ALIGNMENT OF KANSAS MATH STANDARDS WITH DYNAMIC LEARNING MAPS® ESSENTIAL ELEMENTS IN

Math

KANSAS
STATE DEPARTMENT OF
EDUCATION

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Background on the Dynamic Learning Maps® Essential Elements (DLM® EEs)

The Dynamic Learning Maps® Essential Elements are specific statements of knowledge and skills linked to the grade-level expectations identified in the Common Core State Standards. The purpose of the Dynamic Learning Maps® Essential Elements is to build a bridge from the content in the Common Core State Standards to academic expectations for students with the most significant cognitive disabilities. The initial draft of the Dynamic Learning Maps® Essential Elements (then called the Common Core Essential Elements) was released in the spring of 2012.

The initial version of the Dynamic Learning Maps® Essential Elements (DLM® EEs) was developed by a group of educators and content specialists from the 12 member states of the Dynamic Learning Maps® Alternate Assessment Consortium (DLM®) in the spring of 2011. Led by Edvantia, Inc., a sub-contractor of DLM®, representatives from each state education agency and the educators and content specialists they selected developed the original DLM® EEs draft.

Experts in mathematics and English language arts, as well as individuals with expertise in instruction for students with significant cognitive disabilities, reviewed the draft documents. Edvantia then compiled the information into the version released in the spring of 2012.

Concurrent with the development of the DLM® EEs, the DLM® consortium was actively engaged in building learning maps in mathematics and English language arts. The DLM® learning maps are highly connected representations of how academic skills are acquired, as reflected in research literature. In the case of the DLM® project, the Common Core State Standards helped to specify academic targets, while the surrounding map content clarified how students could reach the specified standard. Learning maps of this size had not been previously developed, and as a result, alignment between the DLM® EEs and the learning maps was not possible until the fall of 2012, when an initial draft of the learning maps was available for review.

Alignment of the DLM® EEs to the DLM®

Teams of content experts worked together to revise the initial version of the DLM® EEs and the learning maps to ensure appropriate alignment of these two critical elements of the project. Alignment involved horizontal alignment of the DLM® EEs with the Common Core State Standards and vertical alignment of the DLM® EEs with meaningful progressions in the learning maps. The alignment process began when researchers Caroline Mark and Kelli Thomas compared the learning maps with the initial version of the DLM® EEs to determine how the map and the DLM® EEs should be adjusted to improve their alignment. The teams of content experts most closely involved with this alignment work included:

Mathematics

Kelli Thomas, Ph.D. (co-lead)
Angela Broaddus, Ph.D. (co-lead)
Perneet Sood
Kristin Joannou
Bryan Candea Kromm

English Language Arts

Caroline Mark, Ph.D. (lead)
Jonathan Schuster, Ph.D.
Russell Swinburne Romine, Ph.D.
Suzanne Peterson

These teams worked in consultation with Sue Bechard, Ph.D. and Karen Erickson, Ph.D., who offered guidance based on their experience in the alternate assessment of students with significant cognitive disabilities.

The Alignment Process

The process of aligning the learning map and the DLM® EEs began by identifying nodes in the maps that represented the essential elements in mathematics and English language arts (ELA).

This process revealed areas in the maps where additional nodes were needed to account for incremental growth reflected from an essential element in one grade to the next. Areas were also identified in which an essential element was out of place developmentally, according to research, with other essential elements. For example, adjustments were made when an essential element related to a higher-grade map node appeared earlier on the map than an essential element related to a lower-grade map node (e.g., a fifth-grade skill preceded a third-grade skill). Finally, the alignment process revealed DLM® EEs that were actually written as instructional tasks rather than learning outcomes.

This initial review step provided the roadmap for subsequent revision of both the learning maps and the DLM® EEs. The next step in the DLM® project was to develop the claims document, which served as the basis for the evidence-centered design of the DLM® project and helped to further refine both the modeling of academic learning in the maps and the final revisions to the DLM® EEs.

Claims and Conceptual Areas

The DLM® system uses a variant of evidence-centered design (ECD) as the framework for developing the DLM® Alternate Assessment System. While ECD is multifaceted, it starts with a set of claims regarding important knowledge in the domains of interest (mathematics and English language arts), as well as an understanding of how that knowledge is acquired. Two sets of claims have been developed for DLM® that identify the major domains of interest within mathematics and English language arts for students with significant cognitive disabilities. These claims are broad statements about expected student learning that serve to focus the scope of the assessment. Because the learning map identifies particular paths to the acquisition of academic skills, the claims also help to organize the structures in the learning map for this population of students. Specifically, conceptual areas within the map further define the knowledge and skills required to meet the broad claims identified by DLM®.

The claims are also significant because they provide another means through which to evaluate alignment between the DLM® EEs and the learning map nodes, and serve as the foundation for evaluating the validity of inferences made from test scores. DLM® EEs related to a particular claim and conceptual area must clearly link to one another, and the learning map must reflect how that knowledge is acquired. Developing the claims and conceptual areas for DLM® provided a critical framework for organizing nodes on the learning maps and, accordingly, the DLM® EEs that align with each node. The table below shows the major ELA claims in DLM® and the conceptual areas within each claim.

Table 1 reveals the relationships among the claims, conceptual areas, and DLM® EEs in mathematics. The DLM® EEs are represented with codes that reflect the domains in mathematics. For example, the first letter or digit represents the grade of record, the next code reflects the domain, followed by the number that aligns with the Common Core State Standard grade level expectation. As such, K.CC.1 is the code for the DLM® EE that aligns with kindergarten (K), counting and cardinality (CC), standard 1. Keys to the codes can be found under the table.

Clearly articulated claims and conceptual areas for DLM® served as an important evidence-centered framework within which this version of the DLM® EEs was developed. With the claims and conceptual areas in place, the relationship between DLM® EEs within a claim and conceptual area or across grade levels is easier to track and strengthen. The learning maps, as well as the claims and conceptual areas, were not yet developed when the original versions of the DLM® EEs were created. As such, the relationship of DLM® EEs within and across grade levels was more difficult to evaluate at that time.

BACKGROUND ON THE DLM® ESSENTIAL ELEMENTS

Table 1. DLM® Claims and Conceptual Areas for Students with Significant Cognitive Disabilities in Mathematics

CLAIM 1 Number Sense: Students demonstrate increasingly complex understanding of number sense.

DLM®	DEFINITION	EE INCLUDED
MC 1.1	Understand number structures (counting, place value, fraction).	K.CC.1, 4 ,5; 1.NBT.1a-b; 2.NBT.2a-b,3; 3.NBT.1,2,3; 3.NF.1-3; 4.NF.1-2,3; 5.NF.1,2; 6.RP.1; 7.RP.1-3; 7.NS.2.c-d; 8.NS.2.a
MC 1.2	Compare, compose, and decompose numbers and sets.	K.CC.6; 1.NBT.2, 3, 4, 6; 2.NBT.1, 4, 5b; 4.NBT.2, 3; 5.NBT.1, 2, 3, 4; 6.NS.1, 5-8; 7.NS.3; 8.NS.2.b; 8.EE.3-4
MC 1.3	Calculate accurately and efficiently using simple arithmetic operations.	2.NBT.5.a, 6-7; 3.OA.4; 4.NBT.4, 5.NBT.5, 6-7; 6.NS.2, 3; 7.NS.1, 2.a, 2.b; 8.NS.1; 8.EE.1; N.CN.2.a, 2.b, 2.c; N.RN.1; S.CP.1-5; S.IC.1-2

CLAIM 2 Geometry: Students demonstrate increasingly complex spatial reasoning and understanding of geometric principles.

DLM®	DEFINITION	EE INCLUDED
MC 2.1	Understand and use geometric properties of two- and three-dimensional shapes.	K.MD.1-3; K.G.2-3; 1.G.1, 2; 2.G.1; 3.G.1; 4.G.1, 2; 4.MD.5, 6; 5.G.1-4; 5.MD.3; 7.G.1, 2, 3, 5; 8.G.1, 2, 4, 5; G.CO.1, 4-5, 6-8; G.GMD.4; G.MG.1-3
MC 2.2	Solve problems involving area, perimeter, and volume.	1.G.3; 3.G.2; 4.G.3; 4.MD.3; 5.MD.4-5; 6.G.1, 2; 7.G.4, 6; 8.G.9; G.GMD.1-3; G.GPE.7

CLAIM 3 Measurement Data and Analysis: Students demonstrate increasingly complex understanding of measurement, data, and analytic procedures.

DLM®	DEFINITION	EE INCLUDED
MC 3.1	Understand and use measurement principles and units of measure.	1.MD.1-2, 3.a, 3.b, 3.c, 3.d; 2.MD.1, 3-4, 5, 6, 7, 8; 3.MD.1, 2, 4; 4.MD.1, 2.a, 2.b, 2.c, 2.d; 5.MD.1.a, 1.b, 1.c; N-Q.1-3
MC 3.2	Represent and interpret data displays.	1.MD.4; 2.MD.9-10; 3.MD.3; 4.MD.4.a, 4.b; 5.MD.2; 6.SP.1-2, 5; 7.SP.1-2, 3, 5-7; 8.SP.4; S-ID. 1-2, 3, 4

CLAIM 4 Algebraic and functional reasoning: Students solve increasingly complex mathematical problems, making productive use of algebra and functions.

DLM®	DEFINITION	EE INCLUDED
MC 4.1	Use operations and models to solve problems.	K.OA.1; 1.OA.1.a, 1.b,2, 5.a, 5.b; 2.OA.3, 4; 3.OA.1-2, 8; 4.OA.1-2, 3, 4; 6.EE.1-2, 3, 5-7; 7.EE.1, 4; 8.EE.7; A.CED.1, 2-4; A.SSE.1, 3
MC 4.2	Understand patterns and functional thinking.	3.OA.9; 4.OA.5; 5.OA.3; 7.EE.2; 8.EE.2, 5-6; 8.F.1-3, 4, 5; A.REI.10-12; A.SSE.4; F.BF.1, 2; F.IF.1-3, 4-6; F.LE.1-3

ACRONYM	DEFINITION
A.CED	Creating equations.
A.SSE	Seeing structure in equations.
BF	Building functions
CC	Counting and cardinality.
EE	Expressions and equations
F.BF	Basic fractions
F.IF	Interpreting functions.
G	Geometry
G.GMD	Geometric measurement and dimension
G.MG	Geometry: modeling with geometry
G.GPE	General properties and equations
MD	Measurement and data
NBT	Numbers and operations in base ten
N.CN	Complex number system
NF	Numbers and operations - fractions
N.RN	Real number system
NS	Number systems
N.Q	Number and quantity
OA	Operations and algebraic thinking
RP	Ratios and proportional relationships
S.IC	Statistics and probability: making inferences/justifying conclusions.
S.ID	Statistics and probability: interpreting categorical and quantitative data.
SP	Statistics and probability

Resulting Changes to the DLM® Essential Elements

The development of the entire DLM® Alternate Assessment System guided a final round of revisions to the DLM® EEs, which can be organized into four broad categories: alignment across grade levels, language specificity, common core alignment, and defining learning expectations (rather than instructional tasks). The first type of revision was required to align the DLM® EEs across grade levels, both vertically and horizontally. The maps, and the research supporting them, were critical in determining the appropriate progression of skills and understandings from grade to grade. This alignment across grade levels was important within and across standards, strands, and domains. For example, in determining when it was appropriate to introduce concepts in mathematics regarding the relative position of objects, we had to consider the grade level at which prepositions that describe relative position were introduced in English language arts. Examining the research-based skill development outlined in the learning map aided in these kinds of determinations.

The articulation of the claims and conceptual areas reinforced the need for specific language in the DLM® EEs to describe learning within an area. Because teams assigned to grade bands developed the first round of DLM® EEs, the language choices from one grade to the next were not consistent. Even when closely related skills, concepts, or understandings were targeted, the same terms were not always selected to describe the intended learning outcome.

The teams of content experts who worked on this revised version of the DLM® EEs were very intentional in selecting a common set of terms to reflect the claims and conceptual areas and applied them consistently across the entire set of DLM® EEs.

Another important change in this version of the DLM® EEs involved alignment to the Common Core State Standards (CCSS). Given that the DLM® EEs are intended to clarify the bridge to the CCSS expectations for students with the most significant cognitive disabilities, it is critical that alignment be as close as possible without compromising learning and development over time. While there was never a one-to-one correspondence between the CCSS and the DLM® EEs, the revisions have made the alignment between the two more precise than it was in the first version.

Finally, revisions to the DLM® EEs involved shifting the focus of a small number of DLM® EEs that were written in the form of instructional tasks rather than learning expectations, and adding “With guidance and support” to the beginning of a few of the DLM® EEs in the primary grades in English language arts to reflect the expectations articulated in the CCSS.

Members of the DLM® consortium reviewed each of the changes to the original version of the DLM® EEs. Four states provided substantive feedback on the revisions, and this document incorporates the changes those teams suggested.

Access to Instruction and Assessment

The DLM® EEs specify learning targets for students with significant cognitive disabilities; however, they do not describe all of the ways that students can engage in instruction or demonstrate understanding through an assessment. Appropriate modes of communication, both for presentation or response, are not stated in the DLM® EEs unless a specific mode is an expectation. Where no limitation has been stated, no limitation should be inferred. Students' opportunities to learn and to demonstrate learning during assessment should be maximized by providing whatever communication, assistive technologies, augmentative and alternative communication (AAC) devices, or other access tools that are necessary and routinely used by the student during instruction.

Students with significant cognitive disabilities include a broad range of students with diverse disabilities and communication needs. For some students with significant cognitive disabilities, a range of assistive technologies is required to access content and demonstrate achievement. For other students, AAC devices or accommodations for hearing and visual impairments are needed. During instruction, teams should meet individual student needs using whatever technologies and accommodations are required. Examples of some of the ways that students may use technology while learning and demonstrating learning are topics for professional development, and include:

- Communication devices that compensate for a student's physical inability to produce independent speech.
- Alternate access devices that compensate for a student's physical inability to point to responses, turn pages in a book, or use a pencil or keyboard to answer questions or produce writing.

Many students with significant cognitive disabilities have difficulty with or cannot use speech to communicate and/or are supported by the use of communication symbols (e.g., communication boards, voice output communication devices) and supports to augment their speech and other means of communication. Students who require symbols and other AAC supports require frequent modeling in the use of those symbols to interact and respond during instruction. Students who use symbols and other communication supports need as much modeling as children who use speech to communicate. Modeling in this way is not viewed as a means of prompting, guidance, or support, just as having a teacher talk serves those purposes for a student who communicates using speech.

When modeling the use of symbols and other communication supports, teachers use the symbols and supports themselves, hand them to students without communication impairments to use, and involve the students who need to use them every day. Each of these steps can play an important role in validating the use of symbols and communication supports and demonstrating multiple levels of expertise in their use.

Guidance and Support

The authors of the CCSS use the words “prompting and support” at the earliest grade levels to indicate when students are not expected to achieve standards completely independently. Generally, “prompting” refers to “the action of saying something to persuade, encourage, or remind someone to do or say something” (McKean, 2005). However, in special education, prompting is often used to mean a system of structured cues to elicit desired behaviors that otherwise would not occur. In order to clearly communicate that teacher assistance is permitted during instruction of the DLM® EEs and is not limited to structured prompting procedures, the decision was made by the stakeholder group to use the more general term guidance throughout the DLM® EEs.

Guidance and support during instruction should be interpreted as teacher encouragement, general assistance, and informative feedback to support the student in learning. Some examples of the kinds of teacher behaviors that would be considered guidance and support include verbal supports, such as

- Getting the student started (e.g., “Tell me what to do first.”),
- Providing a hint in the right direction without revealing the answer (e.g., Student wants to write dog but is unsure how, so the teacher might say, “See if you can write the first letter in the word, /d/og [phonetically pronounced].”),
- Using structured technologies such as task-specific word banks, or
- Providing structured cues such as those found in prompting procedures (e.g., Least-to- most prompts, simultaneous prompting, and graduated guidance).

Guidance and support as described above apply to instruction and is also linked to demonstrating learning relative to DLM® EEs, where guidance and support is specifically called out within the standards.

Conclusion

Developing the research-based model of knowledge and skill development represented in the DLM® Learning Maps supported the articulation of assessment claims for mathematics and English language arts. This articulation subsequently allowed for a careful revision of the DLM® EEs to reflect both horizontal alignment with the CCSS and vertical alignment across the grades, with the goal of moving students toward more sophisticated understandings in both domains. Though the contributions made by Edvantia and our state partners in developing the initial set of DLM® EEs were a critical first step, additional revisions to the DLM® EEs were required to ensure consistency across all elements of the Dynamic Learning Maps® Alternate Assessment System.

Appendix

Development of the Dynamic Learning Maps® Essential Elements has been a collaborative effort among practitioners, researchers, and our state representatives. Listed below are the reviews and the individuals involved with each round of improvements to the Dynamic Learning Maps® Essential Elements. Thank you to all of our contributors.

Review of Draft Two of Dynamic Learning Maps® Essential Elements

A special thanks to all of the experts nominated by their state to review draft two of the Dynamic Learning Maps® Essential Elements. We are grateful for your time and efforts to improve these standards for students with significant cognitive disabilities. Your comments have been incorporated into this draft. The states with teams who reviewed draft two include:

- Illinois
- Iowa
- Kansas
- Michigan
- Missouri
- Oklahoma
- Utah
- Virginia
- West Virginia
- Wisconsin

Development of the Original Dynamic Learning Maps® Common Core Essential Elements

A special thanks to Edvantia and the team of representatives from Dynamic Learning Maps® consortium states who developed the original Common Core Essential Elements upon which the revised Dynamic Learning Maps® Essential Elements are based. The team from Edvantia who led the original effort included:

- Jan Sheinker, Sheinker Educational Services, Inc.
- Beth Judy, Director, Assessment, Alignment, and Accountability Services
- Nathan Davis, Information Technology Specialist
- Kristen Deitrick, Corporate Communications Specialist
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ALIGNMENT OF KANSAS MATH STANDARDS WITH DYNAMIC LEARNING MAPS® ESSENTIAL ELEMENTS IN MATH

Kansas Standards and DLM®

States are required to ensure alignment of alternate academic achievement standards for students with the most significant cognitive disabilities to the State's challenging academic content standards for the grade in which the student is enrolled. In spring 2025, the Kansas State Department of Education (KSDE) provided the following document to verify alignment between the DLM® Essential Elements for math and the Kansas Standards for math (2017). It is important to note that Kansas Standards for math vary slightly from the CCSS.

KSDE found that the majority of standards matches were on-grade-level, meaning the assessed EE matched to a Kansas math standard at the same grade level, with the exception of 9 EEs found on 4 assessments: The grade 4 assessment (two above-grade-level matches), the grade 5 assessment (one below-grade-level match), grade 7 assessment (one above-grade-level match), and the grade 8 assessment (three above-grade-level matches). These Standards were called out within the document with the appropriate Kansas standard. It is important to note, Kansas is part of the instructionally embedded model of the DLM® where teachers are able to choose EEs to assess based on what is best for their students. Based on the blueprint requirements for math, the only EE that all students must test on is EE.M.5.OA.3 which actually aligns to Kansas Math Standard 4.OA.1.

Kindergarten

Counting and Cardinality

Know number names and the count sequence.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
K.CC.1	Count to 100 by ones and by tens and identify as a growth pattern.	M.EE.K.CC.1	Starting with one, count to 10 by ones.
K.CC.2	Count forward beginning from a given number within the known **sequence** (instead of having to begin at 1).	Not applicable.	See **M.EE.2.NBT.2.b**.
K.CC.3	Read and write **numerals** from 0 to 20.	Not applicable.	See **M.EE.2.NBT.3**.

Count to tell the number of objects.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
K.CC.4	Understand the relationship between numbers and quantities; connect counting to cardinality. K.CC.4.a When counting objects, say each number's name in sequential order, pairing each object with one and only one number name and each number name with one and only one object. K.CC.4.b Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. K.CC.4.c Understand that each successive number name refers to a quantity that is one larger. K.CC.4.d Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).	M.EE.K.CC.4	Demonstrate one-to-one correspondence, pairing each object with one and only one number and each number with one and only one object.
K.CC.5	Count to answer "how many?" up to20 concrete or pictorial objects arranged in a line, a rectangular array, or a circle, or as many as 10 objects in a scattered configuration (**subitizing**); given a number from 1 to 20, count out that many objects.	M.EE.K.CC.5	Count out up to three objects from a larger set, pairing each object with one and only one number name to tell how many.

Compare numbers

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
K.CC.6	Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, *e.g., by using matching and counting strategies. Include groups with up to ten objects.*	M.EE.K.CC.6	Identify whether the number of objects in one group is more or less than (when the quantities are clearly different) or equal to the number of objects in another group.
K.CC.7	Compare two numbers between 1 and 10 presented as written numerals.	Not applicable.	See **M.EE.2.NBT.4**.

Operations and Algebraic Thinking

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
K.OA.1	Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (*e.g., claps*), acting out situations, verbal explanations, expressions, or equations.	M.EE.K.OA.1	Represent addition as "putting together" or subtraction as "taking from" in everyday activities.
K.OA.2	Solve addition and subtraction word problems, and add and subtract within 10, (*e.g., by using objects or drawings to represent the problem.*) Refer to Table 1 for specific situation types.	Not applicable.	See **M.EE.2.NBT.6–7**.
K.OA.3	**Decompose** numbers less than or equal to 10 into pairs in more than one way, (*e.g., by using objects or drawings, and record each decomposition by a drawing or equation* (*e.g., 5=2+3* **and** *5=4+1*)).	Not applicable.	See **M.EE.1.NBT.6**.
K.OA.4	For any number from 1 to 9, find the number that makes 10 when added to the given number, (*e.g., by using objects or drawings, and record the answer with a drawing or equation.*).	Not applicable.	See **M.EE.1.NBT.2**.
K.OA.5	Fluently (efficiently, accurately, and flexibly) add and subtract within 5.	Not applicable.	See **M.EE.3.OA.4**.

Number and Operations in Base Ten

Work with numbers 11–19 to gain foundations for place value.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
K.NBT.1	Compose and **decompose** numbers from 11 to 19 into ten ones and some further ones, (*e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation* (*e.g., 10+8=18* **and** *19=10+9*); *understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones).*	Not applicable.	See **M.EE.1.NBT.4** and **M.EE.1.NBT.6**.

Measurement and Data

Describe and compare measurable attributes.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
K.MD.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	M.EE.K.MD.1-3	Classify objects according to attributes (big/small, heavy/light).
K.MD.2	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute and describe the difference. *For example, directly compare the heights of two children, and describe one child as taller/shorter.*		

Classify objects and count the number of objects in each category.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
K.MD.3	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count (*Limit category counts to be less than or equal to 10*).	M.EE.K.MD.1-3	Classify objects according to attributes (big/small, heavy/light).

Geometry

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
K.G.1	Describe objects in the environment using names of shapes and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.	Not applicable.	See **M.EE.1.G.a**.
K.G.2	Correctly gives most precise name of shapes regardless of their orientations (position and direction in space) or overall size.	M.EE.K.G.2–3	Match shapes of same size and orientation (circle, square, rectangle, triangle).
K.G.3	Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").		

Analyze, compare, create, and compose shapes.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
K.G.4	Analyze and compare two- and three-dimensional shapes, in different sizes and orientations (position and direction in space), using informal language to describe their similarities, differences, parts (*e.g., number of sides and vertices/"corners"*) and other attributes (*e.g., having sides of equal length*).	Not applicable.	See **M.EE.7.G.1**.
K.G.5	Model shapes in the world by building shapes from components (*e.g., sticks and clay balls*) and drawing shapes.	Not applicable.	
K.G.6	Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*	Not applicable.	See **M.EE.1.G.3**.

Grade 1

Operations and Algebraic Thinking

Represent and solve problems involving addition and subtraction.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
1.OA.1	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, (*e.g., by using objects, drawings, and situation equations and/or solution equations with a symbol for the unknown number to represent the problem.*)	M.EE.1.OA.1.a M.EE.1.OA.1.b	Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (*e.g., claps*), or acting out situations. Recognize two groups that have the same or equal quantity.
1.OA.2	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, (*e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.*)	M.EE.1.OA.2	Use "putting together" to solve problems with two sets.

Understand and apply properties of operations and the relationship between addition and subtraction.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
1.OA.3.	Apply (not necessary to name) properties of operations as strategies to add and subtract. Examples: 8+3=11 is known, then 3+8=11 is also known. (*Commutative property of addition.*) To add 2+6+4, the second two numbers can be added to make a ten, so 2+6+4=2+10=12. (*Associative property of addition.*) To add 0 to any number, the answer is that number 7+0=7 (*Additive identity property of 0*). Students need not use formal terms for these properties.	Not applicable.	See **M.EE.6.EE.3** and **M.EE.N.CN.2**.
1.OA.4	Understand subtraction as an unknown-addend problem. *For example, subtract 10−8 by finding the number that makes 10 when added to 8.*	Not applicable.	See **M.EE.1.NBT.4** and **M.EE.1.NBT.6.**

GRADE 1

Add and subtract within 20.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
1.OA.5	Relate counting to addition and subtraction (*e.g., by counting on 2 to add 2, counting back 1 to subtract 1*).	M.EE.1.OA.5.a	Use manipulatives or visual representations to indicate the number that results when adding one more.
		M.EE.1.OA.5.b	Apply knowledge of "one less" to subtract one from a number.
1.OA.6	Add and subtract within 20, demonstrating fluency (efficiently, accurately, and flexibly) for addition and subtraction within 10. Use mental strategies such as counting on; making ten (*e.g., 8+6=8+2+4=10+4=14)*; decomposing a number leading to a ten *(e.g., 13−4=13−3−1=10−1=9*); using the relationship between addition and subtraction (*e.g., knowing that 8+4=12, one knows 12−8=4); and creating equivalent but easier or known sums* (*e.g., adding 6+7 by creating the known equivalent 6+6+1=12+1=13*).	Not applicable.	See **M.EE.3.OA.4.**

Work with addition and subtraction equations.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
1.OA.7	Understand the meaning of the equal sign (the value is the same on both sides of the equal sign), and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6=6; 7=8−1; 5+2=2+5; 4+1=3+2; 7−1=4; 5+4=7−2*	Not applicable.	See **M.EE.1.OA.1.b** and **M.EE.2.NBT.5.a**.
1.OA.8	Using related equations, Determine the unknown whole number in an addition or subtraction equation. *For example, determine the unknown number that makes the equation true in each of the equations ■−3=7; 7+3=■.*	Not applicable.	See **M.EE.3.OA.4**.

Number and Operations in Base Ten

Extend the counting sequence.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
1.NBT.1	Count to 120 (recognizing growth and repeating patterns), starting at any number less than 120. In this range, read and write **numerals** and represent a number of objects with a written numeral.	M.EE.1.NBT.1.a	Count by ones to 30.
		M.EE.1.NBT.1.b	Count as many as 10 objects and represent the quantity with the corresponding numeral.

Understand place value.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
1.NBT.2	Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: 1.NBT.2.a 10 can be thought of as a grouping of ten ones—called a "ten." 1.NBT.2.b The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. 1.NBT.2.c The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). 1.NBT.2.d Show flexibility in composing and decomposing tens and ones (*e.g., 20 can be composed from 2 tens or 1 ten and 10 ones, or 20 ones.*)	M.EE.1.NBT.2	Create sets of 10.
1.NBT.3	Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the relational symbols >, <, =, and ≠.	M.EE.1.NBT.3	Compare two groups of 10 or fewer items when the number of items in each group is similar.

GRADE 1

Use place value understanding and properties of operations to add and subtract.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
1.NBT.4	Add within 100 using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used including: 1.NBT.4.a Adding a two-digit number and a one-digit number 1.NBT.4.b Adding a two-digit number and a multiple of 10 1.NBT.4.c Understanding that when adding two-digit numbers, combine like base-ten units such as tens and tens, ones and ones; and sometimes it is necessary to compose a ten.	M.EE.1.NBT.4	Compose numbers less than or equal to five in more than one way.
1.NBT.5	Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.	Not applicable.	See **M.EE.1.OA.5.a** and **M.EE.1.OA.5.b**.
1.NBT.6	Subtract multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	M.EE.1.NBT.6	Decompose numbers less than or equal to five in more than one way.

Measurement and Data

Measure lengths indirectly and by iterating length units.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
1.MD.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object..	M.EE.1.MD.1–2	Compare lengths to identify which is longer/shorter, taller/shorter.
1.MD.2	Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*		

Tell and write time.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
1.MD.3	Tell and write time in hours and half-hours using analog and digital clocks.	M.EE.1.MD.3.a	Demonstrate an understanding of the terms *tomorrow*, *yesterday*, and *today*.
		M.EE.1.MD.3.b	Demonstrate an understanding of the terms morning, afternoon, day, and night.
		M.EE.1.MD.3.c	Identify activities that come before, next, and after.
		M.EE.1.MD.3.d	Demonstrate an understanding that telling time is the same every day.

Represent and interpret data.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
1.MD.4	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	M.EE.1.MD.4	Organize data into categories by sorting.

Geometry

Reason with shapes and their attributes.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
1.G.1	Distinguish between defining attributes (*e.g., triangles are closed and three-sided*) versus non-defining attributes (*e.g., color, orientation, overall size*); build and draw shapes to possess defining attributes.	M.EE.1.G.1	Identify the relative position of objects that are on, off, in, and out.
1.G.2	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.6	M.EE.1.G.2	Sort shapes of same size and orientation (circle, square, rectangle, triangle).
1.G.3	Partition circles and rectangles into two and four equal shares, describe the shares using the *words halves, fourths,* and *quarters*, and use the phrases half of, fourth of, and quarter of. *Note: fraction notation (½,¼) is not expected at this grade level.* Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.	M.EE.1.G.3	Put together two pieces to make a shape that relates to the whole (i.*e., two semicircles to make a circle, two squares to make a rectangle*).

Grade 2

Operations and Algebraic Thinking

Represent and solve problems involving addition and subtraction.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
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, (*e.g., by using drawings and situation equations and/or solution equations with a symbol for the unknown number to represent the problem.*) Refer to Table 1 for specific situation types.	Not applicable.	See **M.EE.3.OA.4**.

Add and subtract within 20.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
2.OA.2	Fluently (efficiently, accurately, and flexibly) add and subtract within 20 using mental strategies (counting on, making a ten, decomposing a number, creating an equivalent but easier and known sum, and using the relationship between addition and subtraction) Work with equal groups of objects to gain foundations for multiplication.	Not applicable.	See **M.EE.2.NBT.6–7** and **M.EE.3.OA.4**.

Word with equal groups of objects to gain foundations for multiplication.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
2.OA.3	Determine whether a group of objects (up to 20) has an odd or even number of members, (*e.g., by pairing objects or counting them by 2s*); write an equation to express an even number as a sum of two equal addends.	M.EE.2.OA.3	Equally distribute even numbers of objects between two groups.
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.	M.EE.2.OA.4	Use addition to find the total number of objects arranged within equal groups up to a total of 10.

Number and Operations in Base Ten.

Understand place value.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
2.NBT.1	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; (*e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.*) Understand the following as special cases: 2.NBT.1.a 100 can be thought of as a bundle of ten tens—called a "hundred." 2.NBT.1.b The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds. 2.NBT.1.c Show flexibility in composing and decomposing hundreds, tens and ones (*e.g., 207 can be composed from 2 hundreds 7 ones OR 20 tens 7 ones OR 207 ones OR 1 hundred 10 tens 7 ones OR 1 hundred 9 tens 17 ones, etc.*)	M.EE.2.NBT.1	Represent numbers up to 30 with sets of tens and ones using objects in columns or arrays.
2.NBT.2	Count within 1000; skip-count by 2s, 5s, 10s, and 100s; explain and generalize the patterns.	M.EE.2.NBT.2.a	Count from 1 to 30 (count with meaning; cardinality).
		M.EE.2.NBT.2.b	Name the next number in a sequence between 1 and 10.
2.NBT.3	Read and write numbers within 1000 using base-ten **numerals**, number names, expanded form, and **unit form**.	M.EE.2.NBT.3	Identify numerals 1 to 30.
2.NBT.4	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, <, =, and ≠ relational symbols to record the results of comparisons.	M.EE.2.NBT.4	Compare sets of objects and numbers using appropriate vocabulary (more, less, equal).

GRADE 2

Use place value understanding and properties of operations to add and subtract.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
2.NBT.5	Fluently (efficiently, accurately, and flexibly) add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction (*e.g., composing/decomposing by like base-10 units, using friendly or benchmark numbers, using related equations, compensation, number line, etc.*).	M.EE.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.
2.NBT.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.	M.EE.2.NBT.6-7	Use objects, representations, and numbers (0–20) to add and subtract.
2.NBT.7	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, like base-ten units such as hundreds and hundreds, tens and tens, ones and ones are used; and sometimes it is necessary to compose or decompose tens or hundreds.		
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.	Not applicable.	
2.NBT.9	Explain why addition and subtraction strategies work using place value and the properties of operations. The explanations given may be supported by drawings or objects.	Not applicable.	

Measurement and Data

Measure and estimate lengths in standard units.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
2.MD.1	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	M.EE.2.MD.1	Measure the length of objects using non-standard units.
2.MD.2	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.	Not applicable.	
2.MD.3	Estimate lengths using units of inches, feet, centimeters, and meters.	M.EE.2.MD.3–4	Order by length using non-standard units.
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 (inches, feet, centimeters, and meters)		

Relate addition and subtraction to length.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
2.MD.5	Use addition and subtraction within 100 to solve one- and two-step word problems involving lengths that are given in the same units, *e.g., by using drawings* (*such as drawings of rulers*) *and equations with a symbol for the unknown number to represent the problem.*	M.EE.2.MD.5	Increase or decrease length by adding or subtracting unit(s).
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.	M.EE.2.MD.6	Use a number line to add one more unit of length.

Work with time and money.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
2.MD.7	Tell and write time from analog and digital clocks to the nearest five minutes.	M.EE.2.MD.7	Identify on a digital clock the hour that matches a routine activity.
2.MD.8	Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately (Do not use decimal point, if showing 25 cents, use the word cents or ¢). *For example: If you have 2 dimes and 3 pennies, how many cents do you have?*	M.EE.2.MD.8	Recognize that money has value.
2.MD.9	Identify coins and bills and their values.		

GRADE 2

Represent and interpret data.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
2.MD.10	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object using different units. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.	M.EE.2.MD.9-10	Create picture graphs from collected measurement data.

Geometry

Reason with shapes and their attributes.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
2.G.1	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	M.EE.2.G.1	Identify common two- dimensional shapes: square, circle, triangle, and rectangle.
2.G.2	Partition a rectangle into rows and columns of same size squares, and count to find the total number of them.	Not applicable	
2.G.3	Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves, thirds, half of, a third of*, etc., and describe the whole as two halves, three thirds, four fourths. *Note: fraction notation ½,⅓,¼ is not expected at this grade level.* Recognize that equal shares of identical wholes need not have the same shape.	Not applicable	See **M.EE.4.G.3** and **M.EE.4.NF.1–2**.

Grade 3

Operations and Algebraic Thinking

Represent and solve problems involving multiplication and division.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
3.OA.1	Interpret products of whole numbers, (*e.g., interpret 5·7 as the total number of objects in 5 groups of 7 objects each.*)	M.EE.3.OA.1-2	Use repeated addition to find the total number of objects and determine the sum.
3.OA.2	Interpret whole-number quotients of whole numbers, (*e.g., interpret 56÷8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.*)		
3.OA.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, (*e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.*) Refer to Table 2 for specific situation types.	Not applicable	See **M.EE.3.OA.1** and **M.EE.5.NBT.5**.
3.OA.4	Determine the unknown whole number in a multiplication or division equation by using related equations. *For example, determine the unknown number that makes the equation true in each of the equations 8· ?=48; 5=■÷3; 6 X 6=__*	M.EE.3.OA.4	Solve addition and subtraction problems when result is unknown, limited to operands and results within 20.

Understand properties of multiplication and the relationship between multiplication and division.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
3.OA.5	Apply properties of operations as strategies to multiply and divide. Examples: If 6·4=24 is known, then 4·6=24 is also known. (Commutative property of multiplication.) 3·5·2 can be found by 3·5=15, then 15·2=30 , or by 5·2=10 , then 3·10=30 . (Associative property of multiplication.) Knowing that 8·5=40 and 8·2=16 , one can find 8·7 as 8·(5+2)=(8·5)+(8·2)=40+16=56. (Distributive property.) Students need not use formal terms for these properties.	Not applicable	See **M.EE.N.CN.2**.
3.OA.6	Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*	Not applicable	See **M.EE.5.NBT.6–7**.

Multiply and divide within 100.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
3.OA.7	Fluently (efficiently, accurately, and flexibly) multiply and divide with single digit multiplications and related divisions using strategies (*e.g., relationship between multiplication and division, doubles, double and double again, half and then double, etc.*) or properties of operations.	Not applicable	See **M.EE.7.NS.2.a** and **M.EE.7.NS.2.b**.

GRADE 3

Solve problems involving the four operations, and identify and explain patterns in arithmetic.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
3.OA.8	Solve two-step word problems using any of the four operations. Represent these problems using both situation equations and/or solution equations with a letter or symbol standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. This standard is limited to problems posed with whole numbers and having whole-number answers.	M.EE.3.OA.8	Solve one-step real-world problems using addition or subtraction within 20.
3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*	M.EE.3.OA.9	Identify arithmetic patterns.

Number and Operations in Base Ten

Use place value understanding and properties of operations to perform multi-digit arithmetic.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
3.NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	M.EE.3.NBT.1	Use decade numbers (10, 20, 30) as benchmarks to demonstrate understanding of place value for numbers 0–30.
3.NBT.2	Fluently (efficiently, accurately, & flexibly) add and subtract within 1000 using strategies (*e.g., composing/decomposing by like base-10 units, using friendly or benchmark numbers, using related equations, compensation, number line, etc.*) and algorithms (including, but not limited to: traditional, partial-sums, etc.) based on place value, properties of operations, and/or the relationship between addition and subtraction.	M.EE.3.NBT.2	Demonstrate understanding of place value to tens.
3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10– 90 (*e.g., 9 × 80, 5 × 60*) using strategies based on place value and properties of operations.	M.EE.3.NBT.3	Count by tens using models such as objects, base ten blocks, or money.

Number and Operations—Fractions

Develop understanding of fractions as numbers.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
3.NF.1	Understand a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction $\frac{a}{b}$ as the quantity formed by a parts of size $\frac{1}{b}$.	M.EE.3.NF.1–3	Differentiate a fractional part from a whole.
3.NF.2	Understand a fraction as a number on the number line; represent fractions on a number line diagram.		
3.NF.2.a	Represent a fraction $\frac{1}{b}$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $\frac{1}{b}$ and that the endpoint of the part based at 0 locates the number $\frac{1}{b}$ on the number line.		
3.NF.2.b	Represent a fraction $\frac{a}{b}$ on a number line diagram by marking off a lengths $\frac{1}{b}$ from 0. Recognize that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the number $\frac{a}{b}$ on the number line (a is the countable units of 1*b* that determines the place on the number line).		
3.NF.3	Explain equivalence of fractions, and compare fractions by reasoning about their size (it is a mathematical convention that when comparing fractions, the whole is the same size).		
3.NF.3.a	Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.		
3.NF.3.b	Recognize and generate simple equivalent fractions, *e.g.,* $\frac{1}{2} = \frac{2}{4}$, $\frac{4}{6} = \frac{2}{3}$. *Explain why the fractions are equivalent, e.g., by using a visual fraction model.*		
3.NF.3.c	Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form $3 = \frac{3}{1}$; recognize that $\frac{6}{1} = 6$; locate $\frac{4}{4}$ and 1 at the same point of a number line diagram.		
3.NF.3.d	Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the relational symbols >, <, =, or ≠, and justify the conclusions, (*e.g., by using a visual fraction model.*)		

GRADE 3

Measurement and Data

Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
3.MD.1	Tell and write time to the nearest minute using a.m. and p.m. and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, (*e.g., by representing the problem on a number line diagram.*)	M.EE.3.MD.1	Tell time to the hour on a digital clock.
3.MD.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l) (Excludes cubed units such as cm3and finding the geometric volume of a container).	M.EE.3.MD.2	Identify the appropriate measurement tool to solve one-step word problems involving mass and volume.
3.MD.3	Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, (*e.g., by using drawings (such as a beaker with a measurement scale*) *to represent the problem.*) (Excludes multiplicative comparison problems)		

Represent and interpret data.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
3.MD.4	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*	M.EE.3.MD.3	Use picture or bar graph data to answer questions about data.
3.MD.5	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.	M.EE.3.MD.4	Measure length of objects using standard tools, such as rulers, yardsticks, and meter sticks.

Geometric measurement: understand concepts of area, and relate area to multiplication and to addition.

KANSAS STANDARDS FOR MATH				DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION			CODE	DESCRIPTION
3.MD.6	Recognize area as an attribute of plane figures and understand concepts of area measurement.			Not applicable	See **M.EE.4.MD.2**.
		3.MD.6.a	A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area (does not require standard square units).		
		3.MD.6.b	A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units (does not require standard square units).		
3.MD.7	Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard square units).				
3.MD.8	Relate area to the operations of multiplication and addition.				
		3.MD.8.a	Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.		
		3.MD.8.b	Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.		
		3.MD.8.c	Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.		
		3.MD.8.d	Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems.		

Geometric measurement: recognize perimeter as an attribute of plane figures, and distinguish between linear and area measures.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
3.MD.9	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.	Not applicable	See **M.EE.7.G.4** and **M.EE.8.G.9**.

GRADE 3

Geometry

Reason with shapes and their attributes.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
3.G.1	Understand that shapes in different categories (*e.g., rhombuses, rectangles, and others*) may share attributes (*e.g., having four sides*), and that the shared attributes can define a larger category (*e.g., quadrilaterals*). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	M.EE.3.G.1	Describe attributes of two- dimensional shapes.
3.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as ¼ of the area of the shape.*	M.EE.3.G.2	Recognize that shapes can be partitioned into equal areas.

Grade 4

Operations and Algebraic Thinking

Use the four operations with whole numbers to solve problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
4.OA.1	Interpret a multiplication equation as a comparison, (*e.g., interpret 35=5·7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5.*) Represent verbal statements of multiplicative comparisons as multiplication equations.	M.EE.4.OA.1-2	Demonstrate the connection between repeated addition and multiplication.
4.OA.2	Multiply or divide to solve word problems involving multiplicative comparison, (*e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.*)		
4.OA.3	Solve multi-step word problem 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 situation equations and/or solution equations with a letter or symbol standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	M.EE.4.OA.3	Solve one-step real-world problems using addition or subtraction within 100.

Gain familiarity with factors and multiples.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
4.OA.4	Find all factor pairs for a whole number in the range 1 to 100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1 to 100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1 to 100 is prime or composite.	M.EE.4.OA.4	Show one way to arrive at a product.

Generate and analyze patterns.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
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. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*	M.EE.4.OA.5	Use repeating patterns to make predictions.

GRADE 4

Numbers and Operations in Base Ten

Generalize place value understanding for multi-digit whole numbers.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
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. *For example, recognize that 700÷70=10 by applying concepts of place value and division.*	Not applicable	See **M.EE.5.NBT.1**.
4.NBT.2	Read and write multi-digit whole numbers using base-ten numerals, number names, expanded form, and unit form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, <, =, and ≠ symbols to record the results of comparisons. (Note: Students should demonstrate understanding and application of place value decomposition. *For example, 127 can be 1 hundred, 2 tens, 7 ones or 12 tens, 7 ones Refer to* **2.NBT.1**)	M.EE.4.NBT.2	Compare whole numbers to 10 using symbols (<, >, =).
4.NBT.3	Use place value understanding to round multi-digit whole numbers to any place	M.EE.4.NBT.3	Round any whole number 0-30 to the nearest ten.

Use place value understanding and properties of operations to perform multi-digit arithmetic.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
4.NBT.4	Fluently (efficiently, accurately, and flexibly) add and subtract multi-digit whole numbers using an efficient algorithm (including, but not limited to: traditional, partial-sums, etc.), based on place value understanding and the properties of operations.	M.EE.4.NBT.4	Add and subtract two-digit whole numbers.
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.	Not applicable	See **M.EE.4.OA.1**.
4.NBT.6	Find whole-number quotients and remainders with up to four-digit dividends and one-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.	Not applicable	

Number and Operations: Fractions

Extend understanding of fraction equivalence and ordering.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
4.NF.1	Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × 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.	M.EE.4.NF.1–2	Identify models of one half (1/2) and one fourth (1/4).
4.NF.2	Compare two fractions with different numerators and different denominators, (*e.g., by creating common numerators or denominators, or by comparing to a benchmark fraction such as ½.*) Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with relational symbols >, <, =, or ≠, and justify the conclusions, (*e.g., by using visual fraction models.*).		

GRADE 4

Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
4.NF.3	Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.	M.EE.4.NF.3	Differentiate between whole and half.
	4.NF.3.a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.		
	4.NF.3.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, *e.g., by using a visual fraction model. Examples:* $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2\ 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$. 4.		
	4.NF.3.c Add and subtract mixed numbers with like denominators, *e.g. by replacing each mixed number with an equivalent fraction (simplest form is not an expectation), and/or by using properties of operations and the relationship between addition and subtraction.*		
	4.NF.3.d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, *e.g., by using visual fraction models and equations to represent the problem*.		
4.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.	Not applicable	See **M.EE.4.OA.1–2** and **M.EE.5.NBT.5**.
	4.NF.4.a Understand a fraction a/b as a multiple of $1/b$. *For example, use a visual fraction model to represent* $5/4$ *as the product* $5 \times (1/4)$, *recording the conclusion by the equation* $5/4 = 5 \times (1/4)$.		
	4.NF.4.b Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express* $3 \times (2/5)$ *as* $6 \times (1/5)$, *recognizing this product as* $6/5$. *(In general,* $n \times (a/b) = (n \times a)/b$.*)*		
	4.NF.4.c Solve word problems involving multiplication of a fraction by a whole number, *e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat* $3/8$ *of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*		

Understand decimal notation for fractions, and compare decimal fractions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
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. *For example, express* $3/10$ *as* $30/100$*, and add* $3/10 + 4/100 = 34/100$.	Not applicable.	See **M.EE.7.NS.2.c-d**.
4.NF.6	Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*		
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 relational symbols >, < =, or ≠, and justify the conclusions, (*e.g., by using a visual model.*).		

GRADE 4

Measurement and Data

Solve problems involving measurement and conversion of measurements from larger units to smaller units.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
4.MD.1	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), …*	M.EE.4.MD.1	Identify the smaller measurement unit that comprises a larger unit within a measurement system (inches/foot, centimeter/meter, minutes/hour).
4.MD.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	M.EE.4.MD.2.a	Tell time using a digital clock. Tell time to the nearest hour using an analog clock.
		M.EE.4.MD.2.b	Measure mass or volume using standard tools.
		M.EE.4.MD.2.c	Use standard measurement to compare lengths of objects.
		M.EE.4.MD.2.d	Identify coins (penny, nickel, dime, quarter) and their values.
4.MD.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems explaining and justifying the appropriate unit of measure. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*	M.EE.4.MD.3	Determine the area of a square or rectangle by counting units of measure (unit squares).

Represent and interpret data.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
4.MD.4	Make a data display (line plot, bar graph, pictograph) to show a set of measurements in fractions of a unit (½,¼,⅛). Solve problems involving addition and subtraction of fractions by using information presented in the data display. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*	M.EE.4.MD.4.a	Represent data on a picture or bar graph given a model and a graph to complete
		M.EE.4.MD.4.b	Interpret data from a picture or bar graph.

Geometric measurement: understand concepts of angle and measure angles.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
4.MD.5	When Kansas Math standards were updated in 2017, **4.MD.5** was moved to 8th Grade Standards under **8.G.1** Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.	M.EE.4.MD.5	Recognize angles in geometric shapes.
4.MD.6	When Kansas Math standards were updated in 2017, **4.MD.6** was moved to 8th Grade Standards under **8.G.2** Measure angles in whole-number degrees using a protractor. Draw angles of specified measure using a protractor and straight edge	M.EE.4.MD.6	Identify angles as larger and smaller.

Geometry

Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
4.G.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse, straight, reflex), and perpendicular and parallel lines. Identify these in two-dimensional figures.	M.EE.4.G.1	Recognize parallel lines and intersecting lines.
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 (right, acute, obtuse, straight, reflex). Recognize and categorize triangles based on angles (right, acute, obtuse, and equiangular) and/or sides (scalene, isosceles, and equilateral).	M.EE.4.G.2	Describe the defining attributes of two-dimensional shapes.
4.G.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures, and draw lines of symmetry.	M.EE.4.G.3	Recognize that lines of symmetry partition shapes into equal areas.

Grade 5

Operations and Algebraic Thinking

Write and interpret numerical expressions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
5.OA.1	Use parentheses in numerical expressions and evaluate expressions with these symbols.	Not applicable.	
5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "multiply the sum of 8 and 7 by 2" as 2×(8+7) because parenthetical information must be solved first. Recognize that 3×(18932+921) is three times as large as 18932+921, without having to calculate the indicated sum or product.*	Not applicable.	

Analyze patterns and relationships.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
	This EE aligns with Kansas 4th grade standard **4.OA.1**. 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. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*	M.EE.5.OA.3	Identify and extend numerical patterns.

Number and Operations in Base Ten

Understand the place value system.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
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 1/10 of what it represents in the place to its left.	M.EE.5.NBT.1	Compare numbers up to 99 using base ten models.
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.	M.EE.5.NBT.2	Use the number of zeros in numbers that are powers of 10 to determine which values are equal, greater than, or less than.
5.NBT.3	Read, write, and compare decimals to thousandths. 5.NBT.3.a Read and write decimals to thousandths using base-ten numerals, number names, expanded form, and unit form (*e.g., **expanded form** 47.392=4·10+7·1+3·110+9·1100+2·11000 **unit form** 47.392 = 4 tens + 7 ones + 3 tenths + 9 hundredths + 2 thousandths*). 5.NBT.3.b Compare two decimals to thousandths based on meanings of the digits in each place, using >, <, =, and ≠relational symbols to record the results of comparisons.	M.EE.5.NBT.3	Compare whole numbers up to 100 using symbols (<, >, =).
5.NBT.4	Use place value understanding to round decimals to any place (Note: In fifth grade, decimals include whole numbers and decimal fractions to the hundredths place.)	M.EE.5.NBT.4	Round two-digit whole numbers to the nearest 10 from 0—90.

Perform operations with multi-digit whole numbers and with decimals to hundredths.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
5.NBT.5	Fluently (efficiently, accurately, and flexibly) multiply multi-digit whole numbers using an efficient algorithm (*ex., traditional, partial products, etc.*) based on place value understanding and the properties of operations.	M.EE.5.NBT.5	Multiply whole numbers up to 5 × 5.
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.	M.EE.5.NBT.6–7	Illustrate the concept of division using fair and equal shares.
5.NBT.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.		

GRADE 5

Number and Operations: Fractions

Use equivalent fractions as a strategy to add and subtract fractions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
5.NF.1	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example,* $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$. *(In general,* $\frac{a}{b} + \frac{c}{d}$ = *(ad + bc)/bd.)*	M.EE.5.NF.1	Identify models of halves (1/2, 2/2) and fourths (1/4, 2/4, 3/4, 4/4).
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. For example, recognize an incorrect result* $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$, *by observing that* $\frac{3}{7} < \frac{1}{2}$.	M.EE.5.NF.2	Identify models of thirds (1/3, 2/3, 3/3) and tenths (1/10, 2/10, 3/10, 4/10, 5/10, 6/10, 7/10, 8/10, 9/10, 10/10).

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
5.NF.3	Interpret a fraction as division of the numerator by the denominator ($\frac{a}{b}$ = a ÷ 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. For example, interpret* $\frac{3}{4}$ *as the result of dividing 3 by 4, noting that* $\frac{3}{4}$ *multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size* $\frac{3}{4}$. *If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*	Not applicable.	See **M.EE.6.RP.1**.
5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. 5.NF.4.a Interpret the product ($\frac{a}{b}$) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a **sequence** of operations a × q ÷ b. *For example, use a visual fraction model to show* ($\frac{2}{3}$) × 4 = $\frac{8}{3}$, *and create a story context for this equation. Do the same with* ($\frac{2}{3}$) × ($\frac{4}{5}$) = $\frac{8}{15}$. (In general, ($\frac{a}{b}$) × ($\frac{c}{d}$) = $\frac{ac}{bd}$.) 5.NF.4.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.	Not applicable.	

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
5.NF.5	Interpret multiplication as scaling (resizing), by: 5.NF.5.a Comparing 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.(*e.g., They see (12·3) as half the size of 3.)*. 5.NF.5.b Explaining 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 $\frac{a}{b} = (n \times a)/(n \times b)$ to the effect of multiplying $\frac{a}{b}$ by 1.	Not applicable.	
5.NF.6	Solve real world problems involving multiplication of fractions and mixed numbers, *e.g., by using visual fraction models or equations to represent the problem.*	Not applicable.	See **M.EE.10.N.CN.2.b**.
5.NF.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. Division of a fraction by a fraction is not a requirement at this grade. 5.NF.7.a Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for* ($\frac{1}{3}$) ÷ 4, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* ($\frac{1}{3}$) ÷ 4 = $\frac{1}{12}$ *because* ($\frac{1}{12}$) × 4 = $\frac{1}{3}$. 5.NF.7.b Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ ($\frac{1}{5}$), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ ($\frac{1}{5}$) = 20 because 20 × ($\frac{1}{5}$) = 4.* 5.NF.7.c Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, *e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share $\frac{1}{2}$ lb of chocolate equally? How many $\frac{1}{3}$- cup servings are in 2 cups of raisins?*	Not applicable.	See **M.EE.7.NS.2.b**.

Measurement and Data

Convert like measurement units within a given measurement system.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
5.MD.1	Convert among different-sized standard measurement units within a given measurement system (*e.g., convert 5 cm to 0.05 m*), and use these conversions in solving multi-step, real-world problems.	M.EE.5.MD.1.a	Tell time using an analog or digital clock to the half or quarter hour.
		M.EE.5.MD.1.b	Use standard units to measure weight and length of objects.
		M.EE.5.MD.1.c	Indicate relative value of collections of coins.

Represent and interpret data.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
5.MD.2	Make a data display (line plot, bar graph, pictograph) to show a data set of measurements in fractions of a unit (½,¼,⅛,1⁄16). Use operations (add, subtract, multiply) on fractions for this grade to solve problems involving information presented in the data display. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally. After lunch everyone measured how much milk they had left in their containers. Make a line plot showing data to the nearest 14 cup. Which value has the greatest amount? What is the total?*	M.EE.5.MD.2	Represent and interpret data on a picture graph, line plot, or bar graph.

Geometric measurement: understand concepts of volume, and relate volume to multiplication and to addition.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. 5.MD.3.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. 5.MD.3.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.	M.EE.5.MD.3	Identify common three- dimensional shapes.
5.MD.4	Measure volumes by counting unit cubes such as cubic cm, cubic in, cubic ft. or non-standard cubic units.	M.EE.5.MD.4–5	Determine the volume of a rectangular prism by counting units of measure (unit cubes).
5.MD.5	Relate volume to the operations of multiplication and addition, and solve real-world and mathematical problems involving volume. 5.MD.5.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 three-dimensional whole-number products as volumes, (*e.g., to represent the associative property of multiplication*.) 5.MD.5.b Apply the formulas $V=l \cdot w \cdot h$ and $V=B \cdot h$ (B represents the area of the base) 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. 5.MD.5.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.		

GRADE 5

Geometry

Graph points on the coordinate plane to solve real-world and mathematical problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
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*).	M.EE.5.G.1-4	Sort two-dimensional figures and identify the attributes (angles, number of sides, corners, color) they have in common.
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. (*e.g., plotting the relationship between two positive quantities such as maps, coordinate grid games (such as Battleship), time/temperature, time/distance, cost/quantity, etc.).*		

Classify two-dimensional figures into categories based on their properties.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
5.G.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*	M.EE.5.G.1-4	Sort two-dimensional figures and identify the attributes (angles, number of sides, corners, color) they have in common.
5.G.4	Classify two-dimensional figures in a hierarchy based on properties.		

Grade 6

Ratios and Proportional Relationships

Understand ratio concepts and use ratio reasoning to solve problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.RP.1	Use ratio language to describe a relationship between two quantities. Distinguish between part-to-part and part-to-whole relationships. *For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”*	M.EE.6.RP.1	Demonstrate a simple ratio relationship.
6.RP.2	Use unit rate language (“for each one”, “for every one” and “per”) and unit rate notation to demonstrate understanding the concept of a unit rate ab associated with a ratio $a{:}b$ with $b \neq 0$, *For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar.” “We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.” (Expectations for unit rates in this grade are limited to non-complex fractions.)*	Not applicable.	See **M.EE.7.RP.1–3**.

Understand ratio concepts, and use ratio reasoning to solve problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.RP.3	Use ratio and rate reasoning to solve real-world and mathematical problems, (*e.g., by reasoning about tables of equivalent ratios,* **tape diagrams**, **double number line diagram**, *or using calculations.*) 6.RP.3.a Make tables of equivalent ratios relating quantities with whole-number measurements, find the missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* 6.RP.3.b Find a percent of a quantity as a rate per 100 (*e.g., 30% of a quantity means 30/100 times the quantity*); solve problems involving finding the whole, given a part and the percent.	Not applicable.	See **M.EE.8.F.1–3**.

GRADE 6

The Number System

Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.NS.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, requiring multiple exposures connecting various concrete and abstract models.	M.EE.6.NS.1	Compare the relationships between two unit fractions.

Compute (efficiently, accurately, and flexibly) with multi-digit numbers, and find common factors and multiples.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.NS.2	Fluently (efficiently, accurately, and flexibly) divide multi-digit numbers using an efficient algorithm.	M.EE.6.NS.2	Apply the concept of fair share and equal shares to divide.
6.NS.3	Fluently (efficiently, accurately, and flexibly) add, subtract, multiply, and divide multi-digit decimals using an efficient algorithm for each operation.	M.EE.6.NS.3	Solve two-factor multiplication problems with products up to 50 using concrete objects and/or a calculator.
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 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 18+48 as 6(3+8).*	Not applicable.	

Apply and extend previous understandings of numbers to the system of rational numbers.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
6.NS.5	Understand positive and negative numbers to describe quantities having opposite directions or values (*e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge*); 6.NS.5.a Use positive and negative numbers to represent quantities in real-world contexts. 6.NS.5.b Explaining the meaning of 0 in each situation.	M.EE.6.NS.5–8	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (*e.g., temperature above/below zero*).
6.NS.6	Understand a rational number as a point on the number line and a coordinate pair as a location on a coordinate plane. 6.NS.6.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, (*e.g., −(−3)=3,*) and that 0 is its own opposite. 6.NS.6.b Recognize signs of numbers in ordered pairs indicate 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. 6.NS.6.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.		
6.NS.7	Understand ordering and absolute value of rational numbers. 6.NS.7.a Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret – 3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* 6.NS.7.b Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3o C > –7o C to express the fact that –3oC is warmer than –7oC.* 6.NS.7.c Explain 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. *For example, for an account balance of –30 dollars, write |–30|=30 to describe the size of the debt in dollars.* 6.NS.7.d Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*		

GRADE 6

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
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.	M.EE.6.NS.5–8	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (*e.g., temperature above/below zero*).

Expressions and Equations

Apply and extend previous understandings of arithmetic to algebraic expressions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.EE.1	Write and evaluate numerical expressions involving whole-number exponents.	M.EE.6.EE.1–2	Identify equivalent number sentences.
6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers. 6.EE.2.a Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as $5 - y$.* 6.EE.2.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. *For example, describe the expression 2(8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.* 6.EE.2.c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas V = s3 and A =6s2 to find the volume and surface area of a cube with sides of length s = ½.*		
6.EE.3	Apply the properties of operations and combine like terms, with the conventions of algebraic notation, to identify and generate equivalent expressions. *For example, apply the distributive property to the expression $3(2+x)$ to produce the equivalent expression $6+3x$; apply properties of operations to $y+y+y$ to produce the equivalent expression $3y$.*	M.EE.6.EE.3	Apply the properties of addition to identify equivalent numerical expressions.

Reason about and solve one-variable equations and inequalities.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.EE.4	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.	M.EE.6.EE.5–7	Match an equation to a real-world problem in which variables are used to represent numbers.
6.EE.5	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.		
6.EE.6	Write and solve one-step equations involving non-negative rational numbers using addition, subtraction, multiplication and division.		
6.EE.7	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.	Not applicable.	

Represent and analyze quantitative relationships between dependent and independent variables.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.EE.8	Use variables to represent two quantities in a real-world problem that change in relationship to one another. 6.EE.8.a Identify the independent and dependent variable. 6.EE.8.b Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation* $d=65t$ *to represent the relationship between distance and time.* 6.EE.8.c Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.	Not applicable.	

GRADE 6

Geometry

Solve real-world and mathematical problems involving area, surface area, and volume.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.G.1	Find the area of all triangles, special quadrilaterals (including parallelograms, kites and **trapezoids**), and polygons whose edges meet at right angles (**rectilinear figure** (See Geometry Progression K-6 Pg. 19 Paragraph 4) polygons) by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	M.EE.6.G.1	Solve real-world and mathematical problems about area using unit squares.
6.G.2	Find the volume of a right rectangular prism with fractional edge lengths by applying the formulas $V=lwh$ *and* $V=Bh$ (B is the area of the base and h is the height) to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. (Builds on the 5th grade concept of packing unit cubes to find the volume of a rectangular prism with whole number edge lengths.)	M.EE.6.G.2	Solve real-world and mathematical problems about volume using unit cubes.
6.G.3	Draw polygons whose edges meet at right angles (**rectilinear figure** 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.	Not applicable.	
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.	Not applicable.	

Statistics and Probability

Develop concepts of statistical measures of center and variability and an informal understanding of outlier.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.SP.1	Recognize and generate a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	M.EE.6.SP.1–2	Display data on a graph or table that shows variability in the data.
6.SP.2	Analyze a set of data collected to answer a **statistical question** with a distribution which can be described by its center (mean, median and/or mode), spread (range and/or **interquartile range**), and overall shape (cluster, peak, gap, symmetry, skew (data) and/or outlier).		
6.SP.3	Recognize that a measure of center (mean, median and/or mode) for a numerical data set summarizes all of its values with a single number, while a measure of variation (range and/or **interquartile range**) describes how its values vary with a single number.	Not applicable.	See **M.EE.S.ID.4**.

Summarize and describe distributions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
6.SP.4	Display numerical data on dot plots, histograms, stem-and-leaf plots, and box plots.	Not applicable.	See **M.EE.6.SP.1–2**.
6.SP.5	Summarize numerical data sets in relation to their context, such as by: 6.SP.5.a Reporting the number of observations. 6.SP.5.b Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. 6.SP.5.c Giving quantitative measures of center (mean, median and/or mode) and variability (range and/or interquartile range), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. 6.SP.5.d Relating the choice of measures of center and variability to the distribution of the data.	M.EE.6.SP.5	Summarize data distributions shown in graphs or tables.

Grade 7

Ratios and Proportional Relationships

Analyze proportional relationships and use them to solve real-world and mathematical problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
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. *For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½/¼ miles per hour (interpreting a complex fraction as division of fractions), equivalently 2 miles per hour.*	M.EE.7.RP.1–3	Use a ratio to model or describe a relationship.
7.RP.2	Recognize and represent proportional relationships between quantities:		
	7.RP.2.a Determine whether two quantities are in a proportional relationship, *e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.*		
	7.RP.2.b Analyze a table or graph and recognize that, in a proportional relationship, every pair of numbers has the same unit rate (referred to as the "m").		
	7.RP.2.c Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as* $t=pn$.		
	7.RP.2.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.		
7.RP.3	Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.		

The Number System

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
7.NS.1	Represent addition and subtraction on a horizontal or vertical number line diagram. 7.NS.1.a Describe situations in which opposite quantities combine to make 0. Show that a number and its opposite have a sum of 0 (are additive inverses). *For example, show zero-pairs with two-color counters.* 7.NS.1.b Show $p+q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. 7.NS.1.c Model subtraction of rational numbers as adding the additive inverse, $p-q=p+(-q)$. 7.NS.1.d Model subtraction as the distance between two rational numbers on the number line where the distance is the absolute value of their difference. 7.NS.1.e Apply properties of operations as strategies to add and subtract rational numbers.	M.EE.7.NS.1	Add fractions with like denominators (halves, thirds, fourths, and tenths) with sums less than or equal to one.
7.NS.2	Apply and extend previous understandings of multiplication and division of positive rational numbers to multiply and divide all rational numbers.	See below.	
	7.NS.2.a Describe how multiplication is extended from positive rational numbers to all 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.	M.EE.7.NS.2.a	Solve multiplication problems with products to 100.
	7.NS.2.b Explain 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. Leading to situations such that if p and q are integers, then $-(pq)=-pq=p-q$.	M.EE.7.NS.2.b	Solve division problems with divisors up to five and also with a divisor of 10 without remainders.
	7.NS.2.c Apply properties of operations as strategies to multiply and divide rational numbers. 7.NS.2.d Convert a rational number in the form of a fraction to its decimal equivalent using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	M.EE.7.NS.2.c-d	Express a fraction with a denominator of 10 as a decimal.
7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers.21	M.EE.7.NS.3	Compare quantities represented as decimals in real-world examples to tenths.

GRADE 7

Expressions and Equations

Use properties of operations to generate equivalent expressions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
7.EE.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. Note: factoring is limited to integer coefficients. *For example: apply the distributive property to the expression* $24x+18y$ *to produce the equivalent expression* $6(4x+3y)$.	M.EE.7.EE.1	Use the properties of operations as strategies to demonstrate that expressions are equivalent.
7.EE.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example,* $a+0.05a=1.05a$ *means that "increase by 5%" is the same as "multiply by 1.05."*	M.EE.7.EE.2	Identify an arithmetic sequence of whole numbers with a whole number common difference.

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
7.EE.3	Solve multi-step real-life and mathematical problems with rational numbers. 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. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 110 of her salary an hour, or $2.50, for a new salary of $27.50.*	Not applicable.	
7.EE.4	Use variables to represent quantities in a real-world or mathematical problem, and construct two-step equations and inequalities to solve problems by reasoning about the quantities. 7.EE.4.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 (efficiently, accurately, and flexibly). Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* 7.EE.4.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 and $p>0$. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	M.EE.7.EE.4	Use the concept of equality with models to solve one-step addition and subtraction equations.

Geometry

Draw, construct, and describe geometrical figures and describe the relationships between them

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
7.G.1	Solve problems involving scale drawings of geometric figures, such as computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale	M.EE.7.G.1	Match two similar geometric shapes that are proportional in size and have the same orientation.
7.G.2	Identify three-dimensional objects generated by rotating a two-dimensional (rectangular or triangular) object around one edge.	M.EE.7.G.2	Recognize geometric shapes with given conditions.
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 cylinder.	M.EE.7.G.3	Match a two-dimensional shape with a three-dimensional shape that shares an attribute.

Solve real-life and mathematical problems involving area, surface area, and volume.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
7.G.4	Use the formulas for the area and circumference of a circle and solve problems; give an **informal derivation** of the relationship between the circumference and area of a circle.	M.EE.7.G4	Determine the perimeter of a rectangle by adding the measures of the sides.
	This EE is aligned with Kansas Math Standard **8.G.2** Measure angles in whole-number degrees using a protractor. Draw angles of specified measure using a protractor and straight edge.	M.EE.7.G.5	Recognize angles that are acute, obtuse, and right.
7.G.5	Investigate the relationship between three-dimensional geometric shapes; 7.G.5.a Generalize the volume formula for prisms and cylinders ($V=Bh$ where B is the area of the base and h is the height). 7.G.5.b Generalize the surface area formula for prisms and cylinders ($SA=2B+Ph$ where B is the area of the base, P is the perimeter of the base, and h is the height (in the case of a cylinder, perimeter is replaced by circumference)).	Not applicable.	
7.G.6	Solve real-world and mathematical problems involving area of two-dimensional objects and volume and surface area of three-dimensional objects including cylinders and right prisms. (Solutions should **not** require students to take square roots or cube roots. *For example, given the volume of a cylinder and the area of the base, students would identify the height.*)	M.EE.7.G.6	Determine the area of a rectangle using the formula for length × width, and confirm the result using tiling or partitioning into unit squares.

GRADE 7

Statistics and Probability

Use random sampling to draw inferences about a population.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
7.SP.1	Use statistics to gain information about a population by examining a sample of the population; 7.SP.1.a Know that generalizations about a population from a sample are valid only if the sample is representative of that population and generate a valid representative sample of a population. 7.SP.1.b Identify if a particular random sample would be representative of a population and justify your reasoning.	M.EE.7.SP.1–2	Answer a question related to the collected data from an experiment, given a model of data, or from data collected by the student.
7.SP.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to informally gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*		

Draw informal comparative inferences about two populations.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
7.SP.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability (requires introduction of **mean absolute deviation**). *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*	M.EE.7.SP.3	Compare two sets of data within a single data display such as a picture graph, line plot, or bar graph.
7.SP.4	Use measures of center (mean, median and/or mode) and measures of variability (range, interquartile range and/or mean absolute deviation) for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book. (NOTE: Students should not have to calculate mean absolute deviation but use it to interpret data).*	Not applicable.	See **M.EE.S.ID.4**.

Investigate chance processes, and develop, use, and evaluate probability models.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
7.SP.5	Express the probability of a chance event as a number between 0 and 1 that represents the likelihood of the event occurring. (Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 12 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.)	M.EE.7.SP.5–7	Describe the probability of events occurring as possible or impossible.
7.SP.6	Collect data from a chance process (probability experiment). Approximate the probability by observing its long-run relative frequency. Recognize that as the number of trials increase, the experimental probability approaches the theoretical probability. Conversely, predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times*.		
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.		
	7.SP.7.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.*		
	7.SP.7.b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*		

GRADE 7

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
7.SP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. 7.SP.8.a Know 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. 7.SP.8.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. 7.SP.8.c Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*	Not applicable.	

Grade 8

The Number System

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

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
8.NS.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	M.EE.8.NS.1	Subtract fractions with like denominators (halves, thirds, fourths, and tenths) with minuends less than or equal to one.
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 (*e.g.,* π^2). *For example, for the approximation of 68, show that √68 is between 8 and 9 and closer to 8.*	M.EE.8.NS.2.a	Express a fraction with a denominator of 100 as a decimal.
		M.EE.8.NS.2.b	Compare quantities represented as decimals in real-world examples to hundredths.

Expressions and Equations

Work with radicals and integer exponents.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
8.EE.1	Use square root and cube root symbols to represent solutions to equations of the form $x2=p$ and $x3=p$, where p is a positive rational number. Evaluate square roots of whole number perfect squares with solutions between 0 and 15 and cube roots of whole number perfect cubes with solutions between 0 and 5. Know that √2 is irrational.	M.EE.8.EE.1	Identify the meaning of an exponent (limited to exponents of 2 and 3).
		M.EE.8.EE.2	Identify a geometric sequence of whole numbers with a whole number common ratio.
8.EE.2	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. *For example, estimate the population of the United States as 3×108 and the population of the world as 7×109, and determine that the world population is more than 20 times larger.*	M.EE.8.EE.3–4	Compose and decompose whole numbers up to 999.
8.EE.3	Read and write numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (*e.g., use millimeters per year for seafloor spreading*). Interpret scientific notation that has been generated by technology.		

GRADE 8

Understand the connections between proportional relationships, lines, and linear equations.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
8.EE.4	Graph proportional relationships, interpreting its unit rate as the slope (m) of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	M.EE.8.EE.5–6	Graph a simple ratio by connecting the origin to a point representing the ratio in the form of y/x. *For example, when given a ratio in standard form (2:1), convert to $\frac{2}{1}$, and plot the point (1,2).*
8.EE.5	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 and extend to include the use of the slope formula ($m=y2-y1x2-x1$ when given two coordinate points ($x1$, $y1$) and ($x2$, $y2$)). Generate the equation $y=mx$ for a line through the origin (proportional) and the equation $y=mx+b$ for a line with slope m intercepting the vertical axis at y-intercept b (not proportional when $b\neq0$).		
8.EE.6	Describe the relationship between the proportional relationship expressed in $y=mx$ and the non-proportional linear relationship $y=mx+b$ as a result of a vertical translation. *Note: be clear with students that all linear relationships have a constant rate of change (slope), but only the special case of proportional relationships (line that goes through the origin) continue to have a constant of proportionality.*	Not applicable.	

Analyze and solve linear equations and inequalities.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
8.EE.7	Fluently (efficiently, accurately, and flexibly) solve one-step, two-step, and multi-step linear equations and inequalities in one variable, including situations with the same variable appearing on both sides of the equal sign. 8.EE.7.a Give examples of linear equations in one variable with one solution ($x=a$), infinitely many solutions ($a=a$), or no solutions ($a=b$). 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). 8.EE.7.b Solve linear equations and inequalities with rational number coefficients, including equations/inequalities whose solutions require expanding and/or factoring expressions using the distributive property and collecting like terms.	M.EE.8.EE.7	Solve simple algebraic equations with one variable using addition and subtraction.

Functions

Define, evaluate, and compare functions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
8.F.1	Explain 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. (Function notation is not required in Grade 8.)	M.EE.8.F.1–3	Given a function table containing at least 2 complete ordered pairs, identify a missing number that completes another ordered pair (limited to linear functions).
8.F.2	Compare properties of two linear functions represented in a variety of ways (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change, the greater y-intercept, or the point of intersection.*		
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. *For example, the function* $A=s2$ *giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*		

Use functions to model relationships between quantities.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
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.	M.EE.8.F.4	Determine the values or rule of a function using a graph or a table.
8.F.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (*e.g., where the function is increasing or decreasing, linear or nonlinear*). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	M.EE.8.F.5	Describe how a graph represents a relationship between two quantities.

GRADE 8

Geometry

Geometric measurement: understand concepts of angle and measure angles.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
	This EE is aligned with Kansas High School Standard **G.CO.1**. Verify experimentally (*for example, using patty paper or geometry software*) the properties of rotations, reflections, translations, and symmetry:	M.EE.8.G.1	Recognize translations, rotations, and reflections of shapes.
	This EE is aligned with Kansas High School Standard **G.CO.3**. Given two congruent figures, describe a **sequence** of rigid motions that exhibits the congruence (**isometry**) between them using coordinates and the non-coordinate plane.	M.EE.8.G.2	Identify shapes that are congruent.
8.G.1	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: 8.G.1.a 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 1360 of a circle is called a "one-degree angle," and can be used to measure angles. 8.G.1.b An angle that turns through n one-degree angles is said to have an angle measure of n degrees.	Not applicable.	
8.G.2	Measure angles in whole-number degrees using a protractor. Draw angles of specified measure using a protractor and straight edge.	Not applicable.	
8.G.3	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, *e.g., by using an equation with a symbol for the unknown angle measure.*	Not applicable.	
	This EE is aligned with Kansas High School Standard **G.CO.5. (+)** Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	M.EE.8.G.4	Identify similar shapes with and without rotation.
8.G.4	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and use them to solve simple equations for an unknown angle in a figure.	Not applicable.	
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. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*	M.EE.8.G.5	Compare any angle to a right angle, and describe the angle as greater than, less than, or congruent to a right angle.

Understand and apply the Pythagorean Theorem.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
8.G.7	Explain a proof of the Pythagorean Theorem and its converse.	Not applicable.	
8.G.8	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. *For example: Finding the slant height of pyramids and cones.*	Not applicable.	
8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	Not applicable.	

Solve real-world and mathematical problems involving measurement.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
8.G.10	Use the formulas or informal reasoning to find the arc length, areas of sectors, surface areas and volumes of pyramids, cones, and spheres. *For example, given a circle with a 60° central angle, students identify the arc length as 16 of the total circumference* ($\frac{1}{6}=\frac{60}{360}$).	M.EE.8.G.9	Use the formulas for perimeter, area, and volume to solve real- world and mathematical problems (limited to perimeter and area of rectangles and volume of rectangular prisms).
8.G.11	Investigate the relationship between the formulas of three dimensional geometric shapes; 8.G.11.a Generalize the volume formula for pyramids and cones (V=13Bh). 8.G.11b Generalize surface area formula of pyramids and cones (SA=B+12Pl).		
8.G.12	Solve real-world and mathematical problems involving arc length, area of two-dimensional shapes including sectors, volume and surface area of three-dimensional objects including pyramids, cones and spheres.		

GRADE 8

Statistics and Probability

Investigate patterns of association in bivariate data.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
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 or negative association, linear association, and nonlinear association.	M.EE.8.SP.4	Construct a graph or table from given categorical data, and compare data categorized in the graph or table.
8.SP.2	Know 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.	Not applicable.	See **M.EE.10.S.ID.1–2** and **M.EE.10.S.ID.3**.
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. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	Not applicable.	

High School

Grade Level Classifications

Classification	Description
(9/10)	These standards are required for all students by the end of their first two years of high school math courses.
(11)	These standards are required for all students by the end of their third-year math course.
(9/10/11)	These standards are required for all students in their first three years of high school math courses. These standards are often further divided to **(9/10)** and **(11)** to identify specific concepts and their appropriate grade level. **(9/10)** should primarily accomplish the standards described as linear, quadratic and absolute value while **(11)** should primarily accomplish the standards described as logarithmic, square root, cube root, and exponential.
(all)	These standards should be taught throughout every high school math course and often represent over-arching themes or key features of the mathematical concept. These standards should be taught in conjunction with the appropriate grade level standards.
(+)	These standards should be taught as extensions to grade level standards when possible, or in a fourth-year math course. These standards prepare students to take advanced courses in high school such as college algebra, calculus, advanced statistics, or discrete mathematics.
(★)	**Modeling Standards:** Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol. The star symbol sometimes appears on the heading for a group of standards; in that case, it should be understood to apply to all standards in that group.

HIGH SCHOOL

The Real Number System

Use properties of rational and irrational numbers.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
N.RN.1	Know and apply the properties of integer exponents to generate equivalent numerical and algebraic expressions.	Not applicable.	
N.RN.2	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*	M.EE.N.RN.1	Determine the value of a quantity that is squared or cubed.
N.RN.3	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	Not applicable.	

Quantities ★

Reason quantitatively, and use units to solve problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
N.Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★	M.EE.N.Q.1–3	Express quantities to the appropriate precision of measurement.
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling. ★		
N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★		

The Complex Number System

Perform arithmetic operations with complex numbers.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
N.CN.1	**(11)** Know there is a complex number i such that $i^2 = -1$, and every complex number has the form a + bi with a and b real.	Not applicable.	
N.CN.2	**(11)** Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	M.EE.N.CN.2.a	Use the commutative, associative, and distributive properties to add, subtract, and multiply whole numbers.
		M.EE.N.CN.2.b	Solve real-world problems involving addition and subtraction of decimals, using models when needed.
		M.EE.N.CN.2.c	Solve real-world problems involving multiplication of decimals and whole numbers, using models when needed.
N.CN.3	**(11)** Find the conjugate of a complex number.	Not applicable.	
N.CN.4	**(+)** Use conjugates to find **moduli** and quotients of complex numbers.		

Represent complex numbers and their operations on the complex plane.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
N.CN.5	**(+)** Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers) and explain why the rectangular and polar forms of a given complex number represent the same number.	Not applicable.	
N.CN.6	**(+)** Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example,* $(-1 + \sqrt{3}i)^3 = 8$ *because* $(-1 + \sqrt{3}i)$ *has modulus 2 and argument 120°.*	Not applicable.	
N.CN.7	**(+)** Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.	Not applicable.	

Use complex numbers in polynomial identities and equations.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
N.CN.8	**(11)** Solve quadratic equations with real coefficients that have complex solutions.	Not applicable.	
N.CN.9	**(+)** Extend polynomial identities to the complex numbers. *For example, rewrite* $x^2 + 4$ *as* $(x + 2i)(x - 2i)$.	Not applicable.	
N.CN.10	**(+)** Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials	Not applicable.	

Vector and Matrix Quantities

Represent and model with vector quantities.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
N.VM.1	**(+)** Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (*e.g.,* $\boldsymbol{v}$, $\|\boldsymbol{v}\|$, $\|\|\boldsymbol{v}\|\|$, $\boldsymbol{v}$).	Not applicable.	
N.VM.2	**(+)** Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	Not applicable.	
N.VM.3	**(+)** Solve problems involving velocity and other quantities that can be represented by vectors.	Not applicable.	

Perform operations on vectors.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
N.VM.4	**(+)** Add and subtract vectors. N.VM.4.a **(+)** Add vectors end-to-end, component-wise, and by the parallelogram rule . Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. N.VM.4.b **(+)** Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. N.VM.4.c **(+)** Understand vector subtraction $v-w$ as $v+(-w)$, where $-w$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.	Not applicable.	
N.VM.5	**(+)** Multiply a vector by a scalar. N.VM.5.a **(+)** Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, (*e.g., as* $c(vx,vy)=(cvx,cvy)$.) N.VM.5.b **(+)** Compute the magnitude of a scalar multiple cv using $\|cv\|=\|c\|v$. Compute the direction of cv knowing that when $\|c\|v\neq 0$, the direction of cv is either along v (for $c>0$) or against v (for $c<0$).	Not applicable.	

Perform operations on matrices, and use matrices in applications.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
N.VM.6	**(11)** Use matrices to represent and manipulate data, (*e.g., representing information in a linear programing problem as a matrix or rewriting a system of equations as a matrix.*)	Not applicable.	
N.VM.7	**(11)** Multiply matrices by scalars to produce new matrices, (*e.g., as when all of the payoffs in a game are doubled.*)	Not applicable.	
N.VM.8	**(11)** Add, subtract, and multiply matrices of appropriate dimensions; find determinants of 2×2 matrices.	Not applicable.	
N.VM.9	**(+)** Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.	Not applicable.	
N.VM.10	**(+)** Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.	Not applicable.	
N.VM.11	**(+)** Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.	Not applicable.	
N.VM.12	**(+)** Work with 2×2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.	Not applicable.	

HIGH SCHOOL

Algebra

SEEING STRUCTURE IN EXPRESSIONS

Interpret the structure of expressions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
A.SSE.1	**(all)** Interpret expressions that represent a quantity in terms of its context. ★	M.EE.A.SSE.1	Identify an algebraic expression involving one arithmetic operation to represent a real-world problem.
A.SSE.1.a	**(all)** Interpret parts of an expression, such as terms, factors, and coefficients. ★		
A.SSE.1.b	**(all)** Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1+r)n$ *as the product of P and* $(1+r)n$. ★		
A.SSE.2	**(all)** Use the structure of an expression to identify ways to rewrite it.	Not applicable.	

Write expressions in equivalent forms to solve problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
A.SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. ★	M.EE.A.SSE.3	Solve simple algebraic equations with one variable using multiplication and division.
A.SSE.3.a	**(9/10)** Factor a quadratic expression to reveal the zeros of the function it defines. ★		
A.SSE.3.b	**(11)** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. ★		
A.SSE.3.c	**(11)** Use the properties of exponents to transform expressions for exponential functions. *For example, the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*★		
	This EE is aligned with Kansas High School Standard **F.BF.2 (+)** Write arithmetic and geometric **sequences** and series both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	M.EE.A.SSE.4	Determine the successive term in a geometric **sequence** given the common ratio.

ARITHMETIC WITH POLYNOMIALS AND RATIONAL EXPRESSIONS

Perform arithmetic operations on polynomials.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
A.APR.1	**(9/10)** Add, subtract, and multiply polynomials.	Not applicable.	
A.APR.2	**(11)** Factor higher degree polynomials; identifying that some polynomials are prime.	Not applicable.	
A.APR.3	**(11)** Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number c, the remainder on division by $(x-c)$ is $p(c)$, so $p(c)=0$ if and only if $(x-c)$ is a factor of $p(x)$.	Not applicable.	

Use polynomial identities to solve problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
A.APR.4	**(9/10/11)** Generate polynomial identities from a pattern. *For example, difference of squares, perfect square trinomials, (emphasize sum and difference of cubes in grade* ***11****)*.	Not applicable.	
A.APR.5	**(+)** Know and apply the **Binomial Theorem** for the expansion of $(x+y)n$ in powers of x and y for a positive integer n, where x and $\mathbf{y}$ are any numbers, with coefficients determined for example by Pascal's Triangle. The **Binomial Theorem** can be proven by mathematical **induction** or by a **combinatorial argument**.	Not applicable.	

Rewrite rational expressions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
A.APR.6	**(+)** Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + 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.	Not applicable.	
A.APR.7	**(+)** Add, subtract, multiply, and divide rational expressions.	Not applicable.	

CREATING EQUATIONS★

Create equations that describe numbers or relationships.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
A.CED.1	**(all)** Apply and extend previous understanding to create equations and inequalities in one variable and use them to solve problems. ★	M.EE.A.CED.1	Create an equation involving one operation with one variable, and use it to solve a real-world problem.
A.CED.2	**(all)** Apply and extend previous understanding to create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★	M.EE.A.CED.2–4	Solve one-step inequalities.
A.CED.3	**(all)** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★		
A.CED.4	**(all)** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law* $V=IR$ *to highlight resistance* R. ★		

REASONING WITH EQUATIONS AND INEQUALITIES

Understand solving equations as a process of reasoning, and explain the reasoning.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
A.REI.1	**(all)** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	Not applicable.	

Solve equations and inequalities in one variable.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
A.REI.2	**(all)** Apply and extend previous understanding to solve equations, inequalities, and compound inequalities in one variable, including literal equations and inequalities.	Not applicable.	See **M.EE.A.CED.1**.
A.REI.3	Solve equations in one variable and give examples showing how extraneous solutions may arise. A.REI.3.a **(9/10/11)** Solve rational, absolute value and square root equations. **(9/10)** Limited to simple equations such as, 2√x−3+8=16, x+32x−1=5,x≠12. A.REI.3.a **(+)** Solve exponential and logarithmic equations.	Not applicable.	
A.REI.4	**(11)** Solve radical and rational exponent equations and inequalities in one variable, and give examples showing how extraneous solutions may arise.	Not applicable.	
A.REI.5	Solve quadratic equations and inequalities. A.REI.5.a **(9/10)** Solve quadratic equations by inspection (*e.g., for* $x2=49$), taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives no real solutions. A.REI.5.b **(11)** Solve quadratic equations with complex solutions written in the form $a \pm bi$ for real numbers a and b. A.REI.5.c **(11)** Use the method of completing the square to transform and solve any quadratic equation in x into an equation of the form $(x-p)2=q$ that has the same solutions. A.REI.5.d **(+)** Solve quadratic inequalities and identify the domain.	Not applicable.	

HIGH SCHOOL | ALGEBRA

Solve systems of equations.

KANSAS STANDARDS FOR MATH			DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION		CODE	DESCRIPTION
A.REI.6	**(9/10)** Analyze and solve pairs of simultaneous linear equations.		Not applicable.	
	A.REI.6.a	**(9/10)** Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.		
	A.REI.6.b	**(9/10)** Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example,* $3x+2y=5$ *and* $3x+2y=6$ *have no solution because* $3x+2y$ *cannot simultaneously be 5 and 6.*		
	A.REI.6.c	**(9/10)** Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*		
A.REI.7	**(+)** Represent a system of linear equations as a single matrix equation and solve (incorporating technology) for matrices of dimension 3×3 or greater.		Not applicable.	

Represent and solve equations and inequalities graphically.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
A.REI.8	**(all)** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	M.EE.A.REI.10–12	Interpret the meaning of a point on the graph of a line. *For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost of the pizzas.*
A.REI.9	**(9/10/11)** Solve an equation $f(x)=g(x)$ by graphing $y=f(x)$ and $y=g(x)$ and finding the x-value of the intersection point. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★ For **(9/10)** focus on linear, quadratic, and absolute value.		
A.REI.10	**(9/10)** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.		

Functions

INTERPRETING FUNCTIONS

Understand the concept of a function, and use function notation.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
F.IF.1	**(all)** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y=f(x)$.	M.EE.F.IF.1–3	Use the concept of function to solve problems.
F.IF.2	**(all)** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.		
F.IF.3	**(9/10/11)** Recognize patterns in order to write functions whose domain is a subset of the integers. **(9/10)** Limited to linear and quadratic. *For example, find the function given {(−1,4),(0,7),(1,10),(2,13)}.*		

Interpret functions that arise in applications in terms of the context.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
F.IF.4	**(all)** For a function that models a relationship between two quantities, interpret key features of expressions, graphs and tables in terms of the quantities, and sketch graphs showing key features given a description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ★	M.EE.F.IF.4–6	Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc.
F.IF.5	**(all)** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.* ★		
F.IF.6	**(9/10/11)** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **(9/10)** limited to linear functions. ★		

HIGH SCHOOL | FUNCTIONS

Analyze functions using different representations.

KANSAS STANDARDS FOR MATH CODE	DESCRIPTION	DLM® ESSENTIAL ELEMENT CODE	DESCRIPTION
F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★	Not applicable.	See **M.EE.F.IF.1–3**.
	F.IF.7.a **(9/10)** Graph linear, quadratic and absolute value functions and show intercepts, maxima, minima and end behavior. ★		
	F.IF.7.b **(11)** Graph square root, cube root, and exponential functions. ★		
	F.IF.7.c **(11)** Graph logarithmic functions, emphasizing the inverse relationship with exponentials and showing intercepts and end behavior. ★		
	F.IF.7.d **(+)** Graph piecewise-defined functions, including step functions. ★		
	F.IF.7.e **(11)** Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. ★		
	F.IF.7.f **(+)** Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. ★		
	F.IF.7.g **(+)** Graph trigonometric functions, showing period, midline, and amplitude. ★		
F.IF.8	Write a function in different but equivalent forms to reveal and explain different properties of the function.	Not applicable.	
	F.IF.8.a **(9/10)** Use different forms of linear functions, such as slope-intercept, standard, and point-slope form to show rate of change and intercepts.		
	F.IF.8.b **(11)** Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.		
	F.IF.8.c **(11)** Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y=(1.02)^t, y=(0.97)^t, y=(1.01)^{12t}, y=(1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*		
F.IF.9	**(all)** Compare properties of two functions using a variety of representations (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, a quantity increasing exponentially eventually exceeds a quantity increasing linearly.*	Not applicable.	

BUILDING FUNCTIONS

Build a function that models a relationship between two quantities.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
F.BF.1	Use functions to model real-world relationships. F.BF.1.a **(9/10)** Combine multiple functions to model complex relationships. *For example,* $p(x)=r(x)-c(x)$;$(profit=revenue-cost)$. F.BF.1.b **(11)** Determine an **explicit expression**, a **recursive function**, or steps for calculation from a context.	M.EE.F.BF.1	Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change.
	F.BF.1.c **(11)** Compose functions. *For example, if* $T(y)$ *is the temperature in the atmosphere as a function of height, and* $h(t)$ *is the height of a weather balloon as a function of time, then* $T(h(t))$ *is the temperature at the location of the weather balloon as a function of time.*	Not applicable.	
F.BF.2	**(+)** Write arithmetic and geometric **sequences** and series both recursively and with an explicit formula, use them to model situations, and translate between the two forms. ★	M.EE.F-BF.2	Determine an arithmetic sequence with whole numbers when provided a recursive rule.

Build new functions from existing functions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
F.BF.3	**(9/10/11)** Transform parent functions ($f(x)$) by replacing $f(x)$ with $f(x)+k$, $kf(x)$,$f(kx)$, 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. For **(9/10)** focus on linear, quadratic, and absolute value functions.	Not applicable.	
F.BF.4	Find inverse functions. F.BF.4.a **(11)** Write an expression for the inverse of a function. F.BF.4.b **(11)** Read values of an inverse function from a graph or a table, given that the function has an inverse. F.BF.4.c **(+)** Verify by composition that one function is the inverse of another. F.BF.4.d **(+)** Produce an invertible function from a non-invertible function by restricting the domain.	Not applicable.	

LINEAR, QUADRATIC, AND EXPONENTIAL MODELS ★

Construct and compare linear, quadratic, and exponential models, and solve problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
F.LQE.1	Distinguish between situations that can be modeled with linear functions and with exponential functions. ★	M.EE.F.LE.1–3	Model a simple linear function such as $y = mx$ to show that these functions increase by equal amounts over equal intervals.
F.LQE.1.a	**(11)** Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. ★		
F.LQE.1.b	**(11)** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. ★		
F.LQE.1.c	**(11)** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. ★		
F.LQE.2	**(11)** Construct exponential functions, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). ★		

TRIGONOMETRIC FUNCTIONS

Extend the domain of trigonometric functions using the unit circle.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
F.TF.1	**(+)** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	Not applicable.	
F.TF.2	**(+)** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	Not applicable.	
F.TF.3	**(+)** Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3, \pi/4, and$ $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi - x, \pi + x, and\ 2\pi - x$ in terms of their values for x, where x is any real number.	Not applicable.	
F.TF.4	**(+)** Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	Not applicable.	

Model periodic phenomena with trigonometric functions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
F.TF.5	**(+)** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. ★	Not applicable.	
F.TF.6	**(+)** Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.	Not applicable.	
F.TF.7	**(+)** Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. ★	Not applicable.	

Prove and apply trigonometric identities

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
F.TF.8	**(+)** Prove the Pythagorean identity $sin2(\theta)+cos2(\theta)=1$ and use it to find sin(θ),cos(θ),or tan(θ) given sin(θ),cos(θ),or tan(θ) and the quadrant.	Not applicable.	
F.TF.9	**(+)** Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	Not applicable.	

HIGH SCHOOL

Geometry

CONGRUENCE

Experiment with transformations in the plane.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.CO.1	**(9/10)** Verify experimentally (*for example, using patty paper or geometry software*) the properties of rotations, reflections, translations, and symmetry: G.CO.1.a **(9/10)** Lines are taken to lines, and line segments to line segments of the same length. G.CO.1.b **(9/10)** Angles are taken to angles of the same measure. G.CO.1.c **(9/10)** Parallel lines are taken to parallel lines. G.CO.1.d **(9/10)** Identify any line of reflection and/or rotational symmetry within a figure.	M.EE.G.CO.1	Know the attributes of perpendicular lines, parallel lines, and line segments; angles; and circles.
G.CO.2	**(9/10)** Recognize transformations as functions that take points in the plane as inputs and give other points as outputs and describe the effect of translations, rotations, and reflections on two-dimensional figures. *For example,* (x,y) *maps to* $(x+3,y-5)$; *reflecting triangle ABC(input) across the line of reflection maps the triangle to exactly one location, A'B'C'(output).*	Not applicable.	
G.CO.4	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	M.EE.G.CO.4–5	Given a geometric figure and a rotation, reflection, or translation of that figure, identify the components of the two figures that are congruent.
G.CO.5	**(+)** Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.		

Understand congruence in terms of rigid motions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.CO.3	**(9/10)** Given two congruent figures, describe a **sequence** of rigid motions that exhibits the congruence (**isometry**) between them using coordinates and the non-coordinate plane.	M.EE.G.CO.6–8	Identify corresponding congruent and similar parts of shapes.
G.CO.4	**(9/10)** Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.		
G.CO.5	**(+)** Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent		
G.CO.6	**(+)** Demonstrate triangle congruence using **rigid motion** (ASA, SAS, and SSS).		

Construct arguments about geometric theorems using rigid transformations and/or logic.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.CO.7	**(9/10)** Construct arguments about lines and angles using theorems. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.	Not applicable.	
G.CO.8	**(9/10)** Construct arguments about the relationships within one triangle using theorems. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point; angle sum and exterior angle of triangles.	Not applicable.	
G.CO.9	**(9/10)** Construct arguments about the relationships between two triangles using theorems. Theorems include: SSS, SAS, ASA, AAS, and HL.	Not applicable.	
G.CO.10	**(9/10)** Construct arguments about parallelograms using theorems. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals. (Building upon prior knowledge in elementary and middle school.		

Make geometric constructions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.CO.11	**(9/10)** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	Not applicable.	
G.CO.12	**(+)** Construct an equilateral triangle, a square, and a regular hexagon **inscribed** in a circle.	Not applicable.	

SIMILARITY, RIGHT TRIANGLES, AND TRIGONOMETRY

Understand similarity in terms of similarity transformations.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.SRT.1	**(9/10)** Use geometric constructions to verify the properties of dilations given by a center and a scale factor: G.SRT.1.a **(9/10)** A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. G.SRT.1.b **(9/10)** The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	Not applicable.	See **M.EE.G.CO.6–8**.
G.SRT.2	**(9/10)** Recognize transformations as functions that take points in the plane as inputs and give other points as outputs and describe the effect of dilations on two-dimensional figures.	Not applicable.	
G.SRT.3	**(9/10)** Given two similar figures, describe a **sequence** of transformations that exhibits the similarity between them using coordinates and the non-coordinate plane.	Not applicable.	
G.SRT.4	**(9/10)** Understand the meaning of similarity for two-dimensional figures as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	Not applicable.	See **M.EE.G.CO.6–8**.

Construct arguments about theorems involving similarity.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.SRT.5	**(9/10)** Construct arguments about triangles using theorems. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity, and AA.	Not applicable.	
G.SRT.6	**(9/10)** Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	Not applicable.	See **M.EE.G.CO.6–8**.

Define trigonometric ratios and solve problems involving right triangles.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.SRT.7	**(9/10)** Show that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	Not applicable.	
G.SRT.8	**(9/10)** Explain and use the relationship between the sine and cosine of complementary angles.	Not applicable.	
G.SRT.9	**(9/10)** Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★	Not applicable.	

Apply trigonometry to general triangles.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.SRT.10	**(+)** Derive the formula A=12absin$C$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	Not applicable.	
G.SRT.11	**(+)** Prove the Laws of Sines and Cosines and use them to solve problems.	Not applicable.	
G.SRT.12	**(+)** Understand and apply the **Law of Sines** and the **Law of Cosines** to find unknown measurements in right and non-right triangles (*e.g., surveying problems, resultant forces*).	Not applicable.	

CIRCLES

Understand and apply theorems about circles.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.C.1	**(9/10)** Construct arguments that all circles are similar.	Not applicable.	
G.C.2	**(9/10)** Identify and describe relationships among **inscribed** angles, radii, and chords. Include the relationship between central, inscribed, and **circumscribed** angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	Not applicable.	
G.C.3	**(9/10)** Construct arguments using properties of polygons inscribed and circumscribed about circles.	Not applicable.	
G.C.4	**(+)** Construct inscribed and circumscribed circles for triangles.	Not applicable.	
C.G.5	**(+)** Construct inscribed and circumscribed circles for polygons and tangent lines from a point outside a given circle to the circle.		

Find arc lengths and areas of sectors of circles.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.C.6	**(+)** Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the **constant of proportionality**; derive the formula for the area of a sector.	Not applicable.	

EXPRESSING GEOMETRIC PROPERTIES WITH EQUATIONS

Translate between the geometric description and the equation for a conic section.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.GPE.1	**(9/10)** Write the equation of a circle given the center and radius or a graph of the circle; use the center and radius to graph the circle in the coordinate plane.	Not applicable.	
G.GPE.2	**(+)** Derive the equation of a circle of given center and radius using the Pythagorean Theorem; graph the circle in the coordinate plane;	Not applicable.	
G.GPE.3	**(+)** Complete the square to find the center and radius of a circle given by an equation.	Not applicable.	
G.GPE.4	**(+)** Derive the equation of a parabola given a focus and directrix; graph the parabola in the coordinate plane.	Not applicable.	
G.GPE.5	**(+)** Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant; graph the ellipse or hyperbola in the coordinate plane.	Not applicable.	

Use coordinates to prove simple geometric theorems algebraically.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.GPE.6	**(9/10)** Use coordinates to prove simple geometric theorems algebraically, including the use of slope, distance, and midpoint formulas *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle*.	Not applicable.	
G.GPE.7	**(9/10)** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (*e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point*).	Not applicable.	See **M.EE.G.CO.1**.
G.GPE.8	**(9/10)** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, including the use of the distance and midpoint formulas. ★	M.EE.G.GPE.7	Find perimeters and areas of squares and rectangles to solve real- world problems.

GEOMETRIC MEASUREMENT AND DIMENSION

Explain volume formulas and use them to solve problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.GMD.1	**(+)** Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments and informal limit arguments.	M.EE.G.GMD.1–3	Make a prediction about the volume of a container, the area of a figure, and the perimeter of a figure, and then test the prediction using formulas or models.
G.GMD.2	**(+)** Give an informal argument using Cavalieri's principle for the formulas for the volume of a solid figure.	Not applicable.	

Visualize relationships between two-dimensional and three-dimensional objects.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
	This EE aligns with Kansas 7th Grade Standard **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 cylinder.	M.EE.G.GMD.4	Identify the shapes of two-dimensional cross-sections of three- dimensional objects.

MODELING WITH GEOMETRY

Apply geometric concepts in modeling situations.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
G.MG.1	**(9/10)** Use geometric shapes, their measures, and their properties to describe objects (*e.g., modeling a tree trunk or a human torso as a cylinder*).★	M.EE.G.MG.1–3	Use properties of geometric shapes to describe real-life objects.
G.MG.2	**(9/10)** Apply concepts of density and displacement based on area and volume in modeling situations (*e.g., persons per square mile, BTUs per cubic foot*).★		
G.MG.3	**(9/10)** Apply geometric methods to solve design problems (*e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on **ratios***). ★		

Statistics and Probability

INTERPRETING CATEGORICAL AND QUANTITATIVE DATA

Summarize, represent, and interpret data on a single count or measurement variable.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
S.ID.1	**(9/10)** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (**interquartile range**, standard deviation) of two or more different data sets.	M.EE.S.ID.1–2	Given data, construct a simple graph (line, pie, bar, or picture) or table, and interpret the data.
S.ID.2	**(9/10)** Interpret differences in shape, center, and spread in the context of the data sets using dot plots, histograms, and box plots, accounting for possible effects of extreme data points (**outliers**).	M.EE.S.ID.3	Interpret general trends on a graph or chart.
S.ID.3	**(+)** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	M.EE.S.ID.4	Calculate the mean of a given data set (limit the number of data points to fewer than five).

Summarize, represent, and interpret data on two categorical and quantitative variables.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
S.ID.4	**(9/10)** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	Not applicable.	See **M.EE.F.IF.1** and **M.EE.A.REI.10–12**.
S.ID.5	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.5.a **(9/10)** Use a given linear function to solve problems in the context of data. S.ID.5.b **(9/10)** Fit a linear function to data and use it to solve problems in the context of the data. S.ID.5.c **(+)** Assess the fit of a function by plotting and analyzing residuals. S.ID.5.d **(+)** Fit quadratic and exponential functions to the data. Use functions fitted to data to solve problems in the context of the data.	Not applicable.	

Interpret linear models.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
S.ID.6	**(9/10)** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. (	Not applicable.	See **M.EE.F.IF.4–6**.
S.ID.7	**(11)** Compute (using technology) and interpret the correlation coefficient of a linear fit.	Not applicable.	
S.ID.8	**(11)** Distinguish between correlation and causation.	Not applicable.	

MAKING INFERENCES AND JUSTIFYING CONCLUSIONS (+)

Understand and evaluate random processes underlying statistical experiments.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
S.IC.1	**(+)** Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population.	M.EE.S.IC.1–2	Determine the likelihood of an event occurring when the outcomes are equally likely to occur.
S.IC.2	**(+)** Decide if a specified model is consistent with results from a given data-generating process, *e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*		

Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
S.IC.3	**(+)** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	Not applicable.	See **M.EE.S.ID.1–2**.
S.IC.4	**(+)** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error, (*e.g., through the use of simulation models for random sampling.*)	Not applicable.	See **M.EE.S.ID.1–2**.
S.IC.5	**(+)** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	Not applicable.	See **M.EE.S.ID.1–2**.
S.IC.6	**(+)** Evaluate reports based on data.	Not applicable.	See **M.EE.S.ID.1–2**.

CONDITIONAL PROBABILITY AND THE RULES OF PROBABILITY

Understand independence and conditional probability and use them to interpret data.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	**DESCRIPTION**	**CODE**	**DESCRIPTION**
S.CP.1	**(+)** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).	M.EE.S.CP.1–5	Identify when events are independent or dependent.
S.CP.2	**(+)** Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.		
S.CP.3	**(+)** Understand the conditional probability of A given B as $P(A\ and\ B)P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.		
S.CP.4	**(+)** Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*		
S.CP.5	**(+)** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*		

Use the rules of probability to compute probabilities of compound events in a uniform probability model.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
S.CP.6	**(+)** Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.	Not applicable.	
S.CP.7	**(+)** Apply the Addition Rule, $P(A\ or\ B) = P(A) + P(B) - P(A\ and\ B)$, and interpret the answer in terms of the model.	Not applicable.	See **M.EE.S.IC.1–2**.
S.CP.8	**(+)** Apply the general Multiplication Rule in a uniform probability model, $P(A\ and\ B) = P(A)\ P(B \mid A) = P(B) P(A \mid B)$, and interpret the answer in terms of the model.	Not applicable.	
S.CP.9	**(+)** Use permutations and combinations to compute probabilities of compound events and solve problems.	Not applicable.	

USING PROBABILITY TO MAKE DECISIONS (+) (★)

Calculate expected values, and use them to solve problems.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
S.MD.1	**(+)** Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions. ★	Not applicable.	
S.MD.2	**(+)** Calculate the expected value of a random variable; interpret it as the mean of the probability distribution. ★	Not applicable.	
S.MD.3	**(+)** Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.* ★	Not applicable.	
S.MD.4	**(+)** Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?* ★	Not applicable.	

Use probability to evaluate outcomes of decisions.

KANSAS STANDARDS FOR MATH		DLM® ESSENTIAL ELEMENT	
CODE	DESCRIPTION	CODE	DESCRIPTION
S.MD.5	**(+)** Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. ★ S.MD.5.a **(+)** Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.* ★ S.MD.5.b **(+)** Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.* ★	Not applicable.	
S.MD.6	**(+)** Use probabilities to make fair decisions (*e.g., drawing by lots, using a random number generator*). ★	Not applicable.	
S.MD.7	**(+)** Analyze decisions and strategies using probability concepts (*e.g., product testing, medical testing, pulling a hockey goalie at the end of a game*). ★	Not applicable.	

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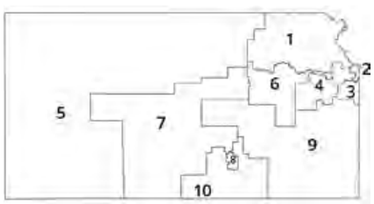

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SUCCESS DEFINED

A successful Kansas high school graduate has the

- Academic preparation,
- Cognitive preparation,
- Technical skills,
- Employability skills and
- Civic engagement

to be successful in postsecondary education, in the attainment of an industry recognized certification or in the workforce, without the need for remediation.

OUTCOMES

- Social-emotional growth
- Kindergarten readiness
- Individual Plan of Study
- Civic engagement
- Academically prepared for postsecondary
- High school graduation
- Postsecondary success

MISSION

To prepare Kansas students for lifelong success through rigorous, quality academic instruction, career training and character development according to each student's gifts and talents.

VISION

Kansas leads the world in the success of each student.

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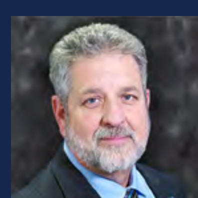

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Kansas leads the world in the success of each student.

July 1, 2025

Kansans CAN

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