A scientific paper is a written and published report describing original research results. Research papers (called primary sources) provide direct or firsthand evidence about an experiment, event, object, person, or work of art and are. They have a Materials & Methods section (it could be called just “Methods” or “Experimental”) that describes how the experiments were performed. Review papers (called secondary sources) describe, discuss, interpret, comment upon, analyze, evaluate, summarize, and process primary sources. They usually DO NOT have an experimental section.

A scientific paper usually consists of the following: (1) Title, (2) List of authors and their addresses/affiliations, (3) Abstract, (4) Introduction, (5) Materials and Methods, (6) Results, (7) Discussion, and (8) References (Literature cited).

Title: The title is the most important part of a paper, as it will be read by many people. It should reflect the content of the paper and include keywords that will attract the attention of potential readers.

List of authors and their addresses

Abstract: The abstract allows the reader to decide whether to read the article. It is a concise summary of the purpose of the paper, the methods used, the results, and the major conclusions. The abstract should not include references.

Introduction: The introduction describes the subject of the paper, outlines the scientific purpose(s) or objective(s) for the research performed and gives the reader sufficient background to understand the rest of the paper. The background should be pertinent to the study reported in the paper. The specific hypotheses and experimental design pertinent to investigating the topic should be described. The introduction should answer the following questions: Why was this study performed? What knowledge already exists about this subject? What is the specific purpose of the study?

Materials and Methods: The description of the materials and methods used in the experiments should provide enough detail for the reader to understand the experiment. When procedures from a lab book or another paper are followed exactly, simply cite the work, noting that details can be found in that particular source. However, it is still necessary to describe special pieces of equipment and the general theory of the assays used. Generally, this section attempts to answer the following questions: What materials were used? How were they used?

Results: The results section should summarize the data from the experiments without discussing their implications. The data should be organized into tables, figures, graphs, photographs, or mentioned in the text. Data included in a table should not be duplicated in a figure or graph. All figures and tables should have descriptive titles and should include a legend explaining any symbols, abbreviations, or special methods used. This section of the paper is focused on general trends and differences and not on trivial details. It is a good idea to write the results section before the rest of the paper.

Figures and tables should be numbered separately and should be referred to in the text by number, for example: (1) Figure 1 shows that the activity increased after five minutes of incubation; (2) The activity increased after five minutes (Fig. 1). Figures and tables should be self-explanatory, so that the reader could understand them without referring to the text. All columns and rows in tables and axes in figures should be labeled.
Discussion: This section should not just reiterate the results but should provide interpretation of the data and how they relate to existing theory and knowledge. Ideas for the improvement of techniques or experimental design may also be included here. In this section, the author(s) should explain the logic that would allow readers to accept or reject the original hypotheses. This is the place to suggest future experiments that might clarify areas of doubt in the presented results.

Literature Cited: This section lists all articles or books cited in the paper. It is not the same as a bibliography, which simply lists references regardless of whether they were cited in the paper. The listing should be alphabetized by the last names of the authors. Different journals require different formats for citing literature. The format is given in the following examples of citations arranged in the ACS Style for articles:


When citing references in the text, refer to articles by the author's name and the date the paper was published. For example:

1. As discussed by Fox, statins may have some significant adverse effects (Fox, 2016);  
2. Statins are a group of drugs that inhibit the synthesis of cholesterol. These drugs may have some significant adverse effects (Fox, 2016).

Consult the ACS Style Manual for more details about citing literature in scientific papers.

General Comments on Style

1. All scientific names (genus and species) must be italicized.
2. Use the metric system of measurements.
3. Numbers should be written as numerals when they are greater than ten or when they are associated with measurements; for example, 6 mm or 2 g but two explanations of six factors. When one list includes numbers over and under ten, all numbers in the list may be expressed as numerals. Spell all numbers beginning sentences.
4. Be sure to divide paragraphs correctly and to use starting and ending sentences that indicate the purpose of the paragraph.
5. Every sentence must have a subject and a verb.
6. Avoid using the first person, I or we, in writing. Keep your writing impersonal, in the third person. Instead of saying, "We weighed the chemicals and dissolved them in water," write, "The chemicals were weighed and dissolved in water."
7. Be consistent in the use of tense throughout a paragraph--do not switch between past and present. It is best to use past tense.
8. After writing a paper, read it over, watching especially for lack of precision and for ambiguity. Each sentence should present a clear message.