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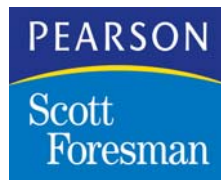
**SCOTT FORESMAN ■ ADDISON WESLEY**

**Mathematics**

to the

**Pennsylvania  
Academic Standards  
for Mathematics**

Grades K-6



O/M-155

## INTRODUCTION

This document demonstrates the high degree of success students will achieve when using **Scott Foresman – Addison Wesley Mathematics** in meeting the objectives of the Pennsylvania Academic Standards for Mathematics. Correlation page references are to the Teacher Edition, which contains facsimile Pupil Edition pages. The Kindergarten – Grade Three Teacher’s Editions are correlated to the Grade 3 standards; Grade Four and Grade Five Teacher’s Editions are correlated to the Grade 5 standards and the Grade Six Teacher’s Edition is correlated to the Grade 8 standards.

**Scott Foresman – Addison Wesley Mathematics** was carefully developed to reflect the specific needs of students and teachers at every grade level, while maintaining an overall primary goal: to have math make sense from every perspective. This program is based on scientific research that describes how children learn mathematics well and on classroom-based evidence that validates proven reliability.

### ● Reaching All Learners

**Scott Foresman – Addison Wesley Mathematics** addresses the needs of every student through structured instruction that makes concepts easier for students to grasp. Lessons provide step-by-step examples that show students how to think about and solve the problem. Built-in leveled practice in every lesson allows the teacher to customize instruction to match students’ abilities. Reaching All Learners, featured in the Teacher Edition, helps teachers meet the diverse needs of the classroom with fun and stimulating activities that are easy to incorporate directly into the lesson plan.

### ● Test Prep

**Scott Foresman - Addison Wesley Mathematics** builds understanding through connections to prior knowledge, math strands, other subjects and the real world. It provides practice for maximum results and offers assessment in a variety of ways. Besides carefully placed reviews at the end of each Section, an important Test Prep strand runs throughout the program. Writing exercises prepare students for open-ended and short-or extended-response questions on state and national tests. Spiral review in a test format help students keep their test-taking skills sharp.

### ● Priority on problem solving:

Problem-solving instruction is systematic and explicit. Reading connections help children with problem-solving skills and strategies for math. Reading for Math Success encourages students to use the reading skills and strategies they already know to solve math problems.

### ● Instructional Support

In the Teacher Edition, the Lesson Planner provides an easy, at-a-glance planning tool. It identifies objectives, math understandings, focus questions, vocabulary, and resources for each lesson in the chapter. Professional Development at the beginning of each chapter in the Teacher Edition includes a Skills Trace as well as Math Background and Teaching Tips for each section in the chapter.

Ancillaries help to reach all learners with practice, problem solving, hands-on math, language support, assessment and teacher support. Technology resources for both the student and the teacher provide a whole new dimension to math instruction by helping to create motivating and engaging lessons.

# Table of Contents

<b>2.1. Numbers, Number Systems and Number Relationships.....</b>	<b>1</b>
<b>2.2. Computation and Estimation.....</b>	<b>7</b>
<b>2.3. Measurement and Estimation.....</b>	<b>12</b>
<b>2.4. Mathematical Reasoning and Connections.....</b>	<b>16</b>
<b>2.5. Mathematical Problem Solving and Communication.....</b>	<b>19</b>
<b>2.6. Statistics and Data Analysis.....</b>	<b>25</b>
<b>2.7. Probability and Predictions.....</b>	<b>28</b>
<b>2.8. Algebra and Functions.....</b>	<b>31</b>
<b>2.9. Geometry.....</b>	<b>36</b>
<b>2.10. Trigonometry.....</b>	<b>41</b>
<b>2.11. Concepts of Calculus.....</b>	<b>43</b>

**Scott Foresman – Addison Wesley Mathematics  
to the  
Pennsylvania Academic Standards for Mathematics**

**Grades K-6**

**2.1. Numbers, Number Systems and Number Relationships**

**2.1.3. GRADE 3**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:*

**A. Count using whole numbers (to 10,000) and by 2's, 3's, 5's, 10's, 25's and 100's.**

**K :** 53A-53B, 53-54, 57A-57B, 57-58, 77A-77B, 77-78, 79A-79B, 79-80, 83A-83B, 83-84, 103A-103B, 103-104, 115A-115B, 115-116, 289A-289B, 289-290, 291A-291B, 291-292

**1 :** 243A-243B, 243-244, 247A-247B, 247-248, 255A-255B, 255-256, 257A-257B, 257-258

**2 :** 99A-99B, 99-100

**3 :** 8A-8B, 8-9, 24A-24B, 24-25, 96A-96B, 96-97

**B. Use whole numbers and fractions to represent quantities.**

**K :** 55A-55B, 55-56, 59A-59B, 59-60, 61A-61B, 61-62, 81A-81B, 81-82, 85A-85B, 85-86, 213A-213B, 213-214, 215A-215B, 215-216

**1 :** 11A-11B, 11-12, 13A-13B, 13-14, 15A-15B, 15-16, 17A-17B, 17-18, 181A-181B, 181-182, 183A-183B, 183-184, 185A-185B, 185-186, 241A-241B, 241-242, 267A-267B, 267-268

**2 :** 81A-81B, 81-82, 83A-83B, 83-84, 85A-85B, 85-86, 95A-95B, 95-96, 101A-101B, 101-102, 103A-103B, 103-104, 269A-269B, 269-270, 271A-271B, 271-272, 273A-273B, 273-274, 275A-275B, 275-276, 277A-277B, 277-278

**3 :** 4A-4B, 4-5, 6A-6B, 6-7, 8A-8B, 8-9, 10A-10B, 10-11, 12A-12B, 12-13, 498A-498B, 498-501, 502A-502B, 502-503, 564A-564B, 564-565, 566A-566B, 566-567

**C. Represent equivalent forms of the same number through the use of concrete objects, drawings, word names and symbols.**

**K :** 55A-55B, 55-56, 59A-59B, 59-60, 61A-61B, 61-62, 81A-81B, 81-82, 85A-85B, 85-86

**1 :** 181A-181B, 181-182, 183A-183B, 183-184, 185A-185B, 185-186

**2 :** 269A-269B, 269-270, 271A-271B, 271-272, 273A-273B, 273-274, 275A-275B, 275-276, 277A-277B, 277-278

**3** : 498A-498B, 498-501, 502A-502B, 502-503, 564A-564B, 564-565, 566A-566B, 566-567

**D. Use drawings, diagrams or models to show the concept of fraction as part of a whole.**

**K** : 211A-211B, 211-212, 213A-213B, 213-214, 215A-215B, 215-216

**1** : 181A-181B, 181-182, 183A-183B, 183-184, 185A-185B, 185-186

**2** : 269A-269B, 269-270, 271A-271B, 271-272, 273A-273B, 273-274, 275A-275B, 275-276, 277A-277B, 277-278

**3** : 498A-498B, 498-501, 502A-502B, 502-503

**E. Count, compare and make change using a collection of coins and one-dollar bills.**

**K** : 179A-179B, 179-180, 181A-181B, 181-182, 183A-183B, 183-184, 187A-187B, 187-188, 189A-189B, 189-A90

**1** : 331A-331B, 331-332, 333A-333B, 333-334, 335A-335B, 335-336, 337A-337B, 337-338, 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348

**2** : 109A-109B, 109-110, 111A-111B, 111-112, 113A-1113B, 113-114, 115A-115B, 115-116, 119A-119B, 119-120

**3** : 36A-36B, 36-39, 40A-40B, 40-41

**F. Apply number patterns (even and odd) and compare values of numbers on the hundred board.**

**K** : 95A-95B, 95-96, 113A-113B, 113-114, 293A-293B, 293-294, 295A-295B, 295-296, 297A-297B, 297-298

**1** : 3A-3B, 3-4, 5A-5B, 5-6, 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262, 265A-265B, 265-266

**2** : 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468

**3** : 24-27, 277, 282, 286, 288-289, 332A-332B, 332-335, 340-341, 344-345

**G. Use concrete objects to count, order and group.**

**K** : 53A-53B, 53-54, 57A-57B, 57-58, 77A-77B, 77-78, 79A-79B, 79-80, 83A-83B, 83-84, 103A-103B, 103-104, 115A-115B, 115-116, 287A-287B, 287-288

**1** : 31A-31B, 31-32, 243A-243B, 243-244, 247A-247B, 247-248, 255A-255B, 255-256, 257A-257B, 257-258, 295A-295B, 295-296, 297A-297B, 297-298, 299A-299B, 299-300, 301A-301B, 301-302

**2** : 81A-81B, 81-82, 83A-83B, 83-84, 85A-85B, 85-86, 95A-95B, 95-96, 101A-101B, 101-102, 103A-103B, 103-104

**3** : 4A-4B, 4-5, 6A-6B, 6-7, 8A-8B, 8-9, 10A-10B, 10-11, 12A-12B, 12-13, 22A-22B, 22-23, 564A-564B, 564-565, 566A-566B, 566-567

**H. Demonstrate an understanding of one-to-one correspondence.****K :** 27A-27B, 27-28, 29A-29B, 29-30, 31A-31B, 31-32, 33A-33B, 33-34**1 :** 307A-307B, 307-308, 309A-309B, 309-310, 311A-311B, 311-312, 313A-313B, 313-314**2 :** 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 325A-325B, 325-326, 327A-327B, 327-328**3 :** 212A-212B, 212-215, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235**I. Apply place-value concepts and numeration to counting, ordering and grouping.****K :** 289A-289B, 289-290**1 :** 281A-281B, 281-282, 283A-283B, 283-284, 284A-284B, 284-285, 287A-287B, 287-288, 295A-295B, 295-296, 297A-297B, 297-298, 299A-299B, 299-300, 301A-301B, 301-302**2 :** 81A-81B, 81-82, 83A-83B, 83-84, 85A-85B, 85-86, 87A-87B, 87-88, 89A-89B, 89-90**3 :** 4A-4B, 4-5, 6A-6B, 6-7, 8A-8B, 8-9, 10A-10B, 10-11, 12A-12B, 12-13, 22A-22B, 22-23, 564A-564B, 564-565, 566A-566B, 566-567**J. Estimate, approximate, round or use exact numbers as appropriate.****K :** 119A-119B, 119-120**1 :** 141A-141B, 141-142, 249A-249B, 249-250, 439A-439B, 439-440**2 :** 141A-141B, 141-142, 149A-149B, 149-150, 191A-191B, 191-192, 229A-229B, 229-230, 429A-429B, 429-430, 445A-445B, 445-446**3 :** 80A-80B, 80-81, 82A-82B, 82-83, 86A-86B, 86-89, 90A-90B, 90-91, 94A-94B, 94-95, 96A-96B, 96-97, 98A-98B, 98-101, 160A-160B, 160-161**K. Describe the inverse relationship between addition and subtraction.****K :** Preparation : 255-256, 275-276**1 :** 137A-137B, 137-138, 139A-139B, 139-140, 141A-141B, 141-142**2 :** 65A-65B, 65-66**3 :** 70A-70B, 70-71**L. Demonstrate knowledge of basic facts in four basic operations.****K :** 91A-91B, 91-92, 93A-93B, 93-94, 95A-95B, 95-96, 97A-97B, 97-98, 103A-103B, 103-104, 105A-105B, 105-106, 107A-107B, 107-108, 125A-125B, 125-126, 127A-127B, 127-128, 129A-129B, 129-130**1 :** 91A-91B, 91-92, 93A-93B, 93-94, 95A-95B, 95-96, 97A-97B, 97-98, 103A-103B, 103-104, 105A-105B, 105-106, 107A-107B, 107-108, 125A-125B, 125-126, 127A-127B, 127-128, 129A-129B, 129-130**2 :** 135A-135B, 135-136, 137A-137B, 137-138, 139A-139B, 139-140, 141A-141B, 141-142, 145A-145B, 145-146, 147A-147B, 147-148, 149A-149B, 149-150, 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 185A-185B, 185-186, 187A-187B, 187-188, 189A-189B, 189-190, 191A-191B, 191-192, 193A-193B, 193-194

**3** : 126A-126B, 126-127, 128A-128B, 128-131, 132A-132B, 132-135, 136A-136B, 136-139, 146A-146B, 146-147, 148A-148B, 148-149, 150A-150B, 150-151, 152A-152B, 152-155, 156A-156B, 156-157, 162A-162B, 162-165, 166A-166B, 166-167, 276A-276B, 276-279, 280A-280B, 280-281, 282A-282B, 282-283, 286A-286B, 286-287, 288A-288B, 288-291, 292A-292B, 292-293, 316A-316B, 316-317, 318A-318B, 318-319, 320A-320B, 320-323, 324A-324B, 324-327, 328A-328B, 328-331, 386A-386B, 386-387, 388A-388B, 388-389, 390A-390B, 390-391, 392A-392B, 392-393, 396A-396B, 396-397, 402A-402B, 402-403

### 2.1.5. GRADE 5

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:*

**A. Use expanded notation to represent whole numbers or decimals.**

**4** : 4A-4B, 4-7, 8A-8B, 8-9

**5** : 4A-4B, 4-5, 8A-8B, 8-11

**B. Apply number theory concepts to rename a number quantity (e.g., six,  $6 \overline{)12}$ ,  $3 \times 2$ ,  $10 - 4$ ).**

**4** : 256A-256B, 256-257, 402A-402B, 402-403, 406A-406B, 406-407

**5** : 162A-162B, 162-163, 164A-164B, 164-167

**C. Demonstrate that mathematical operations can represent a variety of problem situations.**

**4** : 76A-76B, 76-79, 80A-80B, 80-81, 82A-82B, 82-85, 86A-86B, 86-89, 270A-270B, 270-273, 274A-274B, 274-277, 332A-332B, 332-335, 336A-336B, 336-337, 380A-380B, 380-383, 386A-386B, 386-389, 390A-390B, 390-391

**5** : 36A-36B, 36-37, 38A-38B, 38-39, 40A-40B, 40-41, 88A-88B, 88-91, 94A-94B, 94-97, 152A-152B, 152-155, 156A-156B, 156-157, 158A-158B, 158-159, 160A-160B, 160-161, 202A-202B, 202-203, 214A-214B, 214-217, 218A-218B, 218-221, 224A-224B, 224-225, 230A-230B, 230-231, 232A-232B, 232-233, 234A-234B, 234-237, 460A-460B, 460-461, 462A-462B, 462-463, 464A-464B, 464-465, 466A-466B, 466-469, 472A-472B, 472-473, 474A-474B, 474-475, 476A-476B, 476-477, 478A-478B, 478-483

**D. Use models to represent fractions and decimals.**

**4** : 500A-500B, 500-501, 502A-502B, 502-503, 624A-624B, 624-627, 628A-628B, 628-629

**5** : 12A-12B, 12-13, 394A-394B, 394-397

**E. Explain the concepts of prime and composite numbers.**

4 : Preparation : 402-403

5 : 162A-162B, 162-163, 164A-164B, 164-167

**F. Use simple concepts of negative numbers (e.g., on a number line, in counting, in temperature).**

4 : Preparation : 664-665

5 : 712A-712B, 712-715, 716A-716B, 716-717, 718A-718B, 718-719

**G. Develop and apply number theory concepts (e.g., primes, factors, multiples, composites) to represent numbers in various ways.**

4 : 256A-256B, 256-257, 402A-402B, 402-403, 406A-406B, 406-407

5 : 162A-162B, 162-163, 164A-164B, 164-167

**2.1.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:*

**A. Represent and use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, exponents, scientific notation, square roots).**

6: 110A-110B, 110-111, 172A-172B, 172-175, 358A-358B, 358-361, 408A-408B, 408-409

**B. Simplify numerical expressions involving exponents, scientific notation and using order of operations.**

6: 24A-24B, 24-27, 28A-28B, 28-29, 40A-40B, 40-43, 44A-44B, 44-47, 110A-110B, 110-111

**C. Distinguish between and order rational and irrational numbers.**

6: 412A-412B, 412-413

**D. Apply ratio and proportion to mathematical problem situations involving distance, rate, time and similar triangles.**

6: 300A-300B, 300-301, 302A-302B, 302-305, 306A-306B, 306-309, 316A-316B, 316-317, 318A-318B, 318-321, 322A-322B, 322-323, 330A-330B, 330-333

**E. Simplify and expand algebraic expressions using exponential forms.**

6: 106A-106B, 106-109, 110A-110B, 110-111

**F. Use the number line model to demonstrate integers and their applications.**

6: 408A-408B, 408-409, 410A-410B, 410-411, 412A-412B, 412-413



**G. Use the inverse relationships between addition, subtraction, multiplication, division, exponentiation and root extraction to determine unknown quantities in equations.**

**6:** 444A-444B, 444-447, 448A-448B, 448-449, 718A-718B, 718-721

**2.2. Computation and Estimation****2.2.3. GRADE 3**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:*

**A. Apply addition and subtraction in everyday situations using concrete objects.**

- K :** 91A-91B, 91-92, 93A-93B, 93-94, 95A-95B, 95-96, 97A-97B, 97-98, 103A-103B, 103-104, 105A-105B, 105-106, 107A-107B, 107-108, 125A-125B, 125-126, 127A-127B, 127-128, 129A-129B, 129-130
- 1 :** 91A-91B, 91-92, 93A-93B, 93-94, 95A-95B, 95-96, 97A-97B, 97-98, 103A-103B, 103-104, 105A-105B, 105-106, 107A-107B, 107-108, 125A-125B, 125-126, 127A-127B, 127-128, 129A-129B, 129-130
- 2 :** 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 211A-211B, 211-212, 213A-213B, 213-214, 215A-215B, 215-216, 217A-217B, 217-218, 433A-433B, 433-434, 435A-435B, 435-436, 449A-449B, 449-450, 451A-451B, 451-452
- 3 :** 66A-66B, 66-69, 80A-80B, 80-81, 82A-82B, 82-85, 86A-86B, 86-89, 94A-94B, 94-95, 96A-96B, 96-97, 126A-126B, 126-127, 128A-128B, 128-131, 132A-132B, 132-135, 136A-136B, 136-139, 146A-146B, 146-147, 148A-148B, 148-149, 150A-150B, 150-151, 152A-152B, 152-155, 156A-156B, 156-157, 162A-162B, 162-165, 166A-166B, 166-167

**B. Solve single- and double-digit addition and subtraction problems with regrouping in vertical form.**

- K :** 417A-417B, 417-418, 419A-419B, 419-420, 425A-425B, 425-426, 435A-435B, 435-436, 437A-437B, 437-438, 439A-439B, 439-440; 459A-459B, 459-460, 461A-461B, 461-462, 463A-463B, 463-464, 465A-465B, 465-466, 471A-471B, 471-472, 473A-473B, 473-474, 475A-475B, 475-476, 477A-477B, 477-478
- 1 :** 417A-417B, 417-418, 419A-419B, 419-420, 425A-425B, 425-426, 435A-435B, 435-436, 437A-437B, 437-438, 439A-439B, 439-440; 459A-459B, 459-460, 461A-461B, 461-462, 463A-463B, 463-464, 465A-465B, 465-466, 471A-471B, 471-472, 473A-473B, 473-474, 475A-475B, 475-476, 477A-477B, 477-478
- 2 :** 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 211A-211B, 211-212, 213A-213B, 213-214, 215A-215B, 215-216, 217A-217B, 217-218, 433A-433B, 433-434, 435A-435B, 435-436, 449A-449B, 449-450, 451A-451B, 451-452
- 3 :** 126A-126B, 126-127, 128A-128B, 128-131, 132A-132B, 132-135, 136A-136B, 136-139, 146A-146B, 146-147, 148A-148B, 148-149, 150A-150B, 150-151, 152A-152B, 152-155, 156A-156B, 156-157, 162A-162B, 162-165, 166A-166B, 166-167

**C. Demonstrate the concept of multiplication as repeated addition and arrays.****K** : Preparation : 293-294, 295-296**1** : Preparation: 255-256, 257-258, 261-262**2** : 467A-467B, 467-478, 469A-469B, 469-470, 471A-471B, 471-472, 473A-473B, 473-474, 475A-475B, 475-476**3** : 260A-260B, 260-261, 262A-262B, 262-265**D. Demonstrate the concept of division as repeated subtraction and as sharing.****K** : Preparation : 265-266**1** : Preparation : 61-62**2** : 483A-483B, 483-484, 485A-485B, 485-486**3** : 370A-370B, 370-371, 372A-372B, 372-373**E. Use estimation skills to arrive at conclusions.****K** : 119A-119B, 119-120**1** : 141A-141B, 141-142, 249A-249B, 249-250, 439A-439B, 439-440**2** : 141A-141B, 141-142, 149A-149B, 149-150, 191A-191B, 191-192, 229A-229B, 229-230, 429A-429B, 429-430, 445A-445B, 445-446**3** : 80A-80B, 80-81, 82A-82B, 82-83, 86A-86B, 86-89, 90A-90B, 90-91, 94A-94B, 94-95, 96A-96B, 96-97, 98A-98B, 98-101, 160A-160B, 160-161**F. Determine the reasonableness of calculated answers.****K** : Preparation: 251A-251B, 251-253, 253A-253B, 253-254, 255A-255B, 255-256, 257A-257B, 257-258, 271A-271B, 271-272, 273A-273B, 273-274, 275A-275B, 275-276, 277A-277B, 277-278**1** : 141A-141B, 141-142, 439A-439B, 439-440**2** : 175A-175B, 175-176, 177A-177B, 177-178, 179A-179B, 179-180, 181A-181B, 181-182, 185A-185B, 185-186, 187A-187B, 187-188, 189A-189B, 189-190, 191A-191B, 191-192, 193A-193B, 193-194, 227A-227B, 227-228**3** : 80A-80B, 80-81, 82A-82B, 82-83, 86A-86B, 86-89, 90A-90B, 90-91, 94A-94B, 94-95, 96A-96B, 96-97, 98A-98B, 98-101, 160A-160B, 160-161**G. Explain addition and subtraction algorithms with regrouping.****K** : Preparation : 417A-417B, 417-418, 419A-419B, 419-420, 425A-425B, 425-426, 435A-435B, 435-436, 437A-437B, 437-438, 439A-439B, 439-440; 459A-459B, 459-460, 461A-461B, 461-462, 463A-463B, 463-464, 465A-465B, 465-466, 471A-471B, 471-472, 473A-473B, 473-474, 475A-475B, 475-476, 477A-477B, 477-478**1** : 465A-465B, 465-466, 477A-477B, 477-478**2** : 179A-179B, 179-180, 181A-181B, 181-182, 185A-185B, 185-186, 211A-211B, 211-212, 215A-215B, 215-216, 225A-225B, 225-226, 433A-433B, 433-444, 435A-435B, 435-436, 449A-449B, 449-450, 451A-451B, 451-452**3** : 126A-126B, 126-127, 128A-128B, 128-131, 132A-132B, 132-135, 136A-136B, 136-139, 146A-146B, 146-147, 148A-148B, 148-149, 150A-150B, 150-151, 152A-152B, 152-155, 156A-156B, 156-157, 162A-162B, 162-165, 166A-166B, 166-167

**2.2.5. GRADE 5**

***Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:***

**A. Create and solve word problems involving addition, subtraction, multiplication and division of whole numbers.**

**4 :** 76A-76B, 76-79, 80A-80B, 80-81, 82A-82B, 82-85, 86A-86B, 86-89, 270A-270B, 270-273, 274A-274B, 274-277, 332A-332B, 332-335, 336A-336B, 336-337, 380A-380B, 380-383, 386A-386B, 386-389, 390A-390B, 390-391

**5 :** 36A-36B, 36-37, 38A-38B, 38-39, 40A-40B, 40-41, 88A-88B, 88-91, 94A-94B, 94-97, 152A-152B, 152-155, 156A-156B, 156-157, 158A-158B, 158-159, 160A-160B, 160-161, 202A-202B, 202-203, 214A-214B, 214-217, 218A-218B, 218-221, 224A-224B, 224-225, 230A-230B, 230-231, 232A-232B, 232-233, 234A-234B, 234-237, 460A-460B, 460-461, 462A-462B, 462-463, 464A-464B, 464-465, 466A-466B, 466-469, 472A-472B, 472-473, 474A-474B, 474-475, 476A-476B, 476-477, 478A-478B, 478-483

**B. Develop and apply algorithms to solve word problems that involve addition, subtraction, and/or multiplication with decimals with and without regrouping.**

**4 :** 638A-638B, 638-641, 642A-642B, 642-645

**5 :** 38A-38B, 38-39, 40A-40B, 40-41, 88A-88B, 88-91, 92A-92B, 92-93, 94A-94B, 94-97

**C. Develop and apply algorithms to solve word problems that involve addition, subtraction, and/or multiplication with fractions and mixed numbers that include like and unlike denominators.**

**4 :** 564A-564B, 564-567, 568A-568B, 568-571, 574A-754B, 574-577, 578A-578B, 578-583

**5 :** 460A-460B, 460-461, 462A-462B, 462-463, 464A-464B, 464-465, 466A-466B, 466-469, 472A-472B, 472-473, 474A-474B, 474-475, 476A-476B, 476-477, 478A-478B, 478-479

**D. Demonstrate the ability to round numbers.**

**4 :** 62A-62B, 62-63, 64A-64B, 64-67, 68A-68B, 68-71, 72A-72B, 72-73, 258A-258B, 258-261, 316A-316B, 316-319, 368A-368B, 368-371, 636A-636B, 636-637

**5 :** 28A-28B, 28-31, 68A-68B, 68-70, 86A-86B, 86-87, 138A-138B, 138-143, 204A-204B, 204-209, 474A-474B, 474-475, 494A-494B, 494-495, 672A-672B, 672-675

- E. Determine through estimations the reasonableness of answers to problems involving addition, subtraction, multiplication and division of whole numbers.**
- 4 :** 62A-62B, 62-63, 64A-64B, 64-67, 68A-68B, 68-71, 72A-72B, 72-73, 258A-258B, 258-261, 316A-316B, 316-319, 368A-368B, 368-371, 636A-636B, 636-637
- 5 :** 28A-28B, 28-31, 68A-68B, 68-70, 86A-86B, 86-87, 138A-138B, 138-143, 204A-204B, 204-209, 474A-474B, 474-475, 494A-494B, 494-495, 672A-672B, 672-675
- F. Demonstrate skills for using fraction calculators to verify conjectures, confirm computations and explore complex problem-solving situations.**
- 4 :** 564A-564B, 564-567, 568A-568B, 568-571, 574A-754B, 574-577, 578A-578B, 578-583
- 5 :** 460A-460B, 460-461, 462A-462B, 462-463, 464A-464B, 464-465, 466A-466B, 466-469, 472A-472B, 472-473, 474A-474B, 474-475, 476A-476B, 476-477, 478A-478B, 478-479
- G. Apply estimation strategies to a variety of problems including time and money.**
- 4 :** 62A-62B, 62-63, 64A-64B, 64-67, 68A-68B, 68-71, 72A-72B, 72-73, 258A-258B, 258-261, 316A-316B, 316-319, 368A-368B, 368-371, 636A-636B, 636-637
- 5 :** 28A-28B, 28-31, 68A-68B, 68-70, 86A-86B, 86-87, 138A-138B, 138-143, 204A-204B, 204-209, 474A-474B, 474-475, 494A-494B, 494-495, 672A-672B, 672-675
- H. Explain multiplication and division algorithms.**
- 4 :** 124A-124B, 124-127, 128A-128B, 128-131, 132A-132B, 132-135, 136A-136B, 136-139, 146A-146B, 146-147, 148A-148B, 148-149, 150A-150B, 150-151, 152A-152B, 152-153
- 5 :** 72A-72B, 72-75, 76A-76B, 76-77, 152A-152B, 152-155, 156A-156B, 156-157, 158A-158B, 158-159, 162A-162B, 162-163
- I. Select a method for computation and explain why it is appropriate.**
- 4 :** 76A-76B, 76-79, 80A-80B, 80-81, 82A-82B, 82-85, 86A-86B, 86-89, 270A-270B, 270-273, 274A-274B, 274-277, 332A-332B, 332-335, 336A-336B, 336-337, 380A-380B, 380-383, 386A-386B, 386-389, 390A-390B, 390-391
- 5 :** 36A-36B, 36-37, 38A-38B, 38-39, 40A-40B, 40-41, 88A-88B, 88-91, 94A-94B, 94-97, 152A-152B, 152-155, 156A-156B, 156-157, 158A-158B, 158-159, 160A-160B, 160-161, 202A-202B, 202-203, 214A-214B, 214-217, 218A-218B, 218-221, 224A-224B, 224-225, 230A-230B, 230-231, 232A-232B, 232-233, 234A-234B, 234-237, 460A-460B, 460-461, 462A-462B, 462-463, 464A-464B, 464-465, 466A-466B, 466-469, 472A-472B, 472-473, 474A-474B, 474-475, 476A-476B, 476-477, 478A-478B, 478-483

**2.2.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:*

**A. Complete calculations by applying the order of operations.**

**6:** 24A-24B, 24-27, 28A-28B, 28-29, 48A-48B, 48-51

**B. Add, subtract, multiply and divide different kinds and forms of rational numbers including integers, decimal fractions, percents and proper and improper fractions.**

**6:** 86A-86B, 86-89, 90A-90B, 90-93, 94A-94B, 94-97, 100A-100B, 100-103, 204-205, 206A-206B, 206-211, 218A-218B, 218-219, 220A-220B, 220-223, 248A-248B, 248-251, 252A-252B, 252-255, 258A-258B, 258-259, 266A-266B, 266-267, 270A-270B, 270-271

**C. Estimate the value of irrational numbers.**

**6:** Preparation: 106A-106B, 106-109, 110A-110B, 110-111

**D. Estimate amount of tips and discounts using ratios, proportions and percents.**

**6:** 380A-380B, 380-383, 384A-384B, 384-385, 386A-386B, 386-387

**E. Determine the appropriateness of overestimating or underestimating in computation.**

**6:** 16A-16B, 16-17, 18A-18B, 18-19, 216A-216B, 216-217, 256A-256B, 256-257, 368A-368B, 368-369

**F. Identify the difference between exact value and approximation and determine which is appropriate for a given situation.**

**6:** 16A-16B, 16-17, 18A-18B, 18-19, 216A-216B, 216-217, 256A-256B, 256-257, 368A-368B, 368-369

**2.3. Measurement and Estimation****2.3.3. GRADE 3**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Compare measurable characteristics of different objects on the same dimensions (e.g., time, temperature, area, length, weight, capacity, perimeter).**

**K :** 139A-139B, 139-140, 147A-147B, 147-148, 151A-151B, 151-152

**1 :** 365A-365B, 365-366, 369A-369B, 369-370, 371A-371B, 371-372, 373A-373B, 373-374, 375A-375B, 375-376, 383A-383B, 383-384, 385A-385B, 385-386, 387A-387B, 387-388, 389A-389B, 389-390, 391A-391B, 391-392, 393A-393B, 393-394, 397A-397B, 397-398

**2 :** 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348, 355A-355B, 355-356, 357A-357B-357-358, 365A-365B, 365-366, 367A-367B, 367-368, 369A-369B, 369-370

**3 :** 532A-532B, 532-533, 680A-680B, 680-683, 690A-690B, 690-693

**B. Determine the measurement of objects with non-standard and standard units (e.g., US customary and metric).**

**K :** 133A-133B, 133-134, 135A-135B, 135-136, 137A-137B, 137-138, 145A-145B, 145-146, 149A-149B, 149-150

**1 :** 365A-365B, 365-366, 383A-383B, 383-384

**2 :** 341A-341B, 341-342, 353A-353B, 353-354, 363A-363B, 363-364

**3 :** 464A-464B, 464-465, 468A-468B, 468-471, 472A-472B, 472-473, 532A-532B, 532-533

**C. Determine and compare elapsed times.**

**K :** Preparation : 171A-171B, 171-172, 173A-173B, 173-174, 175A-175B, 175-176, 177A-177B, 177-178

**1 :** 221A-221B, 221-222

**2 :** 299A-299B, 299-300

**3 :** 198A-198B, 198-199

**D. Tell time (analog and digital) to the minute.**

**K :** 171A-171B, 171-172, 173A-173B, 173-174, 175A-175B, 175-176, 177A-177B, 177-178

**1 :** 205A-205B, 205-206, 207A-207B, 207-208, 209A-209B, 209-210, 211A-211B, 211-212

**2 :** 291A-291B, 291-292, 293A-293B, 293-294, 295A-295B, 295-296

**3 :** 192A-192B, 192-195, 196A-196B, 196-197, 198A-198B, 198-199

**E. Determine the appropriate unit of measure.****K** : 141A-141B, 141-142, 147A-147B, 147-148, 151A-151B, 151-152**1** : 365A-365B, 365-366, 371A-371B, 371-372, 373A-373B, 373-374, 375A-375B, 375-376, 383A-383B, 383-384, 389A-389B, 389-390**2** : 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348, 365A-365B, 365-366, 367A-367B, 367-368**3** : 464A-464B, 464-465, 468A-468B, 468-471, 472A-472B, 472-473, 532A-532B, 532-533**F. Use concrete objects to determine area and perimeter.****K** : Preparation : 135-136, 137-138, 139-140, 141-142**1** : 377A-377B, 377-378**2** : Preparation : 343-344, 345-346, 347-348**3** : 464A-464B, 464-467, 468A-468B, 468-471**G. Estimate and verify measurements.****K** : 141A-141B, 141-142, 147A-147B, 147-148, 151A-151B, 151-152**1** : 371A-371B, 371-372, 373A-373B, 373-374, 375A-375B, 375-376, 383A-383B, 383-384, 389A-389B, 389-390**2** : 341A-341B, 341-342, 353A-353B, 353-354, 363A-363B, 363-364**3** : 532A-532B, 532-533, 680A-680B, 680-683, 690A-690B, 690-693**H. Demonstrate that a single object has different attributes that can be measured in different ways (e.g., length, mass, weight, time, area, temperature, capacity, perimeter).****K** : 133A-133B, 133-134, 135A-135B, 135-136, 137A-137B, 137-138, 145A-145B, 145-146, 149A-149B, 149-150**1** : 365A-365B, 365-366, 371A-371B, 371-372, 373A-373B, 373-374, 375A-375B, 375-376, 383A-383B, 383-384, 389A-389B, 389-390**2** : 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348, 355A-355B, 355-356, 357A-357B-357-358, 365A-365B, 365-366, 367A-367B, 367-368, 369A-369B, 369-370**3** : 464A-464B, 464-465, 468A-468B, 468-471, 472A-472B, 472-473, 532A-532B, 532-533**2.3.5. GRADE 5****A. Select and use appropriate instruments and units for measuring quantities (e.g., perimeter, volume, area, weight time, temperature).****4** : 464A-464B, 464-467, 468A-468B, 468-473, 588A-588B, 588-589, 652A-652B, 652-653**5** : 528A-528B, 528-531, 534A-534B, 534-535, 568A-568B, 568-569, 620A-620B, 620-621, 622A-622B, 622-623



**B. Select and use standard tools to measure the size of figures with specified accuracy, including length, width, perimeter and area.**

4 : 464A-464B, 464-467, 468A-468B, 468-473, 588A-588B, 588-589, 652A-652B, 652-653

5 : 528A-528B, 528-531, 534A-534B, 534-535, 568A-568B, 568-569, 620A-620B, 620-621, 622A-622B, 622-623

**C. Estimate, refine and verify specified measurements of objects.**

4 : 464A-464B, 464-467, 468A-468B, 468-473, 588A-588B, 588-589, 652A-652B, 652-653

5 : 528A-528B, 528-531, 534A-534B, 534-535, 568A-568B, 568-569, 620A-620B, 620-621, 622A-622B, 622-623

**D. Convert linear measurements within the same system.**

4 : 596A-596B, 596-599, 658A-658B, 658-661

5 : 536A-536B, 536-539

**E. Add and subtract measurements.**

4 : 596A-596B, 596-599, 658A-658B, 658-661, 664A-664B, 664-665

5 : 528A-528B, 528-531, 534A-534B, 534-535

**2.3.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Develop formulas and procedures for determining measurements (e.g., area, volume, distance).**

6: 484A-484B, 484-489, 494A-494B, 494-495, 496A-496B, 496-499, 500A-500B, 500-501

**B. Solve rate problems (e.g.,  $\text{rate} \times \text{time} = \text{distance}$ ,  $\text{principal} \times \text{interest rate} = \text{interest}$ ).**

6: 380A-380B, 380-383, 386A-386B, 386-387

**C. Measure angles in degrees and determine relations of angles.**

6: 476A-476B, 476-479, 480A-480B, 480-483

**D. Estimate, use and describe measures of distance, rate, perimeter, area, volume, weight, mass and angles.**

6: 484A-484B, 484-489, 494A-494B, 494-495, 496A-496B, 496-499, 500A-500B, 500-501

**E. Describe how a change in linear dimension of an object affects its perimeter, area and volume.**

**6:** 564A-564B, 564-567, 570A-570B, 570-571, 572A-572B, 572-575, 594A-594B, 594-597

**F. Use scale measurements to interpret maps or drawings.**

**6:** 330A-330B, 330-333

**G. Create and use scale models.**

**6:** 330A-330B, 330-333

**2.4. Mathematical Reasoning and Connections****2.4.3. GRADE 3**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Make, check and verify predictions about the quantity, size and shape of objects and groups of objects.**

**K :** 11A-11B, 11-12, 13A-13B, 13-14, 15A-15B, 15-16, 17A-17B, 17-18

**1 :** 157A-157B, 157-158, 159A-159B, 159-160, 161A-161B, 161-162

**2 :** 249A-249B, 249-250, 255A-255B, 255-256

**3 :** 450A-450B, 450-453, 454A-454B, 454-455

**B. Use measurements in everyday situations (e.g., determine the geography of the school building).**

**K :** 133B, 135B, 137B, 145B, 147B, 149B

**1 :** 365A-365B, 365-366, 371A-371B, 371-372, 373A-373B, 373-374, 375A-375B, 375-376, 383A-383B, 383-384, 389A-389B, 389-390

**2 :** 341A-341B, 341-342, 353A-353B, 353-354, 363A-363B, 363-364

**3 :** 464A-464B, 464-465, 468A-468B, 468-471, 472A-472B, 472-473, 532A-532B, 532-533

**2.4.5. GRADE 5**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Compare quantities and magnitudes of numbers.**

**4 :** 4A-4B, 4-7, 8A-8B, 8-9, 28A-28B, 28-29, 34A-34B, 34-37

**5 :** 6A-6B, 6-7, 12A-12B, 12-13, 418A-418B, 418-419, 420A-420B, 420-423, 430A-430B, 430-433

**B. Use models, number facts, properties and relationships to check and verify predictions and explain reasoning.**

**4 :** 203, 301, 302-303, 421, 422-423, 603, 635, 651, 662A-662B, 662-663, 669, 675, 676-677, 715, 717, 719, 725, 726-727

**5 :** 292A-292B, 292-293, 356A-356B, 356-357, 570A-570B, 570-571, 664A-664B, 664-665, 720A-720B, 720-721

**C. Draw inductive and deductive conclusions within mathematical contexts.**

**4 :** 12A-12B, 12-13, 24A-24B, 24-25, 38A-38B, 38-39, 90A-90B, 90-91, 94A-94B, 94-95, 140A-140B, 140-143, 156A-156B, 156-157, 198A-198B, 198-199, 222A-222B, 222-223, 278A-278B, 278-281, 290A-290B, 290-291, 326A-326B, 326-329, 342A-342B, 342-343, 384A-384B, 384-385, 396A-396B, 396-399, 460A-460B, 460-461, 474A-474B, 474-477, 512A-512B, 512-513, 538A-538B, 538-539, 584A-584B, 584-588, 600A-600B, 600-601, 648A-648B, 648-649, 662A-662B, 662-663, 696A-696B, 696-697, 714A-714B, 714-715

**5 :** 32A-32B, 32-33, 42A-42B, 42-43, 80A-80B, 80-81, 104A-104B, 104-105, 144A-144B, 144-145, 168A-168B, 168-169, 210A-210B, 210-211, 226A-226B, 226-227, 276A-276B, 276-279, 272A-272B, 272-273, 352A-352B, 352-355, 356A-356B, 356-357, 406A-406B, 406-407, 434A-434B, 434-437, 484A-484B, 484-487, 504A-504B, 504-505, 558A-558B, 558-559, 570A-570B, 570-571, 606A-606B, 606-607, 624A-624B, 624-625, 660A-660B, 660-661, 664A-664B, 664-665, 706A-706B, 706-709, 720A-720B, 720-721

**D. Distinguish between relevant and irrelevant information in a mathematical problem.**

**4 :** 696A-696B, 696-697

**5 :** 406A-406B, 406-407

**E. Interpret statements made with precise language of logic (e.g., “all”, “or”, “every”, “none”, “some”, “or”, “many”).**

**4 :** 704A-704B, 704-705, 706A-706B, 706-709, 710A-710B, 710-713

**5 :** 296A-296B, 296-299, 300A-300B, 300-301, 302A-302B, 302-305

**F. Use statistics to quantify issues (e.g., in social studies, in science).**

**4 :** 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 216A-216B, 216-221

**5 :** 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 286A-286B, 286-287

**2.4.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Make conjectures based on logical reasoning and test conjectures by using counter-examples.**

**6:** 20A-20B, 20-21, 36A-36B, 36-37, 52A-52B, 52-53, 98A-98B, 98-99, 116A-116B, 116-119, 156A-156B, 156-157, 180A-180B, 180-181, 212A-212B, 212-213, 226A-226B, 226-227, 264A-264B, 264-265, 278A-278B, 278-279, 312A-312B,

312-313, 324A-324B, 324-235, 362A-362B, 362-363, 374A-374B, 374-375, 414A-414B, 414-415, 434A-434B, 434-436, 490A-490B, 490-491, 512A-512B, 512-513, 560A-560B, 560-561, 582A-582B, 582-583, 648A-648B, 648-649, 674A-674B, 674-675, 676A-676B, 676-677, 706A-706B, 706-707, 710A-710B, 710-711

**B. Combine numeric relationships to arrive at a conclusion.**

6: 212A-212B, 212-213, 444A-444B, 444-447

**C. Use if...then statements to construct simple, valid arguments.**

6: 560A-560B, 560-561

**D. Construct, use and explain algorithmic procedures for computing and estimating with whole numbers, fractions, decimals and integers.**

6: 86A-86B, 86-89, 90A-90B, 90-93, 94A-94B, 94-97, 100A-100B, 100-103, 204A-204B, 204-205, 206A-206B, 206-211, 252A-252B, 252-255, 266A-266B, 266-267, 418A-418B, 418-421, 422A-422B, 422-425, 426A-426B, 426-427, 428A-428B, 428-429

**E. Distinguish between inductive and deductive reasoning.**

6: 560A-560B, 560-561

**F. Use measurements and statistics to quantify issues (e.g., in family, consumer science situations).**

6: 624A-624B, 624-627, 628A-628B, 628-631, 636A-636B, 636-637, 638A-638B, 638-641, 642A-642B, 642-647

**2.5. Mathematical Problem Solving and Communication****2.5.3. GRADE 3**

***Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:***

**A. Use appropriate problem-solving strategies (e.g., guess and check, working backwards).**

- K :** 19A-19B, 19-20, 21-22, 43A-43B, 43-44, 47-48, 67A-67B, 67-68, 71-72, 95A-95B, 95-96, 97-98, 125A-125B, 125-126, 127-128, 143A-143B, 143-144, 155-156, 185A-185B, 185-186, 191-192, 217A-217B, 217-218, 233A-233B, 233-234, 239-240, 249A-249B, 249-250, 259-260, 279A-279B, 279-280, 281-282, 297A-297B, 297-298
- 1 :** 7A-7B, 7-8, 21A-21B, 21-22, 33A-33B, 33-34, 57A-57B, 57-58, 71A-71B, 71-72, 79A-79B, 79-80, 99A-99B, 99-100, 111A-111B, 111-112, 113-113B, 113-114, 133A-133B, 133-134, 143A-143B, 143-144, 145A-145B, 145-146, 177A-177B, 177-178, 191A-191B, 191-192, 193A-193B, 193-194, 215A-215B, 215-216, 223A-223B, 223-224, 229A-229B, 229-230, 251A-251B, 251-252, 261A-261B, 261-262, 269A-269B, 269-270, 291A-291B, 291-292, 317A-317B, 317-318, 319A-319B, 319-320, 339A-339B, 339-340, 351A-351B, 351-352, 353A-353B, 353-354, 369A-369B, 369-370, 379A-379B, 379-380, 405A-405B, 405-406, 431A-431B, 431-432, 445A-445B, 445-446, 447A-447B, 447-448, 467A-467B, 467-468, 481A-481B, 481-482, 483A-483B, 483-484
- 2 :** 9A-9B, 9-10, 19A-19B, 19-20, 31-32, 57A-57B, 57-58, 67A-67B, 67-68, 69-70, 89A-89B, 89-90, 105A-105B, 105-106, 123-124, 155A-155B, 155-156, 161A-161B, 161-162, 163-164, 189A-189B, 189-190, 197A-197B, 197-198, 199-200, 221A-221B, 221-222, 233A-233B, 233-234, 235-236, 251A-251B, 251-252, 265A-265B, 265-266, 279-280, 311A-311B, 311-312, 327A-327B, 327-328, 329-330, 351A-351B, 351-352, 377A-377B, 377-378, 379-380, 405A-405B, 405-406, 413A-413B, 413-414, 415-416, 439A-439B, 439-440, 453A-453B, 453-454, 455-456, 479A-479B, 479-480, 487A-487B, 487-488, 489-490
- 3 :** 14A-14B, 14-15, 32A-32B, 32-33, 42A-42B, 42-43, 44-45, 76A-76B, 76-77, 102A-102B, 102-103, 104-105, 140A-140B, 140-143, 160A-160B, 160-161, 170-171, 216A-216B, 216-217, 236A-236B, 236-237, 238-239, 270A-270B, 270-273, 284A-284B, 284-285, 294-295, 332A-332B, 332-333, 346A-346B, 346-347, 348-349, 380A-380B, 380-381, 404A-404B, 404-405, 406-407, 436A-436B, 436-439, 474A-474B, 474-475, 476-477, 528A-528B, 528-529, 540A-540B, 540-541, 578A-578B, 578-579, 588A-588B, 588-589, 590-591, 644A-644B, 644-645, 656A-656B, 656-657, 658-659, 698A-698B, 698-699, 708A-708B, 708-709, 710-711

**B. Determine when sufficient information is present to solve a problem and explain how to solve a problem.**

**K :** 19A-19B, 19-20, 43A-43B, 43-44, 67A-67B, 67-68, 95A-95B, 95-96, 125A-125B, 125-126, 143A-143B, 143-144, 185A-185B, 185-186, 217A-217B, 217-218, 233A-233B, 233-234, 249A-249B, 249-250, 279A-279B, 279-280, 297A-297B, 297-298

**1 :** 7A-7B, 7-8, 21A-21B, 21-22, 57A-57B, 57-58, 71A-71B, 71-72, 99A-99B, 99-100, 111A-111B, 111-112, 133A-133B, 133-134, 143A-143B, 143-144, 177A-177B, 177-178, 191A-191B, 191-192, 215A-215B, 215-216, 223A-223B, 223-224, 251A-251B, 251-252, 261A-261B, 261-262, 291A-291B, 291-292, 317A-317B, 317-318, 339A-339B, 339-340, 351A-351B, 351-352, 369A-369B, 369-370, 379A-379B, 379-380, 431A-431B, 431-432, 445A-445B, 445-446, 467A-467B, 467-468, 481A-481B, 481-482

**2 :** 14A-14B, 14-15, 32A-32B, 42A-42B, 42-43, 76A-76B, 76-77, 102A-102B, 102-103, 104-105, 140A-140B, 160A-160B, 160-161, 216A-216B, 216-217, 236A-236B, 236-237, 270A-270B, 270-273, 284A-284B, 284-285, 332A-332B, 332-333, 346A-346B, 346-347, 380A-380B, 380-381, 404A-404B, 404-405, 436A-436B, 436-439, 474A-474B, 474-475, 528A-528B, 528-529, 540A-540B, 540-541, 578A-578B, 578-579, 588A-588B, 588-589, 644A-644B, 644-645, 656A-656B, 656-657, 698A-698B, 698-699, 708A-708B, 708-709

**3 :** 540A-540B, 540-541

**C. Select and use an appropriate method, materials and strategy to solve problems, including mental mathematics, paper and pencil and concrete objects.**

**K :** 19A-19B, 19-20, 43A-43B, 43-44, 67A-67B, 67-68, 95A-95B, 95-96, 125A-125B, 125-126, 143A-143B, 143-144, 185A-185B, 185-186, 217A-217B, 217-218, 233A-233B, 233-234, 249A-249B, 249-250, 279A-279B, 279-280, 297A-297B, 297-298  
19A-19B, 19-20, 43A-43B, 43-44, 67A-67B, 67-68, 95A-95B, 95-96, 125A-125B, 125-126, 143A-143B, 143-144, 185A-185B, 185-186, 217A-217B, 217-218, 233A-233B, 233-234, 249A-249B, 249-250, 279A-279B, 279-280, 297A-297B, 297-298

**1 :** 7A-7B, 7-8, 21A-21B, 21-22, 33A-33B, 33-34, 57A-57B, 57-58, 71A-71B, 71-72, 79A-79B, 79-80, 99A-99B, 99-100, 111A-111B, 111-112, 113-113B, 113-114, 133A-133B, 133-134, 143A-143B, 143-144, 145A-145B, 145-146, 177A-177B, 177-178, 191A-191B, 191-192, 193A-193B, 193-194, 215A-215B, 215-216, 223A-223B, 223-224, 229A-229B, 229-230, 251A-251B, 251-252, 261A-261B, 261-262, 269A-269B, 269-270, 291A-291B, 291-292, 317A-317B, 317-318, 319A-319B, 319-320, 339A-339B, 339-340, 351A-351B, 351-352, 353A-353B, 353-354, 369A-369B, 369-370, 379A-379B, 379-380, 405A-405B, 405-406, 431A-431B, 431-432, 445A-445B, 445-446, 447A-447B, 447-448, 467A-467B, 467-468, 481A-481B, 481-482, 483A-483B, 483-484

- 2 :** 9A-9B, 9-10, 19A-19B, 19-20, 31-32, 57A-57B, 57-58, 67A-67B, 67-68, 69-70, 89A-89B, 89-90, 105A-105B, 105-106, 123-124, 155A-155B, 155-156, 161A-161B, 161-162, 163-164, 189A-189B, 189-190, 197A-197B, 197-198, 199-200, 221A-221B, 221-222, 233A-233B, 233-234, 235-236, 251A-251B, 251-252, 265A-265B, 265-266, 279-280, 311A-311B, 311-312, 327A-327B, 327-328, 329-330, 351A-351B, 351-352, 377A-377B, 377-378, 379-380, 405A-405B, 405-406, 413A-413B, 413-414, 415-416, 439A-439B, 439-440, 453A-453B, 453-454, 455-456, 479A-479B, 479-480, 487A-487B, 487-488, 489-490
- 3 :** 14A-14B, 14-15, 32A-32B, 42A-42B, 42-43, 76A-76B, 76-77, 102A-102B, 102-103, 104-105, 140A-140B, 160A-160B, 160-161, 216A-216B, 216-217, 236A-236B, 236-237, 270A-270B, 270-273, 284A-284B, 284-285, 332A-332B, 332-333, 346A-346B, 346-347, 380A-380B, 380-381, 404A-404B, 404-405, 436A-436B, 436-439, 474A-474B, 474-475, 528A-528B, 528-529, 540A-540B, 540-541, 578A-578B, 578-579, 588A-588B, 588-589, 644A-644B, 644-645, 656A-656B, 656-657, 698A-698B, 698-699, 708A-708B, 708-709

### 2.5.5. GRADE 5

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Develop a plan to analyze a problem, identify the information needed to solve the problem, carry out the plan, check whether an answer makes sense and explain how the problem was solved.**

- 4 :** 12A-12B, 12-13, 24A-24B, 24-25, 38A-38B, 38-39, 40-41, 90A-90B, 90-91, 94A-94B, 94-95, 102-103, 140A-140B, 140-143, 156A-156B, 156-157, 168-169, 198A-198B, 198-199, 222A-222B, 222-223, 234-235, 278A-278B, 278-281, 290A-290B, 290-291, 292-293, 326A-326B, 326-329, 342A-342B, 342-343, 344-345, 384A-384B, 384-385, 396A-396B, 396-399, 412-413, 460A-460B, 460-461, 474A-474B, 474-477, 478-479, 512-A512B, 512-513, 538A-538B, 538-539, 540-541, 584A-584B, 584-858, 600A-600B, 600-601, 602-603, 648A-648B, 648-649, 662A-662B, 662-663, 666-667, 696A-696B, 696-697, 714A-714B, 714-715, 716-717
- 5 :** 32A-32B, 32-33, 42A-42B, 42-43, 44-45, 80A-80B, 80-81, 104A-104B, 104-105, 110-111, 144A-144B, 144-145, 168A-168B, 168-169, 180-181, 210A-210B, 210-211, 226A-226B, 226-227, 238-239, 276A-276B, 276-279, 272A-272B, 272-273, 306-307, 352A-352B, 352-355, 356A-356B, 356-357, 372-373, 406A-406B, 406-407, 434A-434B, 434-437, 438-439, 484A-484B, 484-487, 504A-504B, 504-505, 506-507, 558A-558B, 558-559, 570A-570B, 570-571, 572-573, 606A-606B, 606-607, 624A-624B, 624-625, 626-627, 660A-660B, 660-661, 664A-664B, 664-665, 676-677, 706A-706B, 706-709, 720A-720B, 720-721, 730-731



**B. Use appropriate mathematical terms, vocabulary, language, symbols and graphs to explain clearly and logically solutions to problems.**

**4** : 292A-292B, 292-293, 356A-356B, 356-357, 570A-570B, 570-571, 664A-664B, 664-665, 720A-720B, 720-721

**5** : 278A-278B, 278-279, 324A-324B, 324-325, 362A-362B, 362-363, 512A-512B, 512-513, 674A-674B, 674-675

**C. Show ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams and models.**

**4** : 4A-4B, 4-7, 8A-8B, 8-9, 28A-28B, 28-29, 34A-34B, 34-37, 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 212A-212B, 212-213, 216A-216B, 216-221, 500A-500B, 500-501, 502A-502B, 502-503, 504A-504B, 504-507, 624A-624B, 624-627

**5** : 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 286A-286B, 286-287, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557

**D. Connect, extend and generalize problem solutions to other concepts, problems and circumstances in mathematics.**

**4** : 94-95, 96-97, 98-99, 100-101, 160-163, 164-165, 166-167, 288-289, 464-467, 468-473, 474-475, 476-477, 690-691, 692-695

**5** : 70A-70B, 70-71, 100A-100B, 100-103, 104A-104B, 104-105, 106A-106B, 106-107, 108A-108B, 108-109, 172A-172B, 172-173, 174A-174B, 174-175, 176A-176B, 176-177, 542A-542B, 542-545, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557, 610A-610B, 610-613, 696A-696B, 696-699, 700A-700B, 700-701, 702A-702B, 702-705, 706A-706B, 706-709, 712A-712B, 712-115, 716A-716B, 716-717, 718A-718B, 718-719, 724A-724B, 724-727, 728A-728B, 728-729

**E. Select, use and justify the methods, materials and strategies used to solve problems.**

**4** : 12A-12B, 12-13, 24A-24B, 24-25, 38A-38B, 38-39, 90A-90B, 90-91, 94A-94B, 94-95, 140A-140B, 140-143, 156A-156B, 156-157, 198A-198B, 198-199, 222A-222B, 222-223, 278A-278B, 278-281, 290A-290B, 290-291, 326A-326B, 326-329, 342A-342B, 342-343, 384A-384B, 384-385, 396A-396B, 396-399, 460A-460B, 460-461, 474A-474B, 474-477, 512A-512B, 512-513, 538A-538B, 538-539, 584A-584B, 584-588, 600A-600B, 600-601, 648A-648B, 648-649, 662A-662B, 662-663, 696A-696B, 696-697, 714A-714B, 714-715

**5** : 32A-32B, 32-33, 42A-42B, 42-43, 80A-80B, 80-81, 104A-104B, 104-105, 144A-144B, 144-145, 168A-168B, 168-169, 210A-210B, 210-211, 226A-226B, 226-227, 276A-276B, 276-279, 272A-272B, 272-273, 352A-352B, 352-355, 356A-356B, 356-357, 406A-406B, 406-407, 434A-434B, 434-437, 484A-484B, 484-487, 504A-504B, 504-505, 558A-558B, 558-559, 570A-570B, 570-571, 606A-606B, 606-607, 624A-624B, 624-625, 660A-660B, 660-661, 664A-664B, 664-665, 706A-706B, 706-709, 720A-720B, 720-721

**F. Use appropriate problem-solving strategies (e.g., solving a simpler problem, drawing a picture or diagram).**

**4 :** 12A-12B, 12-13, 24A-24B, 24-25, 38A-38B, 38-39, 40-41, 90A-90B, 90-91, 94A-94B, 94-95, 102-103, 140A-140B, 140-143, 156A-156B, 156-157, 168-169, 198A-198B, 198-199, 222A-222B, 222-223, 234-235, 278A-278B, 278-281, 290A-290B, 290-291, 292-293, 326A-326B, 326-329, 342A-342B, 342-343, 344-345, 384A-384B, 384-385, 396A-396B, 396-399, 412-413, 460A-460B, 460-461, 474A-474B, 474-477, 478-479, 512-A512B, 512-513, 538A-538B, 538-539, 540-541, 584A-584B, 584-858, 600A-600B, 600-601, 602-603, 648A-648B, 648-649, 662A-662B, 662-663, 666-667, 696A-696B, 696-697, 714A-714B, 714-715, 716-717

**5 :** 32A-32B, 32-33, 42A-42B, 42-43, 44-45, 80A-80B, 80-81, 104A-104B, 104-105, 110-111, 144A-144B, 144-145, 168A-168B, 168-169, 180-181, 210A-210B, 210-211, 226A-226B, 226-227, 238-239, 276A-276B, 276-279, 272A-272B, 272-273, 306-307, 352A-352B, 352-355, 356A-356B, 356-357, 372-373, 406A-406B, 406-407, 434A-434B, 434-437, 438-439, 484A-484B, 484-487, 504A-504B, 504-505, 506-507, 558A-558B, 558-559, 570A-570B, 570-571, 572-573, 606A-606B, 606-607, 624A-624B, 624-625, 626-627, 660A-660B, 660-661, 664A-664B, 664-665, 676-677, 706A-706B, 706-709, 720A-720B, 720-721, 730-731

**2.5.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Invent, select, use and justify the appropriate methods, materials and strategies to solve problems.**

**6:** 20A-20B, 20-21, 36A-36B, 36-37, 52A-52B, 52-53, 54-55, 98A-98B, 98-99, 116A-116B, 116-119, 120-121, 156A-156B, 156-157, 180A-180B, 180-181, 182-183, 212A-212B, 212-213, 226A-226B, 226-227, 228-229, 230-231, 264A-264B, 264-265, 278A-278B, 278-279, 280-281, 312A-312B, 312-313, 324A-324B, 324-235, 334-335, 362A-362B, 362-363, 374A-374B, 374, 375, 388-389, 414A-414B, 414-415, 434A-434B, 434-436, 450-451, 490A-490B, 490-491, 512A-512B, 512-513, 520-521, 560A-560B, 560-561, 582A-582B, 582-583, 598-599, 648A-648B, 648-649, 674A-674B, 674-675, 676A-676B, 676-677, 706A-706B, 706-707, 710A-710B, 710-711, 724-725

**B. Verify and interpret results using precise mathematical language, notation and representations, including numerical tables and equations, simple algebraic equations and formulas, charts, graphs and diagrams.**

**6:** 278A-278B, 278-279, 324A-324B, 324-325, 362A-362B, 362-363, 512A-512B, 512-513, 674A-674B, 674-675

**C. Justify strategies and defend approaches used and conclusions reached.**

**6:** 20A-20B, 20-21, 36A-36B, 36-37, 52A-52B, 52-53, 98A-98B, 98-99, 116A-116B, 116-119, 156A-156B, 156-157, 180A-180B, 180-181, 212A-212B, 212-213, 226A-226B, 226-227, 264A-264B, 264-265, 278A-278B, 278-279, 312A-312B, 312-313, 324A-324B, 324-235, 362A-362B, 362-363, 374A-374B, 374-375, 414A-414B, 414-415, 434A-434B, 434-436, 490A-490B, 490-491, 512A-512B, 512-513, 560A-560B, 560-561, 582A-582B, 582-583, 648A-648B, 648-649, 674A-674B, 674-675, 676A-676B, 676-677, 706A-706B, 706-707, 710A-710B, 710-711

**D. Determine pertinent information in problem situations and whether any further information is needed for solution.**

**6:** 582A-582B, 582-583

**2.6. Statistics and Data Analysis****2.6.3. GRADE 3**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Gather, organize and display data using pictures, tallies, charts, bar graphs and pictographs.**

**K :** 27A-27B, 27-28, 29A-29B, 29-30, 31A-31B, 31-32, 33A-33B, 33-34

**1 :** 307A-307B, 307-308, 309A-309B, 309-310, 311A-311B, 311-312, 313A-313B, 313-314

**2 :** 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 325A-325B, 325-326, 327A-327B, 327-328

**3 :** 212A-212B, 212-215, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235

**B. Formulate and answer questions based on data shown on graphs.**

**K :** 27A-27B, 27-28, 29A-29B, 29-30, 31A-31B, 31-32, 33A-33B, 33-34

**1 :** 307A-307B, 307-308, 309A-309B, 309-310, 311A-311B, 311-312, 313A-313B, 313-314

**2 :** 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 325A-325B, 325-326, 327A-327B, 327-328

**3 :** 212A-212B, 212-215, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235

**C. Predict the likely number of times a condition will occur based on analyzed data.**

**K :** 29A-29B, 29-30

**1 :** 309A-309B, 309-310, 311A-311B, 311-312

**2 :** 313A-313B, 313-314

**3 :** 204A-204B, 204-207, 208A-208B, 208-211

**D. Form and justify an opinion on whether a given statement is reasonable based on a comparison to data.**

**K :** 31A-31B, 31-32, 33A-33B, 33-34

**1 :** 309A-309B, 309-310, 311A-311B, 311-312

**2 :** 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324

**3 :** 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B, 232-235

**2.6.5. GRADE 5**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Organize and display data using pictures, tallies, tables, charts, bar graphs and circle graphs.**

**4 :** 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 216A-216B, 216-221

**5 :** 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 286A-286B, 286-287

**B. Describe data sets using mean, median, mode and range.**

**4 :** 226A-226B, 226-229

**5 :** 282A-282B, 282-285

**C. Sort data using Venn diagrams.**

**4 :** Related material : 222-223

**5 :** 103

**D. Predict the likely number of times a condition will occur based on analyzed data.**

**4 :** 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 216A-216B, 216-221

**5 :** 296A-296B, 296-299

**E. Construct and defend simple conclusions based on data.**

**4 :** 204A-204B, 204-205, 206A-206B, 206-207, 208A-208B, 208-211, 216A-216B, 216-221

**5 :** 262A-262B, 262-265, 266A-266B, 266-269, 270A-270B, 270-275, 276A-276B, 276-279

**2.6.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Compare and contrast different plots of data using values of mean, median, mode, quartiles and range.**

**6:** 624A-624B, 624-627, 628A-628B, 628-631

- B. Explain effects of sampling procedures and missing or incorrect information on reliability.**  
6: 620A-620B, 620-623, 650A-650B, 650-651
  
- C. Fit a line to the scatter plot of two quantities and describe any correlation of the variables.**  
6: 640
  
- D. Design and carry out a random sampling procedure.**  
6: 620A-620B, 620-623
  
- E. Analyze and display data in stem-and-leaf and box-and-whisker plots.**  
6: 632A-632B, 632-633, 631
  
- F. Use scientific and graphing calculators and computer spreadsheets to organize and analyze data.**  
6: 627, 641, 661
  
- G. Determine the validity of the sampling method described in studies published in local or national newspapers.**  
6: 620A-620B, 620-623

**2.7. Probability and Predictions****2.7.3. GRADE 3**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:*

**A. Predict and measure the likelihood of events and recognize that the results of an experiment may not match predicted outcomes.**

**K** : Preparation: 213A-213B, 213-214, 215A-215B, 215-216

**1** : 401A-401B, 401-402, 403A-403B, 403-404

**2** : 373A-373B, 373-374, 375A-375B, 375-376

**3** : 700A-700B, 700-701, 702A-702B, 702-703, 704A-704B, 704-707

**B. Design a fair and an unfair spinner.**

**K** : Preparation: 213A-213B, 213-214, 215A-215B, 215-216

**1** : 403A-403B, 403-404

**2** : 373A-373B, 373-374

**3** : 702A-702B, 702-703

**C. List or graph the possible results of an experiment.**

**K** : Preparation: 213A-213B, 213-214, 215A-215B, 215-216

**1** : 401A-401B, 401-402, 403A-403B, 403-404

**2** : 373A-373B, 373-374, 375A-375B, 375-376

**3** : 700A-700B, 700-701, 702A-702B, 702-703, 704A-704B, 704-707

**D. Analyze data using the concepts of largest, smallest, most often, least often and middle.**

**K** : 11A-11B, 11-12, 13A-13B, 13-14, 15A-15B, 15-16, 17A-17B, 17-18

**1** : 401A-401B, 401-402

**2** : 373A-373B, 373-374, 375A-375B, 375-376

**3** : 700A-700B, 700-701, 702A-702B, 702-703, 704A-704B, 704-707

**2.7.5. GRADE 5**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:*

**A. Perform simulations with concrete devices (e.g., dice, spinner) to predict the chance of an event occurring.**

**4** : 700A-700B, 700-703, 706A-706B, 706-709, 710A-710B, 710-713

**5** : 296A-296B, 296-299, 300A-300B, 300-301, 302A-302B, 302-305

- B. Determine the fairness of the design of a spinner.**  
4 : 701-702  
5 : 302A-302B, 302-305
- C. Express probabilities as fractions and decimals.**  
4 : 700A-700B, 700-703, 706A-706B, 706-709, 710A-710B, 710-713  
5 : 302A-302B, 302-305
- D. Compare predictions based on theoretical probability and experimental results.**  
4 : 700A-700B, 700-703, 706A-706B, 706-709, 710A-710B, 710-713  
5 : 296A-296B, 296-299, 300A-300B, 300-301, 302A-032B, 302-305
- E. Calculate the probability of a simple event.**  
4 : 700A-700B, 700-703, 706A-706B, 706-709, 710A-710B, 710-713  
5 : 296A-296B, 296-299, 300A-300B, 300-301, 302A-032B, 302-305
- F. Determine patterns generated as a result of an experiment.**  
4 : 700A-700B, 700-703, 706A-706B, 706-709, 710A-710B, 710-713  
5 : 302A-302B, 302-305
- G. Determine the probability of an event involving “and”, “or” or “not”.**  
4 : 700A-700B, 700-703, 706A-706B, 706-709, 710A-710B, 710-713  
5 : 302A-302B, 302-305
- H. Predict and determine why some outcomes are certain, more likely, less likely, equally likely or impossible.**  
4 : 700A-700B, 700-703, 706A-706B, 706-709, 710A-710B, 710-713  
5 : 302A-302B, 302-305
- I. Find all possible combinations and arrangements involving a limited number of variables.**  
4 : 704A-704B, 704-705  
5 : 300A-300B, 300-301
- J. Develop a tree diagram and list the elements.**  
4 : 704A-704B, 704-705  
5 : 300A-300B, 300-301



**2.7.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:*

- A. Determine the number of combinations and permutations for an event.**  
6: 654A-654B, 654-657, 658A-658B, 658-661
  
- B. Present the results of an experiment using visual representations (e.g., tables, charts, graphs).**  
6: 648A-648B, 648-649, 662A-662B, 662-663
  
- C. Analyze predictions (e.g., election polls).**  
6: 638A-638B, 638-641
  
- D. Compare and contrast results from observations and mathematical models.**  
6: 628A-628B, 628-631, 632A-632B, 632-633, 636A-636B, 636-637, 638A-638B, 638-641, 642A-642B, 642-647, 650A-650B, 650-651, 69A-698B, 698-699, 718A-718B, 718-721
  
- E. Make valid inferences, predictions and arguments based on probability.**  
6: 662A-662B, 662-663, 664A-664B, 664-667

**2.8. Algebra and Functions****2.8.3. GRADE 3**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Recognize, describe, extend, create and replicate a variety of patterns including attribute, activity, number and geometric patterns.**

**K :** 35A-35B, 35-36, 37A-37B, 37-38, 39A-39B, 39-40, 41A-41B, 41-42, 43A-43B, 43-44, 45A-45B, 45-46

**1 :** 3A-3B, 3-4, 5A-5B, 5-6, 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262

**2 :** 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468

**3 :** 24-27, 277, 282, 286, 288-289, 332A-332B, 332-335, 340-341, 344-345

**B. Use concrete objects and trial and error to solve number sentences and check if solutions are sensible and accurate.**

**K :** 255A-255B, 255-256, 275A-275, 275-276

**1 :** 133A-133B, 133-134

**2 :** 9A-9B, 9-10, 17A-17B, 17-18

**3 :** 344A-344B, 344-345

**C. Substitute a missing addend in a number sentence.**

**K :** Preparation 255A-255B, 255-256, 275A-275B, 275-276

**1 :** 261A-261B, 261-262

**2 :** Preparation: 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468

**3 :** 344A-344B, 344-345

**D. Create a story to match a given combination of symbols and numbers.**

**K :** 245A-245B, 245-246

**1 :** 45A-45B, 45-46, 61A-61B, 61-62

**2 :** 3A-3B, 3-4, 13A-13B, 13-14

**3 :** 344A-344B, 344-345

**E. Use concrete objects and symbols to model the concepts of variables, expressions, equations and inequalities.**

**K :** Preparation 255A-255B, 255-256, 275A-275B, 275-276

**1 :** 261A-261B, 261-262

**2 :** Preparation: 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468

**3 :** 344A-344B, 344-345

**F. Explain the meaning of solutions and symbols.**

- K** : 255A-255B, 255-256, 275A-275, 275-276  
**1** : 133A-133B, 133-134, 261A-261B, 261-262  
**2** : 9A-9B, 9-10, 17A-17B, 17-18  
**3** : 344A-344B, 344-345

**G. Use a table or a chart to display information.**

- K** : 27A-27B, 27-28, 29A-29B, 29-30, 31A-31B, 31-32, 33A-33B, 33-34  
**1** : 309A-309B, 309-310, 311A-311B, 311-312  
**2** : 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 325A-325B,  
325-326, 327A-327B, 327-328  
**3** : 204A-204B, 204-207, 208A-208B, 208-211

**H. Describe and interpret the data shown in tables and charts.**

- K** : 27A-27B, 27-28, 29A-29B, 29-30, 31A-31B, 31-32, 33A-33B, 33-34  
**1** : 307A-307B, 307-308, 309A-309B, 309-310, 311A-311B, 311-312, 313A-313B,  
313-314  
**2** : 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 325A-325B,  
325-326, 327A-327B, 327-328  
**3** : 212A-212B, 212-215, 226A-226B, 226-227, 228A-228B, 228-231, 232A-232B,  
232-235

**I. Demonstrate simple function rules.**

- K** : 297A-297B, 297-298  
**1** : 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262  
**2** : Preparation: 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468  
**3** : 277, 282, 286, 288-289, 332A-332B, 332-335, 340-341, 344-345

**J. Analyze simple functions and relationships and locate points on a simple grid.**

- K** : 297A-297B, 297-298  
**1** : 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262  
**2** : Preparation: 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468  
**3** : 277, 282, 286, 288-289, 332A-332B, 332-335, 340-341, 344-345

**2.8.5. GRADE 5**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Recognize, reproduce, extend, create and describe patterns, sequences and relationships verbally, numerically, symbolically and graphically, using a variety of materials.**

**4 :** 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641

**5 :** 14A-14B, 14-17, 66A-66B, 66-67, 84A-84B, 84-85, 106A-106B, 106-107, 136A-136B, 136-137, 728A-728B, 728-729

**B. Connect patterns to geometric relations and basic number skills.**

**4 :** 10A-10B, 10-11, 90A-90B, 90-91, 366A-366B, 366-367, 641

**5 :** 14A-14B, 14-17, 66A-66B, 66-67, 84A-84B, 84-85, 106A-106B, 106-107, 136A-136B, 136-137, 728A-728B, 728-729

**C. Form rules based on patterns (e.g., an equation that relates pairs in a sequence).**

**4 :** 164A-164B, 164-165

**5 :** 106A-106B, 106-107, 728A-728B, 728-729

**D. Use concrete objects and combinations of symbols and numbers to create expressions that model mathematical situations.**

**4 :** 94A-94B, 94-95, 96A-96B, 96-97, 98A-98B, 98-99

**5 :** 100A-100B, 100-103, 104A-104B, 104-105

**E. Explain the use of combinations of symbols and numbers in expressions, equations and inequalities.**

**4 :** 94A-94B, 94-95, 96A-96B, 96-97, 98A-98B, 98-99, 100A-100B, 100-101

**5 :** 100A-100B, 100-103, 104A-104B, 104-105, 106A-106B, 106-107, 108A-108B, 108-109

**F. Describe a realistic situation using information given in equations, inequalities, tables or graphs.**

**4 :** 164A-164B, 164-165, 692A-692B, 692-695

**5 :** 106A-106B, 106-107, 700A-700B, 700-701, 702A-702B, 702-705, 728A-728B, 728-729

**G. Select and use appropriate strategies, including concrete materials, to solve number sentences and explain the method of solution.**

**4 :** 164A-164B, 164-165, 692A-692B, 692-695

**5 :** 106A-106B, 106-107, 728A-728B, 728-729

**H. Locate and identify points on a coordinate system.**

4 : 212A-212B, 212-215

5 : 724A-724B, 724-727, 728A-728B, 728-729

**I. Generate functions from tables of data and relate data to corresponding graphs and functions.**

4 : 164A-164B, 164-165

5 : 106A-106B, 106-107, 728A-728B, 728-729

**2.8.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Apply simple algebraic patterns to basic number theory and to spatial relations**

6: 212A-212B, 212-213, 444A-444B, 444-447

**B. Discover, describe and generalize patterns, including linear, exponential and simple quadratic relationships.**

6: 212A-212B, 212-213, 444A-444B, 444-447, 448A-448B, 448-449

**C. Create and interpret expressions, equations or inequalities that model problem situations.**

6: 8-11, 24-27, 28-29, 30-31, 40-43, 44-47, 48-51, 112-115, 116-119, 274-275, 276-277, 328-329, 380-383, 384-385, 386-387, 408-409, 410-411, 412-413, 418-421, 422-425, 426-427, 428-429, 430-431, 698-699, 700-705

**D. Use concrete objects to model algebraic concepts.**

6: 112-115, 116-119, 274-275, 276-277, 328-329, 380-383, 384-385, 386-387, 408-409, 410-411, 412-413, 418-421, 422-425, 426-427, 428-429, 430-431, 698-699, 700-705

**E. Select and use a strategy to solve an equation or inequality, explain the solution and check the solution for accuracy.**

6: 48A-48B, 48-51, 430A-430B, 430-433, 712A-712B, 712-715

**F. Solve and graph equations and inequalities using scientific and graphing calculators and computer spreadsheets.**

6: 48A-48B, 48-51, 430A-430B, 430-433, 448A-448B, 448-449, 712A-712B, 712-715

**G. Represent relationships with tables or graphs in the coordinate plane and verbal or symbolic rules.**

**6:** 444A-444B, 444-447, 448A-448B, 448-449

**H. Graph a linear function from a rule or table.**

**6:** 444A-444B, 444-447, 448A-448B, 448-449

**I. Generate a table or graph from a function and use graphing calculators and computer spreadsheets to graph and analyze functions.**

**6:** 444A-444B, 444-447, 448A-448B, 448-449

**J. Show that an equality relationship between two quantities remains the same as long as the same change is made to both quantities; explain how a change in one quantity determines another quantity in a functional relationship.**

**6:** 212A-212B, 212-213, 444A-444B, 444-447, 448A-448B, 448-449

**2.9. Geometry****2.9.3 Grade 3**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Name and label geometric shapes in two and three dimensions (e.g., circle/sphere, square/cube, triangle/pyramid, rectangle/prism).**

**K :** 197A-197B, 197-198, 199A-199B, 199-200, 201A-201B, 201-202

**1 :** 157A-157B, 157-158, 159A-159B, 159-160, 161A-161B, 161-162, 165A-165B, 165-166, 167A-167B, 167-168

**2 :** 247A-247B, 247-248, 249A-249B, 249-250, 255A-255B, 255-256

**3 :** 428A-428B, 428-4231, 446A-446B, 446-447, 450A-450B, 450-453, 454A-454B, 454-455

**B. Build geometric shapes using concrete objects (e.g., manipulatives).**

**K :** 203A-203B, 203-204, 205A-205B, 205-206, 207A-207B, 207-208

**1 :** 165B, 166

**2 :** 247A-247B, 249A-249B

**3 :** 442A-442B, 442-443

**C. Draw two- and three-dimensional geometric shapes and construct rectangles, squares and triangles on the geoboard and on graph paper satisfying specific criteria.**

**K :** 203A-203B, 203-204, 205A-205B, 205-206, 207A-207B, 207-208

**1 :** 165B, 166

**2 :** 255A-255B, 255-256

**3 :** 456A-456B, 456-459

**D. Find and describe geometric figures in real life.**

**K :** 197B, 199B, 201B

**1 :** 157B, 159B, 161B, 165B, 167B

**2 :** 247A-247B, 247-248, 249A-249B, 249-250, 255A-255B, 255-256

**3 :** 428A-428B, 428-4231, 446A-446B, 446-447, 450A-450B, 450-453, 454A-454B, 454-455

**E. Identify and draw lines of symmetry in geometric figures.**

**K :** 211A-211B, 211-212

**1 :** 171A-171B, 171-172

**2 :** 261A-261B, 261-262

**3 :** 460A-460B, 460-461

**F. Identify symmetry in nature.**

- K : 211B
- 1 : 171B
- 2 : 261B
- 3 : 460B

**G. Fold paper to demonstrate the reflections about a line.**

- K : 207A-207B, 207-208
- 1 : 173A-173B, 173-174
- 2 : 259A-259B, 259-260
- 3 : 456A-456B, 456-459

**H. Show relationships between and among figures using reflections.**

- K : 207A-207B, 207-208
- 1 : 173A-173B, 173-174
- 2 : 259A-259B, 259-260
- 3 : 456A-456B, 456-459

**I. Predict how shapes can be changed by combining or dividing them.**

- K : 209A-209B, 209-210
- 1 : 173A-173B, 173-174
- 2 : 255A-255B, 255-256
- 3 : 456A-456B, 456-459

**2.9.5 Grade 5**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Give formal definitions of geometric figures.**

- 4 : 434A-434B, 434-437, 438A-438B, 438-439, 444A-444B, 444-447
- 5 : 328A-328B, 328-331, 332A-332B, 332-335, 336A-336B, 336-337

**B. Classify and compare triangles and quadrilaterals according to sides or angles.**

- 4 : 444A-444B, 444-447
- 5 : 342A-342B, 342-345, 346A-346B, 346-349

**C. Identify and measure circles, their diameters and their radii.**

- 4 : 448A-448B, 448-449
- 5 : 336A-336B, 336-337



- D. Describe in words how geometric shapes are constructed.**  
4 : 460  
5 : 356
- E. Construct two- and three-dimensional shapes and figures using manipulatives, geoboards and computer software.**  
4 : 440A-440B, 440-443  
5 : 332A-332B, 332-335
- F. Find familiar solids in the environment and describe them.**  
4 : 440A-440B, 440-443  
5 : 594A-594B, 594-597
- G. Create an original tessellation.**  
4 : Preparation : 452A-452B, 452-455  
5 : 367
- H. Describe the relationship between the perimeter and area of triangles, quadrilaterals and circles.**  
4 : 464A-464B, 464-467, 468A-468B, 468-471  
5 : 540A-540B, 540-541, 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557
- I. Represent and use the concepts of line, point and plane.**  
4 : 434A-434B, 434-437, 440A-440B, 440-443  
5 : 328A-328B, 328-331
- J. Define the basic properties of squares, pyramids, parallelograms, quadrilaterals, trapezoids, polygons, rectangles, rhombi, circles, triangles, cubes, prisms, spheres and cylinders.**  
4 : 434A-434B, 434-437, 438A-438B, 438-439, 444A-444B, 444-447  
5 : 340A-340B, 340-341, 342A-342B, 342-345, 346A-346B, 346-349, 594A-594B, 594-597, 598A-598B, 598-601
- K. Analyze simple transformations of geometric figures and rotations of line segments.**  
4 : 452A-452B, 452-455  
5 : 364A-364B, 364-367
- L. Identify properties of geometric figures (e.g., parallel, perpendicular, similar, congruent, symmetrical).**  
4 : 452A-452B, 452-455, 456A-456B, 456-457, 458A-458B, 458-459  
5 : 360A-360B, 360-363, 368A-368B, 368-371

**2.9.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

- A. Construct figures incorporating perpendicular and parallel lines, the perpendicular bisector of a line segment and an angle bisector using computer software.**  
6: 484A-484B, 484-489
- B. Draw, label, measure and list the properties of complementary, supplementary and vertical angles.**  
6: 480A-480B, 480-483
- C. Classify familiar polygons as regular or irregular up to a decagon.**  
6: 494A-494B, 494-495
- D. Identify, name, draw and list all properties of squares, cubes, pyramids, parallelograms, quadrilaterals, trapezoids, polygons, rectangles, rhombi, circles, spheres, triangles, prisms and cylinders.**  
6: 494A-494B, 494-495, 496A-496B, 496-499, 500A-500B, 500-501, 502A-502B, 502-503, 586A-586B, 586-589
- E. Construct parallel lines, draw a transversal and measure and compare angles formed (e.g., alternate interior and exterior angles).**  
6: 472A-472B, 472-475, 484A-484B, 484-487
- F. Distinguish between similar and congruent polygons.**  
6: 506A-506B, 506-509
- G. Approximate the value of  $\pi$  (pi) through experimentation.**  
6: 502A-502B, 502-503
- H. Use simple geometric figures (e.g., triangles, squares) to create, through rotation, transformational figures in three dimensions.**  
6: 510A-510B, 510-511, 516A-516B, 516-519
- I. Generate transformations using computer software.**  
6: 519
- J. Analyze geometric patterns (e.g., tessellations, sequences of shapes) and develop descriptions of the patterns.**  
6: 516A-516B, 516-519

**K. Analyze objects to determine whether they illustrate tessellations, symmetry, congruence, similarity and scale.**

**6:** 506A-506B, 506-509, 510A-510B, 510-511, 514A-514B, 514-515, 516A-516B, 516-519

**2.10. Trigonometry****2.10.3. GRADE 3**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Identify right angles in the environment.**

**K** : Preparation : 203-204

**1** : Preparation : 165-166

**2** : Preparation : 247-248

**3** : 444A-444B, 444-445

**B. Model right angles and right triangles using concrete objects.**

**K** : 205A-205B, 205-206

**1** : 167A-167B, 167-168

**2** : 255A-255B, 255-256

**3** : 444A-444B, 444-445, 450A-450B, 450-453

**2.10.5. GRADE 5**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Identify and compare parts of right triangles, including right angles, acute angles, hypotenuses and legs.**

**4** : 444A-444B, 444-447

**5** : 342A-342B, 342-345

**B. Create right triangles on a geoboard.**

**4** : 444B, 447

**5** : 343

**2.10.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

- A. Compute measures of sides and angles using proportions, the Pythagorean Theorem and right triangle relationships.**  
6: 328A-328B, 328-329, 330A-330B, 330-333, 499
  
- B. Solve problems requiring indirect measurement for lengths of sides of triangles.**  
6: 330A-330B, 330-333

**2.11. Concepts of Calculus****2.11.3. GRADE 3**

***Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:***

**A. Identify whole number quantities and measurements from least to most and greatest value.**

- K :** 133A-133B, 133-134, 135A-135B, 135-136, 137A-137B, 137-138, 145A-145B, 145-146, 147A-147B, 147-148, 149A-149B, 149-150
- 1 :** 365A-365B, 365-366, 369A-369B, 369-370, 371A-371B, 371-372, 373A-373B, 373-374, 375A-375B, 375-376, 383A-383B, 383-384, 385A-385B, 385-386, 387A-387B, 387-388, 389A-389B, 389-390, 391A-391B, 391-392, 393A-393B, 393-394, 397A-397B, 397-398
- 2 :** 343A-343B, 343-344, 345A-345B, 345-346, 347A-347B, 347-348, 355A-355B, 355-356, 357A-357B-357-358, 365A-365B, 365-366, 367A-367B, 367-368, 369A-369B, 369-370
- 3 :** 532A-532B, 532-533, 680A-680B, 680-683, 690A-690B, 690-693

**B. Identify least and greatest values represented in bar graphs and pictographs.**

- K :** 31A-31B, 31-32, 33A-33B, 33-34
- 1 :** 309A-309B, 309-310, 311A-311B, 311-312, 313A-313B, 313-314, 315A-315B, 315-316
- 2 :** 319A-319B, 319-320, 321A-321B, 321-322, 323A-323B, 323-324, 325A-325B, 325-326, 327A-327B, 327-328
- 3 :** 208A-208B, 208-211, 212A-212B, 212-215, 222A-222B, 222-223

**C. Categorize rates of change as faster and slower.**

- K :** Preparation : 31A-31B, 31-32, 33A-33B, 33-34
- 1 :** Preparation : 309-310, 311-312
- 2 :** Preparation : 323-324
- 3 :** 208A-208B, 208-211, 222A-222B, 222-223

**D. Continue a pattern of numbers or objects that could be extended infinitely.**

- K :** 35A-35B, 35-36, 37A-37B, 37-38, 39A-39B, 39-40, 41A-41B, 41-42, 43A-43B, 43-44, 45A-45B, 45-46
- 1 :** 3A-3B, 3-4, 5A-5B, 5-6, 255A-255B, 255-256, 257A-257B, 257-258, 261A-261B, 261-262
- 2 :** 99A-99B, 99-100, 413A-413B, 413-414, 467A-467B, 467-468
- 3 :** 24-27, 277, 282, 286, 288-289, 332A-332B, 332-335, 340-341, 344-345

**2.11.5. GRADE 5**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Make comparisons of numbers (e.g., more, less, same, least, most, greater than, less than).**

**4 :** 16A-16B, 16-19, 522A-522B, 522-523, 524A-524B, 524-527, 534A-534B, 534-536, 630A-630B, 630-631

**5 :** 6A-6B, 6-7, 12A-12B, 12-13, 418A-418B, 418-419, 420A-420B, 420-423, 430A-430B, 430-433

**B. Identify least and greatest values represented in bar and circle graphs.**

**4 :** 212A-212B, 212-215

**5 :** 262A-262B, 262-265, 286A-286B, 286-287

**C. Identify maximum and minimum.**

**4 :** 206A-206B, 206-207, 212A-212B, 212-215

**5 :** 262A-262B, 262-265, 266A-266B, 266-269

**D. Describe the relationship between rates of change and time.**

**4 :** Related material : 196-197

**5 :** Related material : 564-567

**E. Estimate areas and volumes as the sums of areas of tiles and volumes of cubes.**

**4 :** 476A-476B, 476-477

**5 :** 548A-548B, 548-549, 610A-610B, 610-613

**F. Describe the relationship between the size of the unit of measurement and the estimate of the areas and volumes.****4 :** 468A-468B, 468-471, 476A-476B, 476-477**5 :** 548A-548B, 548-549, 550A-550B, 550-551, 552A-552B, 552-553, 554A-554B, 554-557, 610A-610B, 610-613**2.11.8. GRADE 8**

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:*

**A. Analyze graphs of related quantities for minimum and maximum values and justify the findings.****6:** 636A-636B, 636-637, 638A-638B, 638-641**B. Describe the concept of unit rate, ratio and slope in the context of rate of change.****6:** 300A-300B, 300-301, 302A-302B, 302-305, 306A-306B, 306-309**C. Continue a pattern of numbers or objects that could be extended infinitely.****6:** 212A-212B, 212-213, 444A-444B, 444-447, 448A-448B, 448-449