Q1:

**Explain Ethics from Research Point of View:**

**Research ethics::**

 It provides guidelines for the responsible conduct of research. In addition, it educates and monitors scientists conducting research to ensure a high ethical standard. The following is a general summary of some ethical principles:

**Honesty:**

Honestly report data, results, methods and procedures, and publication status. Do not fabricate, falsify, or misrepresent data.

**Objectivity:**

Strive to avoid bias in experimental design, data analysis, data interpretation, peer review, personnel decisions, grant writing, expert testimony, and other aspects of research.

**Integrity:**

Keep your promises and agreements; act with sincerity; strive for consistency of thought and action.

**Carefulness:**

Avoid careless errors and negligence; carefully and critically examine your own work and the work of your peers. Keep good records of research activities.

**Openness:**

Share data, results, ideas, tools, resources. Be open to criticism and new ideas.

**Respect for Intellectual Property:**

Honor patents, copyrights, and other forms of intellectual property. Do not use unpublished data, methods, or results without permission. Give credit where credit is due. Never plagiarize.

**Confidentiality:**

Protect confidential communications, such as papers or grants submitted for publication, personnel records, trade or military secrets, and patient records.

**Responsible Publication:**

Publish in order to advance research and scholarship, not to advance just your own career. Avoid wasteful and duplicative publication.

**Responsible Mentoring:**

Help to educate, mentor, and advise students. Promote their welfare and allow them to make their own decisions.

**Respect for Colleagues:**

Respect your colleagues and treat them fairly.

**Social Responsibility:**

Strive to promote social good and prevent or mitigate social harms through research, public education, and advocacy.

**Non-Discrimination:**

Avoid discrimination against colleagues or students on the basis of sex, race, ethnicity, or other factors that are not related to their scientific competence and integrity.

**Competence:**

Maintain and improve your own professional competence and expertise through lifelong education and learning; take steps to promote competence in science as a whole.

**Legality:**

Know and obey relevant laws and institutional and governmental policies.

**Animal Care:**

Show proper respect and care for animals when using them in research. Do not conduct unnecessary or poorly designed animal experiments.

**Human Subjects Protection:**

When conducting research on human subjects, minimize harms and risks and maximize benefits; respect human dignity, privacy, and autonomy.

# Importance of research ethics:

[Research ethics](http://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm) are moral principles that guide researchers to conduct and report research without deception or intention to harm the participants of the study or members of the society as a whole, whether knowingly or unknowingly. Practising ethical guidelines while conducting and reporting research is essential to establish the validity of your research.

You must follow ethical guidelines issued by regulatory committees in order to ensure the safety of the participants of a study, the public at large, and that of the researcher himself/herself. Following ethical guidelines will ensure that your research is authentic and error-free, and will allow you to gain credibility and support from the public. You must adhere to ethical guidelines also while presenting your findings in your manuscript. This will ensure that your article is plagiarism-free and also no unverified data reaches the readers of your article. Apart from that, research ethics fill in a sense of responsibility among researchers and make it easy to fix responsibility in case of misconduct.

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Q2:

Time in Research and Data Sets: Explain in detail:

[Data set:](https://en.wikipedia.org/wiki/Data_set)

Definition:

“A **data set** (or **dataset**) is a collection of data”.

In other words we can explain the data set as In the case of tabular data, a **data set** corresponds ... Some other issues (real-**time** data sources, non-relational **data sets**, etc.) Relational **data set** repository

Types of Data Sets:

There are many types of **data sets** on many different topics.

* [Iris flower data set](https://en.wikipedia.org/wiki/Iris_flower_data_set):

Multivariate data set introduced by [Ronald Fisher](https://en.wikipedia.org/wiki/Ronald_Fisher) (1936).

* [MNIST database](https://en.wikipedia.org/wiki/MNIST_database):

Images of handwritten digits commonly used to test classification, clustering, and image processing algorithms

* [*Categorical data analysis*](https://en.wikipedia.org/wiki/Categorical_data_analysis) :

Data sets used in the book, *An Introduction to Categorical Data Analysis*.

* [*Robust statistics*](https://en.wikipedia.org/wiki/Robust_statistics) :

Data sets used in *Robust Regression and Outlier Detection*.

* [*Time series*](https://en.wikipedia.org/wiki/Time_series) :

Data used in Chatfield's book, *The Analysis of Time Series*, are [provided on-line by StatLib.](http://lib.stat.cmu.edu/modules.php?op=modload&name=PostWrap&file=index&page=datasets/)

* *Extreme values* :

Data used in the book, *An Introduction to the Statistical Modeling of Extreme Values* are [a snapshot of the data as it was provided on-line by Stuart Coles](https://web.archive.org/web/20060910161517/http:/homes.stat.unipd.it/coles/public_html/ismev/ismev.dat), the book's author.

* *Bayesian Data Analysis*:

Data used in the book are [provided on-line](http://www.stat.columbia.edu/~gelman/book/data/) by [Andrew Gelman](https://en.wikipedia.org/wiki/Andrew_Gelman), one of the book's authors.

* The [Bupa liver data](ftp://ftp.ics.uci.edu/pub/machine-learning-databases/liver-disorders):

Used in several papers in the machine learning (data mining) literature.

* [Anscombe's quartet](https://en.wikipedia.org/wiki/Anscombe%27s_quartet):

Small data set illustrating the importance of graphing the data to avoid statistical fallacies.

Time in research in Data Set with Explainations:

When most people think of ethics (or morals), they think of rules for distinguishing between right and wrong, such as the Golden Rule ("Do unto others as you would have them do unto you"), a code of professional conduct like the [Hippocratic Oath](https://www.nlm.nih.gov/hmd/greek/greek_oath.html) ("First of all, do no harm"), a religious creed like the Ten Commandments ("Thou Shalt not kill..."), or a wise aphorisms like the sayings of Confucius. This is the most common way of defining "ethics": **norms for conduct** that distinguish between acceptable and unacceptable behavior.

Most people learn ethical norms at home, at school, in church, or in other social settings. Although most people acquire their sense of right and wrong during childhood, moral development occurs throughout life and human beings pass through different stages of growth as they mature. Ethical norms are so ubiquitous that one might be tempted to regard them as simple commonsense. On the other hand, if morality were nothing more than commonsense, then why are there so many ethical disputes and issues in our society?

[Alternatives to Animal Testing](https://www.niehs.nih.gov/health/topics/science/sya-iccvam/index.cfm):

Alternative test methods are methods that replace, reduce, or refine animal use in research and testing

[Learn more](https://www.niehs.nih.gov/health/topics/science/index.cfm) about Environmental science Basics

One plausible explanation of these disagreements is that all people recognize some common ethical norms but interpret, apply, and balance them in different ways in light of their own values and life experiences. For example, two people could agree that murder is wrong but disagree about the morality of abortion because they have different understandings of what it means to be a human being.

Most societies also have legal rules that govern behavior, but ethical norms tend to be broader and more informal than laws. Although most societies use laws to enforce widely accepted moral standards and ethical and legal rules use similar concepts, ethics and law are not the same. An action may be legal but unethical or illegal but ethical. We can also use ethical concepts and principles to criticize, evaluate, propose, or interpret laws. Indeed, in the last century, many social reformers have urged citizens to disobey laws they regarded as immoral or unjust laws. Peaceful civil disobedience is an ethical way of protesting laws or expressing political viewpoints.

Another way of defining 'ethics' focuses on the **disciplines that study** standards of conduct, such as philosophy, theology, law, psychology, or sociology. For example, a ["medical ethicist"](https://www.iep.utm.edu/bioethic/#SH3b) is someone who studies ethical standards in medicine. One may also define ethics as a **method, procedure, or perspective** for deciding how to act and for analyzing complex problems and issues. For instance, in considering a complex issue like [global warming](https://www.niehs.nih.gov/research/programs/geh/index.cfm), one may take an economic, ecological, political, or ethical perspective on the problem. While an economist might examine the cost and benefits of various policies related to global warming, an environmental ethicist could examine the ethical values and principles at stake.

#### [See ethics in practice at NIEHS](https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm)

[Read latest updates in our monthly Global Environmental Health Newsletter](https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm)

Many different disciplines, [institutions](https://gradschool.duke.edu/professional-development/programs/responsible-conduct-research/rcr-policies-and-resources), and professions have standards for behavior that suit their particular aims and goals. These standards also help members of the discipline to coordinate their actions or activities and to establish the public's trust of the discipline. For instance, ethical standards govern conduct in medicine, law, engineering, and business. Ethical norms

There are several reasons why it is important to adhere to ethical norms in research. First, norms **promote the**[aims of research](https://www.niehs.nih.gov/about/strategicplan/index.cfm), such as knowledge, truth, and avoidance of error. For example, prohibitions.

Second, since research often involves a great deal of cooperation and coordination among many different people in different disciplines and institutions, ethical standards promote the **values that are essential to collaborative work**, such as trust, accountability, mutual respect, and fairness. For example, many ethical norms in research, such as [guidelines for authorship](http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html), copyright and [patenting policies](https://www.niehs.nih.gov/about/techtransfer/index.cfm), data sharing policies, and confidentiality rules in peer review, are designed to protect intellectual property interests while encouraging collaboration. Most researchers want to receive credit for their contributions and do not want to have their ideas stolen or disclosed prematurely.

Third, many of the ethical norms help to ensure that researchers can be held **accountable to the public**. For instance, federal policies on research misconduct, conflicts of interest, the [human subjects protections](https://www.niehs.nih.gov/research/clinical/patientprotections/index.cfm), and [animal care and use](https://www.niehs.nih.gov/health/topics/science/sya-iccvam/index.cfm) are necessary in order to make sure that researchers who are funded by public money can be held accountable to the public.

Fourth, ethical norms in research also help to build **public support** for research. People are more likely to fund a research project if they can trust the quality and integrity of research.

Finally, many of the norms of research promote a variety of other important **moral and social values**, such as social responsibility, human rights, animal welfare, compliance with the law, and public health and safety. Ethical lapses in research can significantly harm human and animal subjects, students, and the public. For example, a researcher who fabricates data in a clinical trial may harm or even kill patients, and a researcher who fails to abide by regulations and guidelines relating to radiation or biological safety may jeopardize his health and safety or the health and safety of staff and students.

### Codes and Policies for Research Ethics:

Given the importance of ethics for the conduct of research, it should come as no surprise that many different professional associations, government agencies, and universities have adopted specific codes, rules, and policies relating to research ethics. Many government agencies have ethics rules for funded researchers.

### Ethical Principals:

The following is a rough and general summary of some ethical principals that various codes address.

#### Honesty

Strive for honesty in all scientific communications. Honestly report data, results, methods and procedures, and publication status. Do not fabricate, falsify, or misrepresent data. Do not deceive colleagues, research sponsors, or the public.

#### Objectivity

Strive to avoid bias in experimental design, data analysis, data interpretation, peer review, personnel decisions, grant writing, expert testimony, and other aspects of research where objectivity is expected or required. Avoid or minimize bias or self-deception. Disclose personal or financial interests that may affect research.

#### Integrity

Keep your promises and agreements; act with sincerity; strive for consistency of thought and action.

#### Carefulness

Avoid careless errors and negligence; carefully and critically examine your own work and the work of your peers. Keep good records of research activities, such as data collection, research design, and correspondence with agencies or journals.

#### Openness

Share data, results, ideas, tools, resources. Be open to criticism and new ideas.

#### Intellectual Property

Honor patents, copyrights, and other forms of intellectual property. Do not use unpublished data, methods, or results without permission. Give proper acknowledgement or credit for all contributions to research. Never plagiarize.

#### Confidentiality

Protect confidential communications, such as papers or grants submitted for publication, personnel records, trade or military secrets, and patient records.

#### Responsible Publication

Publish in order to advance research and scholarship, not to advance just your own career. Avoid wasteful and duplicative publication.

#### Responsible Mentoring

Help to educate, mentor, and advise students. Promote their welfare and allow them to make their own decisions.

#### Respect for Colleagues

Respect your colleagues and treat them fairly.

#### Social Responsibility

Strive to promote social good and prevent or mitigate social harms through research, public education, and advocacy.

#### Non-Discrimination

Avoid discrimination against colleagues or students on the basis of sex, race, ethnicity, or other factors not related to scientific competence and integrity.

#### Competence

Maintain and improve your own professional competence and expertise through lifelong education and learning; take steps to promote competence in science as a whole.

#### Legality

Know and obey relevant laws and institutional and governmental policies.

#### Animal Care

Show proper respect and care for animals when using them in research. Do not conduct unnecessary or poorly designed animal experiments.

When conducting research on human subjects, minimize harms and risks and maximize benefits; respect human dignity, privacy, and autonomy; take special precautions with vulnerable populations; and strive to distribute the benefits and burdens of research fairly.

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**Q3:**

**Effective sampling techniques for market research:**

Sampling is an effective way of obtaining opinions from a wide range of people, selected from a specific group, in a bid to find out more about a whole group in general. As a market research tool for entrepreneurs and start-ups looking to better understand their target market or[research the potential for new business ideas](http://www.bl.uk/business-and-ip-centre/articles/why-is-market-research-important-for-new-business-ideas), sampling can be a real benefit.

It would be extremely expensive and time-consuming to gather data from the entire population of your target market, so by carefully sampling your demographic it’s possible to build an accurate picture of your target market using common trends from the results.

**Sample designs:**

A sample design provides the framework for gathering the information required and the way the sample itself is selected. It covers the method of selection, the sample structure and how to analyse and interpret the data once it’s obtained.

The majority of sample designs are built around the concept of random selection. This guards against any potential bias that selecting samples via judgement or convenience simply cannot.

**Sample sizes:**

Deciding upon an appropriate sample size will depend on a variety of factors:

* No estimate taken from a sample has to be an exact number. There will always be margin of error attached to any estimation based on sample results.
* To lower the margin of error you’ll need to choose a greater sample size. It’s also worth bearing in mind the variability of your target population with regards to their values and opinions as this will also have an impact on the overall margin of error.
* Your overall confidence level – for example, statisticians will opt for a 95% confidence level in order to provide strong, conclusive results. Put simply, the higher your confidence level, the clearer you need to be that the results will be as you expect.

**Six sampling techniques to investigate your market:**

* 1. **Cluster sampling**

A sample within your target demographic can be targeted using certain demographic groups or ‘clusters’. It’s a relatively quick sampling technique for those looking to conduct research without complete population information. However, it can prove expensive if the clusters you select are vast and there is also a much greater risk of sampling errors.

* 1. **Convenience sampling**

Arguably the easiest form of sampling, convenience sampling utilises people who are willing to volunteer their services. By using subjects who are readily available for questioning it’s possible for fledgling businesses with small budgets to gather large amounts of data very quickly. On the flip side, the sample will not be wholly representative of the entire population and the results will also be at risk of volunteer bias.

* 1. **Judgement sampling**

This form of sampling is a very deliberate, selective method of understanding your target population. The opposite of random selection, it’s a very useful sampling method for those seeking valuable illustrative examples or case studies. Nevertheless, this method is at the same risk of bias as convenience sampling groups. A judgement sample will also often by smaller than other forms, making it difficult to truly extrapolate reliable insight.

* 1. **Quota sampling**

The aim of this sampling technique is to gather a representative sample of the entire target population. You will go about this by dividing your population using key variables and drawing a sample from each variable. This is not an entirely random selection criteria given that you’re drawing a quota from key variables and it’s a time intensive task to understand the population to be able to even identify the basis of stratification for the key variables.

* 1. **Pure random sampling**

With this sampling method every single person within your target population has an equal chance of being selected for questioning. This makes it much easier to determine both the estimate of the population and the sampling error. It may not be logistically viable however if the sample means you’re required to make lots of small visits across the country to interview those selected.

* 1. **Systematic sampling**

This is a probability sampling method in which people are selected from a larger population according to a random starting point and a fixed, periodic interval. This technique ensures the sample is spread throughout the target population but can be costly and time-consuming if, like pure random sampling, the chosen sample is not conveniently located.

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