TRANSITIONAL KINDERGARTEN MATHEMATICS OVERVIEW

Counting and Cardinality, CC

- Recite numbers in order to 30 with increasing accuracy.
- Recognize and know the name of some written numbers 1-10.
- Count up to 15 objects, using one-to-one correspondence.
- Understand, when counting, that the number name of the last object counted represents the total number of objects in the group.

Operations and Algebraic Thinking, OA

- Expand their understanding of numbers and quantities in their everyday environment.
- Understand that adding one or taking away one changes the number in a small group of objects by exactly one.
- Understand that putting two groups of objects together will make a bigger group and that a group of objects can be taken apart into smaller groups.
- Expand their understanding of sorting and classifying objects in their everyday environment.
- Sort and classify objects by one or more attributes, into two or more groups, with increasing accuracy.

Measurement and Data, MD

- Expand their understanding of comparing, ordering, and measuring.
- Compare by counting or matching two groups of up to five objects and communicate "more," "same as," or "fewer."
- Compare two objects by length, weight, or capacity directly or indirectly.
- Order four or more objects by size.
- Measure length using multiple duplicates of the same size concrete units laid end to end.

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Geometry, G

- Identify and use a variety of shapes in their everyday environment.
- Identify, describe, and construct a variety of different shapes, including variations of a circle, triangle, rectangle, square, and other shapes.
- Combine different shapes to create a picture or design.
- Identify positions of objects and people in space, including in/on/under/up/down/inside/outside/beside/between, and in front/behind.

According to the CA Mathematical TK Framework Chapter, TK classrooms should be mathematically rich environments with ample opportunities for mathematical discourse, modeling of mathematical thinking, nurturing student's mathematical explorations and introduction to vocabulary. These experiences should be embedded throughout the day and students should learn primarily through play and exploration. Furthermore, the TK Framework states that teachers should focus on skills and habits of the mind: problem solving, persistence, and reasoning rather than mastery of concepts introduced. This age group benefits from ample practice and repetition when solidifying mathematical understanding and building skills. The balance of exploratory math experiences with explicit math teaching in this year of learning will allow teachers to engage in thoughtful math discourse with students while honoring the different approaches to learning and to students' individual developmental timelines.

SANTA MONICA-MALIBU UNIFIED SCHOOL DISTRICT

CRITICAL AREAS
Transitional Kindergarten

Instructional time should focus on two critical mathematical areas. One area is representing, relating, and operating on whole numbers. Young students work initially with sets of objects focusing on the topics of subitizing (instantly seeing how many objects are in a small group without counting) (Clements, 1999); counting and cardinality (knowing the number names and the count sequence, understanding that the last number name said when counting a set of objects tells the number of objects counted, and comparing numbers); and operations and algebraic thinking (understanding addition as putting together and adding to, and subtraction as taking apart and taking from). The second important area is geometry with a focus on identifying and describing shapes and space; and analyzing, comparing, creating, and comparing shapes. These two areas are intricate and complex and build the foundation for future learning in mathematics. While both prepare the young learner for more formal mathematics instruction, learning time should be devoted to number sense more than any other topic in mathematics.

CCSESA 2011, 26

At the heart of Early Mathematics Learning and Teaching are mathematical Learning Trajectories. Children follow natural developmental progressions in learning. Curriculum research has revealed sequences of activities that are effective in guiding children through these levels of thinking. These developmental paths are the basis for learning trajectories.

Early Learning Trajectories have three parts.

1. Learning Goal (aka: target, benchmark, expectation)
2. Developmental path along which children develop to reach that goal
3. Set of activities matched to each of the levels of thinking in that path that help children develop the next higher level of thinking

Students' individual developmental learning timeline is honored throughout the year

SANTA MONICA-MALIBU UNIFIED SCHOOL DISTRICT

Mathematical Practice	Explanation and Examples
MP.1 Make sense of problems and persevere in solving them.	**Transitional kindergarten** provides an opportunity for teachers to instill a joy of problem solving in mathematics. Mathematical activities should be both meaningful and challenging. Some of these activities are games (e.g., board games, card number games, dominoes, etc.) and are useful because mathematics is being used to solve problems. Consider using games in which no one "wins" until every student has finished and games that require collaboration. Encourage students to persevere in solving problems – they will find that those problems that take a bit of time to solve can be the most rewarding. Possible prompts: How do you know? What do you know about …? What would happen if…?
MP.2 Reason Abstractly and quantitatively	Counting things for a reason—or just to get better at it—is important. Young students love to count things and to practice the counting sequence. Competence is the motivation. Many experiences in the manipulative-centered activities of transitional kindergarteners are natural environments that require quantitative reasoning. Fair-sharing, in particular, promotes this sort of thinking in the classroom. As students become more familiar with quantitative reasoning with objects, they become more able to reason abstractly (e.g., "You have five trucks and I have four trucks and since five is more than four, you have more trucks than I do and that's not fair!"). Possible prompts: What do you know about the number…? Let's make a story about these numbers…
MP.3 Construct viable arguments and critique the reasoning of others	Young students are very capable of stating a point of view and defending it. Help students transfer these abilities to the domain of mathematics. Ask students how they arrived at the answer and discuss with others not only the correct answer, but also the strategies used for finding the answer. Frequently there is more than one "right" answer (e.g. "What number is greater than five?") and more than one strategy. Model how to explain answers and discuss other solutions with classmates. Possible prompts: How did you figure that out? What do you think about…?
MP.4 Model with mathematics	Modeling with mathematics means that teachers provide models (solving a problem aloud and with manipulatives) and that students use objects to demonstrate their thinking. Possible prompt: What could we use to…? Solve mathematical problems aloud, like dividing up a box of pencils so that each table receives one for each student seated ("Let's see, there are four of you here, so we will need four pencils. One, two, three, four".) Encourage students to use manipulatives to show their thinking ("Mica, can you show me how you know you shared these eight trucks fairly with Charlie?").

MP.5 Use appropriate tools strategically	The transitional kindergarten classroom is filled with tools. These not only include instruments like balance scales and measuring tapes, but all of the manipulatives and objects that students and teachers use to model mathematics. Students should have frequent opportunities to ponder which of these is appropriate to the task at hand. Possible prompts: What could you use to help you with…? How could you use a … to help you with…?
MP.6 Attend to precision	Precision is more than the "right" answer. It involves being able to describe strategies, arguments and decisions with increasing skill. Descriptions become more and more precise. Triangle descriptions change from "Because it looks like a triangle" to "It has three sides and three corners." Students learn that if they do not provide accurate representations during problem solving (e.g., in drawing 3 + 5 they only draw two and five objects) then they will have problems determining accurate answers. There is a beauty in precision – many students are entranced by this beauty (2 + 3 is always 5 – a quite amazing concept!). Possible prompts: What do you know about…? What else do you notice?
MP.7 Look for and make use of structure	Students in transitional kindergarten will begin to see patterns as they gain experience in mathematics. For instance, one plus any number will always equal the next [whole] number in the sequence. Possible prompts: What do you notice about…? How is this the same as…? What are two different ways we can look at these objects? Tell me about your pattern.
MP.8 Look for and express regularity in repeated reasoning	Young students delight in finding patterns – to solve addition problems, one can always count all the objects in both sets. One can also count-on from the larger set. In number decomposition, students may find (especially if they record the addends) that if the first addend is decreased by one, then the second is increased by one (3 + 7 = 10; 2 + 8 = 10; 5 = 3 + 2; 5 = 2 + 3). Asking questions of students that help them examine the strategies with which they solve problems will help them see the regularity in the way they solve these problems. Possible prompt: What do you notice?