



SUGGESTED GRADING RUBRICS

These are the grading rubrics I use when I teach the labs in my *New Designs for Bio-Explorations*. Students have these rubrics before they start, and thus have guidance for the projects they propose and conduct. The first rubric is a general one that works for any lab in which students design and conduct an experiment. The others are designed for specific labs that do not involve an experiment.

Your work will be graded according to the standards that are detailed below. Check with your laboratory instructor for details on which rubrics will be used for a given laboratory exercise. You may achieve one bonus point in any category for work “above and beyond,” up to a maximum of three bonus points.

General Rubric for Experimental Investigations

Experimental design and description

Statement of experimental question:

- 3 pts clearly stated
- 2 pts somewhat clearly stated
- 1 pt vaguely stated
- 0 pts not stated

Appropriateness of experimental question:

- 3 pts relevant to topic
- 2 pts partially relevant to topic
- 1 pt weakly relevant
- 0 pts not relevant

Manipulated variable:

- 3 pts clearly stated
- 2 pts somewhat clearly stated
- 1 pt vaguely stated
- 0 pts not stated

Appropriateness of chosen variable:

- 2 pts allows quantitative measurement
- 1 pt all-or-none measurement
- 0 pts inappropriate measurement

Single manipulated variable:

- 2 pts one variable is manipulated at a time
- 0 pts more than one variable manipulated

Standardized experimental conditions:

- 3 pts conditions carefully standardized
- 2 pts only some conditions standardized
- 1 pt few conditions standardized
- 0 pts much variability among trials

Experimental design and description (*continued*)

Explanation of experiment:

- 3 pts experiment carefully explained
- 2 pts some detail missing
- 1 pt vague description
- 0 pts experiment not described

Measured variable:

- 3 pts clearly stated
- 2 pts somewhat clearly stated
- 1 pt vaguely stated
- 0 pts not stated

Replication:

- 3 pts at least 5 trials conducted
- 2 pts 3 trials conducted
- 1 pt 2 trials conducted
- 0 pts only 1 trial conducted

Data interpretation:

- 3 pts data fully and correctly interpreted
- 2 pts data interpretation incomplete
- 1 pt data interpretation wrong
- 0 pts data not interpreted

Recommended improvement (this study):

- 2 pts appropriate or not needed
- 1 pt weak recommendations
- 0 pts no improvements recommended

Future studies (extensions):

- 3 pts 3 future studies recommended
- 2 pts 2 future studies recommended
- 1 pt 1 future study recommended
- 0 pts 0 future studies recommended

Poster presentation

Data presentation (table or graph):

- 3 pts appropriate
- 2 pts incomplete (e.g., lacks axis label)
- 1 pt major error (e.g., axes reversed)
- 0 pts data not displayed

Visual aids:

- 3 pts neat, clear, large enough to see at back
- 2 pts one aspect of good visual aids missing
- 1 pt two aspects of good visual aids missing
- 0 pts no visual aids

Oral presentation

Data presentation (table or graph):

- 3 pts appropriate
- 2 pts incomplete (e.g., lacks axis label)
- 1 pt major error (e.g., axes reversed)
- 0 pts data not displayed

Visual aids:

- 3 pts neat, clear, large enough to see at back
- 2 pts one aspect of good visual aids missing
- 1 pt two aspects of good visual aids missing
- 0 pts no visual aids

Oral presentation:

- 3 pts loud, clear, good eye contact
- 2 pts one aspect of good presentation missing
- 1 pt two aspects of good presentation missing
- 0 pts no presentation

Written report:

- 5 pts good grammar, clear writing, neat, fewer than 3 typos
- 4 pts only 3 of good report attributes
- 3 pts only 2 of good report attributes
- 2 pts only 1 of good report attributes
- 1 pt problems with grammar, clarity, proofreading, neatness, more than 6 typos
- 0 pts no report

Group work

Attendance and promptness:

- 3 pts on time for all meetings
- 2 pts present for all meetings but late for some
- 1 pt present for all meetings but late for all
- 0 pts missed one or more meetings

Contributed to project by which of the following

(1 point for all that apply):

- ideas for project design
- collection of data
- analysis and interpretation of data
- development of visual aids

Ability to work in groups:

- 3 pts always had a cooperative attitude
- 2 pts sometimes hindered group progress
- 1 pt often hindered group progress but occasionally promoted progress
- 0 pts extremely difficult to work with

Specific Rubric

Observation: The First Necessity of Science

Completeness of observations:

- 5 pts list of at least 30 observations shows excellent observation and analytical skills (from all subject areas: behavior, gross morphology, internal anatomy, cell arrangement)
- 4 pts list of at least 25 observations from all subject areas (see above) but observations not extensive or fully analyzed
- 3 pts list of at least 20 observations not necessarily from all subject areas
- 2 pts list of at least 10 observations not necessarily from all subject areas
- 1 pt list of at least 5 observations not necessarily from all subject areas
- 0 pts no observations

Accuracy of observations:

- 5 pts observations are accurate, in-depth, well organized, and well explained
- 4 pts most (not all) observations are accurate and well explained; observations are well organized
- 3 pts observations are only partially accurate, somewhat superficial, and somewhat disorganized
- 2 pts observations are partially accurate, but poorly described and explained
- 1 pt most observations are inaccurate and poorly described and explained
- 0 pts no observations

You may also wish to use rubrics for presentations and group work.

Building Phylogenies

Phylogeny construction:

- 5 pts properly constructed; at least 3 traits per branching point
- 4 pts properly constructed; only 2 traits per branching point
- 3 pts properly constructed; only 1 trait per branching point
- 2 pts poorly constructed or incomplete but shows some understanding of the concept
- 1 pt construction does not show understanding of the concept
- 0 pts no phylogeny

Character traits used:

- 5 pts All traits used are named and ancestral/derived states are explained
- 4 pts Most traits are named and ancestral/derived states are explained
- 3 pts Some traits are named and ancestral/derived states are explained
- 2 pts Traits are named but ancestral/derived states are not explained
- 0 pts Traits are not named or explained

Measuring Biodiversity

Data:

- 5 pts provided as requested
- 3 pts data incomplete
- 0 pts no data supplied

Graphs:

- 5 pts axes correct, clear, neat, labeled correctly
- 4 pts axes correct and 2 other attributes of good graphs
- 3 pts axes correct and 1 other attribute of good graphs
- 2 pts axes incorrect and neat and labeled correctly
- 1 pt axes incorrect, messy, unreadable, and incomplete
- 0 pts no graphs

Diversity indices (where appropriate):

- 5 pts calculated correctly
- 3 pts calculated incorrectly
- 0 pts not calculated

Phylogeny drawing:

- 5 pts exceptional quality—clear and easy to follow
- 4 pts easily understood
- 3 pts readable but not easily understood
- 2 pts difficult to follow
- 1 pt messy and difficult to follow
- 0 pts unreadable

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Understanding of biodiversity concepts

(report content):

- 5 pts discussion is thorough; recommendations are appropriate and extensive; shows clear understanding of the concepts
- 4 pts recommendations are appropriate; discussion or recommendations could be more extensive; shows clear understanding of the concepts
- 3 pts recommendations are appropriate; both discussion and recommendations could be more extensive; shows moderate understanding of the concepts
- 2 pts recommendations not reasonable; discussion incomplete; shows limited understanding of the concepts
- 1 pt discussion incomplete and superficial; contains errors in interpretation; shows little understanding of the concepts
- 0 pts no report

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Preserving Biodiversity

Goals of preserve plan:

- 5 pts clearly stated and reasonable
- 3 pts moderately clearly stated
- 1 pt not within the mandate given
- 0 pts no goals stated

Quality of plan:

- 5 pts plan will meet stated goals
- 3 pts plan will partially meet stated goals
- 1 pt plan is not likely to meet stated goals
- 0 pts no plan presented

Biological justification:

- 5 pts biological aspects of the plan are well justified
- 3 pts biological aspects of the plan are moderately well justified
- 1 pt biological justification is incorrect
- 0 pts no biological justification

Political/economic justification:

- 5 pts political/economic aspects are addressed thoroughly
- 3 pts political/economic aspects are addressed moderately well
- 1 pt political/economic aspects are addressed incompletely or incorrectly
- 0 pts no addressing of political/economic concerns

Knowledge of current preservation situation:

- 5 pts extensive
- 3 pts moderate
- 1 pt limited
- 0 pts not demonstrated

Budget:

- 5 pts extremely detailed
- 3 pts moderately detailed
- 1 pt superficial
- 0 pts no budget

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