LOUISIANA DEPARTMENT OF EDUCATION

Office of Assessments, Accountability, and Analytics

Grade 8 Mathematics

Achievement Level Descriptors

Major Content

The student solves problems involving the Major Content for the course with connections to the Standards for Mathematical Practice.

Major Content				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
Radicals, Integer Exponents, and Scientific Notation 8 EE.A.1 8 EE.A.2 8.EE.A.3 8.EE.A.4	Evaluates and generates equivalent numerical expressions using and applying properties of integer exponents.	Evaluates **and generates equivalent** numerical expressions using **and applying** properties of integer exponents.	Evaluates numerical expressions using properties of integer exponents.	Evaluates numerical expressions using properties of integer exponents.
	Solves equations of the form $x^2 = p$ and $x^3 = p$, where p is a perfect square or perfect cube**, representing solutions using $\sqrt{\ }$ or $\sqrt[3]{\ }$ symbols.**	Solves equations of the form $x^2 = p$ and $\boldsymbol{x^3 = p}$, where p is a perfect square **or perfect cube**.	**Partially solves equations of the form $\boldsymbol{x^2 = p}$, where $\boldsymbol{p}$ is a perfect square less than or equal to 100, by representing only the positive solution of the equation.**	
	Estimates very large and very small quantities using scientific notation **and determines how many times as large one number is in relation to another.**	Estimates very large **and very small** quantities using scientific notation.	Estimates very large quantities using scientific notation.	Estimates very large quantities using scientific notation.
	Performs operations with numbers expressed in scientific notation. **Interprets scientific notation that has been generated by technology.**	Performs operations with numbers expressed in scientific notation.	**Performs operations with numbers expressed in scientific notation.**	

Major Content				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
	Chooses appropriate units for measuring very large or very small quantities.			
Proportional Relationships and Linear Equations 8.EE.B.5 8.EE.B.6 8.F.A.3	Graphs linear equations in the form $y = mx + b$, including proportional relationships.	Graphs linear equations in the form $y = mx + b$, including proportional relationships.	Graphs linear equations in the form $y = mx + b$, including proportional relationships.	Graphs linear equations in the form $y = mx + b$.
	Interprets the unit rate as the slope of the graph of a proportional relationship and applies these concepts to solve real-world problems.	Interprets the unit rate as the slope of the graph of a proportional relationship **and applies these concepts to solve real-world problems.**	**Interprets the unit rate as the slope of the graph of a proportional relationship.**	
	Compares two different proportional relationships represented in different ways.	**Compares** two different proportional relationships represented in different ways.	**Makes some comparisons between two different proportional relationships represented in different ways.**	
	Interprets $y = mx + b$ as defining a linear function.			
	Uses similar triangles to show that the slope is the same between any two distinct points on a non-vertical line in the coordinate plane.	**Uses similar triangles to show that the slope is the same between any two distinct points on a non-vertical line in the coordinate plane.**		
Solving Linear Equations 8.EE.C.7b	Fluently solves linear equations in one variable, with rational number coefficients, including those that require use of the distributive property and combining like terms.	**Fluently** solves linear equations in one variable, with rational number coefficients, including those that require use of the distributive property and combining like terms.	Solves linear equations in one variable, with rational number coefficients**, including those that require use of the distributive property or combining like terms.**	Solves linear equations in one variable, with rational number coefficients.

Major Content				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
Systems Linear Equations 8.EE.C.8	Analyzes and solves mathematical **and real-world** problems leading to pairs of simultaneous linear equations graphically, algebraically, and by inspection.	**Analyzes and** solves mathematical problems leading to pairs of simultaneous linear equations graphically, **algebraically**, and by inspection.	Solves mathematical problems leading to pairs of simultaneous linear equations graphically **and by inspection.**	Solves mathematical problems leading to pairs of simultaneous linear equations graphically, **where the graph is provided.**
	Understands the relationship between the graphic representation and the algebraic solution to the system.	**Understands the relationship between the graphic representation and the algebraic solution to the system.**		
Functions 8.F.A.1 8.F.A.2 8.F.A.3	Understands a function is a rule assigning to each input exactly one output and can be graphed as a set of ordered pairs.	Understands a function is a rule that assigns to each input exactly one output and can be graphed as a set of ordered pairs.	Understands a function is a rule that assigns to each input exactly one output **and can be graphed as a set of ordered pairs.**	Understands a function is a rule that assigns to each input exactly one output.
	Compares properties of two functions represented in different ways.	**Compares some of the properties of two functions represented in different ways.**		
	Identifies **and proves** functions as linear or nonlinear.	**Identifies functions as linear or nonlinear.**		
Congruence and Similarity 8.G.A.1 8.G.A.2 8.G.A.3 8.G.A.4	Describes the effect of dilations, translations, rotations, and reflections on two-dimensional figures with **and** without coordinates; determines whether two given figures are congruent or similar through one or more transformations; **and describes a sequence of transformations to justify congruence or similarity of two figures.**	Describes the effect of **dilations,** translations, rotations, and reflections on two-dimensional figures **with** coordinates, and determines whether two given figures are congruent **or similar through one or more transformations.**	Describes the effect of translations, rotations, **and** reflections on two-dimensional figures without coordinates and determines whether two given figures are congruent.	Describes the effect of translations, rotations, **or** reflections on two-dimensional figures **without** coordinates and determines whether two given figures are congruent.

Major Content				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
Pythagorean Theorem 8.G.B.7 8.G.B.8	Applies the Pythagorean Theorem in **real-world and mathematical problems in two and three dimensions** and to find the distance between two points in a coordinate system.	Applies the Pythagorean Theorem in a simple planar case **and to find the distance between two points in a coordinate system.**	Applies the Pythagorean Theorem to determine **any side** of a right triangle in a simple planar case without coordinates.	Applies the Pythagorean Theorem to determine the hypotenuse of a right triangle in a simple planar case without coordinates.
	Recognizes situations to apply the Pythagorean Theorem in multi-step problems.			

Additional & Supporting Content

The student solves problems involving the Additional & Supporting Content for the course with connections to the Standards for Mathematical Practice.

Additional & Supporting Content				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
Rational and Irrational Numbers 8.NS.A.1 8.NS.A.2	Distinguishes between rational and irrational numbers, understands these numbers have decimal expansions, approximates locations on a number line, and converts between terminating decimals **or decimals that repeat eventually** and fractional representations of rational numbers.	Distinguishes between rational and irrational numbers, understands these numbers have decimal expansions, approximates locations on a number line**, and converts between terminating decimals or simple repeating decimals and fractional representations of rational numbers.**	Distinguishes between rational and irrational numbers**, understands these numbers have decimal expansions,** and approximates locations on a number line.	Distinguishes between rational and irrational numbers and approximates locations on a number line.
Modeling with Functions 8.F.B.4 8.F.B.5	Constructs a function to model a linear relationship between two quantities described with or without a context.	Constructs a function to model a linear relationship between two quantities described **with or without a context.**	**Constructs** a function to model a linear relationship between two quantities in a table or graph.	**Identifies** a function to model a linear relationship between two quantities in a table or graph.
	Determines the rate of change and initial value of the function **given a description of a relationship** of two or more (x, y) values in a table of values or graph.	Determines the rate of change and initial value of the function **given two or more (*x*, *y*) values** in a table of values or graph.	Determines the rate of change and initial value of the function from a table or graph that contains the initial value.	Determines the rate of change or initial value of the function from a table or graph **that contains the initial value.**
	Analyzes **and describes** the functional relationship between two quantities.	Analyzes the graph of a linear function to describe the functional relationship between two quantities.	**Analyzes the graph of a linear function to describe the functional relationship between two quantities.**	
	Identifies the graph of a function when given a written description.	**Identifies the graph of a function when given a written description.**		

Additional & Supporting Content				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
Volume 8.G.C.9	Uses the formulas for volume of cones, cylinders and spheres to calculate the volume **or dimensions** of solids in mathematical and real-world problems.	Uses the formulas for volume of cones, cylinders and spheres to calculate the volume of solids in mathematical **and real-world** problems.	Uses the formulas for volume of cones, cylinders and spheres to calculate the volume of solids in mathematical problems.	
	Applies volume formulas to composite solids in mathematical problems.			
Bivariate Data 8.SP.A.1 8.SP.A.2 8.SP.A.3 8.SP.A.4	Analyzes and describes the patterns of association in bivariate data by constructing, displaying, and interpreting scatter plots and two-way tables.	**Analyzes and** describes the patterns of association in bivariate data by **constructing, displaying,** and interpreting scatter plots and two-way tables.	**Describes** the patterns of association in bivariate data by interpreting scatter plots and two-way tables.	Identifies the patterns of association in bivariate data by interpreting scatter plots and two-way tables.
	Uses the equation of a linear model to solve problems in context.	Uses the equation of a linear model to solve problems in context.	**Uses the equation of a linear model to solve problems in context.**	
	Informally fits a straight line to a scatter plot that suggests a linear association **and assesses the model fit.**	**Informally fits a straight line to** a scatter plot that suggests a linear association.	**Identifies a line of best fit for a scatter plot that suggests a linear association.**	
	Compares linear models used to fit the same set of data to determine which has a better fit.			

Mathematical Reasoning & Modeling

In connection with course content, the student: expresses course-level appropriate mathematical reasoning by constructing viable arguments and critiquing the reasoning of others; attends to precision when making mathematical statements; solves real-world problems with a degree of difficulty appropriate to the grade/course by applying knowledge and skills articulated in the standards for the current grade/course (or for more complex problems, knowledge and skills articulated in the standards for previous grades/courses); engages in the modeling practice by using mathematics to solve problems arising in everyday scenarios; makes sense of problems and perseveres when solving them; uses appropriate tools strategically; and looks for and makes use of structure.

Type II				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
	In connection with the content knowledge and skills described in Major Content, the student **clearly** constructs and communicates a **complete** response based on		In connection with the content knowledge and skills described in Major Content, the student constructs and communicates a response based on	
LEAP.II.8.1 LEAP.II.8.2 LEAP.II.8.3 LEAP.II.8.4 LEAP.II.8.5	the process to determine the set of all solutions to an equation or system of equations in two variables and the principle that a graph of an equation or system of equations in two variables represents the set of all solutions			
	a chain of reasoning to justify or refute algebraic, function, or linear-equation propositions or conjectures			
	application of geometric reasoning in a coordinate setting and/or using coordinates to draw geometric conclusions			
	Responses may include:			
	a logical approach based on a conjecture and/or stated assumptions	a logical approach based on a conjecture and/or stated assumptions	a **logical** approach based on a conjecture and/or stated assumptions	a faulty approach based on a conjecture and/or stated assumptions
	a logical and complete progression of steps	a logical **and complete** progression of steps	a **logical**, but incomplete, progression of steps	an incomplete or illogical progression of steps
	precise calculation	**precise** calculation	**minor** calculation errors	major calculation errors
	fluent use of grade-level vocabulary, symbols, and labels	**fluent** use of grade-level vocabulary, symbols, and labels	limited use of grade-level vocabulary, symbols, and labels	limited use of grade-level vocabulary, symbols, and labels
	complete justification of a conclusion	**complete** justification of a conclusion	partial justification of a conclusion	partial justification of a conclusion
	generalization of an argument or conclusion			

Type II				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
	evaluating, interpreting and critiquing the validity **and efficiency** of responses, reasoning, approaches, and conclusions**, using mathematical connections and providing counter-examples where applicable**	evaluating, **interpreting, and critiquing** the validity of **responses, reasoning,** approaches, and conclusions	**evaluating the validity of approaches and conclusions**	
	identifying and describing errors in solutions and presenting correct solutions	identifying and describing errors in solutions **and presenting correct solutions**	**identifying and describing errors in solutions**	
	distinguishing correct and flawed reasoning and correcting flawed reasoning	**identifying and describing flaws in reasoning and presenting correct reasoning**		

Type III				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
	In connection with the content knowledge, skills, and abilities described in Major Content, the student devises a plan to apply mathematics in solving problems arising in everyday life, society and the workplace by:			
LEAP.III.8.1 LEAP.III.8.2 LEAP.III.8.3 LEAP.III.8.4	using stated assumptions and making assumptions and approximations to simplify a real-world situation	using stated assumptions **or making assumptions** and approximations to simplify a real-world situation	using stated assumptions and approximations to simplify a real-world situation	using stated assumptions and approximations to simplify a real-world situation
	analyzing and/or creating limitations, **relationships, and interpreting goals** within a model	**creating limitations and goals within a model**		
	analyzing, justifying and defending models which lead to a conclusion	**using models which lead to a conclusion**		
	mapping relationships between quantities by selecting appropriate tools to create models	**mapping relationships** between quantities by **selecting appropriate** tools to create models	**illustrating relationships between quantities** by using provided tools to create models	identifying quantities by using provided tools to create models
	analyzing relationships mathematically between quantities to draw conclusions	analyzing relationships mathematically between quantities to draw conclusions	analyzing relationships mathematically **between quantities** to draw conclusions	analyzing relationships mathematically to draw conclusions
	applying proportional reasoning	applying proportional reasoning	applying proportional reasoning	applying proportional reasoning
	writing/using functions to describe how one quantity of interest depends on another	writing/using functions to describe how one quantity of interest depends on another	**writing**/using functions to describe how one quantity of interest depends on another	using functions to describe how one quantity of interest depends on another
	using reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity	using reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity	using **reasonable** estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity	using unreasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity

Type III				
Content	**Level 5: Advanced**	**Level 4: Mastery**	**Level 3: Basic**	**Level 2: Approaching Basic**
	In connection with the content knowledge, skills, and abilities described in Major Content, the student devises a plan to apply mathematics in solving problems arising in everyday life, society and the workplace by:			
	interpreting mathematical results in an applied context	interpreting mathematical results **in an applied context**	**interpreting mathematical results in a simplified context**	
	determining whether results make sense	determining whether results make sense	**determining whether results make sense**	
	improving a model if it has not served its purpose	**improving** a model if it has not served its purpose	**altering a model if it has not served its purpose**	
	writing a complete, clear, and correct algebraic expression or equation to describe a situation	writing a **complete, clear, and correct** algebraic expression or equation to describe a situation	writing an incomplete algebraic expression or equation to describe a situation	writing an incomplete algebraic expression or equation to describe a situation