



OHIO
Mathematics Benchmarks and Indicators
Grade Eight
Algebra 1 © 2005, Ohio Edition

BENCHMARKS AND INDICATORS	PAGE REFERENCES
Number, Number Sense and Operations Standard	
<i>Number and Number Systems</i>	
1. Use scientific notation to express large numbers and small numbers between 0 and 1.	SE: 425-430, 436 #61-#64, 466 #29-#37, 469 #12-#15, 471 #17 TWE: A 430 BPK 427 OH 20 #6 TT 426 W 425
2. Recognize that natural numbers, whole numbers, integers, rational numbers and irrational numbers are subsets of the real number system.	SE: 104, 107 #2, 114 #64-#66 TWE: ICE 104 OH 8 #2, 11 #2
<i>Meaning of Operations</i>	
3. Apply order of operations to simplify expressions and perform computations involving integer exponents and radicals.	SE: 11-15, 20 #57-#59, 25 #50-#55, 31 #66-#69, 36 #59-#61, 58 #21-#35 TWE: A 15 DI 13, 15 H 11
4. Explain and use the inverse and identity properties and use inverse relationships (addition/subtraction, multiplication/division, squaring/square roots) in problem solving situations.	SE: 21, 103-109, 114 #60-#70, 410-415, 417-423 TWE: A 109, 415, 423 CC 412 STP 106 TNT 106
<i>Computation and Estimation</i>	
5. Determine when an estimate is sufficient and when an exact answer is needed in problem situations, and evaluate estimates in relation to actual answers; e.g., very close, less than, greater than.	SE: 535 ex 5 TWE: OH 9 #2
6. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions.	SE: 535 ex 5
7. Find the square root of perfect squares, and approximate the square root of non-perfect squares as consecutive integers between which the root lies; e.g., $\sqrt{130}$ is between 11 and 12.	SE: 103-109, 114 #60-#63, 115 #25-#27 TWE: A 109 ICE 104 OH 8 #2, 26 #2, 29 #3 TNT 106

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8. Add, subtract, multiply, divide and compare numbers written in scientific notation.	SE: 425-430, 436 #61-#64, 466 #29-#37, 469 #12-#15, 471 #17 TWE: A 430 BPK 427 OH 20 #6 TT 426 W 425
Measurement Standard	
<i>Measurement Units</i>	
1. Compare and order the relative size of common U.S. customary units and metric units; e.g., mile and kilometer, gallon and liter, pound and kilogram.	SE: 656 ex 3, 661 ex 5
2. Use proportional relationships and formulas to convert units from one measurement system to another; e.g., degrees Fahrenheit to degrees Celsius.	TWE: OH 12 #3
<i>Use Measurement Techniques and Tools</i>	
3. Use appropriate levels of precision when calculating with measurements.	SE: <i>Algebra Activity 347</i>
4. Derive formulas for surface area and volume and justify them using geometric models and common materials. For example, find: a. the surface area of a cylinder as a function of its height and radius; b. that the volume of a pyramid (or cone) is one-third of the volume of a prism (or cylinder) with the same base area and height.	SE: 124-125, 414 #46-#48, 415 #60, 456 #53, 817 <i>Algebra Activity 416</i> TWE: OH 21 #7
5. Determine surface area for pyramids by analyzing their parts.	This objective can be met in Glencoe's <i>Pre-Algebra</i> © 2005 on pages 578, 580, 585 and in <i>Mathematics: Applications and Concepts Course 3</i> © 2004 on pages 352-355.
6. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs.	SE: 157 ex 4
7. Apply proportional reasoning to solve problems involving indirect measurements or rates.	SE: 159 #31-#34, 165, 186 #7 TWE: H 155
8. Find the sum of the interior and exterior angles of regular convex polygons with and without measuring the angles with a protractor.	SE: 47 #17-#19
9. Demonstrate understanding of the concepts of perimeter, circumference and area by using established formulas for triangles, quadrilaterals, and circles to determine the surface area and volume of prisms, pyramids, cylinders, spheres and cones. (Note: Only volume should be calculated for spheres and cones.)	SE: 122, 124 #23-#24, 813-814, 815-816, 817 TWE: OH 10 #5, OH 11 #6, OH 13 #3

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10. Use conventional formulas to find the surface area and volume of prisms, pyramids and cylinders and the volume of spheres and cones to a specified level of precision.	SE: 124-125, 414 #46-#48, 415 #60, 456 #53, 817 <i>Algebra Activity</i> 416 TWE: OH 21 #7
Geometry and Spatial Sense Standard	
<i>Characteristics and Properties</i>	
1. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry) of two-dimensional figures and three-dimensional objects.	SE: <i>Algebra Activity</i> 122, 293, 501 TWE: OH 10 #7, 12 #1, 13 #1, 22 #1, 24 #5, 26 #5, 31 #3
2. Recognize the angles formed and the relationship between the angles when two lines intersect and when parallel lines are cut by a transversal.	TWE: OH 9 #6, 15 #7
3. Use proportions in several forms to solve problems involving similar figures (part-to-part, part-to-whole, corresponding sides between figures).	SE: 616-621, 630 #70-#71, 636 #51-#54, 637 #22-#25 TWE: A 621 OH 30 #7
<i>Spatial Relationships</i>	
4. Represent and analyze shapes using coordinate geometry; e.g., given three vertices and the type of quadrilateral, find the coordinates of the fourth vertex.	SE: 196 #48-#50, 611-615, 621 #39-#42, 630 #72-#73, 635 #41-#50, 637 #19-#21 TWE: DI 612, 613 OH 13 #7, 26 #4
<i>Transformations and Symmetry</i>	
5. Draw the results of translations, reflections, rotations and dilations of objects in the coordinate plane, and determine properties that remain fixed; e.g., lengths of sides remain the same under translations.	SE: 197-203, 211 #57-#59, 217 #59-#60, 247 #17-#20, 251 #6-#7 TWE: A 203 DI 198, 199 OH 12 #2, 13 #6, 15 #4
<i>Visualization and Geometric Models</i>	
6. Draw nets for a variety of prisms, pyramids, cylinders and cones.	SE: <i>Algebra Activity</i> 416 TWE: OH 8 #5, OH 19 #4
Patterns, Functions and Algebra Standard	
<i>Use Patterns, Relations and Functions</i>	
1. Relate the various representations of a relationship; i.e., relate a table to graph, description and symbolic form.	SE: 205-211, 212-217, 218-223, 248 #21-#24, 251 #14-#16 <i>Graphing Calculator Investigation</i> 204, 224-225 TWE: A 217, 223 DI 215
2. Generalize patterns and sequences by describing how to find the n th term.	SE: 233-238, 240-245, 250 #46-#51, 251 #23-#28, 253 #19 <i>Spreadsheet Investigation</i> 232 TWE: A 245, 238 DI 235, 236
3. Identify functions as linear or nonlinear based on information given in a table, graph or equation.	SE: 226-231 TWE: OH 15 #6

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<i>Use Algebraic Representations</i>	
4. Extend the uses of variables to include covariants where y depends on x .	SE: 44 ex 2, 213 ex 4, 271 TWE: OH 29 #6
5. Use physical models to add and subtract monomials and polynomials, and to multiply a polynomial by a monomial.	SE: 410-415, 417-423, 437-438, 439-443, 450-451, 452-457, 458-463 TWE: A 415, 423, 443
6. Describe the relationship between the graph of a line and its equation, including being able to explain the meaning of slope as a constant rate of change and y -intercept in real-world problems.	SE: 256-262, 264-270, 272-277, 280-285, 308 #7-#12, 313 #11, 315 #18 <i>Algebra Activity</i> 271 TWE: DI 260, 274
7. Use symbolic algebra (equations and inequalities), graphs and tables to represent situations and solve problems.	SE: 205-211, 212-217, 218-223, 248 #21-#24, 251 #14-#16 <i>Graphing Calculator Investigation</i> 204, 224-225 TWE: A 217, 223 DI 215
8. Write, simplify and evaluate algebraic expressions (including formulas) to generalize situations and solve problems.	SE: 141, 142-148, 149-154, 332-337, 351 #60-#67, 365 #13 TWE: A 148, 154, 337 CC 334 TT 333
9. Solve linear equations and inequalities graphically, symbolically and using technology.	SE: 141, 142-148, 149-154, 332-337, 351 #60-#67, 365 #13 TWE: A 148, 154, 337 CC 334 TT 333
10. Solve 2 by 2 systems of linear equations graphically and by simple substitution.	SE: 368, 369-374, 375, 376-381, 382-386, 387-392, 394-398, 399-402 TWE: A 374, 381, 386
11. Interpret the meaning of the solution of a 2 by 2 system of equations; i.e., point, line, no solution.	SE: 368, 369-374, 375, 376-381, 382-386, 387-392, 394-398, 399-402 TWE: A 374, 381, 386
12. Solve simple quadratic equations graphically; e.g., $y = x^2 - 16$.	SE: 533-538, 544 #56-#58, 552 #60-#62, 575 #17-#22, 579 #8-#11 TWE: A 538 DI 535 H 533
13. Compute and interpret slope, midpoint and distance given a set of ordered pairs.	SE: 196 #48-#50, 611-615, 621 #39-#42, 630 #72-#73, 635 #41-#50, 637 #19-#21 TWE: DI 612, 613 OH 13 #7, 26 #4
<i>Analyze Change</i>	
14. Differentiate and explain types of changes in mathematical relationships, such as linear vs. nonlinear, continuous vs. noncontinuous, direct variation vs. inverse variation.	SE: 264-270 TWE: BPK 264 OH 14 #2, 15 #6, 29 #6, 32 #2

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15. Describe and compare how changes in an equation affects the related graphs; e.g., for a linear equation changing the coefficient of x affects the slope and changing the constant affects the intercepts.	SE: <i>Graphing Calculator Investigation</i> 265, 278-279, 531-532
16. Use graphing calculators or computers to analyze change; e.g., interest compounded over time as a nonlinear growth pattern.	SE: <i>Spreadsheet Investigation</i> 232 <i>Graphing Calculator Investigation</i> 306-307, 729-730
Data Analysis and Probability Standard	
<i>Data Collection</i>	
1. Use, create and interpret scatterplots and other types of graphs as appropriate.	SE: 50-55, 56, 298-305, 722-728, 737-742, 747 #23-#25 TWE: A 55, 56, 305 OH 10 #1
2. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose; e.g., line graph for change over time, circle graph for part-to-whole comparison, scatterplot for relationship between two variants.	SE: 50-55, 56, 298-305, 722-728, 737-742, 747 #23-#25 TWE: A 55, 56, 305 OH 10 #1
3. Differentiate between discrete and continuous data and appropriate ways to represent each.	SE: 50-55 <i>Spreadsheet Investigation</i> 56 TWE: A 55 DI 51
<i>Statistical Methods</i>	
4. Compare two sets of data using measures of center (mean, mode, median) and measures of spread (range, quartiles, interquartile range, percentiles).	SE: 67 #17, 87 #74-#77, 90-94, 109 #84, 113 #51-#52, 115 #32, 116 #7, 818-819 TWE: A 94
5. Explain the mean's sensitivity to extremes and its use in comparison with the median and mode.	SE: 88-94, 109 #84, 113 #50-#51, 115 #32 <i>Reading Mathematics</i> 95 TWE: A 94 DI 90, 91 OH 8 #1, 9 #1, 18 #5
6. Make conjectures about possible relationship in a scatterplot and approximate line of best fit.	SE: 298-305, 312 #66-#70, 313 #21-#24, 323 #59, 331 #61 <i>Graphing Calculator Investigation</i> 306-307, 721 TWE: OH 14 #1
7. Identify different ways of selecting samples, such as survey response, random sample, representative sample and convenience sample.	SE: 708-713, 721 #58-#59, 728 #34, 746 #11-#12, 749 #6-#7 <i>Reading Mathematics</i> 714 TWE: A 713 DI 710 OH 30 #6

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8. Describe how the relative size of a sample compared to the target population affects the validity of predictions.	SE: 708-713, 721 #58-#59, 728 #34, 746 #11-#12, 749 #6-#7 <i>Reading Mathematics 714</i> TWE: A 713 DI 710 OH 30 #6
9. Construct convincing arguments based on analysis of data and interpretation of graphs.	SE: 50-55, 56, 298-305, 722-728, 737-742, 747 #23-#25 TWE: A 55, 56, 305 OH 10 #1
<i>Probability</i>	
10. Calculate the number of possible outcomes for a situation, recognizing and accounting for when items may occur more than once or when order is important.	SE: 777-781, 791 #24-#26, 793 #21-#24 TWE: A 781 OH 16 #4, 32 #5
11. Demonstrate an understanding that the probability of either of two disjoint events occurring can be found by adding the probabilities for each and that the probability of one independent event following another can be found by multiplying the probabilities.	SE: 769-776, 781 #27-#29, 791 #18-#23, 793 #9-#12 TWE: A 776 OH 32 #7

Codes Used for TWE Pages

A	Assess
BPK	Building on Prior Knowledge
CC	Concept Check
DI	Daily Intervention
H	How
ICE	In-Class Example
OH	Countdown to OGT (Ohio tip-in pages)
STP	Standardized Test Practice
TNT	Tips for New Teachers
TT	Teaching Tip
W	Why