

# Project Title: Computer Science

## Description:

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

## State Fair Entries:

3 per county; one per grade level division.

## Exhibit Guidelines:

There are three exhibit grade level divisions; Grades 3-5, Beginner; Grades 6-8, Intermediate; and Grades 9-12, Advanced. Exhibits are to be skill appropriate for the member's grade level.

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. Artificial Intelligence (AI) may be used, with parent permission, when creating this exhibit and is to be documented as a reference. The majority of the work to create this exhibit is to be the 4-H member's original work. 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. 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. 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 content. The poster must be mounted on a firm backing to add stiffness to the exhibit, for example: a foam core board. 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 the previous year's topic, or choose a new topic. Subject categories are:

- Programming, Block- and Text-based Programming
- Web Design and Computer Entrepreneurship
- Computer Forensics
- Hardware and Networking Design/Install/Repair
- Graphic Design, Computer Art, and 3-D Printing
- Robotics
- Videography (NEW THIS YEAR)

Software submitted to be reviewed by a judge must be compatible on both PC and Mac platforms. 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.

All notebooks/portfolios 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 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 manner in which references are listed.

Judges evaluating exhibits should recognize individual differences and creativity, therefore using information in this document as a guide rather than a requirement.

## Exhibit Class Guidelines:

### **Programming, Block- and Text-based Programming:**

Youth can submit programming projects in a 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 a programming language of your choice. You should comment on 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 a programming language of your choice. You should comment on 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 a programming language of your choice. You should comment on 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**

All Divisions: A notebook detailing your steps/process is highly recommended.

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)**

All Divisions: A notebook detailing your steps/process is highly recommended.

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

## **Computer Hardware and Networking Design/Install/Repair**

All Divisions: A notebook detailing your steps/process is highly recommended.

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 the technological needs of 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 and Computer Art

### 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 in 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 into 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 ensure 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 in the exhibit. Exhibits are to be age/grade appropriate. A notebook detailing your steps/process is highly recommended.

### 3-D Printing

Beginner (Grades 3-5)

- Youth can use premade designs with minor modifications. Youth should document the modifications, and cite any sources used for the project.

Intermediate (Grades 6-8)

- Youth can use premade designs with modifications. Youth should document the modifications, and cite any sources used for the project.

Advanced (Grades 9-12).

- Youth are to use a software program to create or design an item printed using a 3-D printer. Youth are encouraged to design and create their own work in totality.
- If youth use a pre-made template, modify enough so that the majority of the design is completed by the 4-H member. Youth must cite any sources used for the project.

All divisions should include:

- The name of the software and version
- Printer make and model
- Notebook detailing steps as well as the files you printed
- 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. A notebook detailing your steps/process is highly recommended.

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 sub-routines
- 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 sub routines
  - Special consideration if robot is not a kit

## **Videography (NEW THIS YEAR)**

Suggested exhibits include A completed video project (e.g., documentary, commercial, short story, instructional, or innovation video are a few suggestions), A notebook or portfolio detailing the process, which should include:

- Planning steps
- Storyboarding
- Script
- Equipment/software used
- Editing steps
- Reference list (sources, interviews, websites, etc.)

### **Beginner (Grades 3-5)**

- Create a flowchart of the video process
- Build a simple video project using basic editing tools
- Use block- or text-based programs for any automation or effects
- Demonstrate sequential planning and basic events (e.g., opening credits, transitions)
- Use at least one basic effect or technique (e.g., fade-in, title screen)

### **Intermediate (Grades 6-8)**

- Create a flowchart with sub-routines (e.g., scenes, chapters)
- Include at least two advanced effects or editing techniques
- Use at least three events in the video (e.g., transitions, overlays, audio cues)
- Create at least two loops or repeated elements (e.g., recurring theme music)
- Ensure smooth operation and flow of the video

### **Advanced (Grades 9-12) - Above guidelines plus:**

- Use text-based editing or scripting tools for advanced logic
- Incorporate multiple (three or more) events and loops
- Include at least three sub-routines (e.g., intro, body, conclusion)
- Special consideration for original work (not using templates or kits)

### **Additional Notes:**

- All divisions should encourage creativity and originality.
- Exhibits must be age/grade appropriate.
- Judges should use these guidelines as a reference, not a strict requirement, and recognize individual differences and creativity.