NEW MILFORD BOARD OF EDUCATION
New Milford Public Schools
50 East Street
New Milford, Connecticut 06776

COMMITTEE ON LEARNING
MEETING NOTICE

DATE:	**May 1, 2018**
TIME:	**7:30 P.M.**
PLACE:	**Lillis Administration Building – Room 2**

AGENDA

New Milford Public Schools Mission Statement

The mission of the New Milford Public Schools, a collaborative partnership of students, educators, family, and community is to prepare each and every student to compete and excel in an ever-changing world, embrace challenges with vigor, respect and appreciate the worth of every human being, and contribute to society by providing effective instruction and dynamic curriculum, offering a wide range of valuable experiences, and inspiring students to pursue their dreams and aspirations.

1. **Call to Order**
2. **Public Comment**
   An individual may address the Board concerning any item on the agenda for the meeting subject to the following provisions:
   A. A three-minute time limit may be allocated to each speaker with a maximum of twenty minutes being set aside per meeting. The Board may, by a majority vote, cancel or adjust these time limits.
   B. If a member of the public comments about the performance of an employee or a Board member, whether positive, negative, or neutral, and whether named or not, the Board shall not respond to such comments unless the topic is an explicit item on the agenda and the employee or the Board member has been provided with the requisite notice and due process required by law. Similarly, in accordance with federal law pertaining to student confidentiality, the Board shall not respond to or otherwise discuss any comments that might be made pertaining to students.
3. **Discussion and Possible Action**
   A. Review and Approval of Curriculum
      1. Introduction to Engineering Design
4. **Presentations**
   A. New Milford High School PLTW Students
   B. PLTW Update
   C. Alumni Survey
5. **Public Comment**
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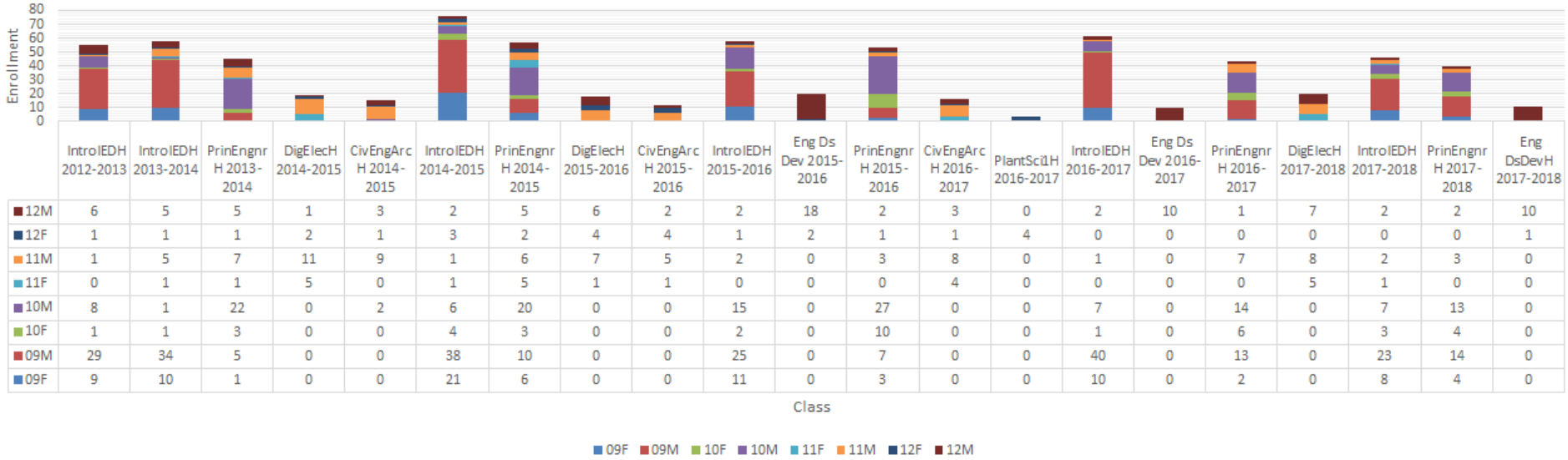
6. Adjourn

Sub-Committee Members: **Tammy McInerney, Chairperson**
Bill Dahl
Joseph Failla
J.T. Schemm

Alternates: **Angela C. Chastain**
Brian McCauley

Project Lead the Way and Alumni Survey Report

Committee on Learning May 2018



	IntroIEDH 2012-2013	IntroIEDH 2013-2014	PrinEngnr H 2013-2014	DigElecH 2014-2015	CivEngArc H 2014-2015	IntroIEDH 2014-2015	PrinEngnr H 2014-2015	DigElecH 2015-2016	CivEngArc H 2015-2016	IntroIEDH 2015-2016	Eng Ds Dev 2015-2016	PrinEngnr H 2015-2016	CivEngArc H 2016-2017	PlantSci1H 2016-2017	IntroIEDH 2016-2017	Eng Ds Dev 2016-2017	PrinEngnr H 2016-2017	DigElecH 2017-2018	IntroIEDH 2017-2018	PrinEngnr H 2017-2018	Eng DsDevH 2017-2018
12M	6	5	5	1	3	2	5	6	2	2	18	2	3	0	2	10	1	7	2	2	10
12F	1	1	1	2	1	3	2	4	4	1	2	1	1	4	0	0	0	0	0	0	1
11M	1	5	7	11	9	1	6	7	5	2	0	3	8	0	1	0	7	8	2	3	0
11F	0	1	1	5	0	1	5	1	1	0	0	0	4	0	0	0	0	5	1	0	0
10M	8	1	22	0	2	6	20	0	0	15	0	27	0	0	7	0	14	0	7	13	0
10F	1	1	3	0	0	4	3	0	0	2	0	10	0	0	1	0	6	0	3	4	0
09M	29	34	5	0	0	38	10	0	0	25	0	7	0	0	40	0	13	0	23	14	0
09F	9	10	1	0	0	21	6	0	0	11	0	3	0	0	10	0	2	0	8	4	0

Number of Students Taking PLTW Series of 4 Year Classes

- There were a total of 12 students who took the series over the 4 year period (2 cohorts of students.)
- There were 55 students in grades 9-12, that took the first Intro course offered in 2012-2013.
- There were 34 freshman in the first cohort.

% of Students Who Earn College Credit

- Over the years, approximately 47% of students hit the University of New Haven's requirement.
- College Credit rate equals a score of 6 at the University of New Haven
- 562 students have participated in PLTW courses since 2014-2015 for college credit (these were the years we were certified and could obtain credit)
- 266 students earned a 6 a more to qualify for credit=47%

2012-2013	TOTAL	NAME	09F	09M	10F	10M	11F	11M	12F	12M
	55	IntrolEDH	9	29	1	8	0	1	1	6
	0	PrinEngrH	0	0	0	0	0	0	0	0
2013-2014	TOTAL	NAME	09F	09M	10F	10M	11F	11M	12F	12M
	0	DigElecH	0	0	0	0	0	0	0	0
	0	CivEngArcH	0	0	0	0	0	0	0	0
	38	IntrolEDH	10	34	1	1	1	3	1	3
	45	PrinEngrH	1	5	3	22	1	7	1	5
2014-2015	TOTAL	NAME	09F	09M	10F	10M	11F	11M	12F	12M
	19	DigElecH	0	0	0	0	5	11	2	1
	15	CivEngArcH	0	0	0	2	0	9	1	3
	76	IntrolEDH	21	38	4	6	1	1	3	2
	0	Eng Ds Dev	0	0	0	0	0	0	0	0
	57	PrinEngrH	6	10	3	20	5	6	2	5
2015-2016	TOTAL	NAME	09F	09M	10F	10M	11F	11M	12F	12M
	18	DigElecH	0	0	0	0	1	7	4	6
	12	CivEngArcH	0	0	0	0	1	3	4	2
	58	IntrolEDH	11	25	2	15	0	2	1	2
	20	Eng Ds Dev	0	0	0	0	0	0	2	18
	53	PrinEngrH	3	7	10	27	0	3	1	2
2016-2017	TOTAL	NAME	09F	09M	10F	10M	11F	11M	12F	12M
	0	DigElecH	0	0	0	0	0	0	0	0
	16	CivEngArcH	0	0	0	0	4	8	1	3
	4	PlantSci1H	0	0	0	0	0	0	4	0
	0	Environlnt	0	0	0	0	0	0	0	0
	61	IntrolEDH	10	40	1	7	0	1	0	2
	10	Eng Ds Dev	0	0	0	0	0	0	0	10
	48	PrinEngrH	2	13	6	14	0	7	0	1
2017-2018	TOTAL	NAME	09F	09M	10F	10M	11F	11M	12F	12M
	20	DigElecH	0	0	0	0	5	8	0	7
	0	CivEngArcH	0	0	0	0	0	0	0	0
	0	Environlnt	0	0	0	0	0	0	0	0
	46	IntrolEDH	8	23	3	7	1	2	0	2
	0	Eng Ds Dev	0	0	0	0	0	0	0	0
	40	PrinEngrH	4	14	4	13	0	3	0	2
	11	Eng Ds DevH	0	0	0	0	0	0	1	10

Program Evaluation

*The first few of pages (1-4) summarizes the assessment, the balance is more about specific content in this example which is Intro to Engineering Design.

The assessment measures achievement level descriptions for IED by Concept. There are 29 concept areas that are covered in this particular course and that are assessed on the examination.

Questions?

Alumni Survey Results Class of 2017

Profile of the Class of 2017

- 342 students made up the class of 2017
- 6 students transferred out of district
- 11 students went to adult education
- 6 students were retained
- 13 students discontinued schooling
- 306 students graduated high school
- 25 students were coded incorrectly, as still enrolled, but had graduated
- New graduation rate would equal 91.2% students (Litchfield Hills Transition Students don't graduate in 4-6 years and therefore decrease the number of graduates-there were approximately 6 students who transferred to LH in 2017)
- State reported a graduation rate of 82.8%, however with the 25 incorrectly coded students, the new rate of graduation would be 89.5%
- In 2016, the graduation rate was 93.4%

Alumni Survey Data-Class of 2017

- In 2017- There were 342 students who were members of the graduating class
- We surveyed 249 students
- Response rate was 24.9% or 62/249 students
- Survey window ran from January 4th and closed January 31st

Favorable Responses

- 85% of respondents felt their teachers cared about them
- 61% felt that teachers made learning an interesting experience
- 95% felt that teachers were knowledgeable about their subject matter
- 70% felt that teachers held students to a high standard and required quality work
- 69% of respondents felt their coursework in high school was rigorous

Current Status of Students Surveyed

- 93% of students went to a 4-year college
- 3% went to a 2-year college
- 5 students stopped going to college due to financial constraints
- 67% of our students took at least one AP class throughout their high school career
- 27% took 5 or more AP courses.

Areas we Can Improve for Students

- Assist with social and civic involvement
- Linking college and career expectations to expectations in the workplace
- Preparation for Success in a two or four year college (although, 69% of students felt their high school coursework was rigorous so this is not related to rigor)

What Is College and Career Readiness?

Every distinct career pathway and college degree requires knowledge, skills, and abilities that are unique to that area. What is emerging from the research, however is the identification of a foundational set of knowledge and skills that all high school graduates need to be prepared to succeed beyond high school regardless of the setting. In particular, the evidence suggests that graduates need not only a solid grounding in the content knowledge specified in college and career readiness standards, but also key thinking and learning skills and strategies that are critical for collegiate and workplace success. The goal is for high school graduates to be both college ready and career ready, enabling them to pursue any opportunity desired. The intersection between college and career readiness is represented by the knowledge and skills necessary for success in both arenas: the ability to place into and succeed in an entry-level college general education course or a career preparation program without remediation. As explained by the Partnership for 21st Century Skills, “Employers, educators and policymakers agree that the skills necessary for entering postsecondary education today are virtually the same skills necessary for success in the modern workplace. The results that matter apply to all students” (2006). (CT College and Career Readiness Toolkit)

Key College and Career Readiness Concepts

Postsecondary refers to any formal setting an individual pursues for additional instruction beyond high school. These may include two-or four-year degree programs, certificate or licensure programs, apprenticeships, or military programs

Work Ready: Individual meets basic expectations regarding workplace behavior and demeanor.

Job Ready: Individual possesses specific knowledge necessary to begin an entry-level position.

Career Ready: Individual possesses sufficient foundational knowledge, skills, and general learning strategies necessary to begin studies in a career pathway.

Key College and Career Readiness Concepts

College Ready: Individual places into and passes, without remediation, a credit-bearing entry-level general education course.

College Eligible: Individual meets the admissions requirements for a two or four year college or university. This typically includes meeting high school graduation requirements, maintaining an acceptable grade point average in specified courses, and obtaining satisfactory SAT or ACT scores.

(Education Policy Improvement Center: Conley, D.T McGaghy, C Cadigan, K, Flynn, K Forbes, J Veach, D (2008) Validations Study I and II)

Seven Principles of College and Career Readiness

Principle 1: Create and maintain a college-and career-readiness culture in the school.

Principle 2: Create a core academic program aligned with and leading to college readiness by the end of grade twelve.

Principle 3: Teach key self-management skills and academic behaviors and expect students to use them.

Principle 4: Make college and careers real by helping students manage the complexity of preparing for and applying to post secondary education.

Seven Principles of College and Career Readiness

Principle 5: Create assignments and grading policies that more closely approximate college and career expectations each successive year of high school.

Principle 6: Make the senior year meaningful and appropriately challenging.

Principle 7: Build partnerships with and connections to postsecondary programs and institutions.

Examples of What a College and Career Ready Student Can Do:

- Communicate effectively and professionally with supervisors and professors
- Read with understanding a range of non-fiction publications, textbooks, and technical materials
- Incorporate feedback effectively
- Produce written products that are consistently free of errors and reflect proper writing conventions
- Collect and analyze data precisely and accurately
- Interpret conflicting explanations of an event or phenomenon
- Write a three to five page research paper structured around a cogent, coherent line of reasoning
- Arrive punctually to class or work

Examples of What a College and Career Ready Student Can Do:

- Attend a study group outside of class
- Create and maintain a personal schedule that includes a prioritized “to do” list
- Complete successfully an assignment that requires two weeks of independent work and extensive research
- Utilize technological tools including appropriate online and desktop applications
- Locate websites containing information on career requirements, colleges, admissions, and financial aid
- Balance short and long- term goals

(Educational Policy Improvement Center (2008). Creating College Readiness (Data file and code book).Eugene, OR: Educational Policy Improvement Center.

Questions?

PROJECT LEAD THE WAY
PLTW

END-OF-COURSE ASSESSMENT SCORE INTERPRETATION GUIDE

for November 1, 2017 through June 30, 2018
IED EoC Test Administration

CONTENTS

August 2017 Edition

1. INTRODUCTION

The *PLTW End-of-Course Score Interpretation Guide* is a course-specific supplement to the *PLTW End-of-Course Assessment Administration Manual*.

- This section provides Project Lead The Way policy for appropriate and inappropriate uses of End-of-Course (EoC) Scores.
- Section 2 includes information about how to interpret student EoC scores in general and for the 2017–18 Introduction to Engineering (IED) course specifically.
- Section 3 provides the complete Achievement Level Descriptions that are aligned to the EoC scores for IED.
- The last section provides guidance for those who need to use EoC scores as part of class grading.

PLTW End-of-Course Assessment Purpose

The purpose of the End-of-Course Assessment is to *understand a student's overall achievement* at the end of a PLTW course.

Use of PLTW EoC Scores

PLTW is mindful of the impact testing has on students and schools. To assist users of the scores with the most fair and proper use of the data and to ensure the scores are used for their intended purpose, this section addresses appropriate and inappropriate uses of PLTW EoC scores.

PLTW encourages using multiple indicators of success when making important decisions regarding a student, school, or program. Other sources of data include prior grades in different courses, scores on other standardized assessments, and teacher recommendations.

Note If PLTW EoC scores are used for purposes other than the appropriate uses listed in this guide, the user is responsible for validating the use of the EoC Assessment for that purpose.

Appropriate uses of EoC scores

The following are PLTW-approved uses of scores from the EoC Assessment.

- **Classroom grades** Though not required, a teacher may choose to include an EoC score as part of a classroom grade. There is no set protocol for assigning letter grades to specific EoC scores. Most importantly, score conversion needs to follow your school's grading policy. For more information, see EoC Score-to-Grade Conversion on page 19.
- **Program monitoring** PLTW uses student performance and assessment item response data to inform curriculum changes, as well as to monitor student performance. Schools and districts may also use student performance data to monitor their PLTW programs.

PLTW encourages using multiple indicators of success when making important decisions regarding a student, school, or program.

- **State educational purposes** A state may use EoC scores as a way to monitor student achievement and completion in educational programs.
- **Student recognition** PLTW EoC scores can be used for recognition at many levels as determined and validated by the user. The criteria for student recognition vary depending on the institution or organization.
  - Students may receive AP + PLTW recognition. For more information, see https://www.pltw.org/our-programs/ap-pltw
  - PLTW does not recommend a specific EoC score to use for student recognition at the local level. However, schools can provide their own type of recognition, such as awards to students in a particular program, students who attain a certain EoC score, or graduating seniors during commencement.
  - Many affiliate universities, colleges, community colleges, and partners award scholarships, credentials, preferential admissions, and/or college credit for completion of PLTW courses. For more information, see https://www.pltw.org/experience-pltw/student-opportunities
- **Summative overview of student performance** EoC scores are a general overview of student achievement in the PLTW course, as indicated by this nationally administered, objective assessment. PLTW EoC Assessments are only one measure of a student's achievement.

Validation and use of PLTW EoC scores for any other purpose is the responsibility of the user.

Inappropriate uses of EoC scores

The following are **not** appropriate uses of PLTW EoC Assessment scores.

- **Making decisions about a student, school, or program** PLTW does not recommend measuring the effectiveness of a school or program based entirely on EoC scores. PLTW encourages using multiple indicators of success when making important decisions regarding a student, school, or program. Other sources of data include prior grades in different courses, scores on other standardized assessments, and teacher recommendations.
- **Prediction of college success** PLTW EoC scores have not been validated as a measure of a student's potential success in college.
- **Teacher evaluations** PLTW EoC scores have not been validated for use as measures of teacher effectiveness.

Other uses

If PLTW EoC scores are used for purposes other than the appropriate uses listed in Section 1, it is the user's responsibility to validate the use of the EoC scores for that purpose.

2. EOC SCORE INTERPRETATION

PLTW EoC score interpretations are *criterion-referenced*, which means that you can interpret a student's EoC score to be a reflection of his or her understanding of the curriculum content *standards*. Criterion-referenced interpretation is *not* to be confused with a system that measures learning relative to the performance of other students, such as percentile ranks. To the contrary, each school year, there is no limit to the number of students who can receive any particular score on a PLTW EoC Assessment.

Standard Setting Process

To better understand the criterion-referenced nature of PLTW EoC scores, it is helpful to know how EoC scores are derived. PLTW EoC scores are derived through the process of *standard setting*, which sets the cut scores for a test.

- In the first phase of standard setting, operational definitions of each achievement level, called Achievement Level Descriptions (ALDs), are developed. See the next section, Achievement Level Descriptions.
- Then the ALDs are used to identify the cut scores, which differentiate students between achievement levels of Basic, Proficient, and Advanced.

The PLTW Standard Setting process helps ensure that the information provided by EoC scores is meaningful and based on high-quality, nationally representative data and systematic, defensible procedures. In other words, our Standard Setting process determines how much knowledge a student must demonstrate on the EoC to achieve the performance level of Basic, Proficient, or Advanced.

After a student completes an EoC Assessment, they receive their EoC score along with the corresponding achievement level indicator (Basic, Proficient, or Advanced), which represents the full achievement level description.

Achievement Level Descriptions

ALDs are statements of what students should know and be able to do in a PLTW classroom. Specifically, the ALDs describe the technical skills and knowledge covered in the curriculum and on the EoC Assessment. ALDs complement curriculum materials and can be used by teachers and students to better understand student performance and expectations. Teachers can also use ALDs to understand how their students performed on the EoC Assessment.

The Basic, Proficient, and Advanced achievement level descriptions each provide a broad assessment of student performance. Each level builds toward the next level. For example, a student who demonstrates an Advanced level of understanding for a particular concept also demonstrates related understandings in the Basic and Proficient levels for that concept.

The three levels of student knowledge and performance are defined in the following broad terms:

Note Achievement level indicators are referred to as "Achievement Indicator" in myPLTW.

Achievement Level Descriptions

Achievement Indicator	The Student Demonstrates…
Basic	… minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.
Proficient	… competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understandings.
Advanced	… comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.

For a full explanation of what each achievement level represents for the Introduction to Engineering course, see Achievement Level Descriptions for IED on page 5.

Score Interpretation Guidelines

Because the interpretation of PLTW EoC Assessment scores is criterion-referenced, each student has the opportunity to earn the highest score.

EoC scores are reported on a number scale of 1 through 9. Each score is tied to one of the EoC achievement indicators. The scores gain their meaning from the ALD interpretation of what a student should know and be able to do as demonstrated on the EoC.

The following table shows how the EoC scores align with the EoC achievement level indicators. The national average score on any PLTW EoC Assessment is 5.

Achievement Level Descriptions with Scores

Achievement Indicator	Basic			Proficient			Advanced	
Achievement Level Description The student demonstrates:	… minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.			… competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understandings.			… comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.	
EoC Score	1	2	3	4	5	6	7	8	9

Note PLTW works with schools to determine whether irregular testing practices took place during an EoC administration and whether a score should be invalidated. (See the *EoC Assessment Administration Manual* for more information.) Student scores that are invalidated will not display on myPLTW, and the Achievement Indicator will show "Invalidated Score".

3. ACHIEVEMENT LEVEL DESCRIPTIONS FOR IED

The tables in this section show the specific ALDs for the PLTW Introduction to Engineering (IED) course. The ALDs are divided into the 29 concept areas or themes that are covered in the course.

ALDs by Concept

Note In the following tables, assume that each higher level of achievement includes the prior level(s).

1. Design Process and Problem Identification

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
List most steps in the design process or list all steps but not in chronological sequence.	List all steps in the design process in chronological sequence.	Show various ways that steps of the design process can iterate and/or follow a non-sequential order.
	Provide an accurate example of what task(s) are performed in each step of the design process.	Given a design problem, create a detailed and comprehensive design brief, including several design criteria.
Identify most components of a design brief.	Identify all components of a design brief.	Edit a design brief during design process as additional information is gained regarding requirements for a successful solution to the problem.
Distinguish between an invention and an innovation.	Identify the step of the design process into which a given task from a real-world design process fits.	Formally document and justify changes to design brief as they occur.

2. Generate Multiple Solution Concepts

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Enumerate some of the techniques and rules of brainstorming.	Enumerate all of the techniques/rules of brainstorming and follow most during brainstorming sessions.	Lead a productive brainstorming session with other students.
Perform research that is limited to one or two sources of unpublished information. Research information has not been evaluated by student.	Perform research that is limited to three to five published sources. Sources have been evaluated and properly cited by student.	In addition to several published secondary sources cited, student can perform some primary research that can be used to analyze, verify, and add to secondary sources.

3. Select a Solution Path

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Create a decision matrix limited to two possible solution paths, with minimal details regarding each design and the design criteria. Ranking scale is missing or incomplete.	Create a decision matrix (using a ranking scale) comparing at least three possible design solutions with respect to acceptable design criteria.	Create a decision matrix using a ranking scale and weighting to compare more than four possible design solutions, each with an annotated sketch and detailed outline of design characteristics for each design. Include a benchmark design for further comparison and analysis (Pugh method).

4. Construct and Test Models and Prototypes

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Create a rough hand sketch, CAD drawing, or physical model of the proposed solution with some scaling, dimensional, or feature errors. Physical model is not testable.	Create a reasonably accurate hand sketch, CAD model, or physical model of the proposed solution. Hand sketches may have inaccuracies with scale and dimensions. Physical model is testable but results may not be completely accurate.	Analyze/test the model(s) and determine whether redesign and retesting are needed based on criteria and constraints of project.

5. Evaluate the Solution

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify MOST desired visual, functional, and structural performance features of the product identified in the Design Brief.	Identify ALL desired visual, functional, and structural performance features of the product as identified in the Design Brief.	Justify suggested revisions/ enhancements to a proposed product design with compelling arguments.
Given a criteria/constraint, reasonably determine whether a given proposed solution does/does not meet the criteria/constraint.	Given a set of criteria/constraints, determine whether a given solution does/does not satisfy requirements of design brief.	

6. Communicate Solution

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Develop engineering notebook entries, but some are missing, incomplete, or difficult to read. There are some annotated sketches and graphics to help explain the design thought process. Some entries may have missing page numbers, signatures, and/or dates.	Develop neat, consistent, readable engineering notebook entries. Where appropriate, entries include an annotated sketch or graphic to help explain the design thought process. All entries have page numbers, signatures, and/or dates.	Develop highly consistent, readable engineering notebook entries, including annotated sketches/graphics to explain thought process. Entries include a plan for the next day's design activities.
Create a design portfolio that is mostly organized, complete, and accurate according to established protocols.	Create a design portfolio that is organized, complete, and accurate according to established protocols.	Consistently include many examples of conclusions, transfer of knowledge, and plans for next design session.
Create slides reflecting a given outline/template; slides include pictorial, graphical, and textual communication. Presentation is clear but lacks flow and attention to details.	Create slides that include CAD graphics and contain embedded hyperlinks for videos to present information. Presentation clearly addresses topic at hand and is understandable to an audience familiar with the topic/project.	Create slides reflecting a high level of subject understanding beyond a given outline/template.
Produce a technical report when given a template, but it may contain errors in grammar, spelling, or format. Report may have some incomplete information or sections.	Produce a technical report when given a template that is well written with few errors in grammar, spelling, or format. Report has a logical flow, clearly presents the topic, and is complete with all sections addressed.	Produce a technical report that contains significant detail and several examples of project justification for investment. Report is succinct and professionally written. Contains conclusions that recommend next course(s) of action for management.

7. Reverse Engineering

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify SOME visual, functional, structural performance features of the product being reverse engineered.	Identify MANY visual, functional, structural performance features of the product being reverse engineered.	Brainstorm/recommend multiple improvements to a product based on reverse engineering analysis and compare the desirability and rank recommendations.

8. What Is Engineering?

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Define engineering. List the major engineering disciplines.	List major disciplines and sub-disciplines of engineering and typical responsibilities.	List many engineering sub-disciplines and explain how they can relate to each other.
Identify some engineering societies.		Identify many engineering societies and their accomplishments.
Define the educational and professional requirements of an engineer, engineering technician, and a scientist.		Enumerate and describe many functional tasks of an engineer.
Define standardization.	Explain how standards are developed and why standards are needed.	Provide examples of how standards affect ethical decisions and fair competition among companies in similar industries.

9. Engineering Impacts

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Given a specific product, list a positive and a negative impact that it might have on society and how it uses resources.	Given a specific product, list two positive and two negative impacts that it might have on society and two ways that it uses resources.	Given a specific product, list many positive and negative impacts that it might have on society and many ways that it uses resources.
List the general lifecycle steps for a product.	List the lifecycle steps for a particular product.	List and detail the lifecycle steps for this particular product, with emphasis on manufacturing extraction, process and disposal including recycling.
Define the concept of sustainable design.	Define sustainable design's impacts on the environment and describe any sustainable design characteristics of that product.	Define sustainable design's impacts on the environment and describe several sustainable design characteristics of that product.

10. Visual Design

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
List most of the visual elements and principles applicable to design.	List and explain all of the visual elements and principles applicable to design.	Assess how the use of a given element or principle of design can be added or changed to enhance a given design.
Identify obvious examples of the use of visual elements and principles in a given design or work.	Identify multiple instances of the use of visual elements and principles in a given design or work.	

11. Graphics Communication

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify the proper position and alignment of the three principal views in a drawing.	Identify the proper position and alignment of the faces of an object represented in both a three principal views drawing and pictorial representations of simple objects.	
Represent hidden and visible features in 2D representations.	Select the proper face of a simple object to use as the front view based on the rules for selection.	Select the proper face of complex objects with hidden features to use as the front view based on the rules for selection.
Differentiate 2D and pictorial views.	Identify and differentiate isometric, oblique, and perspective pictorial views. Produce isometric pictorial hand sketches of simple objects.	Produce isometric pictorial and three-point perspective hand sketches of complex objects.
	Interpret given section views. Interpret given auxiliary views. Describe the purpose of a section view. Describe the purpose of an auxiliary view.	Produce section views of complex objects.

12. Modeling and Graphics Concepts

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify the type of model used for given examples.	Identify and use each type of model when specified/directed.	Portray the same data in multiple types of models with fidelity.
Read and interpret flowcharts and 2D, 3D, graphical, and mathematical models.	Generate and interpret flowcharts and 2D, 3D, graphical, and mathematical models for simple situations/objects.	Generate and interpret flowcharts and 2D, 3D, and mathematical models for complex situations/objects.
Identify/name many simple and more complex 2D shapes.	Identify/name all simple and more complex 2D shapes and simple 3D shapes.	Identify/name all simple and complex 2D and 3D shapes.
Identify simple shapes contained in more complex shapes.	Identify simple shapes contained in complex shapes. Include faces at angles within orthogonal multi-view representations.	Identify and specify the relationships needed to assure proper face/feature relationships using CAD.
Identify relationships from proportionally drawn representations of object (multi-view orthogonal and pictorial representations).	Identify relationships (geometric constraints) needed to assure proper face/feature relationships.	Use all standard line types correctly and produce them in CAD in adherence to all applicable standards.
Identify/name most of the standard line types.	Use most of the standard line types correctly.	
Identify/name relationships (geometric constraints) of elements and features in a model.		

13. Incorporation of Design Values in Models

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the relationship (clearance, interference...) between common mating parts (e.g., nuts/bolts).	Describe the relationships (clearance, interference...) between mating parts (fits, clearances).	Describe the relationships (clearance, interference...) between mating parts (fits, clearances) and select/specify correct relationship values based on design requirements/function.

14. Hand Sketching/Pictorial Representations

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Produce hand sketches using grid or isometric paper as a guide.	Quickly produce hand sketches using grid or isometric paper as a guide from own ideas.	Quickly produce hand sketches of complex parts and assemblies from any source on plain, unlined paper. Use shading to enhance realism/understanding.
Represent gross detail in sketches. Sketches may need considerable oral explanation/clarification to be understood.	Represent geometric details in proportional sketches. Sketches may need some oral explanation/ clarification to be understood.	Represent geometric details in proportional sketches, and sketches generally will need no oral explanation/clarification to be understood.

15. Physical Properties Use in Design

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Distinguish the terms weight and mass although units are often confused.	Use appropriate units for weight and mass.	Calculate the surface area and volume of (or combinations of) 3D shapes (with hollows).
Define the term *physical property* and list some of them.	List many physical properties.	
Calculate areas of 2D objects, namely triangles, squares, and polygons of 8 sides or less.	Calculate surface area and volume of simple 3D solid shapes (uniform cross-section and spheres).	
	Use and convert appropriate physical property units in SI and US Customary systems.	

16. Mathematics as Definitions

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Enter numbers into a Microsoft® Excel® worksheet and cut, paste, and edit them as needed.	Enter numbers and simple formulas into an Excel worksheet and cut, paste, and edit them as needed.	Use Excel to find a trend line (mathematical model) to represent data without assistance.
	Use built-in Excel tools to represent data on a graph in an Excel worksheet.	

17. Computer Models

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Produce simple parts to size by sketching and extruding or extrude cutting simple 2D geometries/ sketches (additive and subtractive methods).	Produce more complex parts by extruding or extrude cutting more complex (filleted, angled line sets, polygons) 2D geometries/sketches. Sketch and add to existing surfaces on a part and/or make appropriate cuts to correctly represent drawn parts.	Develop efficient strategies for producing complex parts by extruding or extrude cutting more complex (filleted, angled line sets, polygons) 2D geometries/sketches using construction planes and projected geometries.
Export CAD models into drawing mode and dimension. Most dimensioning conforms to standard practices, but errors and omissions characterize the drawing.	Identify the most efficient modeling method by comparing two or more existing CAD models (and browser history).	Export CAD models into drawing environment and dimension after realigning model so that any face can be shown as front view. Most dimensioning conforms to standard practices with few errors and omissions.
Build assemblies and apply assembly constraints to align parts along flat surfaces and edges.	Edit and modify parts after creation based on new information.	Build assemblies and apply constraints to align parts along flat surfaces and edges; able to apply concentric and insert components as well as offset and angular constraints.
Identify forms created by rotating a 2D sketch about an axis.	Export CAD models into drawing environment and dimension. Most dimensioning conforms to standard practices with few errors and omissions.	
	Build assemblies and apply assembly constraints to align parts along flat surfaces and edges; able to apply concentric and insert components. Produce revolved shapes/features. Produce part drawings of simple objects with few errors or omissions.	Apply drive constraints and simulate motion.

18. Drawing Tolerances Influence on Acceptable Part Size, Manufacture

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Determine minimum and maximum allowable sizes from bilateral tolerances.	Distinguish location and size dimensions and tolerances. Identify and differentiate among limit dimensions, a unilateral tolerance, and a bilateral tolerance. Determine the specified dimension, tolerance, upper limit, and lower limit for a given dimension and related tolerance.	Determine the tolerance that must be specified to provide a given fit and allowance for a part or part feature.

19. Resolving Ethical Dilemmas in Engineering Design

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Define ethics, ethical dilemma, and most aspects of the engineering code of conduct described by the NSPE.	Define and identify less obvious ethical/unethical behaviors.	Define ethics, ethical dilemma, and identify subtle ethical/unethical situations and give possible solutions. Can outline every major aspect of the NSPE Code of Conduct.
Explain why the code of conduct is needed.		Identify ethical considerations in a given design and in their own design evaluations and modify their designs accordingly.
Identify ethical and unethical behaviors.	Give an example of an ethical dilemma.	Determine the ethical dilemma in simple or complex case studies.

20. Engineering Analysis/Advanced Features of CAD Systems

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Display the properties of a CAD model given a step-by-step tutorial.	Display the properties of a CAD model without instruction.	Perform assembly interference analysis of designed parts.
Observe the effect of material substitution/change on part/model properties given a step-by-step tutorial.	Reverse engineer a product (including a visual, functional, and limited structural analysis).	Modify parts based on information provided by CAD analysis functions.
	When offered alternatives, choose flat patterns (nets) that fold into specific 3D forms.	Design the flat blank for a desired final bent part shape given a step-by-step tutorial.

21. Multi-view Drawings

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Hand sketch multiview drawing of simple solid objects (no internal features) in proper orientation and alignment using grid or isometric paper as a guide to obtain scale. Draw the object using a specified face for the front view, although alignment of views and choice of front face may not be fully correct.	Hand sketch multiview drawing (three principal views) of simple objects of given dimensions with simple clearance holes in proper orientation and alignment using grid or isometric paper as a guide to obtain scale. May have minor errors in line type usage.	Hand sketch multiview drawing of complex objects with angled faces and transitional surfaces (curves and chamfers) and internal features (holes, slots, cutouts, shelled features) to scale on plain paper.
Dimension the visible features from given datum and properly specify on the drawing given size, location, and tolerance specifications. Dimensions should be evenly spaced with no omissions or redundant or crossing dimensions. May have errors in drawing and dimensioning hidden features/surfaces.	Properly select the face to be shown as the front view and align all views/features.	Represent rotated (axially symmetric) parts in two views with proper dimensioning as diameters when other radii features are provided on part.
Distinguish between size and location dimensions.	Dimension the features using chain or datum dimensioning (as required) and properly specify on the drawing given size, location, hole notes, and tolerance specifications according to standard dimensioning rules and guidelines. Proper use of center and hidden lines is expected.	Apply all necessary dimensions according to standard dimensioning rules in order to fully specify a part for manufacture.
Identify line types and their appropriate use in a technical drawing.	Identify and correct errors and omissions in technical drawings including line work, view selection, view orientation, and dimensioning.	

22. Mathematics Defines Relationships

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Evaluate a function (e.g., parametric equation) for an output value when given the corresponding input value with the aid of the teacher.	Evaluate a function (e.g., parametric equation) for an output value when given the corresponding input value.	Determine a function (e.g., parametric equation) that describes a non-linear relationship when given a written or verbal description or a set of input values and corresponding output values.
Determine slope and y- intercept for a given linear function.	Determine slope and y- intercept for a linear function representing a set of data when all data points fall on a line.	
Plot a linear function, given an equation, a set of points, or an intercept and a slope with the aid of the teacher.	Determine a function that describes a linear relationship when given a verbal or written description of the relationship or a set of input and output values.	
Solve linear equations when given a value for one of the variables.		
Solve a system of equations for unknowns by substitution (up to two equations and two unknowns) with the aid of the teacher.	Solve a system of equation for unknowns by substitution (up to two linear equations and two unknowns).	

23. Concepts of Geometry Critical to Engineering Design

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Distinguish the terms circumference, perimeter, and surface area of simple shapes and identify appropriate units in SI and U.S. Customary systems for each.	Determine circumference and perimeter of simple 2D shapes and use and convert appropriate units in SI and U.S. Customary systems.	Use geometric parameters in multi-step engineering calculations (for example, use paint/coating thickness, surface area, and cost/volume of coating to calculate the cost of coating to cover the object).
Define the term geometric constraint.	Identify geometric relationships/ constraints that are applied between sketched features/elements.	
Illustrate each geometric constraint (parallel, perpendicular, concentric, etc.).	Use geometric constraint terminology to describe the relationship between parts in an assembly.	

24. Concepts of Measurement

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Read a ruler and digital calipers to the nearest 1/8 inch consistently.	Read a ruler and dial caliper to the nearest 1/16 or .01 inch (smallest marking) consistently.	Determine measurements with confidence based on multiple sample readings taken on rectangular and cylindrical objects as well as objects of shape combinations and irregular shapes.
Measure rectangular objects accurately.	Measure cylindrical objects accurately.	Convert any combination of SI and English units to consistent units (e.g., mix of in./sec, ft/min to a common measure within same system and across systems in./sec, mm/min, etc.).
Read a weight scale accurately.	Convert SI and U.S. Customary units (one value expressed in one system to the other).	Correctly and consistently convert SI and U.S. Customary units for multi-step problems.
	Describe the accuracy of a set of measurement data in numerical terms (using a mean to calculate error). Correctly compare the accuracy and/or precision of sets of measurement data in general terms.	

25. Statistics

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Calculate an average for a set of data.	Calculate a mean, median, mode, and standard deviation for a set of data.	Explain what outliers are and what, if anything, they mean.
Calculate the range for a set of data.	Graphically represent a set of data using a histogram or dot plot to show form of distribution.	Identify anomalies from expected distribution form.
	Identify graphical characteristics of a normal distribution. Categorize a set of data as approximately normally distributed (or not) based on a histogram or dot plot.	

26. Why Use Teams?

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Enumerate the advantages of working in teams.	Enumerate the stages of team development.	Successfully complete a team-based project and provide reflection on the advantages the team approach provided.
Identify the disadvantages of working in teams.	Identify team norms and why they are important.	

27. Operating in a Team

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify methods for achieving consensus and skills needed for team success.	Identify good/bad behavior in other team members and execute some of the skill needed for individual and team success.	Define team goals, make assignments, set deadlines, and resolve team conflicts.
	Compose and disseminate relevant information to other team members in a clear and timely manner.	Organize and lead a design team to a successful project completion (meet all design requirements, on-time, on-budget, enhancing individual skill during project execution).
	Identify good leadership skills in others.	Determine the engineering discipline needed on the design team and the roles each engineering discipline must execute.

28. Virtual Teaming

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe a virtual design team and identify pros and cons that are inherent in a virtual team.		
Provide some information exchange, but shared information almost always needs clarification, explanation, or correction before it can be used by recipient.	Provide information exchange, but shared information often needs clarification, explanation, or correction before it can be used by recipient.	Consistently provide information exchange needing little if any clarification, explanation, or correction before it can be used by recipient.

29. Measuring Team Member Contributions

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Unable or unwilling to accurately distinguish good/bad behavior in self and other team members. Tends to understate real differences in performance to "keep everybody the same" or over/under values individual contribution beyond its real value to team.	Provide narrative descriptions that more accurately reflect the individuals' performance (but often unable to provide team member ratings that reflect the true differences in performance and contributions).	Provide accurate, detailed evidence of reasons for each rating, and the ratings accurately reflect the evidence.

4. EOC SCORE-TO-GRADE CONVERSION

PLTW recognizes that you may need to convert student EoC Assessment scores into class letter grades. Because grading policies vary among schools, we provide no set protocol nor specific examples for assigning letter grades to specific EoC scores. Most importantly, score conversion needs to follow your school's grading policy.

However, PLTW suggests that you consider the following if you convert EoC scores to letter grades.

- **Local grading policies** Your school or district may determine the policies regarding letter grades, score distributions, or what it means to be "passing". Follow your local grading policies when converting EoC scores to classroom grades.
- **PLTW National average** If you use EoC scores as the basis for classroom grades, think of it like grading on a curve. Typically, when grading on a curve, the average score is the basis for setting the grading scale. Consider the national average EoC score of 5 when you convert EoC scores to your own grading scale.
- **PLTW National EoC norms** The process of Standard Setting used a nationally representative sample of students who took the PLTW IED EoC Assessment, referred to as the "2014 EoC norms". Consider the distribution of scores in the norming group when you complete your EoC score-to-grade conversion. You can use the information in the following table to compare performance of a student against the 2014 norms.

Percent of Students per IED EoC Score from 2014 Norms

Achievement Indicator	Basic			Proficient				Advanced	
Achievement Level Description The student demonstrates:	... minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.			... competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understandings.				... comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.	
EoC Score	1	2	3	4	5*	6	7	8	9
Students at score (%)	7%	12%	16%	17%	12%	10%	8%	13%	5%
Students at or below score (%)	7%	19%	35%	52%	64%	74%	82%	95%	100%

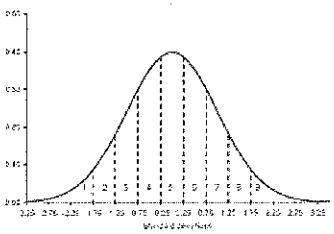
* 5 is the PLTW national average EoC score.

The percentages of students who performed at or below each score provide a reference for how a student performed relative to other students included in the 2014 norming group. For example, if a student received a score of 6 on the IED EoC Assessment, then that student scored as well as or better than 74% of students in the 2014 norms.

What percent of students test high enough to earn college credit?

College Credit rates 6= credit University of New Haven

Stanine Score, bell curnve, all test takers rated, 1= lowest 9= highest, 5 = national average



These years not certified, so no students were eligible

	POE 16-7	CEA 16-17	IED 16-7	POE 15-16	IED 15-16	DE 15-16	CEA 15-16	POE 14-15	IED 14-15	CEA 14-15	IED 13-14	POE 13-14	IED 12-13
6+	21	7	11	30	27	7	6	23	33	6	34	25	36
Total	43	16	66	55	76	21	14	42	57	15	56	45	56
% eligible	49%	44%	17%	55%	36%	33%	43%	55%	58%	40%	61%	56%	64%

all classes	6+	266
	total	562
		47.33%

PROJECT LEAD THE WAY
PLTW

END-OF-COURSE ASSESSMENT SCORE INTERPRETATION GUIDE

for November 1, 2017 through June 30, 2018
DE EoC Test Administration

CONTENTS

August 2017 Edition

1. INTRODUCTION

The *PLTW End-of-Course Score Interpretation Guide* is a course-specific supplement to the *PLTW End-of-Course Assessment Administration Manual*.

- This section provides Project Lead The Way policy for appropriate and inappropriate uses of End-of-Course (EoC) Scores.
- Section 2 includes information about how to interpret student EoC scores in general and for the 2017–18 Digital Electronics (DE) course specifically.
- Section 3 provides the complete Achievement Level Descriptions that are aligned to the EoC scores for DE.
- The last section provides guidance for those who need to use EoC scores as part of class grading.

PLTW End-of-Course Assessment Purpose

The purpose of the End-of-Course Assessment is to *understand a student's overall achievement* at the end of a PLTW course.

Use of PLTW EoC Scores

PLTW is mindful of the impact testing has on students and schools. To assist users of the scores with the most fair and proper use of the data and to ensure the scores are used for their intended purpose, this section addresses appropriate and inappropriate uses of PLTW EoC scores.

PLTW encourages using multiple indicators of success when making important decisions regarding a student, school, or program. Other sources of data include prior grades in different courses, scores on other standardized assessments, and teacher recommendations.

Note If PLTW EoC scores are used for purposes other than the appropriate uses listed in this guide, the user is responsible for validating the use of the EoC Assessment for that purpose.

Appropriate uses of EoC scores

The following are PLTW-approved uses of scores from the EoC Assessment.

- **Classroom grades** Though not required, a teacher may choose to include an EoC score as part of a classroom grade. There is no set protocol for assigning letter grades to specific EoC scores. Most importantly, score conversion needs to follow your school's grading policy. For more information, see EoC Score-to-Grade Conversion on page 15.
- **Program monitoring** PLTW uses student performance and assessment item response data to inform curriculum changes, as well as to monitor student performance. Schools and districts may also use student performance data to monitor their PLTW programs.

PLTW encourages using multiple indicators of success when making important decisions regarding a student, school, or program.

- **State educational purposes** A state may use EoC scores as a way to monitor student achievement and completion in educational programs.
- **Student recognition** PLTW EoC scores can be used for recognition at many levels as determined and validated by the user. The criteria for student recognition vary depending on the institution or organization.
  - Students may receive AP + PLTW recognition. For more information, see https://www.pltw.org/our-programs/ap-pltw
  - PLTW does not recommend a specific EoC score to use for student recognition at the local level. However, schools can provide their own type of recognition, such as awards to students in a particular program, students who attain a certain EoC score, or graduating seniors during commencement.
  - Many affiliate universities, colleges, community colleges, and partners award scholarships, credentials, preferential admissions, and/or college credit for completion of PLTW courses. For more information, see https://www.pltw.org/experience-pltw/student-opportunities
- **Summative overview of student performance** EoC scores are a general overview of student achievement in the PLTW course, as indicated by this nationally administered, objective assessment. PLTW EoC Assessments are only one measure of a student's achievement.

Validation and use of PLTW EoC scores for any other purpose is the responsibility of the user.

Inappropriate uses of EoC scores

The following are **not** appropriate uses of PLTW EoC Assessment scores.

- **Making decisions about a student, school, or program** PLTW does not recommend measuring the effectiveness of a school or program based entirely on EoC scores. PLTW encourages using multiple indicators of success when making important decisions regarding a student, school, or program. Other sources of data include prior grades in different courses, scores on other standardized assessments, and teacher recommendations.
- **Prediction of college success** PLTW EoC scores have not been validated as a measure of a student's potential success in college.
- **Teacher evaluations** PLTW EoC scores have not been validated for use as measures of teacher effectiveness.

Other uses

If PLTW EoC scores are used for purposes other than the appropriate uses listed in Section 1, it is the user's responsibility to validate the use of the EoC scores for that purpose.

2. EOC SCORE INTERPRETATION

PLTW EoC score interpretations are *criterion-referenced,* which means that you can interpret a student's EoC score to be a reflection of his or her understanding of the curriculum content *standards*. Criterion-referenced interpretation is *not* to be confused with a system that measures learning relative to the performance of other students, such as percentile ranks. To the contrary, each school year, there is no limit to the number of students who can receive any particular score on a PLTW EoC Assessment.

Standard Setting Process

To better understand the criterion-referenced nature of PLTW EoC scores, it is helpful to know how EoC scores are derived. PLTW EoC scores are derived through the process of *standard setting*, which sets the cut scores for a test.

- In the first phase of standard setting, operational definitions of each achievement level, called Achievement Level Descriptions (ALDs), are developed. See the next section, Achievement Level Descriptions.
- Then the ALDs are used to identify the cut scores, which differentiate students between achievement levels of Basic, Proficient, and Advanced.

The PLTW Standard Setting process helps ensure that the information provided by EoC scores is meaningful and based on high-quality, nationally representative data and systematic, defensible procedures. In other words, our Standard Setting process determines how much knowledge a student must demonstrate on the EoC to achieve the performance level of Basic, Proficient, or Advanced.

After a student completes an EoC Assessment, they receive their EoC score along with the corresponding achievement level indicator (Basic, Proficient, or Advanced), which represents the full achievement level description.

Achievement Level Descriptions

ALDs are statements of what students should know and be able to do in a PLTW classroom. Specifically, the ALDs describe the technical skills and knowledge covered in the curriculum and on the EoC Assessment. ALDs complement curriculum materials and can be used by teachers and students to better understand student performance and expectations. Teachers can also use ALDs to understand how their students performed on the EoC Assessment.

The Basic, Proficient, and Advanced achievement level descriptions each provide a broad assessment of student performance. Each level builds toward the next level. For example, a student who demonstrates an Advanced level of understanding for a particular concept also demonstrates related understandings in the Basic and Proficient levels for that concept.

The three levels of student knowledge and performance are defined in the following broad terms:

Note Achievement level indicators are referred to as "Achievement Indicator" in myPLTW.

Achievement Level Descriptions

Achievement Indicator	The Student Demonstrates...
Basic	... minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.
Proficient	... competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understandings.
Advanced	... comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.

For a full explanation of what each achievement level represents for the Digital Electronics course, see Achievement Level Descriptions for DE on page 5.

Score Interpretation Guidelines

Because the interpretation of PLTW EoC Assessment scores is criterion-referenced, each student has the opportunity to earn the highest score.

EoC scores are reported on a number scale of 1 through 9. Each score is tied to one of the EoC achievement indicators. The scores gain their meaning from the ALD interpretation of what a student should know and be able to do as demonstrated on the EoC.

The following table shows how the EoC scores align with the EoC achievement level indicators. The national average score on any PLTW EoC Assessment is 5.

Achievement Level Descriptions with Scores

Achievement Indicator	Basic			Proficient			Advanced	
Achievement Level Description The student demonstrates:	... minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.			... competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understandings.			... comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.	
EoC Score	1	2	3	4	5	6	7	8	9

Note PLTW works with schools to determine whether irregular testing practices took place during an EoC administration and whether a score should be invalidated. (See the *EoC Assessment Administration Manual* for more information.) Student scores that are invalidated will not display on myPLTW, and the Achievement Indicator will show "Invalidated Score".

3. ACHIEVEMENT LEVEL DESCRIPTIONS FOR DE

The tables in this section show the specific ALDs for the PLTW Digital Electronics (DE) course. The ALDs are divided into the 29 concept areas or themes that are covered in the course.

ALDs by Concept

Note In the following tables, assume that each higher level of achievement includes the prior level(s).

1. Design Processes in Circuit Creation

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Recall steps of the design process and work through some of the steps.	Implement the design process to design a circuit when guided.	Implement the design process to design a circuit.

2. Safety in the Electronics Classroom

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Recall appropriate safety procedures in the electronics classroom.	Demonstrate appropriate safety procedures with instructor guidance in the electronics classroom.	Consistently demonstrate and apply appropriate safety procedures.

3. Soldering Skills in the Electronics Classroom

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Solder and de-solder components to printed circuit boards, but require instructor assistance in identifying bad solder joints.	Solder and de-solder components to printed circuit boards with minimal need for troubleshooting by student and minimal assistance from instructor.	Solder and de-solder components to printed circuit boards with minimal need for troubleshooting and no assistance from instructor.

4. Scientific and Engineering Notation

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Convert numbers with the proper notation and minimal errors.	Convert numbers and solve calculations with the proper notation and minimal errors.	Solve complex calculations using appropriate notation.

5. Number Systems

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Convert values between binary number and decimal systems. Convert values between binary number and decimal systems and hexadecimal number systems.	Describe the mathematical process for number conversions.	Systematically use mathematical processes to convert any value between any number systems.

6. Circuit Theory Laws

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Distinguish between a series and parallel circuit.	Calculate the equivalent resistance for a series or parallel circuit.	Calculate the equivalent resistance for a series or parallel circuit and determine the voltage, current, and/or resistance for components in a series or parallel circuit.
Calculate the relationship between voltage, current, and resistance using Ohm's Law.	Determine the voltage, current, and/or resistance for components in a series or parallel circuit.	Design a circuit to meet voltage, current, or resistance design requirements based on available components.

7. Analog and Digital Signals

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Distinguish between analog and digital signals.	Capture analog and digital signals and characterize the frequency and period of a signal.	
Identify the parts of a waveform.	Calculate the parts of a waveform.	Select components in a design to produce a desired waveform.

8. Combinational Logic Designs

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify the steps of the combinational logic design process.	Identify where in the combinational logic design process a student is and determine next steps.	Implement the best combinational logic circuit design and provide evidence that a design process was used.

9. Logic Gates

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify a logic gate by its symbol and describe the outputs associated with AND, OR, INVERTER logic gates.	Identify a logic gate by its symbol and describe the outputs associated with NAND, NOR, XOR, XNOR logic gates.	Apply knowledge of logic gates to select the appropriate gate for the circuit design.

10. Truth Tables

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify a logic gate by the truth table outputs. Identify truth table outputs by the logic gates symbol. Create a truth table based on design requirements or written expression of a circuit. Derive a logic expression from a truth table. Create a truth table based on analysis of an existing circuit.	Design and implement a circuit design from a truth table.	Troubleshoot the design of a circuit by analysis of the circuit and comparison to the truth table.

11. Logic Expressions

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Derive an un-simplified logic expression from a truth table. Derive an un-simplified logic expression from analysis of a circuit's design. Identify and contrast a sum of product expression from a product of sum expression.	Convert an un-simplified logic expression between sum of product expressions and product of sum expressions.	Translate circuit designs, truth tables, and design requirements into logic expressions. Implement a circuit design and troubleshoot existing circuits based on logic expressions.

12. Circuit Simplification: Boolean Algebra and DeMorgan's Theorems

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Apply Boolean algebra theorems and DeMorgan's theorems to simplify mathematical expressions.	Recognize and interpret how Boolean algebra theorems and DeMorgan's theorems simplify a circuit to fewer required components.	Apply Boolean algebra theorems and DeMorgan's theorems to simplify circuit implementations during the design phase of a circuit. Demonstrate that a circuit is in its simplest and most efficient design through application of Boolean algebra theorems and DeMorgan's theorems.

13. Circuit Simplification: Karnaugh Mapping

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Construct a Karnaugh Map and relate it to a truth table. Simplify a logic expression graphically using the Karnaugh Mapping process.	Simplify a logic expression graphically using the Karnaugh Mapping process and defend that the expression is in fact in the simplest form.	Simplify a logic expression graphically using the Karnaugh Mapping process with the inclusion of "don't care" conditions and defend that the expression is in fact in the simplest form.

14. Universal Gate Implementation: NAND/NOR

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the benefit of translating AOI logic designs into NAND only or NOR only designs. Describe the relationship between NAND gates and AND gates. Describe the relationship between NOR gates and OR gates. Translate AOI logic designs into NAND only or NOR only designs.	Translate AOI logic designs into NAND only or NOR only designs and defend that the circuit is in its simplest form.	Determine when NAND only or NOR only implementations are the most efficient design and implement effectively into a circuit.

15. Seven-Segment Displays

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Distinguish between a common cathode and common anode seven-segment display. Describe the design of a seven-segment display and identify the seven segments used to create values on the display.	Effectively implement a seven-segment display into a circuit design.	Effectively implement a seven-segment display into a circuit design utilizing seven segment display drivers. Determine when a common cathode or common anode seven-segment display may perform better in a particular circuit design.

16. Binary Addition and Subtraction

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Add numbers in binary. Subtract numbers in binary.	Describe two's complement arithmetic process. Describe the sign convention (sign bit) used to identify negative binary numbers.	Describe two's complement arithmetic process and relate the process to decimal number systems without the use of negative numbers.

17. Binary Adders and Subtractors

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Distinguish between a half adder and full adder. Use an adder/subtractor circuit to verify binary addition or subtraction hand calculations.	Create an adder/subtractor circuit.	Describe the design of an adder/subtractor circuit related to the carry out and use of XOR gates.

18. Exclusive Logic Gates: XOR and XNOR

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the relationship between OR gates and XOR gates. Describe the relationship between NOR gates and XNOR gates.	Simplify circuits with the use of XOR/XNOR gates.	Describe the function of XOR/XNOR gates in a circuit design.

19. Sequential Logic Designs

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Differentiate sequential logic design from combinational logic design. Describe the structure and function of a sequential logic design in a digital circuit. Differentiate between Small Scale Integration (SSI) and Medium Scale Integration (MSI) designs.	Manipulate a sequential logic circuit to produce a desired output.	Design a sequential circuit based on specific design constraints.

20. Clock Signals and Timing Diagrams

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the function of a clock signal in a digital circuit. Describe level triggered or edge triggered event.	Interpret when changes in input and output events will occur on a timing diagram.	Validate circuit design through measurement using a probe/ oscilloscope and analysis of timing diagram.
Describe the function of a 555 timer circuit.	Describe the role of resistors and capacitors in controlling the frequency of a clock signal in a 555 timer design.	Design a desired frequency of a clock signal in a 555 timer design.

21. Flip-Flops

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the structure and function of D Flip-Flips and J/K Flip-Flops. Describe how flip-flop outputs, when linked together, translate into binary counts. Identify when a flip-flop is activated by a leading edge or trailing edge clock signal.	Manipulate a sequential logic circuit to produce a desired output.	Design a sequential logic circuit to produce a desired output.

22. Flip-Flop Applications

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the use of flip-flops in common sequential logic designs, such as counters, event detectors, and shift registers.	Manipulate flip-flops in common sequential logic designs, such as counters, event detectors, and shift registers.	Design common sequential logic circuits such as counters, event detectors, and shift registers using flip-flops based on given design requirements.

23. Asynchronous Counters

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the relationship of the clock signal in an asynchronous design. Differentiate between Small Scale Integration (SSI) and Medium Scale Integration (MSI) designs. Identify whether a circuit is counting up or counting down. Identify where a count range starts and stops/resets.	Identify specific commonly used Medium Scale Integration (MSI) ICs. Identify whether a circuit is counting up or counting down using specific, commonly used, Medium Scale Integration ICs. Identify where a count range starts and stops/resets using specific, commonly used, Medium Scale Integration ICs.	Design asynchronous counter circuits based on specific design requirements using SSI and/or MSI to count up/down, hold/rest, and start/stop counts according to any desired range.

24. Synchronous Counters

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the relationship of the clock signal in a synchronous design. Differentiate between small-scale integration (SSI) and medium-scale integration (MSI) designs.	Identify specific commonly used Medium Scale Integration (MSI) ICs.	Design synchronous counter circuits based on specific design requirements using SSI and/or MSI to count up/down, hold/rest, and start/stop counts according to any desired range.
Identify whether a circuit is counting up or counting down.	Identify whether a circuit is counting up or counting down using specific, commonly used, Medium Scale Integration ICs.	

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify where a count range starts and stops/resets/holds.	Identify where a count range starts and stops/resets using specific, commonly used, Medium Scale Integration ICs.	

25. State Machines

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify and describe the characteristics of a state machine. Interpret a state graph. Interpret a transition table. Translate a state graph into a state transition table. Identify the relationship between a state graph, transition table, and final design of a state machine circuit.	Manipulate a state graph, transition table, or final design of a state machine circuit to meet a specific design requirement.	Design a state machine based on specific design requirements including a state graph and transition table to communicate the design.

26. Motor Control with Digital Design

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify the role of an H-bridge in a circuit design requiring motor voltages other than logic voltages.		Design a circuit with motors as outputs that operate at different voltage levels than the logic voltage levels.
Describe the role of a voltage divider to create a 3.3V source from a 5V source.	Manipulate a voltage divider to create a desired voltage source from a 5V source.	
Describe how Pulse Width Modulation PWM is used to control a servo's speed and direction.	Manipulate Pulse Width Modulation to control a servo's speed and direction.	

27. Progression of Advances in Digital Technology

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify advancements in digital electronics technology from the invention of the transistor, to the logic gate, to integrated circuits, to programmable logic devices, to microcontrollers.	Describe the relationships between transistors, logic gates, integrated circuits, programmable logic devices, and microcontrollers.	Select and apply the most appropriate technology for circuit implementation based on specific design requirements.

28. Programming Syntax Related Microcontrollers

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Define the roles of variables, setup functions, and loop functions.	Manipulate variables, setup functions, and loop functions to produce a desired result.	Create a program to manage inputs and outputs of a microcontroller.

29. Progression of Advances in Digital Circuit Design

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify advancements in digital electronics design from Boolean simplification, to K-Mapping, to PLD design, to microcontroller design.	Distinguish the most appropriate design method for circuit implementation between two design options or approaches.	Select and apply the most appropriate design method for circuit implementation based on specific design requirements.

4. EOC SCORE-TO-GRADE CONVERSION

PLTW recognizes that you may need to convert student EoC Assessment scores into class letter grades. Because grading policies vary among schools, we provide no set protocol nor specific examples for assigning letter grades to specific EoC scores. Most importantly, score conversion needs to follow your school's grading policy.

However, PLTW suggests that you consider the following if you convert EoC scores to letter grades.

- **Local grading policies** Your school or district may determine the policies regarding letter grades, score distributions, or what it means to be "passing". Follow your local grading policies when converting EoC scores to classroom grades.
- **PLTW National average** If you use EoC scores as the basis for classroom grades, think of it like grading on a curve. Typically, when grading on a curve, the average score is the basis for setting the grading scale. Consider the national average EoC score of 5 when you convert EoC scores to your own grading scale.
- **PLTW National EoC norms** The process of Standard Setting used a nationally representative sample of students who took the PLTW DE EoC Assessment, referred to as the "2014 EoC norms". Consider the distribution of scores in the norming group when you complete your EoC score-to-grade conversion. You can use the information in the following table to compare performance of a student against the 2014 norms.

Percent of Students per DE EoC Score from 2014 Norms

Achievement Indicator	Basic			Proficient				Advanced	
Achievement Level Description The student demonstrates:	... minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.			... competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understanding.				... comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.	
EoC Score	1	2	3	4	5*	6	7	8	9
Students at score (%)	12%	9%	15%	13%	14%	7%	10%	16%	4%
Students at or below score (%)	12%	21%	36%	49%	63%	70%	80%	96%	100%

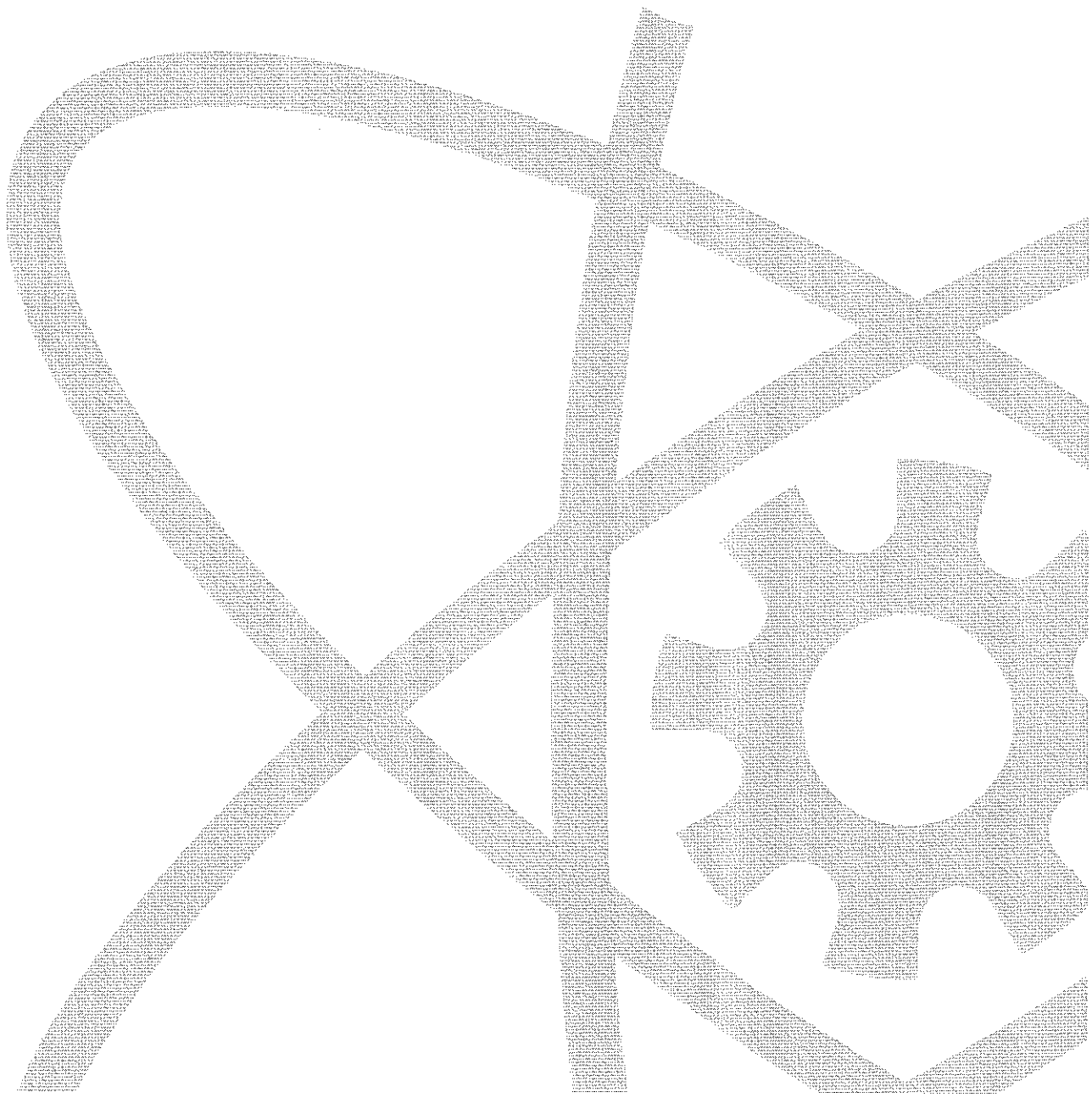
* 5 is the PLTW national average EoC score.

The percentages of students who performed at or below each score provide a reference for how a student performed relative to other students included in the 2014 norming group. For example, if a student received a score of 6 on the DE EoC Assessment, then that student scored as well as or better than 70% of students in the 2014 norms.

PROJECT LEAD THE WAY
PLTW

END-OF-COURSE ASSESSMENT SCORE INTERPRETATION GUIDE

for November 1, 2017 through June 30, 2018
CEA EoC Test Administration



CONTENTS

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1. INTRODUCTION

The *PLTW End-of-Course Score Interpretation Guide* is a course-specific supplement to the *PLTW End-of-Course Assessment Administration Manual*.

- This section provides Project Lead The Way policy for appropriate and inappropriate uses of End-of-Course (EoC) Scores.
- Section 2 includes information about how to interpret student EoC scores in general and for the 2017–18 Civil Engineering and Architecture (CEA) course specifically.
- Section 3 provides the complete Achievement Level Descriptions that are aligned to the EoC scores for CEA.
- The last section provides guidance for those who need to use EoC scores as part of class grading.

PLTW End-of-Course Assessment Purpose

The purpose of the End-of-Course Assessment is to *understand a student's overall achievement* at the end of a PLTW course.

Use of PLTW EoC Scores

PLTW is mindful of the impact testing has on students and schools. To assist users of the scores with the most fair and proper use of the data and to ensure the scores are used for their intended purpose, this section addresses appropriate and inappropriate uses of PLTW EoC scores.

PLTW encourages using multiple indicators of success when making important decisions regarding a student, school, or program. Other sources of data include prior grades in different courses, scores on other standardized assessments, and teacher recommendations.

Note If PLTW EoC scores are used for purposes other than the appropriate uses listed in this guide, the user is responsible for validating the use of the EoC Assessment for that purpose.

Appropriate uses of EoC scores

The following are PLTW-approved uses of scores from the EoC Assessment.

- Classroom grades Though not required, a teacher may choose to include an EoC score as part of a classroom grade. There is no set protocol for assigning letter grades to specific EoC scores. Most importantly, score conversion needs to follow your school's grading policy. For more information, see EoC Score-to-Grade Conversion on page 18.
- Program monitoring PLTW uses student performance and assessment item response data to inform curriculum changes, as well as to monitor student performance. Schools and districts may also use student performance data to monitor their PLTW programs.

PLTW encourages using multiple indicators of success when making important decisions regarding a student, school, or program.

- **State educational purposes** A state may use EoC scores as a way to monitor student achievement and completion in educational programs.
- **Student recognition** PLTW EoC scores can be used for recognition at many levels as determined and validated by the user. The criteria for student recognition vary depending on the institution or organization.
  - Students may receive AP + PLTW recognition. For more information, see https://www.pltw.org/our-programs/ap-pltw
  - PLTW does not recommend a specific EoC score to use for student recognition at the local level. However, schools can provide their own type of recognition, such as awards to students in a particular program, students who attain a certain EoC score, or graduating seniors during commencement.
  - Many affiliate universities, colleges, community colleges, and partners award scholarships, credentials, preferential admissions, and/or college credit for completion of PLTW courses. For more information, see https://www.pltw.org/experience-pltw/student-opportunities
- **Summative overview of student performance** EoC scores are a general overview of student achievement in the PLTW course, as indicated by this nationally administered, objective assessment. PLTW EoC Assessments are only one measure of a student's achievement.

Validation and use of PLTW EoC scores for any other purpose is the responsibility of the user.

Inappropriate uses of EoC scores

The following are **not** appropriate uses of PLTW EoC Assessment scores.

- **Making decisions about a student, school, or program** PLTW does not recommend measuring the effectiveness of a school or program based entirely on EoC scores. PLTW encourages using multiple indicators of success when making important decisions regarding a student, school, or program. Other sources of data include prior grades in different courses, scores on other standardized assessments, and teacher recommendations.
- **Prediction of college success** PLTW EoC scores have not been validated as a measure of a student's potential success in college.
- **Teacher evaluations** PLTW EoC scores have not been validated for use as measures of teacher effectiveness.

Other uses

If PLTW EoC scores are used for purposes other than the appropriate uses listed in Section 1, it is the user's responsibility to validate the use of the EoC scores for that purpose.

2. EOC SCORE INTERPRETATION

PLTW EoC score interpretations are *criterion-referenced*, which means that you can interpret a student's EoC score to be a reflection of his or her understanding of the curriculum content *standards*. Criterion-referenced interpretation is *not* to be confused with a system that measures learning relative to the performance of other students, such as percentile ranks. To the contrary, each school year, there is no limit to the number of students who can receive any particular score on a PLTW EoC Assessment.

Standard Setting Process

To better understand the criterion-referenced nature of PLTW EoC scores, it is helpful to know how EoC scores are derived. PLTW EoC scores are derived through the process of *standard setting*, which sets the cut scores for a test.

- In the first phase of standard setting, operational definitions of each achievement level, called Achievement Level Descriptions (ALDs), are developed. See the next section, Achievement Level Descriptions.
- Then the ALDs are used to identify the cut scores, which differentiate students between achievement levels of Basic, Proficient, and Advanced.

The PLTW Standard Setting process helps ensure that the information provided by EoC scores is meaningful and based on high-quality, nationally representative data and systematic, defensible procedures. In other words, our Standard Setting process determines how much knowledge a student must demonstrate on the EoC to achieve the performance level of Basic, Proficient, or Advanced.

After a student completes an EoC Assessment, they receive their EoC score along with the corresponding achievement level indicator (Basic, Proficient, or Advanced), which represents the full achievement level description.

Achievement Level Descriptions

ALDs are statements of what students should know and be able to do in a PLTW classroom. Specifically, the ALDs describe the technical skills and knowledge covered in the curriculum and on the EoC Assessment. ALDs complement curriculum materials and can be used by teachers and students to better understand student performance and expectations. Teachers can also use ALDs to understand how their students performed on the EoC Assessment.

The Basic, Proficient, and Advanced achievement level descriptions each provide a broad assessment of student performance. Each level builds toward the next level. For example, a student who demonstrates an Advanced level of understanding for a particular concept also demonstrates related understandings in the Basic and Proficient levels for that concept.

The three levels of student knowledge and performance are defined in the following broad terms:

Note Achievement level indicators are referred to as "Achievement Indicator" in myPLTW.

Achievement Level Descriptions

Achievement Indicator	The Student Demonstrates...
Basic	... minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.
Proficient	... competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understandings.
Advanced	... comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.

For a full explanation of what each achievement level represents for the Civil Engineering and Architecture course, see Achievement Level Descriptions for CEA on page 5.

Score Interpretation Guidelines

Because the interpretation of PLTW EoC Assessment scores is criterion-referenced, each student has the opportunity to earn the highest score.

EoC scores are reported on a number scale of 1 through 9. Each score is tied to one of the EoC achievement indicators. The scores gain their meaning from the ALD interpretation of what a student should know and be able to do as demonstrated on the EoC.

The following table shows how the EoC scores align with the EoC achievement level indicators. The national average score on any PLTW EoC Assessment is 5.

Achievement Level Descriptions with Scores

Achievement Indicator	Basic			Proficient			Advanced	
Achievement Level Description The student demonstrates:	... minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.			... competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understandings.			... comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.	
EoC Score	1	2	3	4	5	6	7	8	9

Note PLTW works with schools to determine whether irregular testing practices took place during an EoC administration and whether a score should be invalidated. (See the *EoC Assessment Administration Manual* for more information.) Student scores that are invalidated will not display on myPLTW, and the Achievement Indicator will show "Invalidated Score".

3. ACHIEVEMENT LEVEL DESCRIPTIONS FOR CEA

The tables in this section show the specific ALDs for the PLTW Civil Engineering and Architecture (CEA) course. The ALDs are divided into the 23 concept areas or themes that are covered in the course.

ALDs by Concept

Note In the following tables, assume that each higher level of achievement includes the prior level(s).

1. Design Principles and Elements

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
List some elements and principles of design.	Describe all design elements and principles of design.	Critique the use of design elements and principles in a given object (work of art, building/landscape design, product design) and their impact on the aesthetics, form, function, and appropriateness of design (for example related to the surrounding structures, environment, location, etc.).
Identify the use of some of the elements and principles of design in a given object chosen from variety of mediums (works of art, architecture, product design).	Identify and describe the use of a specific element or principle of design in a given object chosen from a variety of mediums (works of art, architecture, product design).	
	Create a representation that applies some of the design elements and principles and effectively describes how the element(s) and principle(s) of design are reflected.	Create a design that accurately incorporates any particular or all of the design elements and principles.
		Communicate the intent of the use of a particular element or principle of design in a design project.

2. Teamwork/Collaboration/Project Management (Professionalism)

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Communicate the essential nature of collaboration in CEA building design and among a variety of professionals.	Enumerate many of the variety of professions involved in site development and the design and construction of buildings.	
	Participate on a design team. Identify barriers to successful team interactions. Establish appropriate team norms.	Successfully function on an effective design team. Propose ideas to improve team effectiveness and efficiency.
	Express the importance of time management to the success of a building design and construction project.	
	Identify a Gantt Chart as a method of project management and scheduling.	Develop an appropriate Gantt chart to aid project management.

3. Career Paths (CE and Arch) (Professionalism)

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify professional responsibilities related to architecture.	Identify some of the sub-disciplines related to civil engineering and architecture.	Research and analyze broadly available information to identify specific educational and professional requirements related to civil engineering or architectural careers.
Identify professional responsibilities related to civil engineering.	Describe (or portray) the responsibilities of some of the sub-disciplines of civil engineering/ architecture that characterize the distinction among the sub-disciplines.	
Identify some personal/professional skills needed to successfully perform the job of an architect or civil engineer.	Identify several personal/professional skills needed to successfully perform the job of an architect or civil engineer.	Differentiate the skill sets required to successfully perform careers in civil engineering and architecture.
	Identify some basic educational and professional requirements that must be met to become a professional civil engineer or architect (college degree in the discipline, acceptable performance on professional exams, professional experience).	

4. Development of Civil Engineering and Architecture and Impacts

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Communicate the fact that history has impacted civil engineering and architecture.	Explain the impact of scientific discovery on civil engineering and architecture.	Connect the knowledge of historical development to individual design of civil engineering and architectural projects.
Present (on a limited basis) the evolution of architecture and civil engineering through history.	Identify the evolution of civil engineering and architecture as a result of some factors (e.g., material availability, environment, society, and culture).	
Acknowledge that a wide variety of architectural styles exist and are characterized by a variety of features that distinguish the styles from each other.	Identify some architectural features that may be used to help identify the architectural style of a building (e.g., column design, roof style, building materials). Identify the architectural style of a building (that can be clearly classified) from a list of style descriptions.	

5. Residential Construction

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Match a list of construction components for a typical wood-framed residential structure to the correct representation in an architectural drawing or image.	Given a drawing representation or image of a typical wood-framed residential structure, identify the typical components of the wall, roof, and foundation systems.	Create a typical residential section view, identify the typical components of residential wall, roof, and foundation systems.
	Given an image of a building, identify the roof style used. Identify an appropriate roof slope for a given environmental application.	Choose and defend a roof design for a specific residential application based on environmental factors, code requirements, and economic considerations.
	Identify unique criteria for a building project.	
	With guidance, design a residential structure that mostly adheres to a set of basic building guidelines.	With limited guidance, design a residential structure that reflects a set of basic building guidelines (such as those for the affordable home).

6. Commercial Construction

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Match a list of commercial construction wall systems to the correct representation in an architectural drawing.	Identify typical wall constructions that can or cannot be used as load bearing.	Find applicable code requirements based on building metrics.
Differentiate between residential and commercial roofing treatments. Articulate the purpose of a load bearing wall.	Given appropriate building codes resources, identify the design live loads for a specific building application.	Apply complex code requirements (provided) to the design of a building.
State the purpose of building codes and ordinances.	Articulate that multiple codes and ordinances influence the design and construction of a building. Identify and apply some simple code requirements to building design given necessary code resources.	Create a building design that meets identified code and ordinance requirements.
	Identify the appropriateness of a roofing system based on roof slope and use.	Discuss the viability of a commercial project based upon whether the project is legal, physically possible, financially feasible, and desirable for the community.
	With guidance, use zoning ordinances to identify specific regulations related to the development of a site.	

7. Universal Design

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the goals of universal design.	List some common universal design characteristics or features.	Review and critique a building design for compliance with universal design principles and guidelines.
	Incorporate universal design features in a building design.	Implement recommended changes resulting from a critique of universal design principles and guidelines.

8. Sustainable Design/Green Building

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Define sustainable design.	Describe the impact of sustainable and/or green design. List examples of sustainable design practices (including low-impact site design).	Review and critique a building design for compliance with sustainable design principles and guidelines.
	Incorporate sustainable design features in a building/site design. Identify general ways in which the energy efficiency of a building can be improved.	Implement recommended changes resulting from a critique of sustainable design principles and guidelines.

9. Basic Computation Skills

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Choose the appropriate formula from the formula sheet for the given problem.	Identify the appropriate values to use in the formula for the defined variables.	Adjust values given in a problem to improve a design.
Identify appropriate units for length, area, and volume (e.g., volume requires a length cubed; area requires a length squared).		
Manipulate a formula to solve for any variable in the formula with teacher prompts.	Frequently manipulate a formula to correctly solve for any variable in the formula. Correctly substitute and solve a formula for any value.	
	Identify appropriate units for flow and appropriate units for pressure. Correctly convert between units using a single conversion factor. Correctly use a calculator to evaluate complicated CEA formula (i.e., use correct order of operation, correct calculator keys, etc.)	

10. Quantity Takeoff/Cost Estimate

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Calculate area/volume related to the quantity of given simple material or component given a description of the component (e.g., calculate the volume of concrete necessary to construct a slab, calculate the area of plywood sheathing needed to cover a wall).		
List the materials (or identify missing materials not included) that need to be included in a cost estimate for an architectural component (foundation/ wall/roof) given a simple drawing of the component. Does not include calculating quantity.	Determine the quantity of a given building component, based on construction drawings, by performing a multi-step calculation of surface area or volume. Given the appropriate quantities, use the unit cost of materials to calculate the cost of a given component or system.	Identify the most economical configuration of building components (i.e., rebar, etc.).
	With guidance, complete a cost estimate of a basic building.	Without guidance, estimate the cost of a simple specific building project component (such as a roof system or foundation system) based on project drawings.

11. Heat Loss/Gain

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the basic process of heat loss/gain.		Given a specified wall design, identify specific changes needed to reduce heat loss/gain to a specified level.
Communicate the relationship between R-value and U-factor.	Often correctly calculate the total R-Value and U-factor for a specified building component (wall, roof) given a table of R/U values.	
Explain why evaluating heat gain/loss of a building is important to building design.	Correctly calculate the heat load (Q-value) for a given wall, with guidance.	

12. Beam Design/Analysis

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Distinguish between concentrated and distributed loads. Declare the tributary area for a beam given the structural configuration. Describe the difference between beams, girders, and columns. Explain the differences between live and dead loads. Calculate end reaction forces on a symmetrically loaded beam, using the provided formula sheet. Identify pin, roller, and fixed beam supports. Select the formula to calculate beam deflection.	Often correctly determine dead loads (green roof, floor, roof, all loads) resulting from a structural component. Often correctly calculate the beam loading resulting from dead and live floor or roof loads. With guidance, select an open-web steel joist to safely carry applied loading given a load table. With guidance, select a roof deck to safely carry applied roof loading given a load-span table. Often correctly calculate end reactions for a simply supported symmetrically loaded beam. Often correctly construct a beam loading diagram given a description of the loading condition. Represent a uniformly distributed load with an equivalent concentrated load. Often correctly calculate the maximum shear force and maximum bending moment applied to a simply supported beam resulting from a given symmetrical loading case given the formula sheet. Often correctly calculate beam deflection given the formula sheet. Make necessary conversions to calculate beam deflection. Find beam section properties given a wide flange beam table. Often correctly match a shear and moment diagram to the corresponding beam loading diagram that includes either a uniformly distributed load or one or two concentrated loads.	Calculate the end reactions on a non-symmetrically loaded beam. Calculate the loads on a cantilevered beam. Draw a shear force diagram and a maximum bending moment diagram for a simply supported beam that is loaded with concentrated and/or uniformly distributed load(s). Calculate the required minimum plastic section modulus of (Zx) of a beam when given the maximum applied moment. Choose the most efficient beam section to safely carry a given loading. Determine the adequacy of a beam design under given loading conditions. Determine whether a beam has been adequately selected for shear.

13. Storm Water Runoff

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Describe the fact that surface type affects storm water runoff rates.		
Often correctly calculate storm water runoff for a property with a single surface type.	Often correctly calculate storm water runoff from a property with multiple surface types.	
	Correctly calculate the change in storm water runoff between pre- and post-development conditions.	
	Identify methods to impact storm water runoff from a site (water retention structures, altered surface treatments, re-grading, etc.).	Propose appropriate water retention structures to decrease storm water runoff.
	With support, compare site storm water runoff rates among site design options.	Compare site designs and propose specific changes to site plans to reduce storm water runoff.

14. Water Supply

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Explain static head and dynamic head.	Convert between head and pressure.	
Calculate the static head given specific site information.		
	Often correctly determine the total length of pipe fittings and the total length of a run of pipe.	
Calculate dynamic head given static head and head loss.	Often accurately apply the Hazen Williams formula to determine head loss.	Using the Hazen Williams formula, determine the water supply needs for given requirements.

15. Foundation Analysis

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
State the purpose for the foundation of a building and footers for that foundation. Identify different foundation types.		
State the influence of soil types on foundation design.	Utilize available tables to determine the bearing capacity of soil types.	
Select the design formula for calculating dimensions of the footing.	Substitute values in formulas for load calculations. Often correctly calculate concrete weight bearing on the earth based on foundation footing thickness. Often correctly size a spread footing based on the load to be supported.	Differentiate between components of the net load and apply that information in design calculations. Chase (trace) the loads of a structure to determine foundation requirements.

16. Surveying

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify and state the uses of basic surveying equipment. Set up tripod, auto-level, and level the equipment. Read the rod.	Perform, record, and draw a plan view for a control survey. Record survey data in a field note table.	Correctly perform a closed loop survey, record field note data properly, calculate and diagnose closure error.
	Often correctly calculate elevations of survey points based on rod readings recorded during a differential survey.	
	Sometimes recognize mistakes in a control survey.	Recognize major mistakes in recorded survey data and determine a method for obtaining correct data.
	Properly read and interpret a topographical map correctly, with guidance. Often correctly estimate the distance between two points using stadia readings.	Often identify different types of surveys and related drawings and state the purposes for each.

17. Wastewater Management

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify the sanitary sewer main on a drawing (with a legend).	Often correctly calculate the approximate length of the sanitary sewer lateral with given minimum slope and invert elevations at the house and at the sewer main.	Calculate the slope of a given sewer lateral. Given a sewer lateral design and design requirements, determine whether a given sanitary sewer lateral meets the minimum slope requirements.
Identify different wastewater treatment systems.	Often correctly calculate the crown elevation of the sanitary sewer main (given the invert elevation of the sewer main). Often identify the minimum diameter required for the sewer lateral.	Correctly determine the maximum invert elevation of the sewer lateral leaving the structure.

18. CEA Design Process Documentation/Representation/Presentation (2D and 3D Models, Sketching, Drafting, Portfolio)

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Create a bubble diagram that includes the minimum residential requirements. Convert a bubble diagram to a "quick" sketch representing the approximate shape of the building and doors.	Create a bubble diagram that accurately represents a design that accounts for all applicable components and relative size. Identify rooms as part of the service, sleeping, or living area.	Justify bubble diagrams based on varying constraints and criteria (code compliance, adjacency and connections, client desires, traffic patterns, etc. Create a bubble diagram that reflects an efficient design that adequately demonstrates best practice.
Create a floor plan that is potentially inaccurate in size and shape of component rooms/areas or does not meet criteria/constraints.	Create a floor plan sketch that is mostly accurate but contains some errors. Identify deficiencies in a floor plan based on given criteria and constraints.	Analyze and correct deficiencies in a floor plan based on given criteria and constraints or improve the efficiency of a floor plan. Create a set of working drawings for a commercial structure with guidance.

19. Soil Analysis

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
State the components of soils. Describe the purpose for soil analysis related to building/site design.	Follow the sieve analysis/soil analysis procedure with support. Collect data from sieve analysis and record correctly with teacher prompts. Often correctly calculate soil component percentages from sieve analysis data. Often correctly determine (mostly coarse) soil classifications using the USGS chart.	Use the plasticity chart to identify (mostly fine) soils.

20. Structures

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Define building efficiency.	Calculate the structural efficiency of a model. Often correctly determine the most efficient simple structural model.	Identify, propose, and /or implement improvements to a structural simple model to improve structural efficiency.

21. Services and Utilities

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Identify utilities necessary for proper functioning of a residential or commercial building.	Sketch a residential electrical plan that incorporates some electrical components with errors.	Identify errors and omissions on a simple residential electrical plan.
Identify common electrical plan symbols.		Plan and implement an "efficient" electrical plan.
Identify the required locations (rooms) of GFI outlets.	Often correctly apply specific electrical code requirements.	

22. Site Design and Analysis

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Communicate the necessity to meet site restrictions and determine the appropriateness of a building footprint for a given site.	Apply site restrictions to determine the building envelope of a given site.	
On a site plan, recognize the utility and service connections.	Represent a utility service connection or supply on a site plan.	Represent an "efficient" layout for utility and services on a site plan with respect to appropriate entry/exit from the building and other site components.
Describe metes and bounds property description.	Explain metes and bounds property descriptions. Often correctly sketch a property described by metes and bounds.	
Describe the rectangular survey.	Explain the rectangular survey system. Often correctly identify on a map a parcel described using the rectangular survey system.	
Identify typical site plan requirements.	Identify some site orientation considerations (solar, sound, noise, wind, view, terrain, etc.) and their impact on site design. With guidance, develop a site opportunities map to represent site considerations important to the design of site improvements. Identify the necessity to establish an appropriate finished floor elevation and sometimes calculate a reasonable finished floor elevation value. With guidance, critique the viability of a building project with respect to whether the project is physically possible on the site.	Alter the site contours and/or finished floor elevation to provide an effective site design (including consideration for storm water drainage, flood elevations, etc.). Incorporate some site orientation considerations in determining and justifying the placement of a building on a given site.

23. Architectural Drawings, Documentation, and CAD

Basic A student who has reached the *highest level* of the Basic category should be able to do the following:	Proficient A student who has *just reached* the Proficient level should be able to do the following:	Advanced A student who has *just reached* the Advanced level should be able to do the following:
Demonstrate the creation of a simple residential structure (including walls with a door and window and a roof) using 3D architectural software.	Create a simple 3D architectural building and site model to somewhat accurately represent a design.	Create 3D models that include atypical roof/building shapes.
Demonstrate a basic proficiency with the project browser and display features of an architectural software package.		Implement advanced features of 3D architectural software (i.e., creating custom walls and roof assemblies, creating detail views, using grids, creating a walk-through, appropriately placing stairs, etc.).
Create a 3D model of a utility shed with guidance.	Create a set of construction drawings, with guidance, that somewhat accurately represents a simple building design (but may contain errors) to include elevations, floor plan, and a simple wall section.	Manipulate and revise existing 3D models to make improvements to the building/site.
	Create a simple site plan (that may contain some errors) with guidance, to somewhat accurately represent a given building site.	Create a reasonable set of preliminary construction drawings for a non-simple building/site design.

4. EOC SCORE-TO-GRADE CONVERSION

PLTW recognizes that you may need to convert student EoC Assessment scores into class letter grades. Because grading policies vary among schools, we provide no set protocol nor specific examples for assigning letter grades to specific EoC scores. Most importantly, score conversion needs to follow your school's grading policy.

However, PLTW suggests that you consider the following if you convert EoC scores to letter grades.

- **Local grading policies** Your school or district may determine the policies regarding letter grades, score distributions, or what it means to be "passing". Follow your local grading policies when converting EoC scores to classroom grades.
- **PLTW National average** If you use EoC scores as the basis for classroom grades, think of it like grading on a curve. Typically, when grading on a curve, the average score is the basis for setting the grading scale. Consider the national average EoC score of 5 when you convert EoC scores to your own grading scale.
- **PLTW National EoC norms** The process of Standard Setting used a nationally representative sample of students who took the PLTW CEA EoC Assessment, referred to as the "2014 EoC norms". Consider the distribution of scores in the norming group when you complete your EoC score-to-grade conversion. You can use the information in the following table to compare performance of a student against the 2014 norms.

Percent of Students per CEA EoC Score from 2014 Norms

Achievement Indicator	Basic			Proficient				Advanced	
Achievement Level Description The student demonstrates:	...minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.			...competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understandings.				...comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.	
EoC Score	1	2	3	4	5*	6	7	8	9
Students at score (%)	8%	10%	17%	12%	16%	8%	10%	14%	5%
Students at or below score (%)	8%	18%	35%	47%	63%	71%	81%	95%	100%

* 5 is the PLTW national average EoC score.

The percentages of students who performed at or below each score provide a reference for how a student performed relative to other students included in the 2014 norming group. For example, if a student received a score of 6 on the CEA EoC Assessment, then that student scored as well as or better than 71% of students in the 2014 norms.

NEW MILFORD HIGH SCHOOL

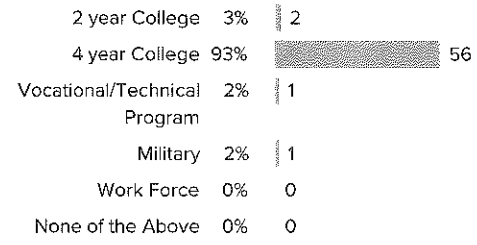
Alumni Survey
2017-18

Report created by
Panorama Education

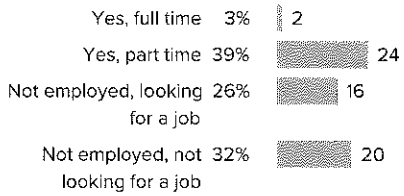
All questions

How did people respond?

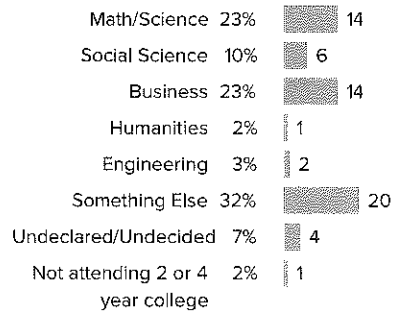
Q.1: What is your current status?



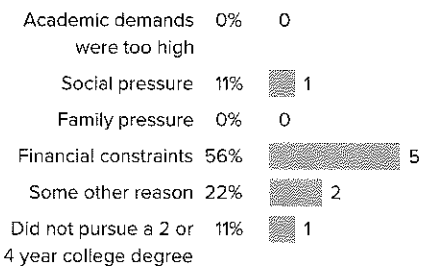
Q.2: Are you currently employed?



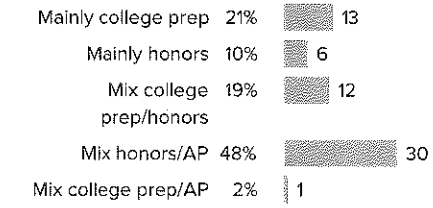
Q.3: If you attend a 2 or 4 year college, what is your major/course of study that you are pursuing?



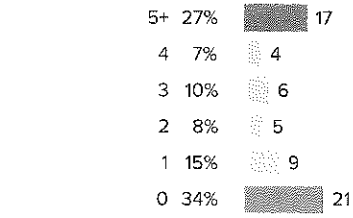
Q.4: If you began to pursue a 2 or 4 year college degree and then stopped, why did you stop?



Q.5: While you were at NMHS what level courses did you primarily take?

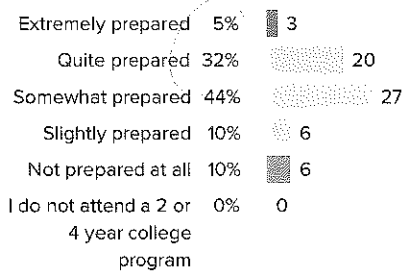


Q.6: How many AP courses did you take while attending NMHS?



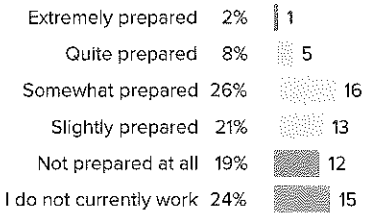
Favorable: **44%**

Q.7: Overall, how well do you feel your high school experience prepared you to be successful academically in your 2 or 4 year college program?



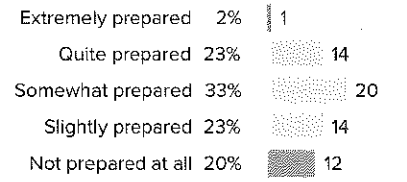
Favorable: **37%**

Q.8: Overall, how well do you feel your high school experience prepared you to be successful at work?



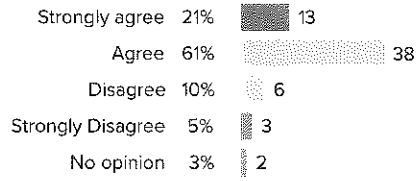
Favorable: **13%**

Q.9: How prepared do you feel your high school experience made you for social and civic involvement?



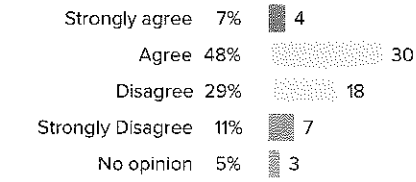
Favorable: **25%**

Q.10: My teachers cared about me.



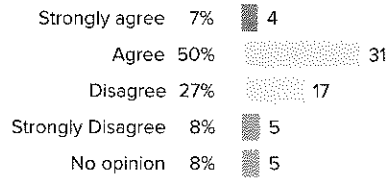
Favorable: **85%**

Q.11: My high school assisted me in learning how to get along with people different from myself.



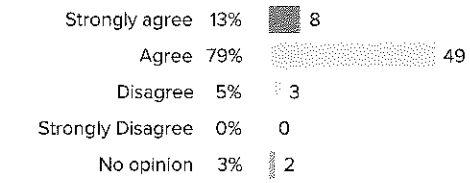
Favorable: **58%**

Q.12: My teachers made learning an interesting experience.



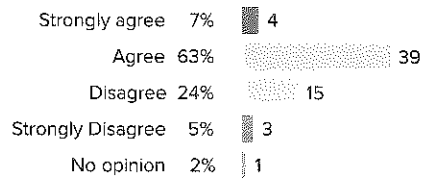
Favorable: **61%**

Q.13: My teachers were knowledgeable of their subject matter.



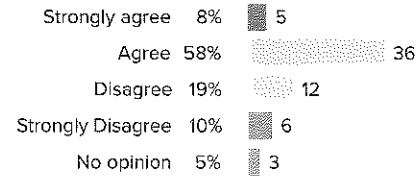
Favorable: **95%**

Q.14: My teachers held students to a high standard and required quality work.



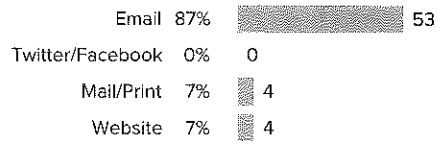
Favorable: **70%**

Q.15: My coursework in high school was rigorous.



Favorable: **69%**

Q.16: How would you like NMHS to communicate with you in the future?



Please list clubs, activities, athletics, and other organizations you were i

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with while at NMHS

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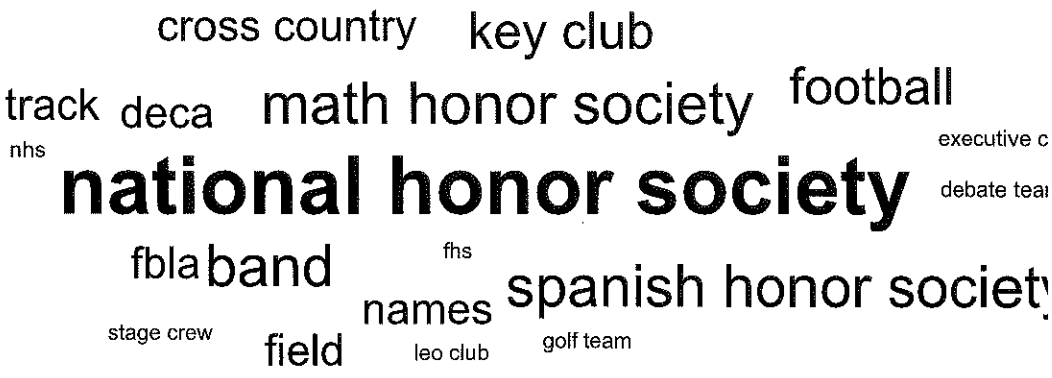

All Free Responses 56 responses

- "German Honor Society **Debate Team** Political Awareness Club GAPP"
- "I did nothing and I'm fine"
- "**Drama club**, musicals."
- "**names**, **key club**, **track** and **field** "
- "marching **band**, winter percussion, drama, **debate team**, gsa"
- "**Executive Club** Team Waramaug SHS **MHS NHS** All School Musical Newspaper **Student Council** "
- "Girls **field hockey** and **basketball** **Names** Athletic council "
- "**DECA NAMES SOCCER TENNIS** "
- "**DECA** for 2 Years "

Filter by Theme:

All responses
national honor society
math honor society band
spanish honor society key club
football names fbla deca
track cross country field
french honor society golf team
debate team leo club
executive club stage crew
drama club nhs fhs
student council

Need Help?

Please list clubs, activities, athletics, and other organizations you were i with while at NMHS.

- "Video game club **French honor society**"
- "**Drama club**, **FBLA**, **stage crew**"
- "**Golf team**, marching **band**, **national honor society**, "
- "NMHS **Basketball** NMHS **Baseball**"
- "**Names**, gapp"
- "Swim"
- "**Band** Winter Percussion Computer Science Club"
- "executive committee, **student council**, **leo club**, national+spanish+german+math honor societies, "
- "**National Honor Society Math Honor Society** **Spanish Honor Society** All School Musical Marching **Band** Production Club"
- "Marching **band**, color guard, **stage crew** "
- "marching **band**, **track** &**field**"
- "**NAMES**, **National Honor Society**, **Spanish Honor Society**, **Key club**, **FBLA**, and **DECA**"
- "**Leo club**, **field hockey** "
- "**Track**, **cross country**, **tennis**"
- "**Debate team** and **Band** "
- "**NHS**, **FHS**, **MHS**, **soccer**, **track**, **cross country**, wave review "
- "**Baseball**. "
- "Honor societies, **key club**, **soccer**, **track** and **field**"
- "NMHS All-School Musical, NMHS Dramatics, **NAMES**"
- "**Executive club**"
- "Girls **soccer**, **key club**, national honors society, **names** "
- "**Volleyball**, **track** and **field**, **FBLA**"

Need Help?

Please list clubs, activities, athletics, and other organizations you were i with while at NMHS.

- "Newspaper, **Math Honor Society**, **National Honor Society**, **French Honor Society** "
- "**NAMES**, **National Honor Society**"
- "**Track** and **field**, Video Game Club"
- "Marching **Band**, Winter Drumline, **Concert Band**, Wind Ensemble, **Jazz Band**, **National Honor Society**, **Spanish Honor Society**, **Math Honor Society**, **Golf Team**"
- "**Student Council** "
- "**NAMES** "
- "Spanish Honors Society, **NHS**, Girl's **Basketball**, **Volleyball**, "
- "**Key Club** , **sports**"
- "Marching **band**, **concert band**, All School Musical"
- "**Football** and wrestling"
- "**Executive Club**, **Key Club**, **Softball**"
- "**Student council Volleyball Tennis Track Executive club** "
- "**Soccer**, indoor/outdoor **track**, **math honor society**, **Spanish honor society**, **national honor society** "
- "**Cross country**, **track** and **field**, **National Honor Society**, disregarding thots"
- "Cheer, dance, **NAMES**"
- "**Baseball** team "
- "Badmitton Club, Magic The Gathering Club, **DECA**."
- "**Baseball**, **Basketball**, **Football**"
- "**Football** "
- "**French Honor Society** Orchestra Video Production"
- "**Cross country basketball lacrosse track** and **field** Wrestling manager **Names** athletic council "

Need Help?

Please list clubs, activities, athletics, and other organizations you were i with while at NMHS.

- "Marching **band**, **jazz band**, **concert band**, **track** and **field**, **softball**, box office "
- "**Band**, **Math Honor Society**, **National Honor Society**, **French Honor Society** "
- "**Drama Club** All School Musical Math Honors Society "
- "**Field Hockey**, **Lacrosse**, **Track**, Production Club, All School Musical, Wind Ensemble/marching **band** "

Please explain your answer above:

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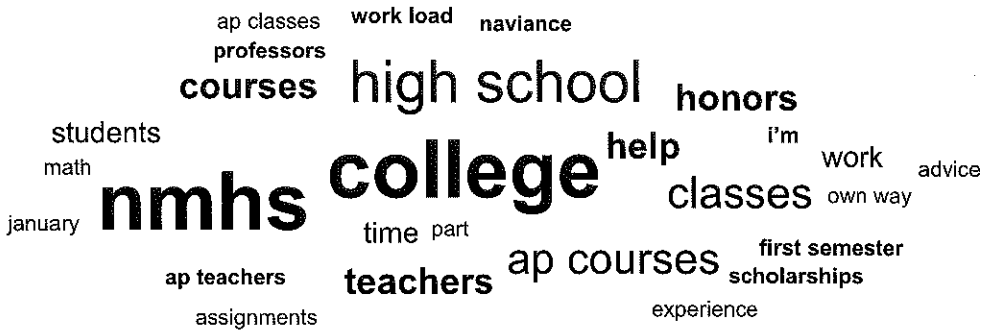

All Free Responses 40 responses

Filter by Theme:

All responses college nmhs high school ap courses classes honors courses help teachers time students work naviance professors i'm ap teachers first semester scholarships work load own way ap classes january advice part math experience assignments

"no"

"I like **college** a lot more than **high school**. I had to learn the adult things on my own, like buying a car and paying bills. I think the only **class** I found extremely helpful for my future was personal finance. Our **math courses** need a lot of **help**. **I'm** not good or bad at **math**, but **I'm high school** I received C's and in **college** I passed with an A. "

"Some of the stuff I learned did **help** yet the profs set up **classes** differently in their **own way**."

"The **work load** in **high school** should have been more to prepare me for **college**, also the **classes** should be focused more on learning through critical thinking because that is something I am struggling with in **college**. "

"some **classes** are easier than the APs i took, while others are way harder"

Need Help?

"**High school** really doesn't matter, the only **course** that remotely prepared me for **college** was AAT"

"Completely different **experience** than I was told."

Please explain your answer above:

"**NMHS** provides a wide variety of elective **classes**, which helped me find what I might be interested in. The **Honors** and **AP classes** I took were mostly rigorous enough to prepare me for the rigorous **classes** in **college**. **Teachers** at **NMHS** are also top-notch in every department. "

"I feel like I was prepared for the most **part** but I feel like there's just some things **high school** couldn't prepare you for like having to do things on your own."

"The **knowledge** gained through the **classes** I took prepared me very well for the **classes** I take in **college**"

"When I got to **college** I found myself struggling a lot with staying on top of my **work** and finding the motivation to get things done, because when I was in **high school**, my **teachers** were way too lenient. I rarely ever handed **assignments** in on **time** and yet would still get full or partial credit, and would often still get decent grades by the end of the semester. Obviously I can't entitely blame the school for this because **part** of this issue comes from within myself, but my point in saying this is that most **teachers** at **NMHS** fed this bad habit."

"The **AP courses** definitely helped with **college** and the one thing I'm disappointed in is that I didn't take more. The **college** prep level was ok and helped me interact with **teachers**. "

"Though some **professors** are tough, in general the level of **work** done in **AP courses** overprepares a **student** for **college**. "

"The courseload I took included **classes** that are very similar to my current **college courses**."

"**college courses** are structured quite differently than the **classes** in **nmhs**. The **work load** and overall dynamic was completely new to me my **first semester**."

"Was not prepared. Given way too much leniency in **highschool** academically- **college** you teach yourself basically. **Highschool** basically walks you through everything "

Need Help?

"The material is presented similar to that of elementary school, nothing like **college**. There is too much put on **teachers**, **professors** don't **help** the way **teachers** do. Too many floaters, no one cares about any **students**"

Please explain your answer above:

"I felt like **high school** didn't really prepare me for **college** because the **classes** in **college** were completely different and harder. I wasn't used to the rigorous coursework"

"**College** is completely different from **high school**, I feel there is no preparing for it and the individual just has to grow up "

"They need to teach more about real life things other than things like **trigonometry** "

"My **first semester** I felt I was mostly retaking **high school courses** "

"I don't like **college** but **NMHS** was trying to hard to be strict and **NMHS** sometimes seemed worse than **college**."

"Topics I learned in **High School** transferred to **College**"

"I think that **NMHS** helped to prepare **students** for **college** level **classes** through **AP classes**. All of my **teachers** were extremely helpful and knowledgeable, and I enjoyed being taught by all of them. I don't think that **NMHS** was extremely helpful with preparation for **college** admissions. I think that **students** need to receive more **advice** about where to apply to, where it is achievable for them to get in to, and they need to hear from current **college students** before **November** 1 or **January** 1, the deadlines for early and regular decision. I also think that **NMHS** needs to establish and maintain links with **students** at **college**, so they can give **advice** about applying to said **colleges**. "

"My **courses** did a good job of preparing me."

"most of the **AP teachers** at NHMS did a phenomenal job of preparing **students** for both the AP exams and **college**. most have since left the school, but in my opinion, Mr. Pernerewski especially deserves **accolades**. "

"I think that by taking **AP courses** it helped me prepare for **college** better"

Need Help?

Please explain your answer above:

"A lot of the **work** in **high school** was basic and I did not write nearly as many essays as I have in **college**"

"I attend a culinary school and getting an internship while in **high school help** build my **experience**. But the academic **classes** did not prepare me for **classes** here. "

"Not attending **college**"

"The school **work** was not as difficult as I thought. "

"I feel like i wasted my **time** in **high school** with way too easy **classes**. most of **time** spent in **class** was on my phone waiting for the **teacher** to start the **assignment** for the **day**. in **college**, i feel like **i'm** actually getting an education. "

"It's just very different from going to **high school** to **college** and it's different for everyone in their **own way** but maybe just more telling us what to expect "

"Good **teachers** and **course** of studies."

"Freshman year of **college** seems relatively easy."

"The **AP classes** helped but **honors** did not. Some **AP teachers** were not prepped to teach an AP **class**."

"**Highschool** never prepared me for **college**, everything is different. There are so many rules in **highschool** that are dumb and have no tre value that aren't executed in **college** and don't even exist in **college**. Also, **naviance** was barely any **help**. For **scholarships** especially, I tried very hard to look for **scholarships** and **Naviance** only ever showed the same 10 local ones and it said "these fit you perfectly" but then I'd be ruled out because of requirements that I didn't fit. "

"I think that the AP **course** that I took was the most similar to the **courses** I am taking in **college**. However I did learn valuable things that helped me in other **classes** as well"

"New Milford was ight"

"Some **classes** were as hard as **college classes**"

Need Help?

Powered by

Please explain your answer.

Need Help?

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Please explain your answer above:

All Free Responses **29 responses**

Filter by Theme:

This question didn't have enough responses to group by theme.

- "The workload is roughly the same"
- "N/A"
- "I didn't really learn much about work"
- "high school helped teach me communication skills i need to get a job and to work with people. "
- "Personal finance definitely helped with the money aspect of working "
- "They have no education on what it is like to be a working citizen "
- "I don't have the experience but I learned what's needed to do my future career successfully."
- "Wasn't told at all how to apply. Or anything."
- "There was not really a real "work" focused class or anything. It was just your standard high school that a student has to go through"
- "All I learned for work is communication through group projects "
- "I think my classes helped to prepare me somewhat for work. "
- "There are internships at NMHS however, they are rarely spoken about and only a few students do them"
- "It didn't really help me. I mostly apply real life experiences I've had to help me with new problems. I don't really reflect on my school experience to help me. "
- "Doesn't teach us about work really except for being on time. "
- "When it comes to work, I definitely feel like I gained the knowledge and developed strategies to be a successful person "

Need Help?

- "One doesn't learn life skills. "
- "High school does not teach you life skills"
- "I honestly do not see how any of the courses I took or any courses offered would legitimately help prepare me for joining the workforce. The only exceptions would be learning basic english/writing and mathematics."
- "no"
- "High school only prepared me for work because of waking up early, but didn't do much because I only hate it still"
- "Teaches responsibility "
- "I wish there were more classes like personal finance mandatory for all students to take because that class prepared me the most for real life "
- "High school doesnt prepare for what i am doing"
- "Jobs are usually more open and I learned more lessons from working with others in the Work place than NMHS."
- "Because of the classes I took, I was somewhat prepared to work. I took Allied Health Careers, which introduced me to a lot of possibilities for my future. Personal Finance also prepared me somewhat for my future (although this class could definitely use improvement). There are plenty of classes I didn't take that could've helped prepare me for work, as well. Whether or not NMHS can prepare you in this department all depends on what courses you take."
- "There's no real world anything in highschool. The only teacher that helped me do anything in the real word was Ms. Peterson during advisory! Even Personal Finance I learned nothing from, because it's such basic crap that I doodled the entire time because I was bored out of my mind. "
- "Working is also completely different from high school. New Milford focused on the academics rather than real world learning "
- "I am successful because I work hard, not because new milford"
- "Didn't give me tools how to do things "

Why is improving college and career readiness important?

Key Issues and Challenges

By the year 2018, 65% of all jobs in Connecticut will require some postsecondary training beyond high school[1]. However, between 2004 and 2010, only 41% of Connecticut public high school graduates went on to complete a postsecondary credential[2]. For all students to remain competitive and for Connecticut to meet its future workforce needs, more students must graduate ready for postsecondary education.

- Historically, secondary and postsecondary educational systems have operated independently creating gaps and misalignment between the two systems.
- The proportion of students going on to postsecondary education has steadily increased over the past 100 years and is likely to continue to increase.
- Getting more students ready for college means succeeding with an increasingly challenging student population.
- Students in the US must negotiate the most complex system of admission to higher education in the world.
- Today's young people will need to be better educated and prepared as the US continues to move toward a knowledge/ information-based economic model.
- National educational policy is emphasizing college and career readiness in addition to basic skills instruction.
- Connecticut's adoption of the Common Core State Standards provides a timely opportunity to implement data-driven college and career readiness initiatives.
- Despite recent improvements, there remains an achievement gap among students in Connecticut. In 2011, for example, 10% of white students were basic or below on the Connecticut Academic Performance Test (CAPT) in math, while 48% of African-American students scored in that lowest performance category[3]. This achievement gap directly impacts college indicators, such as degree attainment; in 2007, 28% of African American adults in Connecticut held an Associate's degree or higher, as compared to their white counterparts at 52%[4].

How can I use this information?

We are all in this challenge together. Everyone – students, educators, families, community leaders, employers and more – have a contribution to make in building successful educational pathways that span early childhood to adulthood. You can use these talking points to avoid the "blame game" that surfaces too often when communities discuss problems in school, college and career readiness. By moving away from fault-finding and instead emphasizing the need for shared responsibility, you can help shape constructive conversations that pave the way for student and community success.

1 Georgetown Center on Education and the Workforce. (2010). Help wanted: Projections of jobs and education requirements through 2018.
2 National Student Clearinghouse. (2010). Postsecondary outcomes 2004-2010 of students graduating from Connecticut public high schools in 2004. Calculations by Board of Regents for Higher Education.
3 Connecticut State Department of Education. (2011). Connecticut Education Data and Research.
4 U.S. Census Bureau. (2010). American Community Survey.

Key College and Career Readiness Terms and Concepts

Postsecondary: In this toolkit, postsecondary refers to any formal setting an individual pursues for additional instruction beyond high school. These may include two- or four-year degree programs, certificate or licensure programs, apprenticeships, or military programs.

Work Ready: Individual meets basic expectations regarding workplace behavior and demeanor.

Job Ready: Individual possesses specific knowledge necessary to begin an entry-level position.

Career Ready: Individual possesses sufficient foundational knowledge, skills, and general learning strategies necessary to begin studies in a career pathway.

College Ready: Individual places into and passes, without remediation, a credit-bearing entry-level general education course.

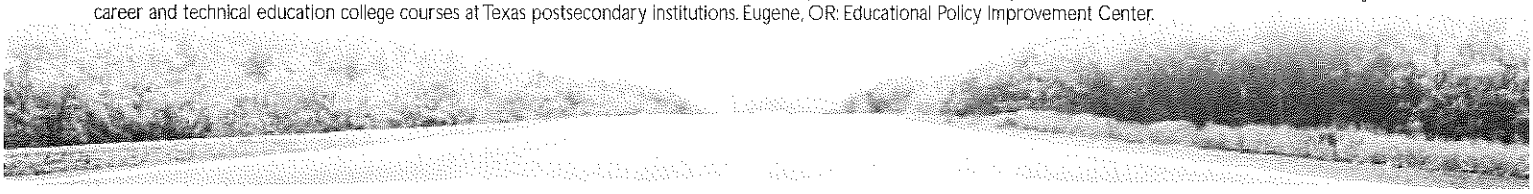
College eligibile: Individual meets the admissions requirements for a two- or four-year college or university. This typically includes meeting high school graduation requirements, maintaining an acceptable grade point average in specified courses, and obtaining satisfactory SAT or ACT scores.

Are college readiness and career readiness the same thing?

Every distinct career pathway and college degree requires knowledge, skills, and abilities that are unique to that area. What is emerging from the research, however, is the identification of a foundational set of knowledge and skills that all high school graduates need to be prepared to succeed beyond high school regardless of the setting. In particular, the evidence suggests that graduates need not only a solid grounding in the content knowledge specified in college and career readiness standards, but also key thinking and learning skills and strategies that are critical for collegiate[5] and workplace[6] success. The goal is for high school graduates to be both college ready and career ready, enabling them to pursue any opportunity desired.

The intersection between college and career readiness is represented by the knowledge and skills necessary for success in both arenas: the ability to place into and succeed in an entry-level college general education course or a career preparation program without remediation. As explained by the Partnership for 21st Century Skills, "Employers, educators and policymakers agree that the skills necessary for entering postsecondary education today are virtually the same skills necessary for success in the modern workplace. The results that matter apply to all students" (2006).

5. Conley, D.T., McGaughy, C., Cadigan, K., Flynn, K., Forbes, J., Veach, D. (2008). Validation study I: Examining the alignment of the Texas College and Career Readiness Standards with entry-level general education courses at Texas postsecondary institutions. Eugene, OR: Educational Policy Improvement Center.
6. Conley, D.T., McGaughy, C., Cadigan, K., Forbes, J., & Young, B. (2009). Validation study II: Alignment of the Texas College and Career Readiness Standards with entry-level career and technical education college courses at Texas postsecondary institutions. Eugene, OR: Educational Policy Improvement Center.



What is College and Career Readiness?

For this toolkit, college and career readiness is defined as students being prepared to succeed in credit-bearing entry-level general education courses or two-year certificate programs without needing remedial or developmental assistance. A crucial distinction is that college eligibility is not the same as college readiness. Historically, many high schools have emphasized getting students accepted into college, with a heavy focus on meeting criteria for admissions. Being ready for college and career preparation extends beyond eligibility, and emphasizes what students need to know and be able to do to persist and ultimately graduate from a postsecondary program. College and career readiness is a multi-faceted concept that includes factors both internal and external to the school environment.

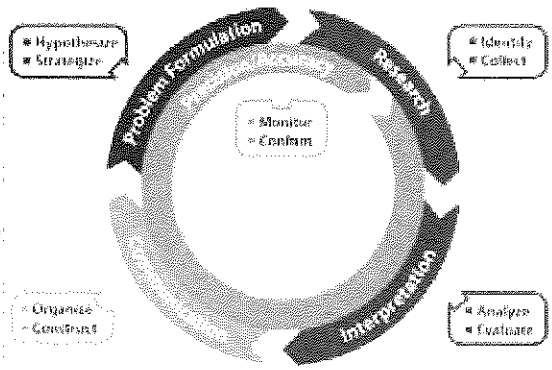
Based on extensive research, David T. Conley and his colleagues at EPIC developed an operational definition of college and career readiness that went beyond course titles, grades, and test scores[7]. This model, termed the Four Keys of College and Career Readiness include: Key Content Knowledge, Key Cognitive Strategies, Key Learning Skills and Techniques, and Key Transition Knowledge and Skills. While there are certainly other factors that influence college and career readiness, these are the four that can be most directly affected by schools and for which schools can be reasonably expected to take primary responsibility[8]. The table below describes the Four Keys.

Four Keys To College And Career Readiness

Key Content Knowledge

- Key terms and terminology
- Factual information
- Linking ideas
- Organizing concepts
- Common Core State Standards (in English/literacy and mathematics only)
- Standards for Success in Science, Social Sciences, Second Languages, the Arts

Key Cognitive Strategies



Key Learning Skills & Techniques

- Time management
- Study skills
- Goal setting
- Self-awareness
- Persistence
- Collaborative learning
- Student ownership of learning
- Retention of factual information

Key Transition Knowledge & Skills

- Admissions requirements
- College types and missions
- Career pathways
- Affording college
- College culture
- Relations with professors
- Social/identity issues in transitioning

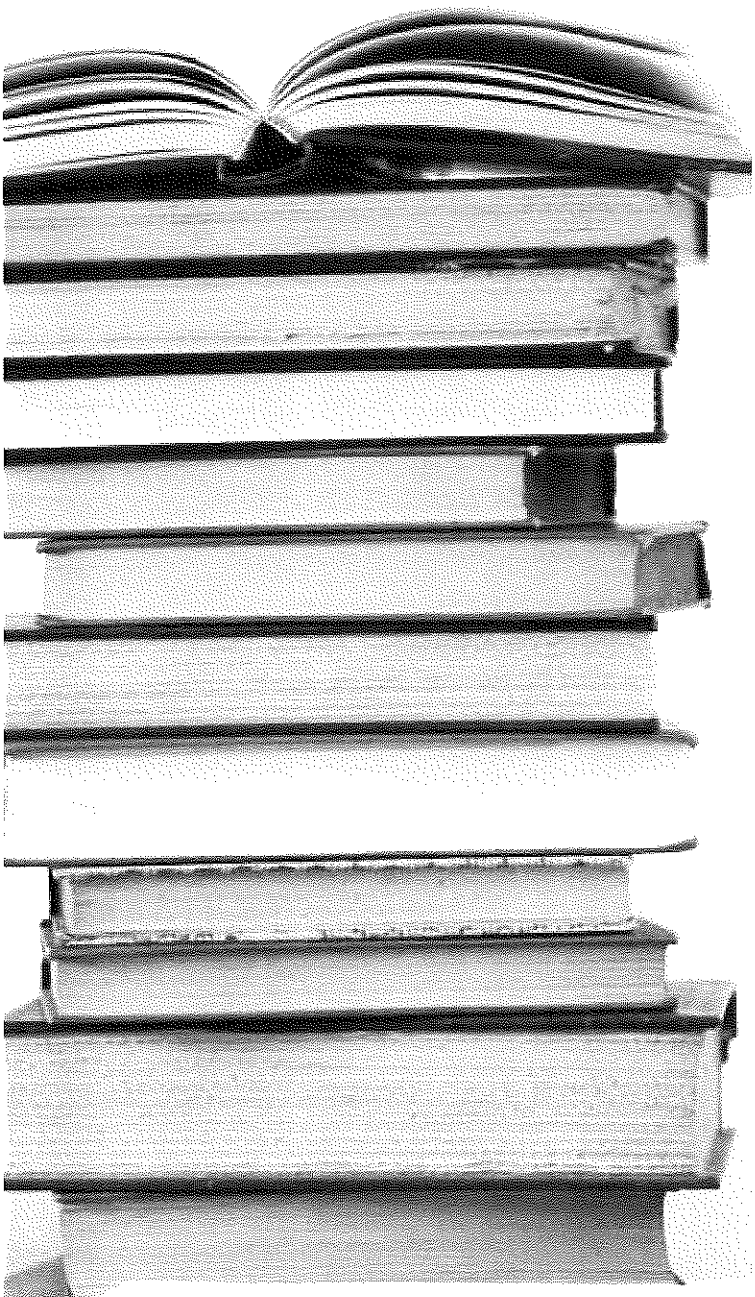
How can I use this information?

Share this definition with both secondary and postsecondary colleagues. Use the Four Keys as a framework to discuss and guide conversations. Sharing common language and a framework are critical to effective, comprehensive planning. Without a comprehensive approach, efforts to prepare students for their postsecondary experiences may be fragmented, duplicative, or otherwise insufficient.

---

7 Conley, D.T. (2007). Redefining college readiness, volume 3. Eugene, OR: Educational Policy Improvement Center.
8 Conley, D.T. (2010). College and career ready: Helping all students succeed beyond high school. San Francisco: Jossey-Bass.

Examples of what a college and career ready student can do:[11]



- Communicate effectively and professionally with supervisors or professors
- Read with understanding a range of non-fiction publications, textbooks, and technical materials
- Incorporate feedback effectively
- Produce written products that are consistently free of errors and reflect proper writing conventions
- Collect and analyze data precisely and accurately
- Interpret conflicting explanations of an event or phenomenon
- Write a three- to five-page research paper structured around a cogent, coherent line of reasoning
- Arrive punctually to class or work
- Attend a study group outside of class
- Create and maintain a personal schedule that includes a prioritized "to do" list
- Complete successfully an assignment that requires two weeks of independent work and extensive research
- Utilize technological tools including appropriate online and desktop applications
- Locate websites containing information on career requirements, colleges, admissions, and financial aid
- Balance short- and long-term goals

How can I use this information?

Secondary instructors can use these examples to adjust their assignments and classroom practices to align more closely with college and career readiness expectations.

Postsecondary instructors can use these examples to inform contributions to alignment efforts. Sharing example assignments, assessments, student work, and other student performance examples makes college and career readiness and performance more concrete.

11 Educational Policy Improvement Center. (2008). Creating college readiness [Data file and code book]. Eugene, OR: Educational Policy Improvement Center.

Seven Principles of College and Career Readiness

In 2007, EPIC was awarded a grant to study the programs and practices of high schools that demonstrate greater-than-expected success in preparing students for college and careers. Researchers conducted extensive site visits, including interviews, observations, and document collection at a sample of 38 schools nationally. From the data and effective practices collected, EPIC synthesized seven principles that describe what educators and administrators do in schools that have success in preparing their students for college and career readiness.

How can I use this information?

Faculty members, counselors, and administrators can use each principle to begin conversations about improving school performance. Postsecondary institutions should take particular note of Principle 7 and consider how they can contribute to such partnerships.

Principle 1. Create and maintain a college- and career-readiness culture in the school.

Principle 2. Create a core academic program aligned with and leading to college readiness by the end of twelfth grade.

Principle 3. Teach key self-management skills and academic behaviors and expect students to use them.

Principle 4. Make college and careers real by helping students manage the complexity of preparing for and applying to postsecondary education.

Principle 5. Create assignments and grading policies that more closely approximate college and career expectations each successive year of high school.

Principle 6. Make the senior year meaningful and appropriately challenging.

Principle 7. Build partnerships with and connections to postsecondary programs and institutions.

For more information about the Seven Principles of College and Career Readiness, see Conley, D. T. (2010). College and career ready: Helping all students succeed beyond high school. San Fransisco: Jossey-Bass.