

**Pennsylvania Department of Education
Grade 11 Mathematics Performance Level Descriptors**

<p>An eleventh-grade student performing at the Below Basic Level demonstrates limited understanding of the concepts and ineffective application of the mathematical skills in the five Pennsylvania Mathematics Reporting Categories.</p>	<p>An eleventh-grade student performing at the Basic Level solves simple or routine problems by applying skills and procedures in the five Pennsylvania Mathematics Reporting Categories.</p> <p>A student performing at the Basic Level:</p> <p>A. compares and translates among real numbers written as square roots, in scientific notation and in exponential form; uses basic, non-complex operations on rational numbers to solve basic problems.</p> <p>B. selects and uses correct formulas to compute basic two- and three-dimensional measures of prisms, cylinders, cones, pyramids and spheres; manipulates one-step formulas.</p> <p>C. identifies relationships of parts of circles, triangles and quadrilaterals; recognizes similarity in shapes; uses formulas to measure segments in routine problems.</p> <p>D. writes linear equations to represent simple patterns and graphs; solves problems described by linear equations; simplifies elementary algebraic expressions; determines slope of a line.</p> <p>E. reads basic graphical representations of data; uses stem-and-leaf plots to represent data; calculates measures of central tendency; calculates probability and applies the fundamental counting principle to simple or routine problems.</p>	<p>An eleventh-grade student performing at the Proficient Level solves practical and real-world problems.</p> <p>A student performing at the Proficient Level:</p> <p>A. demonstrates understanding of and ability to use different forms of real numbers; uses estimation and operations on real numbers to solve multi-step problems, including problems involving proportional relationships.</p> <p>B. uses formulas to solve problems involving two- and three-dimensional measurements of standard and composite geometric shapes; manipulates multi-step formulas; demonstrates the relationships of a change in length and changes in perimeter, circumference, area and volume.</p> <p>C. uses properties and relationships of parts of circles, triangles and quadrilaterals to solve problems; applies the concepts of congruence and similarity in problem-solving settings; describes measures and relationships (perpendicular/parallel with respect to slope) of segments in a coordinate plane.</p> <p>D. writes algebraic expressions and linear and nonlinear equations to describe graphs or patterns; solves problems represented as systems or compound inequalities or quadratic equations; simplifies algebraic expressions in problem-solving situations.</p> <p>E. reads and constructs graphical representations of data; uses box-and-whisker plots to represent data; draws conclusions based on measures of central tendency; uses counting techniques to determine probability; makes predictions based on data sets, probability, graphs and scatter plots.</p>	<p>An eleventh-grade student performing at the Advanced Level solves complex problems and demonstrates in-depth understanding of the skills, concepts and procedures in the five Pennsylvania Mathematics Reporting Categories.</p> <p>A student performing at the Advanced Level:</p> <p>A. uses real number properties and skills to analyze and justify solution techniques and solutions to complex problems; develops solution strategies to solve problems involving multiple operations.</p> <p>B. develops strategies to solve non-routine measurement problems; solves problems involving measurement of complex shapes; uses relationships of measurements of geometric figures to analyze problems and devise solutions.</p> <p>C. integrates properties and relationships of circles and polygons with concepts of congruence and similarity to solve complex problems and justify solutions; describes properties of segments and algebraic representations in the coordinate plane.</p> <p>D. analyzes multiple representations of patterns and data to draw and justify conclusions; solves higher-ordered equations.</p> <p>E. evaluates data representations in terms of validity and target audience; determines probability in complex problems; makes connections between data sets and other branches of mathematics; extrapolates data to make valid predictions.</p>
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