CUMBERLAND PERRY AREA CAREER AND TECHNICAL CENTER

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Transition Guide to Career and Technical Education 2024-2025

INTRODUCTION

This guide is designed to assist those who counsel and guide students for a successful transition from regular education to career and technical education. It includes career information as well as pre-requisite recommendations for reading, math, and soft skills. We hope this guide will be a useful tool for students, parents, counselors, principals, and all those who influence the career decisions of our young people.

This information should be used to ensure appropriate placement of all students, including those with special needs or IEP's, into the Cumberland Perry Area Career and Technical Center. Appropriate placement, in addition to the provisions for necessary support services, will help to ensure that our student-enrollers successfully complete the career and technical education programs and earn the industry credentials and certifications required for an employment advantage as students compete for high priority occupations. In addition, the mission of Cumberland Perry Area CTC is to prepare students for college and career success. We offer programs with many dual enrollment opportunities so that students may earn college credits while enrolled in a career and technical program.

Each child has unique talents and challenges. We want to help students match their individual strengths and interests to the specific qualities and skills necessary for success in career and technical programs, college, and careers.

This guide was developed with input from counselors, career and technical teachers, academic teachers, members of the Local Advisory and Occupational Advisory Committees, students, and administrators. We thank everyone for their assistance.

CPACTC Administrative Team

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How to Use This Transition Guide

This transition guide will help students who are thinking of enrolling in an approved career and technical education program at CPACTC to determine the courses or support services necessary to be successful in specific career and technical education programs. Each page provides critical information about each program, including minimum attributes/prerequisites, math knowledge, reading level, essential physical requirements, and soft skills required to be successful in each program. Other resources to use with this book are: www.pacareerzone.org or www.onetonline.org

<u>Step 1</u> – Refer to the Table of Contents and locate the program in which the student is interested.

<u>Step 2</u> – Copy and paste the minimum attributes/prerequisites, math knowledge, reading level, essential physical requirements and recommended soft skills to **Column 1** (shaded green) on the *Gap Analysis (Discrepancy) Worksheet* on Page 1.

<u>Step 3</u> – Review the minimum attributes/prerequisites, math knowledge, reading level, essential physical requirements and recommended soft skills.

<u>Step 4</u> – Complete Column 2 (shaded pink) on the *Gap Analysis (Discrepancy) Worksheet* with the student's current level of performance in each of the areas identified in Column 1 (minimum attributes/prerequisites, math knowledge, reading level, essential physical requirements, and soft skills).

<u>Step 5</u> – Work with school counselors, parents, teachers, and other school personnel to identify the needed courses, supports, and services that will fill the gap between the student's current level of performance and the essential program requirements, and document them in **Column 3** (shaded blue) on the *Gap Analysis (Discrepancy) Worksheet*.

Program Participation Goals: A successful career and technical education student will

- Perform a wide variety of skills and activities, including co-curricular activities, in an educational environment that mirrors the world of work.
- Purchase required materials in advance of the program, based on the information provided during New Student Orientation conducted by CPACTC annually in May.
- Complete all assignments on time and to the best of their ability.

Program Completion Goals: A successful career and technical education student will

- Complete the NOCTI student occupational assessment (end-of-program assessment) and score at or above the *competent* level on the timed written and performance components. Each assessment covers the full scope of the program.
- Earn at least one industry certification associated with the program of enrollment.
- Score at the proficient level on the Keystone math and Keystone reading assessments.
- Maintain attendance at the rate of 95% or better.
- Continue into post-secondary education, military, or full-time employment related to the program of study upon graduation.

If you have any questions, please contact CPACTC counseling staff (see page 66 for contact phone numbers).

Gap Analysis (Discrepancy) Worksheet

Student Name:	Program Name:		
Column 1	Column 2	Column 3	
CPACTC Program Requirements	Student's Present Level of Performance and Abilities	Supports and Ancillary Services Required for Success in CTE Program	
Minimum Attributes/Prerequisites			
Math Knowledge			
Reading Level			
Essential Physical Requirements			
Soft Skills			

Advanced Manufacturing Technology



Program Name	Advanced Manufacturing Technology CIP 48.0501		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non-direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Excellent hand-eye coordination Attention to fine details 		
Math Knowledge	 Blueprint reading Basic math operations, measurements, fractions, decimals Pre-Algebra working towards Algebra I, II and Trigonometry Ability to measure within .001 tolerances 		
Reading Level: Textbook	11 th Grade reading level Dale-Chall Readability Index: 11.48 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12		
Essential Physical Requirements	Ability to work with small and large components and stand for long periods of time		
Number of Written Tests per Week	1-2 tests (sometimes more)		
Daily Lecture Time	An average of 30-40 minutes daily		
Number of Performance Skills per Week	Performance skills are project based		
Work Qualities Assessed	Safety rules, following directions, initiative, and dependability		
Weekly Homework Assignments	Yes		
Number and Name of Textbooks	 Immerse2learn online modules CamInstructor online modules Tooling with Web Based Instruction 		
Soft Skills	Ability to set priorities, has a teacher recommendation, demonstrates perseverance, and is attentive to fine details and self-motivated		
Uniform Requirements	Long pants but not sweat or exercise pants, CPACTC Advanced Manufacturing T-Shirt, safety glasses provided unless prescription, and steel-toe boots/shoes		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Must meet the tasks per marking period requirement, maintain good attendance (95%) and be recommended by the teacher		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	Statewide Articulation Agreement, see CPACTC website for details. HACC MDES 207 and IA 205		
Student Credentials	National Industry of Metalworking Skills (NIMS),OSHA 10, credit towards the PA Manufacturer's Pre-Apprenticeship, CPR/AED and First Aid		
NIMS	Written and performance testing covering multiple areas of metal machining skills		

Advanced Manufacturing Technology

Math Application Sample Problems

1. What would be the length of the shoulder marked (A) using the print provided?



Academic Standard: MA.1, MA.2

Solution:	3.125 + 2.250	Then:	6.250 - 5.375
_	5.375		0.875

2. When programming a CNC machine, the Cartesian is used to locate a point from a part print. Using the chart below, give the location points. (List the horizontal location first)



Advertising Art and Design



Program Name	Advertising Art & Design 50.0402		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non-direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Creative and artistic ability Drawing ability and color acuity Verbal and written communication skills Some background with computers and basic applications 		
Math Knowledge	Basic math operations, measurements, fractions, decimals		
Reading Level: Textbook	 11th grade reading level Dale-Chall Readability Index: 11.48 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12 		
Essential Physical Requirements	Ability to discriminate subtle differences in color and sit for long periods of time; have fine motor skills for typing, writing, drawing, and using a mouse		
Number of Written Tests per Week	Written tests are not given weekly		
Daily Lecture Time	15 minutes daily; up to three days a week		
Number of Performance Skills per Week	3 – 6 performance skills per week		
Work Qualities Assessed	Safety rules, peer-worker relationships, initiative, dependability, following directions, and professionalism		
Weekly Homework Assignments	One (1) per week		
Number and Name of Textbooks	Adobe Classroom in a Book series		
Soft Skills	Ability to multi-task and set priorities, is self-motivated and works well in groups, has customer service skills, and is interested in pursuing post-secondary education, or entry-level job		
Uniform Requirements	CPACTC student dress code requirements: Follow CPACTC Dress Code		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Must meet the tasks per marking period requirement, maintain good attendance (95%) and be recommended by the teacher		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	Statewide and Local Articulation Agreement, see CPACTC website for details		
Student Credentials	Adobe Certified Associate Exams, Adobe.com, CPR/AED and First Aid		
ΝΟCTΙ	3-hour timed 195 item multiple choice test and timed performance assessment consisting of 2 jobs (3 hours maximum) evaluated by expert industry partners that covers the full scope of the program curriculum		

Advertising, Art and Design

Math Application Sample Problems

Bleed extends beyond trim edges on printed pieces to prevent imperfections when cut. It is typically 0.125" or an $\frac{1}{6}$ ". If bleed is added to all sides of an 8.5"x11" document what would the overall size be? Write out the answer in BOTH decimals and fractions.



Academic Standard:

CC.2.1.HS.F.4

Use units as a way to understand problems and to guide the solution of multi-step problems.

CC.2.1.5.C.1

Use the understanding of equivalency to add and subtract fractions.

Automation and Electromechanical Technology



Program Name	Automation and Electromechanical Technology CIP 15.0303		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non-direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Ability to work as a member of a team 		
Math Knowledge	 Basic math operations Measurement Ratios, proportion Solving for the unknown Completion of Algebra 1& working towards Geometry, Algebra 2 and Trigonometry 		
Reading Level: Textbook	10 th grade reading level Dale-Chall Readability Index: 10.38 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 11		
Essential Physical Requirements	Excellent hand-eye coordination, steady hands, fine finger dexterity		
Number of Written Tests/Quizzes per Week	One (1) per week		
Daily Lecture Time	45 minutes daily		
Number of Performance Skills per Week	5 – 10 performance skills per week. Depends on the level of difficulty.		
Work Qualities Assessed	Safety rules, following directions, initiative, dependability, and customer service skills		
Weekly Homework Assignments	Typically, none if work is completed in class. Otherwise, 30 minutes per week.		
Number and Name of Textbooks	1. Amatrol Virtual Curriculum 2. National Electrical Code		
Soft Skills	Has customer service and communication skills, the ability to work as a member of a team and follow directions; is tech savvy and <u>self-</u> motivated		
Uniform Requirements	Long pants but not sweat or exercise pants, CPACTC Electromechanical Technology t-shirt and polo-shirt, and leather work shoes or boots		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Good attendance, good grades, soft skills, and a driver's license		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	Statewide Articulation Agreement, see CPACTC website for details		
Student Credentials	OSHA 10, CPR/AED and First Aid, SACA certifications		
ΝΟCTΙ	Timed, 3-hour, 180 item multiple choice test and timed performance assessment consisting of 5 jobs (3.25 hour maximum) evaluated by expert industry partners that covers the full scope of the program curriculum		

Automation and Electromechanical Technology

Math Application Sample Problems

1. Given a voltage of 10V and a current of 1mA (milliamp), what is the resistance?

Note:

Ohm's Law - V = I * R $(\Omega = Ohms)$ (V) Voltage = 10V Find (R) = Resistance

Academic Standard: M2.1.11A, M2.2.11A

Solution:

(I) Current = 1mA

 $R = \frac{V}{I} = \frac{10V}{1MA} = \frac{10}{.001} = 10,000 Ω = 10 KΩ$

2. Given a voltage of 120V and a current of 2A (amps), what is the power?

Note:

Power Usage - P = I * V

(I) Current = 2A Find (P) = Power (V) Voltage = 120V

Academic Standard: M2.1.11A, M2.2.11A

Solution:

P = I * V = 120V * 2A = 240W = 0.240 KW

 $\frac{240W}{1000} = 0.24KW$

Automotive Collision Technology



Program Name	Automotive Collision Technology		
	CIP 47.0603		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non-direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Ability to prioritize and multi-task Ability to communicate (customer service skills) Ability to work with others as a cooperative member of the team PA driver's license beloful 		
Math Knowledge	 Proportion Ratios for mixing paint Measure in metric and inches to at least 1/16th of an inch Vectors for pulling a vehicle Basic computer skills for measuring dimensions Basic math operations (fractions, decimals, etc.) 		
Reading Level: Textbook	10 th grade reading level Dale-Chall Readability Index: 10.48 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12		
Essential Physical Requirements	Good hand-eye coordination; ability to do repetitive tasks, lift 60 lbs., and discriminate subtle differences in color and texture		
Number of Written Tests per Week	1 – 2 per week		
Daily Lecture Time	30 minutes daily		
Number of Performance Skills per Week	15 performance skills per marking period to complete POS Requirement: 10 tasks required for grading.		
Work Qualities Assessed	Safety rules, uniform, peer-worker relationships, initiative, dependability, and following directions		
Weekly Homework Assignments	1 – 2 per week		
Name of Textbooks	I-CAR Online		
Soft Skills	Ability to multi-task and set priorities, is self-motivated , works well in groups, has customer service and problem-solving skills		
Uniform Requirements	T-shirt with CPACTC logo, industrial blue work pants (no holes), steel-toe safety shoes, and work gloves		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Must meet the 10 tasks per marking period requirement and maintain good attendance (95%)		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	Statewide Articulation Agreement, see CPACTC website for details. Pennsylvania College of Technology ABC 100 and 104		
Student Credentials	PA Safety Inspection and Emissions Certification (PennDOT), S/P2, ASE 609 Air Conditioning, I-CAR Cert., Cat 1 Safety Inspector, OSHA 10, CPR/AED and First Aid		
ΝΟCTΙ	3-hour, timed 188 item multiple choice test and timed performance assessment consisting of 4 jobs (3.75 hours maximum time) evaluated by expert industry partners that covers the full scope of the program curriculum		

Automotive Collision Technology

Math Application Sample Problems

1. A body shop charges \$100 per hour labor rate, and services 3,000 vehicles per year. The average time spent on labor / vehicle is 1.75 hours. How much is the gross labor income per year of the shop?

Academic Standard: MA.2, MA.3, MB.1

Solution:

3000	\$300,000	\$300,000	
<u>x \$100</u>	x 1.75		
\$300,000	1500000		
	2100000		
	\$525,000.00)	

2. The subframe rails on a Toyota Scion measures 85mm on the left rail and 97mm on the right rail from the center line of the car. Specified width is 88 mm. How far out of specification is the back frame rail and in what direction (away from center or towards center of vehicle)?

Academic Standard: MA.2, MA.3, MB.1, MB.2, MC.1

Solution:

Left	Right
88	97
- 85	<u>- 88</u>
3mm	9mm
towards	away

Î	97mm	 Right
¥ ↓	85mm	Left

Automotive Technology



Program Name	Automotive Technology CIP 47.0604		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non-direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Interest in mechanical, electronic, and diagnostic processes Interest in analyzing problems and identifying appropriate solution Minimal interest in manual automotive repair work PA driver's license helpful 		
Math Knowledge	 Able to read a micrometer to 0.001 of an inch Basic mathematic operations, decimals, fractions Pre-Algebra 		
Reading Level: Textbook	Grade 9 and above Dale-Chall Readability Index: 8.27 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 9		
Essential Physical Requirements	Excellent hand-eye coordination, good peripheral vision, fine motor manual dexterity, and the ability to stand for long periods of time and lift 50 lbs.		
Written Tests per Week	1 per week		
Daily Lecture Time	40 minutes daily		
Performance Skills per Week	Approximately three (3) performance skills per week		
Work Qualities Assessed	Task time, safety rules, uniform, peer-worker relationships, behavior, initiative, and following directions		
Weekly Homework Assignments	1 per week		
Number and Name of Textbooks	Modern Automotive Technology, James E. Duffy, (2025) 10th Edition		
Soft Skills	Ability to multi-task, set priorities, problem solve, and work independently, is self-motivated , and has a positive attitude as well as effective listening and speaking skills		
Uniform Requirements	T-shirt and long sleeved CPACTC logo shirt, industrial black work pants, leather steel-toed work boots or shoes, and safety glasses		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	80% of tasks completed for Career Objective, Employment Pack		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	Statewide and Local Articulation Agreement see CPACTC website for details. Pennsylvania College of Technology AMT 109, 112, 113, 126		
Student Credentials	PA Safety and Emission Inspection (PennDOT), EPA 609, OSHA 10, CPR/AED and First Aid		
ΝΟCTΙ	3 hour, timed 141 item multiple choice test and timed performance assessment consisting of 4 jobs (2.5 hours maximum time) evaluated by expert industry partners that covers the full scope of the program curriculum		

Automotive Technology

Math Application Sample Problems

Compression ratio is calculated by dividing two numbers: the maximum cylinder volume divided by the minimum cylinder volume. A 9:1 ratio means that the maximum cylinder volume is 9 times as large as the minimum cylinder volume. Calculate the compression ratio for an engine using the following information. When the engine is at bottom dead center, the cylinder volume is at its maximum volume of 40 cu. in. When the engine is at top dead center, the volume is at its minimum cylinder volume of 5 cu. in. What would the compression ratio for this engine be?

Academic Standard - CC.2.3.8.A.1

Solution: 8:1

2. Your task is to measure brake drum diameter and determine how much of a brake drum you may remove during re-surfacing before it must be replaced. A brake drum should not be more than 0.060 inches oversized. A drum that is 9.060 inches in diameter when new may not be less than 9 inches in diameter. If this drum measures 9.010 inches from normal wear, how much metal can be removed from the drum during re-surfacing?

Academic Standard - CC.3.5.11-12.C

Solution:	9.060
	9.010
	.050

3. Your task is to determine the circuit resistance (ohms) in a circuit with 12 volts and 1 amp. Ohms Law is a simple formula for calculating circuit voltage, amperage or resistance. When two of the three values are known, you must use Algebra to calculate the missing variable.

Formulas: E = I * R E (Volts) I (Amps) R(Ohms) I = E/RR = E/I

Find the circuit resistance (ohms) in a circuit with 12 volts and 1 amp.

Standard - 3.2.P.B4

Solution: 12 Ohms

Carpentry



Program Name	Carpentry CIP 46.0201
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non-direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Ability to follow verbal and written directions Excellent hand-eye coordination Ability to work as a member of a team
Math Knowledge	 Ability to consistently measure accurately and read blueprints Basic math operations: (addition, subtraction, multiplication and division) in the following areas: measurements, fractions, decimals
Reading Level: Textbook	11 th grade reading level Dale-Chall Readability Index: 11.48 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12
Essential Physical Requirements	Ability to stand for long periods of time, lift a minimum of 40 lbs., and work with small and large components, in the outdoors in all types of weather conditions, and on ladders and roofs
Number of Written Tests per Week	Weekly timesheet graded each day and for the week
Daily Lecture Time	20 minutes daily
Number of Performance Skills per Week	5+ performance skills per week
Work Qualities Assessed	Safety rules, following directions, initiative, dependability, peer-worker relationships, clean-up, and calling-in when sick
Weekly Homework Assignments	One (1) per week
Number and Name of Textbooks	(50) Residential Construction Academy Carpentry – 5 th Edition
Soft Skills	Ability to set priorities and display self-motivation
Uniform Requirements	CPACTC Carpentry t-shirt, suitable work pants (no shorts), and leather steel-toed work boots
Required Expenditures	See CPACTC website
Cooperative Education Requirements	Must meet the tasks per marking period requirement, maintain good attendance (95%), and be recommended by the teacher
Clinical Experience, if any, Requirements	None
Articulation or Dual Enrollment Agreements	Statewide Articulation Agreement, see CPACTC website for details
Student Credentials	OSHA 10, PBA Skills Certificate, JLG Rough Terrain Forklift Class 7, Scissor Lift, and Aerial Work Platform, CPR/AED and First Aid
ΝΟCTΙ	3-hour, timed 150 item multiple choice test and timed performance assessment consisting of 7 jobs (2.67 hours maximum) evaluated by expert industry partners that covers the full scope of the program curriculum

Carpentry

Math Application Sample Problems

1. Change all fractions to common denominator. You need to determine the total dimensions for a project. Your measurements are:

3 1/2" + 3/4" + 92 5/8" + 4 1/2" + 5/8" =

What is the total length needed to complete the project. Round your answer to the lowest common denominator.

Academic Standard: MA.1, MA.2, MA.3, MB.1

Solution:

3 1/2"	=	3 4/8"
3/4"	=	6/8"
92 5/8"	=	92 5/8"
4 1/2"	=	4 4/8"
5/8"	=	5/8"
		+
		99 24/8" = 102"

2. If line length per foot of run is 12.65", calculate the length of a rafter that is 6' 6". Answer must be given in inches to the nearest 1/16".

Academic Standard: MA.1, MA.2, MA.3, MB.1, MB.2, R11A.2, R11B.1, R11B.3, CEW 13.1, CEW 13.3

Solution:

6' 6" = 6.5' 12.65

$$\frac{x \quad 6.5}{6325}$$

 $\frac{7590}{82.225}$ = 82 1/4" or 82 3/16" (to be within 1/16")

Computer Networking



Program N	lame
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Computer Networking CIP 11.0901

Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non-direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Interest in working with computer hardware and network equipment Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems Comprehension of written sentences and paragraphs in work related documents 		
Math Knowledge	 Knowledge of arithmetic - Algebra, Geometry, Calculus, Statistics, and their applications 		
Reading Level: Textbook	13.8 grade reading level, source Microsoft Word Readability-Flesch- Kincaid Grade Level.		
Essential Physical Requirements	Ability to see details at close range and use your hands to work with cables in small spaces		
Number of Written Tests per Week	1 to 2 per week based on tasks and assignments		
Daily Lecture Time	30 minutes each day		
Number of Performance Skills per Week	1-2 per week		
Work Qualities Assessed	Safety rules, following directions, initiative, dependability, customer service skills, self-motivation, and troubleshooting		
Weekly Homework Assignments	Work is completed electronically or on a web-based platform; any unfinished work can be completed at home.		
Number and Name of Textbooks	CISCO Network Academy online Text, CompTIA A+ online study guide		
Soft Skills	Ability to set priorities, analyze information, evaluate results to choose the best solution, and solve problems; is self-motivated, works well in teams and is comfortable with face-to-face communication		
Uniform Requirements	Royal blue CPACTC polo shirts or button-down shirts with the Computer Networking logo are preferred. Business casual is acceptable if student does not have logo shirt. No open toed shoes.		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Has good attendance, is a self-starter, and has a basic understanding of computer systems and good troubleshooting skills		
Experience Requirements	None		
Articulation or Dual Enrollment Agreements	Statewide and Local Articulation Agreement, see CPACTC website for details; HACC CNT 120 and 125		
Student Credentials	A+, Net+, CCNA Routing and Switching, CPR/AED and First Aid		
ΝΟCTΙ	3-hour, timed 194 item multiple choice test and timed performance assessment consisting of 3 jobs (3 hour maximum) evaluated by expert industry partners that covers writing a program and design solution logic		

Computer Networking

1. Given the IP address 192.168.1.47/4, how many hosts are available per subnet?

(4 = subnetbits) Formula: 2^x - 2 = Usable addresses where x = number ofsubnet bits2⁴ = 16 - 2 = 14

Academic Standard: M2.1.11A

Solution: 14 IPs for hosts

Four subnet bits permit sixteen address per subnet $(2^4 = 16)$, minus one address for the network address and minus one for the broadcast address.

2. Convert the following binary number to a decimal.

11110000

Academic Standard: M2.1.11A

Solution:

Binary Number System: Add the value of each column where an on bit (a 1 value) is located.

128	64	32	16	8	4	2	1
1	1	1	1	0	0	0	0

128 + 64 + 32 + 16 = 240

Computer Programming



Program Name	Computer Programming

	CIP 11.0201
Minimum Attributes/ Prerequisites	 Interest in using computers and computer systems to program, write software, set up functions, enter data, and process information Ability to read and understand information and ideas presented in writing Ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations) Ability to apply general rules to specific problems to produce answers that make sense
Math Knowledge	Basic understanding of Algebra & Geometry concepts
Reading Level: Textbook	Grade level appropriate; read and comprehend instructions
Essential Physical Requirements	Long periods of sitting; prolonged screen time
Number of Written Tests per Week	Varies; 2-3 theory assignments per week (not necessarily tests)
Daily Lecture Time	40 minutes daily
Number of Performance Skills per Week	Programming lab assignments; 3-5 per week
Work Qualities Assessed	Safety, following directions, organization, behavior, and class participation
Weekly Homework Assignments	None – work not finished in class is homework
Number and Name of Textbooks	Technical Manuals for Software and Discrete Math
Soft Skills	Is self-motivated, has a growth mindset and demonstrates perseverance
Uniform Requirements	CPACTC polo shirt or business casual shirt
Required Expenditures	See CPACTC website
Cooperative Education Requirements	None currently
Clinical Experience, if any, Requirements	None
Articulation or Dual	Harrisburg University – 10 credits possible; Local Articulation
Student Credentials	PCEP Certified Entry Level Python, Programmer-Python Institute, CPR/AED and First Aid
ΝΟCTΙ	3-hour, timed 166 item exam and 2-hour, timed performance assessment

Computer Programming

Math Pretest

CPACTC Computer Programming

1. Which of these equals a negative number?

- a. (-5) + 9
- b. (-9) + 5
- c. 5 + (-9) + 4
- d. 9 (-5)

2. If x=2 and y=-3, then $(-x)y^2 = ?$

- a. -18
- b. -12
- c. 18
- d. 12

3. FOIL the following: (3x + 4) = ?

- a. $9x^2 + 12x + 16$
- b. 25x²
- c. $9x^2 + 16$
- **d.** $9x^2 + 24x + 16$

4. Simplify: 675 ÷ (6 + 9 ÷ 3)

- a. 225
- b. 15
- c. 75
- d. 135

5. Which of these is not a power of 2?

- a. 1
- b. 128
- c. 64
- d. 10

6. Show your work (x-4) (x+4) = ?

7. Solve using long division $9123 \div 6 = ?$

8. Show your work Find area and perimeter of a square where side = 7in.

9. Show your work m=8 n=14, solve 7m+3mn = ?

10. Write 571 in expanded notation.

Academic Standards:

CC.2.1.7.C.1, CC.2.2.HS.D.1, CC.2.2.HS.B.3, CC.2.1.7.B.2, CC.2.1.7.A.1, CC.2.2.HS.B.3, CC.2.1.7.B.3, CC.2.3.7.A.1, CC.2.2.HS.D.1, CC.2.1.5.A.1

Math Pretest – Solutions

1.	b	6.	x ² – 16
2.	а	7.	1520 R 3
3.	d	8.	A = 49 in., P = 28 in.
4.	С	9.	392
5.	d	10.	$5x10^2 + 7x10^1 + 1x10^0$

Cosmetology



Program Name	Cosmetology			
	CIP Code 12.0401			
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non- direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Creative and artistic ability Verbal communication skills Spatial and form perception Reading comprehension Cognitive retention Recall Focus Sequential learning Visual / Auditory processing 			
Math Knowledge	 Basic math operations Measurements (fractions & decimals) 			
Reading Level: Textbook	Reading level – grade 13 Dale-Chall Readability Index: 10.48 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 10			
Essential Physical Requirements	Ability to discriminate subtle differences in color, stand for long periods, and repetitively use hands and arms; visual/auditory ability			
Number of Written Tests per Week	1 – 2 per week			
Daily Lecture Time	40 minutes daily			
Number of Performance Skills per Week	10 – 15 per week			
Work Qualities Assessed	Safety, hygiene, customer service skills, professionalism, uniform, and duties			
Weekly Homework Assignments	1 – 2 per week			
Number and Name of Textbooks	Milady, Pivot Point text and study guide			
Soft Skills	Has customer service skills and the ability to set priorities; is self- motivated and people-oriented			
Uniform Requirements	Smock, White waterproof shoes (no holes), and black scrub pants			
Required Expenditures	See CPACTC website			
Cooperative Education Requirements	Must complete 1250 cosmetology hours and be scheduled for the state board examination before being placed on Cooperative Education			
Clinical Experience, if any, Requirements	None			
Articulation or Dual Enrollment Agreements	Local Articulation Agreement, see CPACTC website for details			
Student Credentials	State Board of Cosmetology license (Cosmetologist), Barbicide, CPR/AED and First Aid			
ΝΟCTΙ	3-hour, timed 134 item multiple choice test and timed performance assessment consisting of 5 jobs (3.0 hour maximum) evaluated by expert industry partners that covers the full scope of the program curriculum			

Cosmetology

Math Application Sample Problems

1. Ms. Rodman purchased shampoo for \$8.50 and conditioner for \$14.95. What is the total for both products? Include 6% sales tax.

Academic Standard: A2.2.1.1, C2.2.1.1

Solution:

 $14.95 + 8.50 = 23.45 \times .06 = 1.407$ 23.45 + 1.41 = 24.86 total

2. If Tina makes 45% commission and her weekly total is \$1,695.00 in services, how much commission did she earn?

Academic Standard: B2.2.1.1

Solution:

\$1,695.00 <u>x .45%</u>

\$762.75 commission

Criminal Justice



Program Name	Criminal Justice CIP 43.0107
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non-direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Ability to follow written or verbal instructions Courtesy and a professional presence Basic verbal and written communication skills Clean criminal background
Math Knowledge	Basic math operations
Reading Level: Textbook	11 th grade reading level Dale-Chall Readability Index: 11.48 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12 Ability to read technical manuals (software and hardware applications)
Essential Physical Requirements	Ability to lift objects, have physical contact with others, and perform self-defense
Number of Written Tests per Week	1 – 2 per week
Daily Lecture Time	20 minutes daily per lesson
Number of Performance Skills per Week	1 – 3 performance skills per week
Work Qualities Assessed	Safety rules, following directions, dependability, personal appearance and demeanor, participation (teamwork), and attendance
Weekly Homework Assignments	If on task, less than 1 hour in the evening.
Number and Name of Textbooks	 Criminal Justice Today (Fagin) Criminal Investigation (Gilbert) PA Crime Code (Title 18) PA Vehicle Code (Title 75)
Soft Skills	Self-disciplined and self-motivated
Uniform Requirements	Gray CJ shirt, black uniform trousers, black polish-able footwear, and physical fitness shirt
Required Expenditures	See CPACTC website
Cooperative Education Requirements	Generally, students must be over 18. Student must find employer, employer and job must be approved by Criminal Justice Instructor and Co-Op Coordinator. Student must also have good grades and good attendance.
Clinical Experience, if any, Requirements	None
Articulation or Dual Enrollment Agreements	Statewide and Local Articulation Agreements, see CPACTC website for details
Student Credentials	National Incident Management, CPR/AED and First Aid
ΝΟCTΙ	3-hour, timed 188 item multiple choice test and timed performance assessment consisting of 3 jobs (2.17 hour maximum) evaluated by expert industry partners that covers the full scope of the program curriculum

Criminal Justice

Math Application Sample Problems

1. When citing for speeding, the fine is \$35.00 plus \$2.00 per mile for each mile in excess of 5 mile per hour over the maximum speed limit. If you stop a person traveling 75 miles per hour in a 25 mile per hour zone, what is the total fine?

Academic Standard: 2.5.11A

Solution: - $\frac{75 \text{ mph}}{25 \text{ mph}}$ - $\frac{50 \text{ mph}}{50 \text{ mph}}$ - $\frac{5 \text{ in excess of 5 mph}}{45 \text{ mph x $2.00 per mile = } + \frac{90.00}{$125.00 \text{ total fine}}}$

2. You must follow a person (clock) in their vehicle for .3 miles to make an arrest. How many feet must you follow them?

Note: 5,280 ft. = 1 mile)

Academic Standard: 2.5.11A

Solution: 5280 x .3

1,584 feet

Culinary Arts



Program Name	Culinary Arts CIP 12.0508	
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with <u>tools and</u> <u>equipment</u> for periods of non-direct supervision Ability to work productively and safely with <u>peers</u> for periods of non-direct supervision 	
Math Knowledge	 Basic math operations Fractions Proportions Ratios Standard units of measure 	
Reading Level: Textbook	8 ^h grade reading level Dale-Chall Readability Index: 9.28 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 9 Ability to read technical manuals (software and hardware applications)	
Essential Physical Requirements	Ability to stand for long periods of time, move quickly on one's feet, and lift 50 lbs.	
Number of Written Tests per Week	1 quiz every 1.5 – 2 weeks	
Daily Lecture Time	30 minutes daily	
Number of Performance Skills per Week	2 – 3 performance skills per week	
Work Qualities Assessed	Safety rules, following verbal and written directions, initiative, dependability, and customer service skills	
Weekly Homework Assignments	1 – 2 per week	
Number and Name of Textbooks	Professional Cooking 6 th Edition ServSafe 5 th Edition ProStart Level 1 ProStart Level 2	
Soft Skills	Customer service skills, self-motivation, and honesty	
Uniform Requirements	Pearl-button chef coat, black pants (no yoga), white long-sleeved shirt, checkered, baggy chef pants, apprentice hat, chef bib apron, and leather-type safety shoes	
Required Expenditures	Uniform and attendance at 1 afterschool event per year. See CPACTC website for more information.	
Cooperative Education Requirements	Must complete 80% of task list	
Clinical Experience, if any, Requirements	None	
Articulation or Dual Enrollment Agreements	Statewide and Local Articulation Agreements, see CPACTC website for details	
Student Credentials	ServSafe Manager, ServSafe Allergens Prostart I and II, ACF Certified Fundamentals Cook, CPR/AED and First Aid	
ΝΟCTΙ	3-hour, timed 203 item multiple choice test and timed performance assessment consisting of 4 jobs (3 hour maximum) evaluated by expert industry partners that covers the full scope of the program curriculum	

Culinary Arts

Math Application Sample Problems

1. A bushel of spinach weighs 25 lbs. How many 4-ounce portions can you obtain from the bushel?

Note:

16 oz. = 1 lb.

Academic Standard: MA.2

Solution:

Convert 25 lbs. to ounces (16 ounce = 1 lb.)

25 lbs. x 16 ounces = 400 ounces

400/4 = 100 four-ounce portions

2. Find the cost per bottle of 6 one-gallon bottles that sell for \$73.50? What is the cost per fluid ounce?

Note:

8 oz. = 1 cup 2 cups = 1 pint 2 pints = 1 quart 4 quarts = 1 gallon

Academic Standard: MA.2

Solution:

\$73.50 divided by 6 bottles = \$12.25 per bottle

128 ounces = 1 Gallon

\$12.25 / 128 = .0957 or rounding up, it would be about \$.10 per fluid ounce

Dental Assisting



Program Name	Dental Assistant CIP 51.0601		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with <u>tools and</u> <u>equipment</u> for periods of non-direct supervision Ability to work productively and safely with <u>peers</u> for periods of non-direct supervision Ability to work in close contact with others 		
Math Knowledge	 Basic math operations Fractions Proportions Ratios Standard units of measure 		
Reading Level: Textbook	12 th grade reading level Dale-Chall Readability Index: 12.28 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12 Ability to read and comprehend medical terminology		
Essential Physical Requirements	Ability to stand for long periods of time, bend, stoop, and use hands to work within small spaces		
Number of Written Tests per Week	1 – 2 per week		
Daily Lecture Time	0.5 – 1 hour daily		
Number of Performance Skills per Week	1 – 2 performance skills per week		
Work Qualities Assessed	Safety rules, following directions, initiative, dependability, customer service skills, and high personal and dental hygiene		
Weekly Homework Assignments	2 per week		
Number and Name of Textbooks	1. Modern Dental Assisting 2. Dental Radiology		
Soft Skills	Is self-motivated , has customer service skills, and the ability to work as a member of a team and with patients		
Uniform Requirements	Colored specific scrubs and scrub pants, and white leather shoes		
Required Expenditures	See CPACTC website		
Externship Requirements	Good attendance, good grades, proficient in assisting, and PA driver's license		
Clinical Experience, if any,	Level III – Spring Clinical Externship, need to provide own		
Articulation or Dual	transportation		
Enrollment Agreements	See CPACTC website for details		
Student Credentials	State Board of Dentistry Dental Radiographic Exam; DANB Infection Control and Radiation Health & Safety, OSHA 10, CPR/AED, First Aid, Bloodborne Pathogens, and HIPPA		
ΝΟCΤΙ	3-hour, timed 207 item multiple choice test and timed performance assessment consisting of 7 jobs (1.75 hrs. maximum) evaluated by expert industry partners that covers the full scope of the program curriculum		

Dental Assistant

Math Application Sample Problems

1. IF the PID on the x-ray machine is changed from 8 inches to 16 inches, how does this increase in the source-to-receptor distance affect the intensity beam?

Academic Standard: 2.2B

Solution: $1/x = 16^2/8^2 1/x = 256/64 1/x = 4/1 x = 1/4$

2. If you are processing dental x-ray film, determine the amount of time the film must remain in the fixer solution.

Solution Temperature	Time Developer	Rinse Time	Time In Fixer	Wash Time
65°	3.0 mins.	.05	? mins.	20 mins.

Note: Fixer time is double the developer time amount.

Academic Standard: MD.2

Solution:

3.0 x 2

6.0 Minutes

Diesel Technology



Program Name	Diesel Technology CIP 47.0613		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of <u>non-direct supervision</u> Ability to work productively and safely with peers for periods of <u>non-direct supervision</u> PA driver's license is helpful 		
Math Knowledge	 Basic math operations Fractions Proportions Ratios Measurement 		
Reading Level: Textbook	11 th grade reading level Dale-Chall Readability Index: 11.78 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12 Ability to read and comprehend technical manuals and diagrams		
Essential Physical Requirements	Ability to stand for long periods of time, bend, stoop, and work in tight spaces		
Number of Written Tests per Week	1 per week		
Daily Lecture Time	35 minutes daily		
Number of Performance Skills per Week	1 – 3 performance skills per week		
Work Qualities Assessed	Safety rules, following directions, initiative, dependability, customer service skills, and productivity		
Weekly Homework Assignments	1 extensive assignment per week		
Number and Name of Textbooks	 Diesel 1 – CDX Medium/Heavy Duty Diesel Engines 2nd Edition Diesel 2 & 3 – CDX Medium/Heavy Duty Commercial Vehicle Systems, 2nd Edition 		
Soft Skills	Is self-motivated and committed to high quality work; has customer service skills and the ability to work as a member of a team		
Uniform Requirements	Dark blue CPACTC shirt and dark blue work pants, and leather steel- toed work shoes or boots		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Displays appropriate behavior, and has PA driver's license and passing grades		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	See CPACTC website for details		
Student Credentials	PennDOT Safety and Emissions Inspection, CAT I-7 Safety Inspector; EPA 608 and 609 Certifications, OSHA 10, CPR/AED and First Aid		
ΝΟCTΙ	3-hour, timed 155 item multiple choice test and timed performance assessment consisting of 5 jobs (2.5 hours maximum time) evaluated by expert industry partners that covers the full scope of the program curriculum		

Diesel Technology

Math Application Sample Problems

1. A crankshaft has a connecting rod journal diameter of 3.218". The inside diameter of the installed connecting rod bearing is 3.229".

- A. What is the oil clearance?
- B. If the specification for maximum clearance is 0.0055, is this bearing installation within specification?

(Note: The oil clearance is calculated by finding the difference between the outside diameter of the connecting rod journal and the inside of the bearing in the connecting rod.)

Academic Standard: MA11.1, MA11.2, MB11.1

Solution:

3.229 (Inside Diameter) - 3.218 (Outside Diameter of Journal) .011" (Clearance)

Maximum clearance is .0055". .011 > .0055. Therefore, this bearing set exceeds specification and should not be used.

2. A truck tire measures 40" in diameter. How many times will this tire rotate in 1 mile?

Note: 1 mile = 5,280 feet Tire circumference = diameter x 3.14

Academic Standard: MA11.1, MA11.2

Solution: (Hint: Convert tire circumference into feet before determining the answer)

1 Mile = 5,280 feet

 $40^{\circ} \times 3.14 = 125.60^{\circ}$ (tire circumference)

125.60 / 12 = 10.47 feet (tire circumference in feet)

5,280 feet (1 mile) / 10.47 = 504.30 rotations per mile

Early Childhood Education



Program Name	Early Childhood Education CIP 19.0708		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with <u>tools and</u> <u>equipment</u> for periods of non-direct supervision Ability to work productively and safely with <u>peers</u> for periods of non-direct supervision Patience and the ability to work with small children 		
Math Knowledge	Basic math operationsMeasurementsFractions		
Reading Level: Textbook	11 th grade reading level Dale-Chall Readability Index: 11.48 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12		
Essential Physical Requirements	Ability to work with small children ad well as stand, stoop and kneel for long periods		
Number of Written Tests per Week	1 test every 2 weeks About 10 quizzes per marking period		
Daily Lecture Time	40 minutes daily		
Number of Performance Skills per Week	2 – 4 performance skills per week		
Work Qualities Assessed	Safety rules, following directions, initiative, dependability, and peer- worker relationships		
Weekly Homework Assignments	3-4 per week. (If time is used wisely, the students can usually finish their homework in class)		
Number and Name of Textbooks	Working with Young Children		
Soft Skills	Able to set priorities, is self-motivated , and displays patience and perseverance		
Uniform Requirements	CPACTC ECT t-shirt, jeans, casual pants, scrubs or capris and enclosed shoes		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Must meet the tasks per marking period requirement, maintain good attendance (95%), and be recommended by the teacher		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	Statewide and Local Articulation Agreement, see CPACTC website for details Shippensburg University ECH 204, 205, and 206		
Student Credentials	Child Development Associate (CDA) Certification; Act 31 Mandatory Reporter, Health & Safety Basics/Better Kids Care, CPR/AED and First Aid		
ΝΟCTΙ	3-hour, timed 190 item multiple choice test and timed performance assessment consisting of 6 jobs (2 hour maximum) evaluated by expert industry partners that covers the full scope of the program curriculum		

Early Childhood Education

Math Application Sample Problems

 FCCLA wants Mrs. Rahn to purchase a case of spicy beef sticks at B.J.'s for a fund raiser.
 One box of beef sticks costs \$12.69 and the case contains 24 boxes. How much would the case of 24 boxes cost the club? How much would 1 beef stick cost if there were 24 sticks in a box costing \$12.69?

Academic Standard: CC.2.2.HS.D.2

Solution: 24 x \$12.69 = \$304.56 **Solution:** \$12.69 / 24 = \$.5287 or \$.53 per beef stick

2. The Department of Public Welfare requires tables and countertops be sanitized before food preparation is started or children eat at the table surfaces.

Sanitizing solution consists of $\frac{1}{4}$ cup bleach to one gallon of water. In the CPACTC preschool this is far too much solution to use in one day since it needs to be mixed fresh every day. About $\frac{1}{4}$ of this is enough for each preschool session.

- 1. How much water would be needed for the reduced measurement?
- 2. How much bleach would be needed for the reduced amount of water?

Note:

There are 32 tsp. in 1 cup There are 4 quarts in 1 gallon

Academic Standard: CC.Z.2.H.S.D.10.

Solution: 1 gallon has 4 quarts so we would need 1 quart of water.

Bleach $-\frac{1}{4}$ cup has 4 tablespoons - so $\frac{1}{4}$ of 4 is one tablespoon.

The smaller amount would be 1 tablespoon of bleach to 1 quart of water.

Electrical Construction & Maintenance



Program Name	Electrical Construction Maintenance CIP 46.0399		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with <u>tools and</u> <u>equipment</u> for periods of non-direct supervision Ability to work productively and safely with <u>peers</u> for periods of non-direct supervision Ability to work with others as a cooperative member of a team 		
Math Knowledge	 Basic math operations Fractions & decimals Ability to measure to 1/16 of an inch Completion of Pre-Algebra working towards Algebra 1 Ability to solve for unknown variables 		
Reading Level: Textbook	10 th grade reading level Dale-Chall Readability Index: 10.48 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12 Ability to read and understand technical manuals (Code books)		
Essential Physical Requirements	Have good hand-eye coordination, physical strength, and stamina; ability to do repetitive tasks, lift 75 lbs., discriminate subtle differences in color and texture, and bend, stoop and stand for long periods		
Number of Written Tests per Week	2 per month		
Daily Lecture Time	30 minutes daily		
Number of Performance Skills per Week	8 – 10 performance skills for each marking period		
Work Qualities Assessed	Safety rules, uniform, peer-worker relationships, initiative dependability, and following directions		
Weekly Homework Assignments	Any unfinished in-class work is assigned as homework		
Number and Name of Textbooks	1. NEC 2023 2. NCCER Level 1 & 2 3. Training Alliance Pre-apprenticeship		
Soft Skills	Multi-task, set priorities and problem solve; self-motivation ; teamwork; customer service skills and a positive attitude		
Uniform Requirements	Leather work shoes or boots, ECM work shirt, and dark blue jeans / khaki pants		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Must meet the tasks per marking period requirement, maintain good attendance (95%) and be recommended by the teacher		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	Statewide and Local Articulation Agreement, see CPACTC website for details		
Student Credentials	OSHA 10, PBA Certificate, NJATC and IEC 1 st Year Apprenticeship, CPR/AED and First Aid		
ΝΟCTΙ	3-hour, timed 198 item multiple choice test and timed performance assessment consisting of 2 (3.33 hour maximum) jobs evaluated by expert industry partners that covers the full scope of the program curriculum		

Electrical Construction and Maintenance

Math Application Sample Problems

1. A house has two floors measured at 28' x 40'. General lighting is based on 3 watts per square feet. How many watts are required for this house? Round to a whole number.

Note: Total Square Feet = length x width x number of floors

Academic Standard: CC.2.1.HS.FS

Solution: 28 x 40 x 2 = 2240 total square feet 2240 / 3 = 747 watts

2. An electrician is paid \$1,420.00 in January; \$1,560.00 in February; in March \$1,878.00; in April \$1,925.00, and in May and June a total of \$2,016.00. What is his average monthly pay?

Academic Standard: CC.2.1.HS.FS Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data.

Solution:

1420	8799 / 6 = 1466.50
1560	
1878	
1925	
+ 2016	
\$8,799.00	

3. Find the total capacitance of the circuit if capacitors are in series.

 $C_1 = 13 \mu f$, $C_2 = 15 \mu f$, $C_3 = 102 \mu f$

Academic Standard: CC.2.1.HS.FS

Solution:

$$C_{T} = \underbrace{1}_{\begin{array}{c}1\\1\\C_{1}\end{array}} = \underbrace{1}_{\begin{array}{c}1\\C_{2}\end{array}} \underbrace{1}_{\begin{array}{c}1\\C_{3}\end{array}} = \underbrace{1}_{\begin{array}{c}1\\1\\C_{3}\end{array}} \\ \underbrace{1}_{\begin{array}{c}1\\1\end{array}} \\ \\ \underbrace{1}_{\begin{array}{c}1\\1\end{array}} \\ \\ \underbrace{1}_{\begin{array}{c}1\\1\end{array}} \\ \\ \underbrace{1}_{\begin{array}{c}1\\1\end{array}} \\ \\ \\ \underbrace{1}_{\begin{array}{c}1\\1\end{array}} \\ \\ \\ \underbrace{1}_{\begin{array}{c}1\\1\end{array}} \\ \\ \\ \\ \\ \underbrace{1}_{\begin{array}{c}1\\1\end{array}} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array}$$

Healthcare Pathways



Program Name	Healthcare Pathways CIP 51.0899		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with <u>tools and</u> <u>equipment</u> for periods of non-direct supervision Ability to work productively and safely with <u>peers</u> for periods of non-direct supervision and display maturity Ability to work in close contact with others 		
Math Knowledge	 Basic math operations Fractions, proportions, & ratios High degree of accuracy in measurement 		
Reading Level: Textbook	12 th grade reading level – Ranges from 6 th grade to college level depending on the program Dale-Chall Readability Index: 12.28 Raw Score, MS Word Ability to read and comprehend medical terminology		
Essential Physical Requirements	Ability to lift 40lbs., stand for long periods of time, bend and stoop		
Number of Written Tests per Week	 4 tests per week, including skill testing, medical terminology/abbreviations, chapter tests, and/or section tests 		
Daily Lecture Time	25 – 30 minutes daily		
Number of Performance Skills per Week	1 – 2 performance skills per week (more for nursing assistant program)		
Work Qualities Assessed	Safety rules, following directions, initiative, dependability, customer service skills, high personal hygiene, and professionalism		
Weekly Homework Assignments	1 – 5 per week		
Number and Name of Textbooks	 Diversified Health Occupations 7th Edition Biology 105 Nurse Aide Text EKG / Phlebotomy Pharmacy Technician Office Procedures 		
Soft Skills	Communication skills; customer service skills; self-motivation ; work as a member of a team while putting the needs of the patient first, knowledge of HIPAA, and time management skills		
Uniform Requirements	Scrubs (according to level) and all white or black leather shoes or clogs without holes		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Good grades, good attendance, driver's license, and approval by instructor		
Clinical Experience, if any, Requirements	Level III is required to complete a 6 day, 8 hours per day, clinical rotation for CNA Certification		
Articulation or Dual Enrollment Agreements	State and Local Articulation Agreement, see CPACTC website for details. EHP Program-Messiah University BIO 185L and 186L/ HACC BIOL 121 and 122 and PA College of Technology MTR 100		
Student Credentials	AMCA Phlebotomy Tech, MAAC, Nurse Aide Certification (CNA), Act 31 Mandated Reporter, NHA Pharmacy Tech., CPR/AED, First Aid, and OSHA 10		
ΝΟCTΙ	3-hour, timed 154 item multiple choice test and timed performance assessment consisting of 5 (2 hr. maximum) jobs evaluated by expert industry partners that covers portions of the program curriculum related to patient care		

Healthcare Pathways

Math Application Sample Problems

1. A baby weighs 10.9 kilograms. How many pounds does the baby weigh?

Note: 2.2 lbs equals 1 kg

Academic Standard: 805- Measure and record height and weight.

Solution: 24 lbs / 2.2 = 10.9kg

2. Heparin comes 5000 units/ml. A patient is ordered 3000 units. How many ml is needed?

Academic Standard: 834- Describe medication administration to a client, utilizing proper medical math.

Solution:

```
3000 units/x = 5000units/1 ml
Cross multiply
3000 units/ml = 5000 units (X)
3000units/ml/5000 units = x
3/5 ml = x
Or
0.6 ml = x
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Heating, Ventilation & Air Conditioning



Program Name	Heating, Ventilation, & Air Conditioning CIP 47.0201		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with <u>tools and</u> <u>equipment</u> for periods of non-direct supervision Ability to work productively and safely with <u>peers</u> for periods of non-direct supervision Ability to work as a member of a team 		
Math Knowledge	 Basic math operations Measurement Ratios & proportion Solving for the unknown Completion of Pre-Algebra - working towards Alg. I and II 		
Reading Level: Textbook	8 th grade reading level Dale-Chall Readability Index: 8.18 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 8		
Essential Physical Requirements	Ability to stand for long periods of time, bend and stoop, lift 60 lbs., and work in small spaces		
Number of Written Tests per Week	1 every week or every other week		
Daily Lecture Time	35 minutes daily		
Number of Performance Skills per Week	7 performance skills per marking period		
Work Qualities Assessed	Safety rules, following directions, initiative, dependability, and customer service skills		
Weekly Homework Assignments	1 every week or every other week		
Number and Name of Textbooks	 Fundamentals of HVAC/R Electricity and Controls for HVAC/R Residential Construction Academy for HVAC/R 		
Soft Skills	Has customer service skills and self-motivation , is reliable, follows directions, works well in teams, and solves problems		
Uniform Requirements	Leather, steel-toed boots with non-slip soles, dark blue CPACTC t-shirt, and dark blue work pants (no jeans)		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Task 1280 and/or with instructor's permission		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	State and Local Articulation Agreement, see CPACTC website for more details		
Student Credentials	OSHA 10; PBA Endorsement, EPA 608, CPR/AED and First Aid		
ΝΟCTΙ	3-hour, timed 120 item multiple choice test and timed performance assessment consisting of 2 jobs (3 hour maximum) evaluated by expert industry partners that covers the full scope of the program curriculum		

Heating, Ventilation, and Air Conditioning

Math Application Sample Problems

1. Given a voltage of 208V and 10A, find the resistance.

Note:		
Ohms Law	$E = I \times R$	E = Volts
	I=E÷R	I = Amps
	R = E ÷ I	R = Resistance

Academic Standard: M11.A.2.1.1, M11.A.2.1.2, M11.A.2.1.3

Solution: E = 208 208 ÷ 10 = 20.8 amps I = 10 R = ??

2. Given original absolute pressure of 115 PSIG, and new absolute pressure of 215 PSIG, and original volume of 2 cubic inches, find the new volume.

Note:	
Gas Laws	P1 = Original Absolute Pressure
	V1 = Original Volume
	P2 = New Absolute Pressure
	V2 = New Volume
	T1 = Original Absolute Temp
	T2 = New Absolute Temp

Academic Standard: M11.A.2.1.1, M11.A.2.1.2, M11.A.2.1.3

Solution: Use mathematical equation $P1 \times V1 = P2 \times V2$

P1 = 115 PSIA V1 = 2 Cubic Inches P2 = 215 PSIA V2 = ??	P1 = 115 P2 = 215
	$115 \times 2 = 215 \times X$ 230 = 215 x
	230 ÷ 215 = 1.07 X = 1.07
	V2 = 1.07

Horticulture & Landscaping



Program Name	Horticulture and Landscaping		
	01.0601		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with <u>tools and</u> <u>equipment</u> for periods of non-direct supervision Ability to work productively and safely with <u>peers</u> for periods of non-direct supervision Interest in working with plants Willing to work in dirt and extreme temperatures 		
Math Knowledge	 Basic math operations Measurements, fractions, percentages, & decimals Ability to measure ounces and fractions of inches Ability to do money conversion from dollar to cents etc. 		
Reading Level: Textbook	8 th grade reading level Dale-Chall Readability Index: 9.24 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 10		
Essential Physical Requirements	Ability to do repetitive tasks, lift 80 lbs., discriminate subtle differences in color and texture, withstand heat outside or in the greenhouse, and bend, stoop, or stand for long periods of time; display physical strength and stamina		
Number of Written Tests per Week	2 – 3 per week		
Daily Lecture Time	25 – 45 minutes daily		
Number of Performance Skills per Week	2-3 performance skills per week		
Work Qualities Assessed	Safety rules, peer-worker relationships, initiative, dependability, and following directions		
Weekly Homework Assignments	Plant identification, Terminology, Current unit topic		
Number and Name of Textbooks	 Landscaping Principles & Practices Art of Floral Design Landscape Construction Introduction to Horticulture 		
Soft Skills	Ability to multi-task, set priorities, and works well in teams; is Self-motivated; displays customer service skills		
Uniform Requirements	3 CPACTC T-shirts, steel-toed shoes, and jeans		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Must meet the tasks per marking period requirement, maintain good attendance (95%), and be recommended by the teacher		
Clinical Experience, if any, Requirements	None		
Articulation or Dual Enrollment Agreements	Statewide and Local Articulation Agreement, see CPACTC website for details Pennsylvania College of Technology – Horticulture 101 and 113		
Student Credentials	OSHA 10, Pennsylvania Certified Horticulturist, Pennsylvania Pesticide Certification, CPR/AED and First Aid		
ΝΟCΤΙ	3-hour timed test 171 item multiple choice test and timed performance assessment consisting of 5 jobs (2-hour time limit) evaluated by an industry expert		

Horticulture and Landscaping

Math Application Sample Problems

1. Determine the amount of linear feet of edging is required for a garden bed.

Note: Circumference is 2 Short Radius is 3 Long Radius is 4

Use the following mathematical equation.

Note: **π** = Pi (3.14)

$$C = 2 \pi \sqrt{S_2 + L_2}$$

Academic Standard: Circumference of an ellipse to determine the amount of edging required for a bed.

Solution:

C = (2 x)	3.14) ⁻ V S ₂ + L ₂	S = Short Radius
	2	L = Long Radius
= 6.28	$\sqrt{\frac{9+16}{2}}$	
= 6.28	√ 25 / 2	
= 6.28	√ 12.5= (6.28) (3.	54 LF) = 22.23 LF of edging required for bed

2. Determine the number of hours required to install sod on a job.

$$\underline{SY} = \underline{SY}$$
 (SY = Square Yards)
Hrs. x hrs

Academic Standard: CC 2.2 HS C.1 and CC 2.2 HS D.2

Solution:

 $\frac{400 \text{ SY}}{8 \text{ hrs.}} = \frac{280 \text{ SY}}{x \text{ hrs}} \qquad 400x = (280)(8) \qquad x = 2,240 / 400 = 2,240$

x = 5.6 hours required to install the sod

Logistics & Warehouse Management



Program Name	Logistics and Warehouse Management CIP 52.0203	
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with <u>tools and</u> <u>equipment</u> for periods of non-direct supervision Ability to work productively and safely with <u>peers</u> for periods of non-direct supervision Honesty and dependability Ability to work as a member of a team 	
Math Knowledge	Basic math operationsMeasurement	
Reading Level: Textbook	8 th grade reading level Dale-Chall Readability Index: 8.18 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 8	
Essential Physical Requirements	Ability to stand for long periods of time, bend, stoop, and lift 60 lbs.	
Number of Written Tests per Week	1 per week	
Daily Lecture Time	30 minutes daily	
Number of Performance Skills per Week	2 – 3 performance skills per week	
Work Qualities Assessed	Safety rules, following directions, initiative, dependability, and customer service skills	
Weekly Homework Assignments	1 per week	
Number and Name of Textbooks	Marketing Essentials	
Soft Skills	Displays customer service skills, works well in teams, is reliable and self-motivated , and follow directions	
Uniform Requirements	CPACTC Logistics T-shirt, leather steel-toe boots, and orange safety vest	
Required Expenditures	See CPACTC website	
Cooperative Education Requirements	Recommendation of the teacher	
Clinical Experience, if any, Requirements	None	
Articulation or Dual Enrollment Agreements	See CPACTC website for details	
Student Credentials	OSHA 10, Certified Logistics Associate, NSC Forklift Operator; CPR/AED and First Aid	
ΝΟCTΙ	3-hour, timed 157 item multiple choice test and timed performance assessment consisting of 5 jobs (3.75 hr. maximum) evaluated by expert industry partners that covers the full scope of the program curriculum	

Logistics and Warehouse Management

Math Application Sample Problems

1. How many boxes are stacked on this pallet?

Note: Total Boxes = height view x top view

Academic Standard: C.C.2.2.3.A.1







Top View

Solution:

5 boxes on a layer

x 5 Layers

25 Boxes

2. Shop brooms cost \$8.00 each. If Tom bought 10 brooms with a 25% quantity discount, how much did he pay?

Academic Standard: CC.2.1.7.D.1

Solution:

1.\$8.00 cost per broom2.\$80.00 total cost3.\$80.00 costx 10 quantityx .25 discount % $\frac{-\$20.00}{\$60.00}$ price of brooms\$80.00 total cost\$20.00 discount total $\frac{-\$20.00}{\$60.00}$ price of brooms

Masonry



Program Name	Masonry CIP 46.0101	
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with tools and equipment for periods of non-direct supervision Ability to work productively and safely with peers for periods of non-direct supervision Ability to work as a member of a team Excellent eye-hand coordination Ability to work outdoors and indoors in all weather conditions 	
Math Knowledge	 Basic math operations Measurements Fractions, decimals, & ratios Basic applied geometry 	
Reading Level: Textbook	10 th grade reading level Dale-Chall Readability Index: 11.28 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 10	
Essential Physical Requirements	Ability to do repetitive tasks, lift 60 lbs., and stand, stoop, and bend for long periods of time; display physical strength and stamina	
Number of Written Tests per Week	One (1) written assignment every two weeks	
Daily Lecture Time	15 minutes daily	
Number of Performance Skills per Week	2 – 3 performance skills per week	
Work Qualities Assessed	Safety rules, peer-worker relationships, initiative, dependability, following directions, and completion of projects that are plumb, level and square	
Weekly Homework Assignments	Practice layout of projects using tape rule	
Number and Name of Textbooks	1. Brick & Block Construction 2. Masonry Skills 5 th Edition	
Soft Skills	Self-motivated, works well in teams, problem solver, and dependable	
Uniform Requirements	Jeans or suitable work pants (no holes), and leather safety-toe boots or shoes	
Required Expenditures	Modular foot rule, 25 ft. Tape measure, see also: CPACTC website	
Cooperative Education Requirements	Must meet the tasks per marking period requirement, maintain good attendance (95%), and be recommended by the teacher	
Clinical Experience, if any, Requirements	None	
Articulation or Dual Enrollment Agreements	State Articulation Agreement, see CPACTC website for details	
Student Credentials	OSHA 10, Rough Terrain Forklift; Mobile Elevating Work Platform, PBA Certificate, CPR/AED and First Aid	
ΝΟCTΙ	3-hours, timed 200 item multiple choice test and timed performance assessment consisting of 3 jobs (2.5 hour maximum) evaluated by expert industry partners that covers the full scope of the program curriculum	

Masonry

Math Application Sample Problems

1. What does the ruler show in inches?



Academic Variable: CC.2.4.HS.B.1, A1.2.2.1.2, A1.2.3.1.1, A1.2.3.2.1, A1.2.3.2.2, A1.2.3.2.3,

Solution: 1 7/8"

2. What is the area of a brick patio 25' long and 8' wide?

Note: Area = length x width

Academic Standard: CC.2.1.HS.F.2, A1.1.1.1, A1.1.1.2, A1.1.1.3.1, A1.1.1.2.

Solution:

Determine the area $25' \times 8' = 200$ Sq. Ft.

Welding



Program Name	Welding CIP 48.0508		
Minimum Attributes/ Prerequisites	 Ability to work safely and independently with <u>tools and</u> <u>equipment</u> for periods of non-direct supervision Ability to work productively and safely with <u>peers</u> for periods of non-direct supervision Excellent hand-eye coordination Attention to details 		
Math Knowledge	 Blueprint reading Basic math operations Measurements Fractions (need to be able to add and subtract fractions) Decimals and ratios Algebra and Trigonometry Ability to measure within .001 tolerance 		
Reading Level: Textbook	11 th grade reading level Dale-Chall Readability Index: 11.48 Raw Score MS Word and CBA RDNG PROBE GENERATOR (OKAP) Grade 12		
Essential Physical Requirements	<u>Ability to lift 50 lbs.</u> and stand for long periods, have a steady hand, and work with small and large components, within small confines, and in a hot work environment		
Number of Written Tests per Week	1 test plus a written assignment		
Daily Lecture Time	15 minutes daily		
Number of Performance Skills per Week	1 performance skill per week		
Work Qualities Assessed	Safety rules, following directions, initiative, and dependability		
Weekly Homework Assignments	0 – 1 per week		
Number and Name of Textbooks	Welding Technology Fundamentals		
Soft Skills	Ability to set priorities, is self-motivated , pays attention to fine details, and displays perseverance		
Uniform Requirements	Welding gloves, welding helmet, welding jacket, welding pants, and leather steel- toed boots		
Required Expenditures	See CPACTC website		
Cooperative Education Requirements	Must meet the tasks per marking period requirement, maintain good attendance (95%) and be recommended by the teacher		
Clinical Experience, if any, Requirements	None		
Articulation or Dual	Statewide Articulation Agreement, see CPACTC website for details		
Student Credentials	American Welding Society (AWS); JLG Rough Terrain Forklift, OSHA 10, CPR/AED and First Aid		
ΝΟCTΙ	3-hour, timed 138 item multiple choice test and timed performance assessment consisting of 6 jobs (3 hour maximum) evaluated by expert partners that covers the full scope of the program curriculum		

Welding

Math Application Sample Problems

1. Illustrate three ways to write $\frac{1}{2}$ of an inch.

Academic Standard: MB.1

Solution: 8/16, 4/8, .500, 1:2

2. You need to cut a piece of metal to fit 2 projects. Calculate the difference between 5/8" and 3/8". Reduce to the lowest common denominator.

Academic Standard: MB.1

Solution: 1/4"

5/8 - 3/8 = 2/8

2/8 = 1/4

CPACTC Contact Information

To contact staff at CPACTC, dial the CPACTC General Phone number. Then dial the extension to speak to a specific person. If you know the party with whom you would like to speak, dial 9 for a directory by name.

CPACTC General Phone	
Assistant Principal	112
Attendance Office	
Business Office	103
Cooperative Education Coordinator	
Director's Phone	
Student Services Office	117
Assistant Principal of Student Services	179
School Counselor, Dave Payne	173
School Counselor, Lori Staub	
JOC Secretary	
Principal's Office	
Principal's Phone	110
School Nurse	
Technology Director	