Standards: North Carolina Standard Course of Study

NC.8.NS The Number System

Know that there are numbers that are not rational, and approximate them by rational numbers.

NC.8.NS.1 Understand that every number has a decimal expansion. Building upon the definition of a rational number, know that an irrational number is defined as a non-repeating, non-terminating decimal.

Convert between repeating decimals and fractions (8-B.1)

Convert between decimals and fractions or mixed numbers (8-B.2)

Identify rational and irrational numbers (8-F.2)

NC.8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers and locate them approximately on a number line. Estimate the value of expressions involving:

NC.8.NS.2.a Square roots and cube roots to the tenths.

Estimate positive square roots (8-E.2) Estimate positive and negative square roots (8-E.4) Estimate cube roots (8-E.10) Irrational numbers on number lines (8-F.4)

NC.8.NS.2.b π to the hundredths.

Checkpoint opportunity

Checkpoint: Rational and irrational numbers (8-F.5)

Checkpoint: Approximate irrational numbers (8-F.6)

NC.8.EE Expressions and Equations

Work with radicals and integer exponents.

NC.8.EE.1 Develop and apply the properties of integer exponents to generate equivalent numerical expressions.

Powers with negative bases (8-C.4) Understanding negative exponents (8-C.6) Evaluate powers with negative exponents (8-C.7) Multiply powers: integer bases (8-C.9) Divide powers: integer bases (8-C.10) Multiply and divide powers: integer bases (8-C.11) Power of a power: integer bases (8-C.12) Evaluate expressions using properties of exponents (8-C.13) Identify equivalent expressions involving exponents I (8-C.14) Identify equivalent expressions involving exponents II (8-C.15)

NC.8.EE.2 Use square root and cube root symbols to:

NC.8.EE.2.a Represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number.

Solve equations using square roots (8-E.6)

Solve equations using cube roots (8-E.9)

NC.8.EE.2.b Evaluate square roots of perfect squares and cube roots of perfect cubes for positive numbers less than or equal to 400.

Square roots of perfect squares (8-E.1)
Positive and negative square roots (8-E.3)
Relationship between squares and square roots (8-E.5)
Cube roots of positive perfect cubes (8-E.7)
Identify rational and irrational square roots (8-F.1)
Evaluate radical expressions (8-K.8)

NC.8.EE.3 Use numbers expressed in scientific notation to estimate very large or very small quantities and to express how many times as much one is than the other.

Convert between standard and scientific notation (8-D.1) Compare numbers written in scientific notation (8-D.3)

NC.8.EE.4 Perform multiplication and division with numbers expressed in scientific notation to solve real-world problems, including problems where both decimal and scientific notation are used.

Scientific notation on calculators (8-D.2) Add and subtract numbers written in scientific notation (8-D.4) Multiply numbers written in scientific notation (8-D.5) Divide numbers written in scientific notation (8-D.6)

Checkpoint opportunity

Checkpoint: Properties of exponents (8-C.20)

Checkpoint: Scientific notation (8-D.7)

Checkpoint: Square and cube roots (8-E.11)

Analyze and solve linear equations and inequalities.

NC.8.EE.7 Solve real-world and mathematical problems by writing and solving equations and inequalities in one variable.

NC.8.EE.7.a Recognize linear equations in one variable as having one solution, infinitely many solutions, or no solutions.

Find the number of solutions (8-M.20)

Create equations with no solutions or infinitely many solutions (8-M.21)

NC.8.EE.7.b Solve linear equations and inequalities including multi-step equations and inequalities with the same variable on both sides.

Which x satisfies an equation? (8-M.1)
Solve equations involving like terms (8-M.11)
Solve equations with variables on both sides (8-M.12)
Solve equations with variables on both sides: fractional coefficients (8-M.13)
Solve equations with variables on both sides: word problems (8-M.14)
Solve equations with the distributive property (8-M.15)
Solve multi-step equations (8-M.16)

Solve multi-step equations with fractional coefficients (8-M.17)

Solve equations: mixed review (8-M.18)

Solve multi-step equations: complete the solution (8-M.19)

Analyze and solve pairs of simultaneous linear equations.

NC.8.EE.8 Analyze and solve a system of two linear equations in two variables in slope-intercept form.

NC.8.EE.8.a Understand that solutions to a system of two linear equations correspond to the points of intersection of their graphs because the point of intersection satisfies both equations simultaneously.

Is (x, y) a solution to the system of equations? (8-GG.1) Solve a system of equations by graphing (8-GG.2) Find the number of solutions to a system of equations by graphing (8-GG.4)

NC.8.EE.8.b Solve real-world and mathematical problems leading to systems of linear equations by graphing the equations. Solve simple cases by inspection.

Solve a system of equations by graphing (8-GG.2) Solve a system of equations by graphing: word problems (8-GG.3) Find the number of solutions to a system of equations by graphing (8-GG.4) Classify a system of equations by graphing (8-GG.6)

Checkpoint opportunity

Checkpoint: Solve linear equations (8-M.22)

NC.8.F Functions

Define, evaluate, and compare functions.

NC.8.F.1 Understand that a function is a rule that assigns to each input exactly one output.

NC.8.F.1.a Recognize functions when graphed as the set of ordered pairs consisting of an input and exactly one corresponding output.

Is (x, y) a solution to the linear equation? (8-AA.1)

Find values using function graphs (8-BB.4)

Complete a table for a function graph (8-BB.5)

Evaluate a linear function (8-CC.1)

Complete a table for a linear function (8-CC.2)

Complete a table and graph a linear function (8-CC.3)

Evaluate a nonlinear function (8-DD.4)

NC.8.F.1.b Recognize functions given a table of values or a set of ordered pairs.

Identify functions (8-BB.1)

Identify functions: graphs (8-BB.2)

NC.8.F.2 Compare properties of two linear functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Compare linear functions: graphs and equations (8-CC.8)

Compare linear functions: tables, graphs, and equations (8-CC.9)

NC.8.F.3 Identify linear functions from tables, equations, and graphs.

Identify linear and nonlinear functions: graphs and equations (8-DD.1) Identify linear and nonlinear functions: tables (8-DD.2)

Checkpoint opportunity

Checkpoint: Understand functions (8-BB.7)

Checkpoint: Compare linear functions (8-CC.13)

Checkpoint: Linear and nonlinear functions (8-DD.5)

Use functions to model relationships between quantities.

NC.8.F.4 Analyze functions that model linear relationships.

NC.8.F.4.a Understand that a linear relationship can be generalized by y = mx + b.

Slope-intercept form: find the slope and y-intercept (8-AA.3)

Graph a line from an equation in slope-intercept form (8-AA.4)

Write a linear equation from a slope and y-intercept (8-AA.6)

Write linear functions: word problems (8-CC.10)

NC.8.F.4.b Write an equation in slope-intercept form to model a linear relationship by determining the rate of change and the initial value, given at least two (x, y) values or a graph.

Write equations for proportional relationships from tables (8-X.2) Write equations for proportional relationships from graphs (8-X.5) Write and solve equations for proportional relationships (8-X.11) Find the slope from a graph (8-Z.1) Find the slope from two points (8-Z.2) Find the slope from a table (8-Z.3) Slope-intercept form: find the slope and y-intercept (8-AA.3) Write a linear equation from a slope and y-intercept (8-AA.6) Write a linear equation from a graph (8-AA.7) Write a linear equation from a slope and a point (8-AA.8) Write a linear equation from two points (8-AA.9) Write a linear function from a table (8-CC.7) Write linear functions: word problems (8-CC.10)

NC.8.F.4.c Construct a graph of a linear relationship given an equation in slope-intercept form.

Graph a line from an equation in slope-intercept form (8-AA.4)

NC.8.F.4.d Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of the slope and y-intercept of its graph or a table of values.

Find the constant of proportionality from a graph (8-X.4) Interpret graphs of proportional relationships (8-X.10) Write and solve equations for proportional relationships (8-X.11) Interpret points on the graph of a linear function (8-CC.4) Rate of change of a linear function: graphs (8-CC.5) Interpret the slope and y-intercept of a linear function (8-CC.6) Write linear functions: word problems (8-CC.10) Evaluate a linear function: word problems (8-CC.11) Rate of change: tables (8-EE.1)

NC.8.F.5 Qualitatively analyze the functional relationship between two quantities.

NC.8.F.5.a Analyze a graph determining where the function is increasing or decreasing; linear or non-linear.

Identify linear and nonlinear functions: tables and graphs (8)

NC.8.F.5.b Sketch a graph that exhibits the qualitative features of a real-world function.

Identify graphs: word problems (8-EE.3) Checkpoint opportunity

> Checkpoint: Construct and interpret linear functions (8-CC.12) Checkpoint: Sketch and describe graphs (8-EE.4)

NC.8.G Geometry

Understand congruence and similarity using physical models, transparencies, or geometry software.

NC.8.G.2 Use transformations to define congruence.

NC.8.G.2.a Verify experimentally the properties of rotations, reflections, and translations that create congruent figures.

Identify reflections, rotations, and translations (8-R.1)

Translations: graph the image (8-R.3)

Reflections over the x- and y-axes: graph the image (8-R.6)

Reflections: graph the image (8-R.8)

Rotations: graph the image (8-R.10)

NC.8.G.2.b 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.

Identify reflections, rotations, and translations (8-R.1)

Translations: graph the image (8-R.3)

Reflections over the x- and y-axes: graph the image (8-R.6)

Reflections: graph the image (8-R.8)

Rotations: graph the image (8-R.10)

Determine if two figures are congruent: justify your answer (8-R.18)

NC.8.G.2.c Given two congruent figures, describe a sequence that exhibits the congruence between them.

Describe a sequence of transformations (8-R.2)

Sequences of congruence transformations: choose the sequence (8-R.15)

Congruence statements and corresponding parts (8-R.17)

NC.8.G.3 Describe the effect of dilations about the origin, translations, rotations about the origin in 90 degree increments, and reflections across the x-axis and y-axis on two-dimensional figures using coordinates.

Translations: find the coordinates (8-R.4) Translations: write the rule (8-R.5) Reflections over the x- and y-axes: find the coordinates (8-R.7) Reflections: find the coordinates (8-R.9) Rotations: find the coordinates (8-R.11) Reflections and rotations: write the rule (8-R.12) Describe transformations (8-R.13) Sequences of congruence transformations: graph the image (8-R.14) Dilations: graph the image (8-S.2) Dilations: find the coordinates (8-S.3)

NC.8.G.4 Use transformations to define similarity.

NC.8.G.4.a Verify experimentally the properties of dilations that create similar figures.

Dilations: graph the image (8-S.2)

Dilations: find the coordinates (8-S.3)

Dilations: find the scale factor (8-S.4)

NC.8.G.4.b 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.

Side lengths and angle measures of congruent figures (8-R.19)

Similar and congruent figures (8-S.1)

NC.8.G.4.c Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

Checkpoint opportunity

Checkpoint: Congruence transformations (8-R.20)

Checkpoint: Similarity transformations (8-S.11)

Checkpoint: Transformations on the coordinate plane (8-S.12)

Analyze angle relationships.

NC.8.G.5 Use informal arguments to analyze angle relationships.

NC.8.G.5.a Recognize relationships between interior and exterior angles of a triangle.

Find missing angles in triangles (8-Q.7) Find missing angles in triangles using ratios (8-Q.8) Triangle Angle-Sum Theorem (8-Q.9) Exterior Angle Theorem (8-Q.12)

NC.8.G.5.b Recognize the relationships between the angles created when parallel lines are cut by a transversal.

Identify alternate interior and alternate exterior angles (8-P.4) Transversals of parallel lines: name angle pairs (8-P.5) Transversals of parallel lines: find angle measures (8-P.6) Transversals of parallel lines: solve for x (8-P.7)

NC.8.G.5.c Recognize the angle-angle criterion for similarity of triangles.

Angle-angle criterion for similar triangles (8-S.6)

NC.8.G.5.d Solve real-world and mathematical problems involving angles.

Find missing angles in triangles (8-Q.7) Find missing angles in triangles using ratios (8-Q.8) Triangle Angle-Sum Theorem (8-Q.9) Exterior Angle Theorem (8-Q.12)

Checkpoint opportunity

Checkpoint: Triangles and transversals (8-Q.15)

Understand and apply the Pythagorean Theorem.

NC.8.G.6 Explain the Pythagorean Theorem and its converse.

Converse of the Pythagorean theorem: is it a right triangle? (8-T.6)

NC.8.G.7 Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.

Pythagorean theorem: find the length of the hypotenuse (8-T.1)

Pythagorean theorem: find the missing leg length (8-T.2)

Pythagorean theorem: find the missing leg or hypotenuse length (8-T.3)

Pythagorean theorem: find the perimeter (8-T.4)

Pythagorean theorem: word problems (8-T.5)

NC.8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Find the distance between two points (8-O.4)

Checkpoint opportunity

Checkpoint: Pythagorean theorem and its converse (8-T.7)

Checkpoint: Applications of the Pythagorean theorem (8-T.8)

Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

NC.8.G.9 Understand how the formulas for the volumes of cones, cylinders, and spheres are related and use the relationship to solve real-world and mathematical problems.

Volume of cylinders (8-W.3) Volume of cones (8-W.4) Volume of spheres (8-W.7)

Checkpoint opportunity

Checkpoint: Volume (8-W.10)

NC.8.SP Statistics and Probability

Investigate patterns of association in bivariate data.

NC.8.SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

```
Create scatter plots (8-11.4)
Identify trends with scatter plots (8-11.5)
Outliers in scatter plots (8-11.7)
```

NC.8.SP.2 Model the relationship between bivariate quantitative data to:

NC.8.SP.2.a Informally fit a straight line for a scatter plot that suggests a linear association.

Write equations for lines of best fit (8-II.9)

NC.8.SP.2.b Informally assess the model fit by judging the closeness of the data points to the line.

Identify lines of best fit (8-II.8)

Write equations for lines of best fit (8-II.9)

NC.8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate quantitative data, interpreting the slope and y-intercept.

Interpret lines of best fit: word problems (8-II.10)

NC.8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table.

NC.8.SP.4.a Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects.

Find probabilities using two-way frequency tables (8-JJ.4)

NC.8.SP.4.b Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

Checkpoint opportunity

Checkpoint: Scatter plots (8-II.12)

Checkpoint: Lines of best fit (8-II.13)

Checkpoint: Linear models: interpret and solve (8-II.14)

Checkpoint: Two-way frequency tables (8-JJ.11)

For more information about IXL, go to <u>www.ixl.com</u> or send an e-mail to <u>orders@ixl.com</u>.