COMPUTER SCIENCE

PLEASE NOTE: Any changes/updates from the previous year will be BOLDED and ITALICIZED! Pay special attention to any projects with BOLD, ITALICIZED WORDS because they have changed from last year.

The 4-H computer science project is designed for youth to engage in an interactive project to learn all levels of familiarity with computers.

Completion, exhibition participation, and State Fair information for Computers			
Division/Level	**Grades (suggested)**	**Completion Activities Needed**	**Maximum State Fair Entries**
Level 1 Beginner	Grades 3-5	EXHIBITION –or– RECORD SHEET	1 entry
Level 2 Intermediate	Grades 6-8	EXHIBITION –or– RECORD SHEET	1 entry
Level 3 Advanced	Grades 9-12	EXHIBITION –or– RECORD SHEET	1 entry

Remember: **All** posters, notebooks, and display boards **MUST** include a reference list indicating where information was obtained, giving credit to the original author, to complete the 4-H member's exhibit. This reference list should/might include web site links, people and professionals interviewed, books, magazines, etc. It is recommended this reference list be attached to the back of a poster or display board, be the last page of a notebook, or included as part of the display visible to the public. A judge is not to discredit an exhibit for the way references are listed. Reference Sheets are available at the Extension Office for use if needed. For personal safety, do not include personally identifiable information such as mailing address or phone numbers on posters/displays/exhibits.

SUGGESTED REFERENCE MATERIALS (available for purchase in Extension Office or shop4-h.org)
- Level 1: Discovering Computer Science & Programming Through Scratch: Fundamentals Student Notebook
- Level 2: Discovering Computer Science & Programming Through Scratch: Explorations
- Level 3: Discovering Computer Science & Programming Through Scratch: Recursion

GUIDELINES

1. Refer to the Hendricks County 4-H Policies, Entry & Exhibit Guidelines for poster and general display guidelines.
2. *Artificial Intelligence (AI) may be used, with parent permission, when creating this exhibit and is to be documented as a reference. A majority of the work to create this exhibit is to be the 4-H member's original work.*
3. Be sure to enroll in the project on 4-HOnline and enter exhibit information into FairEntry by designated date. *2025 designated FairEntry Deadline is Tuesday, July 1st at 11:59 p.m.*
4. Complete the Record Sheet (if not exhibiting at the Hendricks County 4-H Fair).
5. Exhibits are to be skill appropriate for the member's grade level.
6. Youth enrolled in the computer project will select one of the below subject categories to study, regardless of grade. Youth may choose to create an exhibit demonstrating skills learned during the year. Check with your county Purdue Extension Office to determine if a computer will be available during judging and if there will be an opportunity to explain your exhibit to the judge.
7. Exhibits qualifying for state fair are to be submitted on a thumb drive securely attached to a notebook/portfolio describing accomplishments, skills learned, design ideas, budget, a summary of what was done, screenshots showing the development and final project, etc. as the exhibitor will not be able to discuss their work with a judge.
8. Poster and display board exhibits are permissible. Posters are to be 22"x28" and displayed horizontally and placed in a clear plastic sleeve or covered with clear plastic to protect contents. Display boards should be designed to sit on a table using no more than 36" of tabletop space. Space should be left in the lower right-hand corner to place an exhibit tag provided by Purdue Extension staff. Youth may continue in the same subject category in subsequent years expand on the previous year's topic, or choose a new topic.
9. Subject categories are:

- Block-based Programming
- Text-based Programming
- Web Design and Computer Entrepreneurship
- Computer Forensics

- Hardware and Networking Design/Install/Repair
- Graphic Design
- *Computer Art*
- *3-D Printing*
- Robotics

Software submitted to be reviewed by a judge must be compatible on both PC, Mac platform. If additional software other than Microsoft Office Suite is required to view the member's work, that software must be provided by the member and comply with all manufacturer copyright laws. Apps can be Android or IOS compatible. Grade breakdowns are suggestions.

EXHIBIT CLASSES

Programming, Block- and Text-based

Youth can submit programming projects in a programming language of their choosing. Some popular choices include, but are not limited to:

- Block-based: Scratch, Code Studio, Alice, etc.
- Text-based: Python, JavaScript, C/C++, C#, ASP.net, R, Go, Java, PHP, Perl, Ruby, etc.

Beginner: Grades 3-5
- Create a program using programming language of your choice. You should comment your work and it must include at least ten different commands. Skills this program could use are:
  - Sequence
  - Iteration
  - Conditionals
  - Variables
  - Loops
  - User input
  - Any other similar skill

Intermediate: Grades 6-8
- Create a program using programming language of your choice. You should comment your work and it must include at least ten different commands. Skills this program could use are:
  - More robust demonstration of Beginner Skills
  - Commenting
  - Correct syntax
  - Lists
  - Functions
  - Algorithms
  - Modularization
  - Lists
  - Any other similar skill

Advanced: Grades 9-12
- Create a program using programming language of your choice. You should comment your work and it must include at least ten different commands. Skills this program could use are:
  - More robust demonstration of Intermediate Skills
  - Parameters
  - Recursion
  - Interact with databases
  - Classes
  - Objects
  - Methods
  - Inheritance
  - Integrate multiple languages into one program
  - Demonstrate utilization of a version control system
  - Any other similar skill

Web Design and Computer Entrepreneurship

Beginner Web Design and Computer Entrepreneurship: Grades 3-5
- Build a website demonstrating a knowledge of:
  - Use a website builder to create your website
  - Insert non-stock image into your site
  - Use a template to achieve a unified look
  - Explain CSS in your documentation, what CSS is and why it's important
  - Must have at least two pages and include all items listed above

Intermediate Web Design and Computer Entrepreneurship: Grades 6-8
- Build a website demonstrating a knowledge of:
  - Create your own site or use a website builder
  - Modify existing HTML
  - Use HTML5
  - Modify existing CSS
  - Have a unified theme throughout
  - Use a photo editing software to create custom images
  - Must have at least five pages and include all items listed above

Advanced Web Design and Computer Entrepreneurship: Grades 9-12
- Build a website demonstrating a knowledge of:
  - Create a custom site using appropriate industry tools
  - Have a responsive website
  - Add useful and appropriate plugins
  - Test for and eliminate bugs
  - Include links for social media
  - Include custom audio/video
  - Must have at least ten pages and include all items listed above

Computer Forensics (id theft, online bullying, ethical use of technology, responsible social media use)

Beginner Computer Forensics: Grades 3-5
- Research and create a 3-5 minute presentation on one of the following topics. Present to a group of peers and have an adult leader verify, create a YouTube or MP4 instructional video, or printed slides and notes using PowerPoint or similar presentation software.
  - Media Balance and Well Being
  - Privacy and Security
  - Digital Footprint and Identity
  - Relationships and Communication
  - Cyberbullying, Digital Drama and Hate Speech
  - News and Media Literacy
  - Any other similar topic

Intermediate Computer Forensics: Grades 6-8
- Research and create a 6-8 minute presentation on one of the following topics. Present to a group of peers and have an adult leader verify, create a YouTube or MP4 instructional video, or printed slides and notes using PowerPoint or similar presentation software.
  - Digital Citizenship
    - Media Balance and Well Being
    - Privacy and Security
    - Digital Footprint and Identity
    - Relationships and Communication
    - Cyberbullying, Digital Drama and Hate Speech
    - News and Media Literacy
  - Cyber Security
    - Ethics and Society
    - Security Principles
    - Classic Cryptography
    - Malicious Software
    - Physical Security
    - Web Security
  - Any other similar topic

Advanced Computer Forensics: Grades 9-12
- Research and create a 10-12 minute presentation on one of the following topics. Present to a group of peers and have an adult leader verify, create a YouTube or MP4 instructional video, or printed slides and notes using PowerPoint or similar presentation software.
  - Digital Citizenship:
    - Media Balance and Well Being
    - Privacy and Security
    - Digital Footprint and Identity
    - Relationships and Communication
    - Cyberbullying, Digital Drama and Hate Speech
    - News and Media Literacy
  - Cyber Security
    - Ethics and Society
    - Security Principles
    - Classic Cryptography
    - Malicious Software
    - Physical Security
    - Web Security
  - Any other similar topic

Hardware and Networking Design/Install/Repair

Beginner: Grades 3-5
- Choose 1-2 items from the list and create a report/presentation (including images) of what you did.
  - Deconstruct and reconstruct a computer
  - Learn and report how binary works and how computers use numbers
  - Troubleshoot hardware problems
  - Explore operating systems
  - Investigate open-source resources
  - Install/upgrade operating systems
  - Design a dream machine (give reasons)
  - Any other similar design/install/repair

Intermediate: Grades 6-8
- Choose 1-2 items from the list and create a report/presentation (including images) of what you did.
  - Identify network hardware
  - Design a computer network
  - Explain Internet Protocol
  - Explain different types of servers
  - Use different protocols to communicate
  - Add peripherals to a network
  - Secure a networked computer
  - Share applications simultaneously
  - Setup a Raspberry Pi or other micro-controller
  - Any other similar design/install/repair

Advanced: Grades 9-12
- Choose one or two items from the list and create a report/presentation (including images) of what you did.
  - Design and implement a computer network
  - Secure your network
  - Understand technology needs in your community.
  - Help to solve these needs by organizing a committee or team to work on identified issues.
  - Teach a computer science class to younger 4-Hers.
  - Build your dream computer
  - Network multiple micro-controllers
  - Research careers in technology
  - Any other similar design/install/repair

Graphic Design

There are three divisions: Beginner (Grades 3-5), Intermediate (Grades 6-8) and Advanced (Grades 9-12). Youth are to use a software program to create or design an item that requires graphic design. The name of the software and version is to be included with the exhibit. Exhibits are to be age/grade appropriate. Ideas include, but are not limited to, the following:
- Logo design
- T-shirt or apparel screen printing design
- Promotional brochure
- Marketing materials
- Computer altered photographs/images – Photographs taken by the 4-H member and altered by the 4-H member using a computer are to be entered in the Photography project as a creative/experimental exhibit. Youth must obtain permission from the owner before altering someone else's photograph/image and include a copy of that permission with the exhibit to insure there is no copyright violation.

Computer Art

There are three divisions; Beginner (Grades 3-5), Intermediate (Grades 6-8) and Advanced (Grades 9-12). Youth are to use a software program to create or design an item that requires artistry. Youth may design and create their own work in totality or can use a pre-made template or design to create their own finished product, provided the majority of the created exhibit is completed by the 4-H member. The name of the software and version is to be included with the exhibit. Exhibits are to be age/grade appropriate.

3-D Printing

There are three divisions; Beginner (Grades 3-5), Intermediate (Grades 6-8) and Advanced (Grades 9-12). Youth are to use a software program to create or design an item printed using a 3-D printer. Youth may design and create their own work in totality or can use a pre-made template or design to create their own finished product, provided the majority of the design is completed by the 4-H member. The name of the software and version, as well as printer make and model, is to be included with the exhibit. Exhibits are to be age/grade appropriate.

Robotics

Suggested exhibits include, but are not limited to, a notebook including a printout of code with requirements marked, a flowchart showing how the robot works, images of the robot being built and the final robot in action, a video, a live demonstration, or other applicable exhibits.

Beginner: Grades 3-5
- Create a flowchart
- Build a robot
  - Use block - or text - based program to operate
    - Sequential programs
    - Events at beginning
  - Use at least one basic sensor
  - Model and demonstrate robot behaviors using a simulation environment (e.g. VEXcode VR [https://vr.vex.com])

Intermediate: Grades 6-8
- Create a flowchart with subroutines
- Include at least two sensors in robot
  - Use at least three events in code
  - Create at least 2 loops in code
  - Operation of robot should be smooth

Advanced: Grades 9-12
Above guidelines plus:
- Use text-based language
- Use advanced logic including
  - Multiple (three or more) events
  - Multiple (three or more) loops
  - At least three subroutines
  - Special consideration if robot is not a kit