

PSAE-Work Keys ~ Exam Framework ~ Grade 11

Involving multiplicative reasoning with rates

(Excerpted from the full PSAE Framework.)

The mathematics portion of the PSAE (Prairie State Achievement Examination) is comprised of two components: the ACT Assessment Mathematics Test on Day 1 and the WorkKeys *Applied Mathematics* Assessment on Day 2. Each component contributes 50% to the total PSAE Mathematics scale score.

Framework Structure

This document employs a general organizational structure designed for ease of use. Each State Goal for mathematics is the main organizer, followed by the Illinois Learning Standards for Mathematics within each of these State Goals. Each assessment objective has a unique identifier with three components.

Example: 6.11.01

<i>6</i>	<i>11</i>	<i>01</i>
<i>State Goal</i>	<i>Grade Level</i>	<i>Objective Number</i>

The first component, “6,” indicates the numbered State Goal as defined in the Illinois Learning Standards. The second component, “11,” indicates the grade level. The third component, “01,” indicates that this is the first assessment objective for this State Goal at this grade level.

The WorkKeys *Applied Mathematics* Assessment measures skill in applying mathematical reasoning to work-related problems. There are five skill levels, from Level 3 to Level 7. As one moves from the lower levels to the higher levels, the mathematical concepts and calculations become more complex.

Level 3: Individuals with Level 3 skills can set up and solve problems with single-step mathematical operations (addition, subtraction, multiplication, or division) on whole numbers, fractions, decimals, or percentages.

Level 4: Individuals with Level 4 skills can set up and solve problems with two or more different mathematical operations (addition, subtraction, multiplication, or division) on whole numbers, fractions, decimals, or percentages.

Level 5: Individuals with Level 5 skills can set up and solve problems with multiple-step calculations on a mixture of whole numbers, fractions, decimals, or percentages, when the information is presented in a logical order.

Level 6: Individuals with Level 6 skills can set up and solve problems containing unnecessary information or information presented out of logical order and involving multiple-step calculations on a mixture of whole numbers, fractions, decimals, or percentages.

Level 7: Individuals with Level 7 skills can set up and solve problems requiring extensive calculations and several conversions between systems of measurement. They can calculate percent change, set up and manipulate complex ratios and proportions, find multiple areas or volumes of two- and three-dimensional shapes, find the best economic value of several alternatives, and locate errors in multiple-step calculations.

Mathematics Content Category Table PSAE Grade 11

The following percents are typical but may not be exact for any given administration of the PSAE. Many items measure more than one assessment objective, either within a state goal or across more than one state goal. The interconnection of the content within these state goals is crucial in instruction and curriculum development.

	PSAE Percent <i>(93 items)</i>	ACT* Assessment Component <i>(60 items)</i>	WorkKeys* Assessment Component <i>(33 items)</i>
State Goal 6 – Number Sense	29%	18%	63%
Standard 6A Representations and Ordering	2%	2%	3%
Standards 6B, 6C Computation, Operations, Estimation, and Properties	18%	11%	42%
Standard 6D Ratios, Proportions, and Percents	9%	5%	18%
State Goal 7 – Measurement	18%	11%	37%
Standards 7A, 7B, 7C Units, Tools, Estimation, and Applications	18%	11%	37%
State Goal 8 – Algebra	32%	40%	0%
Standard 8A Representations, Patterns, and Expressions	16%	20%	0%
Standard 8B Connections Using Tables, Graphs, and Symbols	6%	7%	0%
Standards 8C, 8D Writing, Interpreting, and Solving Equations	10%	13%	0%
State Goal 9 – Geometry	19%	24%	0%
Standard 9A Properties of Single Figures and Coordinate Geometry	14%	17%	0%
Standard 9B Relationships Between and Among Multiple Figures	1%	1%	0%
Standard 9C Justifications of Conjectures and Conclusions	1%	1%	0%
Standard 9D Trigonometry	3%	5%	0%
State Goal 10 – Data Analysis, Statistics, and Probability	4%	7%	0%
Standards 10A, 10B Data Analysis and Statistics	3%	5%	0%
Standard 10C Probability	1%	2%	0%

Note: The mathematics portion of the PSAE is a combination of the ACT Assessment Mathematics component and the WorkKeys *Applied Mathematics* Assessment component. Each component contributes 50% to the total PSAE Mathematics scale score.

*These percents are typical, based on an analysis of forms from multiple years. These percents in this chart were derived by considering only an item's primary classification.

The following objectives may lead to exam items involving multiplicative reasoning with rates. These are objectives for *both parts* of the PSAE (The ACT and the Work Keys.)

Mathematics – State Goal 6: Number Sense

Standards 6B, 6C – Computation, Operations, Estimation, and Properties

6.11.09 Solve problems involving estimates or data (e.g., use averages to estimate the cost of a job that includes labor and materials).

6.11.13 Set up, evaluate, or solve single- and multi-step number sentences and word problems with rational numbers using the four basic operations.

6.11.14 Determine the most cost effective option using single- and multi-step calculations and then comparing results.

Standard 6D – Ratios, Proportions, and Percents

6.11.17 Set up, evaluate, or solve number sentences or word problems involving ratios and proportions with rational numbers (e.g., scale drawing, unit rate, scale factor, rate of change).

6.11.18 Set up, evaluate, or solve common problems involving percent (e.g., sales tax, tip, interest, discount, markup, commission, compound interest).

6.11.19 Set up, evaluate, or solve problems stated in terms of direct and inverse variation of simple quantities.

Mathematics – State Goal 7: Measurement

Standards 7A, 7B, 7C – Units, Tools, Estimation, and Applications

7.11.01 Change from one unit to another within the same system of measurement, including calculations with mixed units (e.g., $3\frac{1}{2}$ hours plus 4 hours and 20 minutes; $2\frac{1}{2}$ feet minus 16 inches).

7.11.02 Change from one unit in one system of measurement to a unit in another system of measurement, given a conversion factor.

7.11.07 Use measures expressed as rates (e.g., speed, density), measures expressed as products (e.g., person-days), and dimensional analysis (e.g., converting ft/sec to yards/min) to solve problems.

Mathematics – State Goal 8: Algebra

Standard 8A – Representations, Patterns, and Expressions

8.11.05 Model and describe slope as a constant rate of change.

Standard 8B – Connections Using Tables, Graphs, and Symbols

8.11.13 Represent quantitative relationships graphically, and interpret the meaning of the graph or a specific part of the graph as it relates to the situation represented by the graph.

Standards 8C, 8D – Writing, Interpreting, and Solving Equations

8.11.14 Model problems using mathematical functions and relations (e.g., linear, non-linear).