States and the former Soviet Union resulted in each country's boycotting the Games hosted by the other country.

Political ideals have interfered with the Games in other ways, from the propaganda of the Nazis in Berlin (1936) to the exclusion of white-ruled Rhodesia from the Munich Games (1972). At Munich, nine Israeli athletes were kidnapped and murdered by Palestinian terrorists. Furthermore, the International Olympic Committee has struggled with the licensing and commercialism of the Games, the need to schedule the Games to accommodate American television networks, and the monitoring of athletes who seek illegal competitive advantage, often through the use of performance-enhancing drugs. In 1998, a scandal erupted with the revelations that bribery and favouritism had played a role in the awarding of the 2002 Games to Salt Lake City, Utah. Scandals in judging of various sporting events, especially figure skating, continue to mar the Games. Where will it all end?



### Summary Organizer







**Topic 3B  
Swifter, Higher,  
Stronger?**

(1 lesson)

**T**his lesson focuses on the oath, motto, and creed of the Olympics, and examines history to see if these values were adhered to, even in ancient times. The main academic tasks are: defining terms, drawing conclusions, participating in discussion,

following instructions, note taking, listening to extract relevant points, adding filler words to a point-form outline, creating a written essay from point-form notes, and writing a conclusion.

**Outcomes**

**SLO 1.4** Show an awareness of organizational patterns...

**SLO 2.3** Produce a variety of short and extended text forms necessary for subject-area tasks...

**SLO 4.1** Use language to encourage, support...

**SLO 6.2.11** Use transfer to make a language task easier...

**Instructional and Learning Sequence**

**Sequence 1**

**Activation**

Ask students to consider the title of this lesson. Ask them why it is followed by a question mark, and what the question mark suggests will be the focus of the lesson to follow.

**Distribute Handout 1-18:** “Motto, Creed, Oath.” Ask students the meaning of the terms in the handout title. **(G)**

In their triad groups, students develop definitions and match words with correct terms, using the transfer strategy. **(G)**

Share the results as a class. **(G)**

**Language Features**

**Pronunciation**

**Sounds:** str, final s, th, r, l, gl, tr, ed linkage

**Discourse Features**

A solemn, formal declaration or promise is referred to as an oath.

A brief statement used to express a principle, goal, or ideal is known as a motto.

A formal statement of belief is called a creed.

**Discussion expressions:**

Offering opinion: I think...; I have an idea...

Agreement: I agree with you...; that’s right...; good idea...

Disagreement: I’m sure I agree...; I have a problem with that...

Interruption: Could I say something...; excuse me, but...

Questioning for clarification: What do you mean by...

Could you explain...; etc.

## Student Learning Tasks

In triad groups, read one of the expressions/sentences in **Handout 1-18: “Motto, Creed, Oath”** out loud and come up with an agreed-upon set of definitions. Then work to match the words with the correct terms, using the transfer strategy.

**(G)**

In triads, share your results with the class.

## Teacher Notes and References



**Handout 1-18: “Motto, Creed, Oath”**



Try starting with a word students already know. For example, they might know “motto” because of school or club mottos. They might also know “creed.” Ask students if they know any more words from this word family. Help them if they really don’t know by suggesting words like credible, credence, incredible, et cetera. They may be able to connect the word “creed” with belief. If this doesn’t work, they can start with the definitions given in the Language Features column, or they can look them up. After the matching is complete, you might want to discuss how “swifter, higher, stronger” is the accepted motto, but is not a direct translation from the original Latin (i.e., *citius* = faster; *altius* = higher; *fortius* = braver).

Encourage students to practise different definition patterns introduced in previous lessons.

**Outcomes**

**SLO 1.3** Develop and express a personal position...

**SLO 1.2** Respond to texts with increasing independence.

**SLO 1.4** Show an awareness of organizational patterns...

**SLO 2.2** Use several visual techniques...

**SLO 6.1.2** Use organizational planning to choose good organizational strategies...

**SLO 6.2.12** Use inferencing to guess the meanings...

**Instructional and Learning Sequence**

**Sequence 2**

Discuss with students the ideals of the ancient Olympics. Have them recall these from the “Spirit of the Olympics” lesson. The modern Olympic Games were established to work toward a more peaceful world, bringing countries together through sport. Students discuss how they feel “motto, creed, and oath” apply to the Games today. How do they think they applied to the ancient Olympic Games? (This can be done in small groups or as a class.) **(G)** or **(C)**

**Language Features**

**Discourse Features**

**Discussion expressions:**

To state opinion: I think...; I believe...

To agree: That’s right...; absolutely...; You’re right...; exactly...

To disagree: I don’t think so...; I don’t see that...; I can’t agree with you...

To add information: Another thing...; another idea...; also...; not only that...

To question: What do you mean...; I don’t get it...; Can you explain that again...; I’m not sure I understand your point...; etc.

**Step 1.** Tell the students they will be doing a listening and note taking activity. Read **Handout 1-19: “Olympic Roots”** aloud to the class. The article is based on the economic and political roots of the ancient Olympic Games. The T-List is written in point form with blanks to be filled in while students listen to the reading. Before beginning to read, preview the T-List and the procedures with students, making sure they understand what they are to do. Direct students’ attention to Appendix 4: Note-Taking Symbols, used in the T-List. Students try to predict what types of words (parts of speech) will go in the blanks. **(C)**

**Language Features**

**Structures**

Parts of speech

**Discourse Features**

Expressions to indicate opinion

**Note-taking symbols and abbreviations:** ~, &, N.B., w/, @

## Student Learning Tasks

Recall the ideals of the ancient Olympics from the “Spirit of the Olympics” lesson)—Topic 3A.

Discuss how you think the terms “motto, creed, and oath” apply to the Games today and how they applied to the ancient Olympic Games.

Review **Appendix 5**: T-List Procedures, and ask questions about the procedures.

Review **Appendix 4**: Note-Taking Symbols, and ask questions.

Predict what types of words will go in the blanks.

## Teacher Notes and References



**Handout 1-19**: “Olympic Roots” (for the teacher only)

**Handout 1-20**: “T-List for ‘Olympic Roots’”

**Appendix 4**: Note-Taking Symbols

**Appendix 5**: T-List Procedures



Some words in the reading are underlined, either because they are answers or because they may be unfamiliar. You can pre-teach some of this vocabulary.

This T-List is a technique from the Foresee approach, and is different from the T-Chart referred to in the graphic organizer section of the Introduction.

**Outcomes**

**SLO 6.1.3** Use directed attention...

**SLO 6.1.5** Use selective attention...

**SLO 6.1.6** Use self-monitoring to check, verify...

**SLO 2.2** Use several visual techniques...

**SLO 1.2** Respond to texts with increasing independence.

**SLO 1.4** Show an awareness of organizational patterns...

**SLO 2.3** Produce a variety of...text forms...

**SLO 2.1.1** Analyze and edit texts...

**SLO 2.1.2** Use standard Canadian spelling...

**SLO 2.2** Use several visual techniques...

**SLO 2.3** Produce a variety of...text forms...

**SLO 2.3.1** Use the structures and language features...

**SLO 6.2.11** Use transfer to make a language easier...

**SLO 6.2.13** Use recombination...

**Instructional and Learning Sequence**

Read **Handout 1-19**: “Olympic Roots” article slowly as students fill in the blanks. Check for comprehension. If necessary, read the article once more at normal speed.

As a class, students contribute answers to complete the T-List on a master form on an overhead. For visual clarity, write the answers in a different-coloured marker than the T-List itself. (C)

**Language Features**

**Discourse Features**

expressions for discussion

Once students have completed **Handout 1-20**: “T-List for ‘Olympic Roots,’” discuss how to change the point-form notes into proper sentences by adding filler words, phrases, and punctuation, and by sentence combining. Using a different-coloured marker, accept a variety of answers from the students and record them on the master T-chart. Encourage students to think of different ways to create the sentences. (C) Encourage sentence combining.

**Language Features**

**Structures**

definite and indefinite articles; capitalization and punctuation: commas, semicolons, periods; past tense

**Discourse Features**

**Discourse markers:** however, although, while, therefore

**Introductory phrases:** in fact, as a result

coordinating conjunctions, subordinating conjunctions

## Student Learning Tasks

Take notes on **Handout 1-20**: “T-List for ‘Olympic Roots,’” which is a graphic organizer with the main points on the left and details and supporting points on the right.

Individually, complete Handout 1-20: “T-List for ‘Olympic Roots.’”

In pairs, compare your answers. (P)

Give suggestions for changing the point-form notes into proper sentences by adding filler words, phrases, and punctuation, and by sentence combining.

Add ideas generated by the class to your own T-Lists. (I)

## Teacher Notes and References



**Handout 1-19**: “Olympic Roots” (for the teacher only)

**Handout 1-20**: “T-List for ‘Olympic Roots’”



**Handout 1-21**: “Filled-in T-List for Olympic Roots” (Teacher Reference)



**Handout 1-22**: Final T-List for “Olympic Roots” (Teacher Reference)



There will be a number of grammar structures on which you may want to focus, depending on the needs of students. The use of articles and appropriate punctuation are two areas of focus. Also, discuss all combining forms for the required sentence combining.

**Outcomes**

**SLO 1.2** Respond to texts with increasing independence.

**SLO 1.4** Show an awareness of organizational patterns...

**SLO 2.1.1** Analyze and edit texts...

**SLO 2.1.2** Use standard Canadian spelling...

**SLO 2.4** Use the steps in the writing process...

**SLO 6.1.2** Use organizational planning...

**SLO 6.2.13** Use recombination...

**Instructional and Learning Sequence**

**Sequence 3**

**Writing Task**

Students use their T-List notes to create their own version of the article that was read to them. They must add a conclusion. Students must use sentence combining a minimum of three times. The essay will likely have five short body paragraphs.

**Language Features**

**Discourse Features**

- article format
- paragraph construction

**Student Learning Tasks****Assignment**

Write a five-paragraph essay based on **Handout 1-19:** “Olympic Roots,” using your T-List notes. Write a conclusion and use sentence combining a minimum of three times.

**Teacher Notes and References**

developed)

Rubric for assessing the discourse features that are the focus of this activity (teacher-



Check for correct paragraph usage.



## Motto, Creed, Oath

1. **Swifter, Higher, Stronger**
2. “In the names of all competitors, I promise that we will take part in these Olympic Games, respecting and abiding by the rules which govern them, in the true spirit of sportsmanship, for the glory of sport and the honour of our teams.”
3. **“The most important thing in the Olympic Games is not to win but to take part, just as the most important thing in life is not the triumph, but the struggle. The essential thing is not to have conquered but to have fought well.”**

## Creed

## Oath

## Motto



## Olympic Roots: The Olympics Draw on Traditions of War, Religion, and Ceremony

### Introduction

Physical competitions and contests, like the Olympics, are as old as the hills, but what about the scandals associated with them? Olympic skullduggery is nothing new. The ancient Olympics were plagued by numerous scandals. Records show the Games were connected with commercialism and greed, nationalistic pride, and political strife and competition that sometimes led to war.

### The Ancient Games Were Commercial

Today, winning an Olympic medal is a financial windfall of endorsements. Records suggest this was also common practice at the ancient Olympics. Although the accepted prize was an olive wreath, athletes competed for other perks, as well. Winners might pocket as much as 500 drachmas, which would make them millionaires today. Athletes were often offered free theatre seats or free meals at city hall for life—no small rewards, indeed!

### The Games Instilled Nationalistic Pride

Competition between city-states to produce Olympic winners was fierce and often led to bribery and cheating. Astylos, a sprinter from the city-state of Kroton, competed and won in 488, 484, and 480 BCE. However, in his last race, he was bribed by a powerful tyrant from the city-state of Syracuse to change allegiance so his win would be attributed to that city.

City-states took immense pride in their winners. Sculptors were commissioned to create statues of the victors in their home city-states. The images were idealistic. Only if an athlete was victorious three times could a realistic image of him be erected in the Sanctuary of Zeus.

Cheating brought great shame to the athletes and their city-states. Although statutes warning athletes against cheating lined the road to the stadium, cheating, and bribery were common. In lieu of statues of winners, sometimes statues of Zeus, with written apologies in stone, were erected along the road from the altis to the stadion, the path the athletes took before they

competed, to make an example of cheaters and to discourage others from cheating. Cheaters were sometimes punished by being castrated.

### The Ancient Olympics Were Political and Often Caused War

Not only were the ancient Olympics athletic competitions, they were also political events. The city-state hosting the Games gained prestige, as well as economic and political advantages. The Games were immensely popular, and cities vied for the honour of hosting them. Sometimes citizens actually went to war over them. In 668 BCE, according to Pausanias, a Greek traveller, Pheidon, a powerful tyrant from Argos, was hired by the town of Pisa to capture the Sanctuary of Zeus from the city-state of Elis in order to gain control of the Games. This victory was short-lived, and Elis regained control of the Games the next year. Later, in 364 BCE, another military incident occurred. Elis had again lost control of the Games to Pisa. While Pisa was hosting the Games, Elis attacked the Sanctuary of Zeus. According to Xenophon, a fourth-century historian, the Eleans chose to attack just as the wrestling event was taking place between the dromos and the altar. A day-long battle commenced in which thousands of soldiers were involved.

### Conclusion

(Students will add this.)

Facts from:

<[http://museum.upenn.edu/new/Olympics\\_rev.olympicpolitics.shtml](http://museum.upenn.edu/new/Olympics_rev.olympicpolitics.shtml)>

<[www.museum.upenn.edu/new/Olympics\\_rev/olympiccommercialism.shtml](http://www.museum.upenn.edu/new/Olympics_rev/olympiccommercialism.shtml)>

<<http://corinth.sas.upenn.edu/dgr/otherclips.ancgames.html>>

<[www.upennmuseum.com/pressreleases/forum.pl?msg=35](http://www.upennmuseum.com/pressreleases/forum.pl?msg=35)>



T-List for "Olympic Roots:  
The Olympics Draw on Traditions of War, Religion, and Ceremony"

Main Ideas	Supporting Details
I. Introduction	<ul style="list-style-type: none"> <li>- physical competitions &amp; _____ old as _____</li> <li>- Olympic _____ nothing _____</li> <li>- Ancient Olympics _____ by _____</li> <li>- Ancient Olympics connected w/:               <ul style="list-style-type: none"> <li>a) _____ &amp; greed</li> <li>b) _____ pride</li> <li>c) political _____ &amp; competition - → _____</li> </ul> </li> </ul>
II. Games - _____	<ul style="list-style-type: none"> <li>- accepted prize- _____</li> <li>- competed for other _____</li> <li>- might _____ drachmas - make _____ today</li> <li>- offered free _____ &amp; _____ @ _____ hall - _____</li> </ul>
III. Games Instilled _____ _____	<ul style="list-style-type: none"> <li>- competition btw. _____ fierce - → _____ and cheating</li> <li>- _____ - sprinter - _____ won _____, _____, _____ B.C.</li> <li>- last race - _____ by _____ - _____ to change _____ - win _____ - that city</li> <li>- city-state - _____ pride - winners _____ commissioned - statues of _____ in home _____</li> <li>- Images - _____</li> <li>- only _____ if athlete _____ X _____ - then statue in _____ - Zeus</li> </ul>

(continued)

**Note:** A full-colour version of this handout is available at the Manitoba Education, Citizenship and Youth website at:  
<[www.edu.gov.mb.ca/ks4/cur/diversity/eal.](http://www.edu.gov.mb.ca/ks4/cur/diversity/eal.)>

**T-List for "Olympic Roots:  
The Olympics Draw on Traditions of War, Religion, and Ceremony" (continued)**

IV. A.O. - \_\_\_\_\_  
& Caused \_\_\_\_\_

- \_\_\_\_\_ - great \_\_\_\_\_
- \_\_\_\_\_ warned athletes - \_\_\_\_\_ & cheating common
- statues - Zeus w/ written \_\_\_\_\_ on \_\_\_\_\_ from altis → \_\_\_\_\_
- make \_\_\_\_\_
- cheaters' punishment - \_\_\_\_\_
  
- were \_\_\_\_\_ events
- host - \_\_\_\_\_ + \_\_\_\_\_ & political advantages
- Games - \_\_\_\_\_ - \_\_\_\_\_ for honour of \_\_\_\_\_
- Wars:
  - a) according to \_\_\_\_\_:  
 In \_\_\_\_\_, B.C., Pheidon - tyrant from \_\_\_\_\_ - hired by \_\_\_\_\_  
 - capture sanctuary \_\_\_\_\_ - control Games - \_\_\_\_\_ short-lived - \_\_\_\_\_ - control next year
  - b) according to \_\_\_\_\_:  
 In \_\_\_\_\_ B.C., \_\_\_\_\_ lost control to \_\_\_\_\_  
 - \_\_\_\_\_ Games - Elis \_\_\_\_\_  
 Sanctuary - Zeus - when \_\_\_\_\_  
 event taking place btwn. \_\_\_\_\_ & altar - day long battle \_\_\_\_\_  
 soldiers

V. Conclusion

**Filled-in T-List for "Olympic Roots:  
The Olympics Draw on Traditions of War, Religion, and Ceremony"  
(Teacher Reference)**

**Main Ideas****I. Introduction****Supporting Details**

- physical competitions & contests  
old as hills
- Olympic skullduggery nothing new
- Ancient Olympics plagued by scandals
- Ancient Olympics connected w/:
  - a) commercialism & greed
  - b) nationalistic pride
  - c) political strife & competition - →  
war

**II. Games -**Commercial

- accepted prize- olive wreath
- competed for other perks
- might pocket 500 drachmas - make  
millionaires today
- offered free theatre seats &  
meals @ city hall - life

**III. Games Instilled**Nationalistic  
Pride

- competition btw. city-states fierce - →  
bribery and cheating
- Astylos - sprinter - Kroton  
won 488, 484, 480 B.C.
- last race - bribed by tyrant -  
Syracuse to change  
allegiance - win attributed - that  
city
- city-state - immense pride - winners  
Sculptors commissioned - statues of  
victors in home city-state
- Images - idealistic
- only realistic if athlete Victorious X  
3 - then statue in Sanctuary - Zeus

(continued)

**Note:** A full-colour version of this handout is available at the Manitoba Education, Citizenship and Youth website at:  
<[www.edu.gov.mb.ca/ks4/cur/diversity/eal.](http://www.edu.gov.mb.ca/ks4/cur/diversity/eal.)>

Filled-in T-List for "Olympic Roots:  
The Olympics Draw on Traditions of War, Religion, and Ceremony"  
(Teacher Reference) (continued)

IV. A.O. - Political  
& Caused War

- Cheating - great Shame
- statutes warned athletes - bribery & cheating common
- statues - Zeus w/ written apologies on them from altis → stadion
- make example
- cheaters' punishment - Castration
  
- were political events
- host - prestige + economic & political advantages
- Games - popular - vied for honour of hosting
- Wars:
  - a) according to Pausanias:  
In 668, B.C., Pheidon - tyrant from Argos - hired by Pisa  
- capture sanctuary - Elis - control Games - victory short-lived - Elis - control next year
  - b) according to Xenophon:  
In 364 B.C., Elis lost control to Pisa  
during Games - Elis attacked Sanctuary - Zeus - when wrestling event taking place btwn. dromos & altar - day long battle - thousands soldiers

V. Conclusion

Final T-List for "Olympic Roots: The Olympics Draw on Traditions of War, Religion, and Ceremony" (Teacher Reference)

Main Ideas

I. Introduction

Supporting Details

- physical competitions & contests <sup>and</sup>  
 are as old as <sup>the</sup> hills. (Therefore,) (and)  
 - Olympic skulduggery <sup>is</sup> nothing new.  
 The Ancient Olympics <sup>were</sup> plagued <sup>were</sup> by scandals.  
 It seems (Records show) Ancient Olympics connected w/: with  
 a) Commercialism <sup>and</sup> & greed  
 b) nationalistic pride, <sup>and</sup> (even)  
 c) political strife & competition - → that (sometimes) led to war

II. Games - were

Commercial

Although the <sup>was an</sup> olive wreath,  
 athletes competed for other perks, too (as well) (also).  
 Some winners (victors) - might packet <sup>as much as</sup> 500 drachmas - make <sup>a sum that would</sup> them millionaires in today's world.  
 They were also offered free theatre seats & meals at @ city hall - for life. Apparently

III. Games Instilled

Nationalistic Pride

the olive wreath was only the beginning for victorious athletes.  
 - Competition btw. city-states fierce, - → bribery and cheating were <sup>was</sup> common. An example  
 is - Astylos, a sprinter <sup>from</sup> Kroton (who) won <sup>in his</sup> 488, 484 and 480 B.C.  
 In his last (final) race - Astylos was bribed by a tyrant - from Syracuse to change his allegiance <sup>so that this</sup> - win attributed - that city instead of to Kroton.  
 Each city-state - immense pride - winners <sup>in its</sup> - sculptors were commissioned <sup>to create (sculpt) (make)</sup> - statues of the victors in home city-states.  
 The Images - idealistic.  
 They could <sup>though, were</sup> - only realistic if an athlete victorious <sup>was</sup> X (had three victories) <sup>three times</sup>  
3 - Then statue in Sanctuary of Zeus. <sup>this realistic</sup>

Note: A full-colour version of this handout is available at the Manitoba Education, Citizenship and Youth website at: <www.edu.gov.mb.ca/ks4/cur/diversity/eal.>





**Topic 4**

**Faster, Higher,  
Better?**

(2–3 lessons)

**T**his lesson focuses on the use of science to improve sport performance.

Students will use the placemat and jigsaw techniques to develop group discussion skills, take notes and write summaries using two types of graphic organizers, and work with graphs, charts, and definition patterns.

**Outcomes**

**SLO 1.1** Engage with increasingly difficult oral and/or visual texts...

**SLO 1.3** Develop and express a personal position in a variety of ways...

**SLO 6.2.5** Use deduction and induction...

**SLO 6.2.7** Use elaboration...

**SLO 6.2.12** Use inferencing to guess the meanings...

**Instructional and Learning Sequence**

**Sequence 1**

**Activation**

Using visuals, elicit student opinion on the most exciting Olympic sports to watch. Ask students: What is the Olympic motto? (“Swifter, higher, stronger”) What do many athletes hope to do? (set a world record or Olympic record) Why do athletes want to be the best? Do you know of any current world records or the people who hold them? **(G)**

**Language Features**

**Vocabulary**

set, world record

**Sequence 2**

Distribute **Handout 1-23**: “Olympic Games—Some Track and Field Records” and introduce the graphing assignment.

**Assignment**

Students choose a sport and, using a website or teacher-provided lists of Olympic results obtained from the Centre for Innovation in Mathematics Teaching (see Teacher Notes and References column), compare the records for the last 100 years. Students make a graph of year and record (time, distance, speed, et cetera), using standard terminology: years on the horizontal (x) axis, records on the vertical axis (y). Students choose a scale that is appropriate to the data, and note the trends in performance. **(I)** or **(P)**

**Review** the graphing language from Topic 2.

**Language Features**

**Vocabulary**

plot, x-axis, y-axis, horizontal, vertical, independent variable, dependent variable, statistics, data, trends

## Student Learning Tasks

## Teacher Notes and References

**Assignment**

Choose a sport and, using a website or lists of Olympic results, compare the records for the last 100 years. Make a graph of year and record (time, distance, speed, et cetera), using standard terminology: years on the horizontal (x) axis, records on the vertical axis (y). Choose a scale that is appropriate to the data, and note the trends in performance. **(I)** or **(P)**



- **Handout 1-23:** “Olympic Games—Some Track and Field Records”

- Visuals of runners (Donovan Bailey), cyclists, speed skaters, pole vaulters  
The International Association of Athletics Federation’s website and Canadian Olympic Committee website are good sources. See <[www.iaaf.org](http://www.iaaf.org)> or <[www.olympic.ca](http://www.olympic.ca)>.

Note: The Centre for Innovation in Mathematics Teaching (CIMT) provides “Data sets” of “World Athletics Records” and “Olympic Games Results.” See <[www.cimt.plymouth.ac.uk/resources/data/default/htm](http://www.cimt.plymouth.ac.uk/resources/data/default/htm)>.

Handout 1-23 is an example of one of the lists available on the site. If students do not have Internet access, you will need to provide them with reference materials. CIMT provides results for Olympic Games from 1896 to 2000.

Results for the 2004 Athens Games and other Olympic Games may be obtained from the International Association of Athletics Federation (IAAF) site at <[www.iaaf.org/index.html](http://www.iaaf.org/index.html)>. This site is also excellent for downloading pictures of athletics.

Outcomes	Instructional and Learning Sequence
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**SLO 4.1** Use language to encourage...

**SLO 6.1.5** Use selective attention...

**SLO 6.2.8** Use imagery in the form of mental or actual pictures...

**SLO 6.2.9** Use summarization...

**SLO 6.3.1** Use questioning for clarification...

Introduce the placemat technique and the learning task (see Teacher Notes and References). Give students patterns for stating their opinions about the trend toward better performance. What are the causes?

(Practise patterns with exercise, if needed.)

The groups will likely suggest improvements in equipment have been a major factor. Introduce the idea of sports and technology. How does technology help sports? Is this a good thing?

<b>Language Features</b>	<p><b>Discourse Features</b></p> <p><b>Statements:</b> In my opinion...; It seems to me...; I feel...; Don't you think that...; According to...; etc.</p> <p><b>Agreements:</b> I agree...; That's right/true...; That's a good point...; etc.</p> <p><b>Disagreements:</b> I disagree, I don't agree...; I'm not sure I agree...; Maybe/perhaps, but...; etc.</p>
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## Student Learning Tasks

Use the placemat technique to share your results with three or four peers. (6)

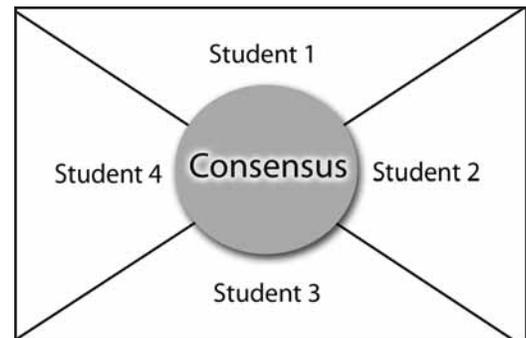
## Teacher Notes and References



**Placemat Technique:** Students sit around a sheet of newsprint or other large piece of paper.

Draw a circle in the middle, and divide the rest of the paper into sections for each team member. Inform the students that one person from each group will be randomly chosen to report to the class on the group work. Students write their own findings in their section (timed) without discussion. Then each student silently reads what he or she has written. Students then decide among themselves what they will put in the middle as their group conclusions.

One student is chosen at random to record the discussion. After all the groups have completed the task, one more student will be randomly chosen to report to the class.



Outcomes	Instructional and Learning Sequence
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**SLO 1.1** Engage with increasingly difficult oral and/or visual texts...

**SLO 1.4** Show an awareness of organizational patterns...

**SLO 2.2** Use several visual techniques...

**SLO 3.2** Develop and implement a plan for researching...

**SLO 6.1.1** Use advance organization...

**SLO 6.1.5** Use selective attention...

**SLO 6.2.12** Use inferencing to guess...

**SLO 6.2.4** Use note taking...

Distribute the article “Wonder Shoes to Smash Olympic Records” on sports technology. Have students look at the title and accompanying photographs to predict what it will be about.

Discuss the different types of shoes worn in sports. How do they differ? How can technology help an athlete’s footwear?

Read the first two paragraphs together. Ask students to underline words they don’t know. Write the words on the blackboard. Determine which words prevent the students from understanding the main ideas. These are the words students should focus on. (C)

Read through the rest of the article, marking words in the same manner. At the end, ask students to make a list of 10 to 12 of these words for personal study.

Ask students to share a few of their words. Demonstrate how an approximate meaning can sometimes be determined from the context of the word (e.g., the word “colleagues” often follows the names of two people who work together). Guessing from context may not give you a precise meaning, but it is often enough to keep the idea going.

Use the dictionary or discuss as a class the remaining words on the list. Have students add the list of words to their personal dictionary.

Read the article a second time, and use **Handout 1-24: “Reading a Science News Article Frame”** to take notes. Project a model on the overhead, and involve students in the process.

Review the questions students formulated before the first reading. How many have been answered? (C)

<b>Language Features</b>	<b>Vocabulary</b>
	revolutionary, smash, state of the art, energy-sapping (note the formation of compound words), vibration, chop, boost, viscosity, elasticity, pendulum, blend, wear and tear, launch
	<b>Words from the Academic Word List:</b> emerge, conserve, suit, alter, resonate, adapt, manipulate, boost, frequency, ideally, blend, conventional
	<b>Discourse Features</b>
	comparison/contrast structures

## Student Learning Tasks

Formulate several questions that you expect the article to answer (e.g., Why are these shoes called “wonder shoes?”).

As the teacher reads, underline the words you don’t know (and do not look them up).

Follow along, marking words you do not know as the teacher reads through the article.

Make a list of 10 to 12 of these words for study and compare lists with a partner. **(I) (P)**

Share a few of your words.

Guess the meaning of words on your list using context as demonstrated by the teacher.

Use a dictionary or define words after class discussion and add words to your personal dictionaries.

Follow along as the teacher reads **Handout 1-24**: “Reading a Science News Article Frame” a second time and make notes. Contribute ideas to note taking.

Complete the notes modelled for you by the teacher.

Review the questions you formulated before reading, to make sure they have all been answered.

## Teacher Notes and References



“Wonder Shoes to Smash Olympic Records,” available at

<<http://news.bbc.co.uk/1/hi/world/americas/873649.stm>> or another similar article.



If you use an alternative article, you will need to adjust the learning task content accordingly.



**Handout 1-24**: “Reading a Science News Article Frame”

### Suggested Reading

A short article on sports technology (See *Scientific American*, November 2000 or May 2000, or search the Internet.)



A number of helpful tutorials for finding and evaluating information on the Internet are available from the Winnipeg

Public Library at:

<<http://wpl.winnipeg.ca/library/onlineresources/internet/getstarted.asp>>.

**Outcomes**

**SLO 2.1.3** Use developing control of grammatical features...

**SLO 2.3** Produce a variety of short and extended text forms...

**SLO 6.2.9** Use summarization...

**SLO 6.2.11** Use transfer...

**Instructional and Learning Sequence**

**Sequence 3**

**Writing an Abstract**

Discuss the use of “abstracts” to convey the essentials of long articles. Model how to write an abstract before students begin to work out writing their own abstracts.

**Assignment**

Students write a one-paragraph abstract of “Wonder Shoes to Smash Olympic Records” using their notes from **Handout 1-24: “Reading a Science News Article Frame.”** Students share with a partner. **(I) (P)**

**Language Features**

**Discourse Features**

summary paragraph construction

## Student Learning Tasks

## Teacher Notes and References

**Assignment**

Write a one-paragraph abstract of “Wonder Shoes to Smash Olympic Records” using your notes from **Handout 1-24: “Reading a Science News Article Frame.”** Share with a partner.  
**(I) (P)**



- **Appendix 2:** How to Create a Summary

- You may wish to provide examples of abstracts from journals or websites.

Module 3, Topic 5A will discuss the use of abstracts.



**Handout 1-24:** “Reading a Science News Article Frame”

**Outcomes**

**SLO 1.1** Engage with increasingly difficult oral and/or visual texts...

**SLO 1.2** Respond to texts...

**SLO 2.1** Show sufficient control over linguistic structures...

**SLO 3.2** Develop and implement a plan for researching...

**SLO 4.1** Use language to encourage...

**SLO 6.1** Students will know and use...

**SLO 6.1.1** Use advance organization...

**SLO 6.1.5** Use selective attention...

**SLO 6.2.4** Use note taking...

**SLO 6.2.7** Use elaboration...

**SLO 6.3.2** Use co-operation...

**Instructional and Learning Sequence**

**Sequence 4**

**Reading for the Main Points** (topic sentences): Distribute copies of **Handout 1-25**: “Where Is the Science in Modern Sport?” and review Appendix 3: Skimming and Scanning for Academic Purposes, which was given out earlier. What sciences are used in modern sports? Brainstorm the different branches of science, supplying vocabulary if necessary.

Read the title, and students predict the topic of the article.

Read the first paragraph together. What is the main idea? Note unfamiliar words that affect comprehension (e.g., pervade, maximize, potential), but not the science words.

**Preview the Subheadings.** What areas will be discussed (e.g., skills, equipment, tactics, psychology, medicine, nutrition, physiology)?

Use the jigsaw strategy to read the article.

As a class, note how the first sentence of each paragraph presents the main idea. What is the main idea of each section? How does the rest of the paragraph help explain the topic sentence? (C)

Consider using one of the assignment options provided.

**Language Features**

**Vocabulary**

tactics, psychology, nutrition, physiology, names of sciences, impact, pervade, maximize, potential

**Sequence 5**

**Roundup**

Make sure the students have entered new words into their dictionaries.

**Learning Log:** What was the most interesting fact you learned in this lesson? You have used several ways to get information from an article now. Which way works best for you?

**Response Journal:** Write five sentences about each of three topics for homework.

## Student Learning Tasks

### Assignment

Brainstorm to predict what each branch of science could contribute to sport.

Predict what **Handout 1-25**: “Where Is the Science in Modern Sport?” will be about and read along as the teacher reads the article to the class.

Use the Jigsaw strategy to read the article.

### Assignment Option

Using the information on the charts (without using the article), write a brief summary of the use of science in modern sports.

OR

Discuss and/or write a paragraph about any other examples of science in sport that you are familiar with.

### Roundup

Enter new words into your dictionaries.

**Learning Log:** Answer the following questions:

1. What was the most interesting fact you learned in this lesson?
2. You have used several learning strategies to get information from an article. Which way works the best for you? Explain.

**Homework:** Write five sentences about each of three topics.

## Teacher Notes and References



**Handout 1-25:** “Where Is the Science in Modern Sport?”

**Appendix 3:** Skimming and Scanning for Academic Purposes

Label the left-hand column of the chart with the different subheadings.



**Jigsaw:** Divide the class into five or six groups. Assign each group one or two (depending on length) sections of the reading.

The group scans its section together, checks key vocabulary, and notes the main contribution of science to the assigned aspect of sports on the chart.

Form new groups with one student from each topic so that each new group has the complete reading. Students explain their own section to the group, so that each person can complete her or his own chart.



## Olympic Games—Some Track and Field Records

MEN's Track and Field Events					
Event	Athlete	Nationality	Time/Dist.	Year	Place
100 metres	Donovan Bailey	Canada	9.84s	1996	Atlanta
200 metres	Michael Johnson	USA	19.32s	1996	Atlanta
400 metres	Michael Johnson	USA	43.49s	1996	Atlanta
800 metres	Vebjoern Rodal	Norway	1m 42.58s	1996	Atlanta
1,500 metres	Noah Ngeny	Kenya	3m 32.07s	2000	Sydney
5,000 metres	Said Aouita	Morocco	13m 5.59s	1984	Los Angeles
10,000 metres	Haile Gebrselassie	Ethiopia	27m 7.34s	1996	Atlanta
Marathon	Carlos Lopes	Portugal	2h 9m 21s	1984	Los Angeles
Steeplechase	Julius Kariuki	Kenya	8m 5.51s	1988	Seoul
High Jump	Charles Austin	USA	2.39 m	1996	Atlanta
Long Jump	Bob Beamon	USA	8.90 m	1968	Mexico City
Pole Vault	Jean Galfione	France	5.92m	1996	Atlanta
Shot	Ulf Timmermann	German Dem. Rep.	22.47 m	1988	Seoul
Discus	Lars Riedel	Germany	69.40 m	1996	Atlanta
Javelin**	Jan Zelezny	Czechoslovakia	90.17 m	2000	Sydney
WOMEN's Track and Field Events					
Event	Athlete	Nationality	Time/Dist.	Year	Place
100 metres	Florence Griffith Joyner	USA	10.62s*	1988	Seoul
200 metres	Florence Griffith Joyner	USA	21.34s	1988	Seoul
400 metres	Marie-Jose Perc	France	48.25s	1996	Atlanta
800 metres	Nadiya Olizarenko	USSR	1m 53.43s	1980	Moscow
1500 metres	Paula Ivan	Romania	3m 53.96s	1988	Seoul
5000 metres	Gabriela Szabo	Romania	14m 40.79s	2000	Sydney
10000 metres	Derartu Tulu	Ethiopa	30m 17.49s	2000	Sydney
Marathon	Naoko Takahashi	Japan	2h 23m 14s	2000	Sydney
High Jump	Stefka Kostadinova	Bulgaria	2.05 m	1996	Atlanta
Long Jump	Jackie Joyner Kersee	USA	7.40 m	1988	Seoul
Shot	Ilona Slupianek	German Dem. Rep.	22.41 m	1980	Moscow
Discus	Martina Hellmann	German Dem. Rep.	72.30 m	1988	Seoul
Javelin**	Trine Hattestad	Norway	68.91 m	2000	Sydney

\* indicates the record was set during one of the preliminary heats. In some cases a better result (time or distance) can be found for an event, but this usually means the better result was made with a wind speed greater than that allowed by the rules.

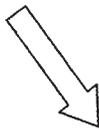
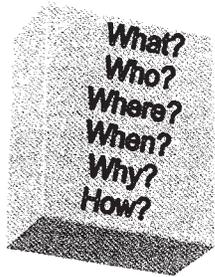
\*\* The javelin record (over time) appears to go “backwards” at one point. This was because the javelin was being thrown so far (over 100 metres for men) it was becoming increasingly difficult to fit a safe throwing-range into a stadium, so the javelin was re-designed so as not to be thrown so far! This meant that records had to be “re-started.”



### Reading a Science News Article Frame

Read the article and write the facts in the boxes.

Title: Author (if available): Source of the article: Date of publication:
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Announcement
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Problem
---------

Solution
Characteristics

Process/Research
------------------

Result
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## Where Is the Science in Modern Sport?

By Craig Sharpe

Science and technology pervade so many aspects of our lives, both in work and leisure, that it would be remarkable if they did not have an equally great impact on sport. To maximize the sporting potential of an Olympic or national squad of competitors, expertise has to be drawn from a number of different branches of science, including physics, biomechanics, electronics, maths, chemistry, biochemistry, materials science, engineering, nutrition, medicine, psychology and physiology.

### Skills

The competitor must be as skilled in the sport as possible, and in some “high skill” sports such as gymnastics, diving or trampolining, coaches will be highly expert at teaching the skills. A variety of analytical equipment may be used to aid in such skill coaching. For example: three-dimensional filming with digitizing into a computer for subsequent analysis of a high jump; slow-motion video analysis of a golf swing; “force platforms” built into gymnastics vaulting horses or discus circles to assess different forces exerted by the competitor at various phases of the movement. These involve a knowledge of biomechanics, electronics, physics and maths.

### Equipment

The equipment has to be the best available, and this may range from a full-blown racing yacht to a vaulting pole to a pair of running shoes. In the pole-vault for example, the world record improved by only 23.5 cm from 1940-62, but in the following 20 years it rose by nearly 100 cm, largely due to improvements in the pole. New synthetic materials allow a much greater conversion of the kinetic energy of the run-up into the potential energy stored in the bending pole, which propels the vaulter ever higher. Also, such materials, by allowing greater bending, let the vaulters grip the poles much higher up, so their final “push-off” is from a greater initial height. Materials scientists and physicists are particularly helpful here.

In the case of distance running, elite marathoners running at a speed of 322 metres/minute were found

to use 62.1 ml of oxygen per kg body weight wearing “old style” shoes; but this fell to 60.8 ml/kg at the same speed when wearing the new “air-soled” shoes, even though these were heavier by 68 g per shoe. Thus the runner could go at the same speed with less energy or at a faster speed with the same energy—with the new shoes. Again the materials scientists (and the shoe designers) and the physiologists are vital in this type of research.

In wind-tunnel tests on cyclists it has been shown that at 40 kph, wind resistance may account for 90% of a cyclist’s energy output. Doubling the speed produces a four-fold increase in wind-resistance. Wind-suits and helmets, together with streamlining the bicycle and the rider adopting a low profile riding posture, can reduce drag by up to 7%. This gives a performance increase of about 5 seconds at 50 kph over 4,000 metres, the distance of an Olympic pursuit race. At this speed, the conventional track bicycle, with 68 cm wheels, may have a drag of 1 kg, but a modern aerodynamic bicycle, with 60 cm wheels, may have a reduced drag of only 0.62 kg.

The newer bikes—such as Olympic gold medallist Boardman’s Lotus bicycle, and world champion Graham Obree’s Caimey bicycle, weigh under 6 kg compared to a conventional track bicycle weight of over 8 kg. This work on the bicycles and cyclists involves materials and fabrics science, engineering, biomechanics, physiology, electronics, computer expertise, and physics.

### Tactics

Tactics are vital in team games such as curling, football, camogie, hockey, soccer and rugby, and racquet sports such as squash, badminton and tennis. Detailed video recording and analysis with the help of computerized notational systems may greatly help the coach to assess the strengths and weaknesses of his or her team or players. This involves high levels of tactical knowledge from the coaches, together with good computer programmer skills to devise the software.

*(continued)*

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## Where Is the Science in Modern Sport? (continued)

### Psychology

Many countries now put teams of fairly equal young men and women into the sports arenas of the world—and the difference between winning and losing may ultimately lie in psychological factors, such as ability to withstand the mental pressure of an entire country's expectations resting on the shoulders of, say, Sonia O'Sullivan, or on the Irish soccer or rugby team. Sports psychologists can also help to ensure that skills—e.g., racquet skills—do not break down under pressure, by using techniques such as “visualization” and “mental rehearsal,” where the competitor goes over and over moves or situations or techniques in their minds.

### Sports Medicine

The best competitor in the world is not going to win if they are too injured to compete—or if their training has been too severely curtailed. So the competitors may need the services of physiotherapists, doctors, osteopaths, and podiatrists (podiatry deals with foot abnormalities, which most of us have to a greater or lesser extent, and their causes and correction). Doctors and physiotherapists may now do special post-graduate courses in sports medicine, and then they often run special “sports injury” clinics.

### Sports Nutrition

In recent years correct feeding of athletes together with fluid replacement has almost become a science in itself. A runner or games player can exhaust half the stored (glycogen) energy in muscle in a single hour of play or training—but there are ways of optimizing its replacement to allow high-quality play or training the next day. Similarly a squash player may lose fluid in the form of sweat at a rate of 1 to 1.5 litres per hour. This water loss must be replaced. Finally, in the sweat are the electrolytes Na, K, Mg and Cl which also have to be replaced later. All this involves biochemists, physiologists and dietitians, as well as some very sophisticated analysis techniques such as Nuclear Magnetic Resonance Spectroscopy, which can analyze levels of various chemical compounds and elements—such as lactic acid, or ATP or phosphorus—in living, exercising, human muscle.

### Sports Physiology

Sports physiology is the analysis of physical fitness into its separate components, in order to see if a competitor is deficient in any of the fitness items and also if he/she is improving them with training. There are five main components of physical fitness:

1. Aerobic function—referring to the whole of oxygen intake, delivery and utilization, involving lungs, blood, heart, muscle capillaries, myoglobin and mitochondria.
2. Anaerobic function—referring to the ability of muscle to work extremely hard without any oxygen at all—as in fast bursts of speed or activity.
3. Muscle power, which involves the force a muscle can generate, together with the speed with which that force can be delivered—in other words, power is a combination of muscle strength and speed—and this can be measured in the laboratory with “isokinetic dynamometers.” The technique of “muscle biopsy” can now help the physiologist to analyze the glycogen (muscle sugar), and other chemical content of individual muscle fibres.
4. Joint mobility refers to the range of movement at a joint. Very high levels are needed for gymnastics and dance, as well as hurdling and diving, and some martial arts such as taekwon do and karate. The movement range of the limb is measured by “goniometers.”
5. Body composition refers to the percentage of fat in the body. Untrained young men and women, 17 to 18 years old, tend to have between 25-30% of fat if they are female, and 12-15% if they are male—a natural sex difference. However, distance runners of both sexes have much less fat than this, whereas sea swimmers of both sexes have much more (which helps them both to float better and to resist the cold). Body fat is measured by skinfold calipers—or by simple (and painless!) electrical methods.

The scientists who carry out all these measurements will be sports physiologists working in a “human performance laboratory,” as in the National Coaching and Training Centre in the University of Limerick, or Professor O'Brien and Dr Bamaville's laboratory in Trinity College Dublin.

*(continued)*

## Where Is the Science in Modern Sport? (continued)

### Conclusion

From the above, one can see that modern sport is enormously helped by the contributions from a whole range of different types of scientists. Central to all this is the “sports scientist,” who will have studied a variety of science topics, such as maths, statistics, physics, biomechanics, computing, chemistry, biochemistry, nutrition, psychology, and sport and exercise physiology. For example, the new degree in Sports Science in the University of Limerick covers all these topics in varying depth. The practising sports scientist will often call in the specialist help of scientists from other specific areas, such as physics, or engineering, or biomechanics to help solve particular problems. To be at all competitive in the world of modern sport, one must have access to the best in science and technology that is appropriate to one’s sport.

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