

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021-22 are highlighted.

Grade 2 Mathematics Blueprint (26 Total Points – 6 Anchor Questions)

Category	Ohio Standard See Ohio Standards for Mathematics for Examples and Notes	Pro-Core Code	Number of Points	
			Standard	Category
Addition and Subtraction	2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions.	1	1 - 2*	8 (31%)
	2.OA.2 Fluently add and subtract within 20 using mental strategies.	2	1 - 2*	
	2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	8	1 - 2*	
	2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.	9	1 - 2*	
	2.NBT.7-9 Add and subtract within 1,000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; record the strategy with a written numerical method (drawings and, when appropriate, equations) and explain the reasoning used. Understand that in adding or subtracting three-digit numbers, hundreds are added or subtracted from hundreds, tens are added or subtracted from tens, ones are added or subtracted from ones; and sometimes it is necessary to compose or decompose tens or hundreds. Explain why addition and subtraction strategies work, using place value and the properties of operations. Explanations may be supported by drawings or objects.	10	1 - 2*	
	2.NBT.8 Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.	11	1 - 2*	
	2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same whole number units.	15	1 - 2*	
Number and Operations	2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members; write an equation to express an even number as a sum of two equal addends.	3	1 - 2*	7 (27%)
	2.OA.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	4	1 - 2*	
	2.NBT.1-2 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones. Count forward and backward within 1,000 by ones, tens, and hundreds starting at any number; skip-count by 5s starting at any multiple of 5.	5	1 - 2*	
	2.NBT.3 Read and write numbers to 1,000 using base-ten numerals, number names, expanded form, and equivalent representations.	6	1 - 2*	
	2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	7	1 - 2*	
	2.MD.8 Solve problems with money. See Ohio Standards for Mathematics for Parts a and b.	18	1 - 2*	
Measurement	2.MD.1-2 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	12	1 - 2*	6 (23%)
	2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.	13	1 - 2*	
	2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	14	1 - 2*	
	2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole number sums and differences within 100 on a number line diagram.	16	1 - 2*	
	2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	17	1 - 2*	
Data and Geometry	2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit or by making repeated measurements of the same object. Show the measurements by creating a line plot, where the horizontal scale is marked off in whole number units.	19	1 - 2*	5 (22%)
	2.MD.10 Organize, represent, and interpret data with up to four categories; complete picture graphs when single-unit scales are provided; complete bar graphs when single-unit scales are provided; solve simple put-together, take-apart, and compare problems using data in the graph.	20	1 - 2*	
	2.G.1 Recognize and identify triangles, quadrilaterals, pentagons, and hexagons based on the number of sides or vertices. Recognize and identify cubes, rectangular prisms, cones, and cylinders.	21	1 - 2*	
	2.G.2-3 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them. Partition circles and rectangles into two, three, or four equal shares; describe the shares using the words halves, thirds, or fourths and quarters, and use the phrases half of, third of, or fourth of and quarter of. Describe the whole as two halves, three thirds, or four fourths in real-world contexts. Recognize that equal shares of identical wholes need not have the same shape.	22	1 - 2*	

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

DoK/CD Goals

- 1 5 – 9 points (State Blueprint: 18 – 33%)
- 2 12 – 17 points (State Blueprint: 45 – 67%)
- 3 3 – 6 points (State Blueprint: 10 – 27%)

Goals for each p-value range

- 0.10 – 0.19 1 – 3 points (~5%)
- 0.20 – 0.29 1 – 4 points (~10%)
- 0.30 – 0.39 3 – 5 points (~15%)
- 0.40 – 0.49 4 – 7 points (~20%)
- 0.50 – 0.59 4 – 7 points (~20%)
- 0.60 – 0.69 3 – 5 points (~15%)
- 0.70 – 0.79 1 – 4 points (~10%)
- 0.80 – 0.89 1 – 3 points (~5%)

Question Type Goals

- Multiple Choice: No more than 16 (60%)
- Technology Enhanced At least 10 (40%)

Modeling and Reasoning for each test:

Minimum 20% (at least 5 questions)

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints
Changes from 2021–22 are highlighted.

Grade 3 Mathematics Blueprint (31 Total Points – 7 Anchor Questions)

Category	Ohio Standard See Ohio Standards for Mathematics for Examples and Notes	Pro-Core Code	Number of Points		State Blueprint
			Standard	Category	
Multiplication and Division	3.OA.1 Interpret products of whole numbers.	1	1	10 (32%)	12 – 16 points (23 – 33%)
	3.OA.2 Interpret whole number quotients of whole numbers.	2	1		
	3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.	3	1		
	3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers.	4	1		
	3.OA.5 Apply properties of operations as strategies to multiply and divide.	5	1		
	3.OA.6 Understand division as an unknown-factor problem.	6	1		
	3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations.	7	1		
	3.OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter or a symbol, which stands for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	8	1		
	3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.	9	1		
	3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range 10-90 using strategies based on place value and properties of operations..	12	1		
Number and Operations	3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.	10	1 – 3*	7 (23%)	11 – 13 points (21 – 27%)
	3.NBT.2 Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	11	1 – 3*		
	3.MD.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes. Solve word problems by adding and subtracting dollars with dollars and cents with cents.	16	1 – 3*		
	3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters(l). Add, subtract, multiply, or divide whole numbers to solve one-step word problems involving masses or volumes that are given in the same units.	17	1 – 3*		
	3.MD.3 Create a scaled picture graphs and a scaled bar graph to represent a data set with several categories. Solve two-step “how many more” and “how many less” problems using information presented in the scaled graphs.	18	1 – 3*		
Geometry	3.MD.5-6 Recognize area as an attribute of plane figures and understand concepts of area measurement. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	20	1 – 3*	7 (23%)	11 – 13 points (21 – 27%)
	3.MD.7 Relate area to the operations of multiplication and addition. Solve mathematical and real world problems by finding the areas of rectangles and figures composed of rectangles.	21	1 – 3*		
	3.MD.8 Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	22	1 – 3*		
	3.G.1 Draw and describe triangles, quadrilaterals (rhombuses, rectangles, and squares), and polygons (up to 8 sides) based on the number of sides and the presence or absence of square corners (right angles).	23	1 – 3*		
	3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.	24	1 – 3*		
Fractions	3.NF.1 Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.	13	2	7 (23%)	11 – 13 points (21 – 27%)
	3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. See Ohio Standards for Mathematics for Parts a and b.	14	2		
	3.NF.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. See Ohio Standards for Mathematics for Parts a, b, c, and d.	15	2		
	3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by creating a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.	19	2		

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

DoK/CD Goals for each test

1	6 – 10 points	(State Blueprint: 18 – 33%)
2	14 – 21 points	(State Blueprint: 45 – 67%)
3	3 – 8 points	(State Blueprint: 10 – 27%)

Goals for each p-value range

0.10 – 0.19	1 – 3 points (~5%)
0.20 – 0.29	2 – 5 points (~10%)
0.30 – 0.39	3 – 6 points (~15%)
0.40 – 0.49	5 – 8 points (~20%)
0.50 – 0.59	5 – 8 points (~20%)
0.60 – 0.69	3 – 6 points (~15%)
0.70 – 0.79	2 – 5 points (~10%)
0.80 – 0.89	1 – 3 points (~5%)

Question Type Goals for each test

Multiple Choice:	No more than 19 (60%)
Technology Enhanced	At least 13 (40%)

Modeling and Reasoning for each test:

Minimum 20% (at least 8 questions)

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021–22 are highlighted.

Grade 4 Mathematics Blueprint, page 1 (30 Total Points – 6 Anchor Questions)

An [online reference sheet](#) is provided for this test.

Category	Ohio Standard See Ohio Standards for Mathematics for Examples and Notes	Pro- Core Code	Number of Points		State Blueprint
			Standard	Category	
Multiplication and Division	4.OA.1 Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations.	1	1	12 40%	33–43%
	4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison by using drawings and equations with a symbol for the unknown number.	2	1		
	4.OA.3 Solve multistep word problems posed with whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	3	1		
	4.OA.4 Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.	4	1		
	4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself	5	1		
	4.MD.2 Solve real-world problems involving money, time, and metric measurement. a. Using models, add and subtract money and express the answer in decimal notation. b. Using number line diagrams, clocks, or other models, add and subtract intervals of time in hours and minutes. c. Add, subtract, and multiply whole numbers to solve metric measurement problems involving distances, liquid volumes, and masses of objects.	17	1		
	4.MD.3 Develop efficient strategies to determine the area and perimeter of rectangles in real-world situations and mathematical problems.	18	1		
	4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right by applying concepts of place value, multiplication, or division.	6	1		
	4.NBT.2 Read and write multi-digit whole numbers using standard form, word form, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	7	1		
	4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place through 1,000,000.	8	1		
	4.NBT.4 Fluently add and subtract multi-digit whole numbers using a standard algorithm.	9	1		
	4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	10	1		
Number and Operations	4.NF.1 Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{(n \times a)}{(n \times b)}$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.	11	1-3*	11 37%	33–43%
	4.NF.2 Compare two fractions with different numerators and different denominators. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions.	12	1-2*		
	4.NF.3 Understand a fraction $\frac{a}{b}$ with $a > 1$ as a sum of fractions $\frac{1}{b}$. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions. c. Add and subtract mixed numbers with like denominators. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.	13	1-2*		
	4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction $\frac{a}{b}$ as a multiple of $\frac{1}{b}$. b. Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$, and use this understanding to multiply a fraction by a whole number. c. Solve word problems involving multiplication of a fraction by a whole number.	14	1-2*		
	4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.	15	1-2*		
	4.NF.6 Use decimal notation for fractions with denominators 10 or 100.	19	1-2*		
	4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions.	16	1-2*		
Geometry	4.MD.4 Display and interpret data in graphs (picture graphs, bar graphs, and line plots) to solve problems using numbers and operations for this grade.	20	1-2*	7 23%	21–27%
	4.MD.1 Know relative sizes of the metric measurement units within one system of units. Metric units include kilometer, meter, centimeter, and millimeter; kilogram and gram; and liter and milliliter. Express a larger measurement unit in terms of a smaller unit. Record measurement conversions in a two-column table.	21	1-2*		
	4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement. a. Understand an angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through $\frac{1}{360}$ of a circle is called a “one-degree angle,” and can be used to measure angles. b. Understand an angle that turns through n one-degree angles is said to have an angle measure of n degrees.	22	1-2*		
	4.MD.6 Measure angles in whole number degrees using a protractor. Sketch angles of specified measure.	23	1-2*		
	4.MD.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems.	24	1-2*		
	4.G.1 Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.				
4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size.					

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints
Changes from 2021-22 are highlighted.

Grade 4 Mathematics Blueprint, page 2

DoK/CD Goals for each test

1	6 – 10 points	(State Blueprint: 18 – 33%)
2	14 – 20 points	(State Blueprint: 45 – 67%)
3	3 – 8 points	(State Blueprint: 10 – 27%)

Question Type Goals for each test

Multiple Choice:	No more than 18 (60%)
Technology Enhanced	At least 12 (40%)

Modeling and Reasoning for each test:

Minimum 20% (at least 6 questions)

Goals for each p-value range

0.10 – 0.19	1 – 3 points (~5%)
0.20 – 0.29	2 – 5 points (~10%)
0.30 – 0.39	3 – 6 points (~15%)
0.40 – 0.49	5 – 8 points (~20%)
0.50 – 0.59	5 – 8 points (~20%)
0.60 – 0.69	3 – 6 points (~15%)
0.70 – 0.79	2 – 5 points (~10%)
0.80 – 0.89	1 – 3 points (~5%)

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021–22 are highlighted.

Grade 5 Mathematics Blueprint, page 1 (30 Total Points – 6 Anchor Questions)

An [online reference sheet](#) is provided for this test.

Category	Ohio Standard See Ohio Standards for Mathematics for Examples and Notes	Pro- Core Code	Number of Points		State Blueprint
			Standard	Category	
Fractions	5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers and fractions greater than 1) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.	11	1-2*	11 37%	33-43%
	5.NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.	12	1-2*		
	5.NF.3 Interpret a fraction as division of the numerator by the denominator ($\frac{a}{b} = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	13	1-2*		
	5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.	14	1-2*		
	a. Interpret the product $(\frac{a}{b}) \times q$ as a parts of a partition of q into b equal parts, equivalently, as the result of a sequence of operations $a \times q \div b$. b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.				
	5.NF.5 Interpret multiplication as scaling (resizing). a. Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $\frac{a}{b} = \frac{(n \times a)}{(n \times b)}$ to the effect of multiplying $\frac{a}{b}$ by 1.	15	1-2*		
	5.NF.6 Solve real-world problems involving multiplication of fractions and mixed numbers.	16	1-2*		
	5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. b. Interpret division of a whole number by a unit fraction, and compute such quotients. c. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions.	17	1-2*		
	5.MD.2 Display and interpret data in graphs (picture graphs, bar graphs, and line plots) to solve problems.	19	1-2*		
Decimals	5.OA.1 Use parentheses in numerical expressions, and evaluate expressions with this symbol.	1	1-2*	12 40%	33-43%
	5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	2	1-2*		
	5.NBT.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.	4	1-2*		
	5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10.	5	1-2*		
	5.NBT.3 Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.	6	1-2*		
	5.NBT.4 Use place value understanding to round decimals to any place, millions through hundredths.	7	1-2*		
	5.NBT.5 Fluently multiply multi-digit whole numbers using a standard algorithm.	8	1-2*		
	5.NBT.6 Find whole number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	9	1-2*		
	5.NBT.7 Solve real-world problems by adding, subtracting, multiplying, and dividing decimals using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction, or multiplication and division; relate the strategy to a written method and explain the reasoning used. a. Add and subtract decimals, including decimals with whole numbers. b. Multiply whole numbers by decimals. c. Divide whole numbers by decimals and decimals by whole.				
	5.MD.1 Know relative sizes of these U.S. customary measurement units: pounds, ounces, miles, yards, feet, inches, gallons, quarts, pints, cups, fluid ounces, hours, minutes, and seconds. Convert between pounds and ounces; miles and feet; yards, feet, and inches; gallons, quarts, pints, cups, and fluid ounces; hours, minutes, and seconds in solving multi-step, real-world problems.	18	1-2*		
Geometry	5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. 5.MD.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	20	1-2*	7 23%	21-27%
	5.MD.5 Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole number products as volumes. b. Apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real-world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.	21	1-2*		
	5.OA.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.	3	1-2*		
	5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond, e.g., x -axis and x -coordinate, y -axis and y -coordinate.	22	1-2*		
	5.G.2 Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	23	1-2*		
	5.G.3 Identify and describe commonalities and differences between types of triangles based on angle measures (equiangular, right, acute, and obtuse triangles) and side lengths (isosceles, equilateral, and scalene triangles).	24	1-2*		
	5.G.4 Identify and describe commonalities and differences between types of quadrilaterals based on angle measures, side lengths, and the presence or absence of parallel and perpendicular lines.				

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021-22 are highlighted.

Grade 5 Mathematics Blueprint, page 2

DoK/CD Goals for each test

- | | | |
|---|----------------|-----------------------------|
| 1 | 6 – 10 points | (State Blueprint: 18 – 33%) |
| 2 | 14 – 20 points | (State Blueprint: 45 – 67%) |
| 3 | 3 – 8 points | (State Blueprint: 10 – 27%) |

Question Type Goals for each test

- | | |
|---------------------|------------------------|
| Multiple Choice: | Not more than 18 (60%) |
| Technology Enhanced | Not less than 12 (40%) |

Modeling and Reasoning for each test:

- Minimum 20% (at least 6 questions)

Goals for each p-value range

- | | |
|-------------|---------------------|
| 0.10 – 0.19 | 1 – 3 points (~5%) |
| 0.20 – 0.29 | 2 – 5 points (~10%) |
| 0.30 – 0.39 | 3 – 6 points (~15%) |
| 0.40 – 0.49 | 5 – 8 points (~20%) |
| 0.50 – 0.59 | 5 – 8 points (~20%) |
| 0.60 – 0.69 | 3 – 6 points (~15%) |
| 0.70 – 0.79 | 2 – 5 points (~10%) |
| 0.80 – 0.89 | 1 – 3 points (~5%) |

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021–22 are highlighted.

Grade 6 Mathematics Blueprint, page 1 (35 Total Points – 7 Anchor Questions)

This test is divided into two parts: one that does not allow a calculator and one that does. An online calculator will be provided for the calculator section. In addition, handheld calculators may be used for the test following the [same protocols as for state testing](#). An [online reference sheet](#) is also provided.

Category	Ohio Standard See Ohio Standards for Mathematics for Examples and Notes	Pro-Core Code	Number of Points		State Blueprint	
			Standard	Category		
Ratios and Proportions	6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.	1	2	4*	8 23%	24–33%
	6.RP.2 Understand the concept of a unit rate $\frac{a}{b}$ associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.	2	2	5*		
	6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems. a. Make tables of equivalent ratios relating quantities with whole number measurements; find missing values in the tables; and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed c. Find a percent of a quantity as a rate per 100, e.g., 30% of a quantity means $\frac{30}{100}$ times the quantity; solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	3	2	5*		
Expressions and Equations	6.EE.1 Write and evaluate numerical expressions involving whole number exponents.	11	1	2*	11 31%	31–44%
	6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. c. Evaluate expressions at specific values of their variables. Perform arithmetic operations, including those involving whole number exponents, using the algebraic order of operations when there are no parentheses to specify a particular order.	12	1	2*		
	6.EE.3 Apply the properties of operations to generate equivalent expressions. 6.EE.4 Identify when two expressions are equivalent.	13	1	2*		
	6.EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	14	1	2*		
	6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	15	1	2*		
	6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q , and x are all nonnegative rational numbers.	16	1	2*		
	6.EE.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	17	1	2*		
Geometry and Statistics	6.NS.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	10	1		9 26%	20–25%
	6.G.1 Through composition into rectangles or decomposition into triangles, find the area of right triangles, other triangles, special quadrilaterals, and polygons; apply these techniques in the context of solving real-world and mathematical problems.	18	1			
	6.G.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l \cdot w \cdot h$ and $V = B \cdot h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	19	1			
	6.G.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	20	1			
	6.G.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	21	1			
	6.SP.1 Develop statistical reasoning by using the GAISE model: a. Formulate Questions: Recognize and formulate a statistical question as one that anticipates variability and can be answered with quantitative data. b. Collect Data: Design and use a plan to collect appropriate data to answer a statistical question. c. Analyze Data: Select appropriate graphical methods and numerical measures to analyze data by displaying variability within a group, comparing individual to individual, and comparing individual to group. d. Interpret Results: Draw logical conclusions from the data based on the original question. 6.SP.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	22	1			
	6.SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	23	1			
	6.SP.4 Display numerical data in plots on a number line, including dot plots (line plots), histograms, and box plots.	24	1			
	6.SP.5 Summarize numerical data sets in relation to their context. a. Report the number of observations. b. Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Find the quantitative measures of center (median and/or mean) for a numerical data set and recognize that this value summarizes the data set with a single number. Interpret mean as an equal or fair share. Find measures of variability (range and interquartile range) as well as informally describe the shape and the presence of clusters, gaps, peaks, and outliers in a distribution. d. Choose the measures of center and variability, based on the shape of the data distribution and the context in which the data were gathered.	25	1			
	The Number System	6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.	4	1		
6.NS.2 Fluently divide multi-digit numbers using a standard algorithm.		5	1	2*		
6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using a standard algorithm for each operation.		6	1	2*		
6.NS.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers with a common factor as a multiple of a sum of two numbers with no common factor.		7	1	2*		
6.NS.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. 6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.		8	1	2*		
6.NS.7 Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. d. Distinguish comparisons of absolute value from statements about order.		9	1	2*		

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021-22 are highlighted.

Grade 6 Mathematics Blueprint, page 2

DoK/CD Goals for each test

1	5 – 11 points	(State Blueprint: 15 – 31%)
2	16 – 23 points	(State Blueprint: 46 – 65%)
3	5 – 11 points	(State Blueprint: 15 – 31%)

Question Type Goals for each test

Multiple Choice:	No more than 22 (60%)
Technology Enhanced	At least 15 (40%)

Modeling and Reasoning for each test:

Minimum 20% (at least 7 questions)

Goals for each p-value range

0.10 – 0.19	1 – 4 points (~5%)
0.20 – 0.19	2 – 5 points (~10%)
0.30 – 0.39	4 – 7 points (~15%)
0.40 – 0.49	5 – 9 points (~20%)
0.50 – 0.59	5 – 9 points (~20%)
0.60 – 0.69	4 – 7 points (~15%)
0.70 – 0.79	2 – 5 points (~10%)
0.80 – 0.89	1 – 4 points (~5%)

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021–22 are highlighted.

Grade 7 Mathematics Blueprint, page 1 (35 Total Points – 7 Anchor Questions)

This test is divided into two parts: one that does not allow a calculator and one that does. An online calculator will be provided for the calculator section. In addition, handheld calculators may be used for the test following the [same protocols as for state testing](#). An [online reference sheet](#) is also provided.

Category	Ohio Standard See Ohio Standards for Mathematics for Examples and Notes	Pro- Core Code	Number of Points		State Blueprint		
			Standard	Category			
Ratios and Proportions	7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.	1	2 – 3*	8 (23%)	23–33%		
	7.RP.2 Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.	2	2 – 4*				
	7.RP.3 Use proportional relationships to solve multistep ratio and percent problems.	3	2 – 4*				
The Number System	7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. b. Understand $p + q$ as the number located a distance $ q $ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers.	4	1-2*	11 (31%)	28–32%		
	7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-\frac{p}{q} = \frac{-p}{q}$, $\frac{p}{-q} = -\frac{p}{q}$. Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	5	1-2*				
	7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers. Computations with rational numbers extend the rules for manipulating fractions to complex fractions.	6	1-2*				
	7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	7	1-2*				
	7.EE.2 In a problem context, understand that rewriting an expression in an equivalent form can reveal and explain properties of the quantities represented by the expression and can reveal how those quantities are related.	8	1-2*				
	7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	9	1-2*				
	7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where $p, q,$ and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where $p, q,$ and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.	10	1-2*				
	7.G.1 Solve problems involving similar figures with right triangles, other triangles, and special quadrilaterals. a. Compute actual lengths and areas from a scale drawing and reproduce a scale drawing at a different scale. b. Represent proportional relationships within and between similar figures.	11	1-2*			8 (23%)	20–25%
	7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric figures with given conditions. a. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. b. Focus on constructing quadrilaterals with given conditions noticing types and properties of resulting quadrilaterals and whether it is possible to construct different quadrilaterals using the same conditions.	12	1-2*				
	7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	13	1-2*				
7.G.4 Work with circles. a. Explore and understand the relationships among the circumference, diameter, area, and radius of a circle. b. Know and use the formulas for the area and circumference of a circle and use them to solve real-world and mathematical problems.	14	1-2*					
7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	15	1-2*					
7.G.6 Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	16	1-2*					
Statistics and Probability	7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population. a. Differentiate between a sample and a population. b. Understand that conclusions and generalizations about a population are valid only if the sample is representative of that population. Develop an informal understanding of bias.	17	1-2*	8 (23%)	20–25%		
	7.SP.2 Broaden statistical reasoning by using the GAISE model: a. Formulate Questions: Recognize and formulate a statistical question as one that anticipates variability and can be answered with quantitative data. b. Collect Data: Design and use a plan to collect appropriate data to answer a statistical question. c. Analyze Data: Select appropriate graphical methods and numerical measures to analyze data by displaying variability within a group, comparing individual to individual, and comparing individual to group. d. Interpret Results: Draw logical conclusions and make generalizations from the data based on the original question.	18	1-2*				
	7.SP.3 Describe and analyze distributions. a. Summarize quantitative data sets in relation to their context by using mean absolute deviation (MAD), interpreting mean as a balance point. b. Informally assess the degree of visual overlap of two numerical data distributions with roughly equal variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.	19	1-2*				
	7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event; a probability around 1/2 indicates an event that is neither unlikely nor likely; and a probability near 1 indicates a likely event.	20	1-2*				
	7.SP.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.	21	1-2*				
	7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.	22	1-2*				
	7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulations. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language, e.g., “rolling double sixes,” identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events.	23	1-2*				

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints
Changes from 2021-22 are highlighted.

Grade 7 Mathematics Blueprint, page 1

DoK/CD Goals for each test

- | | | |
|---|----------------|-----------------------------|
| 1 | 5 – 11 points | (State Blueprint: 15 – 31%) |
| 2 | 16 – 23 points | (State Blueprint: 46 – 65%) |
| 3 | 5 – 11 points | (State Blueprint: 15 – 31%) |

Question Type Goals for each test

- | | |
|---------------------|-----------------------|
| Multiple Choice: | No more than 21 (60%) |
| Technology Enhanced | At least 14 (40%) |

Modeling and Reasoning for each test:

- Minimum 20% (at least 7 questions)

Goals for each p-value range

- | | |
|-------------|---------------------|
| 0.10 – 0.19 | 1 – 4 points (~5%) |
| 0.20 – 0.29 | 2 – 5 points (~10%) |
| 0.30 – 0.39 | 4 – 7 points (~15%) |
| 0.40 – 0.49 | 5 – 9 points (~20%) |
| 0.50 – 0.59 | 5 – 9 points (~20%) |
| 0.60 – 0.69 | 4 – 7 points (~15%) |
| 0.70 – 0.79 | 2 – 5 points (~10%) |
| 0.80 – 0.89 | 1 – 4 points (~5%) |

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021–22 are highlighted.

Grade 8 Mathematics Blueprint, page 1 (32 Total Points – 7 Anchor Questions)

An online calculator will be provided. In addition, handheld calculators may be used for the test following the [same protocols as for state testing](#). An [online reference sheet](#) is also provided.

Category	Ohio Standard See Ohio Standards for Mathematics for Examples and Notes	Pro-Core Code	Number of Points		State Blueprint
			Standard	Category	
Equations and Expressions	8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.	7	1 – 2*	8 25%	20–29%
	8.EE.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .	8	1 – 2*		
	8.EE.7 Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	9	1 – 2*		
	8.EE.8 Analyze and solve pairs of simultaneous linear equations graphically. a. Understand that the solution to a pair of linear equations in two variables corresponds to the point(s) of intersection of their graphs, because the point(s) of intersection satisfy both equations simultaneously. b. Use graphs to find or estimate the solution to a pair of two simultaneous linear equations in two variables. Equations should include all three solution types: one solution, no solution, and infinitely many solutions. Solve simple cases by inspection. c. Solve real-world and mathematical problems leading to pairs of linear equations in two variables.	10	1 – 2*		
	8.SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering; outliers; positive, negative, or no association; and linear association and nonlinear association.	22	1 – 2*		
	8.SP.2 Understand that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	23	1 – 2*		
	8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.	24	1 – 2*		
Functions	8.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	11	1 – 2*	7 22%	20–29%
	8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	12	1 – 2*		
	8.F.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.	13	1 – 2*		
	8.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	14	1 – 2*		
Geometry	8.G.1 Verify experimentally the properties of rotations, reflections, and translations (include examples both with and without coordinates). a. Lines are taken to lines, and line segments are taken to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.	15	1 – 2*	10 31%	20–37%
	8.G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. (Include examples both with and without coordinates.)	16	1 – 2*		
	8.G.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	17	1 – 2*		
	8.G.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. (Include examples both with and without coordinates.)	18	1 – 2*		
	8.G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.	19	1 – 3*		
	8.G.6 Analyze and justify an informal proof of the Pythagorean Theorem and its converse.	20	1 – 2*		
	8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	21	1 – 2*		
	8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	21	1 – 2*		
	8.G.9 Solve real-world and mathematical problems involving volumes of cones, cylinders, and spheres.	21	1 – 2*		
The Number System	8.NS.1 Know that real numbers are either rational or irrational. Understand informally that every number has a decimal expansion which is repeating, terminating, or is non-repeating and non-terminating.	1	1 – 2*	7 22%	20–25%
	8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions.	2	1 – 2*		
	8.EE.1 Understand, explain, and apply the properties of integer exponents to generate equivalent numerical expressions.	3	1 – 2*		
	8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	4	1 – 2*		
	8.EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities and to express how many times as much one is than the other.	5	1 – 2*		
	8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal notation and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.	6	1 – 2*		

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints
Changes from 2021-22 are highlighted.

Grade 8 Mathematics Blueprint, page 2

DoK/CD Goals for each test

- 1 5 – 10 points (State Blueprint: 15 – 31%)
- 2 15 – 21 points (State Blueprint: 46 – 65%)
- 3 5 – 10 points (State Blueprint: 15 – 31%)

Question Type Goals for each test

- Multiple Choice: Not more than 19 points (60%)
- Technology Enhanced At least 13 points (40%)

Modeling and Reasoning for each test:

- Minimum 20% (at least 7 questions)

Goals for each p-value range

- 0.10 – 0.19 1 – 3 points (~5%)
- 0.20 – 0.29 2 – 4 points (~10%)
- 0.30 – 0.39 4 – 6 points (~15%)
- 0.40 – 0.49 5 – 8 points (~20%)
- 0.50 – 0.59 5 – 8 points (~20%)
- 0.60 – 0.69 4 – 6 points (~15%)
- 0.70 – 0.79 2 – 4 points (~10%)
- 0.80 – 0.89 1 – 3 points (~5%)

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021–22 are highlighted.

Algebra I Blueprint (37 Total Points – 8 Anchor Questions)

An online graphing calculator will be provided. In addition, handheld calculators may be used for the test following the [same protocols as for state testing](#). An [online reference sheet](#) is also provided.

Category	Ohio Standard(s) See Ohio's Learning Standards in Mathematics for more detail	Pro-Core Code	Number of Points		State Blueprint
			Standard	Category	
Number, Quantities, Equations and Expressions	N.Q.1-3☉ Reason quantitatively and use units to solve problems.	1	1 – 2*	14 38%	33 – 41%
	A.SSE.1☉-2 Interpret the structure of expressions.	2	1 – 2*		
	A.SSE.3☉ Write expressions in equivalent forms to solve problems.	3	1 – 2*		
	A.APR.1a Perform arithmetic operations on polynomials.	4	1 – 2*		
	A.CED.1-4☉ Create equations that describe numbers or relationships.	5	3 – 4*		
	A.REI.1 Understand solving equations as a process of reasoning and explain the reasoning.	6	1 – 2*		
	A.REI.3,4ab Solve equations and inequalities in one variable.	7	2 – 3*		
A.REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.	8	1 – 2*	16 (43%)	41 – 50%	
Functions	A.REI.5, 6a Verify that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. Solve systems of equations algebraically and graphically.	9			2 – 3*
	A.REI.10-12 Represent and solve linear and exponential equations and inequalities graphically.	10			2 – 3*
	F.IF.1-3 Understand the concept of a function, and use function notation.	11			1 – 2*
	F.IF.4b-5b☉ Interpret linear, exponential, and quadratic functions that arise in applications in terms of the context.	12			2 – 3*
	F.IF.7☉abe,8,9b Analyze functions using different representations.	13			1 – 2*
	F.BF.1a,2☉ Build a function that models a relationship between two quantities.	14			1 – 2*
	F.BF.3a,4a Build new functions from existing functions.	15			1 – 2*
	F.LE.1-3☉ Construct and compare linear, quadratic, and exponential models, and solve problems.	16	2 – 3*		
F.LE.5☉ Interpret expressions for functions in terms of the situation they model.	17	1 – 2*	7 (19%)	18 – 22%	
Statistics	S.ID.1-3☉ Summarize, represent, and interpret data on a single count or measurement variable.	18			2 – 3*
	S.ID.5-6c☉ Summarize, represent, and interpret data on two categorical and quantitative variables.	19			2 – 3*
	S.ID.7-8☉ Interpret linear models.	20	2 – 3*		

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

DoK Goals for each test

- 1 6 – 11 points (State Blueprint: 14 – 30%)
- 2 16 – 25 points (State Blueprint: 45 – 74%)
- 3 6 – 11 points (State Blueprint: 14 – 30%)

Question Type Goals for each test

- Multiple Choice: No more than 22 questions (~60%)
- Technology Enhanced: At least 15 questions (~40%)

Modeling and Reasoning for each test☉:

- ☉Minimum 20% (8 points)

p-value Range Goals (Form C)

- 0.10 – 0.19 1 – 4 points (~ 5%)
- 0.20 – 0.29 2 – 6 points (~ 10%)
- 0.30 – 0.39 4 – 7 points (~ 15%)
- 0.40 – 0.49 6 – 9 points (~ 20%)
- 0.50 – 0.59 6 – 9 points (~ 20%)
- 0.60 – 0.69 4 – 7 points (~ 15%)
- 0.70 – 0.79 2 – 6 points (~ 10%)
- 0.80 – 0.89 1 – 4 points (~ 5%)

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021–22 are highlighted.

Geometry Blueprint (40 Total Points – 8 Anchor Questions)

An online graphing calculator will be provided. In addition, handheld calculators may be used for the test following the [same protocols as for state testing](#). An [online reference sheet](#) is also provided.

Category	Ohio Standard(s) See Ohio's Learning Standards in Mathematics for more detail	Pro-Core Code	Number of Points		State Blueprint
			Standard	Category	
Congruence and Proof	G.CO.1,2,3ab,4,5 Experiment with transformations in the plane.	1	1-3*	13 – 16 34 – 39%	33 – 39%
	G.CO.6-8 Understand congruence in terms of rigid motions.	2	1-3*		
	G.CO.9-11 Prove geometric theorems both formally and informally using a variety of methods.	3	1-3*		
	G.CO.12-13 Make geometric constructions.	4	1-3*		
	G.CO.14 Classify and analyze geometric figures.	5	1-3*		
	G.GPE.4-7 Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements.	12	1-3*		
Similarity and Trigonometry	G.SRT.1-3 Understand similarity in terms of similarity transformations.	6	1-3*	9 – 14 24 – 35%	23 – 35%
	G.SRT.4-5 Prove and apply theorems both formally and informally involving similarity using a variety of methods.	7	1-3*		
	G.SRT.6-8a Define trigonometric ratios and solve problems involving right triangles.	8	1-3*		
	G.MG.1-3 Apply geometric concepts in modeling situations.	16	1-3*		
	G.GMD.5-6 Understand the relationships between lengths, area, and volumes.	15	1-3*		
Circles	G.C.1-3 Understand and apply theorems about circles.	9	1-2*	7 – 10 18 – 24%	18 – 24%
	G.C.5 Find arc lengths and areas of sectors of circles.	10	1-2*		
	G.GPE.1 Translate between the geometric description and the equation for a conic section.	11	1-2*		
	G.GMD.1,3 Explain volume formulas and use them to solve problems.	13	1-2*		
	G.GMD.4 Visualize the relation between two-dimensional and three-dimensional objects.	14	1-2*		
Probability	S.CP.1-5 Understand independence and conditional probability and use them to interpret data.	17	2-5*	7 – 9 18 – 22%	18 – 22%
	S.CP.6-7 Use the rules of probability to compute probabilities of compound events in a uniform probability model.	18	2-5*		

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

DoK Goals for each test

- 1 6 – 12 points (State Blueprint: 14 – 30%)
- 2 17 – 28 points (State Blueprint: 45 – 74%)
- 3 6 – 12 points (State Blueprint: 14 – 30%)

Question Type Goals for each test

- Multiple Choice: No more than 24 points (60%)
- Technology Enhanced: At least 16 points (40%)

Modeling and Reasoning for each test:

- ☛ Minimum 20% (8 points)

p-value Range Goals (Form C)

- 0.10 – 0.19 1 – 4 points (~ 5%)
- 0.20 – 0.29 2 – 6 points (~ 10%)
- 0.30 – 0.39 4 – 8 points (~ 15%)
- 0.40 – 0.49 6 – 10 points (~ 20%)
- 0.50 – 0.59 6 – 10 points (~ 20%)
- 0.60 – 0.69 4 – 8 points (~ 15%)
- 0.70 – 0.79 2 – 6 points (~ 10%)
- 0.80 – 0.89 1 – 4 points (~ 5%)

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021–22 are highlighted.

Algebra 2/Integrated Math 3 Blueprint, page 1 (38 Total Points – 8 Anchor Questions)

An online graphing calculator will be provided. In addition, handheld calculators may be used for the test following the [same protocols as for state testing](#). An [online reference sheet](#) is also provided.

Category	Ohio Standard(s) See Ohio's Learning Standards in Mathematics for more detail	Pro-Core Code	Number of Points		State Blueprint
			Standard	Category	
Number and Quantity	N.RN.1-3☉ Extend the properties of exponents to rational exponents. Use properties of rational and irrational numbers.	1	1 – 2*	4 – 5 11-13 %	No State Exam
	N.CN.1-2 Perform arithmetic operations with complex numbers.	2	1 – 2*		
	N.CN.7 Solve quadratic equations with real coefficients that have complex solutions.	3	1 – 2*		
Algebra	A.SSE.1-2☉ Interpret the structure of expressions-	4	1 – 2*	14 37%	No State Exam
	A.SSE.3c Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Use the properties of exponents to transform expressions for exponential functions.	5	1 – 2*		
	A.APR.1b Perform arithmetic operations on polynomials. Understand the relationship between zeros and factors of polynomials.	6	1 – 2*		
	A.APR.4 Prove polynomial identities and use them to describe numerical relationships.	7	1 – 2*		
	A.APR.6 Rewrite simple rational expressions in different forms; write $\frac{a(x)}{b(x)}$ in the form $q(x) + \frac{r(x)}{b(x)}$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	8	1 – 2*		
	A.CED.1c,2c,3,4d☉ Create equations that describe numbers or relationships.	9	1 – 2*		
	A.REI.2 Understand solving equations as a process of reasoning and explain the reasoning.	10	1 – 2*		
	A.REI.6b Solve systems of linear equations algebraically and graphically. Extend to include solving systems of linear equations in three variables, but only algebraically.	11	1 – 2*		
A.REI.11 Represent and solve equations and inequalities graphically.	12	1 – 2*			
Functions	F.IF.4-6 Interpret functions that arise in applications in terms of a context.	13	1 – 2*	13 34%	No State Exam
	F.IF.7cdf☉,8,ab-9 Analyze functions using different representations.	14	1 – 2*		
	F.BF.1b☉ Write a function that describes a relationship between two quantities. Combine standard function types using arithmetic operations.	15	1 – 2*		
	F.BF.3 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	16	1 – 2*		
	F.LE.4☉ Construct and compare linear, quadratic, and exponential models and solve problems.	17	1 – 2*		
	F.TF.1-2 Extend the domain of trigonometric functions using the unit circle.	18	1 – 2*		
	F.TF.5☉ Model periodic phenomena with trigonometric functions.	19	1 – 2*		
	F.TF.8 Prove and apply trigonometric identities.	20	1 – 2*		
Geometry	G.C.6 Find arc lengths and areas of sectors of circles.	21	2	2 5%	No State Exam
Probability	S.ID.4☉,6,9☉ Summarize, represent, and interpret data on a single count or measurement variable, or two categorical and quantitative variables. Interpret linear models.	22	1 – 2*	4-5 11-13%	No State Exam
	S.IC.1-2☉ Understand and evaluate random processes underlying statistical experiments.	23	1 – 2*		
	S.IC.3-6☉ Make inferences and justify conclusions from sample surveys, experiments and observational studies.	24	1 – 2*		

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021-22 are highlighted.

Algebra 2/Integrated Math 3 Blueprint, page 2

DoK Goals for each test

- 1 6 – 11 points (State Blueprint: 14 – 30%)
- 2 17 – 26 points (State Blueprint: 45 – 74%)
- 3 6 – 11 points (State Blueprint: 14 – 30%)

Question Type Goals for each test

- Multiple Choice: No more than 22 questions (~60%)
- Technology Enhanced: At least 16 questions (~40%)

Modeling and Reasoning for each test:

- ☉ Minimum 20% (8 points)

p-value Range Goals (Form C)

- 0.10 – 0.19 1 – 4 points (~ 5%)
- 0.20 – 0.29 2 – 6 points (~ 10%)
- 0.30 – 0.39 4 – 8 points (~ 15%)
- 0.40 – 0.49 6 – 10 points (~ 20%)
- 0.50 – 0.59 6 – 10 points (~ 20%)
- 0.60 – 0.69 4 – 8 points (~ 15%)
- 0.70 – 0.79 2 – 6 points (~ 10%)
- 0.80 – 0.89 1 – 4 points (~ 5%)

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021–22 are highlighted.

Integrated Math 1 Blueprint (38 Total Points – 8 Anchor Questions)

An online graphing calculator will be provided. In addition, handheld calculators may be used for the test following the [same protocols as for state testing](#). An [online reference sheet](#) is also provided.

Category	Ohio Standard(s) See Ohio's Learning Standards in Mathematics for more detail	Pro-Core Code	Number of Points		State Blueprint
			Standard	Category	
Algebra	N.Q.1-3* Reason quantitatively and use units to solve problems.	1	1 – 2*	9 24%	23–28%
	A.SSE.1ab,3* Interpret the structure of expressions. Write expressions in equivalent forms to solve problems.	2	1 – 2*		
	A.CED.1a,2a*,3*,4b* Create equations that describe numbers or relationships.	3	1 – 2*		
	A.REI.1 Understand solving equations as a process of reasoning and explain the reasoning.	4	1 – 2*		
	A.REI.3 Solve equations and inequalities in one variable.	5	1 – 2*		
Number and Quantity Functions	A.REI.5,6a Solve systems of equations.	6	1 – 2*	13 34%	32–39%
	A.REI.10-12 Represent and solve equations and inequalities graphically.	7	1 – 2*		
	F.IF.1-3 Understand the concept of a function, and use function notation.	8	1 – 2*		
	F.IF.4a,5a* Interpret functions that arise in applications in terms of the context.	9	1 – 2*		
	F.IF.7ae*,9a Analyze functions using different representations.	10	1 – 2*		
	F.BF.1a,2* Build a function that models a relationship between two quantities.	11	1 – 2*		
	F.BF.4a Build new functions from existing functions.	12	1 – 2*		
	F.LE.1abc,2* Construct and compare linear, quadratic, and exponential models, and solve problems.	13	1 – 2*		
F.LE.5* Interpret expressions for functions in terms of the situation they model.	14	1 – 2*			
Geometry	G.CO.1,2,3ab,4,5 Experiment with transformations in the plane.	15	1 – 2*	9 24%	19–24%
	G.CO.6-8 Understand congruence in terms of rigid motions.	16	1 – 2*		
	G.CO.9-11 Prove geometric theorems both formally and informally using a variety of methods.	17	1 – 2*		
	G.CO.12-13 Make geometric constructions.	18	1 – 2*		
	G.CO.14 Classify and analyze geometric figures.	19	1 – 2*		
	G.GPE.5,7* Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements.	20	1 – 2*		
	G.C.2-3 Understand and apply theorems about circles.	21	1 – 2*		
Probability	S.ID.1-3* Summarize, represent, and interpret data on a single count or measurement variable.	22	2 – 3*	7 18%	18–22%
	S.ID.5,6c* Summarize, represent, and interpret data on two categorical and quantitative variables.	23	2 – 3*		
	S.ID.7-8* Interpret linear models.	24	2 – 3*		

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

DoK Goals for each test

- 1 6 – 11 points (State Blueprint: 14 – 30%)
- 2 17 – 26 points (State Blueprint: 45 – 74%)
- 3 6 – 11 points (State Blueprint: 14 – 30%)

Question Type Goals for each test

- Multiple Choice: No more than 22 questions (~60%)
- Technology Enhanced: At least 16 questions (~40%)

Modeling and Reasoning for each test*:

- *Minimum 20% (8 points)

p-value Range Goals (Form C)

- 0.10 – 0.19 1 – 4 points (~ 5%)
- 0.20 – 0.29 2 – 6 points (~ 10%)
- 0.30 – 0.39 4 – 8 points (~ 15%)
- 0.40 – 0.49 6 – 10 points (~ 20%)
- 0.50 – 0.59 6 – 10 points (~ 20%)
- 0.60 – 0.69 4 – 8 points (~ 15%)
- 0.70 – 0.79 2 – 6 points (~ 10%)
- 0.80 – 0.89 1 – 4 points (~ 5%)

2022-23 Pro-Core Math (Grades 2 – 8) Blueprints

Changes from 2021-22 are highlighted.

Integrated Math 2 Blueprint (38 Total Points – 8 Anchor Questions)

An online graphing calculator will be provided. In addition, handheld calculators may be used for the test following the [same protocols as for state testing](#). An [online reference sheet](#) is also provided.

Category	Ohio Standard(s) See Ohio's Learning Standards in Mathematics for more detail	Pro-Core Code	Number of Points		State Blueprint
			Standard	Category	
Number Quantities, Equations and Expressions	A.SSE.1-2 Interpret the structure of expressions.	1/2	1-2*	10 26%	25 – 33%
	A.SSE.3 Write expressions in equivalent forms to solve problems.	2/3	1-2*		
	A.CED.1b,2b,4c Create equations that describe numbers or relationships.	4	2-3*		
	A.REI.4ab Solve equations and inequalities in one variable.	5	2-3*		
	A.REI.7,11 Solve systems of equations.	6	1-2*		
	A.APR.1a Perform arithmetic operations on polynomials.	3/4	1-2*		
Functions	F.IF.4b,5b Interpret functions that arise in applications in terms of the context.	7/12	1-2*	8 21%	11 – 13 (19 – 24%)
	F.IF.7a,8a,9a,9b Analyze functions using different representations.	8	1-2*		
	F.BF.1a,ii Build a function that models a relationship between two quantities.	9	1-3*		
	F.BF.3a Build new functions from existing functions.	10	1-3*		
	F.LE.3 Construct and compare linear, quadratic, and exponential models, and solve problems.	11	1-2*		
Geometry	G.SRT.1-3 Understand similarity in terms of similarity transformations.	12/6	1-2*	13 34%	17 – 22 points (30 – 41%)
	G.SRT.4-5 Prove and apply theorems both formally and informally involving similarity using a variety of methods.	13/7	1-2*		
	G.SRT.6-8a Define trigonometric ratios and solve problems involving right triangles.	14/8	1-2*		
	G.C.1 Understand and apply theorems about circles.	15	1-2*		
	G.C.5 Find arc lengths and areas of sectors of circles.	16/10	1-2*		
	G.GPE.1 Translate between the geometric description and the equation for a conic section.	17/11	1-2*		
	G.GPE.4,6 Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements.	18	1-2*		
	G.GMD.1,3 Explain volume formulas and use them to solve problems.	19/13	1-2*		
	G.GMD.4 Visualize relationship between two-dimensional and three-dimensional objects.	20/14	1-2*		
	G.GMD.5-6 Understand the relationships between lengths, area, and volumes.	21/15	1-2*		
	G.MG.1-3 Apply geometric concepts in modeling situations.	22/16	1-2*		
Probability	S.CP.1-5 Understand independence and conditional probability and use them to interpret data.	23/17	3-4*	7 18%	10 – 12 points (18 – 22%)
	S.CP.6-7 Use the rules of probability to compute probabilities of compound events in a uniform probability model.	24/18	3-4*		

*Ranges leave flexibility for 2-point questions. The total number of points for the Topic should equal the number indicated.

DoK Goals for each test

- 1 6 – 11 points (State Blueprint: 14 – 30%)
- 2 17 – 26 points (State Blueprint: 45 – 74%)
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Question Type Goals for each test

- Multiple Choice: No more than 22 questions (~60%)
- Technology Enhanced: At least 16 questions (~40%)

Modeling and Reasoning for each test:

- Minimum 20% (8 points)

p-value Range Goals (Form C)

- 0.10 – 0.19 1 – 4 points (~ 5%)
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