so you want to do scientific research?

what is research?

Depending on the field, this can range from proving **abstract theorems**, doing **biology/chemistry experiments**, or **inventing new algorithms**. After coming up with something new and interesting, you **share** your work with other scientists.

establishing foundations.

- ★ Ask yourself what you are **interested in pursuing**!
- ★ Take the relevant school courses at the highest level.
- ★ Take additional courses at local university or community college or online program. Many universities offer free courses (eg. MIT OpenCourseWare).
- ★ Create projects by yourself or with a mentor. This is easier in fields like computer science and engineering.
- ★ Participate in related school clubs/activities.
- ★ Participate in **competitions**.
  - ○ US National Chemistry Olympiad
  - ○ F=ma Exam/USA Physics Olympiad
  - ○ USA Biology Olympiad
  - ○ USA Computing Olympiad
  - ○ USA Astronomy and Astrophysics Olympiad
  - ○ American Math Competition/AIME/USA Math Olympiad
  - ○ FIRST Robotics Competition
- ★ National Association of Math Circles
- ★ MIT Online Science, Technology, and Engineering Community
- ★ California State Summer School for Mathematics and Science
- ★ Telluride Association Summer Program
- ★ Minority Introduction to Engineering and Science
- ★ There are **many** programs for minorities and women. There are activities for people of **all** skill levels. **Anyone can start doing science!**

typical research process.

1. **Get an idea for a project.** You will need a mentor that is experienced in the field you want to work in. You may need to read a lot of previous work.
2. **Work hard on your project.** Remember to seek feedback from your mentor. Science competitions and publication should be your goals.
3. **Write your paper.** Reference previous papers by others and follow norms.
4. **Share your work.** Use online communities like Reddit, Twitter, etc. Consider releasing your paper as a preprint. Consider high school journals like the Harvard Journal of Emerging Investigators. Consider submitting your work to a PhD-level peer-reviewed conference/journal (look at where the works you referenced were published!). **Follow the publication standards and ethics in your field.** You may need to prepare talks and posters.

research programs.

These are mostly free, but also **very competitive**. Most are during the summer after junior year. There are also many programs that require tuition fees, but they may not be worth the money.

- ★ Research Science Institute
- ★ Program in Math for Young Scientists
- ★ The Summer Science Program
- ★ Texas Tech University Clark Scholars Program
- ★ Michigan State University High School Honors Science Program
- ★ Texas State University Honors Summer Math Camp
- ★ Stony Brook University Simons Summer Research Program
- ★ Boston University Research in Science and Engineering
- ★ High School Apprenticeship Program
- ★ Science/Research and Engineering Apprenticeship Program
- ★ Air Force Research Laboratory Scholars Program
- ★ Griffiss Institute Internship Program
- ★ Eugene and Ruth Roberts Summer Student Academy
- ★ Research Experiences for High School students (or similar local program)
- ★ More opportunities: **PathwaysToScience.org**

the art of cold emailing.

If you are not participating in a structured program, and you do not have existing connections with university faculty or company employees, then try cold emailing professors at your local university! **Do not be afraid to chat with them.** Introduce any previous projects, competitions, or other activities you have done. Skim through the research papers of who you are emailing and talk about what specifically you are interested in doing.

get recognized: science fairs, competitions, and other scholarships.

- ★ Local science and engineering fair, then state science and engineering fair and/or International Science and Engineering Fair
- ★ Junior Science and Humanities Symposia (regional, then national competition)
- ★ Regeneron Science Talent Search
- ★ Davidson Fellows Scholarship
- ★ Equitable Excellence Scholarship
- ★ Coca-Cola Scholars Foundation
- ★ Burger King Scholars Program
- ★ GE-Reagan Foundation Scholarship Program
- ★ Financial need based scholarships: QuestBridge, Gates, Gates Millennium, Horatio Alger, Jackie Robinson, Jack Kent Cooke, Dell, Elks, etc.