



SAN FRANCISCO UNIFIED SCHOOL DISTRICT
MATHEMATICS
DEPARTMENT



SFUSD Mathematics Core Curriculum Development Project

2014–2015

Grade 6 Unit 0

Creating meaningful transformation in mathematics education



Developing learners who are independent, assertive constructors of their own understanding

DRAFT

SFUSD Mathematics Core Curriculum
Grade 6 Scope and Sequence 2014-15

Grade Level Storyline: In grade 6, instructional time should focus on four critical areas: 1) connecting ration and rate to whole number multiplication and division, and using concepts of ratio and rate to solve problems; 2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; 3) writing, interpreting, and using expressions and equations; and 4) developing understanding of statistical thinking.

	Unit Length	Big Idea	Standards
Unit 0 Introduction	5 days	Unit 0 sets the classroom culture for the first week of school.	Focus on Standards for Math Practice
Unit 1 Rational Numbers and Absolute Value	15 days	Number lines can be used to represent, order and compare, and find the absolute value of rational numbers.	6.NS.5 6.NS.6a,b,c 6.NS.7a,b,c,d 6.NS.8 6.G.3
Unit 2 Fractions and Decimals	15 days	The inverse relationship between multiplication and division can be used to explain why the procedures for dividing fractions make sense.	6.NS.1 6.NS.2 6.NS.3
Unit 3 Ratio	16 days	A ratio represents a comparison of two quantities, which can be expressed by “part to part,” “part to whole,” and “whole to part” relationships. Equivalency of two or more ratios establishes a framework for a proportional relationship.	6.RP.1 6.RP.3
Unit 4 Expressions	15 days	Numerical and algebraic expressions can be expressed in multiple ways.	6.NS.4 6.EE.1 6.EE.2a,b,c 6.EE.3 6.EE.4
Unit 5 Equations and Inequalities	14 days	Real-world situations and mathematical structures can be translated and represented abstractly using variables, expressions, equations, and inequalities.	6.RP.3 6.EE.5 6.EE.6 6.EE.7 6.EE.8
Unit 6 Rate	17 days	A rate is a comparison of the measures of two different things or quantities; the measuring unit is different for each value.	6.RP.2 6.RP.3a,b,d 6.EE.9

Unit 7* Distributions and Variability	20 days	Data can answer statistical questions and can be visually displayed and described using center, spread and overall shape.	6.SP.1 6.SP.2 6.SP.3 6.SP.4 6.SP.5
Unit 8* Surface Area and Volume	13 days	2-D and 3-D shapes can be composed and decomposed to find their area, surface area, and volume.	6.G.1 6.G.2 6.G.3 6.G.4
Unit 9* Putting Mathematics to Work	12 days	Real world questions can be modeled and answered using mathematics.	6.RP.1 6.RP.2 6.RP.3a,b,c,d 6.NS.3 6.NS.8 6.EE.6 6.EE.7 6.EE.9

* These units have been renumbered since the previous draft of the Scope & Sequence. The order of the units is the same; the unit numbers have been changed to match the order.

Grade 6 Unit 0 – Overview

	Day 1	Day 2	Day 3	Day 4	Day 5
Warm Up	Place your birthday on the class histogram	Share Mathographies with partners	Review last night's homework	1-23 Interpreting Bar Graphs	Math Talk: 15 x 18
Launch	1-1 Birthday Bonanza	Relationships between area and perimeter. Problems 1-6 and 1-7	Math Talk: Dot Patterns 1-19: What will figure #10 look like?	Show video of Calavera Jumping Frog Contest https://www.youtube.com/watch?v=FXivgpLSQeo	Make an origami frog http://www.frogsonice.com/froggy/origami/
During	1-2 Sleepy Time	Participation quiz Problem 1-7 team challenge	Project 1-15 and have a short class discussion. Poster for 1-16	1-24 Generate questions 1-25 Presenting data 1-26 How far could I jump?	Class Origami Jumping Frog Contest. Collecting and representing data
Closure/ Extension	Debrief participation quiz with focus on team roles	Revisit the concepts of area and perimeter	Gallery walk to see and comment on posters.	Gallery Walk for 1-26	Gallery Walk
Materials	Lesson 1.1.1 B, two sided	Lesson 1.1.2B resource page Lesson 1.1.2C resource page Student pages 1.1.2	Student pages 1.1.3	Lesson 1.1.4A, one per team Student pages 1.1.4	Index cards for origami frogs

Day 1: What stories can a graph tell?

Objectives:	<ul style="list-style-type: none">● Students will analyze strength and weaknesses of histograms and scatter plots.
SMP(s) Addressed:	<ul style="list-style-type: none">● 6. Attend to precision.
Norms	<ul style="list-style-type: none">● Work to answer questions together and make sure everyone is involved.

Warm-up

- Write directions for Birthday Bonanza on the board (second paragraph of problem 1-1). Student place a sticky note on the Birthday Graph according to month.

Launch

- Prepare two large poster graphs: a monthly birthday grade and Sleepy Tim” graph (problem 1-2). You will need sticky notes and/or sticky dots for the students.
- Discuss the birthday graph. Notice that it is not possible to tell if there are “birthday twins” in the class because days are not included. This is a histogram.
- Talk about basic classroom norms. Ask volunteers to name some. Show them the TEAM norms and tell them we will be focussing on the first one.

During

- Problem 1-1: Students have to find all the others with the same birthday month. An alternate way would be to have them line up in birthday order, but without talking. Count off by fours to create study teams.
- Teams continue with Problem 1-2. Go over team roles from Team Roles resource page. Teams determine which roles they will take. Demonstrate how to put a sticky dot on the graph. Teams come up to place their own sticky dots on graph. Teams discuss questions in Problem 1-2.

Closure/Extension

- Discuss the information from the scatterplot. (You do not need to discuss a formal understanding of “scatterplot.”) Notice that dots that are high and to the left sleep more. It will be difficult to come to one single conclusion about the class’s sleep patterns.

Homework

- Mathography (resource page 1.1.1 B, two sided).

Day 2: How does it change?

Objectives:	<ul style="list-style-type: none">• Students will look at the relationships between perimeter and area and experiment with changing area while keeping perimeter the same.
SMP(s) Addressed:	<ul style="list-style-type: none">• 3. Construct viable arguments and critique the reasoning of others.
Norms	<ul style="list-style-type: none">• Explain and give reasons.

Warm-up

- Students sit in study teams from yesterday. They share their mathographies with a shoulder partner by taking turns reading it out loud. Circulate and take notes on homework completion and neatness. If necessary, talk about the role homework has in learning with the class after the sharing. Collect mathographies. To be read by you but not graded.

Launch

- For each class, cut out a set of shape cards (Lesson 1.1.2B resource page) and a set of clue cards (Lesson 1.1.2C resource page) for each team. Students will write on them. You will need graph paper.
- Describe Participation Quiz (see Math Teaching Toolkit).
- Ask groups to review among themselves what area and perimeter are. Ask for a volunteer to share. Show class the image of Carcassonne, France (included in resources). Have a volunteer read the introduction to the lesson. Teams work on Problems 1-5 and 1-6.
- Discuss Collaborative Learning Expectations after Problem 1-6.

During

- Following this discussion, direct teams to continue working on Problem 1-7. This is a team challenge problem. Be sure to explain the rules and expectations prior to distributing the cards. Remind students that the five “fact” cards should be face-up in the middle of the table. Each student should be assigned one of Figures A through D. Each student should place their name on their card and will be the only person allowed to place that shape with a fact. There is also one shape card (Figure E) that all students are allowed to move. Circulate during the lesson and note good examples of student explaining their reasoning.

Closure/Extension

- To close the lesson, revisit the terms *area* and *perimeter* and check that students are correctly connecting them with the tiles and toothpicks and understand their meaning. One way to do this is to have teams of students come up with something to describe the terms “area” and “perimeter.”

Homework

- Problems 1-10 through 1-14. Remind students that this will be their first graded homework and it should be neat and well explained. If they get stuck, they can write a sentence describing their challenge.

Day 3: How does it grow?

Objectives:	<ul style="list-style-type: none">• Students will extend a pattern and generalize in order to make a prediction.
SMP(s) Addressed:	<ul style="list-style-type: none">• 7. Look for and make use of structure.
Norms	<ul style="list-style-type: none">• Make sure everyone in the group is sharing his/her ideas. Participation means being active in the team discussions.

Warm-up

- Share last night's homework with a partner. Circulate around and take notes on how the students completed their homework. Discuss any issues with specific problems.

Launch

- Math Talk. (See Math Teaching Toolkit for details on how to conduct a Math Talk.) Dot Patterns 1-19: What will figure #10 look like?
- Use the Math Talk as introduction to team work on on Problem 1-15.
- Remind class of Participation Quiz goals.

During

- Teams work on Problem 1-15. Circulate and take note of active participation. Pause the class when most have completed 1-15 to discuss active participation in teams.
- Tell groups they will be working on a poster for Problem 1-16. Circulate and take notes of student interactions during poster work. In particular, note questions that are asked that promote group thinking around the math problem.

Closure/Extension

- Lead a Gallery Walk (see Math Teaching Toolkit), allowing students to view the posters created by other teams. Direct students to look for and write down one new idea that they get from each poster. Debrief the Participation Quiz.

Homework

- Problems 1-19 through 1-23. This will be handed in for grading.

Day 4: How can I organize?

Objectives:	<ul style="list-style-type: none">● Students will generate questions about data and explore ways to organize data to answer different questions.
SMP(s) Addressed:	<ul style="list-style-type: none">● 2. Reason abstractly and quantitatively.
Norms	<ul style="list-style-type: none">● Ask questions until you understand.

Warm-up

- Collect homework. Students sit in the study groups.
- If helpful, show this video to your class (Lego version of Jumping Frog of Calaveras County): <https://www.youtube.com/watch?v=FXivgpLSQeo>
- Otherwise, orally recount the story to your class (summary of story in Resources).

Launch

- Prepare: Lesson 1.1.4A, one per team.
- Volunteer reads the introduction to Problem 1-24.

During

- Teams generate questions that can be answered from the numerical data and those that cannot. Circulate and listen to their conversations. Give students times to generate questions without looking at the actual data. See detailed lesson plan from CPM for more guidance.
- Teams share at least one question they created.
- Pass out Lesson 1.1.4A Resource Page. Discuss which questions can be answered from this data. Teams choose two questions. Ask groups “*How does organizing the data like this help you answer the question?*”
- Groups may continue to Problems 1-25 and 1-26.

Closure/Extension

- Have students share their conclusions and reasoning for part b of Problem 1-26.

Homework

- Problems 1-28 through 1-32 (to be handed in for grade).

Day 5: How can I use data to solve a problem? Part 1

Objectives:	<ul style="list-style-type: none">● Students will use their origami jumping frogs to simulate the contest, collect data, and create graphic representations.
SMP(s) Addressed:	<ul style="list-style-type: none">● 4. Model with mathematics.
Norms	<ul style="list-style-type: none">● Participation means being active in the team member and making sure everyone in your group is joining in.

Warm-up

- Math Talk: $12 \times 17 =$
- The purpose of this Math Talk is to get a sense of students multiplication fluency, number sense, and beginning distributive, but only if the students show this. (*See Math Teaching Toolkit for more guidance.*)

Launch

- Preparation: Hand out one copy of origami frog instruction per table, index cards, meter sticks or measuring tapes (IKEA has paper measuring tapes that work well). Large poster for bar graph of jumping data, but without axes (students will be creating class graphs in groups).
- Tell the class that today we will be having a jumping frog contest, but with origami jumping frogs. Pass out one index card per student. Pass out instructions for making origami jumping frogs. On projector or with big paper, lead the class through the instructions. Show class how to make the frogs jump by pushing down on the their backs. Let the class practice for a while.

During

- The contest will begin with each study team collecting data from their frog jumps. A frog jump is the sum of three hops. Each student takes turns to jump their frog three times. The group measures the distance from the starting point to ending point for each frog in centimeters. They add up the measurements from all four members. (If a team has less than four, they can jump one of their frogs again). Each team posts their jump total on chart in front of class.
- Study teams use that data to create their own bar graphs of the class data. Do not provide guidance on how to create these graphs. Instead, ask each group to create a graph. One objective is for the group to decide on appropriate intervals and representation of data. Circulate through the room noting how groups come to consensus on the graph and what challenges they have representing the data.

Closure/Extension

- Gallery Walk. (*See Math Teaching Toolkit for more details.*) Debrief about the similarities and differences between the graphs even though they were representing the same data. How we think about the data can be influenced by how it is represented.

Homework

- No homework.