

How to Write Biology Lab Reports

"The science laboratory...is where humanity grows greater, stronger & better." --
Microbiologist Louis Pasteur

In some labs we observe nature; in others, we investigate cause-and-effect relationships. To look for cause-and-effect, we do an experiment. In an experiment, the **independent variable [IDV]** is the variable we manipulate (the "cause"). The **dependent variable [DV]** in the experiment is the variable we measure to see if it responds ("the effect").

Before a lab...PRE-LAB! ALL PRE-LABS ARE TYPED!!

Complete a **TYPED "Pre-Lab"**. Your pre-lab is what you use to perform the lab. It generally has 6 parts:

- Title** of the lab. BE SPECIFIC and keep it simple "The Effect of [IDV] on [DV]".
- Research Question:** State precisely and clearly what it is that you will investigate by doing the lab. If doing an experiment, ask "What is the effect of [IDV] on [DV]?" For observation labs, just ask the question naturally.
- Hypothesis & Explanation:** For experiments, propose a relationship between the DV and the IDV & make a prediction about that relationship. Then explain the rationale for your idea by CITING A SOURCE FROM A REPUTABLE WEBSITE!!!. Example: "IF [gas mileage] is related to [tire pressure] AND [for the next month the car's tires will be properly inflated], THEN [the overall gas mileage will increase]. "According to an article in AAA Colorado magazine (PROPERLY CITE!!) about fuel economy..."
- Variables Table:** Good experimental design requires the control of variables that may affect the outcome of your experiment. Create and fill out a table such as this: (each experiment has its own number of relevant variables!)

Relevant Variables	Why Variables Might Affect the Outcome of the Experiment	How Your Method Allows for the Control of (Holds Constant) the Relevant Variables
X		
Y		
Z		

- Methods/Procedures:** List materials needed for the experiment. BE EXPLICIT and BE SPECIFIC about materials required; precise sizes, precise amounts needed, etc.... List directions into a numbered sequence of clear steps that show what actions to take and the order in which to take them. Identify procedural wait time (if any), and include steps that can be initiated while waiting. Someone should be able to replicate your experiment without any questions about your procedures and materials used!
- Data Collection:** Construct one or more **TYPED**, neat, ready-to-use tables for quantitative data (data in the form of numbers). Remember to follow conventional rules when making tables. Data can also be qualitative, such as a color change in a test tube or the reaction of a cell under the microscope. You'll sketch that type of data.

✓ Your pre-lab will be **checked** before we do the lab. Only well-prepared students with **complete pre-labs** earn the opportunity to work in the laboratory; all others will be excluded from the lab to perform classroom service.

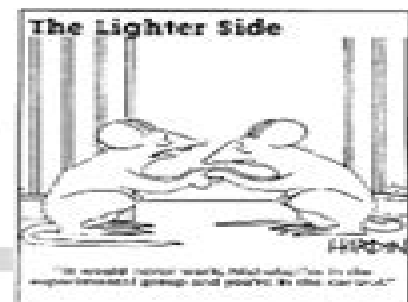
During a lab...

Make the observations and/or perform the experiment. Record your data in the table you made. If you change anything (on purpose or accidentally!), make a note of it. The ability to work cooperatively and safely may also be assessed.

After a lab...

Complete the lab report by adding the **final three necessary components**:

- Data Processing & Presentation (MUST BE COMPUTER-GENERATED):** Transform, analyze, and present the data in a new way to effectively communicate what you discovered. Should you average data? Draw a line of best fit on a graph? Either way, if calculations are performed, **show sample calculations!** Now construct a graph with it (bar, line, or pie, as appropriate). **DO NOT GRAPH RAW DATA (UNPROCESSED DATA)!!**
- Conclusion:** Assume the reader is a science-minded, well-educated layperson. **Conclusions have four parts:**
 - Restatement** of the question and hypothesis.
 - Accurate summary of the results** from the lab. Tell us what happened using **actual data** from your experiment in your account. **This should be a good paragraph or two.**
 - Interpretation of the results** — your judgment as to whether the data do or do not support the hypothesis. Identification of at least **three relevant sources of inaccuracy** (limitations, weaknesses, or errors) and how they may have affected your data. How was the design fundamentally flawed? **Don't just use HUMAN ERROR!**
 - Summary statement about the validity of your conclusions based on your analysis.



How To Write A Microbiology Lab Report

JR Anderson



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vision of human life in the future examining the concepts of the home interior the design studio and the
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web das buch konstantin grcic panorama erscheint anlässlich grcics bislang größter Einzelausstellung es umfasst das erste
 werkverzeichnis des designers und dokumentiert mit detailangaben bildern sowie ausführlichen beschreibungen über 400
 möbel produkte ausstellungen und interieurs

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 whose creations combine an experimental industrial

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web konstantin grcic is one of the most influential designers of our time combining industrial aesthetics and experimental
 artistic elements into works that are both avant garde and functional

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web background grcic was born in munich germany in 1965 to a serbian father a german mother and grew up in wuppertal 6
 7 8 9 his father born in belgrade former yugoslavia collected 18th century art and his mother was an art dealer 7

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web the exhibition konstantin grcic panorama provides a comprehensive overview of grcic s work and sheds light on his
 inspirations and work processes

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 hasselt belgium w i r e web for interdisciplinary research expertise was a major scientific collaborator the exhibition will be
 shown at z33 from 08 02 to 24 05 2015 the opening will be on 07 02 2015

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 museum to konstantin grcic and his works which will be opened on march 21st until september 14th 2014

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web a walk through of the exhibition konstantin grcic panorama at the vitra design museum with an introduction by german
 designer konstantin grcic and the dir

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web konstantin grcic was trained as a cabinetmaker at parnham college in dorset before studying industrial design at the
 royal college of art in london in 1991 he set up his own practice konstantin grcic design the vitra design museum devoted a

monographic exhibition to grcic and his

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web 2015 panorama at the the vitra design museum has been the most comprehensive solo exhibition of my work to date the show included several large scale installations rendering my personal visions for life in the future a home interior a

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web mar 13 2015 the belgium gallery z33 presents the largest show dedicated to the work of the designer konstantin grcic the exhibition entitled panorama was developed in collaboration with the vitra design museum and presents not only the designer s finished projects but also the installation he specially made for the occasion

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web konstantin grcic panorama is being published in conjunction with the largest solo exhibition on grcic to date it constitutes the first catalogue raisonn   of the designer s work and documents more than 350 pieces of furniture products and exhibitions with informative details images and comprehensive descriptions

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web completely rewritten and revised to take account of the recent research developments in anatomy biochemistry anaesthesiology and radiology extended in scope to cover sacrum and sacro iliac joint as well as the lumbar spine new chapter on low back pain

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web aug 25 2022 the lumbar spine comprises the lower end of the spinal column between the last thoracic vertebra t12 and the first sacral vertebra s1 the spinal cord in this region has protection from five durable and mobile vertebrae l1 l5 that allow for the dispersion of axial forces

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web jul 30 2022 fully updated in this sixth edition clinical and radiological anatomy of the lumbar spine walks the reader through the structure function and common disorders of the lumbar spine it covers the basic anatomy of lumbar components how the spine changes with age clinical problems and imaging

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web in this chapter we will attempt to thread that needle to provide pertinent high yield clinical anatomy needed to diagnose and treat pathologies of the lumbar spine without delving into the surgical anatomy needed to perform complex procedures keywords anatomy spine facet joints intervertebral discs muscles tendons ligaments nerves

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web jan 1 2022 the lumbosacral spine consists on average of 5 lumbar vertebrae the sacrum and coccyx an mri scan of this area is used to accurately depict soft tissue in and around the lumbosacral spine measurements mainly focus on a change in signal intensities and less on absolute distances or angles various pathologies affect the configuration of

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web jun 17 2020 the lumbar spine is the third region of the vertebral column located in the lower back between the thoracic and sacral vertebral segments it is made up of five distinct vertebrae which are the largest of the vertebral column this supports the lumbar spine in its main function as a weight bearing structure

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web jan 24 2023 the sacrum is an irregular bone that makes up the back or posterior third of the pelvic girdle a ridge across

the front or anterior portion of the s1 vertebra is called the sacral promontory there are small holes called foramen along both sides of the sacrum that are left over when individual vertebrae fuse together

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web lower part of the foramen between the last lumbar and first sacral vertebrae anatomical variations anatomical variations occur frequently in this region making the sacrum the most variable portion of the spine 5 the variation may be attributed to the dependency of the final sacral morphology to the load related fusion of the bone structure

anatomical relationship and positions of the lumbar and sacral - Mar 31 2022

web may 7 2013 the aim of this study is to investigate the variations and levels of lumbar and sacral spinal cord segments with reference to the axilla of the t11 t12 and l1 spinal nerve roots and adjacent vertebrae

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web lumbar vertebrae inter body joints and the intervertebral discs zygapophysial joints ligaments of the lumbar spine lumbar lordosis and the vertebral canal sacrum basic biomechanics movements of the lumbar spine lumbar muscles and their fascia nerves of the lumbar spine blood supply of the lumbar spine embryology

clinical anatomy of lumbar spine pubmed - Dec 28 2021

web abstract three elements contribute to the neurologic symptoms of the lumbar spine or its multiplicity from an anatomical viewpoint the first element is the problem of neural tissue the second element is the bone or the soft tissue

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web vertebrae and the fth lumbar veretbra articulates with the sacrum fig 1 1 the lo west two lumbar segments the l4 l5 and the l5 s1 in part because of the biomechanics 1 clinical anatomy of the lumbosacral spine 5 what can be said is that the sacroiliac joint is a tough brous stable joint that has

lumbar spine what it is anatomy disorders cleveland clinic - Aug 04 2022

web your lumbar spine is the lower back region of your spinal column or backbone it consists of five bones l1 l5 other structures in or around your lumbar spine are your intervertebral disks spinal cord and nerves muscles tendons and ligaments your lumbar spine supports the weight of your body and allows a wide range of body movements

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