

**GLENCOE CORRELATION**  
**GEOMETRY: CONCEPTS AND APPLICATIONS**  
**OHIO**  
**Mathematics Benchmarks**  
**By the end of the 8-10 program**

| BENCHMARKS   | PAGE REFERENCES   |
|--|---|
| <b>Number, Number Sense and Operations</b>   |   |
| A. Use scientific notation to express large numbers and numbers less than one.   | SE: 46 <i>State Test Example</i> , 47 #5, 214 #28, 347 #3, 583 #2   |
| B. Identify subsets of the real number system.   | SE: 50-51, 54 #4, 82 #1-#3, 85 #1-#2, 641 #10, 642 #19  |
| C. Apply properties of operations and the real number system, and justify when they hold for a set of numbers.   | SE: 57, 59-61, 83 #14-#16, 517, 649   |
| D. Connect physical, verbal and symbolic representations of integers, rational numbers and irrational numbers.   | SE: 50-55, 493 #4<br>TWE: MTL 50<br>OEA 55<br>RA 52   |
| E. Compare, order and determine equivalent forms of real numbers.  | SE: 50, 53 #3, 54 #11-#16, 85 #1-#2, 87 #1, 279   |
| F. Explain the effects of operations on the magnitude of quantities.   | SE: 74-75, 583 #1   |
| G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions.  | SE: 55 #37, 87 #8, 147 #59, 225 #5, 350-355, 361 #28, 367 #19, 394 #11-#17, 397 #3-#5<br>TWE: RA 352                              |
| H. Find the square root of perfect squares, and approximate the square root of non-perfect squares.  | SE: 139 #5, 225 #2, 257, 259 #4-#9, 260 #38, 263-266, 458 #38, 548-553, 558 #18-#20, 578 #11-#16                                  |
| I. Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents.  | SE: 139 #5, 266 #27, 258 ex 3, 551 ex 9, 553 #42-#43, 563 #22, 581 #16, 583 #2  |
| <b>Measurement</b>   |   |
| A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results.  | SE: 256-260   |
| B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision.  | SE: 504-509, 510-514, 516-521, 522-526, 528-532, 541 #15-#23, 543 #7-#18<br>TWE: EC 515<br>OEA 515, 527                           |
| C. Apply indirect measurement techniques, tools and formulas, as appropriate, to find perimeter, circumference and area of circles, triangles, quadrilaterals and composite shapes, and to find volume of prisms, cylinders, and pyramids. | SE: 35-40, 44 #28-#31, 45 #21-#24, 413-417, 419-424, 478-482, 483-487<br><i>Math in the Workplace</i> 41<br>TWE: EC 424<br>RA 416 |
| D. Use proportional reasoning and apply indirect measurement techniques, including right triangle trigonometry and properties of similar triangles, to solve problems involving measurements and rates.                                    | SE: 357 ex 2, 359 #6, 368-373, 392 #13-#18, 396 #30-#31, 397 #19, 564-569, 572-577, 579 #25-#27                                   |

| <b>BENCHMARKS</b>  | <b>PAGE REFERENCES</b>  |
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| E. Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision.   | SE: 96-101, 504-509, 510-514, 516-521, 522-526, 528-532, 541 #15-#23<br>TWE: EC 515<br>OEA 515, 527                                   |
| F. Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions.  | SE: 40 #31, 47 #1, 87 #4, 139 #2, 307 #9, 347 #4, 399 #4, 451 #10, 493 #5, 673 #6   |
| <b>Geometry and Spatial Sense</b>  |   |
| A. Formally define geometric figures.  | SE: 12-15, 188-192, 310-315, 316-320, 327-331, 333-338, 454-458, 496-500  |
| B. Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence.  | SE: 356-360, 362-366, 368-373, 395 #18-#21, 397 #6-#11<br>TWE: MTL 356<br>OEA 361, 373<br>RA 360                                      |
| C. Recognize and apply angle relationships in situations involving intersecting lines, perpendicular lines and parallel lines.   | SE: 128-132, 136 #33-#37, 148-153, 156-160<br>TWE: HG 149<br>MTL 148<br>OEA 153, 161  |
| D. Use coordinate geometry to represent and examine the properties of geometric figures.   | SE: 74-75, 660-664, 670 #25-#28, 671 #14-#15<br>TWE: EC 665<br>OEA 665<br>RA 662<br>TT 660  |
| E. Draw and construct representations of two- and three-dimensional geometric objects using a variety of tools, such as straightedge, compass and technology.  | SE: 29-34, 40 #33, 44 #26-#27, 432, 476 #7-#8<br><i>Hands-On Geometry</i> 210, 474-475, 559<br>TWE: MTL 29                            |
| F. Represent and model transformations in a coordinate plane and describe the results.   | SE: 687-690, 692-696, 697-702, 703-707<br>TWE: EC 707<br>OEA 690<br>RA 688, 694, 700, 704   |
| G. Prove or disprove conjectures and solve problems involving two- and three-dimensional objects represented within a coordinate system.   | SE: 662 ex 3, 662 ex 4, 663 #8-#9, 664 #16-#22, 670 #27-#28, 671 #15  |
| H. Establish the validity of conjectures about geometric objects, their properties and relationships by counter-example, inductive and deductive reasoning, and critiquing arguments made by others. | SE: 6 ex 4, 8 #14, 17 #37, 45 #16-#18, 281 #33, 638-642, 644-647, 649-652, 654-658  |
| I. Use right triangle trigonometric relationships to determine lengths and angle measures.   | SE: 564-568, 572-577, 579 #27, 580 #31-#32, 580 #34-#35, 581 #18-#18<br><i>Lesson 13-4</i> 751 #5-#10<br><i>Lesson 13-5</i> 751 #5-#7 |
| <b>Patterns, Functions and Algebra</b>   |   |
| A. Generalize and explain patterns and sequences in order to find the next term and the $n$ th term.   | SE: 4-5, 17 #38, 40 #35-#36, 42 #11-#13, 250 #23, 273 #10, 451 #10, 493 #1, 493 #9, 665 #31   |

| <b>BENCHMARKS</b>   | <b>PAGE REFERENCES</b>  |
|---|---|
| B. Identify and classify functions as linear or nonlinear, and contrast their properties using tables, graphs or equations.   | SE: Linear equation is defined and graphed on pages 174-178.  |
| C. Translate information from one representation (words, table, graph or equation) to another representation of a relation or function.   | SE: 87 #5, 174-178, 182 #41, 493 #3, 493 #6, 545 #2   |
| D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations.   | SE: 177 #12, 178 #35, 307 #2, 451 #2, 493 #5, 715 #10   |
| E. Analyze and compare functions and their graphs using attributes, such as rates of change, intercepts and zeros.  | SE: 168-172, 174-178, 182 #37-#38, 183 #18-#20, 347 #31<br><i>Lesson 4-5 733 #5-#7</i>                        |
| F. Solve and graph linear equations and inequalities.   | SE: 175 ex 5, 177 #8-#9, 178 #19-#24, 182 #39-#40, 715 #10, 725   |
| G. Solve quadratic equations with real roots by graphing, formula and factoring.  | SE: 545 #10   |
| H. Solve systems of linear equations involving two variables graphically and symbolically.  | SE: 676-680, 681-685, 690 #18, 702 #19, 707 #28, 710 #11-#14, 711 #15-#19, 713 #3-#8<br>TWE: EC 686<br>RA 684 |
| I. Model and solve problem situations involving direct and inverse variation.   | SE: 407 #43   |
| J. Describe and interpret rates of change from graphical and numerical data.  | SE: 171 ex 5, 172 #10-#18, 177 #12a, 179 #38-#39<br><i>Lesson 4-5 733 #1-#2</i><br>TWE: OEA 173               |
| <b>Data Analysis and Probability</b>  |   |
| A. Create, interpret and use graphical displays and statistical measures to describe data; e.g., box-and-whisker plots, histograms, scatterplots, measures of center and variability. | SE: 184, 185 #7, 185 #10, 273 #3, 347 #7, 347 #10, 399 #10, 493 #10, 715 #4                                   |
| B. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose.                                 | SE: 185 #10, 347 #10  |
| C. Compare the characteristics of the mean, median and mode for a given set of data, and explain which measure of center best represents the data.                                    | SE: 22 #39, 225 #1, 225 #3, 307 #5, 583 #3, 583 #8  |
| D. Find, use and interpret measures of center and spread, such as mean and quartiles, and use those measures to compare and draw conclusions about sets of data.                      | SE: 225 #7, 273 #9, 307 #5, 583 #8, 715 #9  |
| E. Evaluate the validity of claims and predictions that are based on data by examining the appropriateness of the data collection and analysis.                                       | SE: Data collection is exemplified on page 89.  |
| F. Construct convincing arguments based on analysis of data and interpretation of graphs.   | SE: 185 #1, 273 #3, 399 #10   |

| BENCHMARKS   | PAGE REFERENCES   |
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| G. Describe sampling methods and analyze the effects of method chosen on how well the resulting sample represents the population.  | SE: A project conducting a poll is on page 89.  |
| H. Use counting techniques, such as permutations and combinations, to determine the total number of options and possible outcomes.   | SE: 138, 139 #1, 139 #10, 185 #9, 583 #9, 629 #2  |
| I. Design an experiment to test a theoretical probability, and record and explain results.   | SE: 484   |
| J. Compute probabilities of compound events, independent events, and simple dependent events.  | SE: 138, 139 #9, 185 #9, 273 #7, 347 #2, 438 #29, 486 #24-#25, 545 #5, 629 #2                                     |
| K. Make predictions based on theoretical probabilities and experimental results.   | SE: 139 #4, 139 #9, 484, 487 #28  |
| <b>Mathematical Processes</b>  |   |
| A. Formulate a problem or mathematical model in response to a specific need or situation, determine information required to solve the problem, choose method for obtaining this information, and set limits for acceptable solution.   | SE: 35-40, 44 #33<br><i>Problem-Solving Workshop</i> 3, 49, 227, 275, 453, 495, 547                               |
| B. Apply mathematical knowledge and skills routinely in other content areas and practical situations.  | SE: 26 ex 4, 171 ex 5, 278 ex 3-4, 292 ex 2, 298 ex 4, 358 ex 3, 403 ex 1-2, 414 ex 3, 594 ex 2, 619 ex 2         |
| C. Recognize and use connections between equivalent representations and related procedures for a mathematical concept; e.g., zero of a function and the x-intercept of the graph of the function, apply proportional thinking when measuring, describing functions, and comparing probabilities. | SE: 265 #2, 351-354, 362-366, 480 #1, 525 #2<br><i>Hands-On Geometry</i> 262                                      |
| D. Apply reasoning processes and skills to construct logical verifications or counter-examples to test conjectures and to justify and defend algorithms and solutions.   | SE: 6-8, 17 #37, 28 #30, 44 #32, 45 #16-#18, 673 #10, 686 #36   |
| E. Use a variety of mathematical representations flexibly and appropriately to organize, record and communicate mathematical ideas.  | SE: 87 #10, 139 #10, 185 #10, 225 #10, 347 #10<br><i>Hands-On Geometry</i> 408, 415                               |
| F. Use precise mathematical language and notations to represent problem situations and mathematical ideas.   | SE: 20 #3, 38 #2, 47 #10, 61 #36, 66 #2, 79 #2, 87 #10, 307 #10, 493 #10  |
| G. Write clearly and coherently about mathematical thinking and ideas.   | SE: 7 #1, 15 #1, 38 #2, 47 #10, 59 #1, 61 #36, 79 #3, 399 #10, 493 #10, 673 #10                                   |
| H. Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner.  | SE: 372 #1, 376 #1, 384 #2, 411 #1, 428 #3, 456 #2, 520 #3, 526 #2, 589 #1<br><i>Problem-Solving Workshop</i> 453 |

## Codes Used for TWE Pages

|     |                       |
|-----|-----------------------|
| EC  | Extra Credit          |
| HG  | Hands-On Geometry     |
| MTL | Motivating the Lesson |
| OEA | Open-Ended Assessment |
| RA  | Reteaching Activity   |
| TT  | Teaching Tip          |

**GEOMETRY: CONCEPTS AND APPLICATIONS**  
**OHIO**  
**Mathematics Benchmarks and Indicators**  
**Grade Ten**

| BENCHMARKS AND INDICATORS  | PAGE REFERENCES   |
|--|---|
| <b>Number, Number Sense and Operations Standard</b>  |   |
| <b>Number and Number Systems</b>   |   |
| 1. Connect physical, verbal and symbolic representations of irrational numbers; e.g., construct $\sqrt{2}$ as a hypotenuse or on a number line.  | SE: 51-55, 478-479, 554-555<br><i>Problem-Solving Workshop</i> 453  |
| <b>Meaning of Operations</b>   |   |
| 2. Explain the meaning of the $n$ th root.   | TWE: EM 563   |
| <b>Computation and Estimation</b>  |   |
| 3. Use factorial notation and computations to represent and solve problem situations involving arrangements.   | SE: <i>Preparing for Standardized Tests</i> 138-139   |
| 4. Approximate the $n$ th root of a given number greater than zero between consecutive integers when $n$ is an integer; e.g., the 4 <sup>th</sup> root of 50 is between 2 and 3.   | This objective is covered in Glencoe's <i>Algebra 2</i> .<br>SE: 247 ex 3, 249 #65  |
| <b>Measurement Standard</b>  |   |
| <i>Use Measurement Techniques and Tools</i>  |   |
| 1. Explain how a small error in measurement may lead to a large error in calculated results.   | Precision, error and percent of error are defined and found.<br>SE: 58-59   |
| 2. Calculate relative error.   | SE: 58-59   |
| 3. Explain the difference between absolute error and relative error in measurement.  | Precision and error are defined.<br>SE: 58-59   |
| 4. Give examples of how the same absolute error can be problematic in one situation but not in another; e.g., compare "accurate to the nearest foot" when measuring the height of a person versus when measuring the height of a mountain. | This objective is covered in Glencoe's <i>Geometry</i> .<br>Measurements are rounded to a specified degree of accuracy.<br>SE: 371-376, 377-382 |
| 5. Determine the measures of central and inscribed angles and their associated major and minor arcs.   | SE: 462-467, 586-591<br>TWE: 5MC 468, 592<br>EC 466<br>ICE 463-465, 587-589   |

| BENCHMARKS AND INDICATORS  | PAGE REFERENCES  |
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| <b>Geometry and Spatial Sense Standard</b>   |  |
| <b>Characteristics and Properties</b>  |  |
| 1. Formally define and explain key aspects of geometric figures, including: <ul style="list-style-type: none"> <li>a. interior and exterior angles of polygons;</li> <li>b. segments related to triangles (median, altitude, midsegment);</li> <li>c. points of concurrency related to triangles (centroid, incenter, orthocenter, circumcenter);</li> <li>d. circles (radius, diameter, chord, circumference, major arc, minor arc, sector, segment, inscribed angle).</li> </ul>   | SE: 228-233, 234-239, 408-412, 454-458, 462-467, 468-473, 485-487, 586-591<br><i>Investigation 244-245</i><br>TWE: OEA 239                 |
| <b>Spatial Relationships</b>   |  |
| 2. Recognize and explain the necessity for certain terms to remain undefined, such as point, line and plane.   | Descriptions of points, lines and planes are given.<br>SE: 12-17   |
| 3. Make, test and establish the validity of conjectures about geometric properties and relationships using counterexample, inductive and deductive reasoning, and paragraph or two-column proof, including: <ul style="list-style-type: none"> <li>a. prove the Pythagorean Theorem;</li> <li>b. prove theorems involving triangle similarity and congruence;</li> <li>c. prove theorems involving properties of lines, angles, triangles and quadrilaterals;</li> <li>d. test a conjecture using basic constructions made with a compass and straightedge or technology.</li> </ul> | SE: 162-167, 210-214, 215-219, 251-255, 256, 362-367, 644-648, 649-653, 654-659, 660-665   |
| 4. Construct right triangles, equilateral triangles, parallelograms, trapezoids, rectangles, rhombuses, squares and kites, using compass and straightedge or dynamic geometry software.  | SE: 474 ex 1, 476 #3<br><i>Investigation 340-341</i>   |
| 5. Construct congruent figures and similar figures using tools, such as compass, straightedge, and protractor or dynamic geometry software.  | SE: <i>Hands-On Geometry</i> 65, 102-103, 107, 162, 210  |
| <b>Transformation and Symmetry</b>   |  |
| 6. Identify the reflection and rotation symmetries of two- and three-dimensional figures.  | SE: 434-439, 444, 448 #27-#30, 449 #16-#17<br>TWE: 5MC 440<br>ICE 434-435  |
| 7. Perform reflections and rotations using compass and straightedge constructions and dynamic geometry software.   | Reflections and rotations are identified and performed.<br>SE: 198-202, 692-696, 697-702<br>TWE: 5MC 203, 697<br>ICE 199-200, 693, 698-699 |
| 8. Derive coordinate rules for translations, reflections and rotations of geometric figures in the coordinate plane.   | SE: 687-690, 692-696, 697-702<br>TWE: 5MC 692, 697<br>EC 201, 690<br>ICE 688   |

| BENCHMARKS AND INDICATORS  | PAGE REFERENCES  |
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| 9. Show and describe the results of combinations of translations, reflections and rotations (compositions); e.g., perform compositions and specify the result of a composition as the outcome of a single motion, when applicable. | SE: 696 #17  |
| <i>Visualization and Geometric Models</i>  |  |
| 10. Solve problems involving chords, radii and arcs within the same circle.  | SE: 454-458, 462-467, 468-473, 586-591<br>TWE: 5MC 462, 468<br>ICE 455-456, 463-465, 470-471, 587  |
| <b>Patterns, Functions and Algebra Standard</b>  |  |
| <i>Use Patterns, Relations and Functions</i>   |  |
| 1. Define function formally and with $f(x)$ notation.  | This objective is covered in Glencoe's <i>Algebra I</i> .<br>SE: 256-261, 269 #35, 275 #32, 289 #32-#33, 356 #61, 393 #52, 425 #68<br><i>Investigation 262-263</i>                 |
| 2. Describe and compare characteristics of the following families of functions: square root, cubic, absolute value and basic trigonometric functions; e.g., general shape, possible number of roots, domain and range.             | Families of linear functions are graphed.<br>SE: 176-177   |
| <i>Use Algebraic Representations</i>   |  |
| 3. Solve equations and formulas for a specified variable; e.g., express the base of a triangle in terms of the area and height.  | This objective is covered in Glencoe's <i>Algebra: Concepts and Applications</i> .<br>SE: 244-249, 250-255, 310-315, 316-321, 322-327, 340 #48, 404 #64, 409 #39-#41, 483, 513 #52 |
| 4. Use algebraic representations and functions to describe and generalize geometric properties and relationships.  | SE: 64-67, 118-121, 168-173, 174-179, 312-315<br>TWE: ICE 64, 118, 169-171, 175-176, 313   |
| 5. Solve simple linear and nonlinear equations and inequalities having square roots as coefficients and solutions.   | SE: 257-261, 262-266<br>TWE: ICE 257-258, 263-264  |
| 6. Solve equations and inequalities having rational expressions as coefficients and solutions.   | Equations and inequalities are solved.<br>SE: 163-167, 194-197, 248-250, 284-287<br><i>Algebra Review 723, 724, 725</i><br>TWE: ICE 163-164, 195, 284                              |
| 7. Solve systems of linear inequalities.   | SE: 676-680, 681-686<br><i>Standardized Test Practice 611 #27</i><br>TWE: 5MC 681, 687<br>EC 686<br>ICE 677, 682-683   |
| 8. Graph the quadratic relationship that defines circles.  | SE: 618-621  |
| 9. Recognize and explain that the slopes of parallel lines are equal and the slopes of perpendicular lines are negative reciprocals.   | SE: 168-173<br>TWE: 5MC 174<br>ICE 171   |
| 10. Solve real-world problems that can be modeled using linear, quadratic, exponential or square root functions.   | SE: 177 #12, 178 #35, 179 #36<br><i>Preparing for Standardized Tests 545 #10</i>   |

| BENCHMARKS AND INDICATORS   | PAGE REFERENCES   |
|---|---|
| <b>Analyze Change</b>   |   |
| 11. Solve real-world problems that can be modeled, using systems of linear equations and inequalities.  | SE: 677-680, 683-685<br>TWE: ICE 677  |
| 12. Describe the relationship between slope of a line through the origin and the tangent function of the angle created by the line and the positive x-axis.   | This objective can be covered during teacher/class discussion.  |
| <b>Data Analysis and Probability Standard</b>   |   |
| <i>Data Collection</i>  |   |
| 1. Describe measures of center and the range verbally, graphically and algebraically.   | SE: <i>Preparing for Standardized Tests</i> 224-225, 307  |
| 2. Represent and analyze bivariate data using appropriate graphical displays (scatterplots, parallel box-and-whisker plots, histograms with more than one set of data, tables, charts, spreadsheets) with and without technology. | SE: <i>Preparing for Standardized Tests</i> 184, 185 #10, 347 #10   |
| 3. Display bivariate data where at least one variable is categorical.   | This objective can be covered during teacher/class discussion.  |
| 4. Identify outliers on a data display; e.g., use interquartile range to identify outliers on a box-and-whisker plot.   | A box-and-whisker plot is displayed.<br>SE: <i>Math in the Workplace</i> 339  |
| <b>Statistical Methods</b>  |   |
| 5. Provide examples and explain how a statistic may or may not be an attribute of the entire population; e.g., intentional or unintentional bias may be present.  | This objective is covered in Glencoe's <i>Algebra: Concepts and Applications</i> .<br>SE: 32-37   |
| 6. Interpret the relationship between two variables using multiple graphical displays and statistical measures; e.g., scatterplots, parallel box-and-whisker plots, and measures of center and spread.                            | This objective is covered in Glencoe's <i>Algebra: Concepts and Applications</i> .<br>SE: 302-307<br><i>Investigation</i> 308-309<br>Enrichment Master page 44.                                   |
| <b>Probability</b>  |   |
| 7. Model problems dealing with uncertainty with area models (geometric probability).  | SE: 484-487<br>TWE: ICE 484   |
| 8. Differentiate and explain the relationship between the probability of an event and the odds of an event, and compute one given the other.  | This objective is covered in Glencoe's <i>Algebra: Concepts and Applications</i> .<br>SE: 219-223, 224-229, 243 #28-#29, 398 #76-#77, 409 #42, 467 #35, 518 #45, 539 #42, 619 #50<br>TWE: OEA 223 |

## Codes Used for TWE Pages

|     |                       |
|-----|-----------------------|
| 5MC | 5-Minute Check        |
| EC  | Extra Credit          |
| EM  | Enrichment Master     |
| ICE | In-Class Examples     |
| OEA | Open-Ended Assessment |