Grade 7 Mathematics Performance Level Descriptors

(Based on PARCC)

In 2018, Colorado will continue to use the performance level descriptors (PLDs) that were developed in collaboration with the Partnership for Assessment of Readiness for College and Careers (PARCC) consortium to describe performance on the CMAS assessments.

	Grade 7 Math : Sub-Claim A The student solves problems involving the Major Content for grade/course with connections to the Standards for Mathematical Practice.			
	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
Proportional Relationships 7.RP.1 7.RP.2a 7.RP.2b 7.RP.2c 7.RP.2d 7.RP.3-1 7.RP.3-2	**Analyzes** and uses proportional relationships to solve real-world and mathematical problems, including **multi-step** ratio/percent problems. Computes unit rates of quantities associated with ratios of fractions. Decides whether two quantities are in a proportional relationship and identifies the constant of proportionality (unit rate) in tables, equations, diagrams, verbal descriptions and graphs. Interprets a point (*x, y*) on the graph of a proportional relationship in terms of the situation, with special attention to the points (0, 0) and (1, *r*) where *r* is the unit rate. Represents proportional relationships by equations and uses them to solve mathematical and real-world problems, including multi-step ratio and percent	**Analyzes** and uses proportional relationships to solve real-world and mathematical problems, including simple ratio/percent problems. Computes unit rates of quantities associated with ratios of fractions. Decides whether two quantities are in a proportional relationship and identifies the constant of proportionality (unit rate) in tables, equations, diagrams, verbal descriptions and graphs. **Interprets a point (*x, y*) on the graph** of a proportional relationship **in terms of the situation, with special attention to the points (0, 0) and (1, *r*) where *r* is the unit rate.** **Represents proportional relationships by equations** and uses them to solve mathematical and real-world problems, including	**Uses** proportional relationships to solve **real-world** and mathematical problems, including simple ratio/percent problems. **Computes unit rates of quantities associated with ratios of fractions.** **Decides** whether two quantities are in a proportional relationship and **identifies the constant of proportionality (unit rate) in tables, equations, diagrams, verbal descriptions and graphs.** **Uses equations representing a proportional relationship to solve mathematical and real-world problems, including ratio and percent problems.**	Identifies proportional relationships to solve mathematical problems, including ratio/percent problems. Identifies whether two quantities are in a proportional relationship.

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	problems. **Determines when it is appropriate to use unit rates and understands its limitations.**	simple ratio and percent problems.		
Operations with Fractions 7.NS.1a 7.NS.1b-1 7.NS.1b-2 7.NS.1c-1 7.NS.1d 7.NS.2a-1 7.NS.2a-2 7.NS.2b-1 7.NS.2b-2 7.NS.2c 7.NS.3 7.EE.3	Performs operations on positive and negative rational numbers in multi-step mathematical and real-world problems. Represents addition and subtraction on a horizontal or vertical number line and recognizes situations in which opposite quantities combine to make zero. Determines reasonableness of a solution and **interprets solutions in real-world contexts.** **Using the properties of operations, justifies the steps taken to solve multi-step mathematical and real-world problems involving rational numbers.**	Performs operations on positive and negative rational numbers in **multi-step** mathematical and real-world problems. Represents addition and subtraction on a horizontal or vertical number line and recognizes situations in which opposite quantities combine to make zero. **Determines reasonableness of a solution.**	Performs operations on positive and negative rational numbers in mathematical and **real-world** problems. Represents addition and subtraction on a horizontal or vertical number line **and recognizes situations in which opposite quantities combine to make zero.**	Performs operations on positive and negative rational numbers in mathematical problems. Represents addition and subtraction on a horizontal or vertical number line.
Expressions, Equations and Inequalities 7.EE.1 7.EE.2 7.EE.4a-1 7.EE.4a-2 7.EE.4b	Applies properties of operations as strategies to add, subtract, factor and expand linear expressions. Solves **multi-step** linear equations with rational coefficients. In mathematical or real-world	Applies properties of operations as strategies to add, subtract, **factor** and expand linear expressions. Solves two-step linear equations with rational coefficients. In a mathematical or **real-world**	Applies properties of operations as strategies to add, subtract **and expand** linear expressions. Solves **two-step** linear equations with rational coefficients. **In a mathematical context, uses**	Applies properties of operations as strategies to add and subtract linear expressions. Solves one-step linear equations with rational coefficients.

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	contexts, uses variables to represent quantities, construct and solve equations and inequalities, and graph **and interpret** solution sets. **Rewrites an expression in different forms.** **Describes the relationship between equivalent quantities that are expressed algebraically in different forms in a problem context and explains their equivalence in light of the context of the problem.**	context, uses variables to represent quantities, construct and solve equations and inequalities, and graph solution sets.	**variables to represent quantities, construct and solve equations and inequalities, and graph solution sets.**	

	Grade 7 Math: Sub-Claim B The student solves problems involving the Additional and Supporting Content for the grade/course with connections to the Standards for Mathematical Practice.			
	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
Representing Geometric Figures 7.G.2 7.G.3	Draws geometric figures – freehand, with a ruler and protractor or with technology – and describes their attributes. Constructs triangles with given angle and side conditions and notices when those conditions determine a unique triangle, more than one triangle or no triangle. Describes two-dimensional figures	Draws geometric figures – freehand, with a ruler and protractor or with technology – and describes their attributes. Constructs triangles with given angle and side conditions. **Describes the two-dimensional figures that result from slicing**	Draws geometric figures – freehand, with a ruler and protractor, or with technology – and describes some of their attributes. **Constructs triangles with given angle and side conditions.**	Draws geometric figures – freehand, with a ruler and protractor, or with technology – and describes some of their attributes.

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	that result from slicing three-dimensional figures by a plane **which may or may not be** parallel or perpendicular to a base or face.	**three-dimensional figures by a plane parallel or perpendicular to a base or face.**		
Drawings and Measurement 7.G.1 7.G.4-1 7.G.4-2 7.G.5 7.G.6	Solves mathematical and real-world problems involving circumference, area, surface area and volume of two-and three-dimensional objects, **including composite objects.** Solves problems involving scale drawings of geometric figures, including reproducing a scale drawing at a different scale. Represents angle relationships using equations to solve for unknown angles. **Produces a logical conclusion** about the relationship between the circumference and area of a circle.	Solves mathematical and **real-world** problems involving circumference, area, surface area and volume of two-and three-dimensional objects. Solves problems involving scale drawings of geometric figures, **including reproducing a scale drawing at a different scale.** **Represents** angle relationships **using equations to solve** for unknown angles.	Solves mathematical problems involving circumference, area, **surface area and volume** of two-**and three-**dimensional objects. Solves problems involving scale drawings of geometric figures. **Uses facts about angle relationships to determine the measure of unknown angles**.	Solves mathematical problems involving circumference and area of two-dimensional objects. Solves problems involving scale drawings of geometric figures.
Random Sampling and Comparative Inferences 7.SP.1 7.SP.2 7.SP.3 7.SP.4	Understands and uses random sampling to draw inferences about a population. Draws relevant informal comparative inferences about two populations, including assessing the degree of visual overlap of two numerical data distributions with	**Understands and uses random sampling** to draw inferences about a population. Draws **relevant** informal comparative inferences about two populations.	**Draws inferences about a population from a table or graph of random samples.** **Draws informal comparative inferences about two populations.**	Compares two populations based on measures of center and measures of variability.

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	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
	similar variabilities. **Generates multiple samples of the same size to gauge the variation in estimates or predictions.** **Analyzes whether a sample is representative of a population.**			
Chance Processes and Probability Models 7.SP.5 7.SP.6 7.SP.7a 7.SP.7b 7.SP.8a 7.SP.8b 7.SP.8c	Understands that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. **Generates a sample space to determine** the probability of simple or compound events using methods such as organized lists, tables, tree diagrams or **simulations.** Approximates the probability of a chance event by collecting data. Develops probability models to determine the probabilities of events. Designs and uses a simulation to generate frequencies for compound events. **Designs and uses a simulation to estimate the probability of a**	Understands that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Finds probabilities when given sample spaces for simple **and compound** events using methods such as organized lists, tables and **tree diagrams.** **Develops a model to approximate the probability of a chance event and predicts approximate frequencies when given the probability or by observing frequencies in data generated from the process.**	Understands that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. **Finds probabilities when given sample spaces for simple events using methods such as organized lists and tables.**	Understands that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.

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	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
	compound event.			

	Grade 7 Math: Sub-Claim C In connection with content, the student expresses grade/course-level appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others and/or attending to precision when making mathematical statements.			
	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
Properties of Operations 7.C.1.1 7.C.1.2 7.C.2	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student clearly constructs and communicates a complete response based on the properties of operations and the relationship between addition and subtraction or between multiplication and division, including: • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • precision of calculation • correct use of grade-level vocabulary, symbols and labels • complete justification of a conclusion • **generalization of an argument or conclusion** evaluating, interpreting, and critiquing the validity of other's responses, approaches, conclusions and reasoning, and **correcting and providing counter-examples**	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student **clearly** constructs and communicates a complete response based on the properties of operations and the relationship between addition and subtraction or between multiplication and division, including: • a logical approach based on a conjecture and/or stated assumptions • a logical and **complete** progression of steps • **precision** of calculation • **correct** use of grade-level vocabulary, symbols and labels • **complete** justification of a conclusion • evaluating**, interpreting and critiquing** the validity of other's **responses,** approaches, conclusions, and **reasoning.**	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student constructs and communicates a **complete** response based on the properties of operations and the relationship between addition and subtraction or between multiplication and division, including: • a **logical** approach based on a conjecture and/or stated assumptions • a **logical,** but incomplete, progression of steps • **minor** calculation errors • **some** use of grade-level vocabulary, symbols and labels • partial justification of a conclusion • **evaluating the validity of other's approaches and conclusions**	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student constructs and communicates an incomplete response based on the properties of operations and the relationship between addition and subtraction or between multiplication and division, including: • a faulty approach based on a conjecture and/or stated assumptions • an incomplete or illogical progression of steps • major calculation errors • limited use of grade-level vocabulary, symbols and labels • partial justification of a conclusion

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	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
	where applicable.			
Concrete Referents and Diagrams 7.C.3 7.C.4	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including: • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • precision of calculation • correct use of grade-level vocabulary, symbols and labels • complete justification of a conclusion • generalization of an argument or conclusion • evaluating, interpreting and critiquing the validity and efficiency of other's responses, approaches, conclusions and reasoning, and **providing a counterexample where applicable.**	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student clearly constructs and communicates a **complete** response based on concrete referents provided in the prompt or **constructed by the student** such as: diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including: • a logical approach based on a conjecture and/or stated assumptions • a logical and **complete** progression of steps • **precision** of calculation • **correct** use of grade-level vocabulary, symbols and labels • **complete** justification of a conclusion • evaluating, **interpreting and critiquing** the validity of other's responses, approaches, conclusions and **reasoning.**	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student constructs and communicates an incomplete response based on concrete referents provided in the prompt or in **simple cases, constructed by the student** such as: diagrams **that are connected to a written (symbolic) method,** number line diagrams or coordinate plane diagrams, including: • a **logical** approach based on a conjecture and/or stated assumptions • a **logical**, but incomplete, progression of steps • **minor** calculation errors • **some** use of grade-level vocabulary, symbols and labels • partial justification of a conclusion • **evaluation the validity of other's approaches and conclusions.**	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student constructs and communicates an incomplete response based on concrete referents provided in the prompt such as: diagrams, number line diagrams or coordinate plane diagrams, which may include: • a faulty approach based on a conjecture and/or stated assumptions • an illogical and incomplete progression of steps • major calculation errors • limited use of grade-level vocabulary, symbols and labels • partial justification of a conclusion
Distinguish	In connection with the content	In connection with the content	In connection with the content	In connection with the content

	Grade 7 Math: Sub-Claim C In connection with content, the student expresses grade/course-level appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others and/or attending to precision when making mathematical statements.			
	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
Correct Explanation/ Reasoning from that which is Flawed 7.C.5 7.C.6.1 7.C.7.1 7.C.7.2 7.C.7.3 7.C.7.4 7.C.8	knowledge, skills, and abilities described in Sub-claims A and B, the student clearly constructs and communicates a complete response to a given equation, multi-step problem, proposition or conjecture, including: • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • precision of calculation • correct use of grade-level vocabulary, symbols and labels • complete justification of a conclusion • **generalization of an argument or conclusion** • evaluating, interpreting and critiquing the validity and **efficiency** of other's responses, approaches, conclusions and reasoning, and **provides a counterexample where applicable.** • identifying and describing errors in solutions and presents correct solutions • **distinguishing correct explanation/reasoning from that which is flawed. If there is a flaw, presents correct**	knowledge, skills, and abilities described in Sub-claims A and B, the student clearly constructs and communicates a complete response to a given equation, multi-step problem, proposition or conjecture, including: • a logical approach based on a conjecture and/or stated assumptions • a logical and **complete** progression of steps • **precision** of calculation • **correct** use of grade-level vocabulary, symbols and labels • **complete** justification of a conclusion • evaluating**, interpreting and critiquing** the validity of other's responses, approaches, conclusions and **reasoning.** • identifying and describing errors in solutions and **presents correct solutions.**	knowledge, skills, and abilities described in Sub-claims A and B, the student constructs and communicates a **complete** response to a given equation, multi-step problem, proposition or conjecture, including: • a **logical** approach based on a conjecture and/or stated assumptions • a **logical,** but incomplete, progression of steps • **minor** calculation errors • **some** use of grade-level vocabulary, symbols and labels • partial justification of a conclusion • **evaluating the validity of other's approaches and conclusions.** • **identifying and describing errors in solutions.**	knowledge, skills, and abilities described in Sub-claims A and B, the student constructs and communicates an incomplete response to a given equation, multi-step problem, proposition or conjecture, including: • a faulty approach based on a conjecture and/or stated assumptions • an illogical and incomplete progression of steps • major calculation errors • limited use of grade-level vocabulary, symbols and labels • partial justification of a conclusion

	Grade 7 Math: Sub-Claim C In connection with content, the student expresses grade/course-level appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others and/or attending to precision when making mathematical statements.			
	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
	reasoning.			

	Grade 7 Math: Sub-Claim D 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			
	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
Modeling 7.D.1 7.D.2 7.D.3 7.D.4	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student devises a plan to apply mathematics in solving problems arising in everyday life, society and the workplace by: • using stated assumptions and making assumptions and approximations to simplify a real-world situation • mapping relationships between important quantities by selecting appropriate tools to create models • analyzing relationships mathematically between important quantities to draw conclusions • writing a complete, clear and correct algebraic expression or equation to describe a situation • applying proportional reasoning • writing/using functions to describe how one quantity of interest depends on another	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student devises a plan to apply mathematics in solving problems arising in everyday life, society and the workplace by: • using stated assumptions and **making assumptions** and **approximations** to simplify a real-world situation • **mapping** relationships between important quantities by **selecting appropriate** tools to create models • analyzing relationships mathematically between important quantities to draw conclusions • writing a **complete**, **clear and correct** algebraic expression or equation to describe a situation • applying proportional reasoning • writing/using functions to describe how one quantity of interest depends on another	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student devises a plan to apply mathematics in solving problems arising in everyday life, society and the workplace by: • using stated assumptions and approximations to simplify a real-world situation • **illustrating relationships** between important quantities by using provided tools to create models • analyzing relationships mathematically **between important quantities** to draw conclusions • writing an incomplete algebraic expression or equation to describe a situation • applying proportional reasoning	In connection with the content knowledge, skills, and abilities described in Sub-claims A and B, the student devises a plan to apply mathematics in solving problems arising in everyday life, society and the workplace by: • using stated assumptions and approximations to simplify a real-world situation • identifying important quantities using provided tools to create models • analyzing relationships mathematically to draw conclusions • writing an incomplete algebraic expression or equation to describe a situation • applying proportional reasoning using functions to describe how one quantity of interest depends on another

	Grade 7 Math: Sub-Claim D 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			
	Level 5: Exceeded Expectations	**Level 4: Met Expectations**	**Level 3: Approached Expectations**	**Level 2: Partially Met Expectations**
	• using reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity • reflecting on whether the results make sense • improving the model if it has not served its purpose	• using reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity	• **writing**/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	
	• interpreting mathematical results in the context of the situation **• analyzing and/or creating constraints, relationships and goals** **• analyzing, justifying and defending models which lead to a conclusion**	• reflecting on whether the results make sense • **improving** the model if it has not served its purpose • interpreting mathematical results in the **context of the situation**	**• reflecting on whether the results make sense** **• modifying the model if it has not served its purpose** **• interpreting mathematical results in a simplified context**	• using unreasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity