



WRITING PRACTICAL EXERCISES FOR THE 21ST CENTURY PROJECT

Physiology for the 21st Century is an online sourcebook of effective and economical experiments patterned after the IUPS *Source Book of Practical Experiments in Physiology Requiring Minimal Equipment*. The descriptions of laboratory exercises are written to guide faculty in planning and writing a laboratory activity for their students and they should not be used as a student handout.

This form contains instructions for people who would like to submit a sourcebook chapter for inclusion in the 21st Century Sourcebook. Experiments using vertebrate animals are not being accepted and experiments using students as human subjects should be noninvasive or minimally invasive.

All contributions will be reviewed and edited by one of the project editors prior to submission to the APS Archive of Teaching Resources (www.apsarchive.org). Once submitted to the Archive, the activity will go through a second peer-review process for scientific accuracy prior to acceptance and posting online. Authors may be asked to revise their submission at any stage of the peer-review process.

All submissions should be formatted using the Word document template available on the 21st Century website (www.the-aps.org/education/21st). Please enter text into the boxes on the template. Some of the categories may seem strange but these are the fields that are in the APS Archive of Teaching Resources. If you plan to use abbreviations, please spell out the term the first time it is used in the exercise and put the abbreviation in parentheses behind the word. *Example:* As a consequence, blood pressure (BP) falls.

Step-by-step instructions for completing the template follow. If you have questions, please email Dee Silverthorn at silverthorn@mail.utexas.edu.

1. EXERCISE TITLE:
2. ORIGINAL EXERCISE NUMBER: [*leave blank*]
3. FIRST AUTHOR:
4. ADDITIONAL AUTHORS:
5. EDITOR(S): [*leave blank*]
6. DESCRIPTION/ABSTRACT (250 WORD LIMIT):

7. LEARNING OBJECTIVES (CONTENT KNOWLEDGE) After completing this lesson, the student will be able to: [*Describe the key concepts students will learn from the experiment; misconceptions that might be corrected. Objectives should begin with action verbs such as explain / describe / list / draw, etc.*]

8. LEARNING OBJECTIVES (PROCESS SKILLS) After completing this lesson, the student will be able to: [*Describe key skills to be learned from experiment. Objectives should begin with action verbs such as measure/design/predict/analyze, etc.*]

9. APPROPRIATE USES OF LESSON: [*What classes or courses might use this activity?*]

10. DESCRIPTION OF THE PHYSIOLOGY: [*Users of the 21st Century Project Sourcebook should not have to consult outside references to understand what is going on as they may not have access to appropriate resources. This section should contain all information needed to educate the reader about the experiment and may need to be quite detailed. May include figures, graphs, and/or flow charts. Assume that the reader has minimal background in physiology. What phenomena does the activity explore? What physiological parameters are measured or observed? Place the experiment in the broader context. Relate to physiological principles. If possible, include citations for the original research from which the activity derives. Use the citation format (Shimada, 1953) or (Smith and Wesson, 2001) or (Patel et al., 1995) for in-text references and put the complete citation for each cited reference in Section 22.*]

11. CLINICAL RELEVANCE OR EVERYDAY RELEVANCE: [*Include any factors that might interest students. Put the experiment and its physiology into a context for them.*]

12. PREREQUISITE STUDENT KNOWLEDGE OR SKILLS: Students should have a basic understanding of: [*What background content should students know to successful complete this exercise*] Students should know how to: [*What skills or techniques should students be able to do to successful complete this exercise?*]

13. TIME REQUIRED/TYPICAL LEARNING TIME:

<input type="checkbox"/> <1 hour	<input type="checkbox"/> 2-3 hours	<input type="checkbox"/> 4-6 hours	<input type="checkbox"/> 6-9 hours	<input type="checkbox"/> >9 hours
Other – please describe:				

14. EQUIPMENT AND SUPPLIES NEEDED: [*Needs to be detailed. Assume the reader has no experience in this activity and needs to set up the experiment for the first time. For example, “rubber tubing” is not specific. Should include acceptable range of tubing diameter and length: 3-5’ of 1 cm I.D. rubber tubing. Provide alternatives when possible. For example: handheld or computer-linked sphygmomanometer. Include where to purchase unusual items, instructions for building simple equipment, recipes for solutions, etc. This section may include diagrams and photographs.*]

15. DIRECTIONS FOR DOING THE EXPERIMENT/ACTIVITY [*Provide enough detail so that the process can be duplicated easily. Numbered steps are good because you*

can use them to refer to particular parts of the experiment. Include samples of data collection or report forms if appropriate. Include diagrams or photographs if appropriate.]

16. SAFETY CONSIDERATIONS: *[Should some students be excluded as experimental subjects? Are precautions needed in handling or disposing of chemicals? Is protective gear required (gloves, goggles, etc.)?]*

17. EXPECTED RESULTS/EXPLANATION OF RESULTS *[What would you expect students to observe or measure? Relate the results to the physiology. Provide sample data or graphs, if available.]*

18. SUGGESTIONS FOR ASSESSMENT *[Include how students might present their data and give examples of questions to be answered in a lab report or other assessment. If the answer to a question is not found elsewhere in the write-up, it should be included here, immediately after the question.]*

19. TROUBLESHOOTING *[Describe common student mistakes and what can go wrong. Explain how to correct or prevent technical problems. List sources of possible artifacts or erroneous results.]*

20. INQUIRY APPLICATIONS AND WIDER EDUCATIONAL CONTEXTS:
[What is the inquiry level of the lesson (see table at bottom of template)? Can the lesson be made more student-centered and/or used at a higher inquiry level? Can the lesson serve as an introduction to a method that can then be used in higher level inquiry investigations? Can the lesson be used in a problem-based learning context or case-based learning context?]

21. OTHER INFORMATION: *[This could include how to handle the class discussion once the experiment is done as well as other interesting background information about the experiment or the physiology behind the experiment.]*

22. REFERENCES: *[This section should include original source citations, textbooks, web sites, acknowledgements, etc. Please look for recent information on the topic using PubMed www.pubmed.org or other resources. As with any paper that cites the work of others, please do not include references that you have not personally looked at. The references listed in this section do not all need to be cited elsewhere in the text but any references cited in the text must be listed here. List references alphabetically by last name of first author.]*

23. KEYWORDS *[No more than 15 words]*

24. DISCIPLINE *[See listing in appendix; select all that apply]*

25. CULTURAL/HISTORICAL/GEOGRAPHIC ASPECTS

Does this activity have aspects that should be noted in terms of cultural applications, historical impacts, or geographic impacts? If so, list these here. If not, write "none."

26. APPROPRIATE GRADE LEVELS [*Leave blank if you are not familiar with these categories.*]

27. RELATED ARCHIVE ITEMS [*Search the Archive for related items, such as other labs, Advances in Physiology Education articles, Legacy articles, etc. (List title or item number)*]

28. RELATED APS JOURNAL ARTICLES [*Search the APS journals website www.the-aps.org/publications/journals for reviews and other related articles. List Advances articles in previous section. References should follow *American Journal of Physiology* style. Notice that there are no periods after authors' initials.*]

Book: Author AA, Author B, and Author CC. *Title* (x ed.). City: Publisher, date.

Chapter in a book: Author AA and Author CC. Title of the chapter. In: *Book Title*, edited by Editor AA, Editor BB. City: Publisher, date, p. 00-00.

Journal article: Author AB. Title of article. *Journal Title Abbreviated* vol: pp-pp, year.

Web article: Author/editor (if known). (Revision or copyright date, if available). Title of page [publication medium*]. Page publisher. URL** [access date].

* [online] ** (protocol://site/path/file) Date may be general (year only) or to the day. If a reference is available both in print and online in electronic format, always cite the print reference.

See www.the-aps.org/publications/i4a/prep_manuscript.htm#references for more information about references format if needed.

For examples of 21st Century activities in the Archive, see:

Effects of Valsalva Maneuver on Cardiovascular Function
www.apsarchive.org/resource.cfm?submissionID=2456

Cold Stress Pressor Test
www.apsarchive.org/resource.cfm?submissionID=2455

For more information, please contact Dee Silverthorn at silverthorn@mail.utexas.edu