



**A Curriculum Framework for  
Contextualized Instruction in Workforce Readiness  
Paraoptometric Technician**

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- Information about the PluggedInVA project, including resources for planning and implementation, are available here <http://www.pluggedinva.com/>.

## I. Introduction

PluggedInVA is a career pathways program that prepares adult learners with the knowledge and skills they need to succeed in postsecondary education, training, and high-demand, high-wage careers in the 21st century.

The goal of PluggedInVA (PIVA) is to provide low-skilled adults with a career pathways program that incorporates 21st century skills into a traditional GED® curriculum to help them quickly develop the technology and workplace skills they need to succeed in a fast-paced, global economy.

Central to the PIVA curriculum is the development of digital literacy skills, 21st century skills, and professional soft skills to prepare learners for employment in a variety of industries as they complete their GED® credential, Career Readiness Certificate (CRC), and industry-recognized certificates.

### Project Rationale

Although a certain degree of flexibility is necessary in the design of PluggedInVA projects to address a range of specific industries, fidelity to the core curriculum and to the essential elements of PIVA is critically important. The essential elements of any PluggedInVA project are

- industry-specific integrated and contextualized curriculum;
- GED® test preparation and basic skills instruction;
- Career Readiness Certificate preparation;
- instruction and certification in digital literacy skills;
- instruction in and demonstration of professional soft skills;
- integrated 21st century skills instruction;
- and a formal capstone project using the knowledge, skills, and experiences from the course.

Additionally, co-enrollment in a post-secondary institution, career coaching, and active business participation are required components of the model.

As PluggedInVA is implemented across the Commonwealth, it is imperative that PIVA projects demonstrate fidelity to the model in order to ensure effective evaluation across sponsoring programs. As a part of this effort, the Virginia Adult Learning Resource Center (VALRC) at Virginia Commonwealth University (VCU), as the creator of the PIVA model, will oversee the

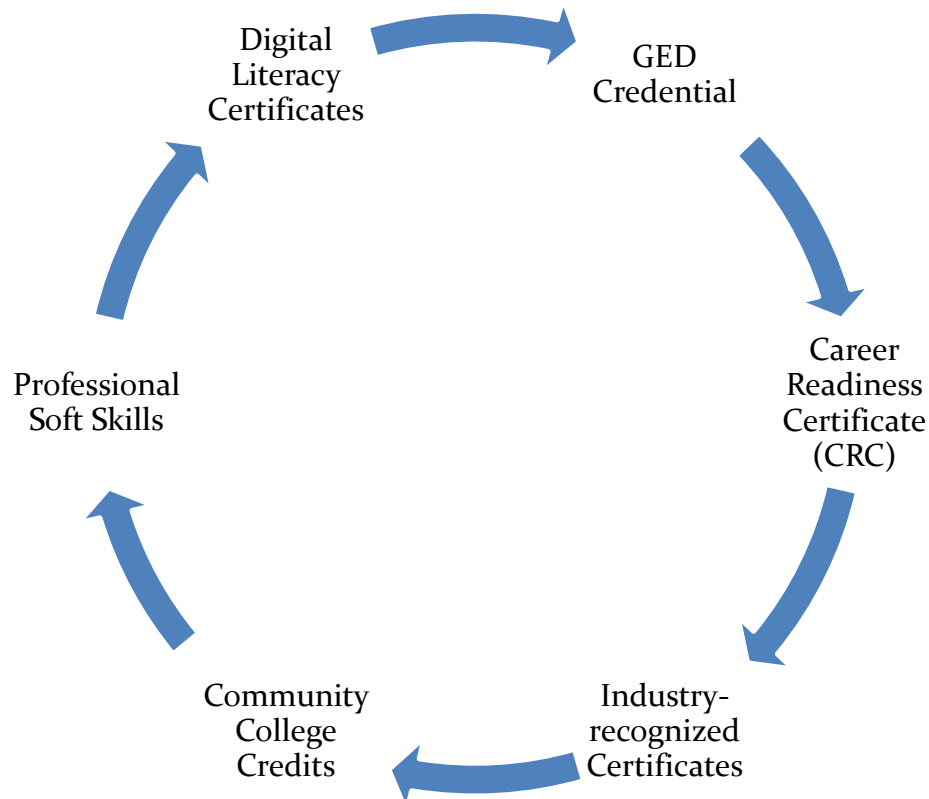
development of the contextualized curriculum, train adult education teachers and community college instructors, and ensure that integrated and facilitative instructional approaches are carried out in the classroom. The PIVA Implementation Guide, written by VALRC, is the basis of this work.

PluggedInVA Implementation Guide, Parts I and II are freely available online:

<http://www.pluggedinva.com/docs/PIVAGuide.pdf>

## Overarching Goal for Adult Educators in PluggedInVA

The goal for the adult education instructors and their staff in a PluggedInVA program is to create a bridge for lower-skilled adults to successfully complete coursework and training that will prepare them to succeed in life-sustaining careers. To do this the adult education team works to make postsecondary coursework relevant to their students' experiences; incorporates workplace and postsecondary expectations into class; consistently solicits learners' input to identify academic areas that need additional strengthening; and structures class activities in ways that develop critical thinking skills, problem-solving skills, teamwork, leadership, and, above all, confidence.



## II. Overarching Objectives PluggedInVA Cohorts

Workforce Readiness Goal: Demonstrate personal qualities and people skills, professional knowledge and skills, and technology skills necessary for success in high-demand, life-sustaining careers.

Learners who successfully complete the PluggedInVA program will have achieved the following certifications and credentials and have demonstrated proficiency in the following skills.

Overarching Objectives		
GED	<b>GED® &amp; Academic Skills</b>	Earn a GED® Credential.
PSS	<b>Professional Soft Skills</b>	Speak with confidence; defuse emotionally charged situations; serve a range of customers; help the team work effectively; work well with different generations in the workplace.
DL	<b>Digital Literacy</b>	Earn the Microsoft Digital Literacy Certificate Demonstrate proficient keyboarding skills, internet security awareness, file management techniques, and industry-specific technology skills.
VPT	<b>Virginia Placement Test (VPT)</b>	Earn scores on the English and Math Virginia Placement Tests to bypass developmental education classes at the community college.
CRC	<b>Career Readiness Certificate (CRC)</b>	Earn a Career Readiness Certificate or improve a score on the CRC.
JR	<b>Job Readiness</b>	Develop employability skills that include resume-writing, written correspondence, oral communication and listening skills, interviewing skills, self-representation, organization, and time management skills.
21C	<b>21st Century Skills &amp; Postsecondary Success Skills</b>	Demonstrate critical thinking skills, innovation and creativity, flexibility with new situations and concepts, teamwork and collaboration, diversity awareness, and clear communication skills. Develop awareness of personal learning preferences and styles, develop study habits that work well with personal abilities and preferences, manage a work-life balance.

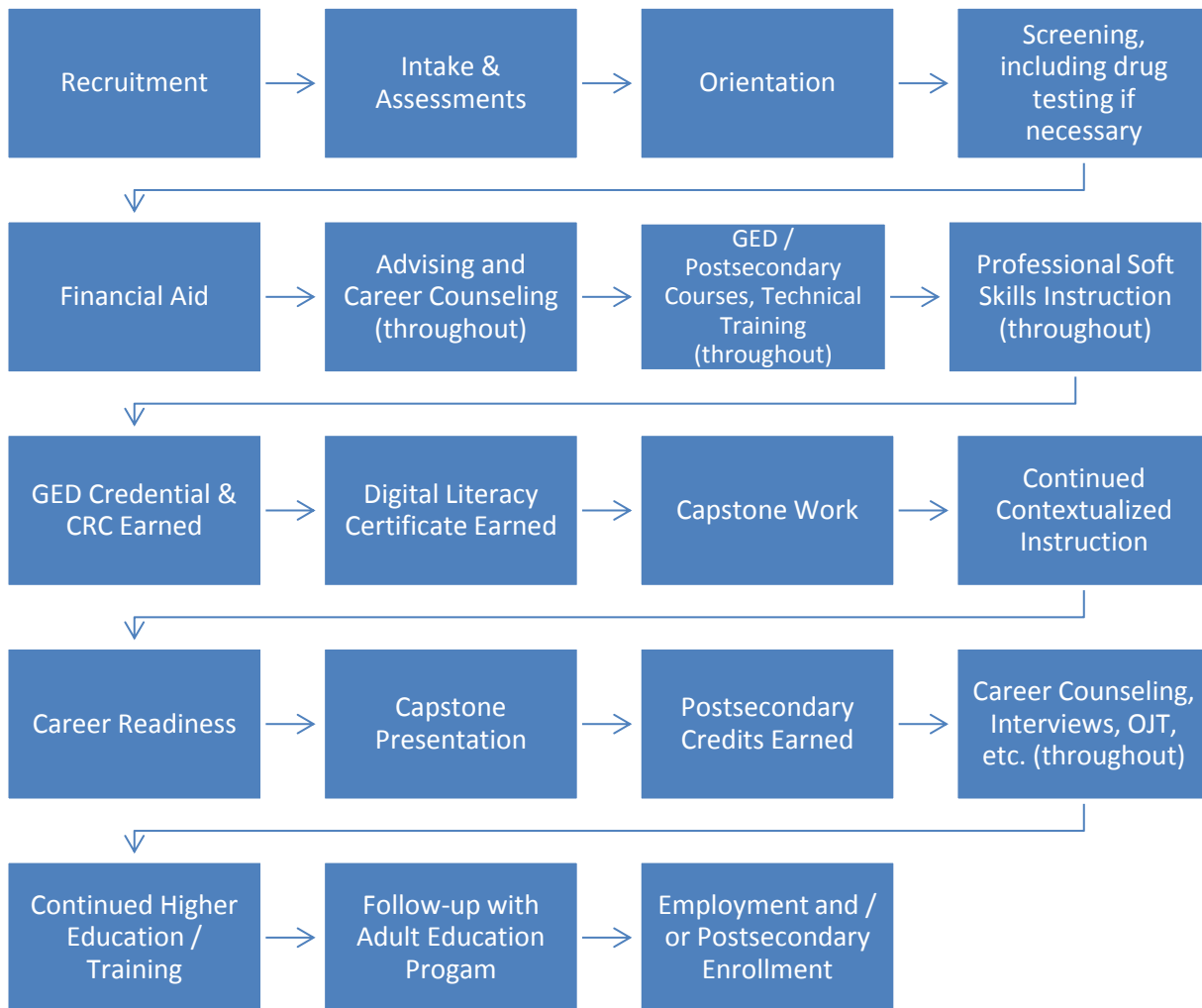
### III. Curriculum Framework

#### PluggedInVA: Overview of the Curriculum Framework

CORE	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
	PHASE ONE			PHASE TWO		
	Orientation Period	Tour Business	Job Shadow		Mock Interviews	Job Fair
<b>I. GED®</b>	<b>GED® Preparation and Career Readiness Certificate</b> As learners successfully complete the GED® credential and earn their CRC, they will focus on digital literacy certifications until all learners pass the GED® test and obtain the CRC at Bronze, Silver, or Gold level.					
<b>II. PSS</b>	<b>Professional Soft Skills and Business Etiquette</b> As GED instruction is completed and all learners successfully pass the GED® test, soft skills will become the emphasis of this block.					
<b>III. DL</b>	<b>Digital Literacy</b> Microsoft Digital Literacy (MSDL)	Microsoft Digital Literacy (MSDL) or Internet and Computing Core (IC3) Certificates		Integrated Technology Instruction as part of core content and the capstone project		
<b>CC</b>	<b>Contextualized Content</b>	Industry-specific content and skills development	<i>Breaking Through: Allied Health (Medical Assisting/Phlebotomy)</i> <i>Breaking Through: Energy/Mining (Electrical/Welding)</i> Construction/Weatherization			
<b>IV. 21C</b>	<b>21st Century Skills</b> Introduction to 21st century skills	Development of 21C skills; participation in collaborative activities		Development and application of 21st century skills; selection of team members for capstone projects	Capstone Teams  Application of GED®, CRC, PSS, DL, CC, and 21C	
<b>INT APP</b>	<b>Integrated Application with Collaborative Learning Activities</b>	Digital portfolio; information challenges; mini-capstone		Digital portfolio; information challenges; capstone project		Digital portfolio; information challenges; capstone project presentations

## IV. Instructional Schedules

Learners will go through all of the steps in this timeline throughout their time in PluggedInVA. Most instructional elements last throughout the 6-month program, and others are emphasized near the end of the program but are still incorporated throughout its entirety.



Following are both monthly and weekly instructional schedule planning templates. Adult education instructors will collaborate with postsecondary instructors to align instructional topics throughout the six months. The design is flexible to give instructors the opportunity to focus more on areas that need strengthening and shorten areas that learners may have already mastered.

Download fillable versions of the following templates at

<https://sites.google.com/site/pluggedinva/curriculummaterials/piva-framework>.

Appendix iii illustrates an online tool that may be used for adult education and postsecondary instructors to plan units of instruction to ensure alignment throughout the six month program.



## Monthly Objectives Instructional Template

Pharmacy Technician Cohort, MONTH 1			
Objectives: pharmacy technician content knowledge and skills			
Math	Skills practiced	Assignments & Resources	
Language (reading, writing, vocabulary)			
Workplace and professional soft skills			
College survival & 21st century skills practiced			
	Activity steps	Outcomes	Resources & materials
Integrated activity 1: (Title of activity)*			
Integrated activity 2: (Title of Activity)*			

\* Monthly activities emphasize the development of 21st century skills essential for the workplace and integrate the core components of the curriculum: industry-related knowledge and skills, basic math and language skills, digital literacy, professional soft skills, and 21st century skills (e.g., teamwork, critical thinking, problem-solving, research, innovation). These activities should be done in teams and form the backbone of the integrated curriculum. More information is available in Section V, Capstone Project.

## Weekly Instructional Schedule Template

Pharmacy Technician Cohort: Weekly Instructional Goals		
Content covered in postsecondary coursework		
Scheduled assessments or presentations:		
Core Content Area	Objectives	Activities & Resources
Pharmacy Technician		
GED Test Preparation	Language Arts	
	Applied Mathematics	
Digital Literacy		
Work Readiness & Professional Soft Skills (including 7 Habits & 21st Century Skills)		
College Survival Skills (21st Century Skills)		
Integrated Activity or Capstone Work (Activity steps / Objectives)		
Instructor Notes:		

## V. Capstone Project

The Capstone Project offers each PluggedInVA student the opportunity to demonstrate mastery of the 21st century skills, professional soft skills, technology skills, and work readiness skills practiced during the cohort. The objectives of the capstone project are

- to demonstrate knowledge and skills gained during the six-month PIVA program,
- to provide an opportunity for students to deliver a formal presentation to members of the community,
- to develop a project that learners may add to their resume to demonstrate otherwise immeasurable skills, such as professional soft skills and 21st century skills (i.e., teamwork, collaboration, problem-solving, critical thinking, and innovation),
- and to serve as a culminating event for the PIVA cohort that encapsulates the rigor, dedication, and skills mastery of the entire class of learners.

The capstone project may take any form within these guidelines:

- Projects are approved by the instructor(s). Instructors assist in the development and selection of capstone projects.
- Projects must be rigorous enough to challenge students to develop essential professional soft skills and 21st century skills. Capstone projects generally take three months to complete.
- Projects are completed in teams where each team member has an explicit and collaborative role.
- Projects must incorporate technology skills and 21st century skills and demonstrate mastery of both academic and workplace skills relevant to the cohort.
- Team projects should address a perceived or expressed need of the community.
- Project presentations are formal events with invited guests from the community.

The following Capstone Project Plan is an example of a tool that can be used to organize each team's project. The project ideas may be brainstormed as a class, or the instructor may choose the project theme. Additionally, ideas to help learners stay motivated may be developed as a whole-group exercise. All capstone plans should be approved by an instructor. Teams may want to present their plans to the whole group as a practice presentation activity and as a way to increase accountability and motivation.

Download the Capstone Project Plan at

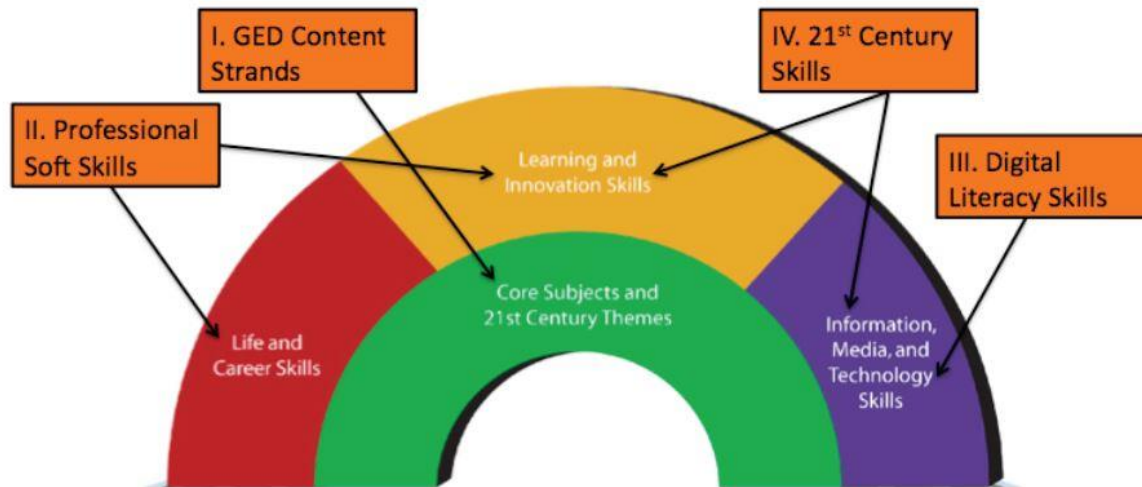
<https://sites.google.com/site/pluggedinvacurriculummaterials/piva-framework>.

## Capstone Project Plan

<b>Project Presentation Date:</b>		<b>Final Project Due Date:</b>		
Team members & Contact Information (Phone & Email)				
<b>Project Ideas</b> (community needs)				
<b>Project Mission / Objective</b> <i>(approved by instructor)</i>				
<b>Project Action Steps</b> <i>(Add as needed.)</i>				
Activity	Person(s) Responsible	Resources Needed	Due Date	
<b>Project Planning Questions</b>				
How will team members communicate?				
How often will team members meet?				
How will team members report completed activities?				
How will back-up plans be developed in case of missed deadlines?				
What are some strategies your team can use to stay motivated?				

## VI. Instructional Approaches & Strategies

Framework for 21st Century Learning with the PluggedInVA Core Content Overlay



Adapted from the Framework for 21st Century Learning: <http://p21.org/overview>. September 2013.

### Instructional Approaches

The PluggedInVA model combines a contextualized and integrated curriculum with project-based learning done in teams. Below is more information on the instructional approaches utilized in the PIVA model.

#### ► Project-based learning

Rationale: Project-based learning provides a sense of accomplishment with the completion of each project; promotes teamwork and collaboration; develops problem-solving, critical thinking, and creativity; prepares learners for the final capstone project; and engages learners with industry-specific content in an authentic way.

#### ► Inquiry learning

Here "inquiry learning" is used as an umbrella term for the project-based, contextualized group instruction that the PluggedInVA model utilizes. Following is a 5-step process for inquiry learning.

1. Identify an issue
2. Locate information
3. Critically evaluate information
4. Synthesize information
5. Communicate

### ► Contextualized and Integrated Instruction

- Instructors can think of contextualization as simply
  - the examples they use to illustrate concepts in class,
  - the topic used for a single lesson,
  - or the theme around which all instruction will revolve for several weeks.
- Learners should be involved in the planning process – their needs and interests point the way to the appropriate contexts for teaching and learning.
- Integrated instruction
  - Focuses on basic skills, content and higher level thinking;
  - Structures learning around themes, big ideas and meaningful concepts;
  - Provides connections among various curricular disciplines;
  - Provides learners opportunities to apply skills they have learned;
  - Encourages active participation in relevant real-life experiences;
  - Offers opportunities for more small group and industrialized instruction; and
  - Accommodates a variety of learning styles

Bell, T.; Urhahne, D.; Schanze, S.; & Ploetzner, R. (2010). Collaborative inquiry learning: models, tools, and challenges. *International Journal of Science Education* , 32( 3).

## Project-based learning activities in PluggedInVA

I. Mini-capstone projects may be completed in a week or two; they are done in teams; and they involve finding a solution to an identified problem.

► See <http://tinyurl.com/oeyfkqk> for examples of Pharmacy Technician problem-solving activities. Other Pharmacy Technician supplemental resources available are at <https://sites.google.com/site/pluggedinva/curriculummaterials/pharmacy-technician-resources> .

II. Information challenges involve research and presentation of a solution (either oral or written); these challenges may be completed in a single class.

### Example of an inquiry process project:

*Large numbers of unemployed or low-skilled individuals reside in the southwestern region of Virginia. What might be one solution for this problem?*

*As a team research possible causes and develop a solution. Use research and your own critical thinking to explain why your solution might work. Present your findings and your solution to the class using a PowerPoint presentation. Also, submit a short written summary of your findings to*

*your instructor. In the summary, describe what role each team member played in the completion of the task.*

### ► Cooperative learning in small groups

"In small groups, students can share strengths and also develop their weaker skills. They develop their interpersonal skills. They learn to deal with conflict. When cooperative groups are guided by clear objectives, students engage in numerous activities that improve their understanding of subjects explored.

In order to create an environment in which cooperative learning can take place, three things are necessary. First, students need to feel safe, but also challenged. Second, groups need to be small enough that everyone can contribute. Third, the task students work together on must be clearly defined."

Educational Broadcasting Cooperation,

<http://www.thirteen.org/edonline/concept2class/coopcollab/index.html> May 2013.

**Small group instruction:** Small groups provide a learning mechanism through which

- learners actively participate;
- teachers become learners at times, and learners sometimes teach;
- respect is given to every member;
- projects and questions interest and challenge students;
- diversity is celebrated, and all contributions are valued;
- students learn skills for resolving conflicts when they arise;
- members draw upon their past experience and knowledge;
- goals are clearly identified and used as a guide;
- research tools such as Internet access are made available;
- and students are invested in their own learning.

Educational Broadcasting Cooperation,

<http://www.thirteen.org/edonline/concept2class/coopcollab/index.html> May 2013.

## Instructional strategies

Following are examples of instructional strategies to encourage the development of effective study skills and critical thinking skills.

► Available as fillable documents at

<https://sites.google.com/site/pluggedinva/curriculummaterials/home/instructional-strategies>

### K-W-L-Q Chart

The K-W-L-Q chart may be used for just about any topic, including potential employers or businesses, a training program, a new topic in students' courses, an historical event or cultural icon, a news event, a local organization, etc.

The K and W columns are filled in by students either individually or in groups before they dive into a new topic; the L and Q columns should be completed after learners have done some learning about the topic.

K	W	L	Q
<b>Topic:</b>			
<b>We Know</b>	We Want to know	We learned	Questions we still have



## Information Synthesis Chart

Source(s)	Main Idea	My Thoughts and Questions
<i>Example:</i> CBS Evening News (December 18, 2009, 6:00 p.m.) US Department of Labor website <a href="http://www.bls.gov/eag/eag.ky.htm">http://www.bls.gov/eag/eag.ky.htm</a>	<i>Example:</i> Jobs decline nationwide for third straight quarter bringing unemployment rates to 10.0%. Unemployment in VA is 7.6% for March 2010.	<i>Example:</i> Is there data for the unemployment rate in the southwestern region of VA? How does it compare to the state and national rates of unemployment? What are possible causes for differences in the rates?

**Group projects:** as team members conduct their own research on their project topics, ask them to jot down notes in the "My Information" column. Team members should meet frequently to share information and create a group summary of research conducted. The template below is a tool to facilitate that process.

Project Research Information Synthesis Chart			
My Information	Information from:	Information from:	Information from:
How does my information compare to my teammates'? Circle or highlight any new or contradictory information. Cross out any information that is the same. Summarize the team's information here.			

Adapted from Henry & Zawilinski. *HOT Blogs: Using online writing spaces to develop higher order thinking skills*. 2008.

**Skills Checklists:** Learners may use these computer basics and inquiry process checklists as both guides that outlines the expectations of the program and as reviews of what skills they have practiced.

<b>PluggedInVA Skills Checklist</b>	
<b>Computer Basics</b>	<b>Date skill demonstrated</b>
<input type="checkbox"/> Turn a computer on/off	
<input type="checkbox"/> Use the mouse/track pad	
<input type="checkbox"/> Follow computer lab rules for computer use	
<input type="checkbox"/> Open programs and files using icons and/or the Start Menu	
<input type="checkbox"/> Create/open a new folder/file	
<input type="checkbox"/> Launch a word processor	
<input type="checkbox"/> Type a short entry in a word processing file	
<input type="checkbox"/> Copy text	
<input type="checkbox"/> Cut text	
<input type="checkbox"/> Paste text	
<input type="checkbox"/> Delete text	
<input type="checkbox"/> Name a word processing file and save it	
<input type="checkbox"/> Open a new window	
<input type="checkbox"/> Open a new tab	
<b>Web Searching Basics</b>	
<input type="checkbox"/> Locate and open a search engine	
<input type="checkbox"/> Type key words in the correct location of a search engine	
<input type="checkbox"/> Type addresses in the address window	
<input type="checkbox"/> Use the refresh button	
<input type="checkbox"/> Use the "Back" and "Forward" buttons	
<input type="checkbox"/> Use a search engine for simple keyword searches (e.g., Google or Bing)	
<b>General Navigation Basics</b>	
<input type="checkbox"/> Maximize/minimize windows	
<input type="checkbox"/> Open and quit applications	
<input type="checkbox"/> Toggle between windows	
<b>Email Basics</b>	
<input type="checkbox"/> Locate and open an email program	
<input type="checkbox"/> Compose, edit, and send email messages	
<input type="checkbox"/> Receive and reply to messages	
<input type="checkbox"/> Attach documents or files to email messages	
<b>Inquiry Process Skill Set</b>	
<b>Understand and Develop Questions</b>	

<ul style="list-style-type: none"> <li>□ Use strategies to ensure initial understanding of the question or information challenge, such as <ul style="list-style-type: none"> <li>○ Rereading the question to ensure understanding</li> <li>○ Paraphrasing the question</li> <li>○ Taking notes about the question</li> <li>○ Thinking about the needs of the person who asked the question</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>□ Use strategies to monitor an understanding of the question, such as <ul style="list-style-type: none"> <li>○ Knowing when to review the question</li> <li>○ Checking an answer in relation to the question to ensure it is complete</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>□ Determine what a useful initial question is, based on a variety of factors that include interest, audience, purpose, and the nature of the inquiry activity</li> </ul>	
<ul style="list-style-type: none"> <li>□ Determine a clear topic/focus for questions to guide the search for information</li> </ul>	
<ul style="list-style-type: none"> <li>□ Modify questions, when appropriate, using strategies as follows: <ul style="list-style-type: none"> <li>○ Narrowing or expanding the focus of the question</li> <li>○ Developing a new or revised question that is more appropriate after gathering information</li> </ul> </li> </ul>	
<b>Locate Information</b>	
<ul style="list-style-type: none"> <li>□ Locate at least one search engine</li> </ul>	
<ul style="list-style-type: none"> <li>□ Use the following general search engine strategies during keyword entry: <ul style="list-style-type: none"> <li>○ Topic and focus</li> <li>○ Single and multiple keyword entries</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>□ Use specialized search engines for images, videos, and other media sources</li> </ul>	
<ul style="list-style-type: none"> <li>□ Select from a variety of search engine strategies to locate useful resources when an initial search is unsuccessful: <ul style="list-style-type: none"> <li>○ Knows the function of the "Did you mean....?" feature in Google</li> <li>○ Adjusts keywords according to the results of a search</li> <li>○ Narrows or expands the search</li> <li>○ Reads search engine results to discover the correct vocabulary and then uses that vocabulary in a new search</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>□ Read search engine results effectively to determine the most useful resource for a task using strategies such as <ul style="list-style-type: none"> <li>○ Knowing which portions of a search results page are sponsored, containing commercially places links, and which are not</li> <li>○ Skimming the main results before reading more closely</li> <li>○ Understanding the meaning of URLs (.com, .org., .edu, .net, .gov)</li> <li>○ Reading summaries carefully and inferring meaning in the search engine results page to determine the best possible site to visit</li> <li>○ Knowing when the first item is not the best item for a question</li> <li>○ Monitoring the extent to which a search results page matches the information needed</li> </ul> </li> </ul>	
<b>Reading to Locate Information on a Webpage</b>	

<input type="checkbox"/> Skim information to determine if it is useful and worth more careful reading	
<input type="checkbox"/> Read more carefully at a site to determine if the required information is there	
<input type="checkbox"/> Predict/infer the information housed behind a link to make efficient choices	
<input type="checkbox"/> Use structural knowledge of web pages to help locate information, including the use of directories	
<input type="checkbox"/> Know when you have left a site and how to return to it using the history	
<input type="checkbox"/> Know how to use multiple browser windows or tabs to compare information	
<input type="checkbox"/> Know how to use an internal search feature to locate information on site (e.g., control F)	
<input type="checkbox"/> Monitor the reading of a webpage and know when it contains useful information and recognize when it does not	
<b>Critical Evaluation of Information</b>	
<input type="checkbox"/> Identify, evaluate, and recognize that all websites have an agenda, purpose, perspective, or bias	
<input type="checkbox"/> Identify and evaluate the author and/or sponsorship of a website	
<input type="checkbox"/> Use author/sponsor information to identify and evaluate biases	
<input type="checkbox"/> Investigate multiple sources to compare and contrast reliability and accuracy of information	
<input type="checkbox"/> Identify several markers that may affect reliability of a site, such as: <ul style="list-style-type: none"> <li>○ Is it a commercial website?</li> <li>○ Is the author an authority on the topic (e.g., professor or scientist)?</li> <li>○ Does the website have links that are broken?</li> <li>○ Does the information make sense?</li> <li>○ Does the website include links to other reliable/reputable websites?</li> <li>○ Does the website contain numerous typos?</li> <li>○ Does the URL provide any clues regarding the reliability?</li> <li>○ Do the images or videos appear to be altered?</li> </ul>	
<input type="checkbox"/> Understand that Wikipedia is a reasonable but imperfect information source	
<input type="checkbox"/> Identify the main purpose of a website (educational, commercial, social, etc.)	
<input type="checkbox"/> Identify the basic form of a website (blog, wiki, forum, informational, governmental, etc.) and use this information to consider reliability	
<input type="checkbox"/> Evaluate information based on the degree to which it is likely to be accurate by verifying and consulting alternative and/or reputable sources	
<b>Synthesize Information</b>	
<input type="checkbox"/> Synthesize/combine information from multiple media sources including written-audio, visual, video, and presented in tables, graphs, or charts	
<input type="checkbox"/> Separate relevant from irrelevant information	
<input type="checkbox"/> Organize information from multiple sources effectively	
<input type="checkbox"/> Manage multiple sources of information both online and offline, including <ul style="list-style-type: none"> <li>○ Choose tools to meet the needs of managing information (file folders, electronic file folders, bookmarking websites, notebooks, etc.)</li> </ul>	

<ul style="list-style-type: none"> <li>○ Keep reference lists of all sources referenced</li> <li>○ Take notes with paper/pen or word processor document</li> </ul>	
<b>Communicate Information</b>	
<input type="checkbox"/> Understand that messages can elicit both positive and negative reactions	
<input type="checkbox"/> Use a variety of writing/editing tools, such as a word processor, spell checker, dictionary, thesaurus, etc.	
<input type="checkbox"/> Copy/paste text and/or a URL to include in a message or document	
<input type="checkbox"/> Know how to use email efficiently to communicate information, including the ability to attach and download files	
<input type="checkbox"/> Know how to use multiple forms of online communication tools including blogs, instant messaging, forums, discussion boards, wikis, Google Docs, etc.	
<input type="checkbox"/> Awareness of audience and the relationship between audience, purpose, medium, and message	
<input type="checkbox"/> Know how to include multiple-media sources within messages	
<input type="checkbox"/> Use formatting techniques, such as headings and subheadings or bolded and underlined text, to organize information for effective communication	
<input type="checkbox"/> Prepare and present information orally to an audience	
<input type="checkbox"/> Prepare and present information visually to an audience	

## VII. Materials and Online Resources

### Career and Technical Education Center

#### Professional Soft Skills

- Stephen R Covey, The Community, <https://www.stephencovey.com/community/>
- Peggy Post & Peter Post, *The Etiquette Advantage in Business*, <http://www.emilypost.com/the-etiquette-advantage-in-business>
- SPOKES Curriculum, West Virginia Department of Education, Customer Service and Job Readiness Skills, [http://wvde.state.wv.us/abe/tcher\\_handbook\\_pdf/section16.pdf](http://wvde.state.wv.us/abe/tcher_handbook_pdf/section16.pdf)

#### Job Readiness

- Vocational Information Center <http://www.khake.com/page66.html>
- Virginia's Career and Technical Education Resource Center <http://cteresource.org/verso/>
- Cover Letter and Resume Samples for Pharmacy Technician <http://coverlettersandresume.com/pharmacy/objectives-for-pharmacy-technician-resume/>
- Pharmacy Tech Tips from the Pros <http://www.pharmacytechpros.com/pharmacy-technician-job-interviewing-tips.html>
- Common Pharmacy Tech Interview Questions: <http://jobs.answers.com/prepare-for-the-interview/pills-privacy-and-patients-common-pharmacy-tech-interview-questions>

#### 21st Century Skills & College Survival

- Partnership for 21st Century Skills <http://www.p21.org/>
- Concept to Classroom, Inquiry-based Learning <http://www.thirteen.org/edonline/concept2class/inquiry/>

#### English

- Read Write Think, International Reading Association <http://www.readwritethink.org/>
- Thinkfinity Resources <http://www.thinkfinity.org/community/thinkfinity-resources>
- Goodwill Community Foundation <http://www.gcflearnfree.org/>
- TV411, videos and web activities designed to reach learning goals <http://www.tv411.org/>
- BBC Skills wise, English and Math for Adults <http://www.bbc.co.uk/skillswise>

#### Math

- Khan Academy <https://www.khanacademy.org/>
- Goodwill Community Foundation, <http://www.gcflearnfree.org/>
- TV411, videos and web activities designed to reach learning goals <http://www.tv411.org/>
- BBC Skills wise, English and Math for Adults <http://www.bbc.co.uk/skillswise>

### Technology

- Goodwill Community Foundation, free online classes, <http://www.gcflearnfree.org/classes>
- Typing Web, free typing lessons and typing certifications <http://www.typingweb.com/>
- Sense-Lang, typing tutor and games <http://www.sense-lang.org/typing/>
- Macmillan McGraw-Hill Computer Literacy Lessons  
<http://activities.macmillanmh.com/reading/treasures/stories/teachcls.html>

### Capstone Project Design and Implementation

- Master of Public Administration: Capstone Project  
[http://www.unomaha.edu/spa/syllabi/PA\\_8990.pdf](http://www.unomaha.edu/spa/syllabi/PA_8990.pdf)

### PluggedInVA Resources

www.

[pluggedinva.com/resources.html](http://pluggedinva.com/resources.html)

- PluggedInVA Instructors' Manual  
[http://www.pluggedinva.com/docs/PIVA\\_Instructor\\_Manual.pdf](http://www.pluggedinva.com/docs/PIVA_Instructor_Manual.pdf)
- PluggedInVA Implementation Guide <http://www.pluggedinva.com/docs/PIVAGuide.pdf>

## VIII. Sample Instructional Activities

\*See <https://sites.google.com/site/pluggedincurriculummaterials/home> for additional activities.

### Team building

- Create a class mission statement and a code of conduct
- Use ice breakers to begin the program or to help alleviate stress during the program. A few sources for ice breakers follow:
  1. 8 Fun Activities to Help Build Your Team: <http://www.officearrow.com/8-fun-activities-to-help-build-your-team.html>
  2. Team Building Activities for Adults: <http://education.qld.gov.au/staff/development/performance/resources/readings/team-building-activities-adults.pdf>
  3. Icebreakers, Energizers, and Team-building Activities (some developed for youth but very appropriate for adults): <http://cchealth.org/tobacco/pdf/activities.pdf>

### Study Skills & Postsecondary Readiness

- Learning styles and preferences survey: take a survey and design a learning plan with study habits and techniques outlined
  - Learning Styles Inventory: <http://www.personal.psu.edu/bxb11/LSI/LSI.htm>
  - Lesson: What's Your Learning Style? <http://sunburst.usd.edu/~bwjames/tut/learning-style/>
  - Career Garden, Study Skills Module <http://www.bostonreedcollege.com/careergarden/files/studyskills.pdf>
- K-W-L-Q: The job of a pharmacy technician / team research project
- Graphic organizers: job comparisons: community versus hospital pharmacies

### Professional Soft Skills and Job Readiness

- Self-representation: create personal mission statement, goal-setting, resume writing
- Interview role plays: create a how-to and how-not-to guide; have students research job openings and, based on what they find there, prepare an interview with answers and follow-up questions (practice on each other and/or perform as role play for class)
- Workplace role-plays: with customers, co-workers, as part of a team, responding to a potential conflict
- Job readiness: develop job search plan (resume, cover letter, interview preparation)
- Job openings search: identify most common qualifications listed on job openings for pharmacy technicians; locate and identify appropriate job openings
- Resources:
  - Department of Labor, Soft Skills to Pay the Bills: <http://www.dol.gov/odep/topics/youth/softskills/>

### Applied Math

- Measurements and calculations (e.g., use baking recipes for unit conversion practice)
- Retail math: budgeting, discounting [Cash course: <http://www.cashcourse.org/>]



- Inventory (familiarity with databases)
- Games: matching parts of body to "routes of administration"; matching abbreviations with full words; matching equal measurement conversions (e.g., kilograms to pounds)
- Practice exams, quizzes, and workbook assignments
- Small- and large-group discussions (using critical thinking and discussion prompts)
- Small group projects and research
- Multimedia (e.g., YouTube videos and work training videos) with pre- and post-work
- Designing an exam review guide (small-group or individual work; guides may be shared with class)

## IX. College Survival Resources

### Time Management: Planning your 168-hour week

Each week has 168 hours. Estimate the number of hours per week that you will dedicate to each of the activities below; then add them together to get a total. Will you be able to fit everything in and maintain a healthy lifestyle?

#### Your time commitments:

Sleep ( = ____ hours per night x 7)	_____ Hours
Meals (= ____ hours per day x 7)	_____ Hours
Class(es) (including commute to class)	_____ Hours
Studying and homework (expect 2 - 3 hours/week per credit hour)	_____ Hours
Work (including commute)	_____ Hours
Family and friends	_____ Hours
Activities (hobbies, exercise, volunteer work, spiritual practices, etc.)	_____ Hours
Extra responsibilities (chores, obligations, etc.)	_____ Hours
Personal care (grooming, appointments)	_____ Hours
Free time	_____ Hours
Other: _____	_____ Hours
	TOTAL= _____ Hours
	168 - Total = _____ Hours Remaining

#### What now?

If your total is more than 168, you will have to cut back. Reassess the time you have set aside above and decide what you can reasonably reduce.

If your total is between 165 and 168, you have a very busy schedule and may not be able to manage unpredictable events. Consider cutting back.

If your total is below 165, Congratulations! You have designed what should be manageable commitments of your time. The next step is to plan when you will accomplish your responsibilities.

Adapted from University of Redlands,  
[http://www.redlands.edu/docs/StudentLife/168\\_Hour\\_Week.pdf](http://www.redlands.edu/docs/StudentLife/168_Hour_Week.pdf), September 2013.

## Test Preparation Tips

Adapted from <http://www.testtakingtips.com/test/genpre.htm>

- ✓ Preparation for your first test should begin on the first day of class; this includes paying attention during class, taking good notes, studying, completing homework assignments and reviewing study materials on a regular basis.
- ✓ Budget your time, make sure you have sufficient time to study so that you are well prepared for the test.
- ✓ Go to review sessions, pay attention to hints that the instructor may give about the test. Take notes and ask questions about items you may be confused about.
- ✓ Ask the instructor to specify the areas that will be emphasized on the test.
- ✓ Make sure you go to the class right before the test; it's another prime time for the instructor to give out more hints or the format of the test.
- ✓ Go over any material from practice tests, HW's, sample problems, review material, the textbook, class notes...
- ✓ Eat before a test. Having food in your stomach will give you energy and help you focus but avoid heavy foods which can make you groggy.
- ✓ Don't try to pull an all-nighter. Get at least 3 hours of sleep before the test (normally 8 hours of sleep a night is recommended but if you are short on time, get at least 3 hours so that you'll be well rested enough to focus during the test).
- ✓ Put the main ideas/information/formulas onto a sheet that can be quickly reviewed many times, this makes it easier to retain the key concepts that will be on the test.
- ✓ Try to show up at least 5 minutes before the test will start.
- ✓ Set your alarm and have a backup alarm set as well.
- ✓ Go to the bathroom before walking into the exam room. You don't want to waste anytime worrying about your bodily needs during the test.

## Test-taking Tips

- ✓ Bring at least two pens/pencils with good erasers, a calculator with enough batteries and any other resources that your instructor allows you to.
- ✓ Bring a watch to the test so that you can better pace yourself.
- ✓ Keep a positive attitude throughout the whole test and try to stay relaxed. If you start to feel nervous take a few deep breaths to relax.
- ✓ Keep your eyes on your own paper, you don't want to appear to be cheating and cause unnecessary trouble for yourself.
- ✓ When you first receive your test, do a quick survey of the entire test so that you know how to efficiently budget your time.
- ✓ Do the easiest problems first. Don't stay on a problem that you are stuck on, especially when time is a factor.
- ✓ Do the problems that have the greatest point values first.
- ✓ Pace yourself, don't rush. Read the entire question and pay attention to the details.
- ✓ Ask the instructor for clarification if you don't understand what they are asking for on the test.
- ✓ Write legibly. If the grader can't read what you wrote, they'll most likely mark it wrong.
- ✓ Always read the whole question carefully. Don't make assumptions about what the question might be.
- ✓ If you don't know an answer, skip it. Go on with the rest of the test and come back to it later. Other parts of the test may have some information that will help you out with that question.
- ✓ Don't worry if others finish before you. Focus on the test in front of you.
- ✓ If you have time left when you are finished, look over your test. Make sure that you have answered all the questions. Only change an answer if you misread or misinterpreted the question because the first answer that you put is usually the correct one. Watch out for careless mistakes and proofread your essay and/or short answer questions.
- ✓ Double check to make sure that you put your first and last name on the test.

Adapted from <http://www.testtakingtips.com/test/gentest.htm>

## X. Collaboration tools

Critical to the success of a PIVA cohort is the collaboration of all involved partners, especially those involved in direct instruction, including the adult education team and the postsecondary instructors. Instructors can keep track of attendance across all classes, keep each other up to date with at-risk students, ensure that what they are teaching aligns to what the students are learning in their other classes, and create a more cohesive program for the learners by communicating with each other.

Instructors and other PIVA staff may regularly update a collaborative document to ensure consistent alignment of the curriculum across class and to keep all PIVA program staff updated on any challenging situations or concerns about students or the curriculum.

Google Apps for Education:

<http://www.google.com/enterprise/apps/education/benefits.html#stayconnected>

Other online collaboration resources:

PBWorks: Online Team Collaboration

<http://www.pbworks.com/education>

Teaching with Online Collaboration Tools: University of Michigan Faculty Examples  
Center for Research on Learning and Teaching

<http://www.crlt.umich.edu/oct>

This page features innovative uses of online collaboration tools (OCTs) for teaching and course management.

In addition to regular face to face meetings, a living document, such as a Google spreadsheet, will help ensure that course content is aligned throughout all sections of the PIVA project. Filling in a Google spreadsheet with simple information such as attendance, grades, class participation, and assignment completion is a quick way to keep all instructors up to date on students' performance in their other classes. This helps everyone best serve the students by identifying areas of concern before they become obstacles to completion.

Topics that are critical to share between all partners and instructors are:

- Curricula
- Class schedules
- All student contact information

- Students' goals
- Materials students use in class and in job training
- Activities that students are engaged in class
- Attendance issues
- Academic or job training performance issues (both positive and negative)
- Perceived needs of the students
- Opportunities for extra work or training experience related to the cohort

Successful programs engage all partners in regular monthly meetings. All partners are seen as equally integral to the success of the cohort, and information and resources are shared freely between them. Any concerns about the cohort are addressed immediately in a professional and constructive manner with all involved parties to ensure quick a resolution and a continuation of optimal program implementation.





**Integrated Paraoptometric Technician Resources &  
Activities Aligned to the PIVA Curriculum**

- A. The American Optometric Association & Certification Information, p. 33
- B. Classroom Activities and Lessons, p. 37
- C. Useful Information and Resources, p. 47
  - i. Toys, Games, and Your Child's Vision, p. 47
  - ii. Protecting Your Eyes at Work, p. 50
  - iii. How Can I Protect my Eyes from Injury?, p. 52
  - iv. Can Contact Lenses be Worn Safely for Industrial Jobs?, p. 53
  - v. What Should be Done in an Eye Emergency?, p. 54
  - vi. When it Comes to Sunglasses, Looks Aren't Everything, p. 55
  - vii. Visual Acuity: What is 20/20 Vision?, p. 57
  - viii. Nutrition and Age-Related Macular Degeneration, p. 59



## A. The American Optometric Association & Certification Information

Retrieved from the American Optometric Association:

[http://www.aoa.org/paraoptometrics/certification/certified-paraoptometric-technician-\(cpot\)?sso=y](http://www.aoa.org/paraoptometrics/certification/certified-paraoptometric-technician-(cpot)?sso=y)

### WHAT TASKS DOES A CERTIFIED PARAOPTOMETRIC (CPOT™) PERFORM?

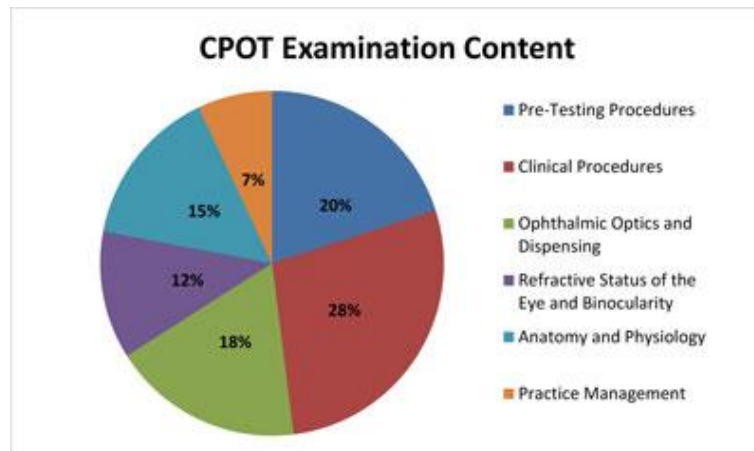
Under the supervision from an optometrist, the CPOT™ may perform technical duties such as taking detailed patient histories, measuring visual acuity, measuring the curvature of the cornea (Keratometry), glaucoma screening, blood pressure testing, and measuring the distance between the pupils of the eye. In addition, they may well order prescription eyewear, modify contact lenses, explain contact lens care regimens, photographing the interior of the eye, supervise staff, and other duties that optometrist may delegate.

### WHAT'S THE EXAMINATION ABOUT?

The CPOT™ examination consists of 225 multiple choice questions related to pre-testing procedures, clinical procedures, ophthalmic optics and dispensing, refractive status of the eye and binocularity, procedures, ophthalmic optics and dispensing, refractive status of the eye and binocularity, anatomy and physiology, and practice management.

### WHAT CONTENT DO I NEED TO STUDY?

The following outline includes a **brief** explanation of the areas covered on the CPOT™ examination (refer to the CPOT™ [Candidate Handbook](#) for the full outline).



**Pre-Testing Procedures (20%)**—Case history, visual acuity, vision screening and preliminary testing techniques, color vision, and stereo acuity

**Clinical Procedures (28%)**—Corneal Topography/Automated Keratometry, tonometry, visual fields, sphygmomanometry, contact lenses, vision therapy, triage and first aid, vision rehabilitation, and special ocular procedures

**Ophthalmic Optics and Dispensing (18%)**—Optical principles of light, prescriptions, lenses, frame selection, and adjustment

**Refractive Status of the Eye and Binocularity (12%)**—Refractive errors, refractive conditions, eye movements, and binocular vision

**Anatomy and Physiology (15%)**—General anatomy and physiology, eye anatomy, and pharmacology

**Practice Management (7%)**—Office management, professional issues, government rules and regulations, and health information technology

CPOT Written Examination Candidate Handbook: <http://www.aoa.org/Documents/optometric-staff/2015%20CPOT%20Written%20Handbook%20FINAL.pdf>

CPOT Clinical Examination Candidate Handbook: <http://www.aoa.org/Documents/optometric-staff/2015%20CPOT%20Clinical%20Handbook%20FINAL.pdf>

To Apply: <http://www.aoa.org/paraoptometrics/certification/apply?sso=y>

**Certification:** <http://www.aoa.org/paraoptometrics/certification?sso=y>

Paraoptometric certification is a program developed by a respected panel of American Optometric Association paraoptometrics and optometrists, created to encourage continuing education and knowledge as the field of optometric assisting grows.

The AOA offers four certified programs for optometric staff. Each program requires successful completion of an examination prepared and administered by the Commission on Paraoptometric Certification (CPC) with the assistance of Professional Testing Corporation. The purpose of the examinations is to assure a level of knowledge to perform the functions necessary to each certified designation. Recipients must renew their certification every three years to remain current in their field.

The CPO<sup>TM</sup>, CPOA<sup>TM</sup>, and CPOT<sup>TM</sup> examinations are accredited by the National Commission for Certifying Agencies (NCCA). The NCCA accreditation serves as a benchmark on how organizations should conduct certification and clearly distinguishes the excellence and value of CPC certification.

PROGRAM	LEVEL	DESCRIPTION	ELIGIBILITY	NEXT STEPS
Certified Paraoptometric (CPO™)	Entry	A CPO™ is a person who has attained national recognition via certification by demonstrating an understanding of the concepts used in optometric care	Eligibility Requirements	Handbook Apply/Fees
Certified Paraoptometric Assistant (CPOA™)	Intermediate	A CPOA™ is a person who has attained national recognition via certification by demonstrating the ability to apply the concepts used in optometric care	Eligibility Requirements	Handbook Apply/Fees
Certified Paraoptometric Technician (CPOT™)	Advanced	A CPOT™ is a person who has attained national recognition via certification by demonstrating the ability to understand, apply, and interrelate the concepts used in optometric care	Eligibility Requirements	CPOT Written Handbook CPOT Clinical Handbook Apply/Fees
Paraoptometric Coding Certification (CPOC™)	Specialty	A CPOC™ is a person who has attained national recognition via certification by demonstrating proficiency, expertise, and validating superior knowledge in an optometric coding environment	Eligibility Requirements	Handbook Apply/Fees

## Certified Paraoptometric (CPO)

[http://www.aoa.org/paraoptometrics/certification/certified-paraoptometric-\(cpo\)?sso=y](http://www.aoa.org/paraoptometrics/certification/certified-paraoptometric-(cpo)?sso=y)

**A CPO™ is a person who has attained national recognition via certification by demonstrating an understanding of the concepts used in optometric care.**

### WHAT TASKS DOES A CERTIFIED PARAOPTOMETRIC (CPO™) PERFORM?

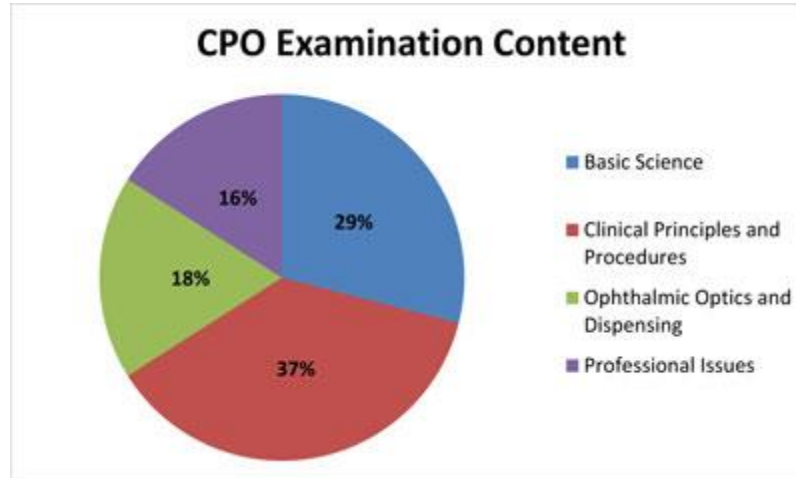
The CPO™ typically carries out a wide variety of front desk procedures such as scheduling appointments, recalling patients, handling insurance forms, accepting payments, and screening telephone calls. They may also be trained in the different styles of eyewear, frame repair and adjusting, office materials purchasing and other duties of a non-technical nature.

### WHAT'S THE EXAMINATION ABOUT?

The CPO™ examination consists of 100 multiple choice questions related to basic science, clinical principles and procedures, ophthalmic optics and dispensing, and professional issues.

## WHAT CONTENT DO I NEED TO STUDY?

The following outline includes a **brief** explanation of the areas covered on the CPO™ examination (refer to the CPO™ [Candidate Handbook](#) for the full outline).



**Basic Science (29%)**—Anatomy, common eye disorders, terminology, surgery, and basic pharmacology

**Clinical Principles and Procedures (37%)**—Eye examination, refractive status, and contact lenses

**Ophthalmic Optics and Dispensing (18%)**—Ophthalmic prescriptions, ophthalmic lenses, and ophthalmic dispensing

**Professional Issues (16%)**—Eyecare specialists and ancillary personnel and practice management

**STUDENT RESOURCES:** <http://www.aoa.org/students?sso=y>

Join the American Optometric Student Association (AOSA): <http://www.theaosa.org/>

Certified Paraoptometric Handbook: <http://www.aoa.org/Documents/optometric-staff/2015%20CPO%20Handbook.pdf>

## B. CLASSROOM EXERCISES

Retrieved from the American Optometric Association at <http://www.aoa.org/patients-and-public/resources-for-teachers/classroom-exercises/exercise-1?sso=y>

### Classroom Exercises: Day and Night

#### LEARNING OBJECTIVE:

To understand how the eyes react and adjust to light.

#### MATERIALS:

A mirror and a flashlight

#### PROCEDURE:

Set up a mirror in a darkened room. A student or several students should stand in front of a mirror for a few minutes. They should be able to notice that the pupils in their eyes have become larger. That is because, in the dim light, the muscles in the iris enlarge the pupil to let in more light. Now, give the flashlight to the student or students and instruct them to carefully shine it at their eyes while they continue to look into the mirror. Ask them what they see. They should see their pupils react by becoming smaller to let in less light.

Ask students to give examples from their everyday lives of the effects of light on their eyes. These might include:

- Entering a dark movie theater on a sunny day, and then leaving the theater to return to the bright sunlight.
- Being awakened by a bright light when you are sleeping.
- Being on an amusement park ride that suddenly goes into a tunnel.

## Classroom Exercises: Pinhole Focusing

### LEARNING OBJECTIVE:

To show that light travels in a straight line and can be focused to form an image or picture. To illustrate the effect a lens has in bending light rays.

### MATERIALS:

Poster board, sheet of waxed paper, scissors, push pin, darning needle, masking tape, a drop light or table lamp shielded to emit the most light in one direction.

### PROCEDURE:

Cut a piece of poster board about 12 inches square. Make a small, clean hole in the center of the poster board with a push pin. (Make sure the hole is very small and very sharp.) In a very dark room, ask one student to hold the poster board with the pinhole in line with, and between 5 to 10 feet away from, the drop light or lamp. Ask another student to hold the waxed paper about an arm's length away from the poster board. Explain that the waxed paper serves as a screen, and that an image focused by the pinhole will appear on that screen upside down.

Demonstrate this by asking a third student to hold an object, such as a scissors, between the light source and the poster board. Ask the student to move the waxed paper closer and farther away and ask students to tell you what they observe.

Conduct the same demonstration two or three more times, enlarging the hole gradually each time until it is the size of the circumference of a darning needle. The image should become brighter and more blurred due to overlapping light rays. If the hole gets too large, mask it with tape and start again.

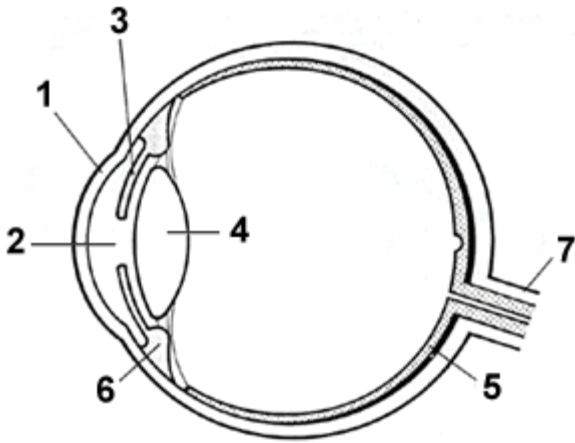
Explain to the students that the cornea and lens of the eye bend the entering light rays and narrow them to focus on the retina. Note that at this point the picture is upside down, just as the students saw in the demonstration. The image is turned around in the brain and we "see" it right side up.

**NOTE:** Since you are performing this experiment in a dark room, remind students to be careful.

## Activity Sheet 1: How the Eyes Work

Below is a drawing of the eye with some of the more important parts numbered. Write the names of the parts of the eye and their functions in the proper boxes. The clue list is there to help you.

(Move your mouse over the illustration to see a colorized version.)




Number	Part Name	Function
1	.	.
2	.	.
3	.	.
4	.	.
5	.	.
6	.	.
7	.	.

### Part Names

- Lens
- Retina
- Ciliary Muscle
- Optic Nerve

### Functions

- Contains cells that detect light
- Opening to the inner eye
- Controls the size of the pupil
- Focuses image of object

- Pupil
  - Cornea
  - Iris
  - Controls shape of lens
  - Transmits information to brain
  - Outermost transparent layer of eye, begins focusing process
- 

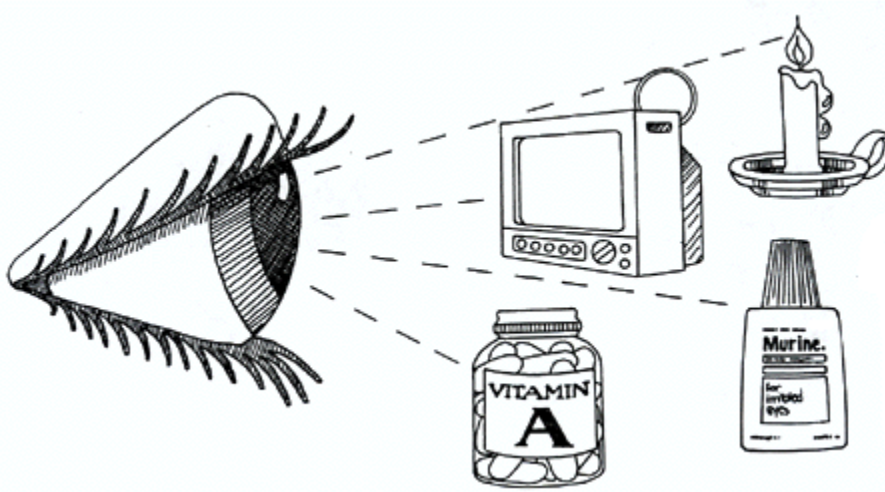
**ANSWERS:**

1. Cornea. Outermost transparent layer of eye. Begins focusing process.
2. Pupil. Opening to the inner eye.
3. Iris. Controls size of pupil.
4. Lens. Focuses image of object (on retina).
5. Retina. Contains cells that detect light.
6. Ciliary muscle. Controls shape of the eye.
7. Optic Nerve. Transmits information to the brain.



## Activity Sheet 2: Your Eye-Q Test

If your eyes are functioning up to par they will bring you clear images of the world around you. But to do so, they need your help and understanding. The statements below are designed to give you an idea of how well you understand your eyes. Check the True or False box next to each statement. After you are finished, look at the bottom of the page and read the correct answers. Grade yourself as follows: 19-20, I understand my eyes very well; 17-18, my view of my eyes is pretty clear; 15-16, my concept of my eyes is a little fuzzy; 13-14, the way I see my eyes could use a little correcting; and 12 or under, my eyes need much more understanding.



True	False	Questions
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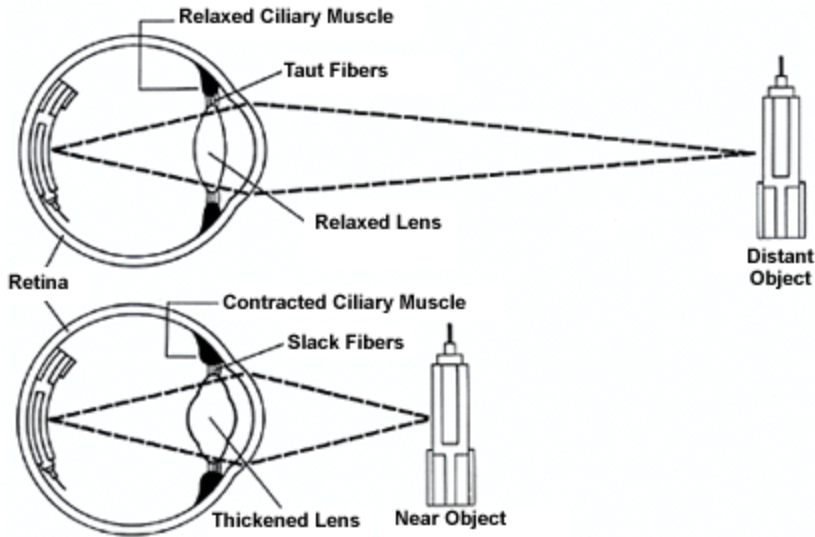
- |  |  |   |
|--|--|---|
|  |  | 1. At a distance of ten inches, my eyes can detect an object as small as four thousandths of an inch in size. |
|  |  | 2. My eyes can distinguish only four colors.  |
|  |  | 3. My eyes can see a candle 14 miles away.  |
|  |  | 4. Ten percent of what I know comes through my eyes.  |
|  |  | 5. Reading in dim light can put a strain on my eyes.  |

6. When viewing the TV, I should sit a distance equal to twice the width of the screen.
7. A lack of vitamin A in my diet can cause reduced night vision.
8. Dilation of the pupils allows my doctor to see a better view of the inside of my eyes.
9. The best color for sunglasses is blue.
10. Tears contain substances that slow down bacterial growth.
11. My eyelids work much like a car's windshield wipers.
12. Sunglasses will allow me to look directly at the sun.
13. Many prescriptions for eyeglasses are identical.
14. Smoking can effect my vision.
15. If I have 20/20 vision, I don't have any eye problems.
16. Air pollution affects only my lungs and breathing.
17. If I am nearsighted, I see near objects more clearly than distant ones.
18. If I am farsighted, I see distant object more clearly than near ones.
19. Glaucoma is a serious eye disease that can cause blindness.
20. Regular eye examinations can help protect my eyes and general health.

**ANSWERS:** 1.T. 2.F. 3.T. 4.F. 5.F. 6.F. 7.T. 8.T. 9.F. 10.T. 11.T. 12.F. 13.F. 14.T. 15.F. 16.F. 17.T. 18.T. 19.T. 20.T.

## Activity Sheet 3: Focus on Seeing

To see objects that are close up the eye's lens must change shape according to the distance involved. The drawings show how lenses that are functioning correctly change shape to give a clear image. Look over the illustrations carefully and then fill in the statements to make them correct.



- The shape of the lens is changed by\_\_\_\_\_.
- For the image to be in focus, it must fall on the\_\_\_\_\_.
- After passing through the lens, the position of the image is\_\_\_\_\_.
- For nearsighted people, the eyeball may be too long and the image will fall in\_\_\_\_\_ of the\_\_\_\_\_.
- For farsighted people, the eyeball may be too short and the image will fall in\_\_\_\_\_ of the\_\_\_\_\_.
- You might be \_\_\_\_\_ if objects in the distance appear blurred.
- Since focusing of an image in the eye is caused by the bending of light rays, your doctor of optometry can correct nearsightedness and farsightedness with glass or plastic\_\_\_\_\_.

### ANSWERS:

- ciliary muscles
- retina
- inverted or upside down

- front, retina
- back, retina
- nearsighted or myopic
- lenses

## Activity Sheet 4: Healthy Eyes Checklist

There are many conditions that make a person's eyes function differently from another person's. Some of these conditions are associated with getting older. Others can occur at any time or may even be present from birth. Recognizing these conditions and knowing how they can be treated are important parts of your eye care program. Below are three random lists: EYE CONDITIONS; DEFINITIONS; and TREATMENTS. Each item is designated with a number. Mark the number to indicate which EYE CONDITION goes with the DEFINITION and TREATMENT (NOTE: Some conditions have the same treatment).

EYE CONDITION	DEFINITION	TREATMENT
1. Nearsightedness (myopia)		
2. Farsightedness (hyperopia)		
3. Astigmatism		
4. Presbyopia		
5. Strabismus (crossed-eyes)		
6. Amblyopia (lazy eye)		
7. Glaucoma		
8. Cataracts		

## DEFINITION

1. A gradual decline in focusing ability due to normal aging.
2. Near objects are seen more clearly than ones that are far away.
3. The two eyes are not aligned. They look in different directions at the same time.
4. Objects are seen more clearly when they are far away than at near distance.
5. An eye disease in which the fluid pressure in the eyeball is too high.
6. Cloudy spots or patches on the eye's normally clear lens.
7. A condition that causes a loss of sharp vision usually in one eye and usually in very young children.
8. A condition caused when the shape of the cornea is more oval than round.

## TREATMENT

1. Detection before age three is vital. Treatment includes corrective lenses and vision therapy.
2. Vision therapy to develop coordination of eye muscles or, sometimes surgery on eye muscles.
3. Treatment includes corrective lenses and/or vision therapy.
4. Drugs or surgery.
5. Prescription eyeglasses and, in some cases, contact lenses.
6. Lenses during early stages, surgery later.

ANSWERS: 1-2-3; 2-4-3; 3-8-3; 4-1-5; 5-3-2; 6-7-1; 7-5-4; 8-6-6.

## Activity Sheet 5: Eyes in Action

We all use our eyes differently. The way we use them depends on our jobs, habits and leisure activities. **To get an idea of the many ways your eyes help you every day, fill in the blanks below.**

1. Today I used my eyes at home to do the following:

\_\_\_\_\_.



2. Today I used my eyes during leisure time to do the following:

\_\_\_\_\_.



3. Today I used my eyes at work/school to do the following:

\_\_\_\_\_.



**Look over the items you listed above. Now complete the following:**

1. At home, I take care of my eyes by

\_\_\_\_\_.

2. At school/work, I take care of my eyes by

\_\_\_\_\_.

3. During leisure activities, I take care of my eyes by

\_\_\_\_\_.

**Now examine what you have written about how you take care of your eyes, then complete the following.**

1. I am MOST CONCERNED about taking care of my eyes at HOME, WORK, SCHOOL, LEISURE (circle one) because

\_\_\_\_\_.

2. To reduce my concern, I am going to do the following:

\_\_\_\_\_.

## C. Useful Information and Resources

### Vision Quest

Lesson ideas to teach students about the eyes, visual system, eye health, and safety. Each lesson idea can be completed as an independent learning activity or incorporated into your existing curriculum.

<http://southdakota.aoa.org/documents/sd/Grades%206-8.pdf>

### i. Toys, Games, and Your Child's Vision

Retrieved from <http://www.aoa.org/patients-and-public/good-vision-throughout-life/toys-games-and-your-childs-vision?sso=y>

### Developing vision at playtime

There are some children's games that call for blindfolds or "not peeking until..." or hiding from sight.

However, most of the time your child is at play his or her eyes are a part of the action.

You can find a lot of ways to use playtime activities, games and toys to help your child, regardless of age, to learn or sharpen many different vision skills. And it can be done without interfering with the carefree fun and joy of playtime.

### How toys and games can help

From the moment of birth, your child is learning to see. He or she progresses from the newborn's blurry world of light and dark to the school-age child's sophisticated ability to handle complex vision tasks. Toys, games and playtime activities help by stimulating this process of vision development. Sometimes, though, despite all your efforts, your child may still miss a step in vision development.

That is why comprehensive optometric care beginning as early as 6 months of age is so important. Your doctor of optometry can identify vision skill areas in need of attention and diagnose vision problems in their early stages, before they have a chance to interfere with your child's total development or learning ability.

He or she may prescribe glasses or vision therapy or suggest specific activities or toys you can use at home to help with your child's problems.

### Toy-buying tips

Inexpensive homemade toys and simple childhood games can be just as effective as purchased toys in helping children develop and improve their vision skills.

When buying toys, select those that are well-made and appropriate to the child's age and level of maturity. Manufacturers often give suggested ages for a toy, but, keep the individual child in mind because children develop at different rates.

Buy the proper safety equipment for older children and be certain they wear it when participating in eye hazardous sports and when using chemistry sets, shop tools, BB guns, sleds or other items with potential to cause eye injuries. Most eye injuries suffered by children occur during play or sports activities and can be prevented.

## Consider this list

Here is a list of toys and activities that can help your child develop or improve various vision skills.

Those suggested for birth through 5 months of age will help stimulate your baby's sense of sight.

Those suggested for older age groups will help develop or sharpen your child's general eye movement skills; eye-hand coordination skills necessary for writing and sports; shape and size discrimination skills needed for reading; and visualization and visual memory skills needed for comprehension and for the ability to visualize abstract things.

### Birth Through 5 Months

*Toys:*

Sturdy crib mobiles and gyms; bright large rattles and rubber squeak toys.

*Activities:*

Peek-a-boo; patty-cake.

### 6 Months Through 8 Months

*Toys:*

Stuffed animals; floating bath toys.

*Activities:*

Hide-and-Seek with toys; read to child.

### 9 Months Through 12 Months

*Toys:*

Sturdy cardboard books; take-apart toys; snap-lock beads; blocks; stacking/nesting toys.

*Activities:*

Roll a ball back-and-forth; read to child.

### One-Year Olds

*Toys:*

Bright balls; blocks; zippers; rocking horse; riding toys pushed with the feet.

*Activities:*

Throwing a ball; read to child.

### Two-Year Olds



*Toys:*

Pencils, markers, crayons; bean bag/ring toss games; peg hammering toys; sorting shapes/sizes toys; puzzles; blocks.

*Activities:*

Read to child; outdoor play; catch.

**3 to 6 Years***Toys:*

Building toys with large snap-together components; stringing beads; puzzles; pegboards; crayons; finger paint; chalk; modeling clay; simple sewing cards; large balls; match-up-shape toys; tricycle; connect-the-dot games; sticker books/games.

*Activities:*

Climbing, running; using balance beam; playground equipment.

**7 Years and Older***Toys:*

Bicycle; jump ropes; pogo sticks; roller skates; different size and shape balls; target games; more sophisticated building toys; puzzles; remote-controlled toys; timed shape/size sorting games; plastic disks for tossing between players.

*Activities:*

Active sports; cycling.

This list of toys and activities is not complete. There are many other ways you can aid your child's vision development and teach him or her good eye safety and vision care habits. Use your creativity and imagination. Computer learning programs and games can be very useful, if available. Also, ask your optometrist to suggest other specific toys and activities.

## ii. Protecting Your Eyes at Work

<http://www.aoa.org/patients-and-public/caring-for-your-vision/protecting-your-vision?sso=y>

Eye injuries in the workplace are very common. The National Institute for Occupational Safety and Health (NIOSH) reports about 2,000 U.S. workers sustain job-related eye injuries that require medical treatment each day. However, safety experts and eye doctors believe the right eye protection could have lessened the severity or even prevented 90% of these eye injuries.



Simply using the proper eye protection on the job could prevent thousands of eye injuries each year.

Common eye injuries occurring at work can result from chemicals or foreign objects in the eye and cuts or scrapes on the cornea. Other causes of injuries include splashes with grease and oil, burns from steam, ultraviolet or infrared radiation exposure, and flying wood or metal chips.

In addition, health care workers, laboratory and janitorial staff, and other workers may be at risk of acquiring infectious diseases from eye exposure. Some infectious diseases can be transmitted through the mucous membranes of the eye as a result of direct exposure to blood splashes, respiratory droplets generated during coughing, or from touching the eyes with contaminated fingers or other objects.

Two major reasons workers experience eye injuries on the job are because they were:

1. Not wearing eye protection, or
2. Wearing the wrong kind of protection for the job.

A Bureau of Labor Statistics (BLS) survey of workers who suffered eye injuries revealed that nearly three out of five **were not wearing eye protection** at the time of the accident. These workers most often reported that they believed protection was not required for the situation.

The Occupational Safety and Health Administration (OSHA) requires the use of eye and face protection whenever there is a reasonable probability of injury that could be prevented by such equipment. Personal protective eyewear, such as goggles, face shields, safety glasses, or full face respirators must be used when an eye hazard exists. The eye protection chosen for specific work situations depends upon the type of hazard, the circumstances of exposure, other protective equipment used, and individual vision needs.

What are the potential eye hazards at work?

Potential eye hazards against which protection is needed in the workplace are:

- **Projectiles** (dust, concrete, metal, wood and other particles)
- **Chemicals** (splashes and fumes)
- **Radiation** (especially visible light, ultraviolet radiation, heat or infrared radiation, and lasers)
- **Bloodborne pathogens** (hepatitis or HIV) from blood and body fluids



Some working conditions include multiple eye hazards. The proper eye protection takes all hazards into account.

The best methods of eye protection differ for each type of hazard. The protector must be matched to the potential hazard. High risk occupations for eye injuries include:

- |                 |                   |
|-----------------|-------------------|
| • construction  | • electrical work |
| • manufacturing | • plumbing        |
| • mining        | • welding         |
| • carpentry     | • maintenance     |
| • auto repair   |                   |

The type of safety eye protection you should wear depends on the hazards in your workplace:

- If you are working in an area that has particles, flying objects, or dust, you must at least wear safety glasses with side protection (side shields)
- If you are working with chemicals, you must wear goggles
- If you are working near hazardous radiation (welding, lasers, or fiber optics) you must use special-purpose safety glasses, goggles, face shields, or helmets designed for that task

In addition, employers need to take steps to make the work environment as safe as possible. This includes:

- Conducting an eye hazard assessment of the workplace
- Removing or reducing eye hazards where possible
- Providing appropriate safety eyewear and requiring employees to wear it

Your optometrist can assist your employer and you in evaluating potential eye hazards in your workplace and determining what type of eye protection may be needed. See [AOA's Occupational Vision Manual](#) for more information.

### iii. How can I protect my eyes from injury?

There are four things you can do to protect your eyes from injury:

1. Know the eye safety dangers at your work.
2. Eliminate hazards before starting work by using machine guards, work screens or other engineering controls.
3. Use proper eye protection.
4. Keep your safety eyewear in good condition and have it replaced if it becomes damaged.

Selection of protective eyewear appropriate for a given task should be made based on a hazard assessment of each activity. Types of eye protection include:

- **Non-prescription and prescription safety glasses** — Although safety glasses may look like normal dress eyewear, they are designed to provide significantly more eye protection. They have lenses and frames that are much stronger than regular eyeglasses. Safety glasses must meet standards of the American National Standards Institute (ANSI). Look for the Z87 mark on the lens or frame.

Safety glasses provide eye protection for general working conditions where there may be dust, chips or flying particles. Additional side protection can be provided by the use of side shields and wraparound-style safety glasses.

Safety lenses are available in glass, plastic, polycarbonate and Trivex™ materials. While all four types must meet or exceed the minimum requirements for protecting your eyes, polycarbonate lenses provide the highest level of protection from impact.



The shield provided by goggles protects eyes from chemical splashes and ocular exposure to bloodborne pathogens.

- **Goggles** — Goggles provide impact, dust and chemical splash protection. Like safety glasses, safety goggles are highly impact resistant. In addition, they provide a secure shield around the entire eye and protect against hazards coming from any direction.

Goggles can be worn over prescription glasses and contact lenses to provide protection from flying objects and chemical splashes and in dusty environments.

- **Face shields and helmets** — Full face shields are used to protect workers exposed to chemicals, heat, or bloodborne pathogens. Helmets are used for welding or working with molten materials. Face shields and

helmets should not be used as the sole means of protective eyewear. They need to be used in conjunction with safety glasses or goggles. Wearing safety glasses or goggles under face shields also provides protection when the shield is lifted.

- **Special protection** — Other types of protection, such as helmets or goggles with special filters to protect the eyes from optical radiation exposure, should be used for tasks such as welding or working with lasers.

One way to ensure that safety glasses provide adequate protection is to be sure they fit properly. Also, eye protection devices must be properly maintained. Scratched and dirty devices reduce vision, cause glare and may contribute to accidents.

Protective eyewear works best when you know how to use it properly. Combined with machine guards, screened or divided work stations, and other engineering controls, using the correct protective eyewear can help keep you safe from any type of eye hazard.

#### iv. Can contact lenses be worn safely for industrial jobs?



While contact lenses cannot provide significant protection from ocular hazards in the workplace, the improved vision many patients experience can have a positive impact on workplace safety.

Contact lenses can't provide significant protection from eye hazards in the work place. However, there is no evidence that the wearing of contact lenses increases the risk of eye injury.

Contact lenses may actually contribute to worker safety and productivity because they often provide improved vision in the workplace. Individuals who wear contact lenses usually obtain a wider field of vision than with eyeglasses and often have less visual distortion, especially with higher power lens prescriptions. In addition, wearing contact lenses instead of eyeglasses can provide a better, more comfortable fit of eye safety equipment, such as goggles and full face respirators.

The American Optometric Association believes ([see the AOA Guidelines for the Use of Contact Lenses in Industrial Environments](#)) that workers should be permitted to wear contact lenses in most eye hazardous environments.

However, eye protection must be worn over contact lenses exactly as would be required of all workers performing the same job.

Contact lenses may be worn safely under a variety of environmental situations. In some cases, such as when hazardous chemical fumes are present, a determination of contact lens wear may need to be made on a case by case basis. Check

with your employer on their safety policy regarding the wearing of contact lenses. Your optometrist can assist your employer and you in determining whether you can safely wear contact lenses in your workplace.

## v. What should be done in an eye emergency?

Seek medical attention as soon as possible following an injury, particularly if you have pain in the eye, blurred vision, loss of vision or loss of field of vision. There are several simple first aid steps that can and should be taken until medical assistance is obtained.

First aid for eye emergencies:

### **Chemicals in the eye**

- Immediately flush the eye with water for at least 15 minutes. Place the eye under a faucet or shower, use a garden hose, or pour water into the eye from a clean container.
- If you are wearing contact lenses, do not wait to remove the lenses. Begin flushing the eye immediately. This may wash the lens out of the eye.
- Do not try to neutralize the chemical with other substances.
- Do not bandage the eye.
- Seek immediate medical attention after flushing.

### **Particles in the eye**

- Do not rub the eye.
- Try to let your tears wash the speck out or irrigate the eye with an artificial tear solution.
- Try lifting the upper eyelid outward and down over the lower eyelid to remove the particle.
- If the particle does not wash out, keep the eye closed, bandage it lightly and seek medical care.

### **Blows to the eye**

- Gently apply a cold compress without putting pressure on the eye. Crushed ice in a plastic bag can be placed gently on the injured eye to reduce pain and swelling.
- In cases of severe pain or reduced vision, seek immediate medical care.

### **Cuts and punctures to the eye or eyelid**

- Do not wash out the eye.
- Do not attempt to remove an object that is stuck in the eye.
- Cover the eye with a rigid shield, like the bottom half of a paper cup.
- Seek immediate medical care.

## vi. When It Comes to Sunglasses, Looks Aren't Everything

<http://www.aoa.org/newsroom/when-it-comes-to-sunglasses-looks-arent-everything?sso=y>

*AOA urges consumers to take a closer look when buying sunglasses this season*

**ST. LOUIS (May 20, 2014)**—After much of the United States experienced an extended "polar vortex" this winter, summer can't come soon enough. As warm weather approaches, many Americans will gladly shed their winter coats for shorts, flip flops and, most importantly, sunglasses. While many will look for fashionable eyewear, the most critical factor to keep in mind is making sure sunglasses provide adequate protection from the harmful effects of ultraviolet (UV) rays. UV radiation, which comes from the sun (and from tanning beds), is what can cause harm to skin and eyes. According to the American Optometric Association's (AOA) 2014 American Eye-Q® survey, 41 percent of consumers do not check the UV protection level before purchasing sunglasses and only 30 percent of Americans said UV protection is the most important factor when purchasing sunglasses, ahead of glare reduction/comfortable vision (27 percent), style (15 percent), price (14 percent) and fit (9 percent).

"The harmful effects of long-term exposure to UV are a real concern because it can cause damage to the eye, possibly resulting in cataracts, age-related macular degeneration, or an abnormal growth called Pterygium," said Beth Kneib, O.D., director of the AOA's Clinical Resources Group.

Short-term exposure to UV rays from a day at the beach, for example, can be serious and could lead to a condition known as photokeratitis, also known as "sunburn of the eye." Symptoms of photokeratitis include red eyes, a foreign-body sensation or gritty feeling in the eyes, extreme sensitivity to light and excessive tearing. These side effects are usually temporary and rarely cause permanent damage to the eyes, but to be sure overexposure is the only problem, patients should consult with their eye doctor if they have these symptoms.

### Children Need Protection

In addition, the average child takes in approximately three times the annual UV exposure of the average adult and up to 80 percent of their lifetime exposure occurs before age 20. Unlike the lens found in an adult eye, which is more mature, a child's lens cannot filter out UV rays as easily, causing damage to the retina.

"Exposure to UV rays can cause problems for people of all ages, but it is critical for children to protect their eyes since they are more transparent than an adult's. By learning to protect their eyes early, they can possibly avoid UV damage," said Dr. Kneib.

### What to Look for in Lenses and Frames

For optimal eye sun-safety, the AOA recommends wearing sunglasses or contact lenses that offer appropriate UV protection, applying UV-blocking sunscreen and wearing a hat to keep direct sunlight off of the face and eyes. The AOA also recommends:

- Lenses that block out 99 to 100 percent of both UV-A and UV-B rays.
- Lenses that have a uniform tint, not darker in one area from another. Gradient lenses should lighten gradually with the bottom being lightest.
- Lenses that are free of distortion and imperfection.
- A frame that fits close to the eyes and contours to the shape of the face, in order to prevent exposure to UV radiation from all sides, even behind.
- Prescription glasses with tints and full UV protection. While some contact lenses also offer UV protection, these should be worn with sunglasses to maximize protection.

- Staying out of the sun during the peak UV exposure risk hours for the eyes, from 8 to 10 a.m. and from 2 to 4 p.m.

There are also a number of lens and frame options that can enhance vision for particular activities, such as:

- Polarized lenses, which reduce reflected glare from sunlight that bounces off snow or water and add comfort and enhance vision when cross-country skiing, fishing or driving.
- "Blue-blocking" lenses help make distant objects easier to see, especially in snow or haze, which is great for skiers, boaters and hunters.
- Polycarbonate lenses to provide impact protection, an important option for potentially hazardous work, sports and other activities.
- Photochromic (transition) lenses that offer convenience since the lens darkens or lightens depending on the light exposure.

The best way to monitor eye health, maintain good vision, and keep up to date on the latest in UV protection is by scheduling yearly comprehensive eye exams. To find an optometrist in your area, or for additional information on how best to protect your eyes from UV radiation, please visit <http://www.aoa.org/uv-protection.xml>.

***About the survey:***

*The ninth annual American Eye-Q® survey was created and commissioned in conjunction with Penn, Schoen & Berland Associates (PSB). From March 20-25, 2014 using an online methodology, PSB interviewed 1,000 Americans 18 years and older who embodied a nationally representative sample of U.S. general population. (Margin of error at 3.10 percent confidence level)*



## vii. Visual Acuity: What is 20/20 Vision?

<http://www.aoa.org/patients-and-public/eye-and-vision-problems/glossary-of-eye-and-vision-conditions/visual-acuity?sso=y>

**20/20 vision** is a term used to express normal visual acuity (the clarity or sharpness of vision) measured at a distance of 20 feet. If you have 20/20 vision, you can see clearly at 20 feet what should normally be seen at that distance. If you have 20/100 vision, it means that you must be as close as 20 feet to see what a person with normal vision can see at 100 feet.

20/20 does not necessarily mean perfect vision. 20/20 vision only indicates the sharpness or clarity of vision at a distance. There are other important vision skills, including peripheral awareness or side vision, eye coordination, depth perception, focusing ability and color vision that contribute to your overall visual ability.

Some people can see well at a distance, but are unable to bring nearer objects into focus. This condition can be caused by hyperopia (farsightedness) or presbyopia (loss of focusing ability). Others can see items that are close, but cannot see those far away. This condition may be caused by myopia (nearsightedness).

A comprehensive eye examination by a doctor of optometry can diagnose those causes, if any, that are affecting your ability to see well. In most cases, your optometrist can prescribe glasses, contact lenses or a vision therapy program that will help improve your vision. If the reduced vision is due to an eye disease, the use of ocular medication or other treatment may be used.

## Visual Acuity FAQs

### Q. What does 20/20 vision mean?

- A. 20/20 vision is a term used to express normal visual acuity (the clarity or sharpness of vision) measured at a distance of 20 feet.

If you have 20/20 vision, you can see clearly at 20 feet what should normally be seen at that distance.

If you have 20/100 vision, it means that you must be as close as 20 feet to see what a person with normal vision can see at 100 feet.

### Q. Does 20/20 mean perfect vision?

- A. No. 20/20 vision only indicates the sharpness or clarity of vision at a distance.

There are other important vision skills, including peripheral awareness or side vision, eye coordination,

depth perception, focusing ability and color vision that contribute to your overall vision ability.

**Q. Is 15/15 vision better than 20/20 Vision?**

- A. No. 15/15 vision means normal sharpness of vision at 15 feet just as 20/20 indicates normal acuity at 20 feet. For consistency, optometrists in the United States use 20 feet as the standard to express sharpness of vision.

Other countries express visual acuity in their own way. In England, for example, optometrists express visual acuity in meters (6/6 is considered normal).

**Q. Why do some people have less than 20/20 vision?**

- A. Visual acuity is affected by many factors. Less than optimum clarity may result from vision conditions like nearsightedness, farsightedness or astigmatism or from eye diseases.

**Q. Will clarity of vision vary with distance?**

- A. Some people can see well at a distance, but are unable to bring nearer objects into focus. This condition can be caused by hyperopia (farsightedness) or presbyopia (loss of focusing ability). Others can see items that are close, but cannot see those far away. This condition may be caused by myopia (nearsightedness).

**Q. If my vision is less than 20/20, what can I do?**

- A. A comprehensive eye examination by a doctor of optometry can diagnose those causes, if any, that are affecting your ability to see well.

In most cases, your optometrist can prescribe glasses, contact lenses or a vision therapy program that will help improve your vision. If the reduced vision is due to an eye disease, the use of ocular medication or other treatment may be used.

## **iix. Nutrition and Age-Related Macular Degeneration**

<http://www.aoa.org/patients-and-public/caring-for-your-vision/nutrition/nutrition-and-age-related-macular-degeneration?sso=y>

Age-Related Macular Degeneration (AMD) is an acquired ocular disorder and a leading cause of legal blindness in persons over sixty.<sup>1</sup> AMD affects the macula, the central part of the retina, which is responsible for providing clear, sharp vision needed for reading, writing, driving and other visually-demanding activities.

The nature and severity of this condition varies with individual patients, with many experiencing some degree of loss of central vision in one or both eyes. Approximately 90% of patients with AMD have a non-exudative (or dry) form of the disease, which results in the development of dry, atrophic scars in the macular area. Non-exudative AMD patients typically experience slower, more gradual loss of vision. Only 10% of patients develop an exudative (or wet) form, which results in the leaking of fluid beneath the retina, and a greater and more rapid loss of central vision. Effective laser photocoagulation treatment for the disease is limited to small numbers of patients with exudative AMD who are identified early in the disease process.<sup>2</sup> Other treatment modalities include photodynamic therapy and surgical transplantation of the macula.

Research has now suggested that the development of AMD is linked to a depleted level of macular pigment. This retinal layer efficiently filters out harmful blue wavelengths of light, and also reduces the amount of free radicals, which are compounds found in high concentrations in the macular area and can cause oxidation of cell membranes.<sup>3</sup> It is theorized that certain antioxidant compounds reduce the effect that these free radicals have on the macular pigment, and consequently may have an impact on the development of AMD.<sup>4,5,6</sup> These antioxidants have demonstrated their effectiveness in building and maintaining the thickness of the retinal pigment layer, and are known as carotenoids, a family of colored compounds found in fruits and vegetables. Beta-carotene is an example of a carotenoid; altogether we consume and utilize fourteen different carotenoids in our diet. Two other carotenoids were found to have effectivity in the retinal pigment layer. Lutein and zeaxanthin are carotenoids found in many vegetables and fruits; they are found in the highest concentration in dark, leafy green vegetables such as spinach, collard greens, and kale. Studies have shown that a diet high in these materials have some effect on delaying the advancement of AMD.<sup>7,8,9,10</sup> The use of synthetic supplements that contain these carotenoids, along with the vitamins C, E, and zinc, have been proven to be an effective means of limiting the disease in patients with advanced signs and symptoms of AMD.<sup>11</sup>

The use of antioxidants cannot reverse the damage caused by AMD; however, its use may prevent or slow the progression of AMD in certain patients. If dietary supplementation of antioxidants taken along with Vitamins C, E, and zinc is undertaken, this therapy may be most appropriate for individuals who:

- Show early evidence of AMD
- Are over 50 years of age
- Have family history of AMD
- Receive insufficient dietary intake of vitamins and minerals

Additional studies and data are needed to further define the nutritional and antioxidant therapies and their relative dosages for the prevention of AMD. Other risk factors, although not thoroughly understood, may include smoking, alcohol intake, excessive sunlight, and elevated total cholesterol levels. Until further study results are available, the American Optometric Association recommends patients reduce their risk of AMD by wearing appropriated sun protection to limit ultraviolet exposure, stopping smoking, moderating any alcohol consumption, maintaining a nutritionally balanced diet, increasing consumption of foods or supplements that contain antioxidants, and seeking periodic optometric retinal examinations.

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