

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



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





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	Major Content					
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic		
Systems	Analyzes and solves	Analyzes and solves	Solves mathematical	Solves mathematical		
Linear	mathematical and real-world	mathematical problems leading	problems leading to pairs of	problems leading to pairs		
Equations	problems leading to pairs of	to pairs of simultaneous linear	simultaneous linear	of simultaneous linear		
8.EE.C.8	simultaneous linear equations	equations graphically,	equations graphically and by	equations graphically,		
	graphically, algebraically, and	algebraically, and by inspection	inspection.	where the graph is		
	by inspection.			provided.		
	Understands the relationship	Understands the relationship				
	between the graphic	between the graphic				
	representation and the	representation and the				
	algebraic solution to the	algebraic solution to the				
	system.	system.				
Functions	Understands a function is a	Understands a function is a rule	Understands a function is a	Understands a function is		
8.F.A.1	rule assigning to each input	that assigns to each input	rule that assigns to each	a rule that assigns to each		
8.F.A.2	exactly one output and can be	exactly one output and can be	input exactly one output	input exactly one output.		
8.F.A.3	graphed as a set of ordered	graphed as a set of ordered	and can be graphed as a set			
	pairs.	pairs.	of ordered pairs.			
	Compares properties of two	Compares some of the				
	functions represented in	properties of two functions				
	different ways.	represented in different ways.				
	Identifies and proves functions	Identifies functions as linear or				
	as linear or nonlinear.	nonlinear.				





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	Major Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Congruence	Describes the effect of	Describes the effect of	Describes the effect of	Describes the effect of	
and	dilations, translations,	dilations, translations,	translations, rotations, and	translations, rotations, or	
Similarity	rotations, and reflections on	rotations, and reflections on	reflections on two-	reflections on two-	
8.G.A.1	two-dimensional figures with	two-dimensional figures with	dimensional figures without	dimensional figures	
8.G.A.2	and without coordinates;	coordinates, and determines	coordinates and determines	without coordinates and	
8.G.A.3	determines whether two	whether two given figures are	whether two given figures	determines whether two	
8.G.A.4	given figures are congruent or	congruent or similar through	are congruent.	given figures are	
	similar through one or more	one or more transformations.		congruent.	
	transformations; and				
	describes a sequence of				
	transformations to justify				
	congruence or similarity of				
	two figures.				
Pythagorean	Applies the Pythagorean	Applies the Pythagorean	Applies the Pythagorean	Applies the Pythagorean	
Theorem	Theorem in real-world and	Theorem in a simple planar	Theorem to determine any	Theorem to determine the	
8.G.B.7	mathematical problems in	case and to find the distance	side of a right triangle in a	hypotenuse of a right	
8.G.B.8	two and three dimensions	between two points in a	simple planar case without	triangle in a simple planar	
	and to find the distance	coordinate system.	coordinates.	case without coordinates.	
	between two points in a				
	coordinate system.				
	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	Distinguishes between	Distinguishes between	Distinguishes between	Distinguishes between	
Irrational	rational and irrational	rational and irrational	rational and irrational	rational and irrational	
Numbers	numbers, understands these	numbers, understands these	numbers , understands	numbers and approximates	
8.NS.A.1	numbers have decimal	numbers have decimal	these numbers have	locations on a number line.	
8.NS.A.2	expansions, approximates	expansions, approximates	decimal expansions, and		
	locations on a number line, and	locations on a number line,	approximates locations on		
	converts between terminating	and converts between	a number line.		
	decimals or decimals that	terminating decimals or			
	repeat eventually and	simple repeating decimals			
	fractional representations of	and fractional			
	rational numbers.	representations of rational			
		numbers.			
Modeling with	Constructs a function to model	Constructs a function to	Constructs a function to	Identifies a function to	
Functions	a linear relationship between	model a linear relationship	model a linear	model a linear relationship	
8.F.B.4	two quantities described with	between two quantities	relationship between two	between two quantities in	
8.F.B.5	or without a context.	described with or without a	quantities in a table or	a table or graph.	
		context.	graph.		
	Determines the rate of change	Determines the rate of change	Determines the rate of	Determines the rate of	
	and initial value of the function	and initial value of the	change and initial value of	change or initial value of	
	given a description of a	function given two or more	the function from a table	the function from a table	
	relationship or two or more	(x, y) values in a table of	or graph that contains the	or graph that contains the	
	(x, y) values in a table of values	values or graph.	initial value.	initial value.	
	or graph.				





		Additional & Supporting Con	tent	
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
	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.		
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	Analyzes and describes the	Analyzes and describes the	Describes the patterns of	Identifies the patterns of
8.SP.A.1	patterns of association in	patterns of association in	association in bivariate	association in bivariate
8.SP.A.2	bivariate data by constructing,	bivariate data by constructing ,	data by interpreting	data by interpreting scatter
8.SP.A.3 8.SP.A.4	displaying, and interpreting scatter plots and two-way tables.	displaying, and interpreting scatter plots and two-way tables.	scatter plots and two-way tables.	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	Informally fits a straight line	Identifies a line of best fit	
	a scatter plot that suggests a	to a scatter plot that suggests	for a scatter plot that	
	linear association and assesses	a linear association.	suggests a linear	
	the model fit.		association.	





	Additional & Supporting Content					
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic		
	Compares linear models used					
	to fit the same set of data to					
	determine which has a better					
	fit.					





EXPRESSING MATHEMATICAL REASONING

In connection with course content, the student expresses course-level appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others and/or attending to precision when making mathematical statements.

	Expressing Mathematical Reasoning					
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic		
	In connection with the content	knowledge and skills described	d In connection with the content knowledge and skills descr			
	in Major Content, the student c	clearly constructs and	in Major Content, the student cons	structs and communicates a		
	communicates a complete resp	oonse based on	response based on			
LEAP.II.8.1	the process to determine the se	et of all solutions to an equation	or system of equations in two variab	les and the principle that a		
LEAP.II.8.2	graph of an equation or system	of equations in two variables rep	presents the set of all solutions			
LEAP.II.8.3	a chain of reasoning to justify c	r refute algebraic, function, or lir	ear-equation propositions or conjec	tures		
LEAP.II.8.4	application of geometric reason	ning in a coordinate setting and/c	or using coordinates to draw geomet	ric conclusions		
LEAP.II.8.5	5 Responses may include:					
	a logical approach based on a	a logical approach based on a	a logical approach based on a	a faulty approach based on		
	conjecture and/or stated	conjecture and/or stated	conjecture and/or stated	a conjecture and/or stated		
	assumptions	assumptions	assumptions	assumptions		
	a logical and complete	a logical and complete	a logical , but incomplete,	an incomplete or illogical		
	progression of steps	progression of steps	progression of steps	progression of steps		
	precise of calculation	precise calculation	minor calculation errors	major calculation errors		
	fluent use of grade-level	fluent use of grade-level	limited use of grade-level	limited use of grade-level		
	vocabulary, symbols, and	vocabulary, symbols, and	vocabulary, symbols, and labels	vocabulary, symbols, and		
	labels	labels		labels		
	complete justification of a	complete justification of a	partial justification of a	partial justification of a		
	conclusion	conclusion	conclusion	conclusion		
	generalization of an					
	argument or conclusion					



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





MODELING & APPLICATION

In connection with content, the student 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), engaging particularly in the Modeling practice, and where helpful making sense of problems and persevering to solve them, reasoning abstractly, and quantitatively, using appropriate tools strategically, looking for the making use of structure and/or looking for and expressing regularity in repeated reasoning.

	Modeling & Application						
	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic			
Content	In connection with the content k	nowledge, skills, and abilities descr	ribed in Major Content, the stud	lent devises a plan to apply			
	mathematics in solving problems	mathematics in solving problems arising in everyday life, society and the workplace by:					
LEAP.III.8.1	using stated assumptions and	using stated assumptions and	using stated assumptions	using stated assumptions			
LEAP.III.8.2	making assumptions and	making assumptions and	and approximations to	and approximations to			
LEAP.III.8.3	approximations to simplify a	approximations to simplify a	simplify a real-world	simplify a real-world			
LEAP.III.8.4	real-world situation	real-world situation	situation	situation			
	analyzing and/or creating	creating limitations and goals					
	limitations, relationships, and	within a model					
	interpreting goals within a						
	model						
	analyzing, justifying and	using models which lead to a					
	defending models which lead	conclusion					
	to a conclusion						
	mapping relationships between	mapping relationships	illustrating relationships	identifying quantities by			
	quantities by selecting	between quantities by	between quantities by using	using provided tools to			
	appropriate tools to create	selecting appropriate tools to	provided tools to create	create models			
	models	create models	models				
	analyzing relationships	analyzing relationships	analyzing relationships	analyzing relationships			
	mathematically between	mathematically between	mathematically between	mathematically to draw			
	quantities to draw conclusions	quantities to draw conclusions	quantities to draw	conclusions			
			conclusions				
	applying proportional	applying proportional	applying proportional	applying proportional			
	reasoning	reasoning	reasoning	reasoning			





Modeling & Application				
	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
Content	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:			
	writing/using functions to	writing/using functions to	writing/using functions to	using functions to describe
	describe how one quantity of	describe how one quantity of	describe how one quantity	how one quantity of interest
	interest depends on another	interest depends on another	of interest depends on	depends on another
			another	
	using reasonable estimates of	using reasonable estimates of	using reasonable estimates	using unreasonable
	known quantities in a chain of	known quantities in a chain of	of known quantities in a	estimates of known
	reasoning that yields an	reasoning that yields an	chain of reasoning that	quantities in a chain of
	estimate of an unknown	estimate of an unknown	yields an estimate of an	reasoning that yields an
	quantity	quantity	unknown quantity	estimate of an unknown
				quantity
	interpreting mathematical	interpreting mathematical	interpreting mathematical	
	results in an applied context	results in an applied context	results in a simplified	
			context	
	determining whether results	determining whether results	determining whether	
	make sense	make sense	results make sense	
	improving a model if it has not	improving a model if it has not	altering a model if it has not	
	served its purpose	served its purpose	served its purpose	
	writing a complete, clear, and	writing a complete, clear, and	writing an incomplete	writing an incomplete
	correct algebraic expression or	correct algebraic expression or	algebraic expression or	algebraic expression or
	equation to describe a situation	equation to describe a situation	equation to describe a	equation to describe a
			situation	situation