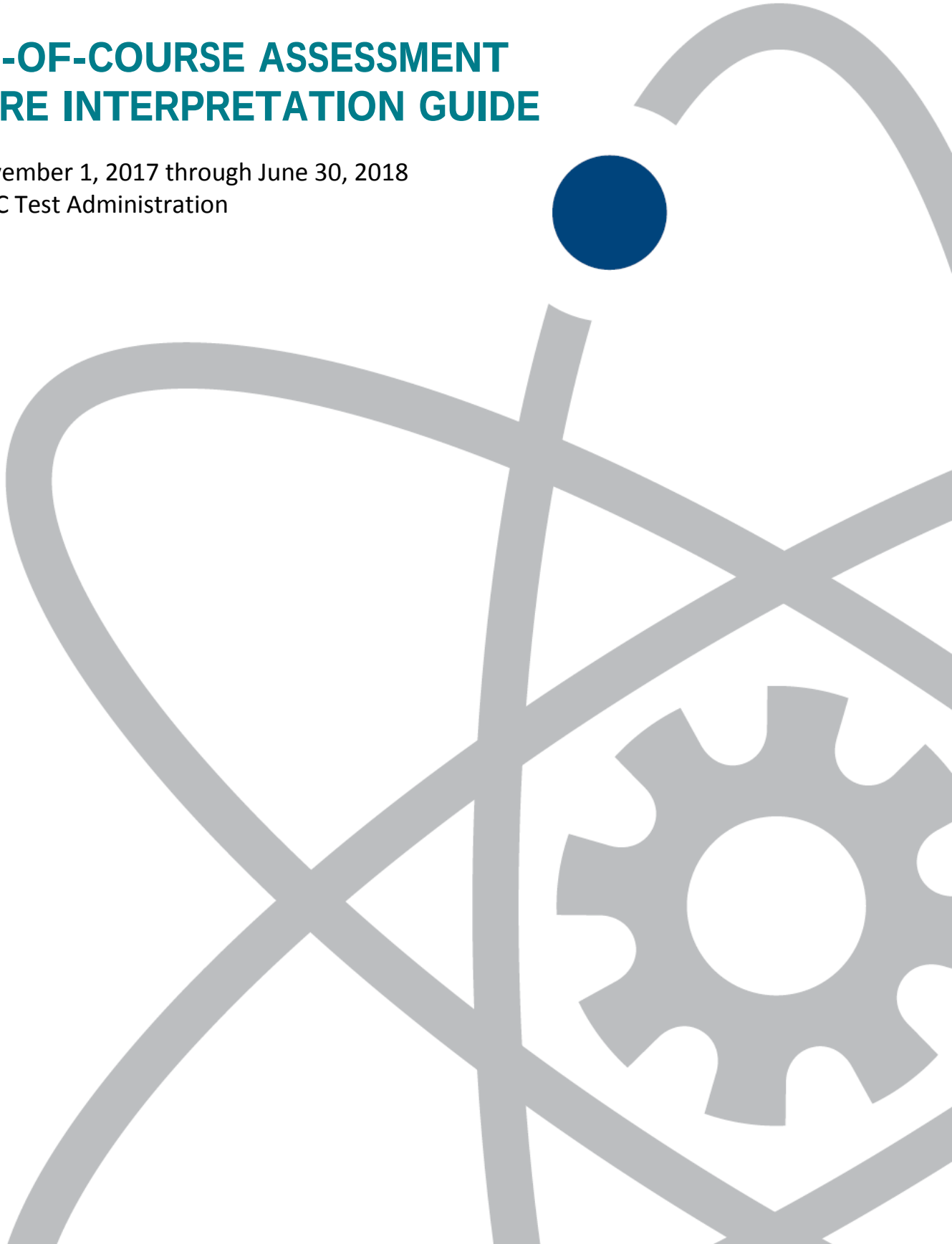
PROJECT LEAD THE WAY
PLTW

END-OF-COURSE ASSESSMENT SCORE INTERPRETATION GUIDE

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



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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 Principles of Biomedical Science (PBS) course specifically.
- Section 3 provides the complete Achievement Level Descriptions that are aligned to the EoC scores for PBS.
- 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 9.
- **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 Principles of Biomedical Science course, see Achievement Level Descriptions for PBS 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 PBS

The tables in this section show the specific ALDs for the PLTW Principles of Biomedical Science (PBS) course. The ALDs are divided into the five 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. General Skills

Basic	Proficient	Advanced
A student who has reached the *highest level* of the Basic category should be able to do the following:	A student who has *just reached* the Proficient level should be able to do the following:	A student who has *just reached* the Advanced level should be able to do the following:
Construct a graph.	Construct and interpolate a graph.	Construct, interpolate, and extrapolate a graph.
Design an experiment that contains most of the components, often with frequent errors.	Design an experiment that contains all of the components.	Design an experiment that contains all of the components with consistent detail and minimal errors.
Display data, draw limited conclusions, and present results.	Evaluate results, provide limited suggestions for revisions and further exploration, and draw conclusions.	Support and justify conclusions, thoroughly suggest necessary revisions and further exploration.
Demonstrate adequate coverage of main points with limited details in written and oral communications.	Demonstrate adequate coverage of main points with sufficient details and limited consideration of the target audience, organized in a somewhat logical sequence in written and oral communications.	Thoroughly and clearly articulate the main points with precise details appropriately designed for the target audience, organized in a logical sequence in written and oral communications.
Recognize that there are standards and practices in place to preserve patient privacy.	Analyze patient scenarios to determine whether or not a patient's rights have been violated.	Justify when it is appropriate to violate privacy standards and practices.

2. Genetics

Basic	Proficient	Advanced
A student who has reached the *highest level* of the Basic category should be able to do the following:	A student who has *just reached* the Proficient level should be able to do the following:	A student who has *just reached* the Advanced level should be able to do the following:
Identify the structures of DNA.	Identify complementary base pairs.	Identify the components of a nucleotide.
State that gel electrophoresis separates DNA fragments based on size.	Explain how restriction enzymes are used to cut DNA.	Analyze the resulting RFLPs to distinguish differences between individuals.
Identify that sickled red blood cells take on a different shape than normal red blood cells.	Describe how sickled red blood cells lead to health complications.	Describe in detail how sickled red blood cells lead to health complications and describe corresponding treatments for the condition.
Recognize that the sequence of nucleotides in DNA determines the sequence of amino acids in a protein.	Explain the process of protein synthesis.	Analyze the effect that mutations have on proteins.
Recognize that DNA, chromosomes, and genes are related to inheritance.	Describe the relationship between DNA, chromosomes, and genes.	Describe the relationship between DNA, chromosomes, and genes and how their role in inheritance determines genotypes and phenotypes.
Recognize that chromosomes transfer genetic material through the processes of mitosis and meiosis.	Demonstrate the movement of chromosomes in the processes of mitosis and meiosis.	Apply knowledge of chromosomal movement to the inheritance of genetic disease.
Draw and analyze pedigree charts to illustrate passage of a trait through generations with errors.	Determine and compare the experimental probability and the theoretical probability of inheriting a trait.	Analyze pedigrees to calculate the probability of inheriting a trait or disease.

3. Metabolism

Basic	Proficient	Advanced
A student who has reached the *highest level* of the Basic category should be able to do the following:	A student who has *just reached* the Proficient level should be able to do the following:	A student who has *just reached* the Advanced level should be able to do the following:
Recognize that blood glucose is regulated by the protein insulin.	Demonstrate the role of insulin in transferring glucose from blood into cells.	Diagram the feedback relationship of blood glucose and the insulin and glucagon hormones.
Identify that there are differences behind the causes of Type 1 and Type 2 diabetes.	Describe the physiological basis of Type 1 and Type 2 diabetes.	Demonstrate the physiological basis of Type 1 and Type 2 diabetes and relate to the corresponding treatments and potential lifestyle changes.
State that Type 1 and Type 2 diabetes can cause significant complications in many human body systems and a variety of treatments are available.	Describe at least one complication in human body systems caused by Type 1 and Type 2 diabetes and describe how Type 1 or Type 2 diabetes leads to this complication.	Describe at least three complications in human body systems caused by Type 1 and Type 2 diabetes and describe how Type 1 or Type 2 diabetes leads to these complications. Specifically describe how macromolecules relate to the functions in the human body.
Identify macromolecules as carbohydrates, lipids, or proteins. Recognize that energy is stored in chemical bonds.	Describe in general terms how macromolecules relate to the function in the human body. Describe how the structure of macromolecules is related to their storage and release of energy.	Interpret how the structure of macromolecules is related to their storage and release of energy through dehydration synthesis and hydrolysis.
Describe in limited detail nutritional terms.	Describe in detail the role of nutrients in the body.	Evaluate how diet choices affect health.

4. Anatomy and Physiology

Basic	Proficient	Advanced
A student who has reached the *highest level* of the Basic category should be able to do the following:	A student who has *just reached* the Proficient level should be able to do the following:	A student who has *just reached* the Advanced level should be able to do the following:
Identify the major components of blood.	Describe how the major components of blood are related to their function in the body.	Interpret blood test results and relate to the health of a person.
Identify the major structures of the cardiovascular system.	Describe the function of the cardiovascular system and the flow of blood through the system.	Evaluate how dysfunction of structures within the cardiovascular system impact health.
Recognize that heart rate, EKG, and blood pressure measurements are indicators of cardiovascular function.	Describe how internal and external factors affect heart rate, EKG, and blood pressure measurements.	Interpret how internal and external factors can affect heart function and can contribute to the development of heart disease.
Recognize that cholesterol is transported in the blood by protein complexes called high density lipoprotein (HDL) and low density lipoprotein (LDL).	Compare and contrast the role of HDL and LDL in the body.	Relate the role of HDL and LDL in the body to human health.
Identify general structures and functions of organ systems.	Describe how some body systems work together to maintain homeostasis.	Describe how a dysfunction in one system affects other systems.

5. Immunology and Infectious Diseases

Basic	Proficient	Advanced
A student who has reached the *highest level* of the Basic category should be able to do the following:	A student who has *just reached* the Proficient level should be able to do the following:	A student who has *just reached* the Advanced level should be able to do the following:
Recognize that infectious diseases are caused by infectious agents and are transmitted in a variety of manners.	Describe the mode of transmission of various infectious agents.	Describe the prevention and types of treatment for various infectious agents.
Identify the major structures of the immune system.	Describe the function of the major structures of the immune system.	Describe in detail how the immune system responds when an antigen enters the body.
Identify the basic structures of a bacterial cell.	Explain how bacteria can be classified based on their cell wall structure.	Describe how unknown bacteria may be identified based on their shape, colony morphology, metabolism, and reaction to the Gram stain.

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 PBS 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 PBS 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 (%)	5%	10%	13%	12%	16%	8%	11%	13%	12%
Students at or below score (%)	5%	15%	28%	40%	56%	64%	75%	88%	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 PBS EoC Assessment, then that student scored as well as or better than 64% of students in the 2014 norms.