

## How to Study for AP Statistics General Exam Tips

1. **Know the format of the exam.** The exam is three hours long and consists of two sections:

Section I: Multiple-Choice (90 minutes/40 questions)

Section II: Free-Response (90 minutes/6 questions)

It's important to note that each section is worth 50% of your final score, which means that they both have an equal weight. Keep this in mind when studying for the exam.

3. **Invest in a good AP Stats review book.** While AP Statistics textbooks are essential for learning all the material you need to know, you should also buy a review book. Textbooks can often be lengthy and dry, and it's impossible to remember absolutely everything you read from the text.
4. **Do NOT memorize formulas.** Don't waste your valuable study time trying to memorize formulas and equations. Since the purpose of the AP Stats exam is to test your ability to analyze, understand, and explain fundamental concepts of statistics, the focus is taken off memorization. You will be given a list of formulas and tables to use during the entire duration of the exam. While you don't need to memorize these formulas, you should still be familiar with them and know how to use them in a variety of ways to solve a variety of problems.
5. **Check out StatTrek.com.** This invaluable site has free statistics tutorials with fast-paced videos, practice questions in the AP format, and examples to help you understand concepts in-depth. There's also a useful Statistics and Probability Dictionary, which illustrates the meaning of key terms you need to know for the AP Stats exam. If you're ever looking for a refreshing way to review statistics concepts, StatTrek.com is the place to go.
6. **Become "one" with your calculator.** There's no way of getting around it: statistics is a very calculator-heavy course. You will need to know how to perform tests on your calculator, interpret

data, and use graphing functionalities. The more you practice using your calculator, the faster you can answer multiple-choice questions on the AP Stats exam.

Overall, you need to be familiar with these functions on your graphing calculator:

- Linear regression equations
- Binomial probability equations
- Summary statistics (mean, median, mode, standard deviation, etc.)
- Histogram plots
- Scatter plots
- Residuals
- Confidence intervals

*Keep in mind that your brain is meant to be the primary tool you use on the exam. Your calculator should only be your secondary tool.*

7. **Practice classifying statistics problems.** Determining *what* questions on the AP Stats exam are actually asking you to do can be difficult to master. In order to become more comfortable identifying what a question really wants you to do, try practicing classifying statistics problems. This website offers an interactive way to do just that:  
<http://www.ltconline.net/green/java/Statistics/catStatProb/categorizingStatProblems12.html>
9. **Watch AP Statistics video lectures.** If you're a visual learner, simply reading a textbook is probably not enough for you to really understand complex concepts.
10. **Take practice AP Stats exams.** In order to get a feel for the types of questions you can expect to see on the AP exam, the most helpful thing you can do is take practice exams. It's not enough to just simply know the format of the exam and understand the material: you must also know *how* to take the test. The multiple choice questions on the AP Stats exam will probably be more detailed and involved than other exams you've taken, and the free-response questions will be similarly challenging.

## AP Statistics Multiple-Choice Tips

1. **Focus on specific themes covered on the exam.** The College Board narrows down the topics covered in the AP Statistics Exam by detailing the four main content areas you should expect to see. Make note of the percentage of each multiple-choice content area on the exam. For example, you might want to spend more time perfecting your statistical inference skills since that comprises 30% to 40% of the multiple-choice section, and less time working on how to conduct a study since that only makes up about 10% to 15% of the multiple-choice section.

2.

<b>Content Area</b>	<b>Specific Concepts Covered</b>	<b>% of Exam</b>
Exploring Data: Describing patterns and departures from patterns	<ul style="list-style-type: none"><li>• Constructing and interpreting graphs of one-variable data</li><li>• Summarizing and comparing distributions of one-variable data</li><li>• Analyzing two-variable and categorical data</li></ul>	20-30%
Sampling and Experimentation: Planning and conducting a study	<ul style="list-style-type: none"><li>• Data collection methods</li><li>• Planning and conducting surveys and experiments</li><li>• Conclusions that can be drawn from observational studies, experiments, and surveys</li></ul>	10-15%
Anticipating Patterns: Exploring random phenomena using	<ul style="list-style-type: none"><li>• Probability</li><li>• Normal distribution</li></ul>	20-30%

probability and simulation	<ul style="list-style-type: none"> <li>Combining independent random variables</li> <li>Sampling distributions</li> </ul>	
Statistical Inference: Estimating population parameters and testing hypotheses	<ul style="list-style-type: none"> <li>Estimation</li> <li>Tests of significance</li> </ul>	30-40%

**Keep these strategies in mind if you get stuck:**

- Answer EVERY question (there is no penalty for wrong answers)
- Examine each question for an absolute maximum of 2 minutes
- Use other questions as hints
- Beware of "EXCEPT" and "NOT" questions
- Use the process of elimination to make educated guesses
- Be sure to check that your bubbles are filled in correctly

**AP Statistics Free Response Portion Tips**

1. **Know the types of free-response questions.** On the AP Statistics exam, there are six free-response questions that you'll have to answer in a total of 90 minutes. The first five questions are shorter, open-ended, and should be answered in around 12 minutes or less. The sixth question, which is a longer investigative task requiring extended reasoning, is designed to be answered in about 30 minutes. The first five open-ended problems are worth 15% of your free-response score, and the investigative task is worth 25% of your final FRQ score.

2. **Understand that responses are graded *holistically*.** The answers you give for the six free-response questions will be scored based on the “complete package.” Other AP exams use a more analytic approach, where components of an answer are specified in advance and the graders follow a strict rubric to award points based on correct information given. On the AP Stats exam, however, scoring is holistic, meaning graders look at the overall quality of your answer and don’t just search for pre-specified correct answers. This is because AP Stats FRQs are open-ended; there is more than one correct answer.
3. **Know the vocabulary of statistics and use it correctly.** It is extremely important to not only know your vocabulary terms, but to also use them correctly within the context of the question. Be especially careful when using the word “normal,” since it has a specific meaning. “Normal” usually refers to the distribution of a graph, and not the general shape of the graph. Instead, it’s better to use terms like “approximately normal,” “mound shaped,” or “bell-shaped.” Do not simply comment on the appearance of graphs. For example, do not say things like “the graph is even” or “the plot is half above and half below.” What do you mean by this? Do you mean that it’s symmetric? Consistent? Besides statistical vocabulary, you also need to know your Greek letters:  $\alpha$  (alpha),  $\beta$  (beta),  $\mu$  (mu),  $\chi$  (chi),  $\pi$  (pi),  $\theta$  (theta), and  $\sigma$  (sigma).
4. **Read the questions carefully and answer them in context.** This may seem like a no-brainer, but make sure you read the question closely and answer fully. In order to do this, you need to offer explanations and conclusions in context for every answer. For example, if you are given a confidence interval on the exam, you must interpret the interval in the context of the question.
5. **State and check all assumptions.** If you are asked to perform a hypothesis test or construct interval estimates on the FRQ section, you need to state and check all assumptions and conditions. It’s not enough to just state them; you must also *show* that the assumptions/conditions are met with the information given in the question. Another way to say this is: show your work! For example, instead of just writing “ $np > 10$ ,” write “ $np = 150(.32) = 48 > 10$ .” Your goal is to convince the AP graders that you know how to calculate results and connect the assumption to the problem, not just memorize information.
6. **It’s okay if you can’t answer early parts of the question.** On the AP Stats FRQ section, many of the problems will be multi-part. This means that you must use solutions you found in earlier parts of the question to answer other parts. But what happens if you just can’t get the correct answer for part (a)? Don’t worry! All is not lost! If you find yourself in this situation, make

up a value to use that makes sense, or explain in detail what you would do if you knew the answer to the first part of the question. You won't necessarily get points for trying, but you could get points for crafting a solution that makes sense and is carefully explained.

7. **Do not add "extra fluff."** You will be given more space than you need to answer the free-response questions on the AP Stats exam. In fact, most of the best answers are usually the shortest. That being said, you still need to make sure you're answering the question fully, clearly, and explicitly. Do not add flowery language and do not ramble.
8. **Be able to construct graphs by hand and interpret data displayed in a variety of ways.** Do not depend on your calculator to make graphs for you. The exam will be written to prevent you from relying on your calculator to construct plots and graphs. For this reason, you need to be comfortable with drawing boxplots, stemplots, histograms, and other graphs completely *by hand*. Remember to label the axes and be aware of the number scale.
9. **Refer to graphs explicitly.** If you're asked to interpret a graph, be very specific and use statistics vocabulary. Instead of saying something like: "The male times are obviously higher than the female times," say "The median male time is higher than the first quartile of the male times." Show that you know how to apply statistical concepts to describe a graph. You can also mark and add notes to the graph itself; keep in mind that the AP grader will read everything you write.
10. **Be aware of the common test taking errors.** There are a number of common mistakes that past test-takers have made on the AP Statistics exam. Keep these errors in mind and do your best to not make the same mistakes. These common errors are:
  - Confusing skewed right and skewed left
  - Confusing symmetric/bell-shaped with approximately normal
  - Mixing up categorical data with quantitative data
  - Mixing up one-variable data with two-variable data
  - Writing down a laundry list of everything you know to answer a question, hoping that at least some part of it is correct

- Confusing random sampling with random allocation
- Mixing up the confidence level with the confidence interval
- Using blocking schemes when it doesn't make sense in the context of the problem
- Simply naming a theorem to answer a question without providing an explanation

11. **Understand the common question prompts.** You will most likely see at least one of the following types of questions. Be aware of how to answer each of them.

Task	What To Do
"Choose"	<p>If an FRQ asks you to choose between two things, you must state <i>why</i> you chose one, AND why you did <i>not</i> choose the other option. It's also extremely important to take a stand. Don't try to say that both are good, or both are bad, or that both have pros and cons. This is not a compare and contrast question. Make a choice.</p>
"Compare"	<p>If an FRQ asks you to compare, it usually involves one-variable distributions. You will need to compare aspects of this distribution, such as shape, spread, etc. Make sure you compare like things, meaning don't compare a median of one distribution to the first quartile of the other distribution. Compare medians to medians, and first quartiles to first quartiles.</p>
Refer to a previous answer, for example: "Using your answer to part (a), explain..."	<p>When an AP Stats FRQ asks you to refer to a previous answer, you must include a reference to this in your answer, either by number or concept. You should also link your answer to the key statistical concept in the original problem.</p>

14. **Understand how to describe a residual plot.** If the AP Stats FRQ asks you to describe a residual plot, be sure to comment on:
- The balance of positive and negative residuals
  - The size of the residuals as compared to the corresponding y-values
  - If the residuals are randomly distributed
15. **Know how to describe a scatterplot.** When describing a scatterplot, make sure you touch upon the following points:
- Direction, strength, and shape
  - Patterns in the data
  - Any deviations from the data patterns

### Tips From AP Statistics Teachers

1. **NEVER write calculator commands on the exam.** Do NOT use calculator-speak as your primary answer, only parenthetically (*normalcdf* or *1-PropZTest*). Never write directions for calculator button-pushing!
2. **It's not what you know; it's what you can PROVE you know.**
3. **When asked to describe a one-variable data set, always write about shape, center, and spread.** Thanks to Mr. L. from Miramar High School for the tip!
4. **Do question 1, then question 6, then the remaining four questions.** Read every question before you begin writing so that you can start to prioritize your time. Whatever you do, don't save question 6 (investigative task) until last. Question 6 is a very important part of the exam and you don't want to be rushed, tired, or out of creative juices when you get to it.
5. **Use inference procedures to make a conclusion about data.** You cannot just look at the data and give your opinion. You must use confidence intervals, hypothesis tests, etc. to come to a conclusion about data.

6. **Don't round off at each step of the problem.** If you start rounding off your answers too early, it will create a cumulative rounding error. This can affect the accuracy of your final answer.
7. **Only use terms and symbols you know.** If you're not entirely sure how to use a term or symbol, don't use it! It's better to explain something in your own words than use a term or symbol incorrectly.
8. **Understand the algebraic interpretation of a regression line.** Questions that require you to interpret the slope or y-intercept of a regression line are very closely graded.
10. **Practice your statistical thinking, processing, and analysis skills!** You shouldn't just focus on memorizing computational methods. The AP Statistics exam is more about statistical thinking.

### Tips From Past AP Statistics Students

1. **Read through the AP Statistics Course Description.** You can find it on College Board. This course description tells you everything you need to know for the exam, from the topics you should study, to sample multiple-choice questions, and from free-response scoring rubrics to formulas you should have a good understanding of.
2. **Make an extra effort to memorize the conditions for different distributions and approximations.** One of the most challenging parts of the AP Stats exam is remembering all of the conditions and assumptions for distributions and approximations. If you memorize these, it will be a lot easier for you on the exam:

Type of Test	Assumptions	Conditions
One proportion z-test	<ul style="list-style-type: none"> <li>· Individuals are independent</li> <li>· Sample is sufficiently large</li> </ul>	<ul style="list-style-type: none"> <li>· Simple random sampling</li> <li>· Population &gt; 10n</li> <li>· <math>np \geq 10, nq \geq 10</math></li> </ul>

Two proportion z-test	<ul style="list-style-type: none"> <li>· Groups are independent</li> <li>· Data in each group is independent</li> <li>· Both groups are sufficiently large</li> </ul>	<ul style="list-style-type: none"> <li>· Simple random sampling</li> <li>· Population &gt;10n for each group</li> <li>· <math>np \geq 10, nq \geq 10</math> for each group</li> </ul>
One Sample T-test	<ul style="list-style-type: none"> <li>· Individuals are independent</li> <li>· Population is normal</li> </ul>	<ul style="list-style-type: none"> <li>· Simple random sampling</li> <li>· <math>n &gt; 30</math>; Central Limit Theorem</li> <li>· Population &gt; 10n</li> </ul>
Two-Sample T-Test	<ul style="list-style-type: none"> <li>· Groups are independent</li> <li>· Individuals are independent</li> <li>· Both populations are normal</li> </ul>	<ul style="list-style-type: none"> <li>· Simple random sampling</li> <li>· Both groups are normal; Central Limit Theorem</li> <li>· Population &gt; 10n for each group</li> </ul>
Matched Pair T-Test	<ul style="list-style-type: none"> <li>· Data are matched</li> <li>· Individuals are independent</li> </ul>	<ul style="list-style-type: none"> <li>· Simple random sampling</li> <li>· Difference is normal; Central Limit Theorem</li> </ul>

	<ul style="list-style-type: none"> <li>Population is normal</li> </ul>	<ul style="list-style-type: none"> <li>All &gt; 10n</li> </ul>
Goodness of Fit Chi-Square Test	<ul style="list-style-type: none"> <li>Data are counts</li> <li>Data are independent</li> <li>Sample is sufficiently large</li> </ul>	<ul style="list-style-type: none"> <li>Simple random sampling</li> <li>All &gt; 10n</li> <li>All expected counts <math>\geq 5</math></li> </ul>
Homogeneity Chi-Square Test	<ul style="list-style-type: none"> <li>Data are counts</li> <li>Data in groups are independent</li> <li>Samples is sufficiently large</li> </ul>	<ul style="list-style-type: none"> <li>Simple random sampling</li> <li>All &gt; 10n</li> <li>All expected counts <math>\geq 5</math></li> </ul>
Independence Chi-Square Test	<ul style="list-style-type: none"> <li>Data are counts</li> <li>Data are independent</li> <li>Sample is large</li> </ul>	<ul style="list-style-type: none"> <li>Simple random sampling</li> <li>All &gt; 10n</li> <li>All expected counts <math>\geq 5</math></li> </ul>
Regression Test	<ul style="list-style-type: none"> <li>Form of relationship is linear</li> </ul>	<ul style="list-style-type: none"> <li>Scatterplot looks approximately linear</li> </ul>

	<ul style="list-style-type: none"> <li>· Errors are independent</li> <li>· Variability of a errors is constant</li> <li>· Errors are normal</li> </ul>	<ul style="list-style-type: none"> <li>· No pattern in residuals plot</li> <li>· Consistent spread</li> <li>· Histogram of residuals is approximately normal</li> </ul>
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4. **Attempt every problem.** Partial credit can add up!
5. **Visit Khan Academy for probability and statistics review videos.** The videos don't really follow the AP format, but they're useful if you're struggling with a particular concept
6. **Form a study group.** A great way to learn something, or understand it better, is to explain a concept to someone else. Study groups give you that opportunity.
7. **Make sure you know when to use certain tests and what conditions to check for each.** You must know when to use a t-test, a z-test, a matched-pairs test, a chi-square test, etc. Make sure you know the different conditions you need to check for these tests as well.